SECTION 4

INPUT PARAMETERS FOR PRZM-3.12

4.1 INPUT FILE SUMMARY

PRZM-3 utilizes up to five input files, depending on the features and modules to be simulated:

Execution Supervisor file (PRZM3.RUN). The Execution Supervisor file determines which modules are chosen for simulation; the number of zones used in a simulation; input, output, and scratch file names with optional path statements; the starting and ending date of a simulation; the number of chemicals (either separate or daughter); weighting parameters between PRZM and VADOFT zones; and global echo and trace levels during execution.

PRZM parameter input file. The PRZM parameter input file specifies regional climatological information, hydrology and erosion parameters, crop characteristics including emergence and harvest dates, pesticide properties and application rates, and soil characteristics.

Time-series files. Various time-series data are input via files specified in the execution supervisor. These include meteorological, nitrogen atmospheric deposition, and septic effluent data. Only the file containing meteorologic data is required for all PRZM-3 runs.

VADOFT parameter input file. The VADOFT input file, containing soil horizon and chemical properties, is required if VADOFT or TRANSPORT SIMULATION are specified as "ON" in the execution supervisor (PRZM3.RUN) file.

MONTE CARLO input file. This file is required when MONTE CARLO is specified as "ON" in the execution supervisor file. The file indicates parameter input values, distributions, and correlations.

All of these files, except for the time-series files, may have embedded comment lines. A comment line is any line beginning with three asterisks (***). These lines are ignored by the code during execution. For best accuracy and process time, a text or line editor is recommended for inputting file records. To better understand record formats used in model input, an example record format statement appears below:

FORMAT 3I2,2X,F8.0,E10.3,1X,2(I5,1X,F8.0)

where input would look like:

```
010181     0.340   2.40E00     1    0.340    1    0.340
```

The format identifier, 3I2, specifies there are three integers with two columns each. The format identifier, 2X, specifies there are two blank spaces. The format identifier, F8.0, specifies there is one floating point field with eight columns and also a decimal point with no precision (although up to seven of these columns may be points of precision with the eighth column being the decimal point since this is a FORTRAN read statement). The format identifier, E10.3, specifies there is one field of ten columns

that may include an exponential suffix. The format identifier, 2(I5,1X,F8.0), specifies that there are two sequential sets of I5,1X,F8.0 entered. All format specifiers should be right justified so that unused columns in a field are assumed to be zeros by the code.

Each of these module files along with their examples are discussed in the following pages. For further descriptions, see Section 4 on parameter estimation.

4.2 TIME-SERIES FILES

The PRZM-3 model requires the input of various time-series data. These are input via files specified in the execution supervisor. The meteorological file is the only time-series file which is required for all PRZM-3 runs. The nitrogen atmospheric deposition and septic effluent files are only required when nitrogen species are being simulated and atmospheric deposition and/or septic effluent is being considered.

4.2.1 Meteorological Data File

PRZM-3 requires the use of a meteorological file that is specified in the execution supervisor. Information on daily precipitation, pan evaporation, temperature, wind speed, and solar radiation is included in each record of the meteorological file. Data format requirements and an example input file are shown below:

Meteorological File Input Guide

RECORD FORMAT: 1X,3I2,5F10.0
READ STATEMENT: MM, MD, MY, PRECIP, PEVP, TEMP, WIND, SOLRAD

where

MM	= meteorological month
MD	= meteorological day
MY	= meteorological year
PRECIP	= precipitation (cm day^{-1})
PEVP	= pan evaporation data (cm day^{-1})
TEMP	= temperature (Celsius)
WIND	= wind speed (cm sec^{-1})
SOLRAD	= solar radiation (Langley)

Example Meteorological File

```
 1 164     0.000     0.149    -0.278   388.925   225.597
 1 264     0.000     0.242     8.611   388.925   226.408
 1 364     0.000     0.227    13.611   388.925   227.280
 1 464     1.041     0.164     9.444   388.925   228.211
 1 564     0.203     0.211     9.722   388.925   229.200
 1 664     1.143     0.186    10.278   388.925   230.248
 1 764     0.000     0.181     6.389   388.925   231.353
 1 864     3.048     0.216    12.222   388.925   232.515
 1 964     0.000     0.229     7.778   388.925   233.733
11064     0.000     0.172     2.500   388.925   235.006
```

4.2.2 Atmospheric Deposition File

When nitrogen species are being simulated in PRZM-3, daily inputs of atmospheric deposition of nitrogen may be input using a file that is specified in the execution supervisor. Daily values for both dry and wet deposition of ammonia, nitrate, and organic N are included on each record of the file. Which dry and wet constituents being simulated are specified on record N4 of the PRZM input file (see Section 4.4.2.2) via a set of six flags (3 dry, 3 wet). Only the constituents with a flag value of -1 will be read from the atmospheric deposition file. Data format requirements and an example input file are shown below:

Atmospheric Deposition File Input Guide

RECORD FORMAT: **1X,3I2,6F10.0**
READ STATEMENT: **MM, MD, MY, AMMD, NITRD, ORGND, AMMW, NITRW, ORGNW**

where

MM = calendar month
MD = calendar day
MY = calendar year
AMMD = ammonia concentration (g cm^{-1})
NITRD = nitrate concentration (g cm^{-1})
ORGND = organic N concentration (g cm^{-1})
AMMW = ammonia concentration (g cm^{-1})
NITRW = nitrate concentration (g cm^{-1})
ORGNW = organic N concentration (g cm^{-1})

Example Atmospheric Deposition File

```
 1 182       .01       .005       0.0       0.0       0.0       0.0
 1 282       .01       .005       0.0       0.0       0.0       0.0
 1 382       .01       .005       0.0       0.0       0.0       0.0
 1 482       .01       .005       0.0       0.0       0.0       0.0
 1 582       .01       .005       0.0       0.0       0.0       0.0
 1 682       .01       .005       0.0       0.0       0.0       0.0
 1 782       .01       .005       0.0       0.0       0.0       0.0
 1 882       .01       .005       0.0       0.0       0.0       0.0
 1 982       .01       .005       0.0       0.0       0.0       0.0
11082       .01       .005       0.0       0.0       0.0       0.0
```

If daily time series of atmospheric deposition are not available, monthly values may be input on record N5 in the PRZM input file (see Section 4.4.2.2). This is indicated by entering flag values of -2 on record N4. The monthly values will be divided equally among the days in the respective months. Additionally, nitrogen applications with fertilizers or manure may be accomplished in a manner analogous to pesticide applications (see records N6 - N7 in Section 4.4.2.2).

4.2.3 Septic Effluent File

When nitrogen species from septic tank effluent are being simulated, PRZM-3 requires the use of a septic effluent file that is specified in the execution supervisor. Daily values for water, ammonia, nitrate, and organic nitrogen are included on each record of the file. These files are generated as output from the OSWDS model (see Section 9.3). Data format requirements and an example input file are shown below:

Septic Effluent File Input Guide

RECORD FORMAT: **1X,3I2,4F10.0**
READ STATEMENT: **MM, MD, MY, INFLOW, AMMON, NITR, ORGN**

where

MM	= effluent month
MD	= effluent day
MY	= effluent year
INFLOW	= amount of water (cm)
AMMON	= ammonia concentration (g cm^{-1})
NITR	= nitrate concentration (g cm^{-1})
ORGN	= organic N concentration (g cm^{-1})

Example Septic Effluent File

```
 1 157 1.133    0.5101E-040.0000    0.1697E-04
 1 257 1.133    0.5101E-040.0000    0.1697E-04
 1 357 1.133    0.5101E-040.0000    0.1697E-04
 1 457 1.133    0.5101E-040.0000    0.1697E-04
 1 557 1.133    0.5101E-040.0000    0.1697E-04
 1 657 1.133    0.5101E-040.0000    0.1697E-04
 1 757 1.133    0.5101E-040.0000    0.1697E-04
 1 857 1.133    0.5101E-040.0000    0.1697E-04
 1 957 1.133    0.5101E-040.0000    0.1697E-04
11057 1.133    0.5101E-040.0000    0.1697E-04
```

4.2.4 WDM Time-series File

Any of the time-series data described above may be accessed using the Watershed Data Management (WDM) utility (Lumb et. al., 1990) instead of flat files. WDM is a robust data management tool which can maintain and compress large amounts of time-series data. It also allows faster input and output of time-series data than a flat file. WDM also comes with an interactive interface (ANNIE) which allows the user to perform detailed management and display of the time-series data on WDM files. Additional information about WDM and its acquisition may be found on the internet at "http://h2o.usgs.gov/software/lib.html".

If any time-series data is to be input using a WDM file, the appropriate record is inserted in the execution supervisor file (see Section 4.3 for details) to specify the WDM file name. The actual time-series data to be read from the WDM file are specified on the appropriate records of the PRZM input file (see Section 4.4 for details). The location of the data on the WDM file is specified by the data-set number(s) provided on the PRZM input file record(s). If a WDM file is specified, but no data-set number is given for a specific time-series data, it is assumed that the data will come from a flat file (also specified in the execution supervisor file) or not be input at all. A brief summary of where various WDM time-series data sets are specified follows:

Time-series Data	PRZM Input File Location
Meteorological	Record 3, columns 49-68
Atmospheric Deposition	Record N4, columns 1-30
Septic Effluent	Record N2, columns 11-30

An additional method for retrieving pan evaporation data as monthly average values exists using WDM. Instead of placing the data-set number for pan evaporation in columns 54-58, a value of -1 may be used. This indicates that the monthly values for pan evaporation are found as attribute values on the data set for precipitation data (specified in columns 49-53). Thus, this method requires that precipitation time-series values are coming from WDM as well. The monthly values are divided equally among each day of corresponding month.

Output of time-series data may also be sent to a WDM file instead of a flat file in the same manner as input time series. On record 43 of the PRZM input file, a "W" is placed in column 40 and a data-set number is placed in columns 41-48. The results for the variable specified in columns 5-8 on that record will be output to this data set.

4.3 EXECUTION SUPERVISOR FILE (PRZM3.RUN)

The PRZM-3 model requires existence of a control file (PRZM3.RUN) also known as the execution supervisor file. This file specifies options by the user to control the overall (global) parameters during model execution. The file must always be resident in the current directory where the execution is performed.

4.3.1 Execution Supervisor Input Examples

The following pages contain examples of the execution supervisor input file. The first example demonstrates a run with only one PRZM zone and one VADOFT zone. The second example demonstrates a run with two PRZM and two VADOFT zones with Monte Carlo capability in use. The third example demonstrates a run with only one PRZM zone with nitrogen simulation being performed and WDM capabilities in use.

4.3.1.1 Example Execution Supervisor (PRZM3.RUN) Input File: One Zone--

```
*** option records
PRZM                                ON
EXAMS                               ON
VADOFT                              ON
MONTE CARLO                         OFF
TRANSPORT SIMULATION                ON
*** zone records
PRZM ZONES                          1
EXAMS ENV.                          1
VADOFT ZONES                        1
ENDRUN
*** input file records
  PATH                              C:\PRZM3\INPUT\
  MCIN                              MC.INP
  METEOROLOGY             1         MET.INP
  PRZM INPUT              1         PRZM3.INP
  EXAMS INPUT             1         EXAM3.EXA
  VADOFT INPUT            1         VADF3.INP
*** output file records
  PATH                              C:\PRZM3\OUTPUT\
  TIME SERIES             1         PRZM.ZTS
  PRZM OUTPUT             1         PRZM.OUT
  EXAMS REPORT            1         EXAMS3.XMS
  EXAMS PLOT              1         EXAMS3.PEX
  VADOFT OUTPUT           1         VADF.OUT
  MCOUT                             MC.OUT
  MCOUT2                            MC2.OUT
*** scratch file records
  PATH                              C:\PRZM3\OUTPUT
  PRZM RESTART            1         RESTART.PRZ
  VADOFT FLOW RS          1         VFLOW.RST
  VADOFT TRANS RST        1         VTRANS.RST
  VADOFT TAPE10           1         VADF.TAP
ENDFILES
*** global records
  START DATE                        010181
  END DATE                          311283
  NUMBER OF CHEMICALS               3
  PARENT OF 2                       1
  PARENT OF 3                       2
ENDDATA
*** display records
ECHO                                4
TRACE                               OFF
```

NOTE: Three asterisks (***) denote a comment line and are ignored by the program.

4.3.1.2 Example Execution Supervisor (PRZM3.RUN) Input File: Two Zones with Monte Carlo Option--

```
***Options
PRZM                                ON
EXAMS                               OFF
VADOFT                              ON
MONTE CARLO                         ON
TRANSPORT SIMULATION                ON
PRZM ZONES                          2
VADOFT ZONES                        2
ENDRUN
***Input files
  MCIN                              MC.INP
  METEOROLOGY            1          MET.INP
  METEOROLOGY            2          METx.INP
  PRZM INPUT             1          PRZM.INP
  PRZM INPUT             2          PRZMx.INP
  VADOFT INPUT           1          VADF.INP
  VADOFT INPUT           2          VADFx.INP
***Output files
  TIME SERIES            1          TIMES.OUT
  TIME SERIES            2          TIMESx.OUT
  PRZM OUTPUT            1          PRZM.OUT
  PRZM OUTPUT            2          PRZMx.OUT
  VADOFT OUTPUT          1          VADF.OUT
  VADOFT OUTPUT          2          VADFx.OUT
  MCOUT                             MC.OUT
  MCOUT2                            MC2.OUT
***Scratch files
  PRZM RESTART           1          RESTART.PRZ
  PRZM RESTART           2          RESTARTx.PRZ
  VADOFT FLOW RST        1          VFLOW.RST
  VADOFT FLOW RST        2          VFLOWx.RST
  VADOFT TRANS RST       1          VTRANS.RST
  VADOFT TRANS RST       2          VTRANSx.RST
  VADOFT TAPE10          1          VADF10.TAP
  VADOFT TAPE10          2          VADF10x.TAP
ENDFILES
  START DATE                        010181
  END DATE                          311281
  NUMBER OF CHEMICALS               3
  PARENT OF 2                       1
  PARENT OF 3                       2
  WEIGHTS
  1.0          0.0
  0.0          1.0
ENDDATA
ECHO                                ON
TRACE                               OFF
```

NOTE: Three asterisks (***) denote a comment line and are ignored by the program.

4.3.1.3 Example Execution Supervisor (PRZM3.RUN) Input File: One PRZM Zone with Nitrogen and WDM in Use--

```
***Options
PRZM                    ON
EXAMS                   OFF
VADOFT                  OFF
MONTE CARLO             ON
TRANSPORT SIMULATION    OFF
NITROGEN SIMULATION     ON
***Zone records
PRZM ZONES               1
ENDRUN
***Input files
 PATH                   C:\PRZM3.0\INPUT\
 MCIN                   MCNIT.INP
***Met stations - all on main wdm file
 WDM FILE           1   PRECIP.WDM
 SEPTIC EFFLUENT    1   SEPTIC.INP
 PRZM INPUT         1   TESTNIT.INP
***Output files
 PATH                   C:\PRZM3.0\OUTPUT\
 TIME SERIES        1   TIMES.OUT
 PRZM OUTPUT        1   TESTNIT.OUT
 MCOUT                  MC.OUT
 MCOUT2                 MC2.OUT
***Scratch files
 PRZM RESTART       1   RESTART.PRZ
ENDFILES
***Global records
 START DATE             010157
 END DATE               311257
 NUMBER OF CHEMICALS    3
ENDDATA
***Display records
ECHO                    4
TRACE                   OFF
```

NOTE: Three asterisks (***) denote a comment line and are ignored by the program.

4.3.2 Execution Supervisor (PRZM3.RUN) Input Guide

RECORD 1 - OPTIONS **FORMAT** **A18,6X,A56**

LABEL (Col. 1-18)	**EXECUTION STATUS** (Col. 25-78)	
PRZM	ON or OFF	(the root zone model execution)
EXAMS	ON or OFF	(the aquatic exposure assessment model)
VADOFT	ON or OFF	(the vadose zone model execution)
MONTE CARLO	ON or OFF	(Monte Carlo execution)
TRANSPORT	ON or OFF	(vadose zone transport execution)
NITROGEN	ON or OFF	(nitrogen model execution)

RECORD 2 - ZONES **FORMAT** **A18,6X,I2**

LABEL (Col. 1-18)	**ZONE NUMBER** (Col. 25-78)	
PRZM ZONES	1 to 10	(total number of PRZM land zones)
EXAMS AQEs	1 to 10	(total number of EXAMS aquatic environments / PRZM run)
VADOFT ZONES	1 to 10	(total number of VADOFT land zones)
ENDRUN	-------	(specifies end of OPTIONS and ZONE records)

RECORD 3 - INPUT FILES **FORMAT** **A18,1X,I2,3X,A56**

LABEL (Col. 1-18)	**ZONE NUMBER** (Col. 20-21)	**NAME** (Col. 25-78)
PATH	-------	directory (optional)
METEOROLOGY	1 to 10	filename
PRZM INPUT	1 to 10	filename
VADOFT INPUT	1 to 10	filename
MCIN	-------	filename
SEPTIC EFFLUENT	1 to 10	filename
NITROGEN DEPOSIT	1 to 10	filename
WDM FILE	--------	filename

RECORD 4 - OUTPUT FILES **FORMAT** **A18,1X,I2,3X,A56**

LABEL (Col. 1-18)	**ZONE NUMBER** (Col. 20-21)	**NAME** (Col. 25-78)
PATH	-------	directory (optional)
TIME SERIES	1 to 10	filename
PRZM OUTPUT	1 to 10	filename
EXAMS REPORT	1 to 10	filename
EXAMS PLOT	1 to 10	filename
VADOFT OUTPUT	1 to 10	filename
MCOUT	1 to 10	filename
MCOUT2	1 to 10	filename

RECORD 5 - SCRATCH FILES FORMAT A18,1X,I2,3X,A56

LABEL (Col. 1-18)	**ZONE NUMBER** (Col. 20-21)	**NAME** (Col. 25-78)
PATH	-------	directory (optional)
PRZM RESTART	1 to 10	filename
VADOFT FLOW RESTART	1 to 10	filename
VADOFT TRANS RESTART	1 to 10	filename
VADOFT TAPE	1 to 10	filename
ENDFILES	------ (specifies end of file name records)	

RECORD 6 - GLOBAL RECORDS FORMAT A18,1X,3I2

LABEL (Col. 1-18)	**VALUE** (Col. 20-25)	
START DATE	ddmmyy	(starting day, month, year)
END DATE	ddmmyy	(ending day, month, year)
NUMBER OF CHEMICALS	1 to 3	(number of chemicals)
PARENT OF 2	1	(parent of the second chemical if TRANSPORT=ON and if more than one chemical)
PARENT OF 3	1 or 2	(parent of third chemical if TRANSPORT=ON and if more than one chemical)
WEIGHTS	------	(indicates next values are weights)

NOTE: enter next lines only if PRZM or VADOFT have multiple zones. Enter a line for every increasing PRZM zone containing a fractional weight to each VADOFT zone. FORMAT: 10(F8.2)

1.0	0.0	(PRZM zone 1 weight to VADOFT zone 1 and 2)
0.0	1.0	(PRZM zone 2 weight to VADOFT zone 1 and 2)
ENDDATA	------	(specifies end of GLOBAL data)

RECORD 7 - DISPLAY RECORDS FORMAT A18,6X,A56

LABEL (Col. 1-18)	**VALUE** (Col. 25-78)	
ECHO	1 to 9	(amount output increasingly displayed to the screen and to files)
TRACE	ON or OFF	(tracking of subroutines for debugging)

EFFECT OF THE ECHO LEVEL ON MODEL OUTPUT

ECHO LEVEL	1	2	3	4	5	6	7	8	9
Percent bar graph	X	X	X	X	X	X	X	X	X
Simulation status to screen		X	X	X	X	X	X	X	X
Simulation status to files			X	X	X	X	X	X	X
Subroutine trace available				X	X	X	X	X	X
Warnings displayed					X	X	X	X	X
Results of linkage routines						X	X	X	X
Detailed water/solute data							X	X	X
Detailed head/concentration data							X	X	
Echo of line being read from input							X	X	
Echo of image being read from input								X	

4.4 PRZM INPUT FILE

The PRZM-3 model requires a PRZM input file if the PRZM option is specified "ON" in the execution supervisor file.

4.4.1 Example PRZM Input Files

The following pages show three examples of PRZM input files. The first example shows an input sequence for pesticide simulation without erosion. The second example shows an input sequence for pesticide simulation with erosion. The third example shows an input sequence for nitrogen simulation.

4.4.1.1 Example PRZM Input File for PRZM-3: Pesticide Simulation–No erosion

```
PRZM3 Input File
3 chemicals, foliar application for chemical 1
    0.74    0.52       0    0.25       1       1
       0
       2
       1    0.25   60.00   80.00       3  86  80  86   0.00  100.00
       2    0.25   60.00   80.00       3  86  80  86   0.00  100.00
       2
  22 656  251056  261156       1
  22 657  251057  261157       2
Chemical Input Data:
       2       3       0       0
chem1-aerial        chem2-granular      chem3-injected
  11 756  0 2 0.00  1.00 0.95 0.01 4 2.00  0.50 1.00 0.00 8 4.00  0.75 1.00 0.00
  11 757  0 2 0.00  1.00 0.95 0.01 0 0.00  0.00 0.00 0.00 0 0.00  0.00 0.00 0.00
      0.       1     1.0       1     0.0       1     0.0
     0.0    .005     0.1
     0.0    .000     0.0
     0.0    .000     0.0
    0.00    0.00    0.00
Soil Series:         LEESBURG          OK185-3
  165.00           0   0   0   0   0   0   0   0
    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
       2
       1  10.000   1.400   0.462   0.000   0.000   0.000
           0.022   0.011   0.033   0.022   0.011   0.033   0.000   0.000   0.000
           0.100   0.462   0.100   0.725   5.000  81.000   0.600
           0.000   0.000   0.000   0.000   0.000   0.000
       2 155.000   1.400   0.462   0.000   0.000   0.000
           0.022   0.011   0.033   0.022   0.011   0.033   0.000   0.000   0.000
           1.000   0.462   0.100   0.725   5.000  81.000   0.600
           0.000   0.000   0.000   0.000   0.000   0.000
       0
    WATR    YEAR      10    PEST    YEAR      10    CONC    YEAR      10   1
       6
      11  -----
      12  -----
      13  -----
       4    DAY
    PRCP    TSER   0   0
    RUNF    TSER   0   0
    RFLX    TSER   0   0   1.E5
    RZFX    TSER   0   0   1.E5
```

4.4.1.2 Example PRZM Input File for PRZM-3: Pesticide Simulation–Erosion

```
PRZM3 Input File
3 chemicals, foliar application for chemical 1
    0.74    0.52       0    0.25       1       1
       4
    0.15    3.47    1.00   10.00               3    6.00   354.0
       2
       1    0.25   60.00   80.00       3              0.00  100.00
       2    0.25   60.00   80.00       3              0.00  100.00
       1       3
2206 2611 0101
0.42 0.42 0.42
0.17 0.17 0.17
  86   80   86
       2       3
2206 2611 0101
0.25 0.25 0.25
0.17 0.17 0.17
  86   80   86
       2
  220656  251056  261156       1
  220657  251057  261157       2
Chemical Input Data:
       2       3       0
chem1-aerial        chem2-granular      chem3-injected
  110756  0 2 0.00  1.00 0.95 0.05 4 2.00  0.50 1.00 0.00 8 4.00  0.75 1.00 0.00
  110757  0 2 0.00  1.00 0.95 0.05 0 0.00  0.00 0.00 0.00 0 0.00  0.00 0.00 0.00
      0.       1     1.0       1     0.0       1     0.0
     0.0    .005     0.1
     0.0    .000     0.0
     0.0    .000     0.0
    0.00    0.00    0.00
Soil Series:         LEESBURG          OK185-3
  165.00           0   0   0   0   0   0   0   0   0
    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00    0.00
       2
       1  10.000   1.400   0.462   0.000   0.000   0.000
           0.022   0.011   0.033   0.022   0.011   0.033   0.000   0.000   0.000
           0.100   0.462   0.100   0.725   5.000  81.000   0.600
           0.000   0.000   0.000   0.000   0.000   0.000
       2 155.000   1.400   0.462   0.000   0.000   0.000
           0.022   0.011   0.033   0.022   0.011   0.033   0.000   0.000   0.000
           1.000   0.462   0.100   0.725   5.000  81.000   0.600
           0.000   0.000   0.000   0.000   0.000   0.000
       0
    WATR    YEAR      10    PEST    YEAR      10    CONC    YEAR      10   1
       6
      11  -----
      12  -----
      13  -----
       6    DAY
    PRCP    TSER   0   0
    RUNF    TSER   0   0
    ESLS    TSER   0   0   .1
    RFLX    TSER   0   0   1.E5
    EFLX    TSER   0   0   1.E5
    RZFX    TSER   0   0   1.E5
```

4.4.1.3 Example PRZM Input File for PRZM-3: Nitrogen Simulation--

```
NITROGEN SIMULATION, TEMPERATURE CORRECTION, PRZM INPUT FOR LA PLATA, CO
SEPTIC SYSTEM, SOIL N CALIBRATION RUN #7
    0.75    0.44       0  15.000       1       2
       0
       1
       1    0.20    50.0  95.000       1  58  58  58                0.0
       1
  020157  010557  011157       1
PESTICIDE TRANSPORT AND TRANSFORMATION AND APPLICATION PARAMETERS
       1       1       0       0
Chem 1
  11 757  0 1 0.00  1.00 0.95 0.01
     0.0       1     0.0
SOILS PARAMETERS (HAPLOBOROLLS)
   250.0           0   0   0   0   0   0   1   1   0
   0.0E0  0.0E00  0.0E00
 0.60 0.60 0.45 0.16 0.25 0.25 0.25 0.25 0.25 0.25 0.18 0.16 0.97 10.0
 6.0  5.0  5.0  6.0  8.0 10.0 13.0 13.0 11.0  9.0  6.0  6.0
       5
       1     5.0    1.27    0.25     0.0     0.0
             0.0     0.0   0.000
             1.0    0.25    0.12    2.32     0.0
             5.0    50.0    23.0     0.0     0.0
       2    45.0    1.27    0.25     0.0     0.0
             0.0     0.0   0.000
             5.0    0.25    0.12    1.16     0.0
             7.0    50.0    23.0     0.0     0.0
       3    10.0    0.20    0.05     0.0     0.0
             0.0     0.0   0.000
             2.0    0.05    0.01    40.0     0.0
             7.0     5.0     2.0     0.0     0.0
       4    30.0     2.2    0.10     0.0     0.0
             0.0     0.0   0.000
             5.0    0.10    0.02    0.03     0.0
             7.5    30.0     5.0     0.0     0.0
       5   160.0    1.37    0.20     0.0     0.0
             0.0     0.0   0.000
            20.0    0.20    0.09    0.15     0.0
             8.0    52.0    22.0     0.0     0.0
       0       0
NITROGEN PARAMETERS
***septic effluent horizon, fract to refractory, effluent WDM datasets
    4   .7    0    0    0    0
***vnut fora imax nupt fixn amvo alpn vnpr
    0    1  100    1    0    1    1    0
*** deposition flags (AM  NO3  ORGN, 3 dry, 3 wet)
   -2   -2    0    0    0    0
  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01  .01
 .005 .005 .005 .005 .005 .005 .005 .005 .005 .005 .005 .005
*** naps frmflg
    0    0
*** plant uptake target and max uptake ratio (nupt=1)
    60.0     2.0
*** fractions of total uptake
 .013  .03  .05  .07  .13  .19  .20  .15 .085  .05 .028 .004
*** horizon fractions of uptake
  .05  .05  .05  .05  .05  .05  .05  .05  .05  .05  .05  .05
  .85  .85  .85  .85  .85  .85  .85  .85  .85  .85  .85  .85
  .05  .05  .05  .05  .05  .05  .05  .05  .05  .05  .05  .05
  .05  .05  .05  .05  .05  .05  .05  .05  .05  .05  .05  .05
  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
*** above-ground plant uptake (vnut=0)
```

```
    0.45    0.45    0.45    0.45    0.45
*** general parameters
*** NOfr   NH3fr    plnt     des     ads  NO3imm     min  denitr    nitr NH3imm
     0.8     0.2    1.07    1.05    1.05    1.07    1.07    1.07    1.05    1.07
*** 1st order rates
***  ads     des  NO3imm     min   denit dni-thr   nitri  NH3imm
     0.0     0.0     0.0  0.0005     0.0     0.0     2.0     0.5
     0.0     0.0     0.0  0.0004     0.0     0.0     1.0     0.5
     0.0     0.0     0.0  0.0003     0.0     0.0     1.0     0.2
     0.0     0.0     0.3  0.0002     1.8     0.2     1.0     0.5
     0.0     0.0     0.5  0.0002     3.5     0.2     0.7     0.5
*** max solubility
  5000.0
***  xfix    kf      n1
     3.5     1.0     1.2
     3.5     1.0     1.2
     3.5     5.0     1.2
     5.0     0.5     1.0
     5.0     1.0     1.1
*** ammonia volatilization parameters
***theta   ref T     rates for each horizon
    1.05    25.0     0.3    0.03     0.1    0.05    0.05
***organic partitioning coeffs, conversion labile>refract, temp correct
  1000.0   5000.  0.0002    1.07
  1000.0   5000.  0.0002    1.07
  1000.0   5000.  0.0002    1.07
  1000.0   5000.  0.0002    1.07
  1000.0   5000.  0.0002    1.07
*** plant N return rates
*** BG return rates per horizon, fraction to refractory
   0.002   0.004   0.002   0.002     0.0     0.3
*** plant>litter rate, litter>soil return rate, fraction to refractory
  0.0007  0.0003     0.3
*** initial storages
*** LONP    LONS    RONP    RONS   AMSed   AMSol     NO3      BG
   300.0     0.0  1020.0     0.0    10.0     0.0     3.0     2.0
  1250.0     0.0  4600.0     0.0   150.0     0.0    15.0    16.0
   190.0     0.0   760.0     0.0    45.0     0.0     5.0     1.0
    34.0     0.0   137.0     0.0     8.0     0.0     1.0     1.0
   650.0     0.0  2280.0     0.0    50.0     0.0     7.0     0.0
*** AG-N   Litter N
     5.0     3.0
    WATR    YEAR       1    NITR    MNTH       1    CONC    YEAR       1
       6    YEAR

    RUNF    TSER   0   0
    STMP    TSER   5   5
    STMP    TSER  14  14
    STMP    TSER  19  19
    STMP    TSER  25  25
    STMP    TSER  33  33
```

4.4.2 PRZM Input Guide

The following pages describe the input records used by the PRZM input file. The input record descriptions are divided into two sections. The first section describes the records which are used for all PRZM simulations. The second section describes the additional records which are needed for nitrogen simulation in PRZM.

When performing nitrogen species simulation in PRZM, the nitrogen input records are to be inserted between records 40 and 41 of the PRZM input sequence described in the previous section. This keeps a logical order of specifying desired outputs after defining all other simulations. Record 41 contains the only modification to an existing PRZM input record. Output element ITEM2 is used to specify pesticide output summaries for a desired time interval and compartment frequency by entering PEST in its position. This element may now be set to NITR to achieve the same type of summary for nitrogen species output. As with pesticides, setting the element ITEM3 to CONC generates nitrogen storage output.

All required records in the PRZM-2 input sequence must be preserved in PRZM-3 input sequences. This means including record numbers 12 - 17 (or 12 - 16 if CAM on record 16 is set to 1) and elements of records 25, 33, 35, and 36 for pesticide parameters even though pesticides are not simulated when running nitrogen simulation. PRZM-2 requires at least one pesticide application (0 is not valid). Thus, to make an existing PRZM-2 input sequence upwardly compatible with PRZM-3, at least one "dummy" pesticide must be defined.

To minimize new input records, the existing cropping dates entered in the PRZM input sequence are used by the nitrogen module to define the crop growing periods. However, the nitrogen module requires a planting date and no planting date is entered in the PRZM input. It is thus assumed that the emergence date entered in the PRZM input will be used as the planting date in the nitrogen module. The cropping period for the crops being simulated must not vary from year to year as the nitrogen algorithm expects the same cropping periods each year. If the cropping period for a crop does vary in the input sequence, the first year's cropping period for that crop will be used throughout the simulation. Cropping periods may still wrap around the end of a year. However, the maximum number of cropping periods that the nitrogen module can simulate is three (versus the existing PRZM-2 limit of five).

Soil temperature must be simulated in PRZM-3 when running nitrogen simulation, as soil temperature values are used significantly in the nitrogen reaction algorithms. This requires ITFLAG to be set to 1 on record 19 and records 30, 31, and 39 to be defined.

4.4.2.1 PRZM Input Guide for All PRZM-3 Runs--

RECORD 1	**FORMAT**	**A78**
col: 1-78	TITLE:	label for simulation title.
RECORD 2	**FORMAT**	**A78**
col: 1-78	HTITLE:	label for hydrology information title.

RECORD 3	**FORMAT**	**2F8.0,I8,F8.0,2I8**
col: 1-8	PFAC:	pan factor used to estimate daily evapotranspiration.
col: 9-16	SFAC:	snowmelt factor in cm/degrees Celsius above freezing.
col: 17-24	IPEIND:	pan factor flag. 0 = pan data read, 1 = temperature data read, 2 = either available used.
col: 25-32	ANETD:	minimum depth of which evaporation is extracted (cm).
col: 33-40	INICRP:	flag for initial crop if the simulation date is before the emergence date. (see record 10). 0 = no; if INICRP>0, its value designates the number of the crop whose data is to be used in the initial simulation period (N.B. INICRP is only used when ERFLAG=0.)
col: 41-48	ISCOND:	surface condition of initial crop if INICRP>0. 1 = fallow, 2 = cropping, 3 = residue. (Used only when ERFLAG=0)
col: 49-52	DSN:	WDM data set number for precipitation data
col: 53-56	DSN:	WDM data set number for potential evaporation data
col: 57-60	DSN:	WDM data set number for temperature data
col: 61-64	DSN:	WDM data set number for wind speed data
col: 65-68	DSN:	WDM data set number for solar radiation data

RECORD 4 FORMAT 6F8.0
Only if IPEIND = 1 or 2 (see record 3).

col: 1-48	DT:	monthly daylight hours for January - June.

RECORD 5 FORMAT 6F8.0
Only if IPEIND = 1 or 2 (see record 3).

col: 1-48	DT:	monthly daylight hours for July - December.

RECORD 6	**FORMAT**	**I8**
col: 1-8	ERFLAG:	flag to calculate erosion. ERFLAG=0, no erosion ERFLAG=2, MUSLE ERFLAG=3, MUST ERFLAG=4, MUSS

RECORD 7 FORMAT 4F8.0, 8X, I8, 2F8.0
Only if ERFLAG = 2, 3, 4 (see record 6).

col: 1-8	USLEK:	universal soil loss equation (K) of soil erodibility.
col: 9-16	USLELS:	universal soil loss equation (LS) topographic factor.
col: 17-24	USLEP:	universal soil loss equation (P) practice factor.
col: 25-32	AFIELD:	area of field or plot in hectares.
col: 40-48	IREG:	location of NRCS 24-hour hyetograph.
col: 49-56	SLP:	land slope (%)
col: 57-64	HL:	hydraulic length (m)

RECORD 8 FORMAT I8

col: 1-8	NDC:	number of different crops in the simulation (1 to 5).

RECORD 9 FORMAT I8,3F8.0,I8,3(1X,I3),2F8.0
Repeat this record up to NDC (see record 8).

col: 1-8	ICNCN:	crop number of the different crop.
col: 9-16	CINTCP:	maximum interception storage of the crop (cm).
col: 17-24	AMXDR:	maximum rooting depth of the crop (cm).
col: 25-32	COVMAX:	maximum areal coverage of the canopy (percent).
col: 33-40	ICNAH:	surface condition of the crop after harvest date (see record 11). 1 = fallow, 2 = cropping, 3 = residue. (Used only when ERFLAG = 0.)
col: 42-52	CN:	runoff curve numbers of antecedent moisture condition II for fallow, cropping, and residue (3 values). Only used if erosion flag is off (ERFLAG=0, see record 6), the which approach is deprecated, i.e., it is recommended that PRZM be run with ERFLAG>0. See record 9E for entry of CN when ERFLAG>0.
col: 53-60	WFMAX:	maximum dry weight of the crop at full canopy (kg m^{-2}). Required if CAM = 3 (see record 16) else set to 0.0 .
col: 61-68	HTMAX:	max. canopy height at maturation date (cm) (see record 11)

RECORD 9A FORMAT 2I8
Only if ERFLAG = 2, 3,or 4 (see record 6).
Repeat 9A-9E for each crop (see example input file)

col: 1-8	CROPNO:	crop number
col: 9-16	NUSLEC:	number of USLEC factors

RECORD 9B FORMAT 16(I2,I2,1X)
Only if ERFLAG = 2, 3,or 4 (see record 6).
Repeat 9B, 9C, and 9E if NUSLEC is >16 (see example input file)

col: variable	GDUSLEC:	day to start USLEC, Manning's N factor, and CN. The first date has to be the crop emergence date.
col: variable	GMUSLEC:	month to start USLEC, Manning's N factor, and CN. The first date has to be the crop emergence date.

RECORD 9C FORMAT 16(F4.0,1X)
Only if ERFLAG = 2, 3,or 4 (see record 6).

col: variable	USLEC:	universal soil loss cover management factors (C value) for each NUSLEC.

RECORD 9D FORMAT 16(F4.0,1X)
Only if ERFLAG = 2, 3,or 4 (see record 6).

col: variable	MNGN:	Manning's N for each NUSLEC.

RECORD 9E FORMAT 16(I4,1X)
Only if ERFLAG = 2, 3,or 4 (see record 6).

col: variable	CN:	runoff curve number of antecedent moisture condition II for each NUSLEC.

RECORD 10 FORMAT I8

col: 1-8	NCPDS:	number of cropping periods (sum of NDC for all cropping dates in record 11).

RECORD 11 FORMAT 2X,3I2,2X,3I2,2X,3I2,I8
Repeat this record up to NCPDS (see record 10).

col: 3-4	EMD:	integer day of crop emergence.

col: 5-6	EMM:	integer month of crop emergence.
col: 7-8	IYREM:	integer year of crop emergence.
col: 11-12	MAD:	integer day of crop maturation.
col: 13-14	MAM:	integer month of crop maturation.
col: 15-16	IYRMAT:	integer year of crop maturation.
col: 19-20	HAD:	integer day of crop harvest.
col: 21-22	HAM:	integer month of crop harvest.
col: 23-24	IYRHAR:	integer year of crop harvest.
col: 25-32	INCROP:	crop number associated with NDC (see record 8).

RECORD 12 FORMAT A78

col: 1-80	PTITLE:	label for pesticide title.

RECORD 13 FORMAT 4I8

col: 1-8	NAPS:	total number of pesticide applications occurring at different dates (1 to 50). Note: if two or more pesticides are applied on the same date then NAPS = 1 for that day.
col: 9-16	NCHEM:	number of pesticide(s) in the simulation. This value should equal the number in the execution supervisor file (1 to 3).
col: 17-24	FRMFLG:	flag for testing of ideal soil moisture conditions for the application of pesticide(s) relative to the target date (see record 15 for target date information). 1, 2, and 3 = yes, 0 = no. 1 = check preceding days (WINDAY, record 16) after the target application date(APD, record 16) for ideal moisture conditions; 2 = check moisture conditions only on the target application date; 3 = check preceding days (WINDAY, record 16) after the target application date(APD, record 16) for ideal moisture conditions. Also, check soil moisture conditions on the target application date.

RECORD 14 FORMAT 3(4X,2I2,I8))
Only if DKFLG2=1, repeat for each chemical

col: variable	DKDAY:	day when first half-life begins.

col: variable	DKMNTH:	month when first half-life begins.
col: variable	DKNUM:	number of days after first half-life begins that half-life is changed to second half-life.

RECORD 15 FORMAT 3A20

col: 1-60	PSTNAM:	names of pesticide(s) for output titles.

RECORD 16 FORMAT 2X,3I2,I3,3(I2,F5.0,F6.0,F5.0,F5.0)
Repeat this record up to NAPS (see record 13).

col: 3-4	APD:	integer target application day.
col: 5-6	APM:	integer target application month.
col: 7-8	IAPYR:	integer target application year.
col: 9-11	WINDAY:	number of days in which to check soil moisture values following the target date for ideal pesticide(s) applications. Required if FRMFLG = 1, 2, or 3 else set to 0 (see record 13).
col: variable	CAM:	**C**hemical **A**pplication **M**ethod. 1 = soil applied, soil incorporation depth of 4 cm, linearly decreasing with depth; 2 = interception based on crop canopy, as a straight-line function of crop development; chemical reaching the soil surface is incorporated to 4 cm; 3 = interception based on crop canopy, the fraction captured increases exponentially as the crop develops; chemical reaching the soil surface is incorporated to 4 cm; 4 = soil applied, user-defined incorporation depth (DEPI), uniform with depth; 5 = soil applied, user-defined incorporation depth (DEPI), linearly increasing with depth; 6 = soil applied, user-defined incorporation depth (DEPI), linearly decreasing with depth; 7 = soil applied, T-Band granular application, user-defined incorporation depth (DEPI), use DRFT input variable to define fraction of chemical to be applied in top 2 cm, remainder of chemical will be uniformly incorporated between 2 cm and the user-defined depth; 8 = soil applied, chemical incorporated entirely into depth specified by user (DEPI) (modified CAM 1) 9 = linear foliar based on crop canopy, chemical reaching the soil surface incorporated to the depth given by DEPI (modified CAM 2);

		10 = nonlinear foliar using exponential filtration, chemical reaching the soil surface incorporated to the depth given by DEPI (modified CAM 3); **NOTE:** DEPI must be set greater than 0.0 for CAM=4-10. If DEPI = 0, or DEPI < the depth of the first (top) surface soil layer, chemical reaching the soil surface is distributed into the first surface soil layer.
col: variable	DEPI:	depth of the pesticide(s) application (cm). Use with CAM=4-10. For CAM=2 or 3, chemical not intercepted by the crop foliage is incorporated to 4 cm. The default incorporation depth for CAM=2 or 3 can only be over-ridden by selecting CAM = 9 or 10 and entering a value >0.0 for DEPI. Should DEPI be zero, or a value less than the depth of the top soil compartment, chemical is distributed uniformly throughout the depth of the top soil compartment.
col: variable	TAPP:	target application rate of the pesticide(s) (kg ha^{-1}).
col: variable	APPEFF:	application efficiency (fraction). target application rate may be reduced to account for application inefficiencies
col: variable	DRFT:	spray drift (fraction). used for spray drift loading to EXAMS pond. However, (1-DRFT) should be >= to application efficiency. DRFT is also used when CAM=7 to represent fraction of chemical which is incorporated into top 2 cm (drift will be set to 0 for EXAMS pond loadings)
RECORD 17	**FORMAT**	**F8.0,3(I8,F8.0)**
col: 1-8	FILTRA:	filtration parameter. Required if CAM = 3 else set to 0.0.
col: variable	IPSCND:	condition for disposition of foliar pesticide after harvest. 1 = surface applied, 2 = complete removal, 3 = left alone. Required if CAM=2 or 3.
col: variable	UPTKF:	plant uptake factor. 0 = no uptake is simulated. 1 = uptake is equal to transpiration * diss. phase concentration, 0.001 to 0.99 = uptake is a fraction of transpiration* dissolved phase concentration. **Note: Repeat IPSCND & UPTKF for each chemical (see example input file**.
RECORD 18	**FORMAT**	**3F8.0**
Only if CAM=2 or 3, repeat this record up to NCHEM.		
col: 1-8	PLVKRT:	pesticide volatilization decay rate on plant foliage ($days^{-1}$).

col: 9-16	PLDKRT:	pesticide decay rate on plant foliage ($days^{-1}$).
col: 17-24	FEXTRC:	foliar extraction coefficient for pesticide washoff per centimeter of rainfall.

RECORD 18A FORMAT 3F8.0
Only if CAM=2 or 3, and NCHEM >1.

col: 1-8	PTRAN12:	foliar transformation rate for chemical 1-2
col: 9-16	PTRAN13:	foliar transformation rate for chemical 1-3
col: 17-24	PTRAN23:	foliar transformation rate for chemical 2-3

RECORD 19 FORMAT A78

col: 1-78	STITLE:	label for soil properties title.

RECORD 20 FORMAT F8.0,8X,9I4

col: 1-8	CORED:	total depth of soil core in cm. (must be sum of all horizons thicknesses (THKNS) in record 33 and at least as deep as the root depth in record 9).
col: 17-20	BDFLAG:	bulk density flag. 0 = apparent bulk density known and entered in record 33, 1 = mineral value entered
col: 21-24	THFLAG:	field capacity and wilting point flag. 0 = water contents are entered, 1 = calculated by the model
col: 25-28	KDFLAG:	soil/pesticide adsorption coefficient. 0 = KD value entered in record 37; 1 = KD value calculated by the model (see record 30); 2 = normalized Freundlich KD value entered in record 37 and the Freundlich exponent 1/n entered in record 30A; 3 = aged sorption is implemented with the Freundlich KD value entered in record 37. Compound specific aging factors are entered in records 30B and 30C.
col: 29-32	HSWZT:	drainage flag, 0 = free draining, 1 = restricted
col: 33-36	MOC:	method of characteristics flag. 1=yes, 0=no.
col: 37-40	IRFLAG:	irrigation flag. 0 = no irrigation simulated 1 = year round, 2 = during cropping period only.
col: 41-44	ITFLAG:	soil temperature simulation flag. 1 or 2 =yes, 0=no.

		Flag value must = 1 if nitrogen is being simulated. Flag value must = 2 if soil temperature is simulated with the use of temperature and moisture corrected degradation (record 32A).
col: 45-48	IDFLAG:	thermal conductivity and heat capacity flag. 1=yes, 0=no
col: 49-52	BIOFLG:	biodegradation flag. 1=yes, 0=no.

RECORD 21 FORMAT 5F8.0
Only if BIOFLG = 1 (see record 20)

col: 1-8	AM:	maintenance coef. of metabolizing X_m population (day^{-1})
col: 9-16	AC:	maintenance coef. of co-metabolizing X_c population (day-1).
col: 17-24	AS:	maintenance coef. of sensitive X_s population (day^{-1}).
col: 25-32	AR:	maintenance coef. of non-sensitive X_r population (day^{-1}).
col: 33-40	KE:	average enzyme content of the X_c population (dimensionless).

RECORD 22 FORMAT 7F8.0
Only if BIOFLG = 1 (see record 20).

col: 1-8	KSM:	saturation constant of the metabolizing X_m population with respect to pesticide concentration.
col: 9-16	KCM:	saturation constant of the metabolizing X_m population with respect to carbon concentration.
col: 17-24	KC:	saturation constant of the co-metabolizing X_c population.
col: 25-32	MKS:	saturation constant of the sensitive X_s population.
col: 33-40	KR:	saturation constant of the non-sensitive X_r population.
col: 41-48	KIN:	inhibition constant (mg g^{-1} dry soil).
col: 49-56	KSK:	carbon solubilization constant (day^{-1}).

RECORD 23 FORMAT 6F8.0
Only if BIOFLG =1 (see record 20).

col: 1-8	KLDM:	death rate of metabolizing X_m population (day^{-1}).
col: 9-16	KLDC:	death rate of co-metabolizing X_c population(day^{-1}).
col: 17-24	KLDS:	death rate of sensitive X_s population (day^{-1}).

col: 25-32	KLDR:	death rate of non-sensitive X_r population (day^{-1}).
col: 33-40	KL1:	second order death rate of X_s population ($mg\ g^{-1}\ day^{-1}$).
col: 41-48	KL2:	dissociation constant of enzyme substrate complex (day^{-1}).

RECORD 24 FORMAT 5F8.0
Only if BIOFLG = 1 (see record 20).

col: 1-8	USM:	growth rate of metabolizing X_m population with respect to pesticide concentration (day^{-1}).
col: 9-16	UCM:	specific growth rate of metabolizing X_m population with respect to carbon concentration (day^{-1}).
col: 17-24	MUC:	specific growth rate of co-metabolizing X_c population (day^{-1}).
col: 25-32	US:	specific growth rate of sensitive X_s population (day^{-1}).
col: 33-40	UR:	specific growth rate of non-sensitive X_r population (day^{-1}).

RECORD 25 FORMAT 5F8.0
Only if BIOFLG = 1 (see record 20).

col: 1-8	YSM:	true growth yield of the metabolizing X_m population with respect to pesticide concentration (mg(dry wt.)/mg).
col: 9-16	YCM:	true growth yield of the metabolizing X_m population with respect to carbon concentration (mg(dry wt.)/mg).
col: 17-24	YC:	true growth yield of the co-metabolizing X_c population (mg(dry wt.)/mg).
col: 25-32	YS:	true growth yield of the sensitive X_s population (mg(dry wt.)/mg).
col: 33-40	YR:	true growth yield of the non-sensitive X_r population (mg(dry wt.)/mg).

RECORD 26 FORMAT 9F8.0

col: variable	DAIR:	diffusion coefficient for the pesticide(s) in the air ($cm^2\ day^{-1}$). Only required if HENRYK is greater than 0 else set to 0.0 for each NCHEM
col: variable	HENRYK:	Henry's law constant of the pesticide(s) for each NCHEM (dimensionless).

col: variable	ENPY:	enthalpy of vaporization of the pesticide(s) for each NCHEM (kcal $mole^{-1}$).

RECORD 27 FORMAT I8,3F8.0
Only if IRFLAG = 1 or 2 (see record 20).

col: 1-8	IRTYP:	type of irrigation. 1 = flood irrigation, 2 = furrow, 3 = over canopy, 4 = under canopy sprinkler, 5 = over canopy without runoff , 6 =over canopy, user-defined rates, with runoff, 7 = over canopy, user-defined rates, without runoff.
col: 9-16	FLEACH:	leaching factor as a fraction of irrigation water depth.
col: 17-24	PCDEPL:	fraction of water capacity at which irrigation is applied.
col: 25-32	RATEAP:	maximum rate at which irrigation is applied (cm hr^{-1}).

RECORD 28 FORMAT 7F8.0
Only if IRFLAG = 1 or 2 and IRTYP = 2 (see record 20).

col: 1-8	Q0:	flow rate of water entering heads of individual furrows (m^3 s^{-1}).
col: 9-16	BT:	bottom width of the furrows (m).
col: 17-24	ZRS:	slope of the furrow channel walls (horizontal/vertical).
col: 25-32	SF:	slope of the furrow channel bottom (vertical/horizontal).
col: 33-40	EN:	Manning's roughness coefficient for the furrow.
col: 41-48	X2:	length of the furrow (m).
col: 49-56	XFRAC:	location in furrow where PRZM infiltration calculations are performed, as a fraction of the furrow length (X2). If XFRAC = -1, average depths are used in PRZM.

RECORD 29 FORMAT 2F8.0
Only if IRFLAG = 1 or 2 and IRTYP = 2 (see record 20).

col: 1-8	KS:	saturated hydraulic conductivity of the soil in which furrows are dug (m s^{-1}).
col: 9-16	HF:	green-amp infiltration suction parameter (m).

RECORD 30 FORMAT I8,3F8.0
Only if KDFLAG = 1 (see record 20).

col: 1-8	PCMC:	flag to select which model is used to estimate KD (see record 36). 1 = mole fraction, 2 = mg liter^{-1}, 3 = micromoles liter^{-1}, 4 = KOC entered (dimensionless).
col: variable	SOL:	pesticide(s) solubility entered according to PCMC flag above for each NCHEM.

RECORD 30A FORMAT 3F8.0
Only if KDFLAG = 2 or 3 (see record 20).

col: variable	FRNDCF:	Freundlich exponent 1/n (dimensionless) for each NCHEM.

RECORD 30B FORMAT 15I5
Only if KDFLAG = 3 (see record 20).

col: variable	BAKD:	Days for the definition of the aging factors VAKD (record 30C) for each NCHEM. Expressed as off-sets from the application date. Although most sensible for single applications, PRZM restarts the sequence at the date of additional pesticide applications. Up to 5 values. The first day must be 0 (zero), so that the sequence will start at the application date..

RECORD 30C FORMAT 15F5.0
Only if KDFLAG = 3 (see record 20).

col: variable	VAKD:	time dependent factor changing on days BAKD (record 30B) to calculate an aged sorption (dimensionless) for each NCHEM. Up to 5 values.

RECORD 31 FORMAT 14F5.0
Only if ITFLAG = 1 or 2 (see record 20).

col: 1-60	ALBEDO:	monthly values of soil surface albedo (12 values).
col: 61-65	EMMISS:	reflectivity of soil surface to longwave radiation (fraction).
col: 66-70	ZWIND:	height of wind speed measurement above the soil surface (m)

RECORD 32 FORMAT 12F5.0
Only if ITFLAG = 1 or 2 (see record 20).

col: 1-60	BBT:	average monthly values of bottom boundary soil temperatures in degrees Celsius (12 values).

RECORD 32A FORMAT 2F8.0
Only if ITFLAG = 1or 2 (see record 20).

col: 1-8	QFAC:	factor for rate increase when temperature increases by 10° C.
col: 9-16	TBASE:	temperature during the test of biodegradation.

RECORD 32B FORMAT 3(I8,2F8.0)
Only if ITFLAG = 2 (see record 20).
One set (MSFLG, MSEFF, MSLAB) for each NCHEM.

col: variable	MSFLG:	flag to select if reference soil moisture for moisture corrected degradation is given absolute or relative to FC (field capacity).
col: variable	MSEFF:	exponent of moisture corrected degradation (moisture relationship according to WALKER).
col: variable	MSLAB:	reference soil moisture.

RECORD 33 FORMAT I8

col: 1-8	NHORIZ:	total number of horizons (minimum of 1).

RECORD 34 FORMAT I8,7F8.0
Repeat records 33-38 in data sets up to NHORIZ.

col: 1-8	HORIZN:	horizon number in relation to NHORIZ.
col: 9-16	THKNS:	thickness of the horizon.
col: 17-24	BD:	bulk density if BDFLAG=0 or mineral density if BDFLAG=1.
col: 25-32	THETO:	initial soil water content in the horizon (cm^3 cm^{-3}).
col: 33-40	AD:	soil drainage parameter if HSWZT = 1, else set to 0.0 (day^{-1}).
col: 41-48	DISP:	pesticide(s) hydrodynamic solute dispersion coefficient for each NCHEM.
col: 49-56	ADL:	lateral soil drainage parameter if HSWZT = 1

RECORD 35 FORMAT 8X,5F8.0
Only if BIOFLG = 1 (see record 20).

col: 9-16	Q:	average carbon content of the population. (dimensionless).
col: 17-24	CM1:	mineralizable carbon (mg g^{-1}).

col: 25-32	Y1:	conc. of metabolizing microbial population (mg g^{-1}).
col: 33-40	Y2:	conc. of co-metabolizing microbial population (mg g^{-1}).
col: 41-48	Y3:	conc. of sensitive microbial population (mg g^{-1}).
col: 49-56	Y4:	conc. of non-sensitive microbial population (mg g^{-1}).

RECORD 36 FORMAT 8X,9F8.0
Only if DKFLG2=0 (see record 13). Note: set DWRATE and DSRATE equal to simulate lumped first-order degradation.

col: variable	DWRATE:	dissolved phase pesticide(s) decay rate for each NCHEM (day^{-1}).
col: variable	DSRATE:	adsorbed phase pesticide(s) decay rate for each NCHEM (day^{-1}).
col: variable	DGRATE:	vapor phase pesticide(s)decay rate for each NCHEM (day^{-1}).

RECORD 36 FORMAT 8X,9F8.0
Only if DKFLG2=1 (see record 13).

col: variable	DWRAT1:	dissolved phase pesticide(s) decay rate for first phase of bi-phase reaction for each NCHEM (day^{-1}).
col: variable	DSRAT1:	adsorbed phase pesticide(s) decay rate for first phase of bi-phase reaction for each NCHEM (day^{-1}).
col: variable	DGRAT1:	vapor phase pesticide(s)decay rate for first phase of bi-phase reaction for each NCHEM (day^{-1}).

RECORD 36A FORMAT 8X,9F8.0
Only if DKFLG2=1 (see record 13).

col: variable	DWRAT2:	dissolved phase pesticide(s) decay rate for second phase of bi-phase reaction for each NCHEM (day^{-1}).
col: variable	DSRAT2:	adsorbed phase pesticide(s) decay rate for second phase of bi-phase reaction for each NCHEM (day^{-1}).
col: variable	DGRAT2:	vapor phase pesticide(s)decay rate for second phase of bi-phase reaction for each NCHEM (day^{-1}).

RECORD 37 FORMAT 8X,7F8.0

col: 9-16	DPN:	thickness of compartments in the horizon (cm).
col: 17-24	THEFC:	field capacity in the horizon (cm^3 cm^{-3}).
col: 25-32	THEWP:	wilting point in the horizon (cm^3 cm^{-3}).
col: 33-40	OC:	organic carbon in the horizon (percent).
col: variable	KD:	pesticide(s) partition coefficient for each NCHEM. Required if KDFLAG = 0, 2, or 3 (see record 20), else set to 0.0 (cm^{-3} g^{-1}).

RECORD 38 FORMAT 8X,5F8.0
Only if ITFLAG = 1or 2 (see record 20).

col: 9-16	SPT:	initial temp. of the horizon (Celsius).
col: 17-24	SAND:	sand content in the horizon. Required if THFLAG = 1, else set to 0.0 (percent).
col: 25-32	CLAY:	clay content in the horizon. Required if THFLAG = 1, else set to 0.0 (percent).
col: 33-40	THCOND:	thermal conductivity of the horizon (cm^{-1} day^{-1}). Required if IDFLAG = 0, else set to 0.0.
col: 41-48	VHTCAP:	heat capacity per unit volume of the soil horizon (cm^{-3} $Celsius^{-1}$). Required if IDFLAG = 0, else set to 0.0.

RECORD 39 FORMAT 8X,6F8.0
Only if DKFLG2=0 and NCHEM>1 (see record 13). Note: this record is used for parent/daughter relationship. Set to zero for simulating independent parent chemicals.

col: 9-16	DKRW12:	dissolved transformation fraction for chemical 1 to 2.
col: 17-24	DKRW13:	dissolved transformation fraction for chemical 1 to 3. If NCHEM = 2, set to 0.0 .
col: 25-32	DKRW23:	dissolved phase transformation fraction for chemical 2 to 3. If NCHEM = 2, set to 0.0 .
col: 33-40	DKRS12:	sorbed phase transformation fraction for chemical 1 to 2.
col: 41-48	DKRS13:	sorbed phase transformation fraction for chemical 1 to 3. If NCHEM = 2, set to 0.0 .
col: 49-56	DKRS23:	sorbed phase transformation fraction for chemical 2 to 3. If NCHEM = 2, set to 0.0.

RECORD 39 FORMAT 8X,3F8.0

Only if DKFLG2=1 and NCHEM >1 (see record 13). Note: this record is used for parent/daughter relationship. Set to zero for simulating independent parent chemicals.

col: 9-16	DKW112:	dissolved phase transformation fraction for first phase of bi-phase transformation for chemical 1 to 2.
col: 17-24	DKW113:	dissolved phase transformation fraction for first phase of bi-phase transformation for chemical 1 to 3. If NCHEM = 2, set to 0.0.
col: 25-32	DKW123:	dissolved phase transformation fraction for first phase of bi-phase transformation for chemical 2 to 3. If NCHEM = 2, set to 0.0 .
col: 33-40	DKS112:	sorbed phase transformation fraction for first phase of bi-phase transformation for chemical 1 to 2.
col: 41-48	DKS113:	sorbed phase transformation fraction for first phase of bi-phase transformation for chemical 1 to 3. If NCHEM = 2, set to 0.0
col: 49-56	DKS123:	sorbed phase transformation fraction for first phase of bi-phase transformation for chemical 2 to 3. If NCHEM = 2, set to 0.0.

RECORD 39A FORMAT 8X,3F8.0

Only if DKFLG2=1 and NCHEM >1 (see record 13). Note: this record is used for parent/daughter relationship. Set to zero for simulating independent parent chemicals.

col: 9-16	DKW212:	dissolved phase transformation fraction for second phase of bi-phase transformation for chemical 1 to 2.
col: 17-24	DKW213:	dissolved transformation fraction for second phase of bi-phase transformation for chemical 1 to 3. If NCHEM = 2, set to 0.0.
col: 25-32	DKW223:	dissolved phase transformation fraction for second phase of bi-phase transformation for chemical 2 to 3. If NCHEM = 2, set to 0.0.
col: 33-40	DKS212:	sorbed phase transformation fraction for second phase of bi-phase transformation for chemical 1 to 2.
col: 41-48	DKS213:	sorbed phase transformation fraction for second phase of bi-phase transformation for chemical 1 to 3. If NCHEM = 2, set to 0.0.
col: 49-56	DKS223:	sorbed phase transformation fraction for second phase of bi-phase transformation for chemical 2 to 3. If NCHEM = 2, set to 0.0.

RECORD 40 **FORMAT** **2I8**

col: 1-8	ILP:	flag for initial pesticide(s) levels before simulation start date. 1 = yes, 0 = no.
col: 9-16	CFLAG:	conversion flag for initial pesticide(s) levels. 0 = mg/kg^{-1}, 1 = kg/ha^{-1}. Leave blank if ILP = 0.

RECORD 41 **FORMAT** **8F8.0**
Only if ILP = 1 (see record 40). NOTE: number of lines = THKNS(I) divided by DPN(I) where I = HORIZN. Maximum of 8 values per line. Enter this record in data sets for each NCHEM.

col: 1-80	PESTR:	initial pesticide(s) levels.

RECORD 42 **FORMAT** **3(4X,A4,4X,A4,I8),I4**

col: 5-8	ITEM1:	hydrologic hardcopy output flag. WATR is inserted or leave blank.
col: 13-16	STEP1:	time step of hydrologic output. DAY = daily, MNTH = monthly, YEAR = yearly.
col: 17-24	LFREQ1:	frequency of hydrologic output given by a specific compartment number.
col: 29-32	ITEM2:	pesticide flux output flag. PEST is inserted or leave blank.
col: 37-40	STEP2:	same as STEP1.
col: 41-48	LFREQ2:	same as LFREQ1.
col: 53-56	ITEM3:	pesticide concentration output flag. CONC is inserted or leave blank.
col: 61-64	STEP3:	same as STEP1.
col: 65-72	LFREQ3:	same as LFREQ1.
col: 73-76	EXMFLG:	flag for reporting output to file for EXAMS model. 1 = yes, 0 = no. If ERFLAG=0, EXMFLG is automatically set to 0

RECORD 43 **FORMAT** **I8**
Only if EXMFLG = 1 (see record 42)

col: 1-8	EXMENV:	EXAMS environment catalog number

RECORD 44 **FORMAT** **I8,A16,2I8,F8.0**

Only if EXMFLG = 1 (see record 42), repeat RECORD 44 for each chemical

col: 1-8	EXMCHM:	EXAMS chemical catalog number
col: 9-24	CASSNO:	chemical CASS Number (optional)
col: 24-32	NPROC:	signals the type of process transforming parent to metabolite in EXAMS. (see EXAMS manual v2.97 pg 91)
col: 33-40	RFORM	gives the reactive molecular form from the transformation of parent to metabolite in EXAMS (see EXAMS manual v2.97 pg 97)
col: 41-48	YIELD	product yield from the transformation pathway dimensions of mole of transformation product produced per mole of parent compound reacted

RECORD 45 FORMAT I8,4X,A4

col: 1-8	NPLOTS:	number of times series plots (max. of 12).
col: 13-16	STEP4:	output time step. This option outputs pesticide runoff and erosion flux and pesticide leaching below core depth. Three options are available: DAY for daily, MNTH for monthly, YEAR for yearly.

RECORD 46 FORMAT 4X,A4,A1,3X,A4,1X,I3,1X,I3,F8.0,7X,A1,I8
Only if NPLOTS>0 and ECHOLV>2 (see record 45). NOTE: repeat this record up to NPLOTS.

col: 5-8	PLNAME:	name of plotting variable (see Table 2-1).
col: 9-9	INDX:	index to identify which pesticide if applicable. 1 = first chemical, 2 = second chemical, 3 = third chemical.
col: 13-16	MODE:	plotting mode. TSER (daily), TCUM (cumulative), TAVE (daily average over multiple compartments), TSUM (daily sum over multiple compartments)
col: 18-20	IARG:	argument value for PLNAME (see Table 4-1).
col: 22-24	IARG2:	argument value for PLNAME (see Table 4-1). (If TSER or TCUM enter same value as IARG0
col: 25-32	CONST:	constant with which to multiply for unit conversion. Leave blank for default to 1.0 .

col: 40-40	PLTYP:	input W for WDM file, P for printer (not required unless running PATRIOT)
col: 41-48	PLTDSN:	WDM data set number for the output time series (Not required unless running PATRIOT)

RECORD 47 FORMAT A78
Only if special actions are desired (see record 48).

col: 1-78	ATITLE:	label for special actions title.

RECORD 48 FORMAT 2X,3I2,1X,A8,1X,I3,3F8.0
Only if special actions are desired. Repeat this record for each special action required (up to 12).

col: 3-4	SADAY:	day of special action.
col: 5-6	SAMON:	month of special action.
col: 7-8	SAYR:	year of special action.
col: 10-17	SPACT:	special action variable (see below).
col: 19-21	NACTS:	horizon or crop number affected by special actions (see below).
col: variable	SPACTS:	new value(s) for the special action

SPACT	NACTS	SPACTS	Format
BD	HORIZON NO.	NEW VALUE(S)	(F8.0)
CN	CROP NO.	NEW VALUES	(3I8)
DSRATE	HORIZON NO.	NEW VALUE(S)	(3F8.0)
DWRATE	HORIZON NO.	NEW VALUE(S)	(3F8.0)
KD	HORIZON NO.	NEW VALUE(S)	(3F8.0)
SNAPSHOT*	----------	-----------	
USLEC	CROP NO.	NEW VALUE(S)	(3F8.0)

* Used to display pesticide concentration profile.

4.4.2.2 PRZM Input Guide for PRZM-3 Nitrogen Simulation Records--

RECORD N1 FORMAT A78

col: 1-78	NTITLE:	title for nitrogen simulation.

RECORD N2 FORMAT I5,F5.0,4I5

col: 1-5	SEPHZN:	horizon number into which septic effluent is introduced.
col: 6-10	ORGFRC:	fraction of organic nitrogen in septic effluent which is refractory (the rest becomes labile).
col: 11-30	SEPDSN:	data-set numbers from WDM file (if in use) for septic effluent values in the following order: water, ammonia, nitrate, organic N.

RECORD N3 FORMAT 8I5

col: 1-5	VNUTFG:	flag to allow plant uptake parameters to vary throughout the year. 1 = yes, 0 = no.
col: 6-10	FORAFG:	method for simulating adsorption and desorption of ammonium. 0 = first-order kinetics, 1 = single value Freundlich.
col: 11-15	ITMAXA:	maximum number of iterations to be attempted in solving Freundlich equation (only needed if FORAFG = 1).
col: 16-20	NUPTFG:	method for simulating plant uptake of nitrogen. 0 = first-order kinetics, 1 = yield-based algorithm.
col: 21-25	FIXNFG:	flag to simulate nitrogen fixation. 1 = yes, 0 = no. (If FIXNFG = 1, NUPTFG must be 1 also).
col: 26-30	AMVOFG:	flag to simulate ammonia volatilization. 1 = yes, 0 = no.
col: 31-35	ALPNFG:	flag to simulate above-ground and litter compartments for plant nitrogen. 1 = yes, 0 = no.
col: 36-40	VNPRFG:	flag to allow plant return parameters to vary throughout the year. 1 = yes, 0 = no.

RECORD N4 FORMAT 6I5

col: 1-30	NIADFG:	array of flags indicating the source of atmospheric deposition data for nitrogen species (ammonia, nitrate, organic N). Three flags for dry deposition are followed by three flags for wet deposition. 0 = no deposition for this species, -2 = monthly values entered on ensuing record (N5), -1 = deposition values come from file specified in execution supervisor, > 0 = values come from this data-set number on WDM file.

RECORD N5 FORMAT 12F5.0
Repeat this record for each occurrence of NIADFG=-2 in record N4.

col: 1-60	NIAFXM/ NIACNM:	monthly values for nitrogen atmospheric deposition (NIAFXM = dry deposition, NIACNM = wet deposition).

RECORD N6 FORMAT 2I5

col: 1-5	NNAPS:	total number of agricultural nitrogen applications occurring at different dates (0 to 50).
col: 6-10	NFRMFG:	flag for testing of ideal soil moisture conditions for the agricultural nitrogen application relative to target dates (see record N6 for target dates information). 1 = yes, 0 = no.

RECORD N7 FORMAT 2X,3I2,I8,5F8.0
Repeat this record up to NNAPS (see record N5). Not required if NAPS=0.

col: 3-4	NAPD:	integer target application day.
col: 5-6	NAPM:	integer target application month.
col: 7-8	NAPYR:	integer target application year.
col: 9-16	NWNDAY:	number of days in which to check soil moisture values following the target dates for ideal nitrogen applications. Require if NFRMFG=1, else set to 0.
col: 17-24	NDEPI:	depth of the nitrogen application (cm).
col: 25-48	NTAPP:	total application of the nitrogen species (kg ha^{-1}) in the following order: ammonia, nitrate, organic N.
col: 49-56	NAPFRC:	fraction of organic N applied which becomes refractory (the rest becomes labile).

RECORD N8 FORMAT 8F8.0
Only if NUPTFG = 0 and VNUTFG = 0 (see record N5). NOTE: number of lines = (NHORIZ divided by 8) plus 1. Maximum of 8 values per line.

col: 1-64	KPLN:	plant nitrogen uptake reaction rate parameters for each soil horizon (/day).

RECORD N9 FORMAT 12F5.0
Only if NUPTFG = 0 and VNUTFG = 1 (see record N5). Repeat this record up to NHORIZ.

col: 1-60	KPLNM:	monthly plant nitrogen uptake reaction rate parameters for each soil horizon (/day).

RECORD N10 FORMAT 2F8.0
Only if NUPTFG = 1 (see record N5).

col: 1-8 NUPTGT: total annual target for plant uptake of nitrogen for all soil layers and all crops during the calendar year (kg/ha/yr).

col: 9-16 NMXRAT: ratio of the maximum uptake rate to the optimum (target) rate when the crop is making up a deficit in nitrogen uptake.

RECORD N11 FORMAT 12F5.0
Only if NUPTFG = 1 (see record N5).

col: 1-60 NUPTFM: monthly fractions of the total annual nitrogen plant uptake target (see record 52) applied to each month (total of values must sum to 1.0).

RECORD N12 FORMAT 12F5.0
Only if NUPTFG = 1 (see record N5). Repeat this record up to NHORIZ.

col: 1-60 NUPTM: fractions of the monthly nitrogen plant uptake target applied to each soil horizon (values across soil horizons must sum to 1.0 for each month).

RECORD N13 FORMAT 8F8.0
Only if ALPNFG = 1 and VNUTFG = 0 (see record N5). NOTE: number of lines = (NHORIZ divided by 8) plus 1. Maximum of 8 values per line.

col: 1-64 ANUTF: above-ground plant uptake fractions for each soil horizon.

RECORD N14 FORMAT 12F5.0
Only if ALPNFG = 1 and VNUTFG = 1 (see record N5). Repeat this record up to NHORIZ.

col: 1-60 ANUFM: monthly fractions of plant uptake which go to above-ground plant N storage.

RECORD N15 FORMAT 10F8.0

col: 1-8 GNPM(1): fraction of nitrogen uptake which comes from nitrate (GNPM(1) and GNPM(2) must sum to 1.0).

col: 9-16 GNPM(2): fraction of nitrogen uptake which comes from ammonium (GNPM(1) and GNPM(2) must sum to 1.0).

col: 17-24 GNPM(3): temperature coefficient for plant uptake (only needed if NUPTFG = 0).

col: 25-32 GNPM(4): temperature coefficient for ammonium desorption (only needed if FORAFG = 0).

col: 33-40	GNPM(5):	temperature coefficient for ammonium adsorption (only needed if FORAFG = 0).
col: 41-48	GNPM(6):	temperature coefficient for nitrate immobilization.
col: 49-56	GNPM(7):	temperature coefficient for organic N ammonification.
col: 57-64	GNPM(8):	temperature coefficient for NO3 denitrification.
col: 65-72	GNPM(9):	temperature coefficient for nitrification.
col: 73-80	GNPM(10):	temperature coefficient for ammonium immobilization.

RECORD N16 FORMAT 8F8.0
Repeat this record up to NHORIZ.

col: 1-8	NPM(1):	first-order reaction rate for ammonium desorption for each soil horizon (only needed if FORAFG = 0) (/day).
col: 9-16	NPM(2):	first-order reaction rate for ammonium adsorption for each soil horizon (only needed if FORAFG = 0) (/day).
col: 17-24	NPM(3):	first-order reaction rate for nitrate immobilization for each soil horizon (/day).
col: 25-32	NPM(4):	first-order reaction rate for organic N ammonification for each soil horizon (/day).
col: 33-40	NPM(5):	first-order reaction rate for denitrification for each soil horizon (/day).
col: 41-48	DNTHRS:	fraction of saturated water content at which denitrification begins to occur.
col: 49-56	NPM(6):	first-order reaction rate for nitrification for each soil horizon (/day).
col: 57-64	NPM(7):	first-order reaction rate for ammonium immobilization (/day).

RECORD N17 FORMAT F8.0
Only if FORAFG = 1 (see record N5).

col: 1-8	GNPM(11):	maximum solubility of ammonium in water (ppm).

RECORD N18 FORMAT 3F8.0
Only if FORAFG = 1 (see record N5). Repeat this record up to NHORIZ.

col: 1-8	NPM(8):	maximum concentration (on the soil) of ammonium which is permanently fixed to the soil for each soil horizon (ppm).
col: 9-16	NPM(10):	coefficient parameter for the Freundlich adsorption/desorption equation for each soil horizon (-).
col: 17-24	NPM(11):	exponent parameter for the Freundlich adsorption/desorption equation for each soil horizon.

RECORD N19 FORMAT 8F8.0
Only if AMVOFG = 1 (see record N5). NOTE: number of lines = (NHORIZ+2 divided by 8) plus 1. Maximum of 8 values per line.

col: 1-8	THVOL:	temperature correction coefficient for ammonia volatilization (needed on first record only).
col: 9-16	TRFVOL:	reference temperature for the correction (needed on first record only) (deg C).
col: 17-64	KVOL:	ammonia volatilization rates for each soil horizon (/day). **Note:** ammonia volatilization is performed in the nitrogen simulation code (i.e., not in the volatilization portion of the PRZM pesticide code) using these parameters.

RECORD N20 FORMAT 4F8.0
Repeat this record up to NHORIZ.

col: 1-8	ORNPM(1):	particulate/soluble partitioning coefficient for labile organic N.
col: 9-16	ORNPM(2):	particulate/soluble partitioning coefficient for refractory organic N.
col: 17-24	ORNPM(3):	first-order conversion rate of labile to refractory particulate organic N (/day).
col: 25-32	ORNPM(4):	associated temperature correction coefficient.

RECORD N21 FORMAT 8F8.0
Only if VNPRFG = 0 (see record N5). NOTE: number of lines = (NHORIZ+1 divided by 8) plus 1. Maximum of 8 values per line.

col: var*	KRETBN:	first-order return rates of below-ground plant N to organic N storage for each soil horizon. * column locations depend on # of horizons

col: var**	BGNPRF:	fraction of plant N return that becomes particulate refractory organic N (the rest becomes particulate labile).
		** column location depends on # of fields filled by values for KRETBN; BGNPRF value location follows last KRETB value

RECORD N22 FORMAT 3F8.0
Only if ALPNFG = 1 and VNPRFG = 0 (see record N5).

col: 1-8	AGKPRN:	first-order fall rate of above-ground plant N to litter N (/day).
col: var*	KRETAN:	first-order return rates of litter N to organic N storage in the top soil horizon (/day).
		* column locations depend on # of horizons
col: var**	LINPRF:	fraction of litter N return that becomes particulate refractory organic N (the rest becomes particulate labile).
		** column location depends on # of fields filled by values for KRETBN; BGNPRF value location follows last KRETB value

RECORD N23 FORMAT 12F5.0
Only if VNPRFG = 1 (see record N5). Repeat this record up to NHORIZ.

col: 1-60	KRBNM:	monthly first-order return rates of below-ground plant N to organic N for each soil horizon (/day).

RECORD N24 FORMAT 12F5.0
Only if VNPRFG = 1 (see record N5).

col: 1-60	BNPRFM:	monthly fractions of below-ground plant N return which becomes particulate refractory organic N (the rest becomes particulate labile).

RECORD N25 FORMAT 12F5.0
Only if ALPNFG = 1 and VNPRFG = 1 (see record N5).

col: 1-60	KRANM:	monthly first-order return rate of above-ground plant N to litter N (/day).

RECORD N26 FORMAT 12F5.0
Only if ALPNFG = 1 and VNPRFG = 1 (see record N5).

col: 1-60	KRLNM:	monthly return rates of litter plant N to particulate labile organic N for the top soil horizon (/day).

RECORD N27 FORMAT 12F5.0
Only if ALPNFG = 1 and VNPRFG = 1 (see record N5).

col: 1-60	LNPRFM:	monthly fractions of litter N return which becomes particulate refractory organic N (the rest becomes particulate labile).

RECORD N28 FORMAT 8F8.0
Repeat this record up to NHORIZ.

col: 1-8	NIT(1):	initial storage of particulate labile organic N in each soil horizon (in kg/ha).
col: 9-16	NIT(2):	initial storage of adsorbed ammonium in each soil horizon (kg/ha).
col: 17-24	NIT(3):	initial storage of solution ammonium in each soil horizon (kg/ha).
col: 25-32	NIT(4):	initial storage of nitrate in each soil horizon (kg/ha).
col: 33-40	NIT(5):	initial storage of plant N in each soil horizon (kg/ha).
col: 41-48	NIT(6):	initial storage of particulate refractory organic N in each soil horizon (kg/ha).
col: 49-56	NIT(7):	initial storage of solution labile organic N in each soil horizon (kg/ha).
col: 57-64	NIT(8):	initial storage of solution refractory organic N in each soil horizon (kg/ha).

RECORD N29 FORMAT 2F8.0
Only if ALPNFG = 1 (see record N5).

col: 1-8	AGPLTN:	initial storage of above-ground plant N (kg/ha).
col: 9-16	LITTRN:	initial storage of litter N (kg/ha).

TABLE 4-1. VARIABLE DESIGNATIONS FOR PLOTTING FILES

Variable Designation (PLNAME)	FORTRAN Variable	Description	Units	Arguments Required (IARG)
Water Storage				
INTS	CINT	Interception storage on canopy	cm	None
SWTR	SW	Soil water storage	cm	1-NCOM2
SNOP	SNOW	Snow pack storage	cm	None
THET	THETN	Soil water content	cm cm^{-1}	1-NCOM2
Water Fluxes				
PRCP	PRECIP	Precipitation	cm day^{-1}	None
SNOF	SNOWFL	Snowfall	cm day^{-1}	None
THRF	THRUFL	Canopy throughfall	cm day^{-1}	None
INFL	AINF	Percolation into each compartment	cm day^{-1}	1-NCOM2
RUNF	RUNOF	Runoff depth	cm day^{-1}	None
CEVP	CEVAP	Canopy evaporation	cm day^{-1}	None
SLET	ET	Actual evapotranspiration from each compartment	cm day^{-1}	1-NCOM2
TETD	TDET	Total daily actual evapotranspiration	cm day^{-1}	None
OUTF	OUTFL	Lateral water outflow	cm day^{-1}	None
IRRG	IRRR	Applied irrigation	cm day^{-1}	None
Sediment Flux				
ESLS	SEDL	Event soil loss	Tonnes day^{-1}	None

TABLE 4-1. VARIABLE DESIGNATIONS FOR PLOTTING FILES (continued)

Variable Designation (PLNAME)	FORTRAN Variable	Description	Units	Arguments Required (IARG)
Pesticide Storages				
FPST	FOLPST	Foliar pesticide storage	g cm^{-2}	None
TPST	PESTR	Total soil pesticide storage in each soil compartment	g cm^{-2}	1-NCOM2
SPST	SPESTR	Dissolved pesticide storage in each soil compartment	g cm^{-2}	1-NCOM2
Pesticide Fluxes				
TPAP	TAPP	Total pesticide application	g cm^{-2} day^{-1}	None
FPDL	FPDLOS	Foliar pesticide decay loss	g cm^{-2} day^{-1}	None
WFLX	WOFLUX	Foliar pesticide washoff flux	g cm^{-2} day^{-1}	None
DFLX	DFFLUX	Individual soil compartment pesticide net diffusive flux	g cm^{-2} day^{-1}	1-NCOM2
AFLX	ADFLUX	Pesticide advective flux from each soil compartment	g cm^{-2} day^{-1}	1-NCOM2
DKFX	DKFLUX	Pesticide decay flux in each soil compartment	g cm^{-2} day^{-1}	1-NCOM2
DWRT	DWRATE	Dissolved decay rate from each soil compartment	day^{-1}	1-NCOM2

TABLE 4-1. VARIABLE DESIGNATIONS FOR PLOTTING FILES (continued)

Variable Designation (PLNAME)	FORTRAN Variable	Description	Units	Arguments Required (IARG)
DSRT	DSRATE	Sorbed decay rate from each soil compartment	day^{-1}	1-NCOM2
UFLX	UPFLUX	Pesticide uptake flux from each soil compartment	g cm^{-2} day^{-1}	1-NCOM2
RFLX	ROFLUX	Pesticide runoff flux	g cm^{-2} day^{-1}	None
EFLX	ERFLUX	Pesticide erosion flux	g cm^{-2} day^{-1}	None
RZFX	RZFLUX	Net pesticide flux past the maximum root depth	g cm^{-2} day^{-1}	None
LTFX	LATFLX	Lateral pesticide outflow	g cm^{-2} day^{-1}	None
COFX	DCOFLX	Pesticide outflow below soil core	g cm^{-2} day^{-1}	None
TUPX	SUPFLX	Total pesticide uptake flux from entire soil profile	g cm^{-2} day^{-1}	None
TDKF	SDKFLX	Total pesticide decay flux from entire profile	g cm^{-2} day^{-1}	None
PCNC	TCNC	Pesticide concentration in canopy	g cm^{-3}	None
VFLX	PVFLUX	Soil pesticide volatilization flux	g cm^{-2} day^{-1}	None
FPVL	FPVLOS	Foliar pesticide volatilization flux Soil Temperature	g cm^{-2} day^{-1}	None
STMP	SPT	Soil temperature in each soil compartment	°C	1-NCOM2

TABLE 4-1. VARIABLE DESIGNATIONS FOR PLOTTING FILES (continued)

Variable Designation (PLNAME)	FORTRAN Variable	Description	Units	Arguments Required (IARG)
KDFR	KD	KD for each soil compartment	$cm^3\ g^{-1}$	1-NCOM2
Canopy Height				
CHGT	HEIGHT	Canopy height	cm	None
Curve Number				
CURV	CVNUM	Curve number	none	None
Soil Concentration*				
TCON	TCON	Total soil concentration	mg/kg	1-NCOM2
ACON	ACON	Adsorbed soil concentration	mg/kg	1-NCOM2
GCON	GCON	Gas soil concentration	mg/l	1-NCOM2
DLYS	DLYS	Dissolved soil concentration weighted for sphere of influence	mg/l	1-NCOM2
DCON	DCON	Dissolved soil concentration	mg/l	1-NCOM2
*Default concentration units may be converted using multiplication factor				
Nitrogen Storages				
PLON	NIT(I,1)	Particulate labile organic N	$kg\ ha^{-1}$	1-NCOM2
AMAD	NIT(I,2)	Adsorbed ammonium	$kg\ ha^{-1}$	1-NCOM2
AMSU	NIT(I,3)	Solution ammonium	$kg\ ha^{-1}$	1-NCOM2
NO3	NIT(I,4)	Nitrate	$kg\ ha^{-1}$	1-NCOM2
PLTN	NIT(I,5)	Plant nitrogen	$kg\ ha^{-1}$	1-NCOM2

TABLE 4-1. VARIABLE DESIGNATIONS FOR PLOTTING FILES (continued)

Variable Designation (PLNAME)	FORTRAN Variable	Description	Units	Arguments Required (IARG)
SLON	NIT(I,6)	Solution labile organic N	kg ha^{-1}	1-NCOM2
PRON	NIT(I,7)	Particulate refractory organic N	kg ha^{-1}	1-NCOM2
SRON	NIT(I,8)	Solution refractory organic N	kg ha^{-1}	1-NCOM2
AGPN	AGPLTN	Above ground plant nitrogen	kg ha^{-1}	None
LITN	LITTRN	Litter nitrogen	kg ha^{-1}	None
Nitrogen Fluxes				
ELON	SEDN(1)	Labile organic N erosion loss	kg ha^{-1} day^{-1}	None
EAMA	SEDN(2)	Adsorbed ammonium erosion loss	kg ha^{-1} day^{-1}	None
ERON	SEDN(3)	Refractory organic N erosion loss	kg ha^{-1} day^{-1}	None
RAMA	RON(1)	Solution ammonium runoff loss	kg ha^{-1} day^{-1}	None
RNO3	RON(2)	Nitrate runoff loss	kg ha^{-1} day^{-1}	None
RLON	RON(3)	Labile organic N runoff loss	kg ha^{-1} day^{-1}	None
RRON	RON(4)	Refractory organic N runoff loss	kg ha^{-1} day^{-1}	None
PSAM	PSAMS	Solution ammonium flux from each compartment	kg ha^{-1} day^{-1}	1-NCOM2

TABLE 4-1. VARIABLE DESIGNATIONS FOR PLOTTING FILES (continued)

Variable Designation (PLNAME)	FORTRAN Variable	Description	Units	Arguments Required (IARG)
OSAM	OSAMS	Solution ammonium lateral outflow from each compartment	kg ha^{-1} day^{-1}	1-NCOM2
PSNI	PSNO3	Nitrate flux from each compartment	kg ha^{-1} day^{-1}	1-NCOM2
OSNI	OSNO3	Nitrate lateral outflow from each compartment	kg ha^{-1} day^{-1}	1-NCOM2
DENI	DENIF	Denitrification	kg ha^{-1} day^{-1}	1-NCOM2
AMNI	AMNIT	Ammonia nitrification	kg ha^{-1} day^{-1}	1-NCOM2
AMIM	AMIMB	Ammonia immobil-ization	kg ha^{-1} day^{-1}	1-NCOM2
ONMNZ	ORNMN	Organic nitrogen mineralization	kg ha^{-1} day^{-1}	1-NCOM2
DDAM	NIADDR(1)	Dry atmospheric deposition of ammonia	kg ha^{-1} day^{-1}	1-NCOM2
DDNI	NIADDR(2)	Dry atmospheric deposition of nitrate	kg ha^{-1} day^{-1}	1-NCOM2
DDON	NIADDR(3)	Dry atmospheric deposition of organic N	kg ha^{-1} day^{-1}	1-NCOM2
WDAM	NIADWT(1)	Wet atmospheric deposition of ammonia	kg ha^{-1} day^{-1}	1-NCOM2
WDNI	NIADWT(2)	Wet atmospheric deposition of nitrate	kg ha^{-1} day^{-1}	1-NCOM2
WDON	NIADWT(3)	Wet atmospheric deposition of organic N	kg ha^{-1} day^{-1}	1-NCOM2

TABLE 4-1. VARIABLE DESIGNATIONS FOR PLOTTING FILES (continued)

Variable Designation (PLNAME)	FORTRAN Variable	Description	Units	Arguments Required (IARG)
NFIX	NFIXFX	Nitrogen fixation	kg ha^{-1} day^{-1}	1-NCOM2
PSLN	PSSLN	Labile organic N flux from each compartment	kg ha^{-1} day^{-1}	1-NCOM2
OSLN	OSSLN	Labile organic N lateral outflow from each compartment	kg ha^{-1} day^{-1}	1-NCOM2
PSRN	PSSRN	Refractory organic N flux from each compartment	kg ha^{-1} day^{-1}	1-NCOM2
OSRN	OSSRN	Refractory organic N lateral outflow from each compartment	kg ha^{-1} day^{-1}	1-NCOM2
NIIM	NIIMB	Nitrate immobilization	kg ha^{-1} day^{-1}	1-NCOM2
AMVO	AMVOL	Ammonia volatilization	kg ha^{-1} day^{-1}	1-NCOM2
LARF	REFRON	Labile to refractory conversion	kg ha^{-1} day^{-1}	1-NCOM2
ANIU	NIUPA	Above-ground nitrate plant uptake	kg ha^{-1} day^{-1}	1-NCOM2
AAMU	AMUPA	Above-ground ammonia plant uptake	kg ha^{-1} day^{-1}	1-NCOM2
BNIU	NIUPB	Below-ground nitrate plant uptake	kg ha^{-1} day^{-1}	1-NCOM2
BAMU	AMUPB	Below-ground ammonia plant uptake	kg ha^{-1} day^{-1}	1-NCOM2
REAG	RETAGN	Plant return to litter	kg ha^{-1} day^{-1}	1-NCOM2

TABLE 4-1. VARIABLE DESIGNATIONS FOR PLOTTING FILES (concluded)

Variable Designation (PLNAME)	FORTRAN Variable	Description	Units	Arguments Required (IARG)
ARLN	RTLLN	Litter return to labile organic N	kg ha^{-1} day^{-1}	1-NCOM2
ARRN	RTRLN	Litter return to refractory organic N	kg ha^{-1} day^{-1}	1-NCOM2
BRLN	RTLBN	Below-ground return to labile organic N	kg ha^{-1} day^{-1}	1-NCOM2
BRRN	RTRBN	Below-ground return to refractory organic N	kg ha^{-1} day^{-1}	1-NCOM2

4.5 VADOFT INPUT FILE

PRZM-3 requires a VADOFT flow input file if VADOFT is specified "ON" in the execution supervisor (PRZM3.RUN) file. Also if TRANSPORT SIMULATION is specified "ON", VADOFT transport input must follow.

When nitrogen simulation is being performed, VADOFT simulates the three nitrogen constituents as if they were three chemicals. Thus, a VADOFT input sequence for modeling nitrogen must contain parameters for all three species. This effects records 11, 14, 20, and 22 of VADOFT input for transport (see Section 4.5.3). Output from VADOFT is still reported by chemical number. Thus, chemical number one is ammonia, chemical number two is nitrate, and chemical number 3 is total organics.

4.5.1 Example VADOFT Input File

```
*********************************FLOW*************************************
3 CHEMICAL, 2 HORIZON, 1 MATERIAL, VADOSE ZONE FLOW SIMULATION FOR ZONE 1
61     1   1     1    1    1     1   1   0   0
20     2   1          .01
 1     1   1     1    0    1     2   1   0
       0.0       1.0       1.0       1.0
 1         0.0        1.0
 2
 1    20   1         50.0
 2    40   1         80.0
 0.0E00    0
       0   1          0.0        0.0E00   0   0    0   0
 7.12E02               .43E00    0.0E00   0.0E00
 0.045E00       -1.0E00    0.145E00  2.68E00  0.626E00                      5   10
YEAR
*********************************TRANSPORT*********************************
3 CHEMICAL, 2 HORIZON, 1 MATERIAL, VADOSE TRANSPORT SIMULATION FOR ZONE 1
61     1   1     1    0    1
 0     1   1     0    0    1     2     1
       0.0       1.0       1.0        1.0
 1     0.0            1.0
 2
 1    20   1    50.0
 2    40   1    80.0
 0.0E00    0     0.0E00    0     0.0E00     0
 0     0         0.0       0.0   0     0    0   0
 1.30E01    .43E00
 1.00E00   1.01E00    1.00E00    0.0E00     0.0E00    0.0E00
 1         0.0        1.0        0.0E00
 1     2.000E-2  0.00E00         7.00E-3    0.00E00  2.30E-2   0.0E00
 1     1
 5    10
 YEAR
```

4.5.2 VADOFT Input Guide for Flow

RECORD 1 **FORMAT** **A80**

col: 1-80 TITLE: label for flow simulation title.

RECORD 2 **FORMAT** **10I5**

col: 1-5	NP:	total number of VADOFT nodal points (max of 100).
col: 6-10	NMAT:	total number of different porous materials (maximum of 5).
col: 11-15	NONU:	flag to indicate if initial condition is non-uniform. 1 = yes, 0 = no.
col: 16-20	ITRANS:	flag to indicate if running in transient or steady-state. Must be set to 1 if PRZM is ON. 1 = transient, 0 = steady-state.
col: 21-25	IMODL:	flag to indicate if running flow or transport model. 1 = flow, 0 = transport. Set to 1 here.
col: 26-30	IKALL:	time stepping index. 1 = backward difference, 0 = central difference. This flag is automatically set to 1 in FLOW.
col: 31-35	IMBAL:	flag to indicate if mass balance computation is required. 1 = yes, 0 = no.
col: 36-40	INTSPC:	flag to indicate initial conditions for head values. 1 = hydraulic head, 0 = pressure head.
col: 41-45	IHORIZ:	flag to indicate if flow direction is horizontal. 1 = yes, 0 = no. Set to 0 if PRZM is ON.
col: 46-50	ICHAIN:	flag to indicate if daughter products are used. 1 = yes, 0 = no. Automatically set to 0 for flow.
RECORD 3	**FORMAT**	**3I5,E10.3**
col: 1-5	NITMAX:	maximum number of iterations per time step. Suggested value of 20.
col: 6-10	INEWT:	flag to indicate nonlinear iterative procedure for solving saturated flow equation. 0 = Picard, 1 = standard Newton-Raphson, 2 = modified Newton-Raphson. Suggested value of 2 if PRZM is ON.
col: 11-15	IRESOL:	maximum number of refinements each time step if solution does not converge. Suggested value of 1.
col: 16-25	HTOL:	head tolerance for the nonlinear solution (length). Suggested value of 0.01.
RECORD 4	**FORMAT**	**8I5**
col: 1-5	KPROP:	flag to indicate relationship between relative permeability versus saturation and pressure head versus saturation. 1 = functional parameters supplied in record 15, 0 = model calculated.

col: 6-10	ITSGN:	flag to indicate if output time values are to be model calculated. 1 = yes, 0 = no.
col: 11-15	ITMARK:	flag to indicate if output time values differ from computational time values (see records 6 and 7). 1 = yes, 0 = no.
col: 16-20	NSTEP:	value of which time step to output nodal values from. When NSTEP = n, then output is printed. Must be from 1 up to 31 (days).
col: 21-25	NVPR:	value of which time step to output nodal velocities. When NVPR = n, then output is printed. Must be from 1 up to 31 (days).
col: 26-30	IOBSND:	flag to indicate if values are printed at certain observation nodes. 1 = yes, 0 = no. NOTE: Echo level must be greater than or equal to 6 in PRZM3.RUN file.
col: 31-35	NOBSND:	number of observation node(s) to be printed. NOBSND must not be greater than NP (see record 2). If IOBSND = 0 then set NOBSND = 0.
col: 36-40	IPRCHK:	flag to indicate if detailed information is generated in the flow matrix. 1 = yes, 0 = no.

RECORD 5 FORMAT 4E10.3
Only if ITRANS = 1 (see record 2).

col: 1-10	TIMA:	initial time value (t). Suggested value if PRZM is ON: 0.0
col: 11-20	TIN:	initial time step value(t). Suggested value if PRZM is ON: 1.0. Omit if ITSGN = 0.
col: 21-30	TFAC:	time step multiplier. Suggested value if PRZM is ON: 1.0. Omit if ITSGN = 0.
col: 31-40	TMAX:	maximum time step value allowed (t). Suggested value if PRZM is ON: 1.0 Omit if ITSGN = 0.

RECORD 6 FORMAT 8E10.3
Only if ITGSN = 0 (see record 4) and ITRANS = 1.

col: 1-80	TMVEC(I):	time values corresponding to the number of time steps where I = 1...31 (t). Input up to 8 values per line.

RECORD 7 FORMAT I5,2E10.3
Only if ITMARK = 1 and ITRANS = 1

col: 1-5	ITMGEN:	flag to indicate if backup file marker time values are used. 1 = yes, 0 = no.
col: 6-15	STMARK:	starting marker time value (t). If PRZM and TRANSPORT are ON, set to 0.0.
col: 16-25	DTMARK:	marker time value increment (t). If PRZM and TRANSPORT are ON, set to 1.0.

RECORD 8 FORMAT 8E10.3
Only if ITRANS = 1, ITMARK = 1 and ITMGEN = 0.

col: 1-80	TMFOMT:	output marker file time values (t) corresponding to TMVEC(I) (see record 6). Input up to 8 values per line.

RECORD 9 FORMAT I5

col: 1-5	NLAYRG:	number of soil horizons to be discretized.

RECORD 10 FORMAT 3I5,E10.3
Repeat this record up to NLAYRG (see record 9).

col: 1-5	ILAYR:	horizon number in relation to NLAYRG.
col: 6-10	NELM:	number of finite elements in ILAYR.
col: 11-15	IMATL:	porous material number related to NMAT (see record 2) in ILAYR.
col: 16-25	THL:	thickness of the horizon (ILAYR).

RECORD 11 FORMAT E10.3,I5

col: 1-10	CHINV:	default initial values of pressure (l) or hydraulic head (m l^3) for nodes in the matrix.
col: 11-15	CNPIN:	number of non-default nodes in the matrix related to the default initial values (CHINV) if NONU = 1 (see record 2), else set to 0.

RECORD 12 **FORMAT** **2I5,2E10.3,2I5,2E10.3**

col: 1-5	IBTND1:	type of boundary condition for the first node. 1 = pressure head, 0 = water flux.
col: 6-10	IBTNDN:	type of boundary condition for the last node. 1 = pressure head, 0 = water flux.
col: 11-20	VALND1:	value of the pressure head or water flux at the first node. The value should be positive for influx and negative for efflux. Set to 0.0 if PRZM is ON.
col: 21-30	VALNDN:	value of the pressure head or water flux at the last node. The value should be positive for influx and negative for efflux. Set to 0.0 if fluid is exiting the last node.
col: 31-35	ITCND1:	flag to indicate if the boundary condition at the first node is transient. 1 = yes, 0 = no. Automatically set to 0 if PRZM is ON.
col: 36-40	ITCNDN:	flag to indicate if the boundary condition at the last node is transient. 1 = yes, 0 = no. Automatically set to 0 if PRZM is ON.
col: 41-50	FLX1:	fluid flux injected into the first node (l^3 t). Automatically set to 0.0 for FLOW if PRZM is ON.
col: 51-60	FLXN:	fluid flux injected into the last node (l^3 t). Automatically set to 0.0 for FLOW if PRZM is ON.

RECORD 13 **FORMAT** **4E10.3**
Repeat this record up to NMAT (see record 2).

col: 1-10	PROP1:	saturated hydraulic conductivity of the material (use cm day^{-1} if PRZM is ON).
col: 11-20	PROP2:	effective porosity of the material.
col: 21-30	PROP3:	specific storage of the material. For unsaturated flow, set to 0.0.
col: 31-40	PROP4:	air entry pressure head of the material.

RECORD 14 **Omit for FLOW simulation.**

RECORD 15 FORMAT 5E10.3
Repeat this record up to NMAT if KPROP = 1.

col: 1-10	FVAL1:	residual water phase saturation of the material (residual water content / saturated water content).
col: 11-20	FVAL2:	parameter n of the relative permeability versus saturation relationship. Suggested value of 0.0 or negative value.
col: 21-30	FVAL3:	leading coefficient of the saturation versus capillary head relationship (alpha).
col: 31-40	FVAL4:	power index of the saturation versus capillary head relationship (beta).
col: 41-50	FVAL5:	power index of the saturation versus capillary head relationship (gamma). Suggested value of 1.- (1./FVAL4).

RECORD 16 FORMAT I5
Repeat records 16-19 in data sets up to NMAT if KPROP = 0.

col: 1-5	NUMK:	number of entry pairs of relative permeability and saturation of the material.

RECORD 17 FORMAT 8E10.3
Only if KPROP = 0.

col: 1-10	SMV1:	value of water phase saturation for point 1 of the entry pairs related to NUMK.
col: 11-20	PKRW1:	value of relative permeability (l^2) for point 1 of the entry pairs related to NUMK.
col: 21-30	SMV2:	etc.
col: 31-40	PKRW2:	etc.

RECORD 18 FORMAT I5
Only if KPROP = 0.

col: 1-5	NUMP:	number of entry pairs of pressure head versus saturation values for the material.

RECORD 19 FORMAT 8E10.3
Only if KPROP = 0.

col: 1-10	SSWV1:	value of water phase saturation for point 1 of the entry pairs related to NUMP.
col: 11-20	HCAP1:	value of the pressure head (l) for point 1 of the entry pairs related to NUMP.
col: 21-30	SSWV2:	etc.
col: 31-40	HCAP2:	etc.

RECORD 20 FORMAT 5(I5,E10.3)
Only if NONU = 1. NOTE: enter next two variables sequentially for every non-default node (CNPIN).

col: 1-5	N:	non-default node number relative to CNPIN (see record 11).
col: 6-15	PINT:	non-default initial value of pressure head (l) or hydraulic head (m l^3) of the node number (n).

RECORD 21 Omit for FLOW simulation.

RECORD 22 Omit for FLOW simulation.

RECORD 23 Omit for FLOW simulation.

RECORD 24 FORMAT I5
Only if ITCND1 = 1 and PRZM is OFF.

col: 1-5	NTSNDH1:	number of selected time values of pressure head or water flux for transient simulation at first node.

RECORD 25 FORMAT 8E10.3
Only if ITCND1 = 1 and PRZM is OFF.

col: 1-80	TMHV1:	time values in relation to NTSNDH1 at the first node for pressure head or water flux (t). Enter up to 8 values per line up to NTSNDH1 lines.

RECORD 26 FORMAT 8E10.3
Only if ITCND1 = 1 and PRZM is OFF.

col: 1-80	HVTM1:	values of pressure head or water flux corresponding to TMHV1 at the first node (length). Enter up to 8 values per line up to NTSNDH1 lines.

RECORD 27 **Omit for FLOW simulation.**

RECORD 28 **FORMAT** **I5**
Only if ITCNDN =1 and PRZM is OFF.

col: 1-5	NTSNDH2:	number of selected time values of pressure head or water flux for transient simulation at the last node.

RECORD 29 **FORMAT** **8E10.3**
Only if ITCNDN = 1 and PRZM is OFF.

col: 1-80	TMHV2:	time values in relation to NTSNDH2 at the last node for pressure head or water flux (t). Enter up to 8 values per line up to NTSNDH2 lines.

RECORD 30 **FORMAT** **8E10.3**
Only if ITCNDN = 1 and PRZM is OFF.

col: 1-80	HVTM2:	values of pressure head or water flux corresponding to TMHV2 at the last node (length). Enter up to 8 values per line up to NTSNDH2 lines.

RECORD 31 **Omit for FLOW simulation.**

RECORD 32 **FORMAT** **16I5**
Only if IOBSND = 1.

col: 1-80	NDOBS:	increasing sequential numbers of observation nodes. Enter up to 16 per line up to NOBSND (see record 4).

RECORD 33 **FORMAT** **A4**

col: 1-4	OUTF:	output time step for printing. Enter DAY for daily, MNTH for monthly, YEAR for yearly.

4.5.3 VADOFT Input Guide for Transport

RECORD 1 **FORMAT** **A80**

col: 1-80	TITLE:	label for transport simulation title.

RECORD 2 **FORMAT** **10I5**

col: 1-5	NP:	total number of VADOFT nodal points.

col: 6-10	NMAT:	total number of different porous materials (maximum of 5).
col: 11-15	NONU:	flag to indicate if initial condition is non-uniform. 1 = yes, 0 = no.
col: 16-20	ITRANS:	flag to indicate if running in transient or steady-state. Must be set to 1 if PRZM is ON. 1 = transient, 0 = steady-state.
col: 21-25	IMODL:	flag to indicate if running flow or transport model. 1 = flow, 0 = transport. Set to 0 here.
col: 26-30	KALL:	time stepping index. 1 = backward difference, 0 = central difference. This flag is automatically set to 1 for steady-state simulation.
col: 31-35	IMBAL:	flag to indicate if mass balance computation is required. 1 = yes, 0 = no.
col: 36-40	INTSPC:	flag to indicate initial conditions for head values. 1 = hydraulic head, 0 = pressure head. Automatically set to 0 for transport.
col: 41-45	IHORIZ:	flag to indicate if flow direction is horizontal. 1 = yes, 0 = no. Set to 0 if PRZM is ON.
col: 46-50	ICHAIN:	flag to indicate if daughter products are used. 1 = yes, 0 = no.

RECORD 3 **Omit for transport simulation.**

RECORD 4 **FORMAT** **8I5**

col: 1-5	KPROP:	flag to indicate relationship between relative permeability versus saturation and pressure head versus saturation. Set to 0 for Transport simulation.
col: 6-10	ITSGN:	flag to indicate if output time values are to be model calculated. 1 = yes, 0 = no.
col: 11-15	ITMARK:	flag to indicate if output time values differ from computational time values (see records 6 and 7). 1 = yes, 0 = no.
col: 16-20	NSTEP:	value of which time step to output nodal values from. When NSTEP = n, then output is printed. Must be from 1 up to 31 (days).
col: 21-25	NVPR:	value of which time step to output nodal velocities. When NVPR = n, then output is printed. Must be from 1 up to 31 (days).

col: 26-30	IOBSND:	flag to indicate if values are printed at certain observation nodes. 1 = yes, 0 = no. NOTE: Echo level must be greater than or equal to 6 in PRZM3.RUN file.
col: 31-35	NOBSND:	number of observation node(s) to be printed. NOBSND must not be greater than NP (see record 2). If IOBSND = 0 then set NOBSND = 0.
col: 36-40	IPRCHK:	flag to indicate if detailed information is generated in the flow matrix. 1 = yes, 0 = no.

RECORD 5 FORMAT 4E10.3
Only if ITRANS = 1 (see record 2).

col: 1-10	TIMA:	initial time value (t). Suggested value if PRZM is ON: 0.0
col: 11-20	TIN:	initial time step value(t). Suggested value if PRZM is ON: 1.0. Omit if ITSGN = 0.
col: 21-30	TFAC:	time step multiplier. Suggested value if PRZM is ON: 1.0. Omit if ITSGN = 0.
col: 31-40	TMAX:	maximum time step value allowed (t). Suggested value if PRZM is ON: 1.0 Omit if ITSGN = 0.

RECORD 6 FORMAT 8E10.3
Only if ITGSN = 0 (see record 4) and ITRANS = 1.

col: 1-80	TMVEC(I):	time values corresponding to the number of time steps where I = 1...31 (t). Input up to 8 values per line.

RECORD 7 FORMAT I5,2E10.3
Only if ITMARK = 1 and ITRANS = 1

col: 1-5	ITMGEN:	flag to indicate if backup file marker time values are used. 1 = yes, 0 = no.
col: 6-15	STMARK:	starting marker time value (t). If PRZM and TRANSPORT are ON, set to 0.0.
col: 16-25	DTMARK:	marker time value increment (t). If PRZM and TRANSPORT are ON, set to 1.0.

RECORD 8 FORMAT 8E10.3
Only if ITRANS = 1, ITMARK = 1 and ITMGEN = 0.

col: 1-80	TMFOMT:	output marker file time values (t) corresponding to TMVEC(I) (see record 6). Input up to 8 values per line.

RECORD 9 FORMAT I5

col: 1-5	NLAYRG:	number of soil horizons to be discretized.

RECORD 10 FORMAT 3I5,E10.3
Repeat this record up to NLAYRG (see record 9).

col: 1-5	ILAYR:	horizon number in relation to NLAYRG.
col: 6-10	NELM:	number of finite elements in ILAYR.
col: 11-15	IMATL:	porous material number related to NMAT (see record 2) in ILAYR.
col: 16-25	THL:	thickness of the horizon (ILAYR).

RECORD 11 FORMAT E10.3,I5
Repeat for each NCHEM.

col: 1-10	CHINV:	default initial values of concentration (m l^3) for nodes in the matrix.
col: 11-15	CNPIN:	number of non-default nodes in the matrix related to the default initial values (CHINV) if NONU = 1 (see record 2), else set to 0.

RECORD 12 FORMAT 2I5,2E10.3,2I5,2E10.3

col: 1-5	IBTND1:	type of boundary condition for the first node. 1 = concentration, 0 = solute flux.
col: 6-10	IBTNDN:	type of boundary condition for the last node. 1 = concentration, 0 = solute flux.
col: 11-20	VALND1:	value of the concentration or solute flux at the first node. The value should be positive for influx and negative for efflux. Set to 0.0 if PRZM is ON.
col: 21-30	VALNDN:	value of the concentration or solute flux at the last node. The value should be positive for influx and negative for efflux. Set to 0.0 if fluid is exiting the last node.

col: 31-35	ITCND1:	flag to indicate if the boundary condition at the first node is transient. 1 = yes, 0 = no. Automatically set to 0 if PRZM is ON.
col: 36-40	ITCNDN:	flag to indicate if the boundary condition at the last node is transient. 1 = yes, 0 = no. Automatically set to 0 if PRZM is ON.
col: 41-50	FLX1:	fluid flux injected into the first node (l^3 t). Automatically set to 0.0 if PRZM is ON.
col: 51-60	FLXN:	fluid flux injected into the last node (l^3 t). Automatically set to 0.0 if PRZM is ON.

RECORD 13 FORMAT 2E10.3
Repeat records 13-14 in data sets up to NMAT.

col: 1-10	CPROP1:	longitudinal dispersivity of the material.
col: 11-20	CPROP2:	effective porosity of the material.

RECORD 14 FORMAT 3(2E10.3)

col: variable	CPROP3:	retardation coefficient for the material. Enter this value up to NCHEM.
col: variable	CPROP4:	molecular diffusion for the material. Enter this value up to NCHEM.

RECORD 15 Omit for TRANSPORT

RECORD 16 Omit for TRANSPORT

RECORD 17 Omit for TRANSPORT

RECORD 18 Omit for TRANSPORT

RECORD 19 Omit for TRANSPORT

RECORD 20 FORMAT 5(I5,E10.3)
Only if NONU = 1. Repeat this record up to NCHEM. NOTE: enter next two variables sequentially for every non-default node (CNPIN).

col: 1-5	N:	non-default node number relative to CNPIN (see record 11).
col: 6-15	PINT:	non-default initial value of concentration (m l^3) of the node number (n).

RECORD 21 FORMAT I5,3E10.3

Repeat records 21-22 in data sets up to NMAT.

col: 1-5	I:	porous material number in relation to NMAT.
col: 6-15	VDFI:	default value of darcy velocity.
col: 16-25	SWDFI:	default value of water saturation.
col: 26-35	UWFI:	value of upstream weighting factor. Set to 0.0 if no upstream weighting is desired.

RECORD 22 FORMAT I5,6E10.3

col: 1-5	I:	porous material number in relation to NMAT.
col: variable	CLAMDI:	decay coefficient of the material. Enter this value up to NCHEM.
col: variable	CRACMP:	transformation mass fraction of the material. Enter this value up to NCHEM.

RECORD 23 FORMAT 2I5

col: 1-5	NVREAD:	flag to indicate if darcy velocities will be read from internal scratch files. If PRZM and TRANSPORT are ON, but not FLOW, then NVREAD is set to 1. 1 = yes, 0 = no.
col: 6-10	IVSTED:	flag to indicate if the velocities are at steady-state. This implies steady-state within each day, not the entire simulation. 1 = yes , 0 = no. If PRZM is ON then IVSTED is set to 1.

RECORD 24 FORMAT I5
Only if ITCND1 = 1 and PRZM is OFF.

col: 1-5	NTSNDH1:	number of selected time values of concentration or solute flux for transient simulation at first node.

RECORD 25 FORMAT 8E10.3
Only if ITCND1 = 1 and PRZM is OFF.

col: 1-80	TMHV1:	time values in relation to NTSNDH1 at the first node for pressure head or water flux (t). Enter up to 8 values per line up to NTSNDH1 lines.

RECORD 26 FORMAT 8E10.3
Only if ITCND1 = 1 and PRZM is OFF.

col: 1-80	HVTM1:	values of concentration or solute flux corresponding to TMHV1 at the first node (length). Enter up to 8 values per line up to NTSNDH1 lines.

RECORD 27 FORMAT 8E10.3
Only if IBTND1 = 0 and PRZM is OFF.

col: 1-80	QVTM1:	volumetric fluxes corresponding to TMHV1 at the first node. Enter 8 values per line up to NTSNDH1.

RECORD 28 FORMAT I5
Only if ITCNDN =1 and PRZM is OFF.

col: 1-5	NTSNDH2:	number of selected time values of concentration or solute flux for transient simulation at the last node.

RECORD 29 FORMAT 8E10.3
Only if ITCNDN = 1 and PRZM is OFF.

col: 1-80	TMHV2:	time values in relation to NTSNDH2 at the last node for concentration or solute flux (t). Enter up to 8 values per line up to NTSNDH2 lines.

RECORD 30 FORMAT 8E10.3
Only if ITCNDN = 1 and PRZM is OFF.

col: 1-80	HVTM2:	values of pressure head or water flux corresponding to TMHV2 at the last node (length). Enter up to 8 values per line up to NTSNDH2 lines.

RECORD 31 FORMAT 8E10.3
Only if ITCNDN = 1 and PRZM is OFF.

col: 1-80	QVTM2:	volumetric fluxes corresponding to TMHV2 at the last node. Enter 8 values per line up to NTSNDH2.

RECORD 32 FORMAT 16I5
Only if IOBSND = 1.

col: 1-80	NDOBS:	increasing sequential numbers of observation nodes. Enter up to 16 per line up to NOBSND (see record 4).

RECORD 33 FORMAT A4

col: 1-4	OUTT:	output time step for printing. Enter DAY for daily, MNTH for monthly, YEAR for yearly.

4.6 MONTE CARLO INPUT FILE

PRZM-3 requires a Monte Carlo input file when MONTE CARLO is specified "ON" in the execution supervisor file. The following is an example Monte Carlo input file.

4.6.1 Example MONTE CARLO Input File

```
***Title
MONTE CARLO TEST INPUT
***Number of runs and confidence level
 100             90.0
***Monte Carlo inputs
KOC 1                   1               800. 1400.          10.10000.      1.
FIELD CAPACITY          1       1       .316   .130          0.05  0.60    5.
WILTING POINT           1       1       .150   .066          0.03  0.30    5.
ORGANIC CARBON    1     1       1.30    .870          0.01  5.00  1.
FIELD CAPACITY          2       1       .288   .110          0.04   .540   5.
WILTING POINT           2       1       .143   .076          0.03   .030   5.
ORGANIC CARBON    2     1       .110    .070          0.01  1.00  1.
DISPERSION 1            1       1       50.0 15.0           10.0  90.0    7.
***Empirical Distribution Data
 4
 89.7            0.10
 82.9            0.20
 76.1            0.30
 69.3            0.40
***Monte Carlo outputs
INFILTRATION            1       1                   CDF       WRITE                 1
DISPERSION 1            1       1                   CDF       WRITE                 1
END
***Correlations
FIELD CAPACITY    1     1       WILTING POINT         1       1    0.757
FIELD CAPACITY    1     1       ORGANIC CARBON        1       1    0.609
FIELD CAPACITY    2     1       WILTING POINT         2       1    0.757
FIELD CAPACITY    2     1       ORGANIC CARBON        2       1    0.170
END
```

NOTE: The above Monte Carlo input file contains lines beginning with three asterisks (***). These are considered comment lines and will be ignored by the program.

4.6.2 MONTE CARLO Input Guide

RECORD 1	**FORMAT**	**A80**
col: 1-80	TITLE:	label for Monte Carlo simulation title.
RECORD 2	**FORMAT**	**I5,F10.0**
col: 1-5	NRUN:	number of Monte Carlo runs (1 to 1000).
col: 6-15	PALPH:	confidence level for percentile confidence bounds. Entered as a percent(%). Default of 90.
RECORD 3	**FORMAT**	**A20,2I5,5F10.0**

Repeat this record for number of inputs desired up to 50 records.

col: 1-20	PNAME:	Monte Carlo input variable name (up to 20 characters). See Table 4-2.
col: 21-25	IND1:	integer index for horizon, application, or material. See Table 4-2.
col: 26-30	INDZ:	zone number (1 to 10).
col: 31-40	VAR1:	the mean value of the distribution variable.
col: 41-50	VAR2:	the standard deviation of the distribution variable.
col: 51-60	VAR3:	the minimum value for the variable.
col: 61-70	VAR4:	the maximum value for the variable.
col: 71-80	VAR5:	flag to indicate the type of the variable distribution. 0 = constant, 1 = normal 2 = log-normal, 3 = exponential 4 = uniform, 5 = Johnson SU, 6 = Johnson SB, 7 = empirical, entered in record 4, 8 = triangular

RECORD 4 FORMAT A3

col: 1-3	ENDIT:	enter "END" to indicate end of record 3

RECORD 5 FORMAT I5
only if VAR5 = 7 (see record 3).

col: 1-5	NDAT:	number of data pairs in empirical cumulative distribution (1 to 20).

RECORD 6 FORMAT 2F10.0
only if VAR5 = 7 (see record 3). Note: repeat record 5 for every time VAR5 =7.

col: 1-10	DIST1:	value of quantile for data pair I where I = 1....NDAT.
col: 11-20	DIST2:	cumulative probability for data pair I where I = 1....NDAT.

RECORD 7 FORMAT A20,2I5,2(A20),I5
repeat this record for number of outputs desired up to 10 records.

col: 1-20	SNAME:	Monte Carlo output variable name. See Table 4-2.
col: 21-25	IND1:	integer index for horizon, application, or material number. See Table 4-2.
col: 26-30	INDZ:	zone number (1 to 10).

col: 31-50	SNAME2:	enter "CDF" to indicate if cumulative distributions are plotted.
col: 51-70	SNAME3:	enter "WRITE" to indicate if values are written as output for each Monte Carlo run (NRUN).
col: 71-75	NAVG:	length of the averaging period (in days) for output variables (1 to 5).

RECORD 8 FORMAT A3

col: 1-3	ENDIT:	enter "END" to indicate end of output variables.

RECORD 9 FORMAT A20,2I5,A20,2I5,F10.0

only if VAR5 = 1, 2, 5, or 6 note: this record may be repeated up to half of the number of inputs in record 3 if correlation is desired.

col: 1-20	NAME1:	variable (PNAME) in record 3 to be correlated.
col: 21-25	IND1:	integer index for horizon, application, or material number (1 to 10).
col: 26-30	INDZ:	zone number (1 to 10).
col: 31-50	NAME2:	variable (PNAME) in record 3 to be correlated with NAME1.
col: 51-55	IND1:	same as IND1 above.
col: 56-60	INDZ:	same as INDZ above.
col: 61-70	CORR:	the value of the correlation coefficient for NAME1 and NAME2.

RECORD 10 FORMAT A3

col: 1-3	ENDIT:	enter "END" to indicate end of correlation inputs.

TABLE 4-2. MONTE CARLO INPUT AND OUTPUT LABELS

Parameter	Monte Carlo Label	Index
Random PRZM Model Inputs		
Soil Bulk Density (g/cm^3)	BULK DENSITY	Horizon
Wilting Point (cm^3/cm^3)	WILTING POINT	Horizon
Field Capacity (cm^3/cm^3)	FIELD CAPACITY	Horizon
Organic Carbon Content (%)	ORGANIC CARBON	Horizon
Application Mass, Chem 1(kg/ha)	APPLICATION 1	App.
Application Mass, Chem 2(kg/ha)	APPLICATION 2	App.
Application Mass, Chem 3(kg/ha)	APPLICATION 3	App.
Dispersion Coeff., Chem 1(cm^2/day)	DISPERSION 1	Horizon
Dispersion Coeff., Chem 2(cm^2/day)	DISPERSION 2	Horizon
Dispersion Coeff., Chem 3(cm^2/day)	DISPERSION 3	Horizon
Decay Rate in Water, Chem 1($days^{-1}$)	WATER DECAY 1	Horizon
Decay Rate in Water, Chem 2($days^{-1}$)	WATER DECAY 2	Horizon
Decay Rate in Water, Chem 3($days^{-1}$)	WATER DECAY 3	Horizon
Decay Rate in Vapor, Chem 1($days^{-1}$)	VAPOR DECAY 1	Horizon
Decay Rate in Vapor, Chem 2($days^{-1}$)	VAPOR DECAY 2	Horizon
Decay Rate in Vapor, Chem 3($days^{-1}$)	VAPOR DECAY 3	Horizon
Decay Rate of Sorbed, Chem 1($days^{-1}$)	SORBED DECAY 1	Horizon
Decay Rate of Sorbed, Chem 2($days^{-1}$)	SORBED DECAY 2	Horizon
Decay Rate of Sorbed, Chem 3($days^{-1}$)	SORBED DECAY 3	Horizon
Henry's Constant, Chem 1	HENRY'S CONSTANT 1	-----
Henry's Constant, Chem 2	HENRY'S CONSTANT 2	-----
Henry's Constant, Chem 3	HENRY'S CONSTANT 3	-----
Irrigation Moisture Level (Fraction)	IRRIG LEVEL	-----
Application Year	APP YEAR	App.
Julian Application Year	APP DAY	App.
Soil Water Content (cm^3/cm^3)	THETA	Comp.
Total Soil Pesticide, Chem 1(kg/ha)	SOIL PESTICIDE 1	Comp.
Total Soil Pesticide, Chem 2(kg/ha)	SOIL PESTICIDE 2	Comp.
Total Soil Pesticide, Chem 3(kg/ha)	SOIL PESTICIDE 3	Comp.
Infiltration Depth (cm)	INFILTRATION	-----
Runoff Depth (cm)	RUNOFF	-----
Precipitation (cm)	PRECIPITATION	-----
Evapotranspiration	EVAPOTRANSPIRATION	Comp.
Flood or Furrow Irrigation Depth	IRREG DEPTH	-----
Nitrate Application (kg/ha)	NO3 APPLICATION	App.
Ammonia Application (kg/ha)	NH3 APPLICATION	App.
Organic N Application (kg/ha)	ORGN APPLICATION	App.
Plant N Uptake Rate (/day)	PLANTN UPTAKE	Horizon
Below-Ground Plant N Return Rate (/day)	BG PLANT N RETURN	Horizon
Above-Ground Plant N Return Rate (/day)	AG PLANT N RETURN	Horizon
Ammonium Desorption Rate (/day)	NH4 DESORPTION	Horizon
Ammonium Adsorption Rate (/day)	NH4 ADSORPTION	Horizon

TABLE 4-2. MONTE CARLO INPUT AND OUTPUT LABELS (Continued)

Parameter	Monte Carlo Label	Index
Nitrate Immobilization Rate (/day)	NO3 IMMOBILIZATION	Horizon
Organic N Ammonification Rate (/day)	AMMONIFICATION	Horizon
Denitrification Rate (/day)	DENITRIFICATION	Horizon
Nitrification Rate (/day)	NITRIFICATION	Horizon
Ammonium Immobilization Rate (/day)	NH4 IMMOBILIZATION	Horizon
Ammonia Volatilization Rate (/day)	NH3 VOLATILIZATION	Horizon
Random PRZM Model Outputs		
Runoff Flux, Chem 1 (kg/ha/day)	RUNOFF FLUX 1	-----
Runoff Flux, Chem 2 (kg/ha/day)	RUNOFF FLUX 2	-----
Runoff Flux, Chem 3 (kg/ha/day)	RUNOFF FLUX 3	-----
Erosion Flux, Chem 1 (kg/ha/day)	EROSION FLUX 1	-----
Erosion Flux, Chem 2 (kg/ha/day)	EROSION FLUX 2	-----
Erosion Flux, Chem 3 (kg/ha/day)	EROSION FLUX 3	-----
Decay Flux, Chem 1 (kg/ha/day)	DECAY FLUX 1	-----
Decay Flux, Chem 2 (kg/ha/day)	DECAY FLUX 2	-----
Decay Flux, Chem 3 (kg/ha/day)	DECAY FLUX 3	-----
Volat. Flux, Chem 1 (kg/ha/day)	VOLAT. FLUX 1	-----
Volat. Flux, Chem 2 (kg/ha/day)	VOLAT. FLUX 2	-----
Runoff Flux, Ammonia	RUNOFF FLUX NH3	-----
Runoff Flux, Nitrate	RUNOFF FLUX NO3	-----
Runoff Flux, Organic N	RUNOFF FLUX ORGN	-----
Erosion Flux, Ammonia	EROSION FLUX NH3	-----
Erosion Flux, Organic N	EROSION FLUX ORGN	-----
Groundwater Flux, Ammonia	GW FLUX NH3	-----
Groundwater Flux, Nitrate	GW FLUX NO3	-----
Groundwater Flux, Organic N	GW FLUX ORGN	-----
Groundwater Flux, Total N	GW FLUX TOTN	-----
Plant Uptake Flux, Ammonia	UPTAKE FLUX NH3	-----
Plant Uptake Flux, Nitrate	UPTAKE FLUX NO3	-----
Plant Uptake Flux, (NH3 + NO3)	UPTAKE FLUX TOTN	-----
Plant Return Flux, Organic N	RETURN FLUX ORGN	-----
Immobilization Flux, Ammonium	IMMOBIL. FLUX NH4	-----
Immobilization Flux, Nitrate	IMMOBIL. FLUX NO3	-----
Immobilization Flux, (NH4 + NO3)	IMMOBIL. FLUX TOTN	-----
Volatilization Flux, Ammonia	VOLATIL. FLUX	-----
Denitrification Flux	DENIT. FLUX	-----
Nitrification Flux	NITRIFICATION FLUX	-----
Ammonification Flux	AMMONIFIC. FLUX	-----

TABLE 4-2. MONTE CARLO INPUT AND OUTPUT LABELS (Concluded)

Parameter	Monte Carlo Label	Index
Random VADOFT Model Inputs		
Volat. Flux, Chem 3 (kg/ha/day)	VOLAT. FLUX 3	-----
Plant Flux, Chem 1 (kg/ha/day)	PLANT FLUX 1	Comp.
Plant Flux, Chem 2 (kg/ha/day)	PLANT FLUX 2	Comp.
Plant Flux, Chem 3 (kg/ha/day)	PLANT FLUX 3	Comp.
Root Zone Flux, Chem 1 (kg/ha/day)	ROOT FLUX 1	-----
Root Zone Flux, Chem 2 (kg/ha/day)	ROOT FLUX 2	-----
Root Zone Flux, Chem 3 (kg/ha/day)	ROOT FLUX 3	-----
Hydraulic Conductivity	HYDRAULIC CONDUC	Material
Residual Saturation	RESIDUAL SATURATION	Material
Van-Genuchten Alpha	V-G ALPHA	Material
Van-Genuchten N	V-G POWER N	Material
Decay Rate Chemical 1	VADOFT DECAY 1	Material
Decay Rate Chemical 2	VADOFT DECAY 2	Material
Decay Rate Chemical 3	VADOFT DECAY 3	Material
Dispersion Coefficient, Chemical 1	VAD DISPC 1	Material
Dispersion Coefficient, Chemical 2	VAD DISPC 2	Material
Dispersion Coefficient, Chemical 3	VAD DISPC 3	Material
Retardation, Chemical 1	VAD RETARD 1	Material
Retardation, Chemical 2	VAD RETARD 2	Material
Retardation, Chemical 3	VAD RETARD 3	Material
Random VADOFT Model Outputs		
Total Water Flux	VAD WATER FLUX	-----
Advection Flux, Chemical 1	VAD ADVECTION 1	-----
Advection Flux, Chemical 2	VAD ADVECTION 2	-----
Advection Flux, Chemical 3	VAD ADVECTION 3	-----
Dispersion Flux, Chemical 1	VAD DISPERSION 1	-----
Dispersion Flux, Chemical 2	VAD DISPERSION 2	-----
Dispersion Flux, Chemical 3	VAD DISPERSION 3	-----
Decay Flux, Chemical 1	VAD DECAY FLUX 1	-----
Decay Flux, Chemical 2	VAD DECAY FLUX 2	-----
Decay Flux, Chemical 3	VAD DECAY FLUX 3	-----
Concentration, Chemical 1	VAD CONC 1	Node
Concentration, Chemical 2	VAD CONC 2	Node
Concentration, Chemical 3	VAD CONC 3	Node

NOTE: Monte Carlo output of nitrogen constituents is achieved by using the existing VADOFT Model Outputs, with Chemical 1 being equivalent to Ammonia, Chemical 2 being equivalent to Nitrate, and Chemical 3 being equivalent to Total Organics (see Section 4.5).