



'DHIAPP.INI' AND '*.ADP' FILES

Reference Manual



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1 CONTROL OF MOUSE COMPUTATIONS - "DHIAPP.INI" FILE

MOUSE computations are complex, and apart from input data, the results depend on default settings of a number of program parameters. These parameters may activate different formulations for the specific aspects, set the threshold or default values for variables, etc. MOUSE is delivered by a set of default parameters. Users can access and modify some of these parameters (e.g. control of variable time step, print of warnings, type of output, etc.) i.e. change the default model performance in various aspects of computations. The controllable parameters are accessible in the ASCII file 'DHIAPP.INI', located per default in the MOUSE/BIN directory.

The 'DHIAPP.INI' file can be edited by any ASCII editor. An edited copy can overwrite the default version, or it can be saved into the wanted project directory under the same name.

Some of the parameters accessible through the 'DHIAPP.INI' file are not explained in detail since they are related to specific technical issues. The parameters which are likely to be relevant to standard MOUSE applications are self-explanatory.

IMPORTANT! Modifications of the original 'DHIAPP.INI' file, located in the MOUSE\BIN directory will affect all MOUSE projects that are computed by the actual MOUSE installation. This may be relevant for general tuning of MOUSE. Project-specific modifications must be introduced by copying the edited 'DHIAPP.INI' file into the current project directory.

In the following, a print of the DHIAPP.INI file is presented.

```
; DHIAPP.INI file
; Used for DHI Software Product :  MOUSE 2004
;
[Mbrowser]
;  MOUSE Text and Html Browser Specification
;  Used for presentation of error/status/summary report after simulation.
;  'Wordpad' and 'Internet Explorer' are shown as examples.
;  HTMBROWSER=C:\Program Files\Internet Explorer\IEXPLORE.EXE
;  BROWSER=c:\Program Files\Accessories\WORDPAD
;  Other text file editors or browsers for Windows may be used.
;  If none are specified, the associated viewers for the file types are used.
```



```

BROWSER=NOTEPAD.exe

;

; During data reading and after the simulation MOUSE generates several LOG-files
; and a simulation summary file. In consecutive simulations, MOUSE maintains a set of
; backup LOG- and summary files, by assigning serial numbers to the files. The files
; indexed "001" are the newest, and growing index numbers indicating older files.
; The maximum number of the backup files maintained can be controlled by setting
; the parameter MAX_LOG_FILE. The default value is 5
MAX_LOG_FILE=5

;

; There are 2 naming conventions when creating summary files after each simulation
; The summaries can either contain the result file name or the project file name.
; SUMMARY_NAME=1 Names the summary including the result filename
; SUMMARY_NAME=2 Names the summary including the project filename
SUMMARY_NAME=2

;

[MouseRunoff]

;-----
; Section for parameters controlling simulation with MOUSE RunOff
;-----

;

; Summary table at the end of the Runoff simulation.
; This can be switched ON/OFF by the parameter:
; SummaryOutput=0 No summary
; SummaryOutput=1 Write summary (default)
SummaryOutput=1

;

; -----
; Infiltration options - Horton's equation
; -----

; It is possible to select between the former standard version of the Horton's equation
; and the integrated version of the Horton's equation. For details please refer to the
; MOUSE Reference Manual (Runoff). In addition it is possible to specify if
; infiltration should be active only during rainfall, or if infiltration should be
; active also after rainfall until surface runoff ends. Any of the four combinations
; can be specified by the parameter below.

```



```
;
; IntegratedHorton =
; 0 : Standard Horton. Infiltration active during rainfall and after until runoff ends
; 1 : Integrated Horton. Infiltration active ONLY during rainfall
; 2 : Standard Horton. Infiltration active ONLY during rainfall
; 3 : Integrated Horton. Infiltration active during rainfall and after until runoff ends
; Option 0 and 1 : as before
; Option 2 and 3 : new options from 20041118
; Option 0 is default in MOUSE 2004 and previous versions
IntegratedHorton=0

;
; Improvements to the numerical scheme used in Runoff B were introduced.
; The improvements can be switched ON/OFF.
; The switches for the modifications in Runoff B engine are:
;   RUNOFF_B_NEW1=ON (default)
;   RUNOFF_B_NEW2=ON (default)
RUNOFF_B_NEW1=ON
RUNOFF_B_NEW2=ON

;
; Low flow limit for switching to dry period time step.
; The dry period time step will only be applied when
; the runoff from the rainfall is below the limit
; for all catchments. Default value is 0.0001 [m3/sec]
RUNOFF_B_LOW_FLOW = 0.001

;
; Runoff Model A, B and C
; Recovery rate for initial loss capacity.
;   The initial loss capacity is regenerated in dry periods by a linear
;   recovery rate. Default value is 0.00005 [m/hour] for all models A, B and C
;   The rate can be controlled by the parameter RUNOFF_A_INITLOSS_RECOVER
;   Set the value to 0.00 if you want the Runoff model to work as in
;   previous versions of MOUSE.
RUNOFF_A_INITLOSS_RECOVER = 0.00005
RUNOFF_B_INITLOSS_RECOVER = 0.00005
RUNOFF_C_INITLOSS_RECOVER = 0.00005

;
```



```

; When carrying out calculations with the SQR module of MOUSE TRAP or when using MOUSE
Online it can be

; relevant to switch off the jump between rain events meaning that calculations will
also be carried out

; for dry weather periods.

;RUNOFF_B_Variable_dT=OFF

;RUNOFF_A_TimeJump=OFF

;

; RMSE_Method parameter = 1 will calculate RMSE in peaks dividing with the number of
peaks afterwards.

; RMSE_Method parameter = 2 will calculate RMSE in peaks without taking the average
value afterwards. (Default = 2)

; RMSE_Method parameter = 3 will calculate the sum of the absolute difference for peak
maxima, i.e. 1 value per peak.

;RMSE_Method=3

; The WBL_Method parameter = 2 will calculate WBL in peaks without taking the average
value afterwards. (Default = 2)

; The WBL_Method parameter = 3 will calculate |Qsim-Qmeasured| in peaks for all values
above the peak threshold.

;WBL_Method=3

;

; Switch for using the total area or the reduced area as basis for the mass of
sediment that can be washed off.

; Default is use the reduced area = TRUE

;SRQ_USE_REDAREA=FALSE

;

[MouseRunoff_C]

;-----

; Section for parameters controlling simulation with MOUSE RunOff C

;-----

; MOUSE Runoff Model C (C1)

; NL_CATCHMENT_GROUPING = 1

; For Runoff Model C1 the result file can be reduced significantly
; by allowing catchments to be "grouped". The principle is that for
; all catchments which have a common parameter set - the resulting
; hydrograph can be scaled from a 'unit' hydrograph. Only one
; hydrograph is saved in the CRF result file. When the CRF file
; later is used as input for the HD simulation, then all
; hydrographs will be generated automatically by multiplying the
; 'unit' hydrograph.

```



```

;   The feature is only implemented for the C1 variant.
;   NL_CATCHMENT_GROUPING = 0   (Default)
;   No grouping of catchments. All individual hydrographs will be
;   written as results to the CRF file.
NL_CATCHMENT_GROUPING = 0
;
;   NL_CONCEPT_DRYDEPTH
;   This parameter can be used to control the minimum depth of water
;   in the reservoir at which the simulation will switch to DRY
;   conditions. The unit is [mm]. The default value is 0.001 mm.
NL_CONCEPT_DRYDEPTH = 0.001
;
[MouseNam]
;-----
;   Section for parameters controlling simulation with MOUSE RDII
;-----
;
;   RDII switching criteria: RDII+A/B --> RDII
;   =====
;   The criteria for switching FROM the detailed surface runoff
;   simulation with RDII+A or RDII+B TO only RDII in dry periods
;   can be controlled by the following parameters:
;   A_STOP_FLOW=          default value is 0.001 m3/sec
;   B_STOP_FLOW=          default value is 0.001 m3/sec
;   The switch will take place when the sum of the FRC runoff
;   from all catchments falls below the specified limit
;   AND
;   the actual rainfall is below the rain limit specified below.
A_STOP_FLOW=0.001
B_STOP_FLOW=0.001
;
;   RDII switching criteria:  RDII --> RDII+A/B
;   =====
;   The criteria for switching TO the detailed surface runoff
;   simulation with RDII+A or RDII+B FROM only RDII in dry periods
;   can be controlled by the following parameters:
;   A_LIMIT_RAIN = default value is 0.00001 my-m/sec

```



```

;   B_LIMIT_RAIN = default value is 0.00001 my-m/sec
;   The switching will happen when the rainfall exceeds the applied
;   limit.
;   NOTE: In periods with snow cover the switching criteria are
;         over-ruled until the snow reservoir is empty.
A_LIMIT_RAIN=0.00001
B_LIMIT_RAIN=0.00001
;
;   RDII hot start
;   =====
;   RDII hot start was enhanced by writing additional storage depths used in
;   overland flow computation to the .NOF result file.
;   Due to this improvement, older *.NOF files cannot be used for hot start. It
;   is recommended to re-do the simulation and produce the new improved files.
;   For backward compatibility this can be switched off by setting
;   the parameter NAM_HOTSTART_VER=0
;
;   Default setting is: NAM_HOTSTART_VER=1
NAM_HOTSTART_VER=1
;
[MouseHD]
;-----
;   Section for parameters controlling simulation with MOUSE HD
;-----
;
;   External control of minimum pipe length (m)
BRANCH_MIN_L=10
;
;   Two minimum depth criteria exist, relative and absolute depth.
;   For each link the minimum depth is set to the lowest of the
;   two criteria.
;
;   External control of the relative minimum water depth in per mille
;   in a link. Default value is 5 o/oo. Minimum accepted is 1 o/oo.
BRANCH_MIN_H_REL=5
;
;   External control of the minimum water depth in mm in a link

```



```
; Default value is 5 mm. Minimum accepted is 1 mm.
BRANCH_MIN_H_ABS=5
;
; External control of the minimum water depth in a manhole,
; NEW_HMIN_NODE=1 gives the new improved formulation,
; NEW_HMIN_NODE=0 gives the old formulation (MOUSE 3.23 and older versions)
NEW_HMIN_NODE=1
;
; External control whether to use the improved continuity equation or not.
; NEW_CONTINUITY=1 gives the new improved formulation
; NEW_CONTINUITY=0 gives the formulation in MOUSE 3.23 and previous versions.
NEW_CONTINUITY=1
;
; Switch for setting head loss and momentum computation back to
; the formulation used before MOUSE version 3.3.
; HEADLOSS_323=1 gives the old formulation used in version 3.23
; MOMENTUM_323=1 gives the old formulation used in version 3.23
; HEADLOSS_323=0 gives the new formulation. Default and recommended.
; MOMENTUM_323=0 gives the new formulation. Default and recommended.
HEADLOSS_323=0
MOMENTUM_323=0
;
; Is possible to switch between different friction loss descriptions.
; External control of friction loss description in links (explicit or implicit)
; imp_friction=1 activates implicit friction description
; imp_friction=0 (default) activates explicit friction description ('classic
; description)
; forward_cent = weighting coefficient, 1.0 results in a full forward centering of the
; scheme
; kin_vis = kinematic viscosity of water [m2/s]. The default value is for 15 deg. C.
; cw1,cw2,cw3,cw4=constants of Colebrook-White equation.
IMP_FRICTION=1
FORWARD_CENT=1.0
KIN_VIS=0.00000131
CW1=6.4
CW2=-2.45
CW3=3.3
```



```
CW4=1.0

;

; Generation of an extra *.XRF result file with:

; Flow velocity, Froude numbers, time step, volume in pipes and nodes

; Set PRINT_EXTRA_INFO=1 to generate the file.

PRINT_EXTRA_INFO=0

;

; Some warnings from the Pipe Flow Module can be switched off here.

; Valid for warning:                Use:

; No. 38  (short conduit warning )   IGNORE_WARNING_38=1

; No. 39  (negative slope warning )  IGNORE_WARNING_39=1

; No. 71  (weir method warning   )   IGNORE_WARNING_71=1

; No. 73  (velocity criteria check)  IGNORE_WARNING_73=1

; No. 211 (manhole diameter check)  IGNORE_WARNING_211=1

; Note: Warning 73 is by default switched OFF when variable time step

;       is applied, but can be set ON by: IGNORE_WARNING_73=0

IGNORE_WARNING_38=0

IGNORE_WARNING_39=0

IGNORE_WARNING_71=0

IGNORE_WARNING_73=0

IGNORE_WARNING_211=0

;

; OR all warnings can be suppressed before start of the simulation

; by setting PRINT_WARNINGS=0. Default setting is PRINT_WARNINGS=1

PRINT_WARNINGS=1

;

; Due to introduction of variable time step (MOUSE 3.3 and newer) the former

; parabolic acceleration of pumps is changed to linear

; acceleration as the default approach.

; The parabolic acceleration can be switched on by setting LINAR_PUMP_ACC=0

LINEAR_PUMP_ACC=1

;

; For MOUSE Long-Term (Job List) simulation, the result file post

; processing can be bypassed by setting the switch LONGTERM_POSTPROCESS=0

; Default is LONGTERM_POSTPROCESS=1 which will always call post processing.

LONGTERM_POSTPROCESS=1

;
```



```
; For writing a MOUSE650.out file which can be used as a base for ADP files
; switch PRODUCE_MOUSE650OUT=1. Default is PRODUCE_MOUSE650OUT=0
PRODUCE_MOUSE650OUT=1
;
; Rising Main conversion factor. Default is 0.001
RM_CONV_FACTOR=0.001
;
; Flood limit assigned for basins. I.e. the added height to the top
; of the basin geometry or ground level.
;FLOODLIMIT=25.0
;
; When modelling open channels the model will normally stop if flooding occurs.
; Here it can be chosen globally to extrapolate all the cross-sections.
; CRS_EXTRAPOLATION=1 gives no extrapolation, i.e. equal to older MOUSE versions
(<2002)
; CRS_EXTRAPOLATION=2 gives an astrapolation according to the angle give in:
; CRS_EXTRAPOLATION_ANGLE=90.0 is the angle between a horizontal level and the
extrapolated CRS
; CRS_EXTRAPOLATION_HEIGHT_FACTOR=3.0 is the maximum height of the extrapolated CRS
given
; as this factor times the maximum height of the CRS
;CRS_EXTRAPOLATION=1
;CRS_EXTRAPOLATION_ANGLE=90.0
;CRS_EXTRAPOLATION_HEIGHT_FACTOR=1.0
;
; During use of the LTS module - Joblist generation the model needs to find out
; when it is raining and when it is dry weather. In order to avoid influence from
; fluctuating raingauges at low intensities it is possible to set the VRAINZERO value.
; The default value is 0.00000001
;VRAINZERO=0.00000001
;
; Ensures that if it was raining e.g. 1.0 (Default) hours prior to a job to be saved
; then the start of the event is moved to the start of this rain, and so backwards
; MINHOURS BETWEENRAINS=1.0
;
;
; MOUSE_MIKE21_DVDT_MAX gives the maximal rate of change for the flow in/out of manhole
inlets in %
```



```
MOUSE_MIKE21_DVDT_MAX=1

;

; MOUSE_MIKE21_ECOEF is an energy loss coefficient which is multiplied on the flow
though inlets in the coupling.

; A value of 1.0 give NO loss
MOUSE_MIKE21_ECOEF=1.0

;

; MOUSE_MIKE21_TRANSCOEF is a coefficient which controls that the flow is changing too
quickly

; It should help keeping Mike 21 stable.  $Q_{mm21} = \text{MOUSE\_MIKE21\_TRANSCOEF} * Q_{mm21\_LastTimeStep} + (1 - \text{MOUSE\_MIKE21\_TRANSCOEF}) * Q_{mm21}$ 
;
MOUSE_MIKE21_TRANSCOEF) * Qmm21
;MOUSE_MIKE21_TRANSCOEF=0.8

;

; Calculation of the energy loss coefficient for weirs, gates/orifices for the km
; approach has been changed so that losses due to change in elevation from weir,
; orifice/gate links has been removed

; It is possible to switch the application of the elevation loss On/Off by the entry
; USE_ELEVATION_LOSS. The default is 'OFF'
;USE_ELEVATION_LOSS = OFF

;

; RTC debugging can be easier by dumping information on the selected control functions
; for the different controlled devices

; PRINT_RTC_STATEMENTS=1 prints statement line numbers, the selected control function
;
; and relative time in hours of simulation time
; PRINT_RTC_STATEMENTS=2 prints statement line numbers, the selected control function
;
; and no time column
; PRINT_RTC_STATEMENTS=3 prints statement line numbers, the selected control function
;
; and the absolute time
;PRINT_RTC_STATEMENTS=3

;

; For optimization purpose the PERFORMANCE_MONITOR gives detailed information on the
; time used for initialization.
;PERFORMANCE_MONITOR = ON

;

; The UND data validation can be disabled by using the UND_VALIDATION keyword
; By doing so no validation will be performed on the input data thereby risking crash
if
```



```
; the setup contains invalid data. This should only be used to tweak performance for
; models where the data is allready validated.
;UND_VALIDATION = OFF
;
; The default slot width for sealed nodes for the water level moving towards INF
; is 0.01 times the diameter of the manhole. This number can be ajusted here.
;NODE_SLOT_WIDTH = 0.01
;
; Improved way of handling low flow conditions (empty pipes). A tiny amount of water
; is needed in a numerical hydrodynamic model to keep the continuum of water in the
; model. When only the minimum of water level is required the roughness is increased
; and thereby decreasing the discharge. As soon as the water level rise above the
; minimum (e.g. 1mm) then the roughness is returned to the value specified by the user.
; Default is 0 (OFF)
;ALTERNATIVELOWFLOW = 1
;
[TimeStepControl]
;-----
; Parameters controlling the time step variation in the MOUSE HD
;-----
;
; QacceptLimitRel is used to ensure correct resolution of inflow
; hydrographs. The value specifies the maximal accepted relative
; deviation between the given and used inflow hydrograph.
; (Default = 0.10)
QacceptLimitRel=0.10
;
; QlowLimitM3s: The relative accept limit is not applied for inflows
; below 'QlowLimitM3s' m3/sec. (Absolute value)
; (Default = 0.010)
QlowLimitM3s=0.010
;
; WaterLevDiffMaxRel:
; Maximum relative change allowed for water depths between two time
; steps. (Relative value) Applied only for depths in standard pipes.
; (Default = 0.10)
WaterLevDiffMaxRel=0.10
```



```
;
; MaxVarCrossConstant:
; Is the maximal allowed variation of the cross section
; parameters: Area, Width and Hydraulic radius in one time
; step. (Relative value)
; (Default = 0.10)
MaxVarCrossConstant=0.10
;
; CrossLowDepthLimit:
; Parameter used for switching the checking of cross section parameters OFF at
; low water depths. The parameter is the relative depth in the pipe.
; (Default = 0.04)
CrossLowDepthLimit=0.04
;
; Crosscheck:
; 0 means that cross-section variable are not checked
; 1 means that cross section variables check are
; based on MaxvarCrossConstant * (maximal
; value of the cross section)
; 2 means that cross section variables check are
; based on MaxvarCrossConstant * (actual
; value of the cross section)
; (Default = 1)
Crosscheck=1
;
; MaxPumpFlowVar:
; Limits the variation in the pump flow through one time
; step. (Relative value)
; (Default = 0.10)
MaxPumpFlowVar=0.1
;
; MaxCourant:
; Limits then variation of the courant number through one time
; step. (Absolute value)
; (Default = 20)
MaxCourant=20
;
```



```
[MouseTRAP]
;-----
; Section for control of MOUSE TRAP parameters
;-----
;
; As Sediment transport calculations often does not need to be carried out
; every HD time step, it is possible here to set how often. I.e. a value of 2
; means that the ST calculation will run every second time the HD calculation
; runs. A value between 6-10 is recommended in the reference manual.
;ST_TimeStepMultiply=1
;ST_SaveStepMultiply=1
;
; External control of the transport mode for the fine PPC fraction.
; PPC_FINE_AD_TRANSPORT=1 transports the fine sediment by use of the
; AD module - PPC_FINE_AD_TRANSPORT=0 transports the fine sediment by
; use of the ST module
PPC_FINE_AD_TRANSPORT=1
;
; External control whether to print TRAP result items or not.
; PRINT_   =0 does not save the item in the result file.
PRINT_WEIR_AD=1
PRINT_PUMP_AD=1
PRINT_NODE_AD=1
PRINT_GRID_AD=1
PRINT_GRID_MASS_AD=1
PRINT_MASS_BALANCE_AD=1
PRINT_BASIN_ST=1
PRINT_WEIR_ST=1
PRINT_PUMP_ST=1
PRINT_SEDIMENT_TRANSPORT=1
PRINT_BED_LEVEL_ST=1
PRINT_MASS_BALANCE_ST=1
PRINT_BED_SHEAR_STRESS=1
PRINT_DIM_LESS_BED_SHEAR_STRESS=1
MIN_ST_DEPTH_REL=1
PRINT_GRAINSIZEMOBILITY_INSTEAD_OF_DL_BED_SHEAR=ON
```



1.1 Extended explanations

Grain Size Mobility

When running the sediment transport module in standard mode it will save results with bed shear stress and dimensionless bed shear stress. Instead of saving the dimensionless bed shear stress, the largest possible grain size which can be moved at a given time, can be saved. The computation is based on the relation between grain size and dimensionless bed shear stress

$$d = \frac{\tau}{\rho_w g (\rho_s - 1) \theta_{cr}}$$

where

d grain size diameter [m]
 τ bed shear stress [N/m^2]
 ρ_w density of water [kg/m^3]
 g gravitational acceleration [m/s^2]
 ρ_s density of sediment [kg/m^3]
 θ_{cr} critical dimensionless bed shear stress [-]

The feature is turned on in the DHIapp.ini file by in the [MouseTRAP] section adding the line:

```
PRINT_GRAINSIZEMOBILITY_INSTEAD_OF_DL_BED_SHEAR=ON
```



2 THE "*.ADP" FILE

2.1 Introduction to *.ADP

The *.ADP file (ADDITIONAL Parameter file) serves as an additional model input possibility, which allows the user to access and control some program features and processes, which are not accessible through the MOUSE menu system. Typically, the *.ADP temporarily includes new MOUSE functions prior to their full implementation in the MOUSE GUI, as well as some rarely used functions, which are of interest of only a few MOUSE users.

The *.ADP is an ASCII file in the so-called PFS format, where information is organised in sections, and where entries are optional and may be given in an arbitrary order.

Most of the parameter values in the *.ADP file may be entered either in SI-units or in US-units.

The *.ADP file is an optional input to a MOUSE computation. The selection of an *.ADP file (if any) to be included into the current computation job is controlled through the MOUSE computational dialog, similarly as for any other optional input file.

An overview of the information that can be supplied to the model in the current version through the *.ADP file is given below. The various features are listed in arbitrary order.

Links:

- Link lengths: per default, MOUSE calculates link lengths as straight connections between the upstream (FROM) and downstream (TO) nodes. This can be overridden by specifying a user-specified length on the link dialog and/or in the *.ADP file. The pipe length value in the *.ADP file has the highest priority level.
- Number of grid points: MOUSE automatically determines an odd number of computational grid points for each link. This is based on geometry of the links and the expected hydraulic conditions in the links. In some cases, the grid established in this way is rather conservative, and a number of grid points may be reduced. This may improve the computational efficiency, but care should be



taken that the accuracy of results is not compromised. The lowest number of grid points in one link is three.

- Variation of the Manning number with depth.
- Slot Width: the default width of the Preissmann slot can be modified (usually reduced) in order to reduce the error when simulating very long highly pressurised conduits. A too small slot width can cause stability problems.

MOUSE effectively supports specification of input in this section. At the initiation of any MOUSE pipe flow computation, MOUSE generates an ASCII file named MOUSE650.OUT, which contains a list of all links in the network and for each link a number of associated parameters. The format and the information content of each line in this file are identical to the input lines of the *.ADP 'Links' section. Practically, the lines related to the specific links may simply be copied into the *.ADP file, and only the desired values should be modified.

Please note that at this instance the *.ADP file replaces effectively the previous ASCII-file named MOUSE650.IN.

Colebrook - White friction description:

- For the specified links (circular pipes), the friction losses are computed using the Colebrook-White formula.

EFOR link:

- A link of the MOUSE and EFOR models can be defined. Correlation between component names in the two models is defined.

Hydrogen Sulphide Build-Up:

- Definition of the input parameters for the MOUSE TRAP simulation of the hydrogen sulphide build-up in sewer mains.

Control of PID Min Capacity Curve:

- Definition of a QH-capacity curve used for specifying a lower capacity curve for PID controlled pumps.

Control of Coupled Pumps:

- Definition of any coupled pumps within the network.



2.2 Detailed description of data sections in the *.ADP file

The format of the '*.ADP' file allows an optional input of various sections in arbitrary order. This means that the sequence of the keywords is not important (except for SYNTAX_VERSION!!). Multiple specification of the same type sections is also allowed.

A detailed description of the each section in the '*.ADP' file is given in the following paragraphs.

2.2.1 Links

```
[ADDITIONAL_LINK_PARAMETERS]
SYNTAX_VERSION = 1.0 // 1.0 = VERSION 2001/2002
UNIT_TYPE = 1 // 1 = SI, 2 = US
MANNING_TYPE = 1 // 1 = Manning M, 2 = Manning n=1/M
LINK_MANVAR = '<LinkID>', <ManBot>, [<ManTop>, ManExp]
LINK_LGRIDSLOT = '<LinkID>', [<Length>], [<Number Grid>],
                '<Slot Width>'
EndSect // ADDITIONAL_LINK_PARAMETERS
```

The SYNTAX_VERSION keyword is optional and, if present, must be located on the top line in a [ADDITIONAL_LINK_PARAMETERS] section. If omitted (or the parameter value set to 0.0), the model will assume the syntax as in version 2000B or earlier. The parameter value 1.0 indicates the syntax version 2001 or 2002.

The UNIT_TYPE keyword, which controls the units (SI or US), is optional. If omitted, use of SI units is assumed. If present, the UNIT_TYPE keyword must be found only once in a [ADDITIONAL_LINK_PARAMETERS] section. This has impact on the parameters specified after the keyword LINK_LGRIDSLOT (m or ft).

The MANNING_TYPE keyword indicates whether the Manning parameters after the LINK_MANVAR keyword are specified as Manning M or Manning $n=1/M$. If omitted, use of Manning M is assumed. The MANNING_TYPE keyword must be found only once in a [ADDITIONAL_LINK_PARAMETERS] section, immediately after the [SYNTAX_VERSION] and [UNIT_TYPE].

The LINK_MANVAR keyword is used for entering constant or depth varying Manning values in the following syntax:

```
LINK_MANVAR = '<LinkID>', <ManBot>, [<ManTop>, <ManExp>]
```

In earlier syntax versions, instead of '<LinkID>' the node names associated with the upstream and downstream end of the link ('<UpNode>', '<DwNode>') were used to locate the link in the model.



Note: If more links exist in parallel the parameters will be applied for all these links.

<ManBot> is the Manning number at the bottom of the pipe or for the complete depth if the optional parameters <ManTop>, <ManExp> are omitted.

<ManTop> is the Manning number at the top of the pipe.

<ManExp> is the coefficient controlling the Manning number variation with the depth. See the MOUSE Tech. Reference for details about the Manning number variation.

The LINK_LGRIDSLOT keyword is used for assigning individual values for pipe length, the number of computational grid points, the grid spacing and the slot width of the Preissmann Slot at the top of the pipes, using the following syntax:

```
LINK_LGRIDSLOT = <LinkID>', [<Length>],[<Number grid>],[<Slot Width>]
```

In earlier syntax versions, instead of '<LinkID>' the node names associated with the upstream and downstream end of the link ('<UpNode>','<DwNode>') were used to locate the link in the model. Note: If more links exist in parallel the parameters will be applied for all these links.

All other parameters are optional. Place commas alone to indicate position of used parameters.

<Length> is the length of the pipe [m]. Use this parameter if the length different than the length computed automatically based on the X-Y coordinates of the adjacent nodes or the length specified in the link dialog is wanted.

<Number grid> is the number of computational grid points to apply for this link. The value should be an odd number ≥ 3 . If an even number is found then MOUSE will add one to the specified value.

<Slot Width> is the width of the Preissmann slot (relative to the conduit width).

Notice that setting of these parameters may create numerical problems in critical locations of a MOUSE model. Also, inappropriate settings of these parameters may severely violate the results of the MOUSE computations, without apparent stability problem. Please refer to the MOUSE Reference Manual before using these parameters. All of the parameters are set automatically by MOUSE if they are not found here.



2.2.2 Colebrook - White

```
[COLEBROOKWHITE_FRICTION]
  SYNTAX_VERSION = 1.0 // 1.0 = VERSION 2001/2002
  UNIT_TYPE = 1 // 1 = SI, 2 = US
  CW_LINK = '<LinkID>', <Roughness>
  ...
EndSect //COLEBROOKWHITE_FRICTION
```

The SYNTAX_VERSION keyword is optional and, if present, must be located on the top line in a [COLEBROOKWHITE_FRICTION] section. If omitted (or the parameter value set to 0.0), the model will assume the syntax as in version 2000B or earlier. The parameter value 1.0 indicates the syntax version 2001 or 2002.

The UNIT_TYPE keyword, which controls the units (SI or US), is optional. If omitted, use of SI units is assumed. If present, the UNIT_TYPE keyword must be found only once in a [COLEBROOKWHITE_FRICTION] section. This has impact on the parameter <Roughness>.

The parameter <Roughness> specifies the equivalent pipe wall roughness (m or ft), used in Colebrook-White formula.

2.2.3 EFOR Link

```
[EFOR_PARAMETERS]
  SYNTAX_VERSION = 1.0 // 1.0 = VERSION 2001/2002
  UNIT_TYPE = 1 // 1 = SI
  EFOR_COUPLING = '<PlantPath>', <PlantTemp>, <EFORInlet>,
                 '<EFORResultFile>', <EFORSaveInterval>,
                 '<MOUSEOutlet>'
  EFOR_SENSOR   = '<PlantPath>', <UnitName>, <SensorTypeNo>
  EFOR_COMPONENT = '<MOUSEComponent>', '<EFORComponent>'
EndSect //EFOR_PARAMETERS
```

The SYNTAX_VERSION keyword is optional and, if present, must be located on the top line in a [EFOR_PARAMETERS] section. If omitted (or the parameter value set to 0.0), the model will assume the syntax as in version 2000B or earlier. The parameter value 1.0 indicates the syntax version 2001 or 2002.

The UNIT_TYPE keyword, which controls the combination of units in MOUSE and EFOR, is optional. If omitted, use of SI units is assumed in MOUSE, and SI-based set of units in EFOR. If present, the UNIT_TYPE keyword must be found only once in a [EFOR_PARAMETERS] section. In version 2002, the only choice possible is '1'.

The EFOR_COUPLING keyword is used for coupling an outlet in MOUSE to an inlet in EFOR.



The <PlantPath> specifies an absolute path of the EFOR model file (*.EFX).

The <PlantTemp> defines the constant temperature (Deg. C) inside the plant during the simulation period.

The <EFORInlet> defines the ID of a plant inlet connected to MOUSE. In version 2002, the MOUSE-EFOR link is function only for WWTP plants with one inlet. The <EFORInlet> parameter is not used, and a dummy value zero (0) must be specified.

The <EFORResultFile> specifies an absolute path of the EFOR result file (*.EFR).

The <EFORSaveInterval> specifies the EFOR result save interval (hours).

The '<MOUSEOutlet>' defines the ID of the MOUSE network location connected to EFOR. In version 2002, the link is possible only at an outlet.

The EFOR_SENSOR keyword is used to specify a sensor in the MOUSE network functioning as an external unit in EFOR.

The <PlantPath> specifies an absolute path of the EFOR model file (*.EFX). The EFOR model file should be identical to the one specified under the EFOR_COUPLING.

The <UnitName> specifies the node in the MOUSE network, where the sensor is located. The corresponding external unit in EFOR should be named identical to the MOUSE node.

The <SensorTypeNo> specifies the type of sensor. The following sensors are available.

- <SensorTypeNo> = 1 : Flow
- <SensorTypeNo> = 2 : Ammonia
- <SensorTypeNo> = 3 : Nitrate
- <SensorTypeNo> = 4 : Orthophosphate
- <SensorTypeNo> = 5 : Oxygen
- <SensorTypeNo> = 6 : Suspended Solids

The EFOR_COMPONENT keyword is used to specify the correlation between the components specified in the MOUSE network and EFOR.



The <MOUSEComponent> specifies the component name used in MOUSE.

The <EFORComponent> specifies the component name used in EFOR. The EFOR component names correspond to the names given in the inlet file (.efi).

2.2.4 MOUSE MIKE SHE Links

```
[MOUSE_COUPLING]
SYNTAX_VERSION = 1
UNIT_TYPE = 1
CALLER = 'MSHE'
COUPLINGMMSHE= 'ID', 'LinkType', 'OLConductivity
', 'OLConductivityExponent', 'SzLeakageCoeff '
EndSect //EFOR_PARAMETERS
```

The SYNTAX_VERSION keyword is optional and, if present, must be located on the top line in a [MOUSE_COUPLING] section. The parameter value 1.0 indicates the syntax version 2004

The present version of MOUSE MIKE SHE link requires that data is given in SI units and the UNIT_TYPE keyword must be defined to be 1.

The CALLER keyword must be defined to 'MSHE'.

The COUPLINGMMSHE keyword defines a MOUSE – MSHE LINK, and there is not limitation in the number of links.

The <ID> parameter is the MOUSE ID of the link (the ID of the Node or the Link)

The <LinkType> (integer) is a code of the Link (1 means the two models are linked at a MOUSE Node, 2 means the two models are linked at MOUSE branch). A MOUSE node link is coupled to the overland component of MIKE SHE, a open branch to the overland competent and the ground water component while a closed branch (a pipe) only is linked to the ground water level of MIKE SHE. MIKE SHE calculates location of the links on the basis of the geographical location of MOUSE elements (x, y, z (invert and top elevation)), please refer to the MIKE SHE reference manual for details.

The <OLConductivity> is a parameter of the link attached to the overland flow, please refer to the MSHE reference manual for details. In a MOUSE node the unit of the parameter $[m^{3-OLExchangeExpo}/s]$, while the unit at a MOUSE branch is $[m^{2-OLExchangeExpo}/s]$

The parameter <OLConductivityExponent> is the exponent of the MIKE SHE overland flow link computation.



The parameter <SzLeakageCoeff> is the Leakage coefficient (i.e. conductance per unit wetted perimeter per unit length) applied in the calculation of groundwater exchange.

2.2.5 Hydrogen Sulphide Build-Up

```
[H2S_PARAMETERS]
  SYNTAX_VERSION = 1
  UNIT_TYPE = 1 // 1 = SI, 2 = US (only SI supported!!)
  HS_Computation = true
  SaveHSrate = true, 'HSrates.txt'
  //HS_Equations:
  //1: Thistlethwayte,
  //2: Boon & Lister
  //3: Pomeroy & Perkhurst
  //4: Nielsen & Hvidtved-Jacobsen
  //5: WATS model - Tanaka and Hvidtved-Jacobsen
  HS_Equation = 4
  //WWDegradability (Waste Water Degradability):
  //1.5 - Domestic WW (Denmark),
  //3.0 - Food Industry WW,
  //6.0 - Very degradable
  WWDegradability = 6.0
  //Correct for full running pipes ra := - HS.Co * fFactor
  CorrectForFull = true, 0.1
  //Component names as they appear under TRAP | AD | Components
  //If PH or H2S = '' then H2S is not calculated
  //If Z = '' then Z-formula is not calculated
  //The rest of the components are required
  DO_Name = 'DO'
  Temperature_Name = 'Temperature'
  XOD_Name = 'BOD'
  SO4_Name = 'SO4'
  PH_Name = 'PH'
  HS_Name = 'HS'
  THS_Name = 'TotalHS'
  H2S_Name = 'H2S'
  Z_Name = 'Z'
  VFA_Name = ''
  OUR_Name = ''
  //OURmodel = MeasuredOUR, mv_H, k_half, q_m, E_A, E_An, n_fe,
  //q_fe, K_fe, Y_Hw, Y_Hf, alpha_w, alpha_f, continued...
  //alpha_T, K_Sw, K_Sf, K_X1, K_X2, K_h1, K_h2, continued...
  //nReacOrder, UseiDisTotRatio, iDisTot, continued...
  //K_ns, K_H2S, p_s, K_O, K_Os, P_atm, P_VS, S_S, continued...
  //S_A, S_F, X_Bw, X_Bf, X_S1, X_S2, S_Afac, continued...
  //S_Ffac, X_Bwfac, X_Bffac, X_S1fac, X_S2fac1, X_S2fac2
  OURmodel = ...
EndSect // H2S_PARAMETERS
```

The parameters description

Scientific and technical reference information for the hydrogen sulphide build-up model is available in "MOUSE TRAP - Technical



Reference. Water Quality Module". The information presented here refers to the input data requirements and formats.

The <Syntax_Version> (integer) must be '2', denoting the version 2001/2002. No earlier versions are available.

The <Unit_Type> (integer) must be '1' (i.e. SI). US units are not supported in version 2002.

The <HS_Computation> (boolean) switches the HS model ON/OFF.

The <SaveHSrate> (boolean, string) switches ON/OFF writing of an output file with the time series of r_a . The string states the file name (including path). If only a file name is specified (i.e. no file path), the file will be saved in the working directory.

The <HS_Equation> (integer) controls which of the equations will be used for the calculation, according to the following:

- 1 = Thistlethwayte,
- 2 = Boon & Lister,
- 3 = Pomeroy & Perkhurst,
- 4 = Nielsen & Hvidtved-Jacobsen.
- 5 = WATS: Tanaka & Hvidtved-Jacobsen.

The <WWDegradability> (double) defines the degradability of the wastewater. Ranges approximately between 1 to 6, where 6 is highly degradable.

The <CorrectForFull> (boolean/double). The first parameter switches the correction of r_a ON/OFF, when the pipe is pressurised. The second parameter is the calibration factor applied for the correction.

The following parameters (string) establish the link to the water quality components defined in the AD model ("TRAP|ADComponents"):

<DO_Name>	Name of the oxygen component.
<Temperature_Name>	Name of the temperature component.
<XOD_Name>	Name of the BOD or COD component. The actual meaning depends on which equation has been chosen.
<SO4_Name>	Name of the SO4 component.
<PH_Name>	Name of the pH component.
<HS_Name>	Name of the HS component.
<THS_Name>	Name of the Total HS component.
<H2S_Name>	Name of the H ₂ S component.



<Z_Name>	Name of the "Z component" in the AD model. This "component" serves for saving the results of the Z-formula in the result file (*.TRF).
<VFA_Name>	Name of the Volatile Fatty Acid component
<OUR_Name>	Name of the Oxygen Uptake Rate component

If <PH_Name> and <H2S_Name> are specified as empty strings (' '), then H₂S is not calculated.

If <Z_Name> is specified as an empty string (' '), then the risk factor Z is not calculated.

Specification of all remaining components is compulsory.

For explanation of the model parameters needed for the WATS model please refer to the MOUSE TRAP Reference manual (WQ).

2.2.6 Control of PID Minimum Capacity Curve

```
[PUMPMINCAPACITY]
SYNTAX_VERSION    = 1.0

[PUMPMINCAPACITYTABLE]
PUMPID = '<PumpPID>'
H = <H1>, <H2>, ... , <Hn>
Q = <Q1>, <Q2>, ... , <Qn>
EndSect // PUMPMINCAPACITYTABLE
EndSect // PUMPMINCAPACITY
```

The SYNTAX_VERSION keyword is optional and, if present, must be located on the top line in a [PUMPMINCAPACITY] section. The parameter value 1.0 indicates the syntax version 2002. No earlier versions are available.

The [PUMPMINCAPACITY] section is used for specifying a lower capacity curve for PID controlled pumps. A standard PID controlled pump will, in order to obtain the specified setpoint, operate between 0 and the pump capacity curve. Including this section in the ADP-file will only allow the pump to operate between the lower capacity curve (specified here) and the capacity curve specified through the interface.

The [PUMPMINCAPACITYTABLE] section specifies the capacity curve for each pump.

The PUMPID keyword specifies the relevant pump. The pump must be specified as PID controlled.

The H and Q keywords specify the points in the capacity curve.



2.2.7 Control of Coupled Pumps

```
[PUMPQCOUPLINGS]
  SYNTAX_VERSION = 1.0
  PUMPQCOUPLING = '<Pump1>', '<Pump2>', ..., '<Pumpn>'
EndSect // PUMPQCOUPLINGS
```

The SYNTAX_VERSION keyword is optional and, if present, must be located on the top line in a [PUMPQCOUPLINGS] section. The parameter value 1.0 indicates the syntax version 2002. No earlier versions are available.

The PUMPQCOUPLINGS keyword includes groups of PID controlled coupled pumps. Each group consists of two or more pumps, where the highest flow dictates the flow for all the other pumps in the group.

The <Pumpn> parameter specifies a pump within the group.

2.2.8 PID Sampling Period

```
[PID_SAMPLING_PERIOD]
  SYNTAX_VERSION = 1.0
  STRUCTURE = '<Pump/Weir/OrificeID>', TypeNo, SamplingPeriod
EndSect
```

The SYNTAX_VERSION keyword is optional and, if present, must be located on the top line in a [PID_SAMPLING_PERIOD] section. The parameter value 1.0 indicates the syntax version 2003. No earlier versions are available.

The STRUCTURE keyword includes the name of a PID controlled device, either a pump, weir or gate. The type number indicate the type where 1 is pump, 2 is weir and 3 is orifice. The sampling period is in seconds.

2.2.9 Radial Gates

```
[RADIAL_GATE]
  // GATE = 'GateID', Trunnion, Radius, TranBottom, TranDepth,
  RadialGateOverflow, GateCoef, GateExp, GateHeight
EndSect
```

The Radial Gate Section lets the user modify an existing gate to be a radial gate with the associated parameters

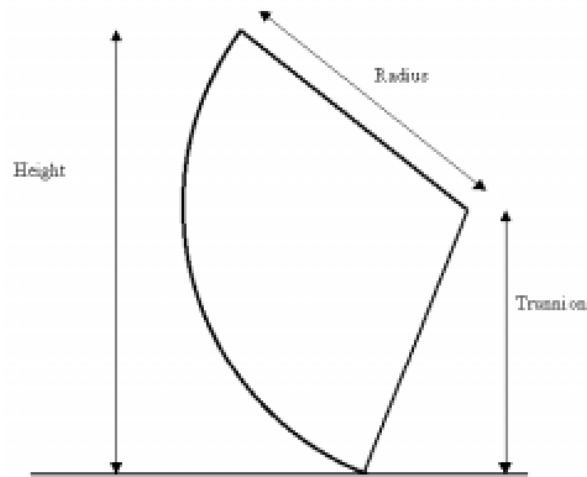


Figure 2-1 Radial Gate

The SYNTAX_VERSION keyword is optional and, if present, must be located on the top line in a [RADIAL_GATE] section. The parameter value 1.0 indicates the syntax version 2003. No earlier versions are available.

Trunnion: Height above sill of centre of gate circle, see Figure 2-1

Radius: Radius of gate, see Figure 2-1

Tran. Bottom: Parameter used to define the transition zone between free flow and sub-merged flow.

Tran. Depth: Parameter used to define the transition zone between free flow and sub-merged flow.

RadialGateOverflow: Indicate that RadialGateOverflow should be used. To enable RadialGateOverflow should be 1 to disable 2. If enabled all the following parameters must be issued.

Gate Coeff: Coefficient used when calculating the flow above the gate.

Gate Exp: Coefficient used when calculating the flow above the gate.

Gate Height: Height above sill of the overflow crest of the gate when the gate is closed,

2.2.10 Variable Headloss Coefficients

The structure of this section is identical to tabular data in the UND file



```
[MOUSE_TABULAR_DATA]
  SYNTAX_VERSION = 1
  UNIT_TYPE = 1
  [DataSet]
    DataSetID = '<NodeID>'
    TypeNo = i
    Data = A1, B1
    Data = A2, B2
    Data = An, Bn
  EndSect // DataSet
EndSect // MOUSE_TABULAR_DATA
```

The SYNTAX_VERSION keyword is optional and, if present, must be located on the top line in a [MOUSE_TABULAR_DATA] section. The parameter value 1.0 indicates the syntax version 2002. No earlier versions are available. Unit_Type indicates either SI units (1) or US units (2). TypeNo indicates which type of relation is issued.

1 = Level - Km / Contraction HLC / Total HLC

2 = Discharge - Km / Contraction HLC / Total HLC

3 = Velocity - Km / Contraction HLC / Total HLC

Data is issued where A is monotonously increasing.

2.2.11 MOUSE LTS - DWF insertion between events

When running a discontinuous calculation (MOUSE LTS) it can be desirable to save reasonable flow values in periods where the dynamic model is not run, i.e. between events. In MOUSE this is not supported by a graphical interface, but it is possible to enter information on where to insert flow values by writing directly in the *.ADP file.

The flow saved between events consists of dry weather flow (DWF), inflow from boundary conditions and inflow from the rainfall runoff, if there is any (CRF). The catchment to include when composing the flow needs to be specified as seen below



First a regular RSF file must be created as the flow is inserted in the user specified result file.



The section to be added in the ADP file must look like the section shown below:

```
[MOUSE_LTS_INSERTFLOW]
// Insert simple flow values between events: InsertFlow = true
InsertFlow = true
SaveStep_HrMiSec = 0, 20, 0
[Locations] // UpNode, Dwnode, NodeSeletiontype, Node/nse/'
  BRANCH = 'B4.1520', 'B4.1510', 1, ''
  BRANCH = 'B4.1200', 'B4.1485', 2, 'Nodes.nse'
  BRANCH = 'B4.1480', 'A0.0327', 3, 'B4.1480'
  EndSect // Locations
EndSect // MOUSE_LTS_INSERTFLOW
```

The insertflow option turns the feature on and of. SaveStep_HrMiSec makes it possible to choose another interval for saving dry weather results than the one chosen in the RSF specification (which applies for saving results during rain events).

The Node selection type can be either 1, 2 or 3, where 1 means that all catchments will be connected to this branch, 2 means that the following node selection file will contain the nodes which will be connected to the branch and 3 means that only the individual node stated will be connected to the branch.

2.2.12 MOUSE Pipe Design

In the present version input data for the Pipe Design Module are specified in the Additional Parameters File (ADP). In order to activate the design module the simulation is started in the usual way after specification of the ADP file name on the Start Simulation Dialog, but an additional dialog for viewing and editing the design data will be available in parallel to the MOUSE Simulation Launcher.

The format of the DESIGN section in the ADP file is as follows:

```
[DESIGN]
  SYNTAX_VERSION = 1.0
  UNIT_TYPE = 1
  COMMERCIALDIAMETERFILE = 'MyOwnDiameters.txt'
  DESIGNRESULTFILE = 'MyOwnResults.txt'
  MANNINGITEM = 'Manning', 1, 1, 2, 'SelectedPipes.lse', '', 50,
  200, -0.05, 1.0
EndSect // DESIGN
```



The SYNTAX_VERSION keyword is optional and, if present, must be located on the top line in a [DESIGN] section. The parameter value 1.0 indicates the syntax version 2003. No earlier versions are available. Unit_Type indicates either SI units (1) or US units (2).

Keyword	Parameter	Description
COMMERCIAL DIAMETERFILE	"DIAMETERFILE"	File with standard diameters. Not mandatory. One diameter in each line specified in mm/inches and in ascending order.
DESIGNRESULT FILE	"RESULTFILE"	File containing the history of the individual diameters. If present at simulation start a continuance of the previous iterations is assumed.
DESIGN CONSTANTS	DC1-DC6	Parameters for internal use. Not mandatory.
MANNINGITEM	DESIGNID	DesignID is used to identify the actual design group, but has no influence on the simulations.
	DESIGNTYPE	1 – Fixed Invert levels for pipes 2 – Fixed Top levels for pipes
	DESIGNCRITERIATYPE	1 – Critical Levels (specified at node dialog) 2 – Filling Degree (value specified as parameter 10 FILLINGDEGREE)
	DESIGNGROUPTYPE	1 – Group. All pipes are resized in parallel based on criteria in one node (value specified as parameter 6 "UPSTREAMNODE") 2 – Individual Pipes. Each pipe is designed based on criteria in the immediate upstream node.
	ELEMENTS	LSE-file specifying the group of links to be designed
	UPSTREAMNODE	Upstream node where design criteria is evaluated. Only used for DESIGNGROUPTYPE = 1
	MIN	Minimum value of the Manning number M. Note that extreme low values can cause numerical problems during the simulation. Its recommended to use values relatively close to the original value and run a few more iterations instead.
	MAX	Maximum value of the Manning number M. Note - se above.
	LOWERLIMIT	Limit for evaluating the design criteria. Specified relative the design criteria.
	FILLINGDEGREE	Filling degree. Only used for DESIGNCRITERIATYPE=2



2.2.13 Horizontal Orifice

Horizontal orifice must be defined as circular orifices, in the standard orifice menu of MOUSE. Please note that the current version is limited to circular horizontal orifices. All horizontal orifices must also be listed in the ADP files. The format of the horizontal orifice section of the ADP files is:

```
[HORIZONTAL_ORIFICE]
  ORIFICE = 'o1', 0.5
  ORIFICE = 'o2', 0.5
EndSect // HORIZONTAL_ORIFICE
```

The first parameter is the orifice id (used to identify the actual orifices among all the orifices listed in the standard orifices/gate list) and the orifice discharge coefficient.

The horizontal orifice uses the sill level specified in standard MOUSE menu, in the way that water depth below the sill level doesn't generate any flow through the gate. A sill level below the node bottom level + 2 * minimum water depth of the node is not allow. If this occurs, MOUSE automatically increases the sill level and issue a warning.

2.2.14 Additional DWF Definition

In DWF it is possible to offset a repetitive profile in time. This value is entered in hours.

An example of the format of the Additional DWF Definition section in the ADP file is as follows:

```
[DWF_ADDITIONAL_DEFINITION]
  G_DWF_LINE = '', 0.0, 1
  G_DWF_LINE = '', 0.0, 2
  G_DWF_LINE = '', 0.0, 3
  G_DWF_LINE = '', 0.0, 4
  L_DWF_LINE = 'Catchments1.cse', 0, 2
  L_DWF_LINE = 'Nodes1.nse', 0, 2
  I_DWF_LINE = 'B4.1200', 0, 1
  I_DWF_LINE = 'B4.1502_4_4', 0, 2
EndSect // DWF_Additional_Definition
```

The keywords are G_DWF_LINE for general, L_DWF_LINE for list and I_DWF_LINE for individual. The first parameter is the specific name associated with the DWF item. For general, there is no name, for list it is the name of the catchment/node selection file and for individual it is the node/catchment id.

The second parameter is the value that the time should be offsetted with. This value is in hours. The last parameter is an integer indicating: 1: Residential, 2: Commercial, 3:Base Flow or 4:Specific.



2.2.15 Explicit weirs

The computation speed of large models can be significant. In some cases it can be relevant to sacrifice some precision to gain speed. The MOUSE software solves the St. Venant equations using an implicit scheme (please see MOUSE Reference manual (pipe flow)). This solution technique ensures the highest possible precision. In cases where the pipe network is looped many places it is very time consuming to compute the solution.

The explicit weir functionality changes the weirs to be computed explicitly, cutting loops where weirs are located in two. This reduces the total computational time considerably. In one case the explicit weirs helped increasing the speed of the model with a factor of 18.

Notice that a speed improvement is only possible for looped networks and the weirs need to be internal weirs, i.e. weirs that discharges to another location in the network. In cases where it is not certain that the model will benefit from explicit weirs with regard to speed it is however very easy to test applying the input data definition given below. Changing otherwise implicit weirs to explicit ones may cause some instability and loss of precision, so it is a good idea to compare the new model results with results from the original model in at least a few of the weir locations.

The explicit weirs can be defined in the ADP file as seen below.

```
[EXPLICIT_WEIRS]
//CalcMethodNo: 1=Implicit, 2=Explicit
LineHeader = 'WeirID', 'CalcMethodNo', 'Centering', 'QFactorMax'
Line = 'IntWeir1', 2, 0.4, 1.0
Line = 'IntWeir2', 2, 0.5, 1.0
EndSect // EXPLICIT_WEIRS
```

The 'CalcMethodNo' can switch the weir between implicit and explicit formulation.

The 'Centering' factor must be between 0 and 1. If it is e.g 0.4 it means that the weir flow at timestep n+1 is computed as 0.4 times the flow computed at the last timestep and (1-0.4) times the newly computed value. The centering helps to smoothen out instabilities and a default value of 0.5 should be a reasonable value.

The 'QFactorMax' is only used when the weir is submerged. It gives an upper limit on the $H/\Delta H$ factor seen in equation 2-16 to 2-18 in the MOUSE Reference manual (pipe flow) in the section concerning submerged weirs.



2.2.16 Inverted Siphons

The sediment transport models are originally developed for mild slope rivers. This means that siphons are not modelled reliably with these formulae. Literature (Fredsoe, 1992) has proposed to adjust the critical bed shear stress by

$$\theta_c = \theta_{co} \cos \gamma \left[1 - \frac{\tan \gamma}{\tan(\varphi_s)} \right]$$

where

- θ_{co} is the original dimensionless bed shear stress
- γ is the slope [$^\circ$]
- φ_s is the static friction angle (angle of repose) for the sediment. App. 26° for sand and 33° for gravel

The correction of the critical bed shear stress has been implemented into the model for marked steep pipes. Marking steep pipes are done through a section in the ADP-file, which could look like below for a case with three steep pipes in the model:

```
[STEEP_PIPE_TRANSPORT]
  SYNTAX_VERSION   = 1.0
  LINK = 'Spipe_1'
  LINK = 'Spipe_2'
  LINK = 'Spipe_3'
EndSect // STEEP_PIPE_TRANSPORT
```

2.2.17 Sediment Traps

The MOUSE ST software can now deal effectively with sediment traps. The currently implemented basin removal function is aimed at sediments entering large retention basins. Research has shown that investigated sediment traps has effectively been able to catch approximately all of the sediments travelling as bed load given that they are emptied often enough. The bed load is taken out of the flow at these locations given that there is storage volume left in the trap. The bed load has been calculated based on the relatively simple Meyer-Peter and Müller bed load formula:

$$\Phi_B = \frac{q_B}{\sqrt{(\rho_s - 1)g d^3}} \left. \vphantom{\Phi_B} \right\} \Rightarrow q_B = 8(\theta - \theta_c)^{3/2} \cdot \sqrt{(\rho_s - 1)g d^3}$$

where

- q_B is the bed load transport per unit width [$m^3/s / m$]



The sediment traps can be specified in the MOUSE ADP file. The three sediment traps have been specified in the ADP file as shown below:

```
[SEDIMENT_TRAPS]
  SYNTAX_VERSION   = 1
  UNIT_TYPE        = 1
  //HEADER =      BasinID, MethodNo, n, TotalVolume [m3],
  //InitialFreeVolume [m3],CleaningPeriod [days],
  //LastCleaningDate [dd-mm-yyyy hh:mm:ss]
  //MethodNo: 1=Efficiency formula, 2=Bed load (Peter-Meyer)
  //trapping, 3= Efficiency formula with trapping
  //n: Efficiency factor (see reference manual) for method 2
  //it also serves as reduction factor multiplied on the bed
  //load.
  //CleaningPeriod: Days between cleaning, eg.7.0 means weekly
  //LastCleaningDate: 0 means at start of simulation but
  //initial free volume remains as stated. The date-time format
  //must be the same as the setting in the PC's system.
  SEDIMENTTRAP = 'TRAP No1', 2, 1.0, 22.0, 22.00, 14.0, '01-
02-1994 00:00:00'
  SEDIMENTTRAP = 'TRAP No2', 2, 1.0, 10.0, 10.00, 14.0, '01-
02-1994 00:00:00'
EndSect // SEDIMENT_TRAPS
```

As seen it is possible to specify a reduced efficiency through the n-factor. It is also possible to include the cleaning procedures in the model as long as the grit pits are cleaned with a regular interval.

2.2.18 Example of an *.ADP file

An example of a fictive '*.ADP' file is presented below. Note that the lines starting with '/' are comment lines. Also, all text beyond the '/' in a line is a comment text.

```
[ADDITIONAL_LINK_PARAMETERS]
  SYNTAX_VERSION = 1.0 // = VERSION 2001
  UNIT_TYPE      = 1 // = SI
  MANNING_TYPE   = 1 // = Manning M
  LINK_MANVAR    = 'LINK51',75 // const. Manning over depth
  LINK_MANVAR    = 'LINK53',75,80,1.0 //linearly variable Manning
  LINK_LGRIDSLOT = 'LINK55',,7 // No.of grid points in LINK55
  //                                     set to 7
  LINK_LGRIDSLOT = 'LINK59',520.3 // Length of LINK59 set to
  //                                     520.3 m
```



```

LINK_LGRIDSLOT = 'LINK57',,,0.005 // Preissmann slot width of
//                               LINK57 set to 0.5% of the diameter
EndSect // ADDITIONAL_LINK_PARAMETERS

[COLEBROOKWHITE_FRICTION]
  SYNTAX_VERSION = 1.0 // = VERSION 2001
  UNIT_TYPE = 1 // = SI
  CW_LINK = 'LINK31',0.001 // friction loss in LINK31 will be
// calculated using Colebrook-White formula.
// Eqv.roughness in LINK31 is 1 mm
  CW_LINK = 'LINK31',0.001
  CW_LINK = 'LINK32',0.001
  CW_LINK = 'LINK34',0.001
  CW_LINK = 'LINK36',0.001
  CW_LINK = 'LINK38',0.001
EndSect //COLEBROOKWHITE_FRICTION

[EFOR_PARAMETERS]
  SYNTAX_VERSION = 1.0 // 1.0 = VERSION 2001
  UNIT_TYPE = 1
  EFOR_COUPLING = 'C:\MOUSEPRO\TRAP_EFOR\RECIRC\cndp.efx',
5.3,0, 'C:\MOUSEPRO\TRAP_EFOR\RECIRC\temp5.efr', 0.08333,
'outlet1'
  EFOR_COMPONENT = 'CODTot', 'CODT' // The component 'CODTot'
// in the MOUSE setup will be transferred to EFOR as Total COD
// specified as 'CODT' within EFOR.

EndSect //EFOR_PARAMETERS
[PUMPMINCAPACITY]
  SYNTAX_VERSION = 1.0

// A lower capacity curve used for PID control is specified for
// the pump GMPS3-1 ( (-500,7.003), (56.9,6.736) ...
// (84.79,2.102), (500, 0) )

  [PUMPMINCAPACITYTABLE]
    PUMPID = 'GMPS3-1'
    H = -500.0, 56.90, 61.27, 64.50, 72.84, 74.87, 75.01,
76.28, 79.00, 84.79, 500.0
    Q = 7.003, 6.736, 6.337, 6.031, 5.135, 4.891, 4.870,
4.470, 3.797, 2.102, 0.0
  EndSect // PUMPMINCAPACITYTABLE
EndSect // PUMPMINCAPACITY

[PUMPQCOUPLINGS]
  SYNTAX_VERSION = 1.0
  PUMPQCOUPLING = 'GMPS3-1', 'GMPS3-2', 'GMPS3-3', 'GMPS3-4'
// The pumps GMPS3-1, GMPS3-2, GMPS3-3 and GMPS3-4 are
// synchronised to accommodate the highest flow given by one of
// the pumps.
EndSect // PUMPQCOUPLINGS

```