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3.   Data Files for Protocol - Model Input and Output Files

Since filenames for the model input files were limited to 8 characters, a system for naming the files was established. This is detailed below.

i.   The initial character identifies the model:

> A =   ADMS,
> E =   AERMOD and
> I =   ISC.

ii.   Characters 2 and 3 indicate the stack height or terrain case:

Stack heights:

> 00 =   ground level source,
> 04 =   40m stack and
> 15 =   150m stack.

Terrain case (all for 40m stack):

> T1 =   case 1,
> T2 =   case 2,
> T3 =   case 3,
> T4 =   case 4,
> T5 =   case 5,
> T6 =   case 6,
> G1 =   Gaussian hill, otherwise set-up as in case 1 and
> F2 =   flat terrain case, otherwise set-up as in case 2, (this test case was used for checking consistency between calculations with and without terrain).

iii.   Characters 4 and 5 identify the meteorological data:

Single hour calculations:

> NL =   Neutral, low windspeed,
> NH =   Neutral, high windspeed,
> UN =   Unstable and
> ST =   Stable.

Annual calculations:

> A1 =   Annual met data with $z_0 = 0.1$m (for ADMS and AERMOD), rural option for ISC,

A5 = Annual met data with $z_0 = 0.5$m (for ADMS and AERMOD), urban option for ISC,

AA = for ADMS only -Annual met data, in ADMS format, recompiled from ADMS met pre-processor output and

AE = for ADMS only -Annual met data, in ADMS format, compiled from AERMET output.

iv.   Where present, characters 6 and/or 7 identify the following options:

B = for test cases using buoyant stack emissions.

For the cases including a building:

25 =   for test cases using the 25m x 25m x 25m building,
35 =   for test cases using the 35m x 35m x 35m building and
W =   for test cases using the wide building - 35m x 35m x 245m.

And for test cases for buoyant plume/boundary layer interactions:

BL =   for boundary layer interaction run with 200m boundary layer height,
BM =   for boundary layer interaction run with 700m boundary layer height and
BH =   for boundary layer interaction run with 1200m boundary layer height.

v.   Finally, an additional character may be present to identify extra runs for the same basic test case, these are defined in full below each of the following tables. In summary, the following characters are used:

For flat terrain calculations:
    'X'   denotes run with boundary layer height set to 200m.

For boundary layer interaction calculations:
    'X'   denotes an extra run with extended calculation grid to cover greater downwind distances from the source.
    'C'   denotes a run with explicit capping inversion and no plume penetration of the boundary layer.
    'R'   denotes an extra run with a finer calculation grid close to the source.

Tables 1 to 7 give details of all the runs included in the protocol. The input and output files are available for download in zipped form as detailed below. (The file structure of the data files is given in Figure 1 in the pdf version of these notes.) The files for each section within the tables are contained in separate folders; for example hourly calculations, AERMOD, flat terrain (no building) files are contained in the folder '\hourly\aermod\flat'.

Downloads:
(Note: File sizes are given in parentheses.)

Summary of file structure (293kB): **pdf**

Model / Scenario	Input files	Output files
Annual Calculations:		
AERMOD[1]	All input files* (21kB)	
	Flat terrain, no building (5kB)	Flat terrain, no building (55MB)
	Flat terrain, with building (2kB)	Flat terrain, with building (20MB)
	Terrain cases (14kB)	Terrain cases (67MB)
ADMS[2]	All input files* (72kB)	
	Flat terrain, no building (16kB)	Flat terrain, no building (2.9MB)
	Flat terrain, with building (6kB)	Flat terrain, with building (1MB)
	Terrain cases (42kB)	Terrain cases (3.4MB)
	Extra met pre-processor calculations [3]	Extra met pre-processor calculations [3]
ISC[4]	All input files* (17kB)	
	Flat terrain, no building (5kB)	Flat terrain, no building (40MB)
	Flat terrain, with building (2kB)	Flat terrain, with building (13MB)
	Terrain cases (10kB)	Terrain cases (42MB)
Single Hour Calculations:		
AERMOD[5]	All input files* (71kB)	
	Flat terrain, no building (14kB)	Flat terrain, no building (712kB)
	Flat terrain, with building (8kB)	Flat terrain, with building (217kB)
	Boundary Layer Interaction (10kB)	Boundary Layer Interaction (273kB)
	Terrain cases (41kB)	Terrain cases (410kB)
ADMS[6]	All input files* (329kB)	
	Flat terrain, no building (53kB)	Flat terrain, no building (254kB)
	Flat terrain, with building (21kB)	Flat terrain, with building (104kB)
	Boundary Layer Interaction (30kB)	Boundary Layer Interaction (142kB)
	Terrain cases (227kB)	Terrain cases (259kB)
ISC[7]	All input files* (54kB)	
	Flat terrain, no building (13kB)	Flat terrain, no building (451kB)
	Flat terrain, with building (8kB)	Flat terrain, with building (151kB)
	Boundary Layer Interaction (7kB)	Boundary Layer Interaction (137kB)
	Terrain cases (29kB)	Terrain cases (308kB)

Notes:
* File contains all input data files for sub-section, e.g. files for all AERMOD annual calculations.

Details of the test cases included in each download are given in the following tables:
(1) see Table 1
(2) see Table 2, input zip file includes terrain data files (see Section 2.3 and Table 9)
(3) see Table 7
(4) see Table 3
(5) see Table 4
(6) see Table 5
(7) see Table 6, input zip file includes terrain data files (see Section 2.3 and Table 9).

Table 1. **Filenames for AERMOD test cases – Single hour calculations**.

Details	Neutral, Low wind speed	Neutral, High wind speed	Unstable	Stable
Flat terrain, no building				
40m stack, no buoyancy	E04NL	E04NH	E04UN	E04ST
40m stack, with buoyancy	E04NLB	E04NHB	E04UNB	E04STB
150m stack, no buoyancy	E15NL	E15NH	E15UN	E15ST
150m stack, with buoyancy	E15NLB	E15NHB	E15UNB	E15STB
Flat Terrain, with building				
Zero source height, no buoyancy, 35mx35mx35m building	E00NL35	E00NH35		
40m stack, no buoyancy, 25m x 25m x 25m building	E04NL25	E04NH25		
40m stack, no buoyancy, 35m x 35m x 35m building	E04NL35	E04NH35		
40m stack, no buoyancy, 35m x 35m x 245m building	E04NLW	E04NHW		
Plume/Boundary Layer Interaction				
150m stack, with buoyancy, 200m bl height	E15NLBL			E15STBL E15STBLC[2] E15STBLX[1]
150m stack, with buoyancy, 700m bl height	E15NLBM		E15UNBM E15UNBMR[3] E15UNBMC[2]	
150m stack, with buoyancy, 1200m bl height	E15NLBH		E15UNBH E15UNBHR[3] E15UNBHC[2]	
With terrain (all 40m stack, no buoyancy)				
Gaussian hill	EG1NL		EG1UN	EG1ST
Case1	ET1NL		ET1UN	ET1ST
Case2	ET2NL		ET2UN	ET2ST
Case3	ET3NL		ET3UN	ET3ST
Case4	ET4NL		ET4UN	ET4ST
Case5	ET5NL		ET5UN	ET5ST ET5STX[1]
Case6	ET6NL		ET6UN	ET6ST
Flat terrain	EF2NL		EF2UN	EF2ST

Notes: All files have the filename extension '.dat'
1. 'X' denotes extra run with extended grid to enable calculation further downwind.
2. 'C' denotes run with explicit capping inversion.
3. 'R' denotes extra run with refined grid close to source.

Table 2. Filenames for AERMOD test cases – Annual calculations.

Details	$z_0 = 0.1$m	$z_0 = 0.5$m
Flat terrain, no building		
40m stack, no buoyancy	E04A1	E04A5
40m stack, with buoyancy	E04A1B	
150m stack, no buoyancy	E15A1	
150m stack, with buoyancy	E15A1B	E15A5B
Flat Terrain, with building		
40m stack, no buoyancy, 25m x 25m x 25m building	E04A125	
40m stack, no buoyancy, 35m x 35m x 35m building	E04A135	
With terrain (all 40m stack, no buoyancy)		
Case1	EC1A1	
Case2	EC2A1	
Case3	EC3A1	
Case4	EC4A1	
Case5	EC5A1	
Case6	EC6A1	
Flat terrain	EF2A1	

Note: All files have the filename extension '.dat'

Table 3.   Filenames for ADMS test cases – Single hour calculations.

Details	Neutral, Low wind speed	Neutral, High wind speed	Unstable	Stable
<u>Flat terrain, no building</u>				
40m stack, no buoyancy	A04NL	A04NH	A04UN	A04ST A04STX[1]
40m stack, with buoyancy	A04NLB	A04NHB	A04UNB	A04STB A04STBX[1]
150m stack, no buoyancy	A15NL	A15NH	A15UN	A15ST A15STX[1]
150m stack, with buoyancy	A15NLB	A15NHB	A15UNB	A15STB A15STBX[1]
<u>Flat Terrain, with building</u>				
Zero source height, no buoyancy, 35mx35mx35m building	A00NL35	A00NH35		
40m stack, no buoyancy, 25m x 25m x 25m building	A04NL25	A04NH25		
40m stack, no buoyancy, 35m x 35m x 35m building	A04NL35	A04NH35		
40m stack, no buoyancy, 35m x 35m x 245m building	A04NLW	A04NHW		
<u>Plume/Boundary Layer Interaction</u>				
150m stack, with buoyancy, 200m bl height	A15NLBL			A15STBL A15STBLX[2] A15STBLC[3]
150m stack, with buoyancy, 700m bl height	A15NLBM		A15UNBM A15UNBMR[4] A15UNBMC[3]	
150m stack, with buoyancy, 1200m bl height	A15NLBH		A15UNBH A15UNBHR[4] A15UNBHC[3]	
<u>With terrain (all 40m stack, no buoyancy)</u>				
Gaussian hill	AG1NL		AG1UN	AG1ST
Case1	AT1NL		AT1UN	AT1ST
Case2	AT2NL		AT2UN	AT2ST AT2STX[2]
Case3	AT3NL		AT3UN	AT3ST
Case4	AT4NL		AT4UN	AT4ST
Case5	AT5NL		AT5UN	AT5ST AT5STX[2]
Case6	AT6NL		AT6UN	AT6ST
Flat terrain	AF2NL		AF2UN	AF2ST

Notes: All files have the filename extension '.apl'
1. 'X' denotes run with boundary layer height set to 200m.
2. 'X' denotes extra run with extended grid to enable calculation further downwind.
3. 'C' denotes run with explicit capping inversion.
4. 'R' denotes extra run with refined grid close to source.

Table 4. Filenames for ADMS test cases – Annual calculations.

Details	$z_0 = 0.1$m	$z_0 = 0.5$m
Flat terrain, no building		
40m stack, no buoyancy	A04A1	A04A5
40m stack, with buoyancy	A04A1B	
150m stack, no buoyancy	A15A1	
150m stack, with buoyancy	A15A1B	A15A5B
Flat Terrain, with building		
40m stack, no buoyancy, 25m x 25m x 25m building	A04A125	
40m stack, no buoyancy, 35m x 35m x 35m building	A04A135	
With terrain (all 40m stack, no buoyancy)		
Case1	AT1A1	
Case2	AT2A1	
Case3	AT3A1	
Case4	AT4A1	
Case5	AT5A1	
Case6	AT6A1	
Flat terrain	AF2A1	

Note: All files have the filename extension '.apl'

Table 5. **Filenames for ISC test cases – Single hour calculations**.

Details	Neutral, Low wind speed	Neutral, High wind speed	Unstable	Stable
Flat terrain, no building				
40m stack, no buoyancy	I04NL	I04NH	I04UN	I04ST
40m stack, with buoyancy	I04NLB	I04NHB	I04UNB	I04STB
150m stack, no buoyancy	I15NL	I15NH	I15UN	I15ST
150m stack, with buoyancy	I15NLB	I15NHB	I15UNB	I15STB
Flat Terrain, with building				
Zero source height, no buoyancy, 35mx35mx35m building	I00NL35	I00NH35		
40m stack, no buoyancy, 25m x 25m x 25m building	I04NL25	I04NH25		
40m stack, no buoyancy, 35m x 35m x 35m building	I04NL35	I04NH35		
40m stack, no buoyancy, 35m x 35m x 245m building	I04NLW	I04NHW		
Plume/Boundary Layer Interaction				
150m stack, with buoyancy, 200m bl height	I15NLBL			I15STBL I15STBLX[1]
150m stack, with buoyancy, 700m bl height	I15NLBM		I15UNBM I15UNBMR[2]	
150m stack, with buoyancy, 1200m bl height	I15NLBH		I15UNBH I15UNBHR[2]	
With terrain (all 40m stack, no buoyancy)				
Gaussian hill	IG1NL		IG1UN	IG1ST
Case1	IT1NL		IT1UN	IT1ST
Case2	IT2NL		IT2UN	IT2ST
Case3	IT3NL		IT3UN	IT3ST
Case4	IT4NL		IT4UN	IT4ST
Case5	IT5NL		IT5UN	IT5ST
Case6	IT6NL		IT6UN	IT6ST
Flat terrain	IF2NL		IF2UN	IF2ST

Notes: All files have the filename extension '.dat'
1. 'X' denotes extra run with extended grid to enable calculation further downwind.
2. 'R' denotes extra run with refined grid close to source.

Table 6. Filenames for ISC test cases – Annual calculations.

Details	$z_0 = 0.1m$	$z_0 = 0.5m$
Flat terrain, no building		
40m stack, no buoyancy	I04A1	I04A5
40m stack, with buoyancy	I04A1B	
150m stack, no buoyancy	I15A1	
150m stack, with buoyancy	I15A1B	I15A5B
Flat Terrain, with building		
40m stack, no buoyancy, 25m x 25m x 25m building	I04A125	
40m stack, no buoyancy, 35m x 35m x 35m building	I04A135	
With terrain (all 40m stack, no buoyancy)		
Case1	IC1A1	
Case2	IC2A1	
Case3	IC3A1	
Case4	IC4A1	
Case5	IC5A1	
Case6	IC6A1	
Flat terrain	IF2A1	

Note: All files have the filename extension '.dat'

Table 7.   Filenames for ADMS test cases to investigate effects of meteorological pre-processors – Annual calculations.

Details	With ADMS Met Data Separate Input	With AERMET Met Data Separate Input
Flat terrain, no building		
40m stack, no buoyancy	A04AA	A04AE
150m stack, with buoyancy	A15AAB	A15AEB

Note: All files have the filename extension '.apl'

4.   Data Files for Protocol - Meteorological Data Files.

Meteorological data from Lyneham for 1995 were used in the intercomparison study. The data were obtained from the UK Meteorological Office in two formats; firstly for ADMS and, after processing through AERMET, for AERMOD; secondly in a form suitable for input to ISC. The UK Meteorological Office have kindly agreed to allow the data to be made available here for further intercomparison studies.

We have also, with their permission, included the equivalent meteorological data files from Trinity Consultants Inc. for comparative purposes. These are also Meteorological Office data, but are obtained via the National Climatic Data Centre (NCDC), Washington, and are processed slightly differently. A more detailed discussion can be found in 'Meteorological Data and Dispersion Modelling', which can be downloaded in Section 6 of this Archive.

These data were used in the supplied forms for the annual calculations. For ADMS, the hourly calculations were carried out by supplying the required meteorological data

within the model input files. However in order to run the hourly calculations in AERMOD and ISC, calculations were made for selected hours within the year. For direct comparison between the models, some editing of the basic meteorological files was necessary. For example, the wind direction for the required hours was changed to 270°, or westerly, for convenience. There were also some changes needed for the calculations involving boundary layer interaction. The resulting data files are all included in the dataset and are detailed in Table 8.
A zip file containing all the meteorological data is provided for downloading:

Downloads:

Meteorological data (2.7MB):	Metdata.zip

Table 8. Meteorological Data Files.

Description	Filenames			
	For ADMS	**For AERMOD**		**For ISC**
		Surface data (.sfc)	**Profile data (.pfl)**	
Data for Annual Calculations:				
Annual data ($z_0 = 0.1m$ or 'rural')	Lyne95.met[1]	Lyne95.sfc	Lyne95.pfl	Lyne95.asc[1]
Annual data ($z_0 = 0.5m$ or 'urban')	Lyne95.met	Lyne95_05.sfc	Lyne95_05.pfl	Lyne95.asc
Data for Hourly Calculations: (wind direction set to westerly for selected hours)	*	Lyne_w.sfc	Lyne_w.pfl	Lyne95_w.asc (Terr95.asc for terrain cases)
Data for boundary layer interaction calculations:				
200m boundary layer	*	E15LBL.sfc	E15.pfl	I15BL.asc
700m boundary layer	*	E15BM.sfc	E15.pfl	I15BM.asc
1200m boundary layer	*	E15BH.sfc	E15.pfl	I15BH.asc
200m boundary layer and explicit capping inversion	*	E15STBLC.sfc	E15.pfl	No ISC calculations
700m boundary layer and explicit capping inversion	*	E15UNBMC.sfc	E15.pfl	No ISC calculations
1200m boundary layer and explicit capping inversion	*	E15UNBHC.sfc	E15.pfl	No ISC calculations
Data for Annual Calculations investigating effects of meteorological preprocessors:				
ADMS met data – separate input	Ly95adms.met	No AERMOD or ISC calculations		
AERMET met data	Ly95aeromod.met			

* Met data for single hour ADMS calculations are included in .apl input file
(1) these files are the datafiles as supplied by the UK Meteorological Office

Trinity Consultants versions of meteorological data for Lyneham 1995 :

ADMS format	03740_95.asc
ISC format	03740_95.met

5. Data Files for Protocol - Terrain Data Files.

For the calculations with terrain, ADMS requires separate input data files of terrain heights. These files are listed in Table 9 and included in the dataset.

For AERMOD and ISC the necessary terrain data are included within the individual input datafiles listed in Tables 1,2,5 and 6. However, for plotting purposes or for use in other models, the '.grd' files corresponding to the ADMS '.ter' files are included in the dataset and are detailed in Table 10.

A zip file containing all the terrain data is provided for downloading:
Downloads:

Terrain files (215kB):   Terraindata.zip

Table 9.   ADMS Terrain Datafiles.

Scenario	Terrain Datafiles	
	Annual Calculations	**Hourly Calculations**
Case 1	AT1A1.ter	AT1.ter
Case 2	AT2A1.ter	AT2.ter
Case 2 – extended grid	*	AT2X.ter
Case 3	AT3A1.ter	AT3.ter
Case 4	AT4A1.ter	AT4.ter
Case 5	AT5A1.ter	AT5.ter
Case 5 – extended grid	*	AT5X.ter
Case 6	AT6A1.ter	AT6.ter
Gaussian hill	*	AG1.ter

* No extended grid or Gaussian hill test cases for annual calculations

Table 10.   AERMOD/ISC Terrain Datafiles.

Scenario	Terrain Datafiles	
	Annual Calculations	**Hourly Calculations**
Case 1	T1A1.grd	T1.grd
Case 2	T2A1.grd	T2.grd
Case 2 – extended grid	*	T2B.grd
Case 3	T3A1.grd	T3.grd
Case 4	T4A1.grd	T4.grd
Case 5	T5A1.grd	T5.grd
Case 5 – extended grid	*	T5X.grd
Case 6	T6A1.grd	T6.grd
Gaussian hill	*	G1.grd

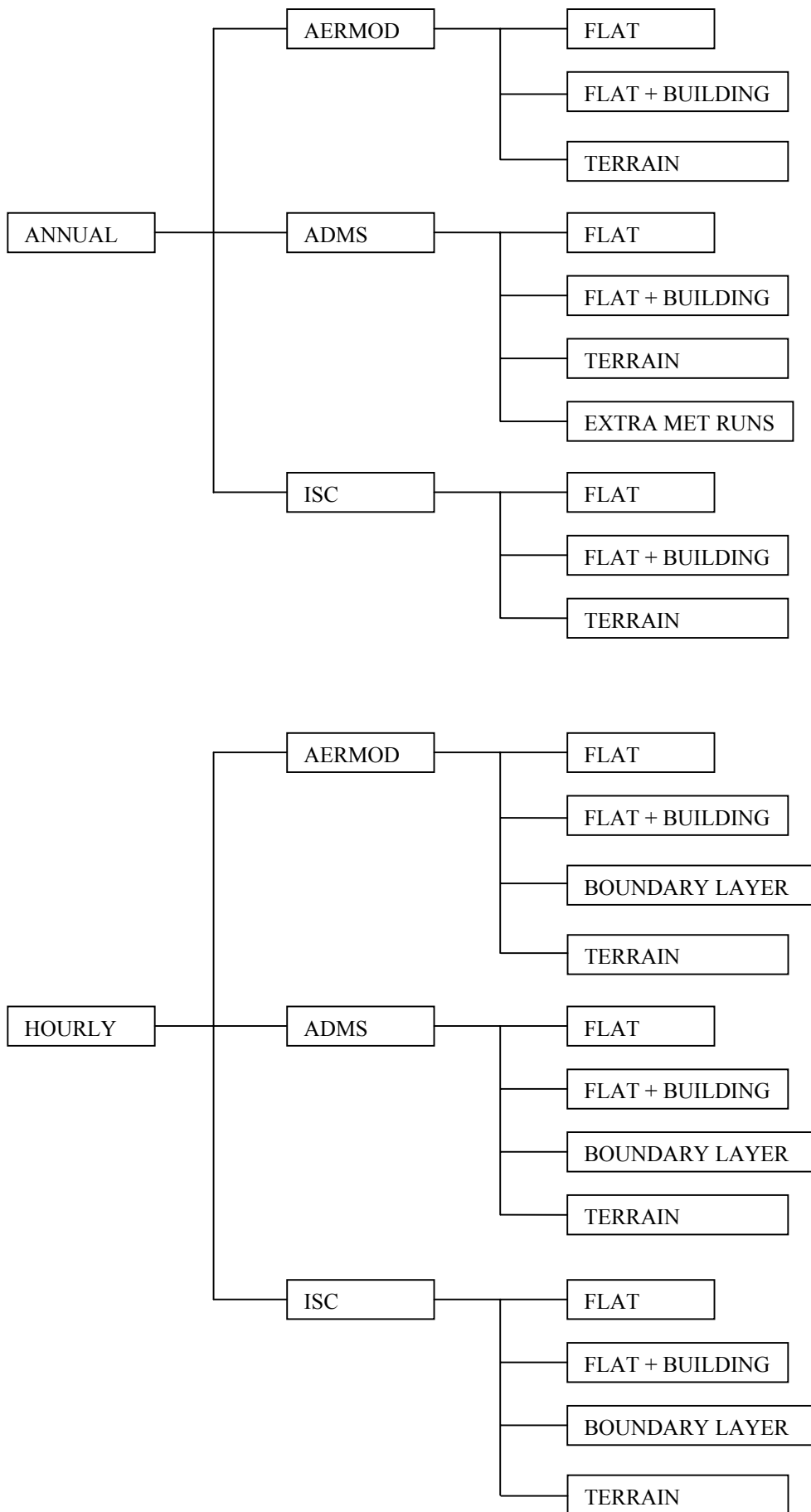* No extended grid or Gaussian hill test cases for annual calculations

Figure 1.   File Structure of Model Input Datafiles.