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Description: This Operation is based on the soil moisture accounting portion of the Sacramento Model [Burnash et. al., 1973].

A complete description of this Operation is in Chapter II.3-SAC-SMA [[Hyperlink](#)].

In addition to the basic soil moisture accounting model the following provisions are included in this Operation:

1. If an areal extent of snow time series is used then the

evapotranspiration (ET) demand is reduced by the following equation when snow is on the ground:

$$E_s = EFC * E_d + (1.0 - EFC) * (1.0 - S_c) * E_d$$

where E_s is the ET-demand with snow on the ground
 E_d is the ET-demand without snow on the ground
EFC is the effective forest cover parameter
 S_c is the areal extent of snow cover expressed as

2. The ET-demand can be uniform throughout the day or can have a fixed diurnal variation. It is recommended that in most cases the uniform ET-demand rate be used. The use of a diurnally varying ET-demand rate, though more physically realistic, will not result in the correct loss of water due to evapotranspiration from riparian vegetation. The fixed diurnal ET-demand variation expressed as percent/100 of daily ET-demand that is applied each hour is as follows:

<u>Hour (local time)</u>	<u>Portion of ET-demand</u>
1-8	0.00
9	0.02
10	0.05
11	0.10
12	0.16
13	0.20
14	0.18
15	0.14
16	0.09
17	0.05
18	0.01
19-24	0.00

2. A precipitation multiplying factor is provided for possible use during an operational program run. This precipitation multiplier is only applied during the computational period (i.e., period with observed data).

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References:

Burnash, Robert J.C., Ferral, R. Larry and McGuire, Richard A., 1973: 'A Generalized Streamflow Simulation System - Conceptual Modeling for Digital Computers', Joint Federal-State River Forecast Center, Sacramento, California, 204 pp.

Anderson, Eric A. and Neuman, Patrick J.: 'Inclusion of Frozen Ground Effects in a Flood Forecasting Model', Proceedings of the Fifth Northern Research Basins Symposium and Workshop, Vierumaki, Finland, March 19-23, 1984.

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Allowable Data Time Intervals: 1, 2, 3, 4, 6, 8, 12 and 24 hours

Time Series Used: Time series used in this Operation are as follows:

<u>General Type</u>	<u>Dimn</u>	<u>Units</u>	<u>Use</u>	<u>Required</u>	<u>Form of Output T.S.</u>	<u>Data Time Interval</u>	<u>Missing Values Allowed</u>
Precipitation (rain + melt)	L	MM	I	yes	n/a	any	no
Channel inflow (runoff)	L	MM	O	yes	replaces	any <u>1/</u>	no
Potential ET	L	MM	I	no	n/a	24	no
Areal extent of snow	DLES	PCTD	I	no	n/a	any <u>2/</u>	no
Runoff components (data type code ROCL) <u>3/</u>	L	MM	O	no	replaces	any <u>2/</u>	no
Soil moisture storages (data type code SMZC) <u>4/</u>	L	MM	O	no	replaces	any <u>2/</u>	no

Notes:

- 1/ Must be the same as the time interval for rain plus melt data.
- 2/ Must be a multiple of the time interval for rain plus melt data.
- 3/ The 7 runoff components (ROCL) data values per time interval are:
 - (1) total channel inflow
 - (2) impervious runoff
 - (3) direct runoff
 - (4) surface runoff
 - (5) interflow
 - (6) supplemental baseflow
 - (7) primary baseflow
- 4/ The 5 soil moisture storages (SMZC) data values per time interval are:
 - (1) upper zone tension water deficit (UZTWM-UZTWC)
 - (2) upper zone free water contents (UZFWC)
 - (3) lower zone tension water deficit (LZTWM-LZTWC)
 - (4) lower zone free supplemental contents (LZFSFC)
 - (5) lower zone free primary contents (LZFPC)

Input Summary: The card input for this Operation is as follows:

<u>Card</u>	<u>Format</u>	<u>Columns</u>	<u>Contents</u>
1	5A4	1-20	General heading information
	8X,I2	29-30	Data time interval of precipitation (rain plus melt) and channel inflow data
	2X,2A4	33-40	Internal identifier for the precipitation (rain plus melt) time series
	1X,A4	42-45	Data type code for precipitation time series
	7X,2A4	53-60	Identifier for the channel inflow (runoff) time series
	1X,A4	62-65	Data type code for runoff time series
2	2X,2A4	3-10	Identifier for areal extent of snow time series; blank if none
	1X,A4	12-15	Data type code for areal extent of snow time series (blank if not used)
	3X,I2	19-20	Data time interval of areal extent of snow cover time series (blank if not used)
	2X,2A4	23-30	Identifier for runoff components time series; data type code is 'ROCL'; blank if none
	2X,2A4	33-40	Identifier for soil moisture storage time series; data type code is 'SMZC'; blank if none
	1X,A4	42-45	Option to store sums of water balance, runoff and evapotranspiration (ET) components for execution period (default is to not store sums); enter 'SUMS' if sums are to be stored
	1X,A4	47-50	Enter 'PRST' to print detailed soil moisture output (blank otherwise); this option is used when running Calibration System program (MCP3 or OPT3) and the months to print are controlled by card 7; if running the Operational Forecast System program FCST use the Technique PRINTSMA to set this option
	3X,I2	54-55	Data time interval of the runoff

<u>Card</u>	<u>Format</u>	<u>Columns</u>	<u>Contents</u>
			components time series (default is 24 hours)
	3X,I2	59-60	Data time interval of the soil moisture storage time series (default is 24 hours)
	1X,A4	62-65	Enter 'FRZE' to use the frozen ground portion of the Sacramento Model; this option is used when running Calibration System program (MCP3 or OPT3); if running the Operational Forecast System program FCST use the Technique FROST to set this option
3	20X,F5.2	21-25	PXADJ (precipitation adjustment factor); this factor may have been applied in a preceding snow model Operation
	F5.2	26-30	PEADJ (ET-demand adjustment factor)
	F5.0	31-35	UZTWM (upper zone tension water capacity; units of MM)
	F5.0	36-40	UZFWM (upper zone free water capacity; units of MM)
	F5.2	41-45	UZK (fractional daily upper zone free water withdrawal rate)
	F5.2	46-50	PCTIM (minimum impervious area; units of percent/100)
	F5.2	51-55	ADIMP (additional impervious area; units of percent/100)
	F5.2	56-60	RIVA (riparian vegetation area; units of percent/100)
	I5	61-65	Diurnal evapotranspiration (ET) variation option (default is uniform distribution of daily ET-demand); enter value greater than zero to use diurnal variation (it is recommended that the default option be generally used)
	F5.2	66-70	EFC (effective forest cover; units of percent/100)
4	20X,F5.1	21-25	ZPERC (PBASE*(1+ZPERC) is the maximum percolation rate)
	F5.1	26-30	REXP (exponent for the percolation

<u>Card</u>	<u>Format</u>	<u>Columns</u>	<u>Contents</u>
			equation)
	F5.0	31-35	LZTWM (lower zone tension water capacity; units of MM)
	F5.0	36-40	LZFSM (lower zone supplemental free water capacity; units of MM)
	F5.0	41-45	LZFPM (lower zone primary free water capacity; units of MM)
			Note: LZFSM and LZFPM are input as total values and not just as the visible (channel component) portion
	F5.2	46-50	LZSK (fractional daily supplemental withdrawal rate)
	F5.2	51-55	LZPK (fractional daily primary withdrawal rate)
	F5.2	6-60	PFREE (percent/100 of percolated water which always goes directly to lower zone free water storages)
	F5.2	61-65	RSERV (percent/100 of lower zone free water which cannot be transferred to lower zone tension water)
	F5.2	66-70	SIDE (ratio of non-channel baseflow (deep recharge) to channel (visible) baseflow)
5	2X,2A4	3-10	Identifier for potential evapotranspiration (ET) time series (blank if none used)
	1X,A4	12-15	Data type code for potential evapotranspiration (ET) time series (blank if none used)
	5X,12F4.2	21-68	ET-demand or PE-adjustment factor for the 16th of each month (January through December; units of MM/day); daily values are computed by linear interpolation; if PE data used then values are PE-adjustments; if PE data not used then values represent ET-demand
6			Initial carryover values for the state variables:
	20X,F5.0	21-25	UZTWC (upper zone tension water

<u>Card</u>	<u>Format</u>	<u>Columns</u>	<u>Contents</u>
			contents; units of MM)
	F5.0	26-30	UZFWC (upper zone free water contents; units of MM)
	F5.0	31-35	LZTWC (lower zone tension water contents; units of MM)
	F5.0	36-40	LZFSC (lower zone free supplemental contents; units of MM)
	F5.0	41-45	LZFPFC (lower zone free primary contents; units of MM)
	F5.0	6-50	ADIMC (tension water contents of the ADIMP area; units of MM; if not known then use UZTWC+LZTWC)
	4X,I1	55	Read additional carryover indicator: 0 = set additional carryover to default values 1 = read additional carryover

Card 6A needed only if read additional carryover indicator (column 55 of Card 6) is set to one and either PE, snow cover or runoff component time series are used.

6A	7F5.0	1-35	Current values of runoff components time series; see Note <u>3</u> / under Time Series Used
	5X,F5.0	41-45	Previous PE value
	F5.0	46-50	Previous snow cover value

Card 7 needed only if this is a Calibration System program (MCP3 or OPT3) and detailed output was requested on Card 2.

7	14I5	1-70	Months for which detailed output is to be printed; form of input is month, year, month, year, etc.; years are 4 digits; months must be in chronological order; maximum of 7 months can be entered
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Cards F1, F2 and F3 are needed only if 'FRZE' was specified in columns 62-65 of Card 2. 1/ 2/ 3/

F1	2X,A8	3-10	Identifier of air temperature time series
	1X,A4	12-15	Data type code of air temperature time series

<u>Card</u>	<u>Format</u>	<u>Columns</u>	<u>Contents</u>
	3X,I2	19-20	Data time interval of air temperature time series
	17X,A8	38-45	Identifier of water equivalent time series; blank if none
	1X,A4	47-50	Data type code of water equivalent time series
	3X,I2	54-55	Data time interval of water equivalent time series
	2X,A8	58-65	Identifier of frost index time series; blank if none; data type code is set to 'FGIX'
	3X,I2	69-70	Data time interval of frost index time series
F2			Frozen ground model parameters (symbols in brackets are those used in the reference 'Inclusion of Frozen Ground Effects in a Flood Forecasting Model'):
	F5.0	1-5	CSOIL (units of $\text{DEGC}^{-1} \cdot \text{HR}^{-1}$) [Cg]; bare ground frost coefficient for a given time interval
	F5.0	6-10	CSNOW [Cs]; reduction in CSOIL per MM of snow water equivalent
	F5.0	11-15	GCH (units of DEGC/DAY) [Hc]; daily thaw rate from ground head
	F5.0	16-20	RTHAW (units of DEGC/MM) [Ct]; thaw coefficient for water entering the soil
	F5.0	21-25	FRTEMP (units of DEGC) [FI]; FI value above which there is no reduction in percolation or interflow withdrawal
	F5.0	26-30	SATR (units of $\text{DEGC}^{-1} \cdot \text{HR}^{-1}$) [Cr]; reduction in percolation and interflow withdrawal per DEGC of FI below FI1 under saturated soil conditions
	F5.0	30-35	FREXP [x]; exponent
F3	F5.0	1-5	FINDX (units of DEGC) [FI]; initial value of the frost index (if starting with no frozen ground the value is zero)
	F5.0	31-35	PTA (units of DEGC) [Ta]; initial value

<u>Card</u>	<u>Format</u>	<u>Columns</u>	<u>Contents</u>
			of the air temperature
	F5.0	36-40	PWE (units of MM) [W]; initial value of the snow water equivalent

Notes:

- 1/ Parameter and state variable names are not printed as part of the Operation summary. The parameters are identified as FGPARM(1), FGPARM(2), etc. The parameter values are printed in the same order that they are input.
- 2/ When using the Interactive Calibration Program (ICP) the parameter values must be changed using the Edit Deck menu option. They cannot be changed using the Selected Parameters option.
- 3/ If the parameter SATR is set to zero the frost index can be computed and displayed as part of the SAC-SMA model panel in ICP but the frozen ground algorithms will not change the percolation or interflow withdrawal rates in the model. This is a way to see whether the frost index should be used to modify the Sacramento Model computations. Values of SATR that are greater than zero cause the percolation in interflow withdrawal rates to decrease whenever the frost index drops below the value of the FRTEMP parameter.

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Sample Input and Output: Sample input is shown in Figure 1 [\[Bookmark\]](#). Sample output from the print parameter and print carryover routines is shown in Figure 2 [\[Bookmark\]](#). Sample output from the execution routine is shown in Figure 3 [\[Bookmark\]](#).

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Error and Warning Messages: The error and warning messages generated by this Operation and the corrective action to take when they occur are as follows:

A. Messages that can occur during setup.

1. ****ERROR**** TIME INTERVAL=nn ONLY IN INTERVALS OF 1, 2, 3, 4, 6, 8, 12 AND 24 HOURS ARE ALLOWED.

Action: Use an allowable computational time interval.

2. ****WARNING**** NOTE THAT PXADJ MAY HAVE ALREADY BEEN APPLIED BY A SNOW MODEL OPERATION.

Action: Make sure that PXADJ has not been applied twice.

3. ****WARNING**** nn PARAMETERS WERE CHANGED BECAUSE THEY WERE ASSIGNED IMPOSSIBLE VALUES.

Action: Check that revised values are okay.

B. Messages that can occur during execution.

1. ****WARNING**** INITIAL STATE VARIABLES CONTAIN IMPOSSIBLE VALUES.

Action: Check the revised values.

2. ****WARNING**** WATER BALANCE RESIDUAL EXCEEDS 1 MM. RESIDUAL=nnnn.

Action: Operation is not executing properly.

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Carryover Transfer Rules: The following rules apply to the 6 state variables during the carryover transfer process:

1. UZTWC and LZTWC: the deficit (i.e., capacity-contents) is retained as long as the contents do not go below zero
2. UZFWC: value remains the same as long as UZFWC is less than or equal to UZFWM
3. LZFSC and LZFPC: the channel component of the withdrawal from these storages remain the same as long as the contents are less than or equal to the capacities. The equation used is:

$$LZFSC_n = LZFSC_o * (LZSK_o / LZSK_n) * ((1 + SIDE_n) / (1 + SIDE_o))$$

where the subscripts n and o signify new and old values, respectively. A similar equation is used for LZFPC.

4. ADIMC: the deficit (i.e., UZTWM+LZTWM-ADIMC) is retained as long as ADIMC is greater than or equal to UZTWC

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Card Punch Limitations: The punched card formats for this Operation are as follows. No checks are made to determine if values exceed the maximum allowable value.

<u>Parameter or Variables</u>	<u>Punch Format</u>	<u>Maximum Value</u>	<u>Precision After Decimal Point</u>
LZTWM, LZFPM, LZTWC, LZFPC, ADIMC	F5.0	9999.	none
UZTWM, UZFWM, ZPERC, LZFSM, UZTWC, UZFWC, LZFSC	F5.1	999.9	tenths
REXP, SIDE	F5.2	99.99	hundredths
PXADJ, PEADJ, UZK, PCTIM,	F5.3	9.999	thousandths

<u>Parameter or Variables</u>	<u>Punch Format</u>	<u>Maximum Value</u>	<u>Precision After Decimal Point</u>
ADIMP, RIVA, EFC, LZSK, PFREE, RSERV			
LZPK	F5.4	.9999	ten-thousandths
PE-adjustment curve	F4.2	9.99	hundredths
ET-demand curve	F4.1	99.9	tenths

Figure 1. Sample card input for Operation SAC-SMA

```

-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
      10      20      30      40      50      60      70      80
SAC-SMA
WET-DRY CYCLE TEST          6  WET-DRY  MAP          WET-DRY  INFW
                               SUMS PRST
                               1.0  1.0  50.  20.  0.4  .01  .10  .05          0.0
                               29.  2.0 200.  50. 250.  .15 .006  0.2  0.3  0.0
TEST-PE  PTPE              1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0
                               30.0  0.0 175.  0.0 150. 205.

```

Figure 2. Sample output from Operation SAC-SMA print parameter and print carryover routines

```

SACRAMENTO SOIL-MOISTURE ACCOUNTING OPERATION FOR  WET-DRY CYCLE TEST

      COMPUTATIONAL TIME INTERVAL IS  6 HOURS.

      TIME SERIES USED BY THIS OPERATION.

      CONTENTS              I.D.      TYPE      TIME INTERVAL
RAIN+MELT                  WET-DRY   MAP        6 HOURS
CHANNEL INFLOW(RUNOFF)    WET-DRY   INFW       6 HOURS
POTENTIAL ET              TEST-PE   PTPE       24 HOURS

SUMS OF WATER BALANCE VARIABLES ARE STORED.

DETAILED SOIL-MOISTURE OUTPUT WILL BE PRINTED.
FOR MONTHS  6/1978  7/1978

PARAMETER VALUES - CAPACITIES ARE IN MM.

PX-ADJ  PE-ADJ  UZTWM  UZFWM  UZK  PCTIM  ADIMP  RIVA  EFC  DAILY ET  DIST.
 1.000  1.000   50.   20.  0.400  0.010  0.100  0.050  0.0  UNIFORM

PBASE  ZPERC  REXP  LZTWM  LZFSM  LZFFM  LZSK  LZPK  PFREE  RSERV  SIDE
 9.0   29.0   2.00  200.   50.   250.  0.1500  0.0060  0.20  0.30  0.0

16TH OF MONTH VALUES      1    2    3    4    5    6    7    8    9    10   11   12
PE-ADJUSTMENT              1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00  1.00

SOIL-MOISTURE CONTENTS(MM) FOR  WET-DRY CYCLE TEST

UZTWC  UZFWC  LZTWC  LZFSC  LZFFC  ADIMC
 30.   0.0  175.   0.0  150.  205.

```

Figure 3. Sample output from Operation SAC-SMA execution routine

DETAILED SOIL-MOISTURE ACCOUNTING OUTPUT FOR WET-DRY CYCLE TEST											6/1978	TIME ZONE=INTL			UNITS ARE MM.		
DAY HR	UZWTC	UZFWC	LZTWC	LZFSC	LZFPFC	ADIMC	PERC	IMP	DIR	SUR	INT	SUP	PRI	TOT-RO	ET-DMD	ACT-ET	
RAIN+MELT																	
1 6	40.00	0.0	175.00	0.0	149.77	215.00	0.0	0.100	0.0	0.0	0.0	0.0	0.201	0.301	0.0	0.0	10.00
1 12	50.00	4.000	175.00	0.0	149.55	225.94	0.0	0.140	0.306	0.0	0.0	0.0	0.200	0.647	0.0	0.0	14.00
1 18	50.00	14.484	178.67	0.473	149.76	229.37	4.593	0.160	1.257	0.0	0.822	0.005	0.200	2.444	0.0	0.0	16.00
1 24	50.00	20.000	186.37	1.433	150.47	232.55	9.615	0.300	2.461	11.441	2.013	0.032	0.201	16.448	0.0	0.0	30.00
2 6	50.00	18.699	193.60	2.290	151.12	234.15	9.048	0.100	0.839	0.0	2.004	0.065	0.202	3.211	0.0	0.0	10.00
2 12	50.00	20.000	200.00	3.258	151.92	235.92	8.503	0.150	1.283	2.582	2.083	0.094	0.203	6.396	0.0	0.0	15.00
2 18	50.00	15.672	200.00	6.696	155.30	236.58	7.236	0.050	0.433	0.0	1.862	0.171	0.205	2.722	0.0	0.0	5.00
2 24	50.00	9.272	200.00	8.799	157.57	236.58	4.922	0.0	0.0	0.0	1.316	0.274	0.209	1.798	0.0	0.0	0.0
3 6	48.75	5.453	200.00	9.879	158.88	235.33	2.991	0.0	0.0	0.0	0.737	0.327	0.211	1.275	1.250	1.237	0.0
3 12	47.53	3.235	200.00	10.294	159.53	234.09	1.727	0.0	0.0	0.0	0.436	0.358	0.213	1.007	1.250	1.231	0.0
3 18	46.34	1.841	200.00	10.411	159.85	232.86	1.144	0.0	0.0	0.0	0.223	0.365	0.213	0.801	1.250	1.226	0.0
3 24	45.18	1.050	200.00	10.273	159.91	231.63	0.648	0.0	0.0	0.0	0.127	0.369	0.214	0.709	1.250	1.220	0.0
4 6	44.05	0.599	200.00	9.996	159.81	230.41	0.370	0.0	0.0	0.0	0.073	0.364	0.214	0.649	1.250	1.214	0.0
4 12	42.95	0.340	200.00	9.643	159.62	229.20	0.212	0.0	0.0	0.0	0.041	0.354	0.214	0.608	1.250	1.209	0.0
4 18	41.88	0.193	199.96	9.271	159.39	227.99	0.121	0.0	0.0	0.0	0.023	0.342	0.214	0.577	1.250	1.203	0.0
4 24	40.83	0.109	199.85	8.908	159.16	226.80	0.069	0.0	0.0	0.0	0.013	0.329	0.213	0.553	1.250	1.198	0.0
5 6	39.81	0.061	199.70	8.557	158.93	225.60	0.039	0.0	0.0	0.0	0.007	0.316	0.213	0.534	1.250	1.193	0.0
5 12	38.82	0.034	199.51	8.219	158.69	224.42	0.022	0.0	0.0	0.0	0.004	0.303	0.213	0.517	1.250	1.188	0.0
5 18	37.85	0.019	199.30	7.893	158.45	223.24	0.013	0.0	0.0	0.0	0.002	0.291	0.212	0.503	1.250	1.183	0.0
5 24	36.90	0.011	199.06	7.579	158.21	222.07	0.007	0.0	0.0	0.0	0.001	0.280	0.212	0.490	1.250	1.178	0.0
6 6	35.98	0.006	198.80	7.278	157.98	220.90	0.004	0.0	0.0	0.0	0.001	0.269	0.212	0.478	1.250	1.173	0.0
6 12	35.08	0.006	198.53	6.988	157.74	219.75	0.0	0.0	0.0	0.0	0.0	0.258	0.211	0.466	1.250	1.168	0.0
6 18	34.20	0.006	198.23	6.710	157.50	218.59	0.0	0.0	0.0	0.0	0.0	0.248	0.211	0.455	1.250	1.163	0.0
6 24	33.35	0.006	197.92	6.443	157.27	217.45	0.0	0.0	0.0	0.0	0.0	0.238	0.211	0.444	1.250	1.158	0.0
7 6	32.51	0.006	197.59	6.186	157.03	216.31	0.0	0.0	0.0	0.0	0.0	0.228	0.210	0.434	1.250	1.154	0.0
7 12	31.70	0.006	197.24	5.940	156.79	215.17	0.0	0.0	0.0	0.0	0.0	0.219	0.210	0.425	1.250	1.149	0.0
7 18	30.91	0.006	196.88	5.704	156.56	214.04	0.0	0.0	0.0	0.0	0.0	0.210	0.210	0.415	1.250	1.144	0.0
7 24	30.13	0.006	196.50	5.476	156.32	212.92	0.0	0.0	0.0	0.0	0.0	0.202	0.209	0.407	1.250	1.140	0.0
8 6	29.38	0.006	196.11	5.258	156.09	211.81	0.0	0.0	0.0	0.0	0.0	0.194	0.209	0.398	1.250	1.135	0.0
8 12	28.65	0.006	195.71	5.049	155.85	210.69	0.0	0.0	0.0	0.0	0.0	0.186	0.209	0.390	1.250	1.130	0.0
8 18	27.93	0.006	195.29	4.848	155.62	209.59	0.0	0.0	0.0	0.0	0.0	0.179	0.209	0.382	1.250	1.126	0.0
8 24	27.23	0.006	194.86	4.655	155.38	208.49	0.0	0.0	0.0	0.0	0.0	0.172	0.208	0.374	1.250	1.121	0.0
9 6	26.55	0.006	194.42	4.470	155.15	207.40	0.0	0.0	0.0	0.0	0.0	0.165	0.208	0.367	1.250	1.116	0.0
9 12	25.89	0.006	193.96	4.292	154.92	206.31	0.0	0.0	0.0	0.0	0.0	0.158	0.208	0.359	1.250	1.112	0.0
9 18	25.24	0.006	193.49	4.121	154.68	205.23	0.0	0.0	0.0	0.0	0.0	0.152	0.207	0.353	1.250	1.107	0.0
9 24	24.61	0.006	193.01	3.957	154.45	204.15	0.0	0.0	0.0	0.0	0.0	0.146	0.207	0.346	1.250	1.103	0.0
10 6	23.99	0.006	192.52	3.799	154.22	203.08	0.0	0.0	0.0	0.0	0.0	0.140	0.207	0.340	1.250	1.098	0.0
10 12	23.39	0.006	192.02	3.648	153.99	202.01	0.0	0.0	0.0	0.0	0.0	0.135	0.206	0.334	1.250	1.093	0.0
10 18	22.81	0.006	191.51	3.503	153.76	200.95	0.0	0.0	0.0	0.0	0.0	0.129	0.206	0.328	1.250	1.089	0.0
10 24	22.24	0.006	190.99	3.363	153.52	199.90	0.0	0.0	0.0	0.0	0.0	0.124	0.206	0.322	1.250	1.084	0.0
11 6	21.68	0.006	190.46	3.229	153.29	198.85	0.0	0.0	0.0	0.0	0.0	0.119	0.205	0.316	1.250	1.080	0.0
11 12	21.14	0.006	189.92	3.101	153.06	197.81	0.0	0.0	0.0	0.0	0.0	0.114	0.205	0.311	1.250	1.075	0.0
11 18	20.61	0.006	189.37	2.977	152.83	196.77	0.0	0.0	0.0	0.0	0.0	0.110	0.205	0.306	1.250	1.071	0.0
11 24	20.10	0.006	188.82	2.859	152.60	195.73	0.0	0.0	0.0	0.0	0.0	0.106	0.204	0.301	1.250	1.066	0.0
12 6	19.59	0.006	188.25	2.745	152.37	194.71	0.0	0.0	0.0	0.0	0.0	0.101	0.204	0.296	1.250	1.062	0.0
12 12	19.10	0.006	187.68	2.636	152.15	193.68	0.0	0.0	0.0	0.0	0.0	0.097	0.204	0.292	1.250	1.057	0.0
12 18	18.63	0.006	187.10	2.531	151.92	192.67	0.0	0.0	0.0	0.0	0.0	0.093	0.204	0.287	1.250	1.052	0.0
12 24	18.16	0.006	186.51	2.430	151.69	191.66	0.0	0.0	0.0	0.0	0.0	0.090	0.203	0.283	1.250	1.048	0.0
13 6	17.71	0.006	185.92	2.333	151.46	190.65	0.0	0.0	0.0	0.0	0.0	0.086	0.203	0.279	1.250	1.043	0.0
13 12	17.26	0.006	185.32	2.240	151.23	189.65	0.0	0.0	0.0	0.0	0.0	0.083	0.203	0.275	1.250	1.039	0.0
13 18	16.83	0.006	184.71	2.151	151.00	188.65	0.0	0.0	0.0	0.0	0.0	0.079	0.202	0.271	1.250	1.034	0.0
13 24	16.41	0.006	184.10	2.065	150.78	187.66	0.0	0.0	0.0	0.0	0.0	0.076	0.202	0.267	1.250	1.030	0.0
14 6	16.00	0.006	183.48	1.983	150.55	186.68	0.0	0.0	0.0	0.0	0.0	0.073	0.202	0.264	1.250	1.025	0.0
14 12	15.60	0.006	182.86	1.904	150.32	185.70	0.0	0.0	0.0	0.0	0.0	0.070	0.201	0.260	1.250	1.021	0.0
14 18	15.21	0.006	182.23	1.828	150.10	184.72	0.0	0.0	0.0	0.0	0.0	0.067	0.201	0.257	1.250	1.016	0.0
14 24	14.83	0.006	181.59	1.756	149.87	183.75	0.0	0.0	0.0	0.0	0.0	0.065	0.201	0.254	1.250	1.011	0.0
15 6	14.46	0.006	180.96	1.686	149.65	182.79	0.0	0.0	0.0	0.0	0.0	0.062	0.201	0.251	1.250	1.007	0.0
15 12	14.10	0.006	180.31	1.619	149.42	181.83	0.0	0.0	0.0	0.0	0.0	0.060	0.200	0.248	1.250	1.002	0.0
15 18	13.75	0.006	179.67	1.554	149.20	180.87	0.0	0.0	0.0	0.0	0.0	0.057	0.200	0.245	1.250	0.998	0.0
15 24	13.40	0.006	179.01	1.492	148.97	179.92	0.0	0.0	0.0	0.0	0.0	0.055	0.200	0.242	1.250	0.993	0.0