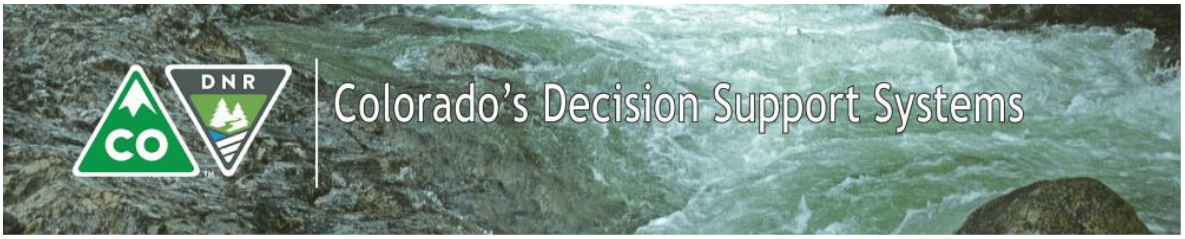


4.0 Input Description

This section describes the input files required to operate the StateMod Model. Some data file formats have been superseded over time while continuing to maintain the old format. For a description of the old format see Section 9.0 Discontinued by Supported File Formats.

The following subsections are available in this section:

- 4.40 Reservoir Target Content File - Daily (*.tad)
- 4.41 Irrigation Water Requirement File - Daily (*.ddx)
- 4.42 Delay Table File - Daily (*.urd/*.dld)
- 4.43 Historic Streamflow File - Daily (*.riy)
- 4.44 Historic Diversion File - Daily (*.ddy)
- 4.45 Historic Well Pumping File - Daily (*.wey)
- 4.46 Historic Reservoir Content File - Daily (*.eoy)
- 4.47 Downstream Call File (*.cal)
- 4.48 Rio Grande Spill (*.xrg)
- 4.49 Plan Data (*.pln)
- 4.50 Augmentation Plan to Well Data (*.plw)
- 4.51 Plan Return File (*.prf)
- 4.52 Reservoir Return Flow File (*.rrf)
- 4.53 Reach Data File (*.rch)
- 4.54 Plan to Reservoir Recharge Data (*.plr)

4.0 Remarks

Regardless of how the model is applied: Base Flow, Simulate, Report, or Data Check of a monthly simulation requires no more than the first 29 files (less may be provided if wells are simulated). Additional files are needed to implement more complex operations, including files 31 - 33 for variable efficiency and soil moisture accounting; files 36 – 46 for a daily simulation; and files 47 – 53 for specific, relatively unique applications that include a downstream call, plans, and the Rio Grande Compact.

Throughout this documentation a standard file naming convention has been used (e.g. Response file (*.rsp), Control file (*.ctl), etc. where * refers to a basin or scenario). This naming convention is recommended for scenario management but it is not required. Note that model output files take on the name of the response (*rsp) file; the user is encouraged to manage different model runs using the response file name.

When the base streamflow file is generated outside the StateMod baseflow module or represents a file that has been saved for historical purposes, it is typically named *.rim. However when the StateMod baseflow results are used for the simulation, the baseflow file it is typically named *.xbm to ensure data passes from the baseflow module to the simulate module.

In general, the top of each data set contains a variable number of comment cards identified by a ”#" in column 1; for files created using a DMI (TSTool or StateDMI) these comments reflect the command file used to create the file. Generally, only the control (*.ctl) file and operational right (*.opr) files allow comments identified by a '#' below the header and within the data itself. It is recommended that a

‘#’ sign be used specifically in the operating rule file to provide additional comments (as this file is not created using a DMI) and to turn off all lines associated with operating rules not used in a given scenario. Monthly time series data contain values for each month of the study period. Annual time series contain twelve values to be repeated for each year of the study period.

All structure names and ID’s are limited to 24 and 12 characters respectively. To allow free formatted input files there should be no blank characters in the name or ID or they should be in single or double quotes (e.g. instead of My Name use ‘My_Name’ or “My Name”).

Identifiers used throughout the model are limited to 12 characters. However if the standard numbering convention shown below is followed the ID should be limited to 9 characters since 3 of the 12 may be used to identify up to 99 unique water rights (e.g. 123456789.01). In general, any character may be used as an ID in StateMod although two reports; one related to the operational right file and one related to consumptive use by water district identifier look for specific characters in specific fields to simplify reporting. The Check option generates a report for operating rules which uses the operational right ID to the left of the decimal point to group operational rights from the same source together. Similarly, the consumptive use report (*xcu) from the Report option presents the diversions by water district by combining all structures that have the first two digits of their ID the same. The following convention is recommended to ensure the reports operate appropriately and that data for different river basins will have unique identifiers:

Item	Source	Example
Diversion ID	State WD + 5-digit ID	5700501
Reservoir ID	State WD + 5-digit ID	5703001
Instream Flow ID	State WD + 5-digit ID	5702501
Instream Flow terminus ID	State WD + 5-digit ID	5702501_Dwn
Water Right	Associated Structure ID plus .01, .02, etc.	5700501.01
Operational Right ID	Source Structure * 10 + .01, .02, etc.	5703010.01
Streamflow Gage ID	USGS ID	09010400
Intermediate River Node	Upstream USGS ID + .01	09010400.01
Precipitation ID	NOAA/NCDC ID	USC00050848
Evaporation ID	NOAA/NCDC ID	USC00050848
Administration Number	State Engineer's Administration Number	16192.10378
Delay (Return Flow) Table ID	1, 2, 3, etc.	

Aggregated diversions User WD_XXB###, where 43_ADW001

WD is the water district

XX is the aggregated type

AD = diversion AR = reservoir

AM = municipal AS = stock pond

```
B = basin (W=White, S=San Juan, etc.)
### = counter
```

4.1 Response File (*.rsp)

The response file contains the names of all other data files required to run the model. This file is read by subroutine StateM. Note, that Version 10.30 and greater allows a user to enter response file data using one of two formats; random and sequential. StateMod reads the first file type and based on the occurrence of the character '=' in the first file name it determines if the file is random (contains a '=') or sequential (does not contain a '=').

The random file approach allows file names to be entered in any order as described below under Random Response Format. Any file type that is not required for a simulation is simply not included. Also any file name may be commented out by including a '#' character in column 1. Its format is described in the table below (Random Response Format). For a description of the sequential, old, format see the section titled 9.0 Discontinued but Supported File Formats.

Note that model output files take on the name of the response (*rsp) file; the user is encouraged to manage different model runs using descriptive response file naming conventions.

File Descriptor	File Type	Standard Suffix
Control =	Control File	*.ctl
River_Network =	River Network File	*.rin
River_Gage =	River Gage File	*.rig
Reservoir_Station =	Reservoir Station	*.res
Diversion_Station =	Diversion Station	*.dds
StreamGage_Station =	Stream Gage Station	*.ris
Instreamflow_Station =	Instream Flow Station	*.ifs
Well_Station =	Well Station	*.wes
Instreamflow_Right =	Instream Flow Right	*.ifr
Reservoir_Right =	Reservoir Right	*.rer
Diversion_Right =	Diversion Right	*.ddr
Operational_Right =	Operational Right	*.opr
Well_Right =	Well Right	*.wer
Precipitation_Monthly =	Precipitation Monthly	*.prc
Precipitation_Annual =	Precipitation Annual	*.pra
Evaporation_Monthly =	Evaporation Monthly	*.evm
Evaporation_Annual =	Evaporation Annual	*.eva
Stream_Base Monthly =	Baseflow Monthly	*.rim/*.xbm
Diversion_Demand_Monthly =	Diversion Demand Monthly	*.ddm
Diversion_Demand_AverageMonthly =	Diversion Demand Annual	*.dda
Diversion_DemandOverride_Monthly =	Diversion Override Monthly	*.ddo
Instreamflow_Demand_Monthly =	Inst. Flow Demand Monthly	*.ifm
Instreamflow_Demand_AverageMonthly =	Inst. Flow Demand Ave. Monthly	*.ifa
Well_Demand_Monthly =	Well Demand Monthly	*.wem

```
DelayTable_Monthly =                    Delay Table Monthly           *.dly
Reservoir_Target_Monthly =              Reservoir Target Monthly      *.tar
Reservoir_Return =                      Reservoir Seepage Return Data *.rrf

IrrigationPractice_Yearly =             Irrigation Practice Yearly    *.ipy
ConsumptiveWaterRequirement_Monthly =   Irrigation Water Req. Monthly *.iwr/*.ddc
StateCU_Structure =                     StateCU Structure (AWC) file  *.str

Reservoir_Historic_Monthly =            Reservoir Historic Monthly    *.eom
StreamEstimate_Coefficients =           Stream Estimate Coefficients  *.rib
StreamGage_Historic_Monthly =           Stream Gage Historic Monthly  *.rih
Diversion_Historic_Monthly=             Diversion Historic Monthly    *.ddh
Well_Historic_Monthly =                 Well Historic Monthly         *.weh

OutputRequest =                         Output Request                *.out

Stream_Base_Daily =                     Stream Base Daily             *.rid
Diversion_Demand_Daily =                Direct Flow Demand Daily      *.ddd
Instreamflow_Demand_Daily =             Instream Flow Demand Daily    *.ifd
Well_Demand_Daily =                     Well Demand Daily             *.wed
Reservoir_Target_Daily =                Reservoir Target Daily        *.tad
DelayTable_Daily =                      Delay Table Daily             *.dld
ConsumptiveWaterRequirement_Daily =     Irrigation Water Req. Daily   *.iwd
StreamGage_Historic_Daily =             StreamGage Historic Daily     *.riy
Diversion_Historic_Daily =              Diversion Historic Daily      *.ddy
Well_Historic_Daily =                   Well Historic Daily           *.wey
Reservoir_Historic_Daily =              Reservoir Historic Daily      *.eoy

Downstream_Call =                       Downstream Call               *.cal
RioGrande_Spill_Monthly =               Rio Grande Spill file         *.rgs
San_Juan_Recovery =                     San Juan Recovery Data        *.sjr

GeographicInformation =                 Geographic Information (1)    *.gis
Network =                               Network File (1)              *.net

Plan_Data =                             Plan Data                     *.pln
Plan_Wells =                            Plan Well Augmentation Data   *.plw
Plan_Return =                           Plan Return Data              *.prf

Reach_Data =                            Reach Report Data             *.rch
```

(1) The Geographic Information (*.gis) and Network (*.net) files are not used by StateMod. However, if included, they allow the StateMod GUI to use them for presentation.

4.2 Control File (*.ctl)

The control file contains information which controls the model simulation. To allow old StateMod data sets to operate without editing, the data after the year type (row 18-1) is assumed to be zero if not provided. Comments, indicated by a # in column 1, may be provided at any location in this file. This file is read by subroutine DATINP.

Row-data	Variable	Description
Title Data		
1 thru 2		Format (a80)
1-1	headin(i,1)	Title printed on output
2-1	headin(i,2)	Title printed on output
Study Period Data		
3 through 32		Format (i8 or f8.0)
3-1	iystr	Starting year of the simulation
4-1	iyend	Ending year of the simulation
General Control Switches		
5-1	iresop	Switch for output units; 1=cfs for all, 2=acft for all, 3=kaf for all, 4=cfs for daily and acft for monthly 5=cms for all
6-1	moneva	Switch for Evaporation and precipitation data; 0 = monthly; 1=average
7-1	iopflo	Switch for Streamflow; 1=total, 2=gains
8-1	numpre	Number of precipitation stations
9-1	numeva	Number of evaporation stations
10-1	interv	+n =Number of entries in each delay (return flow) pattern -1 =Variable number of entries per delay (return flow) pattern. return data is provided as a percent (e.g. 5.00) -100 =Variable number of entries per delay (return flow) pattern. return data is provided as a decimal (e.g. 0.05).
Factor Data		
11-1	factor	Factor to convert from CFS to AF/DAY (1.9835)
12-1	rfacto	Divisor for streamflow data units; Enter 0 for data provided in CFS, Enter 1.9835 for data provided in AF/Mo
13-1	dfacto	Divisor for diversion data units; Enter 0 for data provided in CFS, Enter 1.9835 data provided in AF/Mo
14-1	ffacto	Divisor for in-stream flow data units; Enter 0 for data provided in CFS, Enter 1.9835 for data provided in AF/Mo
15-1	cfacto	Factor to convert reservoir content data to AF
16-1	efacto	Factor to convert evaporation data to feet/mo
17-1	pfacto	Factor to convert precip. data to feet/mo
18-1	cyr1	Year type Format (a5) (Right justified,

all capital letters)
CYR = Calendar Year (Jan - Dec)
WYR = Water Year (Oct - Sep)
IYR = Irrigation Year (Nov - Oct)

Advanced Control Switches

19-1 icondem Switch for demand data type
See Section 7 for a discussion of the
Demand options.
If simulating wells (iwell > 0 see below)
1 Historical Demand Approach
demands for structures with both SW
and GW rights are provided in a
separate file (e.g. *.ddm & *.wem)
and are not added
(i.e. SW shortages cannot be
supplied by GW & visa versa)
2 Historic Sum Demand Approach
demands for structures with both SW &
GW rights are provided separately
(i.e. the *.ddm and *.wem files
are added. Demands can be supplied
by SW or GW)
3 Structure Demand Approach
demands for structures with both SW
and GW rights are provided
in one file, the direct diversion
demand file (e.g. *.ddm).Demands
for well only lands are provided
in the well demand file (*.wem)
Demands can be supplied by SW or GW).
4 Supply Demand Approach
Same as 3 but the surface water may be
diverted up to their demand even
if a CIR does not exist.
See Section 7 for a detailed
discussion.
5 Decreed Demand Approach
Same as 4 but the Decreed Demand
Approach is used. See Section 7
for additional discussion.

20-1 ichk Switch for detailed output
0 No detailed results
1 Print river network
4 Print detailed water right, operation and
re-op data
5 Print detailed demand data
6 Print detailed daily data
7 Print detailed return flow data
8 Print detailed daily baseflow data to
*.log file and daily baseflow results to
the *.xtp file
9 Print detailed reoperation data

10 Echo operational right file read
11 Print reservoir evaporation details
14 Detailed water right data
20 Override daily ID for testing
21 Print top of binary file for *.xbn report
24 Print detailed results of opr. rule 23 downstream call
25 Limit daily baseflow output to the river ID specified in variable ccall (24-1)
30 Do not print daily binary results
90 Print detailed water use data from return
91 Print detailed demand data from Bomsec and well water right data from Welrig
92 Print detailed soil moisture data
94 Print ichk=4 plus call information
-n Print allocation data at river node n
100+n Echo operational right file read and provide detailed output for an operational right type n for the operational right ID provided for variable ccall (24-1). Note ichk=131 provides details on an operational right type 31
201 Provide detailed output for an instream right ID provided for ccall (24-1)
202 Provide detailed output for a reservoir right ID provided for ccall (24-1)
203 Provide detailed output for a diversion right ID provided for ccall (24-1)
206 Provide detailed output for a well right ID provided for ccall (24-1)

21-1	ireopx	Switch for reoperation control See Section 3 for a discussion of the Reoperation control 0 Reoperate for reservoir releases and returns to non downstream returns (default) 1 Do not reoperate -n Reoperate when the sum of reservoir releases or downstream return flows exceed n in acft.
22-1	ireach	Switch for instream flow reach approach See Section 7 for a discussion of the Instream flow options. 0 No instream reach approach (Phase II) 1 Instream reach approach (Phase III) 2 Same as 0 plus monthly instream demands may be provided in the monthly may be provided in the monthly instream demand file (*.ifm) 3 Same as 1 plus monthly instream demands may be provided in the monthly instream demand file

		(*.ifm)
23-1	icall	Switch for detailed call data See Section 7 for a discussion of the Detailed call data 0 No detailed call data 1 Yes detailed call data
24-1	ccall	Detailed call water right ID (e.g. Section 4.6 field 1-1 variable (cidvri) See Section 5 for a discussion of the Detailed call data Note this variable is not used if the control variable icall = 0
25-1	iday	Switch for daily calculations See Section 7 for a discussion of the Daily capability 0 Monthly analysis 1 Daily analysis 2 Daily analysis where the daily demand is a monthly total that is decreased by the amount diverted each day (i.e. "daily-decrementing" approach).
26-1	iwell	Switch for well operations See Section 7 for a discussion of the well options. 0 No well analysis -1 No well analysis but the file names are included in the response file (*.rsp) 1 Well analysis with no max recharge 2 Well analysis with a constant maximum Stream recharge assigned as variable gwmaxrc in the control file (*.ctl) 3 Well analysis with a variable maximum Stream recharge assigned as variable Gwmaxrc in the river network file (*.rin)
27-1	gwmaxrc(1)	Maximum recharge limit (cfs) See Section 7 for a description of the well options and this variable +n Constant maximum recharge limit (cfs). Only used when variable iwell of the control file (*.ctl) is set to 2.
28-1	isjrip	Switch for an annual San Juan Recovery Program (SJRIP) Sediment file is no longer used
29-1	itsfile	Switch for an annual irrigation practice file See Section 7 for a discussion of Variable efficiency and use of the annual CU time series data 0 No time series file provided -1 Time series file provided in the response (*.rsp)file but not used 1 Use Annual GW area limit only

		2 Use Annual Well Capacity only 10 Use all data provided in *.ipy file. This includes annual GW area, well capacity, area served by ground water, area served by sprinklers, max Flood efficiency, max sprinkler efficiency, and total area
30-1	ieffmax	Switch for annul consumptive water requirement (*.iwr or *.ddc) file See Section 7 for a discussion of Variable efficiency and use of the annual CU time series data 0 No IWR file provided -1 IWR (*.iwr) file provided in the response (*.rsp)file but not used 1 IWR file provided and variable efficiency used. (requires itsfile from above be > 0) 2 IWR file provided and printed to output but variable efficiency is not used except to limit reservoir releases to days when an IWR exists when iday = 2
31-1	isprink	Switch for sprinkler data (area and efficiency) use See Section 7 for a description of the sprinkler options 0 No sprinkler data used 1 For baseflow or simulation mode Use sprinkler area, sprinkler efficiency and gwmode data provided in time series file (*.ipy)
32-1	soild	Switch for soil moisture accounting See Section 7 for a Description of the Soil Moisture capability 0 No Soil Moisture (*.str) file provided -1 Soil Moisture (*.str) file provided in the response (*.rsp) file but not used +n Soil Moisture (*.str) used where +n is a typical soil zone depth (ft) (e.g. 2.5 - 3.0 ft). Note StateMod sets the initial soil moisture storage to 50% of the soil capacity
33-1	isig	Switch for significant figures behind decimal point in output files 0 No significant figures 1 One significant figure 2 Two significant figures

4.3 River Network File (*.rin)

The river network file is used to describe the river basin of interest. The network (*.net) diagram is typically created in StateDMI, then commands are used to convert the diagram to the river network "flat file" formate. Note, the last downstream node should be blank. This file is read by subroutine DATINP.

Row-data	Variable	Description
1		Format (a12, a24, a12, 1x, a12, 1x, f8.0)
1-1	cstaid(1)	River node ID
1-2	stanam(i,1)	Station name
1-3	cstadn(1)	Downstream node Note leave blank for the end of the network or for a tributary with a futile call
1-4	comment(1)	Comment reserved for structure at this location
1-5	gwmaxr(1)	Variable maximum recharge limit (cfs). Only used when variable iwell of the control file (*.ctl) is set to 3.
		Repeat for the number of river nodes

4.4 River Station File (*.ris)

The river station file is used to describe the name and location of nodes where baseflows are known. Baseflows typically consist of streamflow gages (which have a historical time series in the historical stream flow file (*.rih)) and other nodes which have a base flow estimated using information in the base flow data file (*.rib). The number and order of entries corresponds to the Stream flow file. This file is read by subroutine DATINP.

Row-data	Variable	Description
Station Data		
1		Format (a12, a24, a12, 1x, a12)
1-1	crunid(1)	Stream station ID
1-2	runnam(i,1)	Station name
1-3	cgoto(1)	River node with a stream gage
1-4	crunidy(1)	Daily Stream station ID (for daily model only) See Section 7 for a detailed discussion
		Enter Stream station ID (crunid) if daily data Will be provided for this station Monthly data controls Enter another stream station ID to use the daily distribution of another but weight values by the monthly total in *.rim file Enter 0 to use the average daily value from the monthly total in the *.rim file Monthly data controls

```
                                Enter 3 to use the daily value provided in
                                      the daily river (*.rid) file
                                      Daily data controls
                                Enter 4 to use a daily pattern developed by
                                      connecting the midpoints of monthly data
                                      Monthly data controls

                                Repeat for the number of stream gages
```

4.4.1 River Gage File (*.rig)

The river gage file is used to describe the name and location of nodes where gaged streamflows are located. Gaged streamflows have a historical time series in the historical stream flow file (*.rih). This file is part of a future enhancement that clearly separates data in the river station file (*.ris) into gaged and non gaged flow locations. Currently this file is used by the daily baseflow module only. This file is read by subroutine VIRIN.

```
Row-data        Variable        Description

Station Data
1                               Format (a12, a24, a12, 1x, a12)
1-1             crunid(1)       Stream Gage station ID
1-2             runnam(i,1)     Station name
1-3             cgoto(1)        River node with a stream gage
1-4             crunidy(1)      Daily Stream station ID (for daily model only)
                                See Section 7 for a detailed discussion

                                Enter Stream station ID (crunid) if daily data
                                      Will be provided for this station
                                      Monthly data controls
                                Enter another stream station ID to use the
                                      daily distribution of another but weight
                                      values by the monthly total in *.rim file
                                      Monthly data controls
                                Enter 0 to use the average daily value from
                                      the monthly total in the *.rim file
                                      Monthly data controls
                                Enter 3 to use the daily value provided in
                                      the daily river (*.rid) file
                                      Daily data controls
                                Enter 4 to use a daily pattern developed by
                                      connecting the midpoints of monthly data
                                      Monthly data controls
                                Enter Stream station ID (crunid) if daily data
                                      will be provided for this station
                                      Monthly data controls
                                Enter another stream station ID to use the
                                      daily distribution of another but weight
                                      values by the monthly total in *.rim file
                                      Monthly data controls
                                Enter 0 to use the average daily value from
                                      the monthly total in the *.rim file
```

		Monthly data controls
		Enter 3 to use the daily value provided in
		the daily river (*.rid) file
		Daily data controls
		Enter 4 use a daily pattern developed by
		Connecting the midpoints of monthly data
		Monthly data controls
		Repeat for the number of stream gages

4.5 Direct Diversion Station File (*.dds)

The direct diversion station file contains information to describe the physical properties of each direct diversion in the system. This file is read by subroutine DATINP. Note that the average efficiency data provided with this file (*divefc*) is not used when the variable efficiency approach is operated (see control file variable *ieffmax*) and the structure is included in the irrigation water requirement file (*.ddc/*iwr).

Row-data	Variable	Description
Station Data		
1		Format (a12, a24, a12, i8, f8.2, 2i8, 1x, a12)
1-1	cdivid(1)	Diversionstation ID
1-2	divnam(i,1)	Diversion name
1-3	cgoto	River node where diversion is located
1-4	idivsw(1)	Switch; 0=off, 1=on
1-5	divcap(1)	Diversion capacity (CFS)
1-6	dumx	Not currently used
1-7	ireptyp(1)	If a general replacement reservoir option
		(type 10) is used.
		0 Do not provide general replacement reservoir
		benefits
		1 Provide 100% replacement
		-1 Provide depletion replacement
1-8	cdividy(1)	Daily Diversion ID (not used for monthly model)
		See Section 7 for a detailed discussion
		Enter station ID (cdivid) if daily data
		will be provided for this station
		Monthly data generally controls
		Enter another station ID to use the daily
		distribution of another but weight values
		by the monthly total in *.ddm file
		Monthly data generally controls
		Enter 0 to use the average daily value from
		the monthly data in the *.ddm file
		Monthly data controls
		Enter 3 to use the daily value from
		the daily demand (*.ddd) file
		Daily data controls
		Enter 4 use a daily pattern developed by
		connecting the midpoints of monthly data

Monthly data controls

Diversion Switches

2		Format(12x, a24, 12x, 2i8, f8.2, f8.0, i8)
2-1	usernam(1)	User name
2-2	idvcom(1)	Data type switch 1 monthly total demand provided (Section 4.17), 2 annual total demand provided (Section 4.18), 3 monthly irrigation water requirement provided (Section 4.17) 4 annual irrigation water requirement provided (Section 4.17) 5 estimate to be zero
2-3	nrtn(1)	Number of return flow locations or table references
2-4	divefc(1)	System efficiency switch. Enter 0-100 % for a constant value each month. Enter a negative value to provide 12 values, one for each month. Note this data is not used when the variable efficiency approach is used (see control file variable ieffmax) and the structure is in the IWR file
2-5	area(1)	Recent Irrigated Acreage (ac)
2-6	irturn(1)	1
2-7	demsrc(1)	Demand source code (used for documentation purposes and non-StateMod applications to determine if a structure supplies an irrigation demand.) 1 = Irrigated acreage from GIS database 2 = Irrigated acreage from structure file (tia) 3 = Irrigated acreage from GIS database, the primary component of lands served by multiple structures 4 = Same as 3 but data is from the structure file (tia) 5 = Secondary component of lands served by multiple structures 6 = Municipal, industrial or transmountain structure (no acreage data expected) 7 = Carrier structure (no acreage data expected) 8 = Acreage data provided by the user -999 = Acreage data unknown

Monthly Efficiency Data

3		Free Format (Include if divefc above is < 0)
3-1	diveff(1,12)	Efficiency % by month for the year type selected (water year, irrigation year, calendar year)

```
Return Flow Data
4                               Format (36x, a12, f8.2, i8)
4-1             crtnid(1)       River node receiving return flow
4-2             pcttot(1)       Percent of return flow to this river node
4-3             irtndl(1)       Delay (return flow) table for this return
                                      flow

                                Repeat for number of returns (nrtn)

                                Repeat for number of diversions
```

4.6 Direct Diversion Rights File (*.ddr)

The direct diversion rights file contains data associated with a diversion right. This file is read by subroutine RIGINP.

```
Row-data        Variable        Description
_____________________________________________________________

Right Data
1                               Format (a12, a24,a12,4x, f12.0,f8.2,i8)
1-1             cidvri(1)       Diversion right ID
1-2             named(1)        Diversion right name
1-3             cgoto           Direct diversion structure ID associated
                                      with this right
1-4             irtem(1)        Administration number
1-5             dcrdiv(1)       Decreed amount(CFS)
1-6             idvrsw(1)       Switch
                                      0=off
                                      1=on
                                      +n Begin in year n
                                      -n Stop after year n

                                Repeat for the number of diversion rights
```

4.7 Instream Flow Station File (*.ifs)

The instream flow station file contains information to describe the physical properties of each instream flow in the system. This file is read by subroutine DATINP.

```
Row-data        Variable        Description
_____________________________________________________________

Station Data
1                               Format (a12, a24, a12, 1x, a12,1x,a12,i8)
1-1             cifrid(1)       Instream flow station ID
1-2             xfrnam1(i,1)    Instream flow station name
1-3             cgoto(1)        Upstream river node where the instream flow
                                      point or reach is located
1-4             ifrrsw(1)       Switch; 0=off, 1=on
1-5             crtnid          Downstream river node where the instream flow
                                     point or reach is located.  For an instream
                                     point enter cgoto(1) or leave blank
```

1-6	cifrridy(1)	Daily Instream station ID (for daily model only) See Section 7 for a detailed discussion Enter Instream station ID (crunid) if daily data will be provided for this station Monthly data controls Enter another instream station ID to use the daily distribution of another but weight values by the monthly total in *.rim file Enter 0 to use the average daily value from the monthly data in the *.ifm file Monthly data controls Enter 3 to use the daily value from the daily demand (*.ifd) file Daily data controls Enter 4 use a daily pattern developed by connecting the midpoints of monthly data Monthly data controls
1-7	iifcom(1)	Data type switch 1 monthly total demand provided (Section 4.17) 2 annual total demand provided (Section 4.18)
		Repeat for the number of instream flow stations

4.8 Instream Flow Right File (*.ifr)

The instream flow right file contains data associated with an instream flow's water rights. Note that StateMod allows two more more instream flow rights for one reach. This file is read by subroutine RIGINP

Row-data	Variable	Description
Right Data		
1		Format (a12, a24,a12, 4x, f12.0, f8.2, i8)
1-1	cifrri	Instream Flow right ID
1-2	namei(1)	Instream Flow right name
1-3	cgoto	Instream structure ID associated with this right
1-3	irtem(1)	Administration number
1-4	dcrifr(1)	Decreed amount(CFS)
1-5	iifrsw(1)	Switch 0=off 1=on +n Begin in year n -n Stop after year n
		Repeat for the number of instream flow rights

4.9 Well Station File (*.wes)

The well station file contains information to describe the physical properties of each well structure in the system. This file is read by subroutine DATINP.

Row-data	Variable	Description
Station Data		
1		Format (a12, a24, a12, i8, f8.2, 1x, a12, 1x, f12.5)
1-1	cdividw(1)	Well Station ID
1-2	divnamw(1)	Well Station name
1-3	idvstaw(1)	River node where the well is located
1-4	idivsww(1)	Switch; 0=off, 1=on
1-5	divcapw(1)	Well capacity (cfs)
1-6	cdividyw(1)	Daily Well Station ID (not used for monthly model) See Section 7 for a detailed discussion Enter station ID (cdividw) if daily data will be provided for this station Monthly data controls Enter another station ID to use the daily distribution of another but weight values by the monthly total in *.wem Monthly data controls Enter 0 to use the average daily value from the monthly data in the *.wem file Monthly data controls Enter 3 to use the daily value from the daily well demand (*.wed) file Daily data controls Enter 4 use a daily pattern developed by connecting the midpoints of monthly data Monthly data controls
1-7	primary(1)	Switch; 0=off Water right priorities determine when water is diverted. This option is commonly called SW primary because SW is typically senior +n=on Well water rights will be adjusted by n. This option is called GW primary because it allows priority of GW rights to be made senior to SW rights when an appropriate value of n is provided (e.g. 15000).Note StateMod operates appropriately if n makes a ground water right negative
Well Switches		
2		Format(36x, a12, 3i8, f8.2, f8.0, i8, f8.0)
2-1	idvcow2(1)	Diversion this well structure is associated with. Enter NA if this well is not associated with a diversion structure

2-2	idvcomw(1)	Data type switch 1 monthly total demand provided (Section 4.22) 2 Not active. Reserved for annual total demand 3 monthly irrigation water requirement provided(Section 4.21) 4 Not active. Reserved for annual irrigation water requirement 5 estimate to be zero 6 this well station is tied to a direct diversion station and expects demand data provided as a total in file *.ddm (e.g. no well demand data is expected)
2-3	nrtnw(1)	Number of return flow locations or table references
2-4	nrtnw2(1)	Number of depletion locations or table References
2-5	divefcw(1)	System efficiency Enter 0-100% for a constant value each month. Enter a negative value to provide 12 values, one for each month
2-6	areaw(1)	Irrigated acreage (ac) for future n = Irrigated acreage for this structure -1 = Irrigated acreage provided in the direct diversion station file (*.dds).Use when a structure has both SW and GW supplies
2-7	irturnw(1)	1
2-8	demsrcw(1)	Demand source code (used for documentation purposes and non StateMod applications to determine if a structure supplies an irrigation demand) 1 = Irrigated acreage from GIS database 2 = Irrigated acreage from structure file (tia) 3 = Irrigated acreage from GIS database, the primary component of lands served by multiple structures 4 = Same as 3 but data is from the structure file (tia) 5 = Secondary component of lands served by multiple structures 6 = Municipal, industrial or transmountain structure (no acreage data expected) 7 = Carrier structure (no acreage data expected) 8 = Acreage data provided by the user -999 = Acreage data unknown

Monthly Efficiency Data

3		Free Format (Include if divefc above is < 0)

```
3-1             diveffw(1,12)  Efficiency % by month for the year type
                                     selected (water year, irrigation year,
                                     calendar year)

Return Flow Data
4                              Format (36x, a12, f8.2, i8)
4-1             crtnidw(1)     River node receiving return flow
4-2             pcttotw(1)     Percent of return flow to this river node
4-3             irtndlw(1)     Delay (return flow) table for this return
                                     flow

                               Repeat for number of return locations (nrtnw)

Depletion Data
5                              Format (36x, a12, f8.2, i8)
5-1             crtnidw2(1)    River node receiving depletion
5-2             pcttotw2(1)    Percent of depletion to this river node
5-3             irtndlw2(1)    Delay (depletion) table for this return
                                     flow

                               Repeat for number of depletion locations(nrtnw2)

                               Repeat for number of wells
```

4.10 Well Right File (*.wer)

The well right file contains data associated with a well structures. This file is read by subroutine RIGINP.

```
Row-data        Variable       Description

Right Data
1                              Format (a12, a24,a12, 4x, f12.0, f8.2, i8)
1-1     cidvri(1)              Well right ID
1-2     cnamed(1)              Well right name
1-3     cgoto                  Well structure ID associated with this
                                     right
1-3     irtem(1)               Administration number
1-4     dcrdivw(1)             Decreed amount(CFS)
1-5     idvrsww(1)             Switch
                                     0=off
                                     1=on
                                     +n Begin in year n
                                     -n Stop after year n

                               Repeat for the number of well rights
```

4.11 Reservoir Station File (*.res)

The reservoir station file contains information to describe the physical properties of each reservoir in the system. Reservoirs may be operated such that they will not (iressw = 1 or 2) or will (iressw = 3) divert above their target. When a reservoir stores above its target and subsequently releases that water as part of an operating rule, the net result is a paper fill which is charged against the reservoir right's one fill limitation and additional water becomes available downstream of the reservoir. This file is read by subroutine GETRES.

Row-data	Variable	Description
Station Data		
1		Format (a12, a24, a12, i8,f8.0, 1x, a12)
1-1	cresid(1)	Reservoirstation ID
1-2	resnam(i,1)	Reservoir name
1-3	cgoto	River node where reservoir is located
1-4	iressw(1)	Switch for reservoir; 0 off, 1 on, Do not adjust for dead storage Do not store above reservoir targets 2 on, Do not store above reservoir targets Adjust maximum ownership and initial storage of the last account by the dead storage volume 3 on, Do not adjust for dead storage Do not store above reservoir target Charge ability to store above a reservoir target to the decree (e.g. paper fill)
1-5	rdate(1)	Date for one fill rule administration +n month for reoperation at the beginning of the month (e.g. 1 = January 1, 2 = February 1, etc.) -1 to do not administer the one fill rule.
1-6	cresidy(1)	Daily reservoir ID (not used for monthly model) See Section 7 for a detailed discussion Enter station ID (cresid) if daily data will be provided for this station Monthly data controls Enter another station ID to use the daily distribution of another but weight values by the monthly total in the reservoir target (*.tar) file or reservoir end- of-month (*.eom) file Monthly data controls Enter 0 to use the average daily value from the monthly data in the reservoir target (*.tar) file or reservoir end- of-month (*.eom) file Monthly data controls Enter 3 to use the daily value from the daily reservoir target (*.tad) file or reservoir end-of-day (*.eod) file

		Daily data controls Enter 4 use a daily pattern developed by Connecting the midpoints of monthly data Monthly data controls Enter 5 to use a daily pattern developed by connecting the end points of monthly data
Physical Data		
Row 2		Format (24x, 4f8.0, 4i8)
2-1	volmin(1)	Minimum reservoir content (AF)
2-2	volmax(1)	Maximum reservoir content (AF)
2-3	flomax(1)	Maximum flow downstream of the reservoir (e.g. current stream flow plus the reservoir release (CFS)
2-4	deadst(1)	Dead storage in reservoir (AF)
2-5	nowner(1)	Number of owners
2-6	nevapo(1)	Number of evaporation stations for this reservoir
2-7	nprecp(1)	Number of precipitation stations for this reservoir
2-8	nrange(1)	Number of area capacity values
Owner Data		
Row 3		Format (12x, a12, 3f8.0, i8)
3-1	ownnam(1)	Owner name
3-2	ownmax(1)	Maximum storage of owner 1
3-3	curown(1)	Initial storage of owner 1
3-4	pcteva(1)	Switch for evaporation distribution 0 Prorate reservoir evaporation between all accounts proportionally based on their current storage volume n Apply n (%) to this account -1 No evaporation to this account
3-5	n2own(1)	Ownership date used for one fill calculations 1 Ownership is tied to a first fill right(s), 2 Ownership is tied to a second fill right(s)
		Repeat for the number of owners (nowner)
Evaporation Data		
Row 4		Format (24x,f8.2)
4-1	cevar(1)	Evaporation station ID for this reservoir
4-2	weigev(1)	Percent of this station to use
		Repeat for the number of evap stations (nevapo)
Precipitation Data		
Row 5		Format (24x,,f8.2)
5-1	cprer(1)	Precipitation station ID
5-2	weigpr(1)	Percent of this station to use
		Repeat for the number of precipitation stations (nprecp)

```
Area Capacity Data
Row 6                          Format (24x,3f8.0)
6-1     conten(i,1)            Content in area capacity table for point 1 (AF)
6-2     surarea(i,1)           Area associated with the content for point 1 (ac)
6-3     seepage(irg,1)         Seepage associated with the content for
                                     point 1 (AF per month)

                               Repeat above for nrange(1) values

                               Repeat rows 1-8 for the number of reservoirs
```

4.12 Reservoir Right File (*.rer)

The reservoir rights file contains data associated with a reservoir's water rights. This file is read by subroutine RIGINP.

```
Row-data       Variable        Description

Right Data
                               Format (a12,a24,a12,4x,f12.0,f8.0,4i8,a12)
1-1     cirsid(1)              Reservoir right ID
1-2     namer(1)               Reservoir right name
1-3     cgoto                  Reservoir station ID associated with this right
1-3     rtem(1)                Administration number
1-4     dcrres(1)              Decreed amount (AF)
1-5     irsrsw(1)              Switch
                                     0=off
                                     1=on
                                     +n Begin in year n
                                     -n Stop after year n
1-7     iresco(2,1)            Switch for account distribution
                                     +n Account to be served by this right
                                     0 Fill all accounts based on their
                                           ratio of their ownership ration
                                     -n Fill the first n accounts based on
                                           the ratio of their ownership
1-8     ityrsr(1)              Reservoir right type;
                                     1 Standard
                                     -1 Out Of Priority water right
1-9     n2fill(1)              Reservoir right type
                                     1 First fill,
                                     2 Second fill
1-10    copid(1)               Associated Out-of-priority operational right
                                     (include only for Out Of Priority water rights
                                     (ityrsr = -1)

                               Repeat for the number of reservoir rights
```

4.13 Operational Right File (*.opr)

The operational file describes unique or complex operations within the basin. Operating rules simulate these operations using the source, destination, priority, rule type and other parameters included in each rule. Use of the terms “operational rights” and “operating rules” are used interchangeably herein. This file is read by subroutine OPRINP. As the data and information associated with this file varies based on the type of operational right selected, the input descriptions is repeated for each operating rule.

Comments, indicated by a # in column 1 may be provided at any location in this file. It is recommended that a ‘#’ sign be used specifically in the operating rule file to provide additional comments (as this file is not created using a DMI) and to turn off all lines associated with operating rules not used in a given scenario. In addition to any comments, it is recommended the following string be provided near the top of the file before any data #FileFormatVersion 2 to indicate the format used in the file. If the format version indicator is not provided StateMod will try to read the file and try to determine the appropriate file type. Beginning with version 12.0 an operating rule file format was adopted that includes six additional variables associated with water reuse, diversion type, etc. For a description of the old (*.par file) format, which StateMod still supports, see Section 9.0 Discontinued by Supported File Formats.

The following are noted:

- StateMod operating rules represent water being diverted or transferred from a Source to a Destination with a particular Delivery Method. Identification of these elements is necessary to select the appropriate operating rule for each situation.

- Sources can be the River (for direct flow and storage rights – see Sections 4.6 and 4.12), Ground Water (for well rights – see Section 4.10), a Reservoir (see Section 4.11) or a Plan structure (see Section 3.9).

- Destinations can be diversion structures, reservoirs, instream flows, or plan structures

- StateMod operating rules deliver water to meet demands via the river or through a carrier. Water delivered by the river is self explanatory. For example, a reservoir release to the river that is later diverted or exchanged from the river by ditch. StateMod considers the delivery method to be a carrier when water is delivered from one structure by another structure without being released to the river. For example, the delivery from an off-channel reservoir to an irrigation demand directly located below the reservoir. All carriers such as canals, ditches, laterals, pipelines, tunnels, etc are treated as diversion structures.

Delivery Method Relative to the Source

Delivery Method	Description
River	Release to the river then divert directly or by exchange
Carrier	Release to a carrier. Water is transported to a user by a canal, it is not released to the stream system.
Bookover	Transfer from one reservoir account to another account

	or another reservoir (water is not physically moved)
Alternate_Point	Divert at a different location than the water right
Out_Of_Priority	Out of Priority

- Destinations can be diversion structures, reservoirs, instream flows, or plan structures

- A total of 11 generic operating rule types were originally sufficient for development of all of the western slope planning models. Development of the Rio Grande planning model required eight new rule types. One more rule type was added to support revisions to the San Juan model. Two more rule types were added when representation of the Blue River decree operations was added to the Colorado model. Recently, in preparation for the South Platte planning model, 27 new rule types have been added to the StateMod executable, bringing the total to 50 operating rule types.

- The original 11 operating rule types typically addressed a single Source, multiple Destination types, and a single Delivery Method. Pursuant to the continuing development of the model there is some redundancy with the original operating rule types and a subsequent one that provides the same functionality but has more flexibility. For example, the Carrier without Loss rule (type 11) can be replaced with the Carrier with Loss rule (type 45) by simply setting the carrier loss to zero.

- There are two ways to set the beginning and ending years of operation for an operating rule. Originally the annual on/off switch (*ioprsw(1)*) defined either the starting or ending year of operation for a rule, but this functionality was enhanced by the development of the the start/end date (*IoBeg, IoEnd*) fields. It is recommended the start/end dates be used to define the period of operation for the rules.

Descriptions of each operating rule and their associated input variables, are included in Sections 4.13.1 to 4.13.50. Examples of each operating rule are provided in Section 4.13.51.

Figures 1 through 4 are flow charts developed to assist a user to select the appropriate operating rule. Figures 1-3 provide information when the source of water is a Reservoir, Direct Flow Right or a Plan Structure, respectively. Figure 4 provides information for special rules that have been developed for unique circumstances (e.g. Rio Grande compact, South Platte River compact, Augmentation Wells, etc.). These figures can be used by selecting the appropriate figure based on the source of water, and selecting the appropriate subset (Delivery Method, Ownership, Plan Type, Special Rule) that meets a user's needs.

Following are five (5) examples of how to use these figures to select the appropriate operating rule:

Example 1 - Release water from a reservoir (Source) to a direct diversion (Destination) by river exchange (Delivery Method)

- On Figure 1 (Source – Reservoir), follow the arrow titled “Delivery via the River by Exchange”. Continue down that arrow to the arrow titled Destination “Diversion”, resulting in use of type 4 operating rule (see Section 4.13.4).

Example 2 - Diversion of an entire (100%) direct flow right (Source) to an off-channel reservoir (Destination) through a carrier structure (Delivery Method) with or without loss.

- On Figure 2 (Source - Direct Flow Right) , follow the arrow titled “Total (100 percent) Amount of Right” to Destination “Carrier to a Diversion or Reservoir”, resulting in use of type 11 operating rule (see Section 4.13.11). If carrier losses associated with diversions to storage are to be representedthe Destination “Carrier to Reservoir with Loss” would result in use of a Type 45 operating rule (see Section 4.13.45).

Example 3 - Release reusable water stored in a Plan (Source) and Reservoir to meet Terms & Conditions on a neighboring tributary (Destination) via a river exchange (Delivery Method)

- On Figure 3 (Source – Plan Structure) follow the arrow titled “From Reservoir Reuse Plan” to Destination “Terms & Conditions Plan Delivery by Exchange”, resulting in use of type 49 operating rule (explained further below in Section 4.13.49).

Example 4 - Represent the South Platte Compact

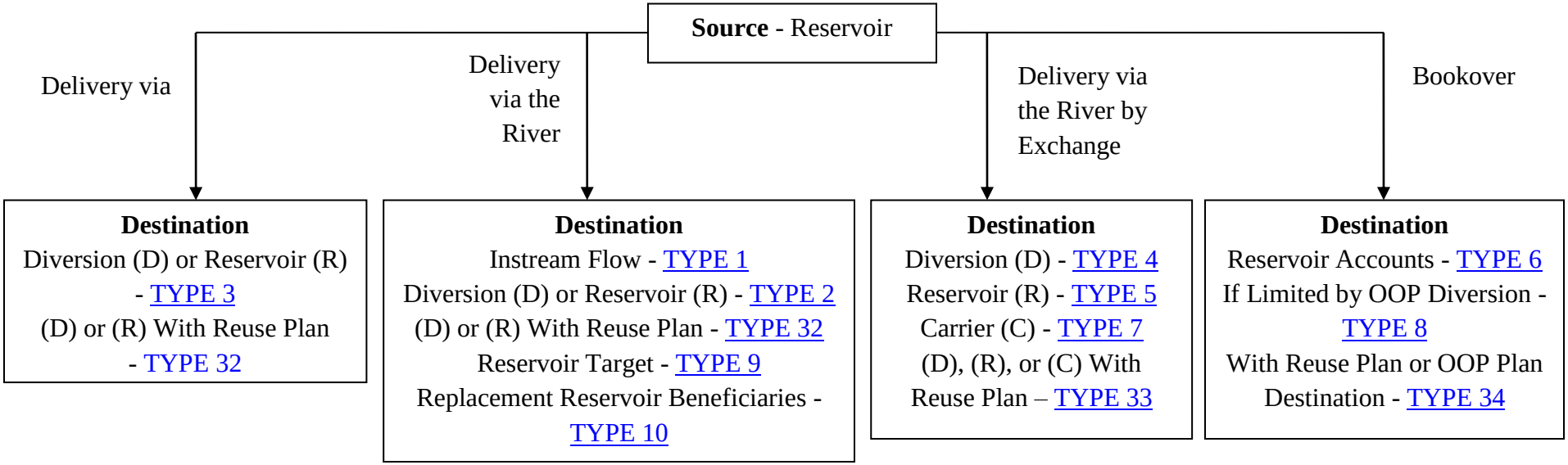
- On Figure 4 (Special Operating Rules) select the box titled “Interstate Compacts” to Destination “South Platte Compact”, resulting in use of type 40 and type 50 operating rules (see Section 4.13.40 and 4.13.50);

Example 5 - Operate an Augmentation Well

- On Figure 4 (Special Operating Rules) select the box titled “Source – Ground Water”to Augmentation Well, resulting in use of type 37 operating rule (explained further below in Section 4.13.49).

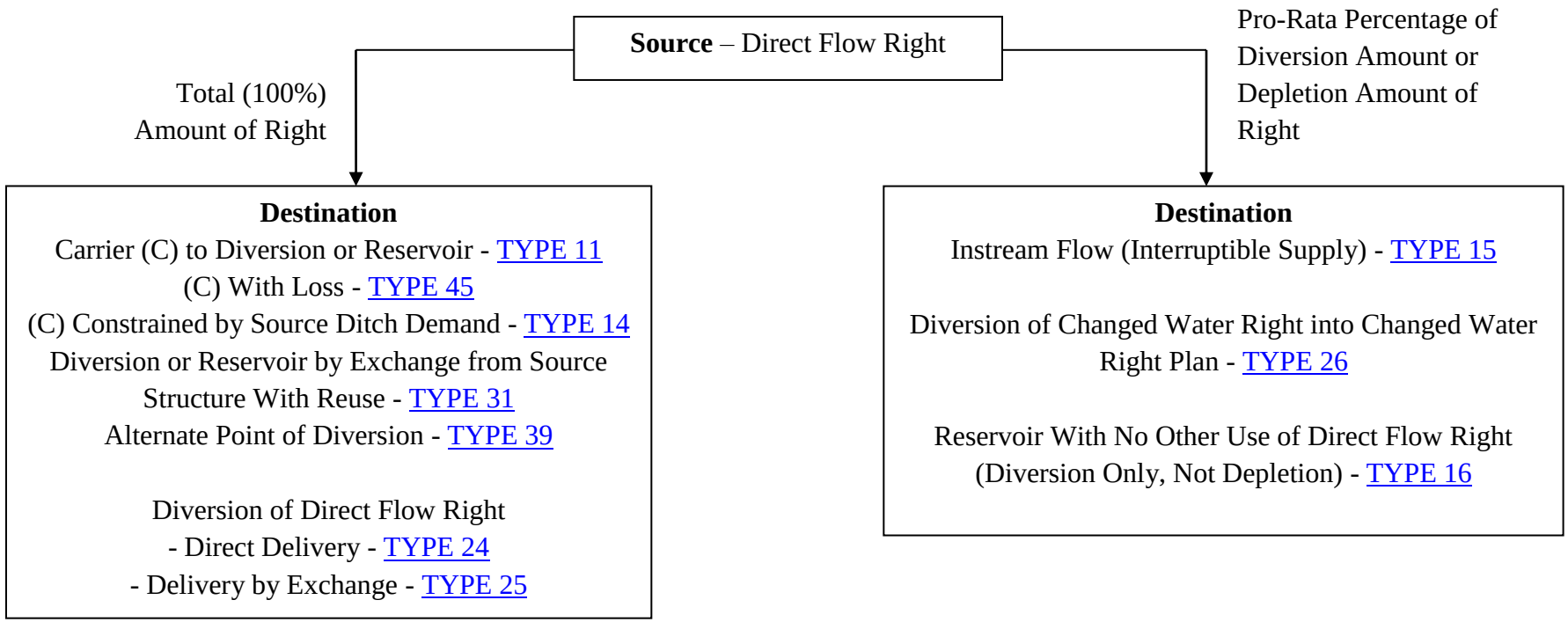
STATEMOD OPERATING RULES DECISION TREE

Figure 1: Operating Rule Types, Source = Reservoir



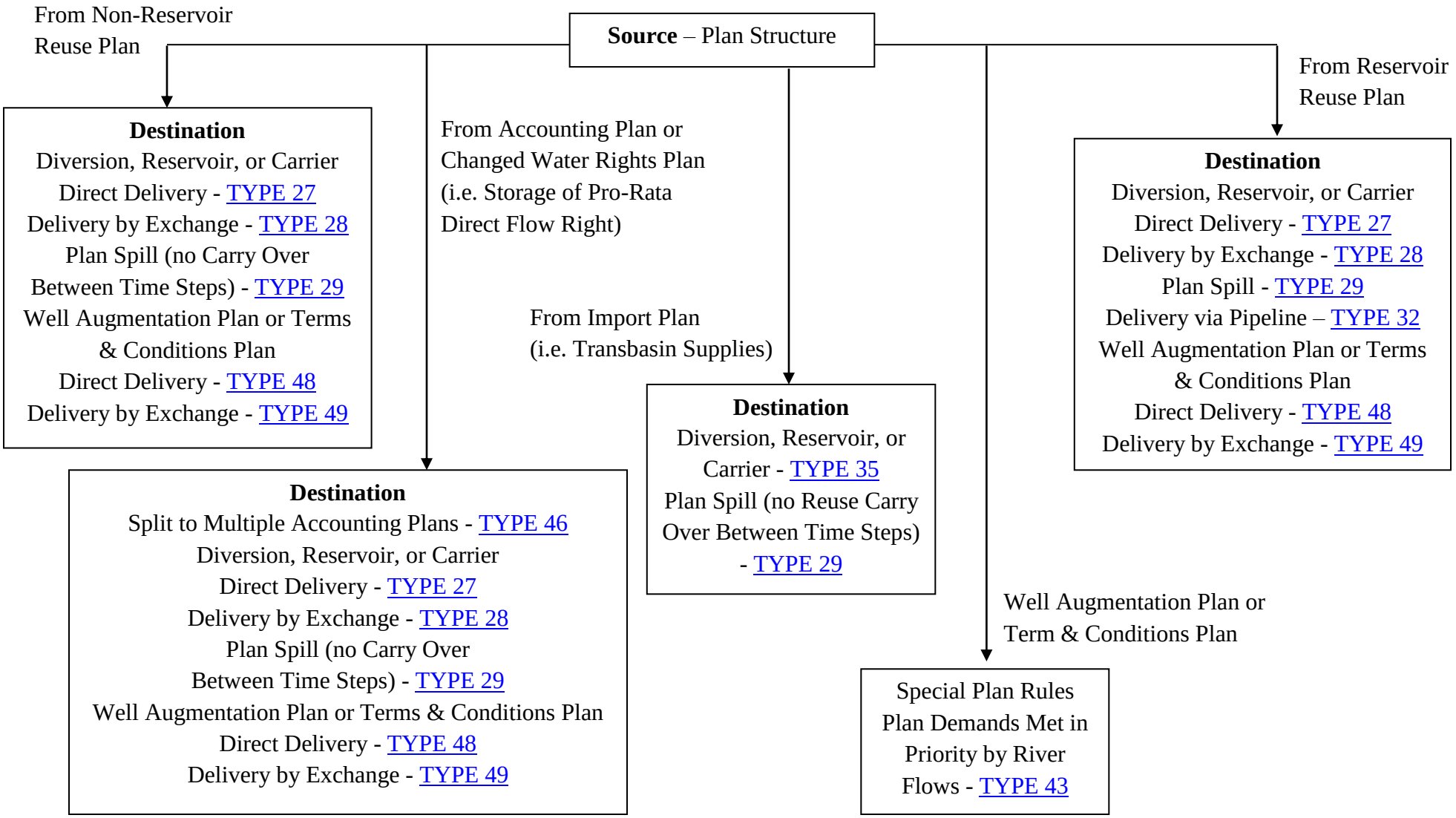
STATEMOD OPERATING RULES DECISION TREE

Figure 2: Operating Rule Types, Source = Direct Flow Right



STATEMOD OPERATING RULES DECISION TREE

Figure 3: Operating Rule Types, Source = Plan Structure



STATEMOD OPERATING RULES DECISION TREE

Figure 4: Special Operating Rule Types

Interstate Compacts

La Plata Compact (Index Flow) - TYPE 13
Rio Grande Compact Deliveries - TYPE 17
Conejos River Compact Deliveries - TYPE 18
South Platte Compact - TYPE 40 and TYPE 50

Soil Moisture

Soil Moisture Use Senior to Surface and/or Ground Water Right – TYPE 22

Other

Reoperation (Increase Speed of Simulation) - TYPE 12
Downstream Call Function (Used for Modeling a Portion of a River System) - TYPE 23

Storage Operations

OOP Diversion (Upstream Storage Statute) - TYPE 38
operated with OOP Bookover – TYPE 8

Storage with Special Limits (e.g., Green Mountain 1955 Exchange Limited by Dillon and Colorado Springs OOP Diversion and Storage Plan) – TYPE 41
Administrative Plan Limit (HUP Releases, Colorado Springs Operations) – TYPE 47
Plan Reset – TYPE 42

Source – Ground Water

Augmentation Well - TYPE 37
Recharge Well – TYPE 44

Item	Destination or Diverting Structure	Source or Replacement Structure	Operational Activity
4.13.1	Instream Flow	Reservoir	Reservoir to Instream Flow Delivery by the River
4.13.2	Direct Flow or Reservoir	Reservoir	Reservoir to a Direct Flow or reservoir or carrier Delivery by the river or carrier
4.13.3	Direct Flow or Reservoir	Reservoir	Reservoir to a Carrier Delivery by a carrier
4.13.4	Direct Flow	Reservoir	Reservoir Exchange to a Direct Flow Delivery by the river
4.13.5	Reservoir	Reservoir	Reservoir Exchange to Storage Delivery by the river
4.13.6	Reservoir	Reservoir	Bookover transfer between reservoir accounts
4.13.7	Diversion or Reservoir	Reservoir	Reservoir to a Carrier by Exchange Delivery by the river
4.13.8	Reservoir or Plan	Reservoir or Plan	Out-of-Priority Bookover Bookover of an Out-of-Priority diversion
4.13.9	NA	Reservoir	Release for target contents Delivery by the river
4.13.10	Direct Flow	Reservoir	General Reservoir Replacement By direct release or exchange Delivery by the river
4.13.11	Direct Flow or Reservoir	Water Right	Carrier Right to a ditch or reservoir Delivery by a carrier
4.13.12	NA	NA	Reoperation Reoperate water rights
4.13.13	Instream Flow	Stream Gage	Index flow constraint on an instream flow diversion Note La Plata Compact uses this Operating Rule
4.13.14	Direct Flow or Reservoir	Direct Flow	Carrier Right with Constrained Demand Carrier constrained by the demand At both the destination and source Delivery by the river

4.13.15	Instream Flow	Water Right	Interruptible supply Based on a natural flow estimate Transfer a direct diversion water Right to an instream flow
4.13.16	Direct Flow	Water Right	Direct Flow Storage Allow the unused portion of a direct flow decree to be stored in a reservoir
4.13.17	Direct Flow	Index Station	Rio Grande Compact - Rio Grande portion
4.13.18	Direct Flow	Index Station	Rio Grande Compact – Conejos River portion
4.13.19	Direct Flow	River	Split Channel Operations
4.13.20	NA	Reservoir	San Juan Reservoir RIP Operation
4.13.21	Well	NA	Wells with Sprinkler Use
4.13.22	Direct Flow and Well	NA	Soil Moisture Use
4.13.23	Downstream Call	River	Downstream Call Operate a downstream call
4.13.24	Direct Flow or Reservoir or Plan	Water Right	Direct Flow Exchange Supply a direct flow or reservoir or plan by exchange of a water right From river or carrier
4.13.25	Direct Flow or Reservoir or Plan	Water Right	Direct Flow Bypass Supply a direct flow or reservoir or Plan by a bypass of a water right From river or carrier
4.13.26	Changed Water Right Plan	Water Right	Transfer a direct flow water water right to an administrative plan
4.13.27	Diversion or Reservoir	Reservoir or Reuse Plan	Reservoir or ReUse Plan to a Diversion or Reservoir Direct with or without destination reuse Supply a diversion or Reservoir from a Reservoir or Reuse Plan directly from the river or a carrier

4.13.28	Diversion or Reservoir	Reservoir or ReUse Plan	Reservoir or ReUse Plan to a Diversion or Reservoir by exchange with or without destination reuse Supply a diversion or reservoir from a reservoir or plan by exchange by Exchange from the river or a carrier
4.13.29	NA	Plan	Plan Spill Release water from a plan delivery by the river Source water location is destination when Changed Water Rights Plan is source
4.13.30	Reservoir	Operating Rule	Reservoir Rediversion Redivert water released by another operating rule for a T&C plan
4.13.31	Direct Flow or Reservoir	Water Right	Carrier Right with Reuse
4.13.32	Direct Flow or Reservoir or Carrier	Reservoir & Reservoir Reuse Plan	Plan Reservoir and Plan to a direct flow or reservoir or carrier direct with or without destination reuse Delivery by the river or carrier
4.13.33	Direct Flow or Reservoir or Carrier	Reservoir & Reservoir Reuse Plan	Plan to a Direct Flow or reservoir or carrier by exchange with or without destination reuse Delivery by the river or carrier
4.13.34	Reservoir	Reservoir (bookover)	Bookover with Reuse with Reuse
4.13.35	Import Diversion	Acct.Plan	Import to an Accounting Plan Delivery by the river
4.13.36	Direct Flow	Water Right	Seasonal (daily) Water Right (e.g. Meadow Rights)
4.13.37	Plan	Well Water Right	Augmentation Well Pump an augmentation well to satisfy a T&C or Well Augmentation plan requirement
4.13.38	Direct Flow or Reservoir or	Water Right	Out-of-Priority Diversion Divert out-of-priority to

	Carrier		a reservoir or a diversion with Respect to a senior reservoir right. Addresses the upstream storage statute.
4.13.39	Well or Diversion	Water Right	Alternate Point Pump or divert using an alternate Point of diversion
4.13.40	Diversion or Instream Flow	River	South Platte Compact Release Works in conjunction with a type 50 operating rule to 1) release Water to a user that is water short and located upstream of the Washington county line (e.g not in Water District 64) or 2) to the South Platte compact itself.
4.13.41	Reservoir	Water Right	Storage with Special Limits Limit reservoir storage by the amount diverted by one or more Out-of-Priority Plans
4.13.42	NA	Plan	Plan Reset
4.13.43	Well Augmentation Plan	River	In-Priority Supply Determine if well depletions from pumping in a prior time step or terms and conditions accounted for in a Plan structure are in priority
4.13.44	Recharge Reservoir	Well Water Right	Recharge Well Pump a recharge well to a Recharge Reservoir
4.13.45	Direct Flow or Reservoir	Water Right	Carrier Right with Loss to a ditch or reservoir Delivery by a carrier
4.13.46	Admin Plan	Admin Plan	Multiple Ownership
4.13.47	NA	Rel. Limit Plan	Monthly/Annual Plan Limits
4.13.48	Direct Flow or Reservoir or Carrier	Reservoir or Plan	Reservoir or Plan to Plan Direct
4.13.49	Plan or Reservoir Reuse	Plan	Reservoir or Plan to Plan Exchange

4.13.50	Plan	River	South Platte Compact Storage Works in conjunction with a type 40 operating rule to allow water to be diverted in priority to a plan that represents the South Platte compact

4.13.1 Reservoir Release to an Instream Flow (ityopr=1)

The type 1 operating rule provides a method to release water to an instream flow via the river.

Row-data	Variable	Description
Control Data		
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12, 1x,a12,1x, 2f8.0, 2i8)		
1-1	cidvri(1)	Operational right ID
1-2	nameo(1)	Operational right name
1-3	rtem(1)	Administration number
1-4	dumx	Monthly Switch 0 No monthly on/off values 12 Number of monthly on/off Switches provided
1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on +n Begin in year n -n Stop after year n
Destination Data		
1-6	ciopde	Destination instream structure
1-7	iopdes(2,1)	Destination instream account (typically 1)
Supply Data		
1-8	ciopso(1)	Supply reservoir ID
1-9	iopsou(2,1)	Supply reservoir account
1-10	ciopso(2)	0
1-11	iopsou(4,1)	0
Type Data		
1-12	ityopr(1)	1
Associated Plan Data		
1-13	creuse	NA
Diversion Type		
1-14	cdivtyp	NA
Conveyance Loss (%)		
1-15	OprLoss	0
Miscellaneous Limits		
1-16	OprLimit	0

```
Start Date
1-17           IoBeg          First year of operation

End Date
1-18           IoEnd          Last year of operation


Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1            imonsw(1)      Monthly switch 0=off, 1=on
                                 +n Day first used that month
                                 -n Day last used that month
                              Note the first entry corresponds to the first
                                 month specified in the control file
```

4.13.2 Reservoir Release to a Diversion or Reservoir or Carrier (ityopr=2)

The type 2 operating rule provides a method to release water to a reservoir, direct flow structure or a carrier via the river. In addition, it can be used to constrain a diversion to the capacity of up to 10 intervening structures or carriers. Note a diversion is implicitly constrained by the capacity of the destination structure (variable ciopde, row-data 1-6).

```
Row-data     Variable          Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
               1x,a12, 1x, 2f8.0, 2i8)
1-1            cidvri(1)      Operational right ID
1-2            nameo(1)       Operation right name
1-3            rtem(1)        Administration number
1-4            dumx           Monthly and Intervening Structure
                              Switch
                              +n Number of intervening structures
                                 (max = 10)
                              -n Include -12 monthly on/off
                                 values minus n intervening
                                 structures.
                              Note, when a negative value is,
                              provided, it should be -13 or less
                              for 12 monthly values and 1
                              intervening structure)
1-5            ioprsw(1)      Annual On/Off Switch
                                 0 off
                                 1 on
                                 +n Begin in year n
                                 -n Stop after year n

Destination Data
1-6            ciopde         Destination diversion ID or reservoir ID
1-7            iopdes(2,1)    Destination structure account
                                    For a diversion destination, enter 1
```

```
                                    For a reservoir destination, enter
                                    +n Account served by this right
                                    -n Fill first n accounts based on
                                    the ratio of their ownership

Supply Data
1-8             ciopso(1)       Supply reservoir ID
1-9             iopsou(2,1)     Supply reservoir account
1-10            ciopso(2)       0
1-11            iopsou(4,1)     0 = provide 100% replacement
                                -1 = provide depletion replacement
Type Data
1-12            ityopr(1)       2

Associated Plan Data
1-13            creuse             NA

Diversion Type
1-14            divtyp             NA

Conveyance Loss (%)
1-15            OprLoss            0

Miscellaneous Limits
1-16            OprLimit           0

Start Date
1-17            IoBeg              First year of operation

End Date
1-18            IoEnd              Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1             imonsw(1)       Monthly switch 0=off, 1=on
                                      +n Day first used that month
                                      -n Day last used that month
                                Note the first entry corresponds to the first
                                   month specified in the control file

Intervening Structure Data
Include only if the variable (dumx) = 1-10 or < -12 1-10 or < -12
Format (36x, 10a12)
3-1             intern(1,1)     For +dumx, Enter dumx intervening
                                   structure ID's
                                   For -dumx, Enter abs(dumx)-12
                                   intervening structure ID's
```

4.13.3 Reservoir Release to a Diversion or Reservoir by a carrier (ityopr=3)

The type 3 operating rule provides a method to release water to a reservoir or direct flow structure by a conduit (e.g. a pipeline or canal that flows directly from a reservoir to a user) rather than the river. In

addition, it can be used to constrain a diversion to the capacity of up to 10 intervening structures or carriers. Note a diversion is implicitly constrained by the capacity of the destination structure (variable ciopde, row-data 1-6).

Row-data	Variable	Description
Control Data		
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12, 1x,a12,1x, 2f8.0, 2i8)		
1-1	cidvri(1)	Operational right ID
1-2	nameo(1)	Operational right name
1-3	rtem(1)	Administration number
1-4	dumx	Monthly and Structure Switch +n Number of intervening structures (max = 10) -n Include 12 monthly on/off values minus n intervening structures Note, when a negative value is, provided, it should be -13 or less)
1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on +n Begin in year n -n Stop after year n
Destination Data		
1-6	ciopde	Destination diversion ID or destination reservoir ID
1-7	iopdes(2,1)	Destination structure account For a diversion destination, enter 1 For a reservoir destination, enter +n Account to be served by this right -n Fill the first n accounts based on the ratio of their ownership
Supply Data		
1-8	ciopso(1)	Supply reservoir ID
1-9	iopsou(2,1)	Supply reservoir account
1-10	ciopso(2)	0
1-11	iopsou(4,1)	0 = provide 100% replacement -1 = provide depletion replacement
Type Data		
1-12	ityopr(1)	3
Associated Plan Data		
1-13	creuse	NA
Diversion Type		
1-14	cdivtyp	Diversion
Conveyance Loss (%)		
1-15	OprLoss	0

```
Miscellaneous Limits
1-16           OprLimit       0

Start Date
1-17           IoBeg          First year of operation

End Date
1-18           IoEnd          Last year of operation


Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1            imonsw(1)      Monthly switch 0=off, 1=on
                                 +n Day first used that month
                                 -n Day last used that month
                              Note the first entry corresponds to the first
                                 month specified in the control file

Intervening Structure Data
Include only if the variable (dumx) = 1-10 or < -12 1-10 or < -12
Format (36x, 10a12)
3-1            intern(1,1)    For +dumx, Enter dumx intervening
                                 structure ID's
                              For -dumx, Enter abs(dumx)-12
                                 intervening structure ID's
```

4.13.4 Reservoir Release to a Diversion by Exchange with the River (ityopr=4)

The type 4 operating rule provides a method to allow a direct flow diversion to occur via a reservoir exchange. In general, an exchange is required whenever a reservoir cannot serve a direct flow diversion or reservoir directly. When the destination variable ciopde (row-data = 1-6) is a structure ID, the exchange is not constrained by the structures water right. When the destination variable ciopde (row-data = 1-6) is a water right, the exchange is limited to its decreed amount less any diversions that have been charged to that right. For a direct diversion the limit is constrained to diversions that have occurred in the current time step. For a reservoir, the limit is constrained by storage that has occurred over the administrative season. The type 4 operating rule implicitly limits the exchange amount to ensure no senior, intervening water rights are impacted. Intervening rights are those water rights that occur between the diversion and a point downstream where the releasing reservoir's water is available.

```
Row-data       Variable       Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
               1x,a12,1x, 2f8.0, 2i8)
1-1            cidvri(1)      Operational right ID
1-2            nameo(1)       Operational right name
1-3            rtem(1)        Administration number
1-4            dumx           Monthly Switch
                                 0 No monthly on/off values
                                 12 Number of monthly on/off switches provided
```

```
1-5            ioprsw(1)      Annual On/Off Switch
                                 0=off
                                 1=on
                                 +n Begin in year n
                                 -n Stop after year n

Destination Data
1-6            ciopde         Destination structure ID or water right
1-7            iopdes(2,1)    Destination structure account, enter 1 for a
                              diversion

Supply Data
1-8            ciopso(1)      Supply reservoir ID
1-9            iopsou(2,1)    Supply reservoir account
1-10           ciopso(2)      0
1-11           iopsou(4,1)    0 = provide 100% replacement
                              -1 = provide depletion replacement

Type Data
1-12           ityopr(1)      4

Associated Plan Data
1-13           creuse         NA

Diversion Type
1-14           cdivtyp        NA

Conveyance Loss (%)
1-15           OprLoss        0

Miscellaneous Limits
1-16           OprLimit       0

Start Date
1-17           IoBeg          First year of operation

End Date
1-18           IoEnd          Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1            imonsw(1)      Monthly switch 0=off, 1=on
                                 +n Day first used that month
                                 -n Day last used that month
                              Note the first entry corresponds to the first
                                 month specified in the control file
```

4.13.5 Reservoir Storage by Exchange (ityopr=5)

The type 5 operating rule allows a reservoir to store water by an exchange with another reservoir. When the destination reservoir variable ciopde (row-data = 1-6) is a reservoir ID, the exchange is not constrained by the reservoir's water rights. When the variable ciopde (row-data = 1-6) is a water right,

the exchange is limited to the water right specified less any diversions that have been charged to that right during the administrative season.

Row-data	Variable	Description
Control Data		
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12, 1x,a12,1x, 2f8.0, 2i8)		
1-1	cidvri(1)	Operational right ID
1-2	nameo(1)	Operational right name
1-3	rtem(1)	Administration number
1-4	dumx	Monthly Switch 0 No monthly on/off values 12 Number of monthly on/off switches provided
1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on +n Begin in year n -n Stop after year n
Destination Data		
1-6	ciopde	Destination reservoir ID or water right
1-7	iopdes(2,1)	Destination structure account For a reservoir destination, enter +n Account to be served by this right -n Fill the first n accounts based on the ratio of their ownership
Supply Data		
1-8	ciopso(1)	Supply reservoir ID
1-9	iopsou(2,1)	Supply reservoir account
1-10	ciopso(2)	0
1-11	iopsou(4,1)	0
1-12	ityopr(1)	5
Associated Plan Data		
1-13	creuse	NA
Diversion Type		
1-14	cdivtyp	NA
Conveyance Loss (%)		
1-15	OprLoss	0
Miscellaneous Limits		
1-16	OprLimit	0
Start Date		
1-17	IoBeg	First year of operation First year of operation
End Date		
1-18	IoEnd	Last year of operation Last year of operation

```
Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1            imonsw(1)      Monthly switch 0=off, 1=on
                                 +n Day first used that month
                                 -n Day last used that month
                               Note the first entry corresponds to the
                                 first month specified in the control file
```

4.13.6 Reservoir to Reservoir Transfer (Bookover) (ityopr=6)

The type 6 operating rule allows a reservoir to reservoir bookover to occur. It is commonly used to transfer water from one reservoir storage account to another in a particular month. In addition, the amount booked over may be constrained by a diversion demand or the amount diverted by another operating rule.

The following are noted:

- If variable iopsou(2,1) is set to a diversion structure, variable iopsou(4) is set to 99 and variable oprlimit is set to 0, the book over can be limited by the demand specified in the direct diversion demand file (*.ddm).

- If variable iopsou(2,1) is set to a operating rule, variable iopsou(4) is set to 0, and variable oprlimit is set to 0, the book over can be limited by the amount divered by another operating rule.

- If variable iopsou(2,1) is set to a operating rule, iopsou(4) is set to 0 and oprlimit is set to 1, the bookover can be limited to not occur after the operating rule iopsou(2,1) operates. This capability was added for several reservoirs located in the San Juan Basin where water needs to get booked from several accounts in a reservoir to an account in that same reservoir then booked back from that account in order to reallocate total reservoir storage to each individual account at the beginning of the reservoir's administration year.

A Bookover is reported in the reservoir report (*.xre) as follows:

- When a Type 6 Bookover operating rule is used to book water from one reservoir account to another without making a release to the river, the reservoir report (*.xwb) for the total reservoir (account 0) and the account where the water was booked shows the water under the column 7, "From Carrier by Other". In addition, the reservoir report (*.xwb) for the individual account along with the operating rule reporting (*.xop) reflect the actual amount diverted.

- When a Type 6 Bookover operating rule is used to book water from one account to another and then back at the same reservoir, the reservoir report (*.xwb) for the total reservoir (account 0) shows the water moving twice (once out and once back in) under the column 7, "From Carrier by Other". However, the reservoir report (*.xwb) for the individual accounts along with the operating rule reporting (*.xop) reflect the actual amount diverted.

- See Section 7 for additional discussion on modeling reservoir operations, including bookovers.

Row-data	Variable	Description
Control Data		
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12, 1x,a12,1x, 2f8.0, 2i8)		
1-1	cidvri(1)	Operational right ID
1-2	nameo(1)	Operational right name
1-3	rtem(1)	Administration number
1-4	dumx	Monthly and Structure Switch 0 No monthly on/off values 12 Number of monthly on/off switches provided
1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on +n Begin in year n n Stop after year n
Destination Data		
1-6	ciopde	Destination reservoir ID
1-7	iopdes(2,1)	Destination structure account For a reservoir destination, enter +n Account served by this right -n Fill the first n accounts based On the ratio of their ownership
Supply Data		
1-8	ciopso(1)	Supply reservoir ID
1-9	iopsou(2,1)	Supply reservoir account
1-10	ciopso(2)	If not required enter 0 If limited by the amount diverted under an operating rule, enter the operating rule ID If limited by a diversion demand amount enter the diversion structure ID
1-11	iopsou(4,1)	0 if ciopso(2) is 0 or an operating rule ID 99 if ciopso(2) is a diversion structure ID
Type Data		
1-12	ityopr(1)	6
Associated Plan Data		
1-13	creuse	NA
Diversion Type		
1-14	cdivtyp	NA
Conveyance Loss (%)		
1-15	OprLoss	0

```
Miscellaneous Limits
1-16           OprLimit       0 if ciopso(2) is 0
                              1 if ciopso(2) is a operating rule and
                                 The user wants this (cidvri(1))
                                 operating rule to not operate after
                                 the the operating rule specified
                                 by ciopso(2) operates.  (See above
                                 for additional discussion of this
                                 capability.

Start Date
1-17           IoBeg          First year of operation

End Date
1-18           IoEnd          Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1            imonsw(1)      Monthly switch 0=off, 1=on
                                 +n Day first used that month
                                 -n Day last used that month
                              Note the first entry corresponds to the first
                                 month specified in the control file
```

4.13.7 Diversion by a Carrier by Exchange (ityopr=7)

The type 7 operating rule provides a method to allow a diversion by a carrier via a reservoir exchange. In general, an exchange is required whenever a reservoir cannot serve a demand directly. This operating rule implicitly limits the exchange amount to ensure no senior, intervening water rights are impacted. Intervening rights are those water rights that occur between the storing reservoir and a point downstream where the releasing reservoir's water is available.

```
Row-data       Variable       Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
               1x,a12,1x, 2f8.0, 2i8)
1-1            cidvri(1)      Operational right ID
1-2            nameo(1)       Operational right name
1-3            rtem(1)        Administration number
1-4            dumx           Monthly Switch
                                 0 No monthly on/off values
                                 12 Number of monthly on/off switches provided
1-5            ioprsw(1)      Annual On/Off Switch
                                 0=off
                                 1=on
                                 +n Begin in year n
                                 -n Stop after year n
Destination Data
1-6            ciopde         Destination - Operational Right ID of the Carrier
1-7            iopdes(2,1)    Destination account
```

		For a diversion destination, enter 1 For a reservoir destination, enter +n Account to be served by this right -n Fill the first n accounts based on the ratio of their ownership
Supply Data		
1-8	ciopso(1)	Supply reservoir ID
1-9	iopsou(2,1)	Supply reservoir account
1-10	ciopso(2)	0
1-11	iopsou(4,1)	See Section 7 for a discussion of the Reservoir demand options. 0 = reservoir demand is not adjusted +n = Reservoir demand is limited to not exceed CIR/n; where n (%) is the efficiency of reservoir water use. Note n (%) is limited to not exceed the max system efficiency. Also a +n requires the variable efficiency option (ieffmax) from control file be on.
Type Data		
1-12	ityopr(1)	7
Associated Plan Data		
1-13	creuse	NA
Diversion Type		
1-14	cdivtyp	NA
Conveyance Loss (%)		
1-15	OprLoss	0
Miscellaneous Limits		
1-16	OprLimit	0
Start Date		
1-17	IoBeg	First year of operation
End Date		
1-18	IoEnd	Last year of operation
Monthly Data		
Free Format		
Include only if the variable (dumx) = 12 or less than -12		
2-1	imonsw(1)	Monthly switch 0=off, 1=on +n Day first used that month -n Day last used that month Note the first entry corresponds to the first month specified in the control file
Intervening Structure Data		

```
Include only if the variable (dumx) = 1-10 or < -12 1-10 or < -12
Format (36x, 10a12)
3-1            intern(1,1)    For +dumx, Enter dumx intervening
                                 structure ID's
                              For -dumx, Enter abs(dumx)-12
                                 intervening structure ID's
```

4.13.8 Out-Of-Priority Reservoir Bookover (ityopr=8)

The type 8 operating rule works in concert with an out-of-priority diversion (type 38) to book water

1. From an out-of-priority reservoir account to another reservoir account or

2. From an out-of-priority (OOP) plan to reduce its obligation.

This rule was significantly enhanced in order to address 1. Out out-of-priority diversions in addition to out-of-priority storage and 2. Out-of-priority storage and diversions occurring at more than one reservoir and diversion with regard to the same subordinated reservoir.

When the destination is a reservoir the out-of-priority diversion is typically kept in a separate account of the junior reservoir (e.g. an OOP account). Also an out-of-priority plan is used to track the amount taken. If the volume of water stored in the OOP plan exceeds the remaining capacity of the subordinated reservoir right, the Type 8 rule books water from the out-of-priority account to another general purpose account within the junior reservoir and the OOP plan obligation is reduced. To perform this activity the operating rule "associated" with the OOP diversion or storage being booked over must be known to the type 8 operating rule. If the subordinated reservoir right does not fill then a type 27 operating rule is typically used to transfer the water from the out-of-priority reservoir to the subordinated reservoir and adjust the obligation stored in the OOP Plan.

When the destination is an OOP Plan the out-of-priority diversion is stored under the OOP Plan. Once the volume of water stored in the OOP plan exceeds the remaining capacity of the subordinated reservoir right, the obligation stored in the OOP plan is reduced. To perform this activity the operating rule "associated" with the OOP diversion or storage being booked over must be known to the type 8 operating rule. If the subordinated reservoir right does not fill then a type 27 operating rule is typically used to transfer the water from a reservoir to the subordinated reservoir and adjust the obligation stored in the OOP Plan.

The following are noted:

- The variable ciopso(2) (row-data 1-10) is used to identify the senior decree that is being subordinated.
- The variable intern(n,1) (rule n, value 1) is used to identify the junior decree that will be credited withdiverting water out of priority when booked over.
- The variables intern(n,2) (rule n, value 2) through intern(n,10) (rule n, value 10) are used to identify up to 9 operating rules associated with this OOP plan.
- If the destination is a reservoir all OOP diversions are charged against the junior reservoir's water right when they are booked over to an account where they can be released.

- If the subordinated water right is not filled, the water stored out of priority is released to the subordinated reservoir at the end of the administration year assigned to each reservoir (see variable rdate in a reservoir station file (*.res)).
- The type 8 operating rule has generic applications but was originally developed to handle the Blue River decree that allows OOP storage of water in Dillon Reservoir (an upstream junior reservoir), OOP storage of water in Blue Lake (an upstream reservoir), OOP diversion to Roberts Tunnel (an upstream junior diversion), and an OOP diversion to the Con Hoosier system before Green Mountain Reservoir (a downstream senior) is filled. See Section 7 for additional description of the Blue River Decree implementation to the Colorado River Basin.

Row-data	Variable	Description
Control Data		
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12, 1x,a12,1x, 2f8.0, 2i8)		
1-1	cidvri(1)	Operational right ID
1-2	nameo(1)	Operational right name
1-3	rtem(1)	Administration number
1-4	dumx	Monthly switch Enter 2 if no on/off switches are provided e.g. one for an associated Water Right and one for an associated operating Rule Enter -14 if on/off switches are provided e.g. twelve on/off switches, one for an associated Water Right and one for an associated operating Rule
1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on +n Begin in year n -n Stop after year n
Destination Data		
1-6	ciopde	Destination reservoir ID or Plan ID
1-7	iopdes(2,1)	Destination structure account For a reservoir destination, enter +n Account to be served by this right -n Fill the first n accounts based on the ratio of their ownership
Supply Data		
1-8	ciopso(1)	If the destination is a reservoir enter the supply reservoir ID (same as the destination ID) If the destination is a Plan enter NA
1-9	iopsou(2,1)	If the destination is a reservoir enter the supply reservoir account If the destination is a Plan enter NA
1-10	ciopso(2)	Supply (subordinated) water right ID
1-11	iopsou(4,1)	0

```
Type Data
1-12            ityopr(1)       8

Associated Plan Data
1-13            creuse          Out-of-Priority Plan ID

Diversion Type
1-14            cdivtyp         NA

Conveyance Loss (%)
1-15            OprLoss         0

Miscellaneous Limits
1-16            OprLimit        0

Start Date
1-17            IoBeg           First year of operation

End Date
1-18            IoEnd           Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1             imonsw(1)       Monthly switch 0=off, 1=on
                                   +n Day first used that month
                                   -n Day last used that month
                                Note the first entry corresponds to the first
                                   month specified in the control file

Destination Water Right or Associated Reservoirs
Include only if the variable (dumx) = +n or < -12
3                               Format (36x, 10a12)
3-1             intern(1,1)     The destination water right ID
                                   (the one storing Out-of-Priority)
3-2             intern(1,2)     The OOP operational right associated
                                   with this bookover
                                Note must be provided in the *.opr
                                   file before the bookover right
```

4.13.9 Reservoir Target (ityopr=9)

The type 9 operating rule allows reservoir releases to be made from a reservoir to satisfy a target reservoir content specified in the *.tar file. This operating rule is commonly applied to simulate flood control operations where forecast data is are unavailable. In addition, it may be used to simulate hydropower operations when a hydropower demand cannot be specified by other means.

```
Row-data        Variable        Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
                1x,a12,1x, 2f8.0, 2i8)
1-1             cidvri(1)       Operational right ID
```

```
1-2            nameo(1)       Operational right name
1-3            rtem(1)        Administration number
1-4            dumx           Monthly Switch
                                 0 No monthly on/off values
                                 12 Number of monthly on/off switches
                               provided
1-5            ioprsw(1)      Annual On/Off Switch
                                 0=off
                                 1=on
                                 +n Begin in year n
                                 -n Stop after year n
Destination Data
1-6            ciopde         NA
1-7            iopdes(2,1)    0

Source Data
1-8            ciopso(1)      Reservoir ID
1-9            iopsou(2,1)    Reservoir account; Enter 0 to meet target
                                 levels by releasing from each account by
                                 the proportionate amount currently in each
1-10           ciopso(2)      0
1-11           iopsou(4,1)    0

Type Data
1-12           ityopr(1)      9

Associated Plan Data
1-13           creuse         NA

Diversion Type
1-14           cdivtyp        NA

Conveyance Loss (%)
1-15           OprLoss        0

Miscellaneous Limits
1-16           OprLimit       0

Start Date
1-17           IoBeg          First year of operation

End Date
1-18           IoEnd          Last year of operation


Monthly Data
Include only if the variable (dumx) = 12
2                             Free Format
2-1            Imonsw(1)      Monthly switch 0=off, 1=on
                                 +n Day first used that month
                                 -n Day last used that month
                               Note the first entry corresponds to the first
                                 month specified in the control file
```

4.13.10 General Replacement Reservoir to a Diversion by a Direct Release or Exchange (ityopr=10)

The type 10 operating rule provides a method to supply reservoir water to a large number of structures without supplying individual operating rules for each. The following are noted:

- The operating rule checks whether reservoir replacement water will be supplied to a diversion by a direct reservoir release or exchange.
- The operating rule serves all water rights which are senior to its Administration number which have variable "ireptyp" of the Direct Diversion Station File (*.dds) set to 1 or -1.
- The variable “ireptyp” specified by structure in the diversion station (*.dds) file specifies if replacement releases are to be made for the full diversion (ireptyp=1) or depletion (ireptyp=-1) or not at all (ireptyp=0).
- When more than one replacement reservoir is specified, they are sorted by Administration number and operate by priority, most senior first.
- The replacement reservoir operating rule applies to direct flow structures only, therefore carrier systems must be tied to a replacement reservoir directly. The following are is noted:
- The replacement reservoir operating rule has generic applications but was originally developed to handle the replacement reservoir obligations of Green Mountain Reservoir in the Colorado River Basin.
- When a replacement reservoir operating rule is included in a simulation and the release from a replacement reservoir is non-zero, additional information associated with the replacement reservoir operation is provided in the replacement reservoir summary (*.xrp).

Row-data	Variable	Description
Control Data		
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12, 1x,a12,1x, 2f8.0, 2i8)		
1-1	cidvri(1)	Operational right ID
1-2	nameo(1)	Operation right name
1-3	rtem(1)	Administration number
1-4	dumx	Monthly Switch 0 No monthly on/off values 12 Number of monthly on/off switches provided
1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on
Destination Data		
1-6	ciopde	0
1-7	iopdes(2,1)	0
Source Data		
1-8	ciopso(1)	Supply reservoir ID
1-9	iopsou(2,1)	Supply reservoir account
1-10	ciopso(2)	NA

1-11	iopsou(4,1)	0 (not used)
Type Data		
1-12	ityopr(1)	10
Associated Plan Data		
1-13	creuse	NA
Diversion Type		
1-14	cdivtyp	NA
Conveyance Loss (%)		
1-15	OprLoss	0
Miscellaneous Limits		
1-16	OprLimit	0 Do not adjust Monthly or Annual Operational limits 1 Operating Rule ID specified in row 3 for which monthly and Annual limits will be INCREASED by the amount released 2 Operating Rule ID specified in row 3 for which monthly and Annual limits will LIMIT the amount released
Start Date		
1-17	IoBeg	First year the operating rule is on
End Date		
1-18	IoEnd	Last year the operating rule is on
Monthly Data		
Free Format		
Include only if the variable (dumx) = 12 or less than -12		
2-1	imonsw(1)	Monthly switch 0=off, 1=on +n Day first used that month -n Day last used that month Note the first entry corresponds to the first month specified in the control file
Monthly and Annual Limitation Data		
Include only if the switch (OprLimit > 0)		
Format (36x, 10a12)		
3-1	cx	If OprLimit=1, Operating Rule ID for which monthly and Annual limits will be INCREASED by the Amount released. If OprLimit=2, Operating Rule ID for which monthly and Annual limits will LIMIT the Amount released

4.13.11 Carrier Right to a Ditch or Reservoir (ityopr=11)

The type 11 operating rule provides a method to divert water to a reservoir or direct flow structure using another structure's water rights. In addition, it can be used to constrain a diversion to the capacity of up to 10 intervening structures.The following are noted:

- A diversion is implicitly constrained by the capacity of the destination structure (variable ciopde).
- The source water right may operate as a standard direct flow right and/or as a carrier. When the variable iopsou(2,1) = 1 the right is used as a carrier only. When the variable iopsou(2,1) = 0 the right is used as both a direct flow right and a carrier right.
- If the source is a diversion right, the administration number used for the operating rule is the priority of the diversion right, not the priority assigned to the operating rule.
- If several operating rules use the same water right, diversions are not allowed to exceed the decreed capacity.
- If the destination is a diversion, the demand is the destination structure's demand. Any return flows use the return flow pattern and locations assigned to the destination structure in the diversion station file (*.dds).
- If the destination is a reservoir, the operating rule demand is the destination reservoir's capacity.
- If the destination is a reservoir and the source is a diversion right, the operating rule diversion IS NOT CHARGED against the reservoir's decree.
- If the destination is a reservoir and the source is a reservoir right, the operating rule diversion IS CHARGED against the reservoir's decree.
- If carrier losses are to be included use a type 45 operating rule.

```
Row-data        Variable        Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
               1x,a12,1x, 2f8.0, 2i8)
1-1             cidvri          Operational right ID
1-2             nameo(1)        Operational right name
1-3             rtem(1)         Administration number. Note if
                                   ciopso(1) is a diversion right,
                                   its administration number is
                                   used and rtem is ignored
1-4             dumx            Monthly and Structure Switch
                                   +n Number of intervening structures
                                      (max = 10)
                                   -n Include -12 for monthly on/off
                                      values minus n intervening
                                      structures
                                      Note, when a negative value is,
                                      provided, it should be -13
                                      or less).
1-5             ioprsw(1)       Annual On/Off Switch
                                   0=off
                                   1=on
```

		+n=Begin in year n -n=Stop after year n
Destination Data		
1-6	ciopde	Destination diversion or reservoir ID
1-7	iopdes(2,1)	Destination structure account, 1 for a diversion destination +n for a reservoir destination, +n Account served by this right -n Fill the first n accounts using the ratio of their ownership
Source Data		
1-8	ciopso(1)	Water right ID under which the diversion occurs Note may be a diversion right or a reservoir right
1-9	iopsou(2,1)	0 The source water right (ciopso(1)) is left on (i.e. it can be used as a both a direct flow right and this operating rule). 1 The source water right (ciopso2(1) is turned off (i.e. it can only be used by this operating rule)
1-10	ciopso(2)	NA the water right is administered at the location specified in the appropriate water right file +n the water right is administered at location n (e.g. a reservoir right is administered at a the location of a carrier)
1-11	iopsou(4,1)	0 Not used
Type Data		
1-12	ityopr(1)	11
Plan Data		
1-13	creuse	NA If the carrier loss is not associated with a recharge source +n Enter Recharge Plan ID If the carrier loss is a recharge source. Note the Plan type must be recharge (type 8)
Diversion Type		
1-14	cdivtyp	NA
Conveyance Loss (%)		
1-15	OprLoss	0
Miscellaneous Limits		
1-16	OprLimit	0 No carrier limitation

```
                                +n Carrier limit (cfs) Note this
                                   value is an additional constraint
                                   that is imposed on a carrier
                                   since the capacity of the diverting
                                   structure and all carriers is an
                                   implicit constraint. This value is
                                   typically used to represent the
                                   maximum diversion rate allowed to
                                   fill a reservoir

Start Date
1-17            IoBeg           First year of operation

End Date
1-18            IoEnd           Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1             imonsw(1)       Monthly switch 0=off, 1=on
                                   +n Day first used that month
                                   -n Day last used that month
                                Note the first entry corresponds
                                   to the first month specified in
                                   the control file

Intervening Structure Data
Include only if the variable (dumx) = 1-10 or < -12 1-10 or < -12
Format (36x, 10a12)
3-1             intern(1,1)     For +dumx, Enter dumx intervening
                                   structure ID's
                                For -dumx, Enter abs(dumx) - 12
                                   intervening structure ID's
```

4.13.12 Reoperation (ityopr=12)

The type 12 operating rule provides a method to speed up model execution while incurring some level of inaccuracy. It is typically used in coordination with the control file variable ireopx. When the control file variable ireopx is set to 0, all activities that supply new water to the system (reservoir releases, return flows to non downstream tributaries, etc.) automatically cause the model to reoperate with no inaccuracy and this operating rule is not required. When the control file variable ireopx is set to 1, this operating rule initiates reoperation at the Administration number specified. Reoperation, as used herein, restarts the water right allocation procedure from senior to junior in order to allow senior ditches to benefit from any new water that might have been introduced to the system.

```
Row-data        Variable        Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
                1x,a12,1x, 2f8.0, 2i8)
1-1             cidvri          Operational right ID
```

```
1-2            nameo(1)       Operation right name
1-3            rtem(1)        Administration number
1-4            dumx           0
1-5            ioprsw(1)      Annual On/Off Switch
                                 0=off
                                 1=on
                                 +n=Begin in year n
                                 -n=Stop after year n
1-6            ciopde         0

Destination Data
1-7            iopdes(2,1)    0
1-8            ciopso(1)      0

Supply Data
1-9            iopsou(2,1)    0
1-10           ciopso(2)      0
1-11           iopsou(4,1)    0

Type Data
1-12           ityopr(1)      12

Associated Plan Data
1-13           creuse         NA
Diversion Type
1-14           cdivtyp        NA

Conveyance Loss (%)
1-15           OprLoss        0

Miscellaneous Limits
1-16           OprLimit       0

Start Date
1-17           IoBeg          First year of operation

End Date
1-18           IoEnd          Last year of operation


Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1            imonsw(1)      Monthly switch 0=off, 1=on
                                 +n Day first used that month
                                 -n Day last used that month
                               Note the first entry corresponds to the first
                                 month specified in the control file
```

4.13.13 La Plata Compact (Index Flow) (ityopr=13)

The type 13 operating rule allows an instream flow to operate based on its location on the river and the stream flow at a remote location. This rule has generic applications but was originally developed to

handle the La Plata River compact in the San Juan River Basin. This compact, in general, limits Colorado's commitment to deliver water to New Mexico based on the flow at an upstream, index gage. Additional discussion of the La Plata Compact implementation is provided in Section 7.

Row-data	Variable	Description
Control Data		
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12, 1x,a12,1x, 2f8.0, 2i8)		
1-1	cidvri(1)	Operational right ID
1-2	nameo(1)	Operational right name
1-3	rtem(1)	Administration number
1-4	dumx	Monthly Switch 0 No monthly on/off values 12 Number of monthly on/off switches provided
1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on +n=Begin in year n -n=Stop after year n
Destination Data		
1-6	ciopde	Destination Instream Flow
1-7	iopdes(2,1)	Destination Account, enter 1
Supply Data		
1-8	ciopso(1)	River ID of the Index flow station
1-9	iopsou(2,1)	Percent of the Index flow station available
1-10	ciopso(2)	Instream Flow water right
1-11	iopsou(4,1)	1 The source water right (ciopso(2) is turned off) i.e. it can only be used by this operating rule)
Type Data		
1-12	ityopr(1)	13
Associated Plan Data		
1-13	creuse	NA
Diversion Type		
1-14	cdivtyp	NA
Conveyance Loss (%)		
1-15	OprLoss	0
Miscellaneous Limits		
1-16	OprLimit	0
Start Date		
1-17	IoBeg	First year of operation
End Date		
1-18	IoEnd	Last year of operation
Monthly Data		

```
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1            imonsw(1)      Monthly switch 0=off, 1=on
                                 +n Day first used that month
                                 -n Day last used that month
                               Note the first entry corresponds to the first
                                 month specified in the control file
```

4.13.14 Carrier Right with Constrained Demand (ityopr=14)

The type 14 operating rule provides a method to divert water to a reservoir or direct flow structure using another structure's water rights. It is similar to the type 11 operating rule except the amount diverted is constrained by the demand of the structure associated with the source water right. Because it is an extension of the Type 11 operating rule, the amount diverted by a Type 14 rule is constrained by the source water right, carrier capacity, and the demand of the source structure. The following are noted:

- When the variable iopsou(4,1) is equal to 0, the diverting structure's demand is limited to the monthly value read from the direct flow demand (*.ddm) file. When the variable iopsou(4,1) is greater than 1, the diverting structure's demand for the year is limited to the annual value read as variable iopsou(4,1).
- The source water right may operate as a standard direct flow right and/or as a carrier. When the variable iopsou(2,1) = 1 is the right is used as a carrier only. When the variable iopsou(2,1) = 0 the right is used as both a direct flow right and a carrier right.

```
Row-data       Variable       Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
               1x,a12,1x, 2f8.0, 2i8)
1-1            cidvri         Operational right ID
1-2            nameo(1)       Operational right name
1-3            rtem(1)        Administration number.Note if ciopso(1) is
                                 a diversion right, its administration
                                 number is used and rtem is ignored.
1-4            dumx           Monthly and Structure Switch
                                 +n Number of intervening structures
                                    (max = 10)
                                 -n Include -12 monthly on/off values
                                    minus n intervening structures
                                    Note, when a negative value is,
                                    provided, it should be -13 or less)
1-5            ioprsw(1)      Annual On/Off Switch
                                 0=off
                                 1=on
                                 +n=Begin in year n
                                 -n=Stop after year n

Destination Data
1-6            ciopde         Destination diversion ID or reservoirID
1-7            iopdes(2,1)    Destination structure account
                              For a diversion destination, enter 1
```

		For a reservoir destination, enter +n Account to be served by this right -n Fill the first n accounts based on the ratio of their ownership
Source Data		
1-8	ciopso(1)	Water right ID under which the diversion occurs (must be a diversion right)
1-9	iopsou(2,1)	0 The source water right (ciopso(1)) is left on (i.e. it can be used as a both a direct flow right and this operating rule) 1 The source water right (ciopso2(1) is turned off (i.e. it can only be used by this operating rule)
1-10	ciopso(2)	NA (not used)
1-11	iopsou(4,1)	1 Monthly diversion limit is provided in the direct diversion demand file (*.ddm) for ciopso(2) +n Annual diversion limit (acft). Note any data provided in the direct diversion demand file (*.ddm) is ignored.
Type Data		
1-12	ityopr(1)	14
Associated Plan Data		
1-13	creuse	NA
Diversion Type		
1-14	cdivtyp	NA
Conveyance Loss (%)		
1-15	OprLoss	0
Miscellaneous Limits		
1-16	OprLimit	0
Start Date		
1-17	IoBeg	First year of operation
End Date		
1-18	IoEnd	Last year of operation
Monthly Data		
Free Format		
Include only if the variable (dumx) = 12 or less than -12		
2-1	imonsw(1)	Monthly switch 0=off, 1=on +n Day first used that month -n Day last used that month Note the first entry corresponds to the first month specified in the control file

```
Intervening Structure Data without loss
Include only if the variable (dumx) = 1-10 or < -12 1-10 or < -12
Format (36x, 10a12)
3-1            intern(1,1)    For +dumx, Enter dumx intervening
                                 structure ID's
                              For -dumx, Enter abs(dumx)-12
                                 intervening structure ID's
```

4.13.15 Interruptible Supply Direct (ityopr=15)

The type 15 operating rule allows a direct flow diversion's water right (ciopso(2)) to defer its ability to divert in order to supply water to an instream flow located downstream. The rule may or may not operate in a given year based on the flow (iopsou(2)) at a specified location (ciopso(1)) in the network in the month indicated when variable imonsw(i) is equal to 2. The following comments are provided to assist in using and interpreting this operating rule:

- Once a water right has chosen to interrupt their supply and provide water to the instream flow, it cannot reoperate until it is turned off.
- The amount available for diversion is the minimum available to the source water right when it is in priority (i.e. diversion to instream flow = min (instream flow demand, direct diversion water right, direct diversion demand, available flow to direct diversion).
- Variable iopsou(4,1) allows the user to specify if the amount transferred is the total amount diverted or the amount that would have been consumed.
- The monthly on/off switches (imonsw(i)) allows the operating rule to continue from one simulation year through the next (e.g. begin in August of one year and continue through October of the next year). However, this ability requires the operating rule not operate until the first on switch (imonsw(i) = 2) is encountered.
- The Administration number assigned to the source water right overrides the variable rtem(1) provided with the operating rule.
- Because this operating rule has the ability to turn on and off based on a discharge, this operating rule is either on or off (i.e. the user is not allowed to initiate its operation during the study period by specifying a year for variable ioprsw(1).

```
Row-data       Variable       Description

Source Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
               1x,a12,1x, 2f8.0, 2i8)
1-1            cidvri         Operational right ID
1-2            nameo(1)       Operational right name
1-3            rtem(1)        Administration number. Note since ciopso(1) is
                                 a water right, its administration
                                 number is used and rtem(1)is ignored.
1-4            dumx           Monthly Switch
                                 0=No monthly on/off values
                                 12=Number of monthly on/off switches
                                 provided
1-5            ioprsw(1)      Annual On/Off Switch
                                 0=off
```

```
                                   1=on
                                   +n=Begin in year n
                                   -n=Stop after year n

Destination Data
1-6            ciopde          Destination instream flow ID
1-7            iopdes(2,1)     1 Destination structure account

Source Data
1-8            ciopso(1)       Stream ID used to determine if the interruptible
                                   supply operating rule will be used
1-9            iopsou(2,1)     Natural streamflow (acft) below which the
                                   interruptible supply operating rule
                                   will be used
1-10           ciopso(2)       Direct flow diversion water right to be used
                                   as the interruptible supply
1-11           iopsou(4,1)     0 = allow 100% of the decree to be diverted
                               -1 = allow depletion (CU) to be diverted

Type Data
1-12           ityopr(1)       15

Associated Plan Data
1-13           creuse          NA

Diversion Type
1-14           cdivtyp         NA

Conveyance Loss (%)
1-15           OprLoss         0

Miscellaneous Limits
1-16           OprLimit        0

Start Date
1-17           IoBeg           First year of operation

End Date
1-18           IoEnd           Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1            imonsw(1)       Monthly switch 0=off, 1=on
                                   +n Day first used that month
                                   -n Day last used that month
                               Note the first entry corresponds to the first
                                   month specified in the control file

Intervening Structure Data
Include only if the variable (dumx) = 1-10 or < -12
Format (36x, 10a12)
3-1            intern(1,1)     For +dumx, Enter dumx intervening
```

```
                                   structure ID's
                                For -dumx, Enter abs(dumx)-12
                                   intervening structure ID's
```

4.13.16 Direct Flow Storage Direct (ityopr=16)

The type 16 operating rule allows a direct flow diversion's water right (ciopso(1)) to store in account (iopdes(2,1) of reservoir (ciopde). The amount stored may be limited by a maximum exchange percent (iopsou(4,1)); which is the same as 100 - a bypass percent. The following comments are provided to assist in using and interpreting this operating rule:

- A water right may operate as a standard direct flow right and/or as a direct flow storage right. When the variable iopsou(2,1) = 0 is the right is used as a direct flow storage right only. When the variable iopsou(2,1) = 1 is the right is used as both a direct flow right and a direct flow storage right.
- The source water right must be associated with 1 user (i.e. multiple users at the same diversion are not supported).
- Because a direct flow storage right may be used to serve both a direct flow storage user and as a direct flow storage right, the Administration number assigned to the operating rule is used in the analysis (i.e. it is not overridden by the source water rights administration number).
- Variable iopsou(4,1) allows the user to specify the maximum percent of the remaining decree that may be stored. This maximum percent is equivalent to 100 - a bypass percent.
- Direct flow storage is limited to the irrigation season by evaluating the demand associated with the structure tied to the source water right in the direct flow demand file (*.ddm). In addition, the user may control seasonal demands using the monthly on/off switch (imonsw(i)).
- The amount available for diversion is the minimum physical water available, remaining decree (e.g. some of the decree may have been used for direct diversion purposes), the exchange potential between the direct flow right and the reservoir, the maximum direct flow storage percent, the remaining reservoir volume, the reservoir target, the remaining reservoir account volume.

```
Row-data       Variable       Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
               1x,a12,1x, 2f8.0, 2i8)
1-1            cidvri         Operational right ID
1-2            nameo(1)       Operational right name
1-3            rtem(1)        Administration number
1-4            dumx           Monthly and Structure Switch
                                  +1 Destination Structure ID
                                     (use to provide demand data
                                     when the destination is tied
                                     to a carrier)
                                  -n Include -12 monthly on/off values
                                     minus n destination structure IDs
                                     (use to provide demand data
                                     when the destination is tied
                                     to a carrier)
```

1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on +n=Begin in year n -n=Stop after year n
Destination Data		
1-6	ciopde	Destination reservoir ID
1-7	iopdes(2,1)	Destination reservoir account
Source Data		
1-8	ciopso(1)	Direct Flow water right ID
1-9	iopsou(2,1)	0 The source water right (ciopso(1)) is left on (e.g. it can be used as a both a direct flow right and this operating rule) 1 The source water right (ciopso2(1) is turned off (e.g. it can only be used by this operating rule)
1-10	ciopso(2)	0 (not used)
1-11	iopsou(4,1)	Maximum direct flow storage percent
Type Data		
1-12	ityopr(1)	16
Associated Plan Data		
1-13	creuse	NA
Diversion Type		
1-14	cdivtyp	NA
Conveyance Loss (%)		
1-15	OprLoss	0
Miscellaneous Limits		
1-16	OprLimit	0
Start Date		
1-17	IoBeg	First year of operation
End Date		
1-18	IoEnd	Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12

2-1	imonsw(1)	Monthly switch 0=off, 1=on +n Day first used that month -n Day last used that month Note the first entry corresponds to the first month specified in the control file

Demand Data
Include only if the variable (dumx) = +n or < -12

```
Format (36x, 10a12)
3-1            Intern(1,1)    Enter the destination structure ID
                                 (use to provide demand datawhen the destination
                                 is tied to a carrier)
```

4.13.17 Rio Grande Compact - Rio Grande River Direct (ityopr=17)

The type 17 operating rule was developed specifically for the Rio Grande River's portion of the Rio Grande Compact. Unlike most other operating rules, it requires two rows of data. The first row of data expects:

- The destination to be an Instream flow (i.e. an Instream flow right just below the Rio Grande at Labatos gage).
- Source 1 to be the stream gage that represents the index flow (i.e. Rio Grande at Del Norte)
- Source 2 to be the stream gage used to adjust to the discharge at the Instream flow location (i.e. the combined discharge of the Conejos River near La Sauses).

The second row of data expects:

- Qdebt is the year when annual obligation calculations begin to include adjustments for the cumulative surplus / shortage (i.e. 1985)
- Qdebtx is the initial surplus / shortage (acft) for Rio Grande (e.g. 944,000 * 60%).
- Source 3 is not used.
- The Source 4 coefficient represents the annual yield (acft/yr) of the Closed Basin Project to the Rio Grande River.
- The Source 5 coefficient represents the annual discharge of the Norton Drain South to the Rio Grande River.

```
Row-data       Variable       Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
               1x,a12,1x, 2f8.0, 2i8)
1-1            cidvri         Operational right ID
1-2            nameo(1)       Operational right nam
1-3            rtem(1)        Administration number
1-4            dumx           Enter -8 if no monthly switches included.
                              Enter -20 if monthly switches are included.
                              Note the above allows 2 - 3 rows of data
                                 to be provided for this operational rule
1-5            ioprsw(1)      Annual On/Off Switch
                                 0=off
                                 1=on
                                  +n=Begin in year n
                                 -n=Stop after year n

Destination Data
1-6            ciopde         Destination instream flow ID
1-7            iopdes(2,1)    Coefficient (1.0)

Source Data
1-8            ciopso(1)      Source 1 (Index Gage)ID (Rio Grande at
```

		Del Norte)
1-9	iopsou(2,1)	Source 1 coefficient (1.0)
1-10	ciopso(3)	Source 2 (Index Gage) ID (Combined Conejos River nr La Sauses)
1-11	iopsou(4,1)	Source 3 coefficient (-1.0)

Type Data

1-12	ityopr(1)	17

Associated Plan Data

1-13	creuse	NA

Diversion Type

1-14	cdivtyp	NA

Conveyance Loss (%)

1-15	OprLoss	0

Miscellaneous Limits

1-16	OprLimit	0

Start Date

1-17	IoBeg	First year of operation

End Date

1-18	IoEnd	Last year of operation

Additional Compact Data

2	Format (12x, 24x, 12x, 4x, 12x,f8.0, f8.0, 3(1x, a12, i8))	
2-1	qdebt	Year when annual obligation calculation includes an adjustment for the cumulative surplus shortage
2-2	qdebtx	Initial surplus/shortage (acft) for the Rio Grande in the year this operating rule begins
2-3	ciopso(5)	Source 3 (not used on Rio Grande)
2-4	iopsou(6,1)	Source 3 Coefficient (1.0)
2-5	ciopso(7)	Source 4 not used (enter Closed Basin)
2-6	iopsou(8,1)	Source 4 Closed Basin annual yield to Rio Grande (e.g. 19,200 acft/yr)
2-7	ciopso(9)	Source 5 not used (NortonDrnS)
2-8	iopsou(10,1)	Source 5 Norton Drain South annual yield to Rio Grande(e.g. -4000 acft/yr)

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12

2-1	imonsw(1)	Monthly switch 0=off, 1=on +n Day first used that month -n Day last used that month Note the first entry corresponds to the first month specified in the control file

4.13.18 Rio Grande Compact - Conejos River Direct (ityopr=18)

The type 18 operating rule was developed specifically for the Conejos River's portion of the Rio Grande Compact. Unlike most other operating rules, it requires two rows of data. The first row of data expects:

- The destination to be an Instream flow (i.e. an Instream flow just below the combine Conejos River near La Sauses).
- Source 1 is the stream gage that represents the first index flow (i.e. Conejos River near Magote).
- Source 2 is the stream gage that represent the second index flow (i.e. Los Pinos River near Ortiz).

The second row of data expects:

- Qdebt is the year when annual obligation calculations begin to include adjustments for the cumulative surplus / shortage (i.e. 1985).
- Qdebtx is the initial surplus / shortage (acft) for the Conejos River (e.g. 944,000 * 40%).
- Source 3 is the stream gage that represents the third index flow (San Antonio River at Ortiz).
- The Source 4 coefficient is used to represent the annual yield (acft/yr) of the Closed Basin Project to the Conejos River.
- The Source 5 coefficient is used to represent the annual discharge of the Norton Drain South to the Conejos River.

Note the format of a standard operational right input file has been adjusted to include a third source and account (coefficient).

```
Row-data        Variable        Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
               1x,a12,1x, 2f8.0, 2i8)
1-1             cidvri          Operational right ID
1-2             nameo(1)        Operational right name
1-3             rtem(1)         Administration number
1-4             dumx            Enter -8 if no monthly switches included
                                Enter -20 if monthly switches are included
                                Note the above allows 2 or 3 rows of data
                                   to be recognized for this operational
                                   rule
1-5             ioprsw(1)       Annual On/Off Switch
                                   0=off
                                   1=on
                                   +n=Begin in year n
                                   -n=Stop after year n

Destination Data
1-6             ciopde          Destination instream flow ID
1-7             iopdes(2,1)     Coefficient (1.0)
```

Source Data

1-8	ciopso(1)	Source 1 (Index Gage)ID (Conejos River near Magote)
1-9	iopsou(2,1)	Source 1 coefficient (1.0)
1-10	ciopso(2)	Source 2 (Index Gage) ID (Los Pinos River near Ortiz)
1-11	iopsou(4,1)	Source 2 coefficient (1.0)

Type Data

1-12	ityopr(1)	18

Associated Plan Data

1-13	creuse	NA

Diversion Type

1-14	cdivtyp	NA

Conveyance Loss (%)

1-15	OprLoss	0

Miscellaneous Limits

1-16	OprLimit	0

Start Date

1-17	IoBeg	First year of operation

End Date

1-18	IoEnd	Last year of operation

Additional Compact Data

2	Format (12x, 24x, 12x, 4x, 12x,f8.0,f8.0, 3(1x, a12, i8))	
2-1	qdebt	Year when annual obligation calculations include an adjustment for the cumulative surplus shortage
2-2	qdebtx	Initial surplus/shortage (acft) for the Conejos in the year this operating rule begins
2-3	ciopso(5)	Source 3 (Index Gage) ID (San Antonio River at Ortiz)
2-4	iopsou(6,1)	Source 3 Coefficient (1.0)
2-5	ciopso(7)	Source 4 not used (enter ClosedBasin for documentation purposes)
2-6	iopsou(8,1)	Source 4 Closed Basin annual yield to Conejos (e.g. 12,800 acft/yr)
2-7	ciopso(9)	Source 5 not used (enter NortonDrnS for documentation purposes)
2-8	iopsou(10,1)	Source 5 Norton Drain South annual yield to Conejos(e.g. 4000 acft/yr)

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12

```
2-1             imonsw(1)       Monthly switch 0=off, 1=on
                                   +n Day first used that month
                                   -n Day last used that month
                                Note the first entry corresponds to the first
                                   month specified in the control file
```

4.13.19 Split Channel Operations (ityopr=19)

The type 19 operating rule for split channel operations is currently under development.

4.13.20 San Juan Reservoir RIP Reservoir Operation (ityopr=20)

The type 20 operating rule for the SJRIP is no longer used.

4.13.21 Wells with Sprinkler Use (ityopr=21)

The type 21 operating rule allows the administration date for wells with sprinklers to be different than that specified by the well water rights (*.wer) file. This operating rule is commonly applied to simulate maximum water supply mode which preferentially meets a structures demand by wells with sprinklers first, surface water second and wells with flood irrigation last. Note this operating rule expects, and checks, that the control file (*.ctl) variables *itsfile, ieffmax* and *isprnk* are set appropriately. As described in Section 4.2, the control variable *itsfile* provides sprinkler area, sprinkler efficiency and *gwmode* data; the control variable *ieffmax* provides flood efficiency data; and the variable *isprnk* specifies sprinklers will be used. Note the irrigation practice time series file (*.ipy) variable *gwmode* must equal 1 (maximum supply) in order for this operating rule to apply.

```
Row-data        Variable        Description
-------------------------------------------------------------------------

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
                1x,a12,1x, 2f8.0, 2i8)
1-1             cidvri(1)       Operational right ID
1-2             nameo(1)        Operational right name
1-3             rtem(1)         Administration number
1-4             dumx            0
1-5             ioprsw(1)       Annual On/Off Switch
                                   0=off
                                   1=on
                                   +n Begin in year n
                                   -n Stop after year n

Destination Data
1-6             ciopde          NA
1-7             iopdes(2,1)     0

Source Data
1-8             ciopso(1)       NA
1-9             iopsou(2,1)     0
1-10            ciopso(2)       NA
1-11            iopsou(4,1)     0
```

```
Type Data
1-12            ityopr(1)       21

Associated Plan Data
1-13            creuse          NA

Diversion Type
1-14            cdivtyp         NA

Conveyance Loss (%)
1-15            OprLoss         0

Miscellaneous Limits
1-16            OprLimit        0
Start Date
1-17            IoBeg           First year of operation

End Date
1-18            IoEnd           Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1             imonsw(1)       Monthly switch 0=off, 1=on
                                   +n Day first used that month
                                   -n Day last used that month
                                Note the first entry corresponds to the first
                                   month specified in the control file
```

4.13.22 Soil Moisture Use (ityopr=22)

The type 22 operating rule allows the administration date for soil moisture use to be specified for all ditches and wells with one operational right. This operating rule is commonly applied when soil moisture accounting is included in the analysis (control variable *soild* = 1). Note this operating rule expects, and checks, that the control file (*.ctl) variables *itsfile, ieffmax* and *soild* are set appropriately. As described in Section 4.2, the control variable *soild* allows water deliveries in excess of a diversion's consumptive demand to be stored in the soil moisture zone. This operating rule allows the administration date to be specified that controls when water stored in the soil moisture zone is used (e.g. after surface rights, after well right, etc.). Note the soil moisture accounting requires the variable efficiency option be on by setting the annual time series file control variable (itsfile) equal to 10.

```
Row-data        Variable        Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
                1x,a12,1x, 2f8.0, 2i8)
1-1             cidvri(1)       Operational right ID
1-2             nameo(1)        Operational right name
1-3             rtem(1)         Administration number
1-4             dumx            0
1-5             ioprsw(1)       Annual On/Off Switch
```

```
                                   0=off
                                   1=on
                                   +n Begin in year n
                                   -n Stop after year n

Destination Data
1-6            ciopde          NA
1-7            iopdes(2,1)     0

Source Data
1-8            ciopso(1)       NA
1-9            iopsou(2,1)     0
1-10           ciopso(2)       NA
1-11           iopsou(4,1)     0

Type Data
1-12           ityopr(1)       22

Associated Plan Data
1-13           creuse          NA

Diversion Type
1-14           cdivtyp         NA

Conveyance Loss (%)
1-15           OprLoss         0

Miscellaneous Limits
1-16           OprLimit        0

Start Date
1-17           IoBeg           First year of operation

End Date
1-18           IoEnd           Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1            imonsw(1)       Monthly switch 0=off, 1=on
                                  +n Day first used that month
                                  -n Day last used that month
                               Note the first entry corresponds to the first
                                  month specified in the control file
```

4.13.23 Downstream Call Direct (ityopr=23)

The type 23 operating rule allows a downstream call to be provided which limits any upstream diversions, reservoir storage, etc. that are junior to the calls administration number. The following comments are provided to assist in the use and interpretation this operating rule:

- The downstream call must be tied to an instream flow station.

- Call data are specified as a time series in a file named “Downstream_Call (*.cal)” (see Section 4.1 Response Data). Note for a monthly model the call on day 1 is used to estimate the call for that month.
- The amount of water controlled by a downstream call is the minimum of its instream flow water right, its demand, and the available flow in the river when it is called. If the user wants to control the entire flow below a downstream call structure a large decreed amount and demand should be specified.
- For a free river the downstream call’s administration number should be entered as the most junior water right in the basin (e.g. 999999).
- The downstream calls administration number specified in the operation right file should be the most junior in the basin. This ensures it is not called as an operating rule prior to a consumptive (diversion, well, reservoir) water right.
- If the quantity of water associated with a downstream call is known then it is recommended the user model it as a standard instream flow (see Section 4.7).

Row-data	Variable	Description
Control Data		
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12, 1x,a12, 1x,2f8.0, 2i8)		
1-1	cidvri	Operational right ID
1-2	nameo(1)	Operational right name
1-3	rtem(1)	Administration number (enter the most junior in the basin (e.g. 999999))
1-4	dumx	Monthly Switch 0 No monthly on/off values 12 Number of monthly on/off Switches provided
1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on +n=Begin in year n -n=Stop after year n
Destination Data		
1-6	ciopde	Instream flow station
1-7	iopdes(2,1)	1 (not used)
Source Data		
1-8	ciopso(1)	NA (not used)
1-9	iopsou(2,1)	1 (not used)
1-10	ciopso(2)	0 (not used)
1-11	iopsou(4,1)	0 (not used)
Type Data		
1-12	ityopr(1)	23
Associated Plan Data		
1-13	creuse	NA

```
Diversion Type
1-14           cdivtyp        NA

Conveyance Loss (%)
1-15           OprLoss        0

Miscellaneous Limits
1-16           OprLimit       0


Start Date
1-17           IoBeg          First year of operation

End Date
1-18           IoEnd          Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1            imonsw(1)      Monthly switch 0=off, 1=on
                                 +n Day first used that month
                                 -n Day last used that month
                              Note the first entry corresponds to the first
                                 month specified in the control file
```

4.13.24 Direct Flow Exchange Direct (ityopr=24)

The type 24 operating rule allows a direct flow diversion's water right (ciopso(1)) to be exchanged to another direct flow structure, reservoir or plan (ciopde). The exchange can occur from the river or by a carrier. The amount diverted can be limited to the amount available (Diversion) or its CU (Depletion). The following comments are provided to assist in using and interpreting this operating rule:

- This operating rule controls both the source and exchanged (destination) diversion or storage. Any shortages at the source location are shared with the destination based on ownership of each.
- The **percent ownership** can be supplied that limits the exchange of the source water right.
- The **consumptive use** of the supply data can be specified to limit the exchange. The efficiency of water use for the exchanged water is set in the plan (*.pln) file. It may be set to a fixed efficiency for all months, a constant value for each of 12 months or to the efficiency of the source water right structure.
- The **source water right** may be transferred to a diversion, reservoir or plan (ciopde). When the destination is a plan, the user is typically trying to 1. Satisfy a T&C Plan obligation or 2. Temporarily store the water in an Accounting Plan.
    - If a portion or all of the source water right has been changed and the destination is a changed water rights plan, it is recommended the user not use this rule and instead implement Changed Water Rights plan operations (See Section 7 and Section 4.13.26).
- Because a direct flow exchange right may be used to serve both a direct flow right and as a direct flow exchange right, the administration number assigned to the operating rule is used in

the analysis for both the direct flow and the direct flow exchange (i.e. it is not overridden by the source water rights administration number).

- Direct flow exchange may be controlled over a season by using the monthly on/off switch (imonsw(im)). Note the monthly on/off switches only control the exchange operation (i.e. the source water right continues to operate independent of the monthly on/off switch).
- **Monthly and Annual exchange limits** are required as input.
- The **exchange amount** is the minimum physical water available, remaining decree of the exchanging right (e.g. some of the decree may have been used for direct diversion purposes), the exchange potential between the destination and exchange locations, the monthly and annual exchange limits and the destination structure's capacity.
- **Carrier losses** associated with intervening structures may be provided if variable OprLoss is > 0 or = -1 and the variable dumx = 1-10 or < -12. Note carrier losses are routed back to the system using the return flow parameters associated with the carrier structure.
- **Terms and Conditions** (T&C Plans) may be calculated if the source 2 variable (ciopso2) is set to a T&C plan. The variable iousou(4,1) is used to indicate how and when T&C demands are calculated.
    - If the user is implementing T&C on a changed water right, it is recommended the user implement Changed Water Rights plan operations (See Section 7 and Section 4.13.26) and associate the T&C plan when the water is released from the Changed Water Rights plan.
    - When ciopso2 = Plan ID and iopsou(4,1)=-1 the destination must be an accounting plan and the T&C Obligation is calculated when water is released from that Accounting plan using a type 27 or 28 rule.
    - When ciopso2 = Plan ID and iopsou(4,1)=1 a standard return pattern is used to calculate the T&C Obligation. A **Standard Return Pattern** calculates the T&C Obligation to be:
        - T&C Obligation (standard) = (Data in the return flow file (e.g. *.urm)) * ((Released Water) * (1.0-CU Factor)), where the CU Factor is provided in row 5. The first value in a standard return flow table corresponds to the month diverted, the second to the month after a diversion, etc. Data that associates a Plan ID with any number of Return Flow Location(s), Percent(s), and Return Table ID(s) is provided in the plan Return File (*.prf).
    - When ciopso2 = Plan ID and iopsou(4,1)=2 a fixed return pattern is used to calculate the T&C Obligation. A **Fixed Return Pattern** calculates the T&C Obligation to be:
        - T&C Obligation (fixed) = (Data in the return flow file (e.g. *.urm)) * ((Released Water) The first value in a fixed return flow table corresponds to the first month in the simulation (e.g. January for a calendar year simulation), the second month to February (again for a calendar year simulation), etc. Data that associates a Plan ID with any number of Return Flow Location(s), Percent(s), and Return Table ID(s) is provided in the plan Return File (*.prf).
    - When ciopso2 = Plan ID and iopsou(4,1)=3 a mixed return pattern is used to calculate the T&C Obligation. **Mixed Return Pattern** contains both a Standard and Fixed component and calculates the T&C Obligation to be:

        - T&C Obligation (standard) = (Data in the return flow file (e.g. *.urm)) * ((Released Water) * (1.0-CU Factor)), where the CU Factor is provided in row 5. The first value in a standard return flow table corresponds to the month diverted, the second to the month after a diversion, etc. Data that associates a Plan ID with any number of Return Flow Location(s), Percent(s), and Return Table ID(s) is provided in the plan Return File (*.prf).
        - T&C Obligation (fixed) = (Data in the return flow file (e.g. *.urm)) * ((Released Water) The first value in a fixed return flow table corresponds to the first month in the simulation (e.g. January for a calendar year simulation), the second month to February (again for a calendar year simulation), etc. Data that associates a Plan ID with any number of Return Flow Location(s), Percent(s), and Return Table ID(s) is provided in the plan Return File (*.prf).
    - When ciopso2 = Plan ID and iopsou(4,1)=4 a default return pattern is used to calculate the T&C Obligation. A **Default Return Pattern** has a standard component that uses historic return flow data associated with the source water right to calculate the T&C Obligation.
    - If the variable ciopso2 is set to a T&C Plan ID and iopsou(4,1) is greater than zero then CU Factors are expected to be provided in card 5. Note the CU Factors typically represent negotiated values to, but not necessarily the same as, the efficiency of the Transfer From Structure. Also these factors are only used when iopsou(4,1) = 1 (Standard Return) or 3 (Mixed Return) even though they are required as input.
- Water diverted by a Type 24 operating rule are reported in the **Stream Report (*.xdd)** as follows:
    - At the source, the water exchanged to the destination is reported as Carried, Exchanged or Bypassed.
    - At the destination, the water diverted is reported as From River by Other.

```
Row-data        Variable        Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
               1x,a12, 1x,2f8.0, 2i8)
1-1             cidvri          Operational right ID
1-2             nameo(1)        Operational right name
1-3             rtem(1)         Administration number
1-4             dumx            Monthly and Intervening Structure Switch
                                   +n Number of intervening structures
                                      (max = 10)
                                   12 Monthly (12) on/off values
                                   -n Include -12 monthly on/off
                                      values minus n intervening
                                      structures
                                      Note, when a negative value is,
                                      provided, it should be -13 or
                                      less for 12 monthly values and
                                      one intervening structure
1-5             ioprsw(1)       Annual On/Off Switch
```

		0=off 1=on +n=Begin in year n -n=Stop after year n
Destination Data		
1-6	ciopde	Destination structure (Diversion ID, Reservoir ID or Accounting Plan ID) Use Type 26 operating rule and Type 13 plan for changed water rights.
1-7	iopdes(2,1)	Destination account For a diversion destination, enter 1 For a plan destination, enter 1 For a reservoir destination, enter the account
Source Data		
1-8	ciopso(1)	Source water right ID
1-9	iopsou(2,1)	Percent of source water right to exchange
1-10	ciopso(2)	T&C Plan ID Enter NA if none or If the destination is an Accounting Plan and the terms and conditions associated with this transfer will be calculated when water is released
1-11	iopsou(4,1)	0 if ciopso(2) = NA 1 for a standard return pattern 2 for a fixed annual return pattern 3 for a mixed return pattern 4 for a default (source) return pattern -1 the terms and conditions associated with this transfer will be calculated when water is released
Type Data		
1-12	ityopr(1)	24
Associated Plan Data		
1-13	creuse	Reuse Plan ID (enter NA if none)
Diversion Type		
1-14	cdivtyp	Diversion or Depletion
Conveyance Loss (%)		
1-15	OprLoss	0 No Transit loss -1 Provide intervening structure with loss data in row 3.
Miscellaneous Limits		
1-16	OprLimit	0 -1 Execute the first iteration only Review results – option not fully tested

Start Date

1-17	IoBeg	First year of operation

End Date

1-18	IoEnd	Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12

2-1	imonsw(1)	Monthly switch 0=off, 1=on +n Day first used that month -n Day last used that month Note the first entry corresponds to the first month specified in the control file

Intervening Structure Data without loss
Include only if OprLoss = 0 and the variable (dumx) = 1-10 or < -12
Format (36x, 10a12)

3-1	intern(1,1)	For +dumx, Enter dumx intervening structure ID's For -dumx, Enter abs(dumx)-12 intervening structure ID's

Intervening Structure Data with loss
Include only if OprLoss > 0 or = -1 and the variable (dumx) = 1-10 or < -12
See Section 7 for the approach used to model an augmentation station (e.g. a structure that carries a diversion, typically with loss, then returns non-lost water to the river).
Free Format

3b-1	intern(1,1)	Intervening structure ID (e.g. a Diversion ID or Stream ID)
3b-2	OprLossC(1,1)	Carrier Loss for Structure ID %
3b-3	InternT(1,1)	Intervening Structure Type Enter Carrier if it is a diversion structure located on the river Enter Return if it is a return location on the River Repeat for +dumx values

Exchange Limits (Monthly and Annual)
Free Format

4-1	OprMax(1,1-12)	Monthly exchange limit (af/mo)
4-13	OprMax(1,13)	Annual exchange limit (af/yr)

T&C CU Factors Data
Include only if ciopso(2)is a T&C Plan and iopsou(4,1) is >0
Note the data is only used when iopsou(4,1) is a standard Return pattern (1) or a mixed return pattern(3).
Free Format

5-1	OprEff(1)	Efficiency in month 1
5-2	OprEff(2)	Efficiency in month 2

4.13.25 Direct Flow Bypass Direct (ityopr=25)

The type 25 operating rule allows a direct flow diversion's water right (ciopso(1)) to be bypassed to a direct flow structure, reservoir or plan (ciopde). The diversion can occur from the river or through a carrier. The amount diverted may be limited to the amount available (Diversion) or its CU (Depletion). The following comments are provided to assist in using and interpreting this operating rule:

- A water right may operate as both a standard direct flow right and as a bypass water right.
- The user can supply data that limits the bypass to a percent (ownership) of the water right.
- The user can supply data that limits the bypass to the consumptive use of their portion of the water right. The efficiency of water use is estimated to equal the efficiency of the source water right's structure.
- The **source water right** may be transferred to a diversion, reservoir or plan (ciopde). When the destination is a plan, the user is typically trying to satisfy a T&C Plan obligation generated by another operating rule with the source water right.
- The user can supply a **"Reuse plan"** (creuse) that allows consumptive use credits associated with the direct flow bypass to be stored. A "Reuse Plan" may not be assigned when the destination is a plan because it using the full transfer to offset a T&C requirement.
- Because a direct flow bypass right may be used to serve both a direct flow right and as a direct flow bypass right, the administration number assigned to the operating rule is used in the analysis analysis for both the direct flow and the direct flow bypass (i.e. it is not overridden by the source water rights administration number).
- Direct flow bypass operations may be controlled over a season by using appropriate demand data and/or the monthly on/off switch (imonsw(im)). Note the monthly on/off switches only control the bypass operation (i.e. the source water right continues to operate independent of the monthly on/off switch).
- **Monthly and Annual exchange** limits are required as input.
- The amount available for diversion is the minimum physical water available, remaining decree of the exchanging right (e.g. some of the decree may have been used for direct diversion purposes), the bypass potential between the destination and bypass location, and the destination structure's capacity and the destination structure's demand.
- **Carrier losses** associated with intervening structures may be provided if variable OprLoss is > 0 or = -1 and the variable dumx = 1-10 or < -12. Note carrier losses are routed back to the system using the return flow parameters associated with the carrier structure.
- **Terms and Conditions** (T&C Plans) may be calculated if the source 2 variable (ciopso2) is set to a T&C plan. The variable iousou(4,1) is used to indicate how and when T&C demands are calculated.
    - If the user is implementing T&C on a changed water right, it is recommended the user implement Changed Water Rights plan operations (See Section 7 and Section 4.13.26) and associate the T&C plan when the water is released from the Changed Water Rights plan.

- When ciopso2 = Plan ID and iopsou(4,1)=-1 the destination must be an accounting plan and the T&C Obligation is calculated when water is released from that Accounting plan using a type 27 or 28 rule.
- When ciopso2 = Plan ID and iopsou(4,1)=1 a standard return pattern is used to calculate the T&C Obligation. A **Standard Return Pattern** calculates the T&C Obligation to be:
    - T&C Obligation (standard) = (Data in the return flow file (e.g. *.urm)) * ((Released Water) * (1.0-CU Factor)), where the CU Factor is provided in row 5. The first value in a standard return flow table corresponds to the month diverted, the second to the month after a diversion, etc. Data that associates a Plan ID with any number of Return Flow Location(s), Percent(s), and Return Table ID(s) is provided in the plan Return File (*.prf).
- When ciopso2 = Plan ID and iopsou(4,1)=2 a fixed return pattern is used to calculate the T&C Obligation. A **Fixed Return Pattern** calculates the T&C Obligation to be:
    - T&C Obligation (fixed) = (Data in the return flow file (e.g. *.urm)) * ((Released Water) The first value in a fixed return flow table corresponds to the first month in the simulation (e.g. January for a calendar year simulation), the second month to February (again for a calendar year simulation), etc. Data that associates a Plan ID with any number of Return Flow Location(s), Percent(s), and Return Table ID(s) is provided in the plan Return File (*.prf).
- When ciopso2 = Plan ID and iopsou(4,1)=3 a mixed return pattern is used to calculate the T&C Obligation. **Mixed Return Pattern** contains both a Standard and Fixed component and calculates the T&C Obligation to be:
    - T&C Obligation (standard) = (Data in the return flow file (e.g. *.urm)) * ((Released Water) * (1.0-CU Factor)), where the CU Factor is provided in row 5. The first value in a standard return flow table corresponds to the month diverted, the second to the month after a diversion, etc. Data that associates a Plan ID with any number of Return Flow Location(s), Percent(s), and Return Table ID(s) is provided in the plan Return File (*.prf).
    - T&C Obligation (fixed) = (Data in the return flow file (e.g. *.urm)) * ((Released Water) The first value in a fixed return flow table corresponds to the first month in the simulation (e.g. January for a calendar year simulation), the second month to February (again for a calendar year simulation), etc. Data that associates a Plan ID with any number of Return Flow Location(s), Percent(s), and Return Table ID(s)is provided in the plan Return File (*.prf).
- When ciopso2 = Plan ID and iopsou(4,1)=4 a default return pattern is used to calculate the T&C Obligation. A **Default Return Pattern** has a standard component that uses historic return flow data associated with the source water right to calculate the T&C Obligation.
- If the variable ciopso2 is set to a T&C Plan ID and iopsou(4,1) is greater than zero then CU Factors are expected to be provided in card 5. Note the CU Factors typically represent negotiated values related to, but not necessarily the same as, the efficiency of the Transfer From Structure. Also these factors are only used when iopsou(4,1) = 1 (Standard Return) or 3 (Mixed Return) even though they are required as input.

- Water bypassed by a Type 25 operating rule is reported in the **Stream Report (*.xdd)** as follows:
    - At the source, the water bypassed to the destination is reported as Carried, Exchanged or Bypassed.
    - At the destination, the water diverted is reported as From River by Other.

```
Row-data       Variable       Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
        1x,a12, 1x,2f8.0, 2i8)
1-1            cidvri         Operational right ID
1-2            nameo(1)       Operational right name
1-3            rtem(1)        Administration number
1-4            dumx           Monthly and Intervening Structure
                              Switch
                                 +n Number of intervening structures
                                    (max = 10)
                                 12 Monthly (12) on/off values
                                 -n Include -12 monthly on/off
                                    values minus n intervening
                                    structures
                                    Note, when a negative value is,
                                    provided, it should be -13 or
                                    less for 12 monthly values and
                                    one intervening structure
1-5            ioprsw(1)      Annual On/Off Switch
                                 0=off
                                 1=on
                                 +n=Begin in year n
                                 -n=Stop after year n

Destination Data
1-6            ciopde         Destination structure (Diversion ID
                                 Reservoir ID or Plan ID)
                              Use Type 26 operating rule and Type 13 plan
                              for changed water rights.
1-7            iopdes(2,1)    Destination structure account
                              For a diversion destination, enter 1
                              For a reservoir destination, enter
                                 +n Account to be served by this right
                                 -n Fill the first n accounts based on
                                    the ratio of their ownership

Source Data
1-8            ciopso(1)      Source water right ID
1-9            iopsou(2,1)    Percent of source water right to be bypassed
1-10           ciopso(2)      T&C Plan ID
                              Enter NA if none or
                                 if the destination is an Accounting
                                 Plan and the terms and conditions
```

		associated with this transfer will be calculated when water is released
1-11	iopsou(4,1)	0 if ciopso(2) = NA 1 for a standard return pattern 2 for a fixed return pattern 3 for a mixed return pattern -1 the terms and conditions associated with this transfer will be calculated when water is released

Type Data

1-12	ityopr(1)	25

Associated Plan Data

1-13	creuse	Reuse Plan ID (enter NA if none)

Diversion Type

1-14	cdivtyp	Diversion or Depletion

Conveyance Loss (%)

1-15	OprLoss	0 No Transit loss -1 Provide intervening structure with loss data in row 3.

Miscellaneous Limits

1-16	OprLimit	0

Start Date

1-17	IoBeg	First year of operation

End Date

1-18	IoEnd	Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12

2-1	imonsw(1)	Monthly switch 0=off, 1=on +n Day first used that month -n Day last used that month Note the first entry corresponds to the first month specified in the control file

Intervening Structure Data without loss
Include only if OprLoss = 0 and the variable (dumx) = 1-10 or < -12
Format (36x, 10a12)

3-1	intern(1,1)	For +dumx, Enter dumx intervening structure ID's For -dumx, Enter abs(dumx)-12 intervening structure ID's if < -12 enter abs(dumx)-12

```
                                    intervening structure IDs

Intervening Structure Data with loss
Include only if OprLoss > 0 or = -1 and the variable (dumx) = 1-10 or < -12
See Section 7 for the approach used to model an augmentation station (i.e. a
structure that carries a diversion, typically with loss, then returns non-lost
water to the river).
Free Format
3b-1           intern(1,1)    Intervening structure ID
                                 (e.g. a Diversion ID or Stream ID)
3b-2           OprLossC(1,1)  Carrier Loss for Structure ID %
3b-3           InternT(1,1)   Intervening Structure Type
                              Enter Carrier if it is a diversion
                                 structure located on the river
                              Enter Return if it is a return
                                 location on the River

                              Repeat for +dumx values
Exchange Limits (Monthly and Annual)
Note: Must include 13 values
Free Format
4-1            OprMax(1,1-12) Monthlyexchange limit (af/mo)
4-13           OprMax(1,13)   Annual exchange limit (af/yr)

T&C CU Factors
Include only if ciopso(2)is a T&C Plan and iopsou(4,1) is >0.
Free Format
5-1            OprEff(1)      Efficiency in month 1
5-2            OprEff(2)      Efficiency in month 2

5-12           OprEff(12)     Efficiency in month 12
```

4.13.26 Changed Water Right (ityopr=26)

The type 26 operating rule allows a changed water right to be diverted from the river and temporarily stored in an accounting plan. Once the changed water right is stored in an accounting plan it can be released at a junior priority by a direct release using a Type 27 rule or by exchange using a Type 28 operating rule or spilled using a Type 29 rule. It can also be split into more than one owner using a Type 46 operating rule. The amount changed is limited by water supply available to the source water right and the percent of the source water right to be changed. The following comments are provided to assist in using and interpreting this operating rule:

- The **percent ownership** allows the user to specify the amount of the souuce water right to be changed and temporarily stored in a plan.
- The **source** must be a diversion water right.
- The **destination** must be a Changed Water Rights plan (Type 13).
- Because a changed water right may be used to serve both a direct flow right and a changed right, the administration number assigned to the operating rule is used in the analysis for both the direct flow and the changed water right (i.e. it is not overridden by the source water rights administration number).

- **Monthly and Annual exchange limits** are required to control the amount changed by month and year.
- The source water right is controlled by this operating rule. Therefore the **source water right is turned off** when this operating rule is read and the source water right cannot be used to divert water as a standard direct flow water right.
- The **changed amount** is the minimum of the physical water available, decree of the source water right and the monthly and annual exchange limits.
- The changed water right **operates once per iteration** (e.g. it is not allowed to benefit from a junior diversions return flows or a junior reservoirs release).
- **The water that remains at the head gate is limited by the source structures capacity**. When a portion of the water available to a Type 26 operating rule remains at the headgate and is diverted by the source structure, the source structures capacity is reduced by the amount diverted.
- **The changed amount is not limited by the source structure's capacity**. Capacity limitatons are imposed when water is released from the administrative plan using a type 26 or type 27 operating rule. If, the source structure happens to be used as a carrier as part of a release by a type 27 rule or by a type 28 rule, the capacity of the structure is reduced by the amount carried (not the amount released and carried).
- Changed water rights are reported in the **Stream Report (*.xdd)** (1) at structure where the source water right is located, (2) at the destination administrative plan and (3), if the destination plan is subsequently split to multiple administration plans, at each of those administrative plans as follows:
    - Changed water released for use by a direct release (type 27) or by an exchange (Type 28) is reported as Carried, Exchanged or Bypassed.
    - Changed water released as a spill (Type 29) is not reported as Carried, Exchanged or Bypassed.

Row-data	Variable	Description
Control Data		
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12, 1x,a12, 1x,2f8.0, 2i8)		
1-1	cidvri	Operational right ID
1-2	nameo(1)	Operational right name
1-3	rtem(1)	Administration number
1-4	dumx	Monthly and Intervening Structure Switch 0 No monthly on/off control 12 Monthly on/off control provided (
1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on +n=Begin in year n -n=Stop after year n
Destination Data		

```
1-6             ciopde          Destination Plan ID
1-7             iopdes(2,1)     Destination account, enter 1


Source Data
1-8             ciopso(1)       Source water right ID
1-9             iopsou(2,1)     Percent of source water right to
                                     be changed
1-10            ciopso(2)       NA
1-11            iopsou(4,1)     0 if ciopso(2) = NA

Type Data
1-12            ityopr(1)       26

Associated Plan Data
1-13            creuse          Reuse Plan ID (enter NA if none)

Diversion Type
1-14            cdivtyp         Diversion

Conveyance Loss (%)
1-15            OprLoss         0 No Transit loss

Miscellaneous Limits
1-16            OprLimit        0 No Operating Limits

Start Date
1-17            IoBeg           First year of operation

End Date
1-18            IoEnd           Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12
2-1             imonsw(1)       Monthly switch 0=off, 1=on
                                   +n Day first used that month
                                   -n Day last used that month
                                Note the first entry corresponds to the first
                                   month specified in the control file

Exchange Limits (Monthly and Annual)
Free Format
4-1             OprMax(1,1-12) Monthly exchange limit (af/mo)
4-13            OprMax(1,13)   Annual exchange limit (af/yr)
```

4.13.27 Reservoir or Reuse Plan or Accounting Plan to a Diversion or Reservoir or Carrier or Plan or Instream Flow with Reuse Direct (ityopr=27)

The type 27 operating rule provides a method to release water from a Reservoir or ReUse Plan (type 4 or 6), or Out-of-Priority (OOP) Plan (type 9), or Accounting Plan (11), or Changed Water Right Plan

(type 13) to a diversion or reservoir or instream flow or instream flow reach directly via the river or by a carrier. The following are noted:

- A "**ReUse Plan**" is a plan type that can be used identify the location of a reusable water supply associated with a CU transfer, or transmountain import (see Section 7 for more details about plans).
- An "**Accounting Plan**" is a plan type that is used for accounting only (see Section 7 for more details about plans).
- An "**OOP Plan**" is a plan type that is associated with a diversion or storage taken out-of-priority by a type 38 operating rule.
- A "**Changed Water Right Plan**" is a plan type that can be used to identify the location of water diverted by a Changed Water Right Operating Rule (type 26).
- If the source is a Reuse, Accounting or Changed Water Right Plan, the destination may be reusable (e.g. creuse is a reuse plan (type 3 or 4).
- If the source is an Changed Water Right Plan (plan type 13), the variable Oprlimit must have a value between 5 and 9.
- If the source is a reservoir, the source data may be tied to an Out-of-Priority Plan (e.g. creuse is a OOP plan (type 9)).
- If carrier losses are calculated (OprLoss>0), the return flow pattern and return locations are those assigned to the SOURCE (CARRIER) structure in the diversion station file (*.dds) (e.g. if the source is a water right tied to structure X, then the return flow pattern and locations are those provided for structure X in the diversion station file (*.dds)).
- The variable OprLimit is used to constrain a release to an operating rule that contains monthly and annual limits, the amount diverted by another operating rule or, if the source is a Changed Water Right, the operating rule that diverted the Changed Water Right.
    - If the variable OprLimit set to 1 or 6, StateMod will warn the user a value of 1 or 6 are not currently operational but are reserved for potential future enhancements.
    - If the variable OprLimit is set to 2, 4 or 7, the operating rule ID specified in row 4's monthly and annual limits **will be decreased and limit** the amount released.
    - If the variable OprLimit is set to 3, 4 or 8, the operating rule ID specified in row 4 or 5 **will limit** a release to the amount diverted byanother operating rule..
    - If the variable OprLimit is set to 4 or 9, the operating rule ID specified in row 4 should be an operating rule with monthly and annual limits (similar to Oprlimit=2), the operating rule ID specified in row 5 should be the operating rule that will limit a release to the amount diverted by that operating rule (similar to OprLimit = 3). If the variable OprLimit is set to 5, 7, 8 or 9, the source should be a Changed Water Right Plan (type 13) and the operating rule ID specified in row 4, 5 or 6 should be the operating rule that diverted the Changed Water Right.
- **Terms and Conditions** (T&C Plans) may be calculated if the source 2 variable (ciopso2) is set to a T&C plan. The variable iousou(4,1) is used to indicate how and when T&C demands are calculated.
    - When ciopso2 = Plan ID and iopsou(4,1)=-1 the destination must be an accounting plan and the T&C Obligation is calculated when water is released from that Accounting plan using a type 27 or 28 rule.

- When ciopso2 = Plan ID and iopsou(4,1)=1 a standard return pattern is used to calculate the T&C Obligation. A **Standard Return Pattern** calculates the T&C Obligation to be:
    - T&C Obligation (standard) = (Data in the return flow file (e.g. *.urm)) * ((Released Water) * (1.0-CU Factor)), where the CU Factor is provided in row 5. The first value in a standard return flow table corresponds to the month diverted, the second to the month after a diversion, etc. Data that associates a Plan ID with any number of Return Flow Location(s), Percent(s), and Return Table ID(s) is provided in the plan Return File (*.prf).
- When ciopso2 = Plan ID and iopsou(4,1)=2 a fixed return pattern is used to calculate the T&C Obligation. A **Fixed Return Pattern** calculates the T&C Obligation to be:
    - T&C Obligation (fixed) = (Data in the return flow file (e.g. *.urm)) * ((Released Water) The first value in a fixed return flow table corresponds to the first month in the simulation (e.g. January for a calendar year simulation), the second month to February (again for a calendar year simulation), etc. Data that associates a Plan ID with any number of Return Flow Location(s), Percent(s), and Return Table ID(s) is provided in the plan Return File (*.prf).
- When ciopso2 = Plan ID and iopsou(4,1)=3 a mixed return pattern is used to calculate the T&C Obligation. **Mixed Return Pattern** contains both a Standard and Fixed component and calculates the T&C Obligation to be:
    - T&C Obligation (standard) = (Data in the return flow file (e.g. *.urm)) * ((Released Water) * (1.0-CU Factor)), where the CU Factor is provided in row 5. The first value in a standard return flow table corresponds to the month diverted, the second to the month after a diversion, etc. Data that associates a Plan ID with any number of Return Flow Location(s), Percent(s), and Return Table ID(s) is provided in the plan Return File (*.prf).
    - T&C Obligation (fixed) = (Data in the return flow file (e.g. *.urm)) * ((Released Water) The first value in a fixed return flow table corresponds to the first month in the simulation (e.g. January for a calendar year simulation), the second month to February (again for a calendar year simulation), etc. Data that associates a Plan ID with any number of Return Flow Location(s), Percent(s), and Return Table ID(s)is provided in the plan Return File (*.prf).
- When ciopso2 = Plan ID and iopsou(4,1)=4 a default return pattern is used to calculate the T&C Obligation. A **Default Return Pattern** has a standard component that uses historic return flow data associated with the source water right to calculate the T&C Obligation.
- If the variable ciopso2 is set to a T&C Plan ID and iopsou(4,1) is greater than zero then CU Factors are expected to be provided in card 5. Note the CU Factors typically represent negotiated values related to, but not necessarily the same as, the efficiency of the Transfer From Structure. Also these factors are only used when iopsou(4,1) = 1 (Standard Return) or 3 (Mixed Return) even though they are required as input.

- An **Augmentation Structure** (i.e. a structure that carries a diversion, typically with loss, then returns non-lost water to the river for subsequent diversion) can be modeled as follows:
    - Variable dumx should be set so that at least two structures will be provided in row 3b.

    - The first carrier should be the Structure ID that diverts water from the stream and has an intervening structure type = Carrier.
    - The second carrier should be a station on the river that has an intervening structure type = Return.
    - Note that conveyance losses can be specified for a intervening structure type = Carrier but not an intervening structure type = Return. This limitation allows losses to be routed to the system using the return flow properties of the carrier structure.
    - If water that returns to the river is subsequently rediverted into another carrier at least three entries should be provided sequentially as follows; 1. An intervening structure with type = Carrier, 2. An intervening structure with type = Return, and 3. An intervening structure with type = Carrier.
    - A maximum of 10 intervening structures (intervening types = Carrier or Return) can be provided.
- Releases from a Plan by a Type 27 operating rule are reported in the **Stream Report (*.xdd)** as follows:
    - At the source, the water release to the destination is reported as Carried, Exchanged or Bypassed.
    - At the destination, the water diverted is reported as From River by Other.

Row-data	Variable	Description
Control Data		
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12, 1x,a12, 1x,2f8.0, 2i8)		
1-1	cidvri(1)	Operational right ID
1-2	nameo(1)	Operational right name
1-3	rtem(1)	Administration number
1-4	dumx	Monthly Intervening Structure Switch +n Number of intervening structures (max = 10) 12 Monthly (12) on/off values -n Include -12 monthly on/off values minus n intervening structures Note, when a negative value is, provided, it should be -13 or less for 12 monthly values and one intervening structure
1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on +n Begin in year n -n Stop after year n
Destination Data		
1-6	ciopde	Destination structure (diversion or reservoir or instream flow or T&C (type 1) or Accounting Plan (type 11)

1-7	iopdes(2,1)	Destination structure account For a diversion or plan or instream flow destination enter 1 For a reservoir destination, enter +n Account to be served by this right -n Fill the first n accounts based On the ratio of their ownership
Supply Data		
1-8	ciopso(1)	ReUse Plan or Accounting Plan or Reservoir
1-9	iopsou(2,1)	If ciopso(1) is a plan enter the ownership % If ciopso(1) is a reservoir enter the account #
1-10	ciopso(2)	T&C Plan ID (enter NA if none)
1-11	iopsou(4,1)	0 if ciopso(2) = NA 1 for a standard return pattern 2 for a fixed return pattern 3 for a mixed (standard and fixed) return pattern
Type Data		
1-12	ityopr(1)	27
Associated Plan Data		
1-13	creuse	If the source is a Reuse Plan ID enter Reuse Plan ID or NA if none If the source is a Reservoir enter the associated Reuse Plan or OOP Plan ID
Diversion Type		
1-14	cdivtyp	Diversion or Depletion If the destination is a reservoir set to Diversion
Conveyance Loss (%)		
1-15	OprLoss	0 No Transit loss -1 Provide intervening structure with loss data in row 3.
Miscellaneous Limits		
1-16	OprLimit	0 Do not constrain the release by another operating rule. Note OprLimit must be 5, 7, 8 or 9 if the source is an Changed Water Right Plan (type 13).

		1 Not operational. Preserved for a potential enhancement. 2 Decrease monthly and annual releases limits of the operational rule specified in row 4. 3 Limit the amount released by the amount diverted by the operational rule in row 4 or row 5. 4 Include the functionality of oprlimit = 2 in row 4 and the functionality of oprlimit = 3 in row 5. 5 If the source is a Changed Water Right Plan (type 13), enter the operational right ID (type 26) that diverted the Changed Water Right. 6 Not operational. Preserved for a potential enhancement. 7 A combination of Oprlimit = 2 and 5. 8 A combination of Oprlimit = 3 and 5. 9 A combination of Oprlimit = 4 and 5.
Start Date		
1-17	IoBeg	First year of operation
End Date		
1-18	IoEnd	Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12

2-1	imonsw(1)	Monthly switch 0=off, 1=on +n Day first used that month -n Day last used that month Note the first entry corresponds to the first month specified in the control file

Intervening Structure Data with loss
Include only if OprLoss > 0 or = -1 and the variable (dumx) = 1-10 or < -12
Note that intervening structure data without a loss is not operational, use a zero carrier loss to model these operations.
See Section 7 for the approach used to model an augmentation station (e.g. a structure that carries a diversion, typically with loss, then returns non-lost water to the river).
Free Format

3b-1	intern(1,1)	Intervening structure ID (e.g. a Diversion ID or Stream ID)
3b-2	OprLossC(1,1)	Carrier Loss for Structure ID %
3b-3	InternT(1,1)	Intervening Structure Type Enter Carrier if it is a diversion structure located on the river Enter Return if it is a return location on the River Repeat for +dumx values

Associated Operating Rule

```
Include only if the switch (OprLimit) = 2, 3, 4, 5, 7, 8 or 9
Free Format
4-1            cx             If OprLimit=2, 4, 7 or 9 Operating
                                 Rule ID with monthly and annual limits
                              If OprLimit=3 or 8 Operating
                                 Rule ID that will LIMIT the amount released
                              If Oprlimit=5, Operating Rule ID that
                                 Diverted water to a Changed Water
                                 Right Plan (type 13)
Associated Operating Rule
Include only if the switch (OprLimit) = 4, 7, 8 or 9
Free Format
5-1            cx             If OprLimit=4, 8 or 9 Operating Rule
                                 ID that will limit the amount diverted
                              If OprLimit= 7, Operating Rule ID that
                                 Diverted water to a Changed Water
                                 Right Plan (type 13)
Associated Operating Rule
Include only if the switch (OprLimit) = 9
Free Format
6-1            cx             If OprLimit= 9, Operating Rule ID that
                                 Diverted water to a Changed Water
                                 Right Plan (type 13)


T&C CU Factors
Include only if ciopso(2)is a T&C Plan and iopsou(4,1) is >0.
Free Format
7-1            OprEff(1)      Efficiency in month 1
7-2            OprEff(2)      Efficiency in month 2

7-12           OprEff(12)     Efficiency in month 12
```

4.13.28 Reservoir or Reuse or Accounting Plan to a User by Exchange (ityopr=28)

The type 28 operating rule provides a method to release water from a Reservoir, or ReUse Plan (type 4 or 6), or Out-of-Priority (OOP) Plan (type 9), or Accounting Plan (11), or Changed Water Right Plan (type 13) to a diversion, reservoir, instream flow, or carrier by exchange. In addition, it can be used to release water to an instream flow node or reach. The following are noted:

- A "**ReUse Plan**" is a plan type that can be used identify the location of a reusable water supply associated with a CU transfer or transmountain import (see Section 7 for more details about plans).
- An "**Accounting Plan**" is a plan type that is used for accounting only (see Section 7 for more details about plans).
- An "**OOP Plan**" is a plan type that is associated with a diversion or storage taken out-of-priority by a type 38 operating rule.
- A "**Changed Water Right Plan**" is a plan type that can be used to identify the location of water diverted by a Changed Water Right Operating Rule (type 26).
- If the source is a Reuse, Accounting Plan or Changed Water Right, the destination may be reusable (i.e. creuse is a reuse plan (type 3 or 4).

- If the source is an Changed Water Right Plan (plan type 13), the variable Oprlimit must have a value between 5 and 9.
- If the source is a reservoir, the source data may be tied to an out-of-priority Plan (i.e. creuse is an OOP plan (type 9)).
- If carrier losses are calculated (OprLoss>0), the return flow pattern and return locations are those assigned to the SOURCE (CARRIER) structure in the diversion station file (*.dds) (e.g. if the source is a water right tied to structure X, then the return flow pattern and locations are those provided for structure X in the diversion station file (*.dds)).
    - The variable OprLimit is used to constrain a release to to an operating rule that contains monthly and annual limits, the amount diverted by another operating rule or, if the source is a Changed Water Right, the operating rule that diverted the Changed Water Right. If the variable OprLimit set to 1 or 6, StateMod will warn the user a value of 1 or 6 are not currently operational but are reserved for potential future enhancements.
    - If the variable OprLimit is set to 2, 4 or 7, the operating rule ID specified in row 4's monthly and annual limits **will be decreased and limit** the amount released.
    - If the variable OprLimit is set to 3, 4 or 8, the operating rule ID specified in row 4 or 5 **will limit** a release to the amount diverted byanother operating rule.
    - If the variable OprLimit is set to 4 or 9, the operating rule ID specified in row 4 should be an operating rule with monthly and annual limits (similar to Oprlimit=2), the operating rule ID specified in row 5 should be the operating rule that will limit a release to the amount diverted by that operating rule (similar to OprLimit = 3).
    - If the variable OprLimit is set to 5, 7, 8 or 9, the source should be a Changed Water Right Plan (type 13) and operating rule ID specified in row 4, 5 or 6 should be the operating rule that diverted the Changed Water Right.
- **Terms and Conditions** (T&C Plans) may be calculated if the source 2 variable (ciopso2) is set to a T&C plan. The variable iousou(4,1) is used to indicate how and when T&C demands are calculated.
    - If the user is implementing T&C on a changed water right, it is recommended the user implement Changed Water Rights plan operations (See Section 7 and Section 4.13.26) and associate the T&C plan when the water is released from the Changed Water Rights plan.
    - When ciopso2 = Plan ID and iopsou(4,1)=-1 the destination must be an accounting plan and the T&C Obligation is calculated when water is released from that Accounting plan using a type 27 or 28 rule.
    - When ciopso2 = Plan ID and iopsou(4,1)=1 a standard return pattern is used to calculate the T&C Obligation. A **Standard Return Pattern** calculates the T&C Obligation to be:
        - T&C Obligation (standard) = (Data in the return flow file (e.g. *.urm)) * ((Released Water) * (1.0-CU Factor)), where the CU Factor is provided in row 5. The first value in a standard return flow table corresponds to the month diverted, the second to the month after a diversion, etc. Data that associates a Plan ID with any number of Return Flow Location(s), Percent(s), and Return Table ID(s) is provided in the plan Return File (*.prf).

- When ciopso2 = Plan ID and iopsou(4,1)=2 a fixed return pattern is used to calculate the T&C Obligation. A **Fixed Return Pattern** calculates the T&C Obligation to be:
    - T&C Obligation (fixed) = (Data in the return flow file (e.g. *.urm)) * ((Released Water) The first value in a fixed return flow table corresponds to the first month in the simulation (e.g. January for a calendar year simulation), the second month to February (again for a calendar year simulation), etc. Data that associates a Plan ID with any number of Return Flow Location(s), Percent(s), and Return Table ID(s) is provided in the plan Return File (*.prf).
- When ciopso2 = Plan ID and iopsou(4,1)=3 a mixed return pattern is used to calculate the T&C Obligation. **Mixed Return Pattern** contains both a Standard and Fixed component and calculates the T&C Obligation to be:
    - T&C Obligation (standard) = (Data in the return flow file (e.g. *.urm)) * ((Released Water) * (1.0-CU Factor)), where the CU Factor is provided in row 5. The first value in a standard return flow table corresponds to the month diverted, the second to the month after a diversion, etc. Data that associates a Plan ID with any number of Return Flow Location(s), Percent(s), and Return Table ID(s) is provided in the plan Return File (*.prf).
    - T&C Obligation (fixed) = (Data in the return flow file (e.g. *.urm)) * ((Released Water) The first value in a fixed return flow table corresponds to the first month in the simulation (e.g. January for a calendar year simulation), the second month to February (again for a calendar year simulation), etc. Data that associates a Plan ID with any number of Return Flow Location(s), Percent(s), and Return Table ID(s)is provided in the plan Return File (*.prf).
- When ciopso2 = Plan ID and iopsou(4,1)=4 a default return pattern is used to calculate the T&C Obligation. A **Default Return Pattern** has a standard component that uses historic return flow data associated with the source water right to calculate the T&C Obligation.
- If the variable ciopso2 is set to a T&C Plan ID and iopsou(4,1) is greater than zero then CU Factors are expected to be provided in card 5. Note the CU Factors typically represent negotiated values related to, but not necessarily the same as, the efficiency of the Transfer From Structure. Also these factors are only used when iopsou(4,1) = 1 (Standard Return) or 3 (Mixed Return) even though they are required as input.

- Releases from a Plan by a Type 28 operating rule are reported in the **Stream Report (*.xdd)** as follows:
    - At the source, the water release to the destination is reported as Carried, Exchanged or Bypassed.
    - At the destination, the water diverted is reported as From River by Other.

```
Row-data        Variable        Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
               1x,a12, 1x,2f8.0, 2i8)
1-1             cidvri(1)       Operational right ID
1-2             nameo(1)        Operational right name
```

1-3	rtem(1)	Administration number
1-4	dumx	Monthly Intervening Structure Switch +n Number of intervening structures (max = 10) 12 Monthly (12) on/off values -n Include -12 monthly on/off values minus n intervening structures Note, when a negative value is, provided, it should be -13 or less for 12 monthly values and one intervening structure
1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on +n Begin in year n -n Stop after year n

Destination Data

1-6	ciopde	Destination structure (diversion or reservoir or instream flow or plan)
1-7	iopdes(2,1)	Destination structure account For a diversion or plan or instream flow destination enter 1 For a reservoir destination, enter +n Account to be served by this right -n Fill the first n accounts based on the ratio of their ownership

Supply Data

1-8	ciopso(1)	ReUse Plan or Accounting Plan or Reservoir
1-9	iopsou(2,1)	If ciopso(1) is a plan enter the ownership % If ciopso(1) is a reservoir enter the account #
1-10	ciopso(2)	T&C Plan ID (enter NA if none)
1-11	iopsou(4,1)	0 if ciopso(2) = NA 1 for a standard return pattern 2 for a fixed return pattern 3 for a mixed (standard and fixed) return pattern

Type Data

1-12	ityopr(1)	28

Associated Plan Data

1-13	creuse	Reuse Plan ID (enter NA if none)

Diversion Type

1-14	cdivtyp	Diversion or Depletion If the destination is a reservoir set to Diversion

Conveyance Loss (%)

1-15	OprLoss	0 No Transit loss -1 Provide intervening structure with loss data in row 3.

Miscellaneous Limits

1-16	OprLimit	0 Do not constrain the release by another operating rule. Note OprLimit must be 5, 7, 8 or 9 if the source is an Changed Water Right Plan (type 13). 1 Not operational. Preserved for potential enhancement. 2 Decrease monthly and annual releases limits of the operational rule specified in row 4. 3 Limit the amount released by the amount diverted by the operational rule in row 4 or row 5. 4 Include the functionality of oprlimit =2 in row 4 and oprlimit=3 in row 5. 5 If the source is a Changed Water Right Plan (type 13), enter the operational right ID that diverted the Changed Water Right. 6 Not operational. Preserved for a potential enhancement. 7 A combination of Oprlimit = 2 and 5. 8 A combination of Oprlimit = 3 and 5. 9 A combination of Oprlimit = 4 and 5.

Start Date

1-17	IoBeg	First year of operation

End Date

1-18	IoEnd	Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12

2-1	imonsw(1)	Monthly switch 0=off, 1=on +n Day first used that month -n Day last used that month Note the first entry corresponds to the first month specified in the control file

Intervening Structure Data with loss
Include only if OprLoss > 0 or = -1 and the variable (dumx) = 1-10 or < -12
Note that intervening structure data without a loss is not operational, use a zero carrier loss to model these operations.
See Section 7 for the approach used to model an augmentation station (e.g. a structure that carries a diversion, typically with loss, then returns non-lost water to the river).
Free Format

```
3b-1            intern(1,1)    Intervening structure ID
                                  (e.g. a Diversion ID or Stream ID)
3b-2            OprLossC(l,1)  Carrier Loss for Structure ID %
3b-3            InternT(1,1)   Intervening Structure Type
                               Enter Carrier if it is a diversion
                                  structure located on the river
                               Enter Return if it is a return
                                  location on the River

                               Repeat for +dumx values


Associated Operating Rule
Include only if the switch (OprLimit) = 2, 3, 4, 5, 7, 8 or 9
Free Format
4-1             cx             If OprLimit=2, 4, 7 or 9 Operating
                                  Rule ID with monthly and annual limits
                               If OprLimit=3 or 8 Operating
                                  Rule ID that will LIMIT the amount released
                               If Oprlimit=5, Operating Rule ID that
                                  Diverted water to a Changed Water
                                  Right Plan (type 13)

Associated Operating Rule
Include only if the switch (OprLimit) = 4, 7, 8 or 9
Free Format
5-1             cx             If OprLimit=4, 8 or 9 Operating Rule
                                  ID that will limit the amount diverted
                               If OprLimit= 7, Operating Rule ID that
                                  Diverted water to a Changed Water
                                  Right Plan (type 13)
Associated Operating Rule
Include only if the switch (OprLimit) = 9
Free Format
6-1             cx             If OprLimit= 9, Operating Rule ID that
                                  Diverted water to a Changed Water
                                  Right Plan (type 13)

T&C CU Factors
Include only if ciopso(2)is a T&C Plan and iopsou(4,1) > 0.
If iopsou(4,1) = 2 (fixed) or 4 (default) enter -1.0 since this data is not used.
Free Format
7-1             OprFac(1)      CU factor in month 1
7-2             OprFac(2)      CU factor in month 2
...                            ...      ...
7-12            OprFac(12)     CU factor in month 12

                               Repeat for number of return flow locations
```

4.13.29 Reservoir or Plan Spill (ityopr=29)

The type 29 operating rule provides a method to spill water from a Reservoir or Reuse Plan or Accounting Plan or a Changed Water Right Plan to the system. The following are noted:

- When water is spilled from a plan it must be a Reuse Plan, an Accounting Plan or a Changed Water Right Plan.
    - A "ReUse Plan" is a special structure type that can be used identify the location of a reusable water supply associated with a CU transfer or transmountain import (see Section 7 for more details about plans).
    - An "Accounting Plan" is a special structure type that can be used to identify the location of transferred water that might be used for a variety of demands (see Section 7 for more details about plans).
    - A "Changed Water Right Plan" is a special structure that can be used to temporarily store a changed water right at its decreed priority and released at a priority that is junior by a direct release using a type 27 operating rule or by exchange using a type 28 operating rule or spilled using a type 29 operating rule (see Sectoin 7.43 for more details about a Changed Water Right plan).
- If the reuse plan is tied to a reservoir (e.g. it is a plan type 3 or 5) then source 1 (ciopso(1)) should be a reservoir ID and source 2 (ciopso(2)) may or may not be a Plan ID.
- If the reuse plan is not tied to a reservoir then source 1 (ciopso(1)) should be a plan ID and source 2 (ciopso(2)) should be NA.
- If the variable OprLimit is set to 1 the operating rule ID specified in row 4 will have its monthly and annual limits increased by the amount released.
- If the source is an Changed Water Right plan then the destination (ciopde) should be the location of the source water right.
- The type 29 operating rule allows the source to be a reservoir that may or may not be associated with a plan. As opposed to a standard reservoir spill operating rule (type 9) that releases water from a reservoir to meet a target storage, a type 29 reservoir spills the amount currently in storage when the operating rule executes. (e.g. it releases without regard to the target storage).
- The variable ciopde allows the user to specify where a spill will occur. The following are recommended:
    - If a plan is specified, with or without a reservoir, the user has the ability to control if the available flow at the node where the reservoir is located does or does not get adjusted. This capability is often required for a Changed Water Right Plan where the water may be diverted, temporarily stored in a plan that subsequently gets spilt for temporary storage in other plans associated with multiple users and ultimately released. If simulating a changed water right, the spill location, variable ciopde, should be the location of the changed water right.
    - If a plan is not specified, e.g. water is being spilled from a reservoir for an administrative purpose, the spill will occur at the reservoir node and the River Outflow and Available Flow are adjusted using the same approach as a type 9 operating rule. If the source is a reservoir the spill location, variable ciopde, should be NA since the reservoir location is the default spill location.

Row-data	Variable	Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,

```
              1x,a12, 1x,2f8.0, 2i8)
1-1           cidvri(1)      Operational right ID
1-2           nameo(1)       Operational right name
1-3           rtem(1)        Administration number
1-4           dumx           Monthly Switch
                                0 No monthly on/off values
                                12 Monthly on/off switches
1-5           ioprsw(1)      Annual On/Off Switch
                                0=off
                                1=on
                                +n Begin in year n
                                -n Stop after year n

1-6           ciopde         Spill location.
                                If the supply (ciopso(1)) is a plan:
                                   NA spill downstream of the plan location
                                   +n river ID where the plan spill occurs
                                If the supply (ciopso(1)) is a reservoir:
                                   NA the spill will occur at the
                                   Reservoir location
1-7           iopdes(2,1)    0

Supply Data
1-8           ciopso(1)      Supply Reservoir ID or ReUse plan ID
                                or Administrative plan ID
1-9           iopsou(2,1)    Supply Reservoir account or ReUse
                                Account (enter 0 if not applicable)
1-10          ciopso(2)      Supply Plan ID associated with a reservoir
                             Enter NA if none
1-11          iopsou(4,1)    0

Type Data
1-12          ityopr(1)      29

Associated Plan Data
1-13          creuse         NA

Diversion Type
1-14          cdivtyp        NA

Conveyance Loss (%)
1-15          OprLoss        0

Miscellaneous Limits
1-16          OprLimit       0 Do not adjust Monthly or Annual
                             Operational limits
                                +n Adjust monthly and Annual limits
                                of the operational rule
                                specified in row 3 below
Start Date
1-17          IoBeg          First year of operation

End Date
```

```
1-18            IoEnd           Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1             imonsw(1)       Monthly switch 0=off, 1=on
                                   +n Day first used that month
                                   -n Day last used that month
                                Note the first entry corresponds to the first
                                   month specified in the control file

Monthly and Annual Limitation Data
Format (36x, 10a12)
Include only if the switch (OprLimit) = 1
3-1             cx              Operating Rule ID for which monthly and annual
                                   limits will be increased by the amount spilled
```

4.13.30 Reservoir Re Diversion (ityopr=30)

The type 30 operating right allows a reservoir to re-divert water released in the same time step to a T&C plan by another operating rule. This operating rule is similar to a standard reservoir diversion except the amount diverted is limited to the amount released by a prior operating rule (ciopso1).This rule was developed and is commonly used because T&C releases are typically required to benefit other users before the system knows a release was unnecessary. Therefore, when implemented properly, the senior administration number of the T&C release operates and makes water available to other water users. Then the junior reservoir re diversion (type 30) operates to try and re-store this release if water is available (e.g. the release was not required).

```
Row-data        Variable        Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
               1x,a12, 1x,2f8.0, 2i8)
1-1             cidvri(1)       Operational right ID
1-2             nameo(1)        Operational right name
1-3             rtem(1)         Administration number
1-4             dumx            Monthly Intervening Structure Switch
                                   +n Number of intervening structures
                                        (max = 10)
                                   12 Monthly (12) on/off values
                                   -n Include -12 monthly on/off
                                   values minus n intervening
                                   structures
                                   Note, when a negative value is,
                                   provided, it should be -13 or
                                   less for 12 monthly values and 1
                                   intervening structure)
1-5             ioprsw(1)       Annual On/Off Switch
                                   0=off
                                   1=on
                                   +n Begin in year n
                                   -n Stop after year n
```

```
Destination Data
1-6             ciopde          Destination reservoir
1-7             iopdes(2,1)     Destination account

Supply Data
1-8             ciopso(1)       Operating right ID associated with
                                   the release of water to a T&C plan
1-9             iopsou(2,1)     0
1-10            ciopso(2)       NA
1-11            iopsou(4,1)     0

Type Data
1-12            ityopr(1)       30

Associated Plan Data
1-13            creuse          NA

Diversion Type
1-14            cdivtyp         NA

Conveyance Loss (%)
1-15            OprLoss         0

Miscellaneous Limits
1-16            OprLimit        0

Start Date
1-17            IoBeg           First year of operation

End Date
1-18            IoEnd           Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1             imonsw(1)       Monthly switch 0=off, 1=on
                                   +n Day first used that month
                                   -n Day last used that month
                                Note the first entry corresponds to the first
                                   month specified in the control file

Intervening Structure Data without loss
Include only if the variable (dumx) = 1-10 or < -12
Format (36x, 10a12)

3-1             intern(1,1)     For +dumx, Enter dumx intervening
                                   structure IDs
                                For -dumx, Enter abs(dumx)-12
                                   intervening structure IDs
```

4.13.31 Carrier Right with Reuse (ityopr=31)

The type 31 operating rule provides a method to divert water to a reservoir or direct flow structure using another structure's water rights. It is similar to the type 11 operating rule except it tracks reusable water associated with the diverted water's return flows. Water may be diverted to a reservoir or direct flow structure using a carrier structure's water rights. In addition, it can be used to constrain a diversion to the capacity of up to 10 intervening structures.

Note a diversion is implicitly constrained by the capacity of the destination structure (variable ciopde 1-6). Also, if several operating rules use the same water right, diversions are not allowed to exceed the decreed capacity. Finally if the destination is a reservoir, the operating rule demand is the destination reservoir's capacity. If the destination is a diversion, the demand is the destination structure's demand.

Row-data	Variable	Description
Control Data		
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12, 1x,a12, 1x,2f8.0, 2i8)		
1-1	cidvri	Operational right ID
1-2	nameo(1)	Operational right name
1-3	rtem(1)	Administration number. Note if ciopso(1) is a diversion right, its administration number is used and rtem is ignored
1-4	dumx	Monthly and Structure Switch +n Number of intervening structures (max = 10) -n Include -12 for monthly on/off values minus n intervening structures. Note, when a negative value is, provided, it should be -13 or less)
1-5	ioprsw(1)	Annual On/Off Switch 0 off 1 on +n Begin in year n -n=Stop after year n
Destination Data		
1-6	ciopde	Destination diversion ID or reservoir ID
1-7	iopdes(2,1)	Destination structure account For a diversion destination, enter 1 For a reservoir destination, enter +n Account to be served by this right -n Fill the first n accounts based on the ratio of their ownership
Source Data		
1-8	ciopso(1)	Diversion Water right ID
1-9	iopsou(2,1)	0
1-10	ciopso(2)	NA
1-11	iopsou(4,1)	0

```
Type Data
1-12           ityopr(1)      31

Associated Plan Data
1-13           creuse         Reuse Plan ID (enter NA if none)

Diversion Type
1-14           cdivtyp        NA

Conveyance Loss (%)
1-15           OprLoss        0

Miscellaneous Limits
1-16           OprLimit       0

Start Date
1-17           IoBeg          First year of operation

End Date
1-18           IoEnd          Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1            imonsw(1)      Monthly switch 0=off, 1=on
                                 +n Day first used that month
                                 -n Day last used that month
                              Note the first entry corresponds to the first
                                 month specified in the control file


Intervening Structure Data without loss
Include only if the variable (dumx) = 1-10 or < -12
Format (36x, 10a12)
3-1            intern(1,1)    For +dumx, Enter dumx intervening
                                 structure ID's
                              For -dumx, Enter abs(dumx)-12
                                 intervening structure ID's
```

4.13.32 Reservoir with a Reservoir Reuse Plantyp to a User Direct (ityopr=32)

The type 32 operating rule provides a method to release water from a reservoir with a reservoir reuse plan (type 3 or 5) to a reservoir, direct flow, instream flow node or instream flow reach located downstream of the reservoir. If the delivery method is a release from the reservoir directly to a demand or reservoir (i.e. no release to the river) the diversion type (cdivtyp) should be set to Direct. If the delivery method is the river and the delivery is intended to meet the destination's demand the diversion type (cdivtyp) should be set to Diversion. If the destination is a diversion and the delivery is intended to meet the consumption associated with the destination's demand, the diversion type (cdivtyp) should be set to Depletion. In addition, carriers can be used to constrain a release to the capacity of up to 10

intervening structures or carriers. Note a diversion is implicitly constrained by the capacity of the destination structure (variable ciopde).

Row-data	Variable	Description
Control Data		
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12, 1x,a12, 1x,2f8.0, 2i8)		
1-1	cidvri(1)	Operational right ID
1-2	nameo(1)	Operation right name
1-3	rtem(1)	Administration number
1-4	dumx	Monthly and Intervening Structure Switch +n Number of intervening structures (max = 10) -n Include -12 monthly on/off values minus n intervening structures Note, when a negative value is, provided, it should be -13 or less for 12 monthly values and
1-5	ioprsw(1)	Annual On/Off Switch 0 off 1 on +n Begin in year n -n Stop after year n
Destination Data		
1-6	ciopde	Destination diversion ID or reservoir ID or Instream flow ID
1-7	iopdes(2,1)	Destination structure account For a diversion or instream flow destination, enter 1 For a reservoir destination, enter +n Account to be served by this right -n Fill the first n accounts based on the ratio of their ownership
Supply Data		
1-8	ciopso(1)	Supply reservoir ID
1-9	iopsou(2,1)	Supply reservoir account
1-10	ciopso(2)	Supply Reservoir Reuse Plan ID at Source
1-11	iopsou(4,1)	See Section 7 for a discussion of the Reservoir demand options. 0 = Reservoir demand is not adjusted +n = Reservoir demand is limited to not exceed CIR/n; where n (%) is the efficiency of reservoir water use that is limited to not exceed the max system efficiency

```
                                        Note a +n requires the
                                        variable efficiency option
                                        (ieffmax) from control file be
                                        on

Type Data
1-12            ityopr(1)       32

Associated Plan Data
1-13            creuse          Reuse Plan ID for returns (enter NA if none)

Diversion Type
1-14            cdivtyp         Diversion or Depletion or Direct

Conveyance Loss (%)
1-15            OprLoss         0

Miscellaneous Limits
1-16            OprLimit        0

Start Date
1-17            IoBeg           First year of operation

End Date
1-18            IoEnd           Last year of operation


Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1             imonsw(1)       Monthly switch 0=off, 1=on
                                   +n Day first used that month
                                   -n Day last used that month
                                Note the first entry corresponds to the first
                                   month specified in the control file

Intervening Structure Data without loss
Include only if the variable (dumx) = 1-10 or < -12
Format (36x, 10a12)
3-1             intern(1,1)     For +dumx, Enter dumx intervening
                                   structure ID's
                                For -dumx, Enter abs(dumx)-12
                                   intervening structure ID's
```

4.13.33 Reservoir with a Reuse Plan to a User by Exchange (ityopr=33)

The type 33 operating rule provides a method to release water from a Reservoir with a Reservoir Reuse plan (type 3 or 5) to a reservoir, direct flow, instream flow or a carrier located upstream of the reservoir, by exchange when the receiving structures return flows can be reused. The amount released may equal the destinations demand (Diversion) or consumption (Depletion). In addition, it can be used to constrain a diversion to the capacity of up to 10 intervening structures or carriers. Note a diversion is implicitly constrained by the capacity of the destination structure (variable ciopde, row-data 1-6).

Row-data	Variable	Description
Control Data		
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12, 1x,a12, 1x,2f8.0, 2i8)		
1-1	cidvri(1)	Operational right ID
1-2	nameo(1)	Operation right name
1-3	rtem(1)	Administration number
1-4	dumx	Monthly and Intervening Structure Switch +n Number of intervening structures (max = 10) -n Include -12 monthly on/off values minus n intervening structures Note, when a negative value is provided, it should be -13 or less for 12 monthly values and
1-5	ioprsw(1)	Annual On/Off Switch 0 off 1 on +n Begin in year n -n Stop after year n
Destination Data		
1-6	ciopde	Destination diversion ID or reservoir ID or Instream Flow node or reach
1-7	iopdes(2,1)	Destination structure account For a diversion destination, enter 1 For a ISF destination, enter 1 For a reservoir destination, enter +n Account to be served by this right -n Fill the first n accounts based on the ratio of their ownership
Supply Data		
1-8	ciopso(1)	Supply reservoir ID
1-9	iopsou(2,1)	Supply reservoir account
1-10	ciopso(2)	Supply Reservoir Reuse Plan ID
1-11	iopsou(4,1)	See Section 7 for a discussion of the Reservoir demand options. 0 = reservoir demand is not adjusted +n = Reservoir demand is limited to not exceed CIR/n; where n (%) is the efficiency of reservoir water use that is limited to not exceed the max system efficiency Note a +n requires the variable efficiency option (ieffmax) from control file be

```
                                        on

Type Data
1-12            ityopr(1)      33

Associated Plan Data
1-13            creuse         Reuse Plan ID for returns (enter NA if none)

Diversion Type
1-14            cdivtyp        Diversion or Depletion

Conveyance Loss (%)
1-15            OprLoss        0

Miscellaneous Limits
1-16            OprLimit       0

Start Date
1-17            IoBeg          First year of operation

End Date
1-18            IoEnd          Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1             imonsw(1)      Monthly switch 0=off, 1=on
                                  +n Day first used that month
                                  -n Day last used that month
                               Note the first entry corresponds to the first
                                  month specified in the control file

Intervening Structure Data without loss
Include only if the variable (dumx) = 1-10 or < -12
Format (36x, 10a12)
3-1             intern(1,1)    For +dumx, Enter dumx intervening
                                  structure ID's
                               For -dumx, Enter abs(dumx)-12
                                  intervening structure ID's
```

4.13.34 Reservoir to Reservoir Transfer (Bookover) with a Plan (ityopr=34)

The type 34 operating rule allows a reservoir to reservoir transfer (bookover) to occur where the destination water may be reusable or increase an OOP plan obligation. It is commonly used to transfer water from one reservoir storage account to another in a particular month. The following are noted:

- The destination reservoir may be the same or different than the source reservoir. If they are different the destination reservoir must be located downstream of the source reservoir.
- If the delivery method is a release from the reservoir directly to a demand or reservoir (i.e. no release to the river) the diversion type (cdivtyp) should be set to Direct. If the delivery method is the river and the delivery is intended to meet the destination's demand the diversion type (cdivtyp) should be set to Diversion.

- The amount transferred can be limited to the amount of water diverted by another operating rule (specified under variable ciopso(2)).
- The amount transferred can be limited to the demand of a diversion structure (specified in field ciopso(2)).
- The amount transferred can be limited to the volume of water in an Out-of-Priority (OOP) plan (specified in field ciopso(2)).
- The amount transferred can be booked from one reservoir to another by a carrier (pipeline).
- If the variable OprLimit is set to 1 the operating rule ID specified in row 4's monthly and annual limits **will be increased and limit** the amount rleased. Also because the capacity of the source structure of the operating rule ID specified in row 4 has already been adjusted the source structure's capacity will not limit the amount diverted.
- If water is being transferred from an OOP plan in one reservoir to an OOP plan in another reservoir then:
  - Source 1 should be the source reservoir
  - Source 2 should be the OOP plan at the source reservoir
  - The destination should be the reservoir receiving the bookover
  - The plan data should be the OOP plan at the destination reservoir

```
Row-data        Variable        Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
                1x,a12, 1x,2f8.0, 2i8)
1-1             cidvri(1)       Operational right ID
1-2             nameo(1)        Operational right name
1-3             rtem(1)         Administration number
1-4             dumx            Monthly and Structure Switch
                                   0 No monthly on/off values
                                   12 Number of monthly on/off
                                      Switches provided
1-5             ioprsw(1)       Annual On/Off Switch
                                   0=off
                                   1=on
                                   +n Begin in year n
                                   -n Stop after year n

Destination Data
1-6             ciopde          Destination reservoir ID
1-7             iopdes(2,1)     Destination structure account
                                For a reservoir destination, enter
                                   +n Account to be served by this right
                                   -n Fill the first n accounts based on
                                      the ratio of their ownership

Supply Data
1-8             ciopso(1)       Supply reservoir ID
1-9             iopsou(2,1)     Supply reservoir account

1-10            ciopso(2)       Transfer Limit
```

		If not required enter 0 If limited by the amount diverted under an operating rule, enter the operating Rule ID. If limited by a diversion demand amount enter the diversion structure ID. If limited by an OOP Plan amount enter the OOP Plan ID.
1-11	iopsou(4,1)	Enter 0 (Not Used)
Type Data		
1-12	ityopr(1)	34
Plan Data		
1-13	creuse	Reuse Plan ID or OOP Plan ID
Diversion Type		
1-14	cdivtyp	Diversion or Direct
Conveyance Loss (%)		
1-15	OprLoss	0
Miscellaneous Limits		
1-16	OprLimit	0 Do not adjust Monthly or Annual Operational limits 1 Increase monthly and Annual Diversion limits of the operational rule specified in row 4. Also do recognize the capacity of the structure associated with the operational rule in row 4 is already adjusted.
Start Date		
1-17	IoBeg	First year of operation
End Date		
1-18	IoEnd	Last year of operation
Monthly Data		
Free Format		
Include only if the variable (dumx) = 12 or less than -12		
2-1	imonsw(1)	Monthly switch 0=off, 1=on +n Day first used that month -n Day last used that month Note the first entry corresponds to the first month specified in the control file
Associated Operating Rule		
Include only if the switch (OprLimit) =2 or 3		
Free Format		
3-1	cx	If Oprlimit=2, Operating Rule ID for which monthly and Annual limits will LIMIT the amount released

```
                                If OprLimit=3, Operating Rule ID
                                   for which diversions by that rule
                                   will LIMIT the Amount released

Intervening Structure Data without loss
Include only if the variable (dumx) = 1-10 or < -12
Format (36x, 10a12)
4a-1            intern(1,1)    For +dumx, Enter dumx intervening
                                   structure ID's
                               For -dumx, Enter abs(dumx)-12
                                   intervening structure ID's
```

4.13.35 Import to a Plan (ityopr=35)

The type 35 operating rule provides a method to import water from outside the system to an accounting plan. An import structure should be specified with the same ID in both the diversion station file (*.dds) and plan file (*.pln) using Plan Type 7. The destination accounting plan must be located directly downstream of the import diversion/plan, intervening structures in this rule are not recommended. Monthly import values should be specified as negative demands in the diversion demand file (*.ddm).If the imported supplies are reusable, designate the reuse plan when the imported water is released from the accounting plan.

```
Row-data        Variable        Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
               1x,a12, 1x,2f8.0, 2i8)
1-1             cidvri(1)       Operational right ID
1-2             nameo(1)        Operation right name
1-3             rtem(1)         Administration number
1-4             dumx            Monthly Switch
                                   12 Include monthly on/off values
1-5             ioprsw(1)       Annual On/Off Switch
                                   0 off
                                   1 on
                                   +n Begin in year n
                                   -n Stop after year n

Destination Data
1-6             ciopde          Destination accounting plan
1-7             iopdes(2,1)     Destination structure account
                                For a plan destination, enter 1

Supply Data
1-8             ciopso(1)       Diversion ID where imported water enters the system
                                   Note import ID in diversion file (*.dds)
                                   must match import plan ID in plan file (*.pln)
1-9             iopsou(2,1)     0 (not used)
1-10            ciopso(2)       NA
1-11            iopsou(4,1)     0

Type Data
```

```
1-12            ityopr(1)      35

Associated Plan Data
1-13            creuse         NA

Diversion Type
1-14            cdivtyp        NA

Conveyance Loss (%)
1-15            OprLoss        0

Miscellaneous Limits
1-16            OprLimit       0

Start Date
1-17            IoBeg          First year of operation

End Date
1-18            IoEnd          Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1             imonsw(1)      Monthly switch 0=off, 1=on
                                  +n Day first used that month
                                  -n Day last used that month
                               Note the first entry corresponds to the first
                                  month specified in the control file
```

4.13.36 Seasonal (Daily) Water Right Direct (ityopr=36)

The type 36 operating rule provides a method to limit a direct flow water right to begin on a particular day and end on a particular day during a monthly simulation. In addition it may be used in a daily analysis if a diversion has several water rights, with some controlled by their daily demand and others limited toboth their daily demand data and a specified diversion season. The type 36 operating right has generic applications, however it was originally developed to model Meadow Rights that occur in water districts 1 and 64 of the South Platte River.

```
Row-data        Variable       Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
                1x,a12, 1x,2f8.0, 2i8)
1-1             cidvri(1)      Operational right ID
1-2             nameo(1)       Operation right name
1-3             rtem(1)        Administration number
1-4             dumx           Monthly and Intervening Structure Switch
                                  +n Number of intervening structures
                                     (max = 10)
                                  -n Include -12 monthly on/off
```

		structures Note, when a negative value is, provided, it should be -13 or less for 12 monthly values and one intervening structure
1-5	ioprsw(1)	Annual On/Off Switch 0 off 1 on +n Begin in year n -n Stop after year n

Destination Data

1-6	ciopde	Destination diversion ID
1-7	iopdes(2,1)	Destination structure account, enter 1 for a diversion,

Supply Data

1-8	ciopso(1)	Diversion Water Right ID
1-9	iopsou(2,1)	0 (not used)
1-10	ciopso(2)	NA
1-11	iopsou(4,1)	0

Type Data

1-12	ityopr(1)	36

Associated Plan Data

1-13	creuse	NA

Diversion Type

1-14	cdivtyp	Direct

Conveyance Loss (%)

1-15	OprLoss	0

Miscellaneous Limits

1-16	OprLimit	0

Start Date

1-17	IoBeg	First year of operation

End Date

1-18	IoEnd	Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12

2-1	imonsw(1)	Monthly switch 0=off, +n Day first used that month -n Day last used that month Note the first entry corresponds to the first month specified in the control file

Intervening Structure Data without loss

```
Include only if the variable (dumx) = 1-10 or < -12
Format (36x, 10a12)
3-1             intern(1,1)    For +dumx, Enter dumx intervening structure ID's
                               For -dumx, Enter abs(dumx)-12
                                  intervening structure ID's
```

4.13.37 Augmentation Well Direct (ityopr=37)

The type 37 operating rule provides a method to pump an Augmentation well in order to satisfy a T&C or Augmentation Plan demand. The source is a well water right. The destination is a T&C or Well Augmentation Plan. The following comments are provided to assist in using and interpreting this rule:

- An augmentation well right is typically tied to a unique (augmentation) Well structure. This allows unique return and depletion data associated with the augmentation well to be provided in the well station file (*.wes). Note that return flows associated with an augmentation are typically assigned a unit response function that routes water to the stream in the same time step that they occur.
- This rule requires source 2 (ciopso(2)) be an "Augmentation plan ID". This allows the augmentation plan requirements associated with the augmentation well to be stored and ultimately satisfied. This plan ID may or may not be the same as the destination plan ID.
- An augmentation well might serve as both a water supply and an augmentation source. This can occur when the same right is assigned to both a standard (irrigation) well structure and an Augmentation well structure. If the administration number assigned in the operational right file is different than the administration number of the source (augmentation) well the operating rule value is used and a warning is printed to the log file. The amount pumped to each demand is limited by the well's total capacity and water right.

```
Row-data       Variable       Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
               1x,a12, 1x,2f8.0, 2i8)
1-1            cidvri(1)      Operational right ID
1-2            nameo(1)       Operation right name
1-3            rtem(1)        Administration number
1-4            dumx           Monthly On/Off Switch
                                 0 Include no monthly on/off values
                                 12 Include 12 monthly on/off values
1-5            ioprsw(1)      Annual On/Off Switch
                                 0 off
                                 1 on
                                 +n Begin in year n
                                 -n Stop after year n

Destination Data
1-6            ciopde         T&C or Well Augmentation Plan ID
1-7            iopdes(2,1)    0 (not used)

Supply Data
1-8            ciopso(1)      Well Water Right ID
```

```
1-9             iopsou(2,1)    0 (not used)
1-10            ciopso(2)      Plan ID used to track the Augmentation
                                  requirement of the Augmentation Well pumping
1-11            iopsou(4,1)    0

Type Data
1-12            ityopr(1)      37

Associated Plan Data
1-13            creuse         NA

Diversion Type
1-14            cdivtyp        NA

Conveyance Loss (%)
1-15            OprLoss        0

Miscellaneous Limits
1-16            OprLimit       0

Start Date
1-17            IoBeg          First year of operation

End Date
1-18            IoEnd          Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1             imonsw(1)      Monthly switch 0=off, 1=on
                                  +n Day first used that month
                                  -n Day last used that month
                               Note the first entry corresponds to the first
                                  month specified in the control file

Intervening Structure Data without loss
Include only if the variable (dumx) = 1-10 or < -12
Format (36x, 10a12)
3-1             intern(1,1)    For +dumx, Enter dumx intervening
                                  structure ID's
                               For -dumx, Enter abs(dumx)-12
                                  intervening structure ID's
```

4.13.38 Out-of-Priority Diversion with Plan Direct (ityopr=38)

The type 38, Out-of-Priority Diversion, operating rule provides a method to divert to a reservoir or a diversion out-of-priority with respect to a reservoir based on the upstream storage statute. Source 1 is the senior reservoir right that is being subordinated. Source 2 is the destination reservoir water right that is diverting out-of-priority. The destination is a reservoir or ditch. A plan ID is used to track the volume of water that must be paid back should the subordinated reservoir right go unsatisfied. The following comments are provided to assist in using and interpreting this rule:

- The user must supply an “Out-of-Priority (OOP) Plan ID” associated with the OOP diversion.

- When multiple structures divert with respect to the same subordinated reservoir right, they may be provided the same OOP Plan ID or different OOP Plan ID's. Separate OOP Plan ID's are recommended if the user is interested in monitoring the demand and supplies associated with each OOP diversion. A combined OOP Plan ID is recommended if the user is not interested in monitoring the demand and supplies associated with each OOP diversion.
- The administration number provided to the operating rule is typically just senior to the senior subordinated reservoir right.

```
Row-data       Variable       Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
       1x,a12, 1x,2f8.0, 2i8)
1-1    cidvri(1)              Operational right ID
1-2    nameo(1)               Operation right name
1-3    rtem(1)                Administration number
1-4    dumx                   Monthly Intervening Structure Switch
                                 +n Number of intervening structures (max = 10)
                                 12 Monthly (12) on/off values
                                 -n Include -12 monthly on/off
                                    values minus n intervening
                                    Note, when a negative value is,
                                    provided, it should be -13 or
                                    less for 12 monthly values and
                                    one intervening structure
1-5    ioprsw(1)              Annual On/Off Switch
                                 0 off
                                 1 on
                                 +n Begin in year n
                                 -n Stop after year n

Destination Data
1-6    ciopde                 Diversion or Reservoir ID
1-7    iopdes(2,1)            Destination structure account
                              For a diversion destination, enter 1
                              For a reservoir destination, enter
                                 +n Account to be served by this right
                                 -n Fill the first n accounts based on
                                    the ratio of their ownership

Supply Data
1-8    ciopso(1)              Senior subordinated reservoir right ID
1-9    iopsou(2,1)            0 (not used)
1-10   ciopso(2)              Junior right ID diverting out of priority
1-11   iopsou(4,1)            0 (not used)

Type Data
1-12   ityopr(1)              38

Associated Plan Data
1-13   creuse                 Reuse Plan ID (used to store amount diverted
                                 out-of-priority)
```

```
Diversion Type
1-14    cdivtyp                 NA

Conveyance Loss (%)
1-15    OprLoss                 0

Miscellaneous Limits
1-16    OprLimit                0

Start Date
1-17    IoBeg                   First year of operation

End Date
1-18    IoEnd                   Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1     imonsw(1)               Monthly switch 0=off, 1=on
                                   +n Day first used that month
                                   -n Day last used that month
                                Note the first entry corresponds to the first
                                   month specified in the control file
Intervening Structure Data
Include only if the variable (dumx) = 1-10 or < -12
Format (36x, 10a12)
3-1     intern(1,1)             For +dumx, Enter dumx intervening
                                   structure ID's
                                For -dumx, Enter abs(dumx)-12
                                   intervening structure ID's
```

4.13.39 Alternate Point Direct (ityopr=39)

The type 39 operating rule allows a structure to divert at an Alternate Point using a water right that is assigned to another structure (i.e. not assigned to the Alternate Point). The alternate point can be located upstream or downstream of the destination structure. The rule allows water to be diverted at one or both locations up to the decreed amount. Source 1 is the water right that allows the diversion. Source 2 is the location in the network where the Alternate Point will be administered. The destination must be a diversion and is typically (but not required to be) the structure associated with Source 1. The following comments are provided to assist in using and interpreting this rule:

- If the source structure is no longer capable of diverting, its capacity is typically set to zero in the diversion structure file.
- The administration number provided to the operating rule is typically equal to or slightly junior to the decreed water right.
- The source water right may operate as a standard direct flow right and as an alternate point. The total amount diverted at the decreed location and the alternate point are limited to the decreed amount, demand, available supply, etc. When the variable iopsou(2,1) = 0 is the right is used as both a direct flow and alternate point. When the variable iopsou(2,1) = 1 the right is only used as an alternate point.

- When the alternate point is a diversion, results are reported in the Stream Report (*.xdd) as follows:
    - At the destination, the diversion is reported as From Carrier by Other.
    - At the source structure, the diversion is reported as From River by Other and Carried, Exchange or Bypassed. The Total Supply associated with the alternate point diversion is therefore zero (diversion less carried water is zero)

- When the alternate point is a well, results are reported in the Stream Report (*.xdd) as follows:
    - At the destination, the diversion is reported as From Carrier by Other.
    - At thesource structure, the well pumping is reported as From Well and Carried, Exchange or Bypassed. The Total Supply associated with the alternate point diversion is therefore zero (well pumping less carried water is zero).

Row-data	Variable	Description
Control Data		
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12, 1x,a12, 1x,2f8.0, 2i8)		
1-1	cidvri(1)	Operational right ID
1-2	nameo(1)	Operation right name
1-3	rtem(1)	Administration number
1-4	dumx	Monthly On/Off Switch 0 Include no monthly on/off values 12 Include 12 monthly on/off values
1-5	ioprsw(1)	Annual On/Off Switch 0 off 1 on +n Begin in year n -n Stop after year n
Destination Data		
1-6	ciopde	Destination ID (must be a diversion)
1-7	iopdes(2,1)	Enter 1
Supply Data		
1-8	ciopso(1)	Diversion Water right serving the alternate point
1-9	iopsou(2,1)	0 The source water right (ciopso(1)) is left on (i.e. it can be used as a both a direct flow right and this operating rule) 1 The source water right (ciopso2(1) is turned off (i.e. it can only be used by this operating rule)
1-10	ciopso(2)	Location wehere the Alternate Point is being administred (may be any diversion or well location)
1-11	iopsou(4,1)	0 do not limit the diversion to flow at the source right location 1 do limit the diversion to flow

```
                                  at the source right location
Type Data
1-12           ityopr(1)      39

Associated Plan Data
1-13           creuse         NA

Diversion Type
1-14           cdivtyp        Diversion

Conveyance Loss (%)
1-15           OprLoss        0

Miscellaneous Limits
1-16           OprLimit       0

Start Date
1-17           IoBeg          First year of operation

End Date
1-18           IoEnd          Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1            imonsw(1)      Monthly switch 0=off, 1=on
                                 +n Day first used that month
                                 -n Day last used that month
                               Note the first entry corresponds to the first
                                 month specified in the control file

Intervening Structure Data without loss
Include only if the variable (dumx) = 1-10 or < -12
Format (36x, 10a12)
3-1            intern(1,1)    For +dumx, Enter dumx intervening
                                 structure ID's
                               For -dumx, Enter abs(dumx)-12
                                 intervening structure ID's
```

4.13.40 South Platte Compact Release (ityopr=40)

For a complete description of how the South Platte compact is implemented in StateMod see section 7. The Type 40 operating rule simulates a release from the South Platte Compact Plan. It should be used to allow any diversion not located in water district 64 (e.g. upstream of the Washington county line) to attempt to divert water stored in the South Platte Compact plan and therefore not be called out by the compact. In addition, it should be used to release water from the compact plan to the compact itself. The following comments are provided:

- To serve any diversion that is water short and not located in water district 64 the **destination should be assigned 64x.**

- When the destination is any diversion not located in water district 64 (e.g 64x) the administration number assigned is not used since this operating rule is called immediately following the priority of any water right that is water short and not located in water district 64.
- To serve the compact itself the destination should be assigned an instream flow that represents the South Platte Compact.
- The administration number assigned to the operating rule used to release water from the South Platte Compact to the compact itself should be the most junior in the basin.
- Results for a type 40, South Platte Compact Storage, are reported in the Stream Report (*.xdd) as follows:
    - When the destination is any structure not located in water district 64, the diversion is reported as From River by Other because it is diverted by an operating rule. The Total Supply equals From River by Other that also equals Water Use To Other. In the Station Balance accounting River Outlfow equals the River Inflow less River Divert and River by Well.
    - When the destination is the South Platte Compact, the diversion is reported as From River by Other because it is diverted by an operating rule. The Total Supply equals From River by Other that also equals Water Use To Other. In the Station In/Out accounting the return flow equals the divesion because it is non-consumptive. In the Station Balance accounting River Outlfow equals the River Inflow less River Divert and River by Well.
- The check file contains a list of every structure served by a type 40 operating rule.

Row-data	Variable	Description
Control Data		
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12, 1x,a12,1x, 2f8.0, 2i8)		
1-1	cidvri(1)	Operational right ID
1-2	nameo(1)	Operational right name
1-3	rtem(1)	Administration number
1-4	dumx	Monthly switch 0=off, 1=on +n Day first used that month -n Day last used that month Note the first entry corresponds to the first month specified in the control file
1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on +n=Begin in year n -n=Stop after year n
Destination Data		
1-6	ciopde	Enter 64x to indicate the operating rule serves any water right not located in water district 64; or Enter the South Platte compact instream flow ID to indicate

		the operating rule provides water to the compact itself.
1-7	iopdes(2,1)	Destination Account, enter 1
Supply Data		
1-8	ciopso(1)	Compact plan ID (must be an Administrative plan, type 11)
1-9	iopsou(2,1)	0
1-10	ciopso(2)	NA
1-11	iopsou(4,1)	0
Type Data		
1-12	ityopr(1)	40
Associated Plan Data		
1-13	creuse	NA
Diversion Type		
1-14	cdivtyp	Diversion
Conveyance Loss (%)		
1-15	OprLoss	0
Miscellaneous Limits		
1-16	OprLimit	0
Start Date		
1-17	IoBeg	First year of operation
End Date		
1-18	IoEnd	Last year of operation
Type Data		
1-12	ityopr(1)	40
Associated Plan Data		
1-13	creuse	NA
Diversion Type		
1-14	cdivtyp	NA
Conveyance Loss (%)		
1-15	OprLoss	0
Miscellaneous Limits		
1-16	OprLimit	0
Start Date		
1-17	IoBeg	First year of operation
End Date		
1-18	IoEnd	Last year of operation

4.13.41 Reservoir Storage with Special Limits Direct (ityopr=41)

The type 41 operating rule allows a reservoir to store reservoir water right up to the volume of water stored in an Out-Of-Priority plan. It was originally developed to simulate the so called "1955 Exchange" on the Blue River that limits storage in Green Mountain to the amount of water diverted out-of-priority by Denver and Colorado Springs with respect to Green Mountain Reservoir. The following are noted:

- Source 1 should be a reservoir water right supplied in the reservoir right file (*.rer). Note when this right is tied to a type 41 operating rule it is turned off and StateMod prints a warning. By turning this right off, StateMod ensures this right no longer diverts as a standard reservoir but instead is controlled by information in the Type 41 operating rule.
- The administration number assigned in the reservoir right file overrides the administration number assigned in the operating rule. Note if the administration numbers are not equal, StateMod warns the user that the data in the reservoir right file controls.
- The destination should be a reservoir.
- The variable intern is used to store up to 10 plans that might limit the reservoir storage.
- The intervening plans should be Out-of-Priority (type 9) Plans.

```
Row-data        Variable        Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
                1x,a12, 1x,2f8.0, 2i8)
1-1             cidvri(1)       Operational right ID
1-2             nameo(1)        Operation right name
1-3             rtem(1)         Administration number
1-4             dumx            Monthly and Limiting Plan Switch
                                   +n Number of Limiting OOP plans
                                      (max = 10)
                                   -n Include -12 monthly on/off
                                      values minus n limiting OOP
                                      plans
                                      Note, when a negative value is,
                                      provided, it should be -13 or
                                      less for 12 monthly values and
                                      one limiting OOP plan)
1-5             ioprsw(1)       Annual On/Off Switch
                                   0 off
                                   1 on
                                   +n Begin in year n
                                   -n Stop after year n

Destination Data
1-6             ciopde          Reservoir ID
1-7             iopdes(2,1)     Destination structure account
                                For a reservoir destination, enter
                                   +n Account to be served by this right
                                   -n Fill the first n accounts based on
                                      the ratio of their ownership
```

```
Supply Data
1-8             ciopso(1)       Reservoir Water right
1-9             iopsou(2,1)     0 (not used)
1-10            ciopso(2)       NA
1-11            iopsou(4,1)     0 (not used)

Type Data
1-12            ityopr(1)       41

Associated Plan Data
1-13            creuse          NA

Diversion Type
1-14            cdivtyp         Diversion

Conveyance Loss (%)
1-15            OprLoss         0

Miscellaneous Limits
1-16            OprLimit        0

Start Date
1-17            IoBeg           First year of operation

End Date
1-18            IoEnd           Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1             imonsw(1)       Monthly switch 0=off, 1=on
                                   +n Day first used that month
                                   -n Day last used that month
                                Note the first entry corresponds to the first
                                   month specified in the control file

Limiting OOP Plan Volume Data
Include only if the variable (dumx) = 1-10 or < -12
Format (36x, 10a12)
3-1             intern(1,1)     For +dumx, Enter dumx limiting
                                   OOP Plan ID's
                                For -dumx, Enter abs(dumx)-12
                                   limiting OOP PlanID's
```

4.13.42 Plan Demand Reset (ityopr=42)

The type 42 operating rule provides a method to reset a plan demand. The following are noted:

- Because a type 42 rule does not provide a water supply it should, in general, only be used be used to mimic historical operations and/or restrict an operational activity to annual operations.
- Source 1 should be one of the following plan types: 1 = Term and Condition, 2 = Well Augmentation, 9 = Out-of-Priority Plan.

Row-data	Variable	Description
Control Data		
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12, 1x,a12, 1x,2f8.0, 2i8)		
1-1	cidvri(1)	Operational right ID
1-2	nameo(1)	Operational right name
1-3	rtem(1)	Administration number
1-4	dumx	Monthly Switch 0 No monthly on/off values 12 Monthly on/off switches
1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on +n Begin in year n -n Stop after year n
Destination Data		
1-6	ciopde	NA
1-7	iopdes(2,1)	0
Supply Data		
1-8	ciopso(1)	ReUse plan ID
1-9	iopsou(2,1)	Enter 0
1-10	ciopso(2)	NA
1-11	iopsou(4,1)	0
Type Data		
1-12	ityopr(1)	42
Associated Plan Data		
1-13	creuse	NA
Diversion Type		
1-14	cdivtyp	NA
Conveyance Loss (%)		
1-15	OprLoss	0
Miscellaneous Limits		
1-16	OprLimit	0
Start Date		
1-17	IoBeg	First year of operation
End Date		
1-18	IoEnd	Last year of operation
Monthly Data		
Free Format		
Include only if the variable (dumx) = 12 or less than -12		

```
2-1             imonsw(1)      Monthly switch 0=off, 1=on
                                  +n Day first used that month
                                  -n Day last used that month
                               Note the first entry corresponds to the first
                                  month specified in the control file
```

4.13.43 In-Priority Supply (ityopr=43)

The type 43 operating rule provides a method to supply a T&C requirement or a Well Augmentation Requirement if the amount owed in the current time step occurs in priority. The following are noted:

- In order to determine if future pumping depletions can be satisfied In-Priority a well must be tied to an augmentation plan (see **Section 4.49**)
- The amount of water pumped and its associated depletion over time is reported as part of a standard plan output (*.xpl). Source 1 of this report is reserved for In_Priority_Supply_Now (depletions that occur in priority in the month pumped). Source 'n' will report in-priority depletions (depletions that occur at a time step after the pumping) if an In-Priority Supply(type 43) operating rule is specified.
- Pumping is determined to be In-Priority in the time step it occurs if there is water available in the stream to offset any net depletion at that time. Therefore, it is allocated at the administration number of the well and is not controlled by this operating rule.
- T&C requirement is determined to be In-Priority in the time step it occurs if there is water available in the stream to offset any net depletion at that time. It is allocated at the administration number in this operating rule.
- In-Priority Depletions associated with pumping in a prior time step occur if there is water available in the stream to offset the depletion when they occur at the river. Because future depletions are stored by augmentation plan, not well, this determination is made at the administration number assigned to this In-Priority Supply Operating Rule (type 43).
- It is impractical to determine if future depletions are In-Priority using the administration number of each well because there are often thousands of wells being modeled and future depletions often extend over 20 years. In addition, this estimate is considered appropriate for a planning model because wells are typically junior to most direct flow and storage rights.
- The administration number assigned to an In-Priority Supply Operating Rule (type 43) is typically a decree weighted average priority of the wells associated with the well augmentation plan. The decree weighted average priority is calculated as follows:

  Admin_Ave = (sum(WR(j) * Admin(j)) / (sum WR(j))
  Where:
  Admin_Ave is the weighted average administration number
  WR(j) is the decreed water right for well j
  Admin(j) is the administration number of well j
  sum() is the summation

```
Row-data        Variable        Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
               1x,a12, 1x,2f8.0, 2i8)
```

1-1	cidvri(1)	Operational right ID
1-2	nameo(1)	Operational right name
1-3	rtem(1)	Administration number
1-4	dumx	Monthly Switch 0 No monthly on/off values 12 Monthly on/off switches
1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on +n Begin in year n -n Stop after year n

Destination Data

1-6	ciopde	Well Augmentation Plan or Term and Condition Plan
1-7	iopdes(2,1)	0

Supply Data

1-8	ciopso(1)	NA
1-9	iopsou(2,1)	0
1-10	ciopso(2)	NA
1-11	iopsou(4,1)	0

Type Data

1-12	ityopr(1)	43

Associated Plan Data

1-13	creuse	NA

Diversion Type

1-14	cdivtyp	NA

Conveyance Loss (%)

1-15	OprLoss	0

Miscellaneous Limits

1-16	OprLimit	0

Start Date

1-17	IoBeg	First year of operation

End Date

1-18	IoEnd	Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12

2-1	imonsw(1)	Monthly switch 0=off, 1=on +n Day first used that month -n Day last used that month Note the first entry corresponds to the first month specified in the control file

4.13.44 Recharge Well (ityopr=44)

The type 44 operating rule provides a method to pump a Recharge well in order to fill a Recharge Reservoir. The following comments are provided to assist in using and interpreting this rule:

- A recharge well operating rule ties a well right (ciopso(1)) to a recharge reservoir (ciopdes(1)) and account (iopdes(2,1)). Typically the recharge reservoir's seepage provides a lagged water supply for an augmentation plan.
- A recharge well only diverts when it is in priority.
- A recharge well is typically located close to the river and has a relatively quick, if not instantaneous, impact on the river. This quick response is not a requirement, simply how they typically operate. If the recharge well has a lagged depletion that is out of priority its augmentation requirement is included in the plan data (creuse). The depletions associated with this source are specified in the well station file (*.wes).
- A recharge well might serve as both a water supply and a recharge reservoir's source. This can occur when the same well right is assigned to both a standard (irrigation) well structure and a type 44 operating rule. If the administration number assigned in the operational right file is different than the administration number of the source (augmentation) well the operating rule value is used and a warning is printed to the log file. The amount pumped to each demand is limited by the well's total capacity and water right.

```
Row-data        Variable        Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
                1x,a12, 1x,2f8.0, 2i8)
1-1             cidvri(1)       Operational right ID
1-2             nameo(1)        Operation right name
1-3             rtem(1)         Administration number
1-4             dumx            Monthly On/Off Switch
                                   0 Include no monthly on/off values
                                   12 Include 12 monthly on/off values
1-5             ioprsw(1)       Annual On/Off Switch
                                   0 off
                                   1 on
                                   +n Begin in year n
                                   -n Stop after year n
Destination Data
1-6             ciopde          Recharge Reservoir
1-7             iopdes(2,1)     Recharge Reservoir Account

Supply Data
1-8             ciopso(1)       Well Water Right ID
1-9             iopsou(2,1)     0 (not used)
1-10            ciopso(2)       NA (not used)
1-11            iopsou(4,1)     0

Type Data
1-12            ityopr(1)       44

Plan Data
```

```
1-13           creuse         Augmentation Plan used to track future
                                 depletion obligations, if any

Diversion Type
1-14           cdivtyp        NA

Conveyance Loss (%)
1-15           OprLoss        0

Miscellaneous Limits
1-16           OprLimit       0

Start Date
1-17           IoBeg          First year of operation

End Date
1-18           IoEnd          Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1            imonsw(1)      Monthly switch 0=off, 1=on
                                 +n Day first used that month
                                 -n Day last used that month
                              Note the first entry corresponds to the first
                                 month specified in the control file

Intervening Structure Data without loss
Include only if the variable (dumx) = 1-10 or < -12
Format (36x, 10a12)
3-1            intern(1,1)    For +dumx, Enter dumx intervening
                                 structure ID's
                              For -dumx, Enter abs(dumx)-12
                                 intervening structure ID's
```

4.13.45 Carrier with Loss (ityopr=45)

The type 45 operating rule provides a method to divert water to a carrier with loss. The carrier then delivers water to a diversion or reservoir. The source may be a diversion water right or, if delivering to a reservoir, a diversion or reservoir water right. The type 45 rule can include transit losses on up to 10 intervening structures. Also it allows the user to specify a percent of the source right that is owned. This routine is similar to type 11 but includes more extensive treatment of transit losses and water right ownership. The following are noted:

- A diversion is implicitly constrained by the capacity of the destination structure (variable ciopde).
- The source water right may operate as a standard direct flow right and/or as a carrier. When the variable iopsou(2,1) = 0 the right is used as a carrier only. When the variable iopsou(2,1) = 1 the right is used as both a direct flow right and a carrier right.
- If a source right is used by both a direct flow and operating rule total diversions by both the direct flow and operating rule are not allowed to exceed the decreed capacity.

- If the destination is a diversion, the source should be a diversion water right.
- **If the destination is a diversion, the demand should be specified at the location where the destination is located** (i.e. not the carrier location). Therefore any transit losses between the carrier headgate and the destination will be calculated by StateMod and implicitly included in the river headgate demand.
- If the destination is a reservoir, the source should be a diversion water right or a reservoir water right.
- **If the destination is a reservoir, the demand is calculated at the location where the reservoir is located** (i.e. not the carrier location). Therefore any transit losses between a river headgate and the destination will be calculated by StateMod and implicitly included in the river headgate demand.
- If the destination is a reservoir and the source is a diversion right, the operating rule diversion IS NOT CHARGED against the reservoir's decree.
- If the destination is a reservoir and the source is a reservoir right, the operating rule diversion IS CHARGED against the reservoir's decree.
- Transit losses are reported with the carrier structure, not the destination.
- When the destination is an off-channel reservoir and the source is its water right, the administration location (ciopso2) may be used to administer the reservoir right at a diversion location located on the mainstem. This diversion location is implicitly treated as a carrier.
- When the miscellaneous limit (oprlimit) is set to a non zero value indicating a limit is provided the source constraint (ipsou(2,k) should be set to 1 to indicate the source water right is controlled by this operating rule. Without this constraint, water may be diverted under the source right, not this operating rule.
- When the miscellaneous limit (oprlimit) is set to 2 the diversion is limited to both the destination demand (ciopde) and the demand of the reservoir structure listed in row 4. The demand of the reservoir structure listed in row 4 is obtained from the monthly target file (*.tam) or daily reservoir target file (*.tad). Note that when the demand (ciopde) is a reservoir the monthly target (along with the capacity, etc.) is implicitly used to limit the amount diverted to a reservoir. However since a resrvoirs capacity may go up or down during a time step the voulue diverted may exceed the target value. When data is assigned herein the target is also used as a volumetric limit that cannot be exceeded in a given time step. This option is, typically, only used when the destination is a Recharge Reservoir.
- When the miscellaneous limit (oprlimit) is set to 3 the diversion is limited to both the destination demand (ciopde) and the demand of the diversion structure listed in row 4. The demand of the diversion structure listed in row 4 is obtained from the monthly diversion demand file (*.ddm) or daily diversion demand file (*.ddd).
- When the miscellaneous limit (oprlimit) is set to 4 the diversion is limited to both the destination demand (ciopde) and the monthly and annual limits specified by the type 47 operating rule listed in row 4.
- Results for a type 45, Carrier with Loss, are reported in the Stream Report (*.xdd) as follows:
    1. At the destination, the diversion is reported as From Carrier by Other,
    2. At the carrier structure, the diversion is reported as From River by Other, loss is reported as From River Loss, and Carried, Exchange or Bypassed is From River by

Other less From River Loss. The Total Supply associated with the carrier is zero (diversion less loss less carried water equals zero)

Row-data	Variable	Description
Control Data		
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12, 1x,a12,1x, 2f8.0, 2i8)		
1-1	cidvri	Operational right ID
1-2	nameo(1)	Operational right name
1-3	rtem(1)	Administration number. Note if ciopso(1) is a diversion right, its administration number is used and rtem is ignored
1-4	dumx	Monthly and Structure Switch +n Number of intervening structures (max = 10) -n Include 12 monthly on/off values minus n intervening structures Note, when a negative value is provided, it should be -13 or less
1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on +n=Begin in year n -n=Stop after year n
Destination Data		
1-6	ciopde	Destination diversion or reservoir ID
1-7	iopdes(2,1)	Destination structure account, 1 for a diversion destination +n for a reservoir destination +n Account served by this right -n Fill the first n accounts using the ratio of their ownership
Source Data		
1-8	ciopso(1)	Water right ID under which the diversion occurs. Note may be a diversion right or a reservoir right
1-9	iopsou(2,1)	0 The source water right (ciopso(1)) is left on (i.e. it can be used as a both a direct flow right and this operating rule) 1 The source water right (ciopso(1) is turned off (i.e. it can only be used by this operating rule)
1-10	ciopso(2)	NA the water right is administered at the location specified in the appropriate water right file

		+n the water right is administered at location n (e.g. a reservoir right is administered at the carrier or the reservoir)
1-11	iopsou(4,1)	+n Percent of the water right ciopso(1) to be used as a source.

Type Data

1-12	ityopr(1)	45

Associated Plan Data

1-13	creuse	NA If the carrier loss is not associated with a recharge source +n Enter Recharge Plan ID if the carrier loss is a recharge source. Note the Plan type must be recharge (type 8).

Diversion Type

1-14	cdivtyp	NA

Conveyance Loss (%)

1-15	OprLoss	0 No Transit loss

Miscellaneous Limits

1-16	OprLimit	0 The source water right is not Shared with another operating rule. 1 Not currently operational. 2 In addition to the destination demand (ciopde) the diversion is limited to the reservoir demand of the structure listed in Row 4. 3 In addition to the destination demand (ciopde) the diversion is limited to the diversion demand of the structure listed in Row 4. 4 In addition to the destination demand (ciopde) the diversion is limited to the monthly and annual limits of the Type 47 operating rule listed in Row 4

Start Date

1-17	IoBeg	First year of operation

End Date

1-18	IoEnd	Last year of operation

Monthly Data
Free Format
Include only if monthly & structure switch (dumx) = 12 or less than -12

2-1	imonsw(1)	Monthly switch 0=off, 1=on +n Day first used that month

```
                                   -n Day last used that month
                                Note the first entry corresponds to
                                   the first month specified in the control file

Intervening Structure Data with loss
Include only if the monthly & structure switch (dumx) = 1-10 or < -12
See Section 7 for the approach used to model an augmentation station (e.g. a
structure that carries a diversion, typically with loss, then returns non-lost
water to the river).

Free Format
3b-1            intern(1,1)    Intervening structure ID
                                   (e.g. a Diversion ID or Stream ID)
3b-2            OprLossC(1,1)  Carrier Loss for Structure ID %
3b-3            InternT(1,1)   Intervening Structure Type
                               Enter Carrier if it is a diversion
                                   structure located on the river
                               Enter Return if it is a return
                                   location on the River

                               Repeat for +dumx values

Additional Demand constraint
Include only if the switch (OprLimit) = 2 or 3

Free Format
4-1             cx             If Oprlimit = 2 enter the
                                   diversion ID whos demand
                                   will limit the amount diverted.
                               If Oprlimit = 3 enter the
                                   Recharge reservoir ID whose demand
                                   will limit the amount diverted.
                               If Oprlimit = 4 enter the Type 47
                                   Operational right ID that contains
                                   Monthly and annual diversion limits
```

4.13.46 Multiple Plan Ownership (ityopr=46)

The type 46 operating rule provides a method to distribute water from one accounting plan to multiple accounting plans at the same priority. It is typically used along with a Direct Flow Exchange (type 24) or Direct Flow Bypass (type 25) when the transferred water is used by more than one owner. The following are noted:

- The source is an accounting plan for which the water supply is typically a water transfer associated with a Direct Flow Exchange (type 24) or Direct Flow Bypass (type 25).
- The destination is two or more accounting plans. Each plan represents the percent ownership of the transferred water from the original accounting plan. Each should be located downstream of the source account.
- After the water is distributed via the Type 46 rule, water is typically released from the destination plans using an Admin Plan Direct Release (type 27), or an Admin Plan Exchange (type 28), or an Admin Plan Spill (type 29).
- The percent ownership is specified using variable iopdes(2,k) as a percent.

- The maximum number of owners is set at 10.

Row-data	Variable	Description
Control Data		
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12, 1x,a12,1x, 2f8.0, 2i8)		
1-1	cidvri	Operational right ID
1-2	nameo(1)	Operational right name
1-3	rtem(1)	Administration number
1-4	dumx	Monthly and Structure Switch +n Number of intervening structures (max = 10) -n Include -12 for monthly on/off Values minus n intervening structures Note, when a negative value is, provided, it should be -13 or less)
1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on +n=Begin in year n -n=Stop after year n
Destination Data		
1-6	ciopde	Destination plan ID
1-7	iopdes(2,1)	Destination ownership %
Source Data		
1-8	ciopso(1)	Accounting Plan ID
1-9	iopsou(2,1)	1
1-10	ciopso(2)	NA
1-11	iopsou(4,1)	NA
Type Data		
1-12	ityopr(1)	46
Associated Plan Data		
1-13	creuse	NA
Diversion Type		
1-14	cdivtyp	Diversion
Conveyance Loss (%)		
1-15	OprLoss	NA
Miscellaneous Limits		
1-16	OprLimit	+n Number of Destinations
Start Date		
1-17	IoBeg	First year of operation

```
End Date
1-18            IoEnd           Last year of operation

Repeat the Destination plan ID (ciopde) and Destination ownership %
(iopdes(2,1)) for the number of destinations (OprLimit(k))
Format (81x, a12, i8)

Monthly Data
Free Format
Include only if OprLoss = 0 and the variable (dumx) = 12 or less than -12
2-1             imonsw(1)       Monthly switch 0=off, 1=on
                                   +n Day first used that month
                                   -n Day last used that month
Note the first entry corresponds to the first month specified in the control file
```

4.13.47 Accounting Plan Limit (ityopr=47)

The type 47 operating rule provides a method to impose monthly and annual limits for one or more operating rules. It is typically used when the source of the water supply is a "standard" storage right. For example if water is stored in a reservoir under a "standard" storage right, releases to selected users might be limited to the monthly and annual limits imposed by this rule. This rule has generic application but was developed for the Colorado River Basin where replacement reservoir releases from Green Mountain Reservoir, Williams Fork Reservoir and Wolford Mountain Reservoir are limited to 66,000 af/yr. The Accounting Plan assigned as the source in this rule is typically tied to a Replacement Reservoir Release (type 10) or a Direct Flow Release with a Plan (type 27). The following are noted:

- The operating rule's source is an accounting plan that requires a monthly or annual limit. It can be located anywhere in the network.
- The operating rule's destination is null (i.e. the rule simply imposes monthly or annual limits on any water user tied to this plan).
- The administration number specified for this plan is not used by StateMod (i.e. it is simply a place holder).
- The annual limits are reset at the month that corresponds to the source variable iopsou(2,k). For example 1 = January, 2=February, etc.)
- Monthly and annual data is required for this operating rule.

```
Row-data        Variable        Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
                1x,a12,1x, 2f8.0, 2i8)
1-1             cidvri          Operational right ID
1-2             nameo(1)        Operational right name
1-3             rtem(1)         Administration number
1-4             dumx            Monthly and Structure Switch
                                   +n Number of intervening structures
                                      (max = 10)
                                   -n Include -12 for monthly on/off
                                      Values minus n intervening
                                      structures
                                      Note, when a negative value is,
```

		provided, it should be -13 or less
1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on +n=Begin in year n -n=Stop after year n
Destination Data		
1-6	ciopde	NA
1-7	iopdes(2,1)	NA
Source Data		
1-8	ciopso(1)	Accounting Plan ID
1-9	iopsou(2,1)	Month when the operatingal limits are Reset (e.g. 1= January, 2 = February, etc).
1-10	ciopso(2)	NA
1-11	iopsou(4,1)	NA
Type Data		
1-12	ityopr(1)	47
Associated Plan Data		
1-13	creuse	NA
Diversion Type		
1-14	cdivtyp	Diversion
Conveyance Loss (%)		
1-15	OprLoss	NA
Miscellaneous Limits		
1-16	OprLimit	0 Do not include Monthly or Annual Operational limits 1 Monthly and Annual **diversion** limits are provided (see row 3)
Start Date		
1-17	IoBeg	First year of operation
End Date		
1-18	IoEnd	Last year of operation
Monthly Data		
Free Format		
Include only if OprLoss = 0 and the variable (dumx) = 12 or less than -12		
2-1	imonsw(1)	Monthly switch 0=off, 1=on +n Day first used that month -n Day last used that month Note the first entry corresponds to the first month specified in the control file

```
Operating Limits (Monthly and Annual)
Include if OprLimit = 1
3-1            OprMax(1,1-12) Monthly exchange limit (af/mo)
3-13           OprMax(1,13)   Annual exchange limit (af/yr)
```

4.13.48 Plan or Reservoir Reuse to a T&C or Augmentation Plan Direct (ityopr=48)

The type 48 operating rule provides a method to release water from a reservoir, recharge site or Reuse Plan to a T&C or Well Augmentation Plan destination (demand) via a direct release to the river. The following comments are provided:

- A "ReUse Plan" **source** is a special structure type that can be used to provide water supplies that might accrue from a water right transfer or reusable imported water. See Section 7 for more details.
- A "Recharge Plan" **source** is a special structure type that can be used to provide water supplies that might accrue from a reservoir or canal seepage.
- A "Special Augmentation" Plan **source** is a plan type that can be used to recognize a physical water supply is not required because of an administrative decision. Examples are wells located in a designated basin or decreed as non tributary.
- A "T&C" Plan destination (**demand)** is a special structure type that can be used to store Terms and Conditions (demands) that might be imposed on a water use as part of a water transfer.
- An "Augmentation" Plan destination (**demand)** is a plan type that can be used to store water demands imposed on a water use in order to allow a well to pump out of priority.
- A "Special Augmentation" Plan destination (**demand)** is a plan that can be used to store water demands that can be offset by an administrative decision. Examples are wells located in a designated basin or decreed as non tributary.
- If the variable OprLimit is set to 0 no adjustment to monthly or annual diversion limits will be performed. If the variable OprLimit is set to -1 the operating rule ID specified in row 4 will have its monthly and annual diversion limits adjusted by the amount released.
- If the variable ceuse is set to a plan ID, any canal losses will be routed to that plan. Note the plan type must be 8 (recharge).
- Results for a type 48, Reservoir to a Plan Direct, are reported in the Stream Report (*.xdd) as follows:
    - At the destination well plan, the diversion is reported as From River by Storage (exchange) and the Total Supply equals From River by Other. The station balance reports River Divert as zero because the diversion is to a plan which is non-consumptive.
    - At the source reservoir on only carrier and Station Balance data are reported. The River Divert equals the net amount diverted at the reservoir (diversion less release). If the reservoir does not store then the net amount diverted should be negative and equal to the amount released to the destination well plan less any losses.

```
Row-data     Variable          Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
               1x,a12, 1x,2f8.0, 2i8)
```

1-1	cidvri(1)	Operational right ID
1-2	nameo(1)	Operational right name
1-3	rtem(1)	Administration number
1-4	dumx	Monthly Switch 0 No monthly on/off values 12 Number of monthly on/off Switches provided
1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on +n Begin in year n -n Stop after year n

Destination Data

1-6	ciopde	Plan ID (must be a T&C Plan (type 1) or a Well Augmentation Plan (type 2) or a Special Augmentation Plan (type 10)
1-7	iopdes(2,1)	0 (Not used)

Supply Data

1-8	ciopso(1)	Reservoir ID or Recharge Plan ID or Reuse Plan ID or Special Augmentation Plan ID. If a plan it must be a Reservoir Recharge Plan (type 8) or CU reuse plan (type 3 or 4) or a Special Augmentation Plan (type 10)
1-9	iopsou(2,1)	If ciopso(1) is a reservoir, enter the reservoir account If ciopso(1) is not a reservoir enter 0
1-10	ciopso(2)	If ciopso(1) is a Recharge Plan enter the associated Reservoir ID, otherwise enter NA
1-11	iopsou(4,1)	0

Type Data

1-12	ityopr(1)	48

Associated Plan Data

1-13	creuse	NA Canal losses are routed to the river Plan ID Canal losses are routed to Plan ID

Diversion Type

1-14	cdivtyp	NA

Conveyance Loss (%)

1-15	OprLoss	0

Miscellaneous Limits

1-16	OprLimit	0

Start Date

1-17	IoBeg	First year of operation

```
End Date
1-18           IoEnd          Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1            imonsw(1)      Monthly switch 0=off, 1=on
                                 +n Day first used that month
                                 -n Day last used that month
                               Note the first entry corresponds to the first
                                 month specified in the control file
```

4.13.49 Plan or Reservoir Reuse to a T&C or Augmentation Plan by Exchange (ityopr=49)

The type 49 operating rule provides a method to release water from a reservoir, recharge site or Reuse Plan to a T&C or Well Augmentation Plan destination (demand) via an exchange from the river. The following comments are provided:

- A "ReUse Plan" **source** is a special structure type that can be used to provide water supplies that might accrue from a water right transfer or reusable imported water. See Section 7 for more details.
- A "Recharge Plan" **source** is a special structure type that can be used to provide water supplies that might accrue from a reservoir or canal seepage.
- A "Special Augmentation" Plan **source** is a plan type that can be used to recognize a physical water supply is not required because of an administrative decision. Examples are wells located in a designated basin or decreed as non tributary.
- A "T&C" Plan destination (**demand)** is a special structure type that can be used to store water Terms and Conditions (demands) that might be imposed on a water use as part of a water transfer.
- A "Augmentation" Plan destination (**demand)** is a plan type that can be used to store water demands imposed on a water use in order to allow a well to pump out of priority.
- A "Special Augmentation" Plan destination (**demand)** is a plan that can be used to store water demands that can be offset by an administrative decision. Examples are wells located in a designated basin or decreed as non tributary.
- If the variable OprLimit is set to 0 no adjustment to monthly or annual diversion limits will be performed. If the variable OprLimit is set to -1 the operating rule ID specified in row 4 will have its monthly and annual diversion limits adjusted by the amount released.
- Results for a type 49, Reservoir to a Plan by Exchange, are reported in the Stream Report (*.xdd) as follows:
    - At the destination well plan, the diversion is reported as From River by Other (exchange) and the Total Supply equals From River by Other. The station balance reports River Divert as zero because the diversion is to a plan which is non-consumptive.
    - At the source reservoir only carrier and Station Balance data are reported. The River Divert equals the net amount diverted at the reservoir (diversion less release). If the

reservoir does not store then the net amount diverted should be negative and equal to the amount released to the destination well plan less any losses.

Row-data	Variable	Description
Control Data		
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12, 1x,a12, 1x,2f8.0, 2i8)		
1-1	cidvri(1)	Operational right ID
1-2	nameo(1)	Operational right name
1-3	rtem(1)	Administration number
1-4	dumx	Monthly Switch 0 No monthly on/off values 12 Number of monthly on/off switches provided
1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on +n Begin in year n -n Stop after year n
Destination Data		
1-6	ciopde	Plan ID (must be a T&C Plan (type 1) or Augmentation Plan (type 2) or Special Augmentation Plan (type 10)
1-7	iopdes(2,1)	0 (Not used)
Supply Data		
1-8	ciopso(1)	Reservoir ID or Recharge Plan ID or Reuse Plan ID or Special Augmentation Plan ID If a plan it must be Seepage Plan (type 8) or CU reuse plan (type 3 or 4) or a Special Augmentation Plan (type 10)
1-9	iopsou(2,1)	If ciopso(1) is a reservoir, enter the reservoir account If ciopso(1) is a plan, enter NA
1-10	ciopso(2)	If ciopso(1) is a Recharge Plan enter the associated Reservoir ID, otherwise enter NA
1-11	iopsou(4,1)	0
Type Data		
1-12	ityopr(1)	49
Associated Plan Data		
1-13	creuse	NA
Diversion Type		
1-14	cdivtyp	NA
Conveyance Loss (%)		
1-15	OprLoss	0

```
Miscellaneous Limits
1-16           OprLimit       0

Start Date
1-17           IoBeg          First year of operation

End Date
1-18           IoEnd          Last year of operation

Monthly Data
Free Format
Include only if the variable (dumx) = 12 or less than -12
2-1            imonsw(1)      Monthly switch 0=off, 1=on
                                 +n Day first used that month
                                 -n Day last used that month
                               Note the first entry corresponds to the first
                                 month specified in the control file
```

4.13.50 South Platte Compact Storage (ityopr=50)

For a complete description of how the South Platte compact is implemented in StateMod see Section 7. The Type 50 operating rule temporarily stores water available to the South Platte Compact in priority in an administrative plan. It is used in conjunction with a type 40 operating rule to insure the South Platte Compact does not call out any water right located in water district 64 (e.g. upstream of the Washington county line). In addition it is used with a type 40 operating rule to release water to the compact itself after every junior water right not located in water district 64 has had the opportunity to insure it was not called out by the compact. The following comments are provided:

- The type 50 operating rule turns off the source instream flow right so that it is completely controlled by the type 50 operating rule.
- The administration number assigned to the operating rule used to store water in the South Platte Compact plan (type 50) should be 17332.00000, the value associated with the South Platte's decreed priority of June 14, 1897.
- Results for a type 50, South Platte Compact Storage, are reported in the Stream Report (*.xdd) as follows:
    - At the destination compact plan, the diversion is reported as From River by Other because it is diverted by an operating rule. The Total Supply equals From River by Other that equals Water Use To Other. The station In/Out reports the diversion as a return flow because it is non-consumptive. The Station Balance reports River Divert as the amount diverted to the plan.

```
Row-data       Variable       Description

Control Data
Format (a12, a24, 12x, 4x, f12.5, f8.0, i8, 3(1x,a12,i8), i8, 1x,a12,
               1x,a12,1x, 2f8.0, 2i8)
1-1            cidvri(1)      Operational right ID
1-2            nameo(1)       Operational right name
1-3            rtem(1)        Administration number
1-4            dumx           Monthly switch 0=off, 1=on
```

		+n Day first used that month -n Day last used that month Note the first entry corresponds to the first month specified in the control file
1-5	ioprsw(1)	Annual On/Off Switch 0=off 1=on +n=Begin in year n -n=Stop after year n
Destination Data		
1-6	ciopde	Enter the plan ID that corresponds To the South Platte compact (must Be an administrative, type 11 plan)
1-7	iopdes(2,1)	Destination Account, enter 1
Supply Data		
1-8	ciopso(1)	Instream flow water right associated With the South Platte Compact
1-9	iopsou(2,1)	0
1-10	ciopso(2)	NA
1-11	iopsou(4,1)	0
Type Data		
1-12	ityopr(1)	50
Associated Plan Data		
1-13	creuse	NA
Diversion Type		
1-14	cdivtyp	Diversion
Conveyance Loss (%)		
1-15	OprLoss	0
Miscellaneous Limits		
1-16	OprLimit	0
Start Date		
1-17	IoBeg	First year of operation
End Date		
1-18	IoEnd	Last year of operation

4.13.51 Operating Rule Examples

```
#
# Operating rule types listed below are described in detail in StateMod documentation,
# Section 4.13.x where 'x' is the rule type listed below.
#
# This .opr file contains example operating rules that can be copied to a blank file to start
# development of operating rules for a different application. These examples have the correct
# format and can be expanded based on information in Section 4.13 of the StateMod documentation
# and the specific applications for which the rules are to be used.
#
# Start new .opr file with header line below that starts with "# ID        Name"
#
#
#
#               OPERATING RULE TYPES
#     ======================================
#        1   Reservoir to an Instream Flow
#        2   Reservoir to a Direct Flow or Reservoir or Carrier
#        3   Reservoir to a Carrier
#        4   Reservoir Exchange to a Direct Flow
#        5   Reservoir Exchange to Storage
#        6   Paper Exchange Between Reservoirs
#        7   Reservoir to a Carrier by Exchange
#        8   Out-of-Priority Book Over
#        9   Release for Target Contents
#        10  General Reservoir Replacement
#        11  Carrier to a Ditch or Reservoir
#        12  Re-operate Water Rights
#        13  Index flow Constraint on an Instream Flow Diversion
#        14  Carrier with Constrained Demand
#        15  Interruptible Supply
#        16  Direct Flow Storage
#        17  Rio Grande Compact - Rio Grande
#        18  Rio Grande Compact - Conejos River
#        19  Split Channel Operations
#        20  San Juan Reservoir RIP Operation
#        21  Wells with Sprinkler Use
#        22  Soil Moisture Use
#        23  Downstream Call
#        24  Direct Flow Exchange of a Pro-Rata Water Right
#        25  Direct Flow Bypass of a Pro-Rata Water Right
#        26  Changed Water Rights Operation
#        27  Reservoir or Reuse Plan to a Diversion or Reservoir Direct with or without Destination Reuse
#        28  Reuse Plan to a Diversion or Reservoir by Exchange with or without Destination Reuse
#        29  Reuse Plan Spill
#        30  Reservoir Re-Diversion
#        31  Carrier to a Ditch or Reservoir with Reusable Return Flows
#        32  Reservoir and Plan to a Direct Flow or reservoir or Carrier Direct with or without Destination Reuse
#        33  Reservoir and Plan to a Direct Flow or Reservoir or Carrier by Exchange with or without Destination Reuse
#        34  Reservoir to Reservoir Transfer with Reuse
#        35  Import to a Diversion, Reservoir or Carrier with or without Reuse
#        36  Seasonal (daily) On and Off Capability (e.g. Meadow Rights)
#        37  Augmentation Well
#        38  Out-of-Priority Diversion (addresses the upstream storage statute)
```

```
#        39  Alternate Point Diversion
#        40  South Platte Compact
#        41  Reservoir Storage with Special Limits
#        42  Plan Reset
#        43  In-Priority Well Depletion
#        44  Recharge Well
#        45  Carrier with Transit Loss (allows multiple carriers and associated loses)
#        46  Multiple Ownership Plans (distributes Plan contents to multiple plans)
#        47  Administration Plan Limits
#        48  Plan or Reservoir Reuse to a Plan Direct
#        49  Plan or Reservoir Reuse to a Plan by Exchange
#       50  South Platte Compact Storage
#
#
#         GENERAL GUIDE TO COLUMN ENTRIES
#  ========================================
#   ID         ID number of operating rule that is used to separate operating rule output in *.xop file
#   Name       Name of operating rule - used for descriptive purposes only
#   Admin#     Administration number used to determine priority of operational water rights relative to other operations and direct diversion, reservoir, instream flow, and well rights (see tabulation in *.xwr file)
#   # Str      Number of carrier structures, monthly on/off switches, or monthly volumetrics (flag telling StateMod program the number of entries on next line)
#   On/Off     1 for ON and 0 for OFF (must use # to turn off rules with more than one line)
#   Dest ID    Destination of operating rule whose demand is to be met by simulating the operating rule
#   Dest Ac    Account at destination to be met by operating rule - typically 1 for a diversion structure and account number for reservoir destination
#   Sou1 ID    ID number of primary source of water under which water right is being diverted in operating rule - typically a water right, reservoir, or Plan structure
#   Sou1 Ac    Account of Sou1 - typically 1 for a diversion structure and account number for reservoir source
#   Sou2 ID    ID of Plan where reusable storage water or reusable ditch credits is accounted
#   Sou2 Ac    Percentage of Plan supplies available for operation
#   Type       Rule type corresponding with definitions in Chapter 4 of StateMod documentation
#   ReusePlan  ID of Plan where reusable return flows or diversions to storage are accounted
#   Div Type   'Diversion' indicates pro-rata diversion of source water right priority or exchange of reusable credits to Dest1
#              'Depletion' indicates pro-rata diversion of source water right priority consumptive use or augmentation of upstream diversions at Dest1
#   OprLoss    Percentage of simulated diversion lost in carrier ditch (only applies to certain rules - see StateMod documentation, Section 4.13)
#   Limit      Capacity limit for carrier structures different from capacity in .dds file (used to represent constricted conveyance capacity for winter deliveries to reservoirs)
#   Comments   Description of rule type
#
# Note - multiple *.opr input file formats may be provided. It is recommended the following string be provided near the top of the file before any data: # FileFormatVersion 2
# If the format version indicator is not provided StateMod will try to read the file and try to determine the appropriate file type.
#
#
#           OPERATING RULE EXAMPLES
#  ========================================
#
# ID        Name                    NA                   Admin#   # Str  On/Off Dest Id     Dest Ac  Sou1 Id     Sou1 Ac  Sou2 Id     Sou2 Ac     Type ReusePlan    Div Type      OprLoss   Limit Comments
# ---------eb---------------------eb----------exxxxb----------eb------eb------e-b----------eb------e-b----------eb------e-b----------eb------eb------exb----------exb----------exb------eb------exb----------
#
# FileFormatVersion 2
#
##########
#  Type 1   Reservoir to an Instream Flow
#           Green Mountain Reservoir (ID 363543 - Account 6) to meet 15-mile reach fish flows (ID 952002)
#           during July through October only (12 monthly switches for USGS Water Year simulation included on second line)
#
3635430.26  Opr Fish to Fish Flow                   99999.93011     12.       0 952002             1 363543             6 0                  0       1 NA           NA                 0       0       0    9999
                                  1 0 0 0 0 0 0 0 0 1 1 1
#
```

```
##########
#  Type 2   Reservoir to a Direct Flow or Reservoir or Carrier
#           Williams Fork Reservoir (ID 513709) release from GMR1 Pool (Account 4) to meet Farmers Irrigation Company (ID 952011) demand
#           carried through Silt Pump Canal (ID 390663 on second line)
#
5137090.30  Opr WFR-Silt Project                    39041.00002      1.       1 950011            1 513709            4 0                 1       2 NA          NA                  0       0       0    9999
                                390663
#
##########
#  Type 3   Reservoir to a Carrier
#           Meadow Creek Reservoir (ID 513686) release from Denver/Englewood Pool (Account 1) directly to Moffat Tunnel (ID 510728) without using the river
#
5136860.02  Opr MCrkRes to 510728                   31259.30134      0.       1 510728            1 513686            1 0                 0       3 NA          NA                  0       0       0    9999
#
##########
#  Type 4   Reservoir Exchange to a Direct Flow
#           Meadow Creek Reservoir (ID 513686) release from Vail Ditch Pool (Account 2) to the upstream Vail Ditch (ID 510941) via the river by exchange
#
5136860.01  Opr MCkRes->VailIrDivSys                31259.30134      0.       1 510941            1 513686            2 0                 0       4 NA          NA                  0       0       0    9999
#
##########
#  Type 5   Reservoir Exchange to Storage
#           Wolford Mountain Reservoir (ID 503668) release from Colorado Springs Replacement Pool (Account 1) to first two accounts (-2 below) in upstream
#           Granby Reservoir (ID 514620) via the river by exchange
#
5036680.17  Opr Wolford - Granby Ex                 31258.00007      0.       1 514620           -2 503668            9 0                 0       5 NA          NA                  0       0       0    9999
#
##########
#  Type 6   Paper Exchange Between Reservoirs
#           Bookover of water from Vega Reservoir (ID 723844) Project Irrigation Pool (Account 1) to Vega Reservior Power Exchange Pool (Account 3), limited
#           by amount of water simulated through operating rule ID 7205830.01 (Cottonwood Branch Pipeline direct diversion water right carried to Molina Power
#           Plant - see Type 11 example below)
#
7238440.19  Opr Vega Bookovr for 583               37486.00001      0.       1 723844            3 723844            1 7205830.01        0       6 NA          NA                  0       0       0    9999
#
##########
#  Type 7   Reservoir to a Carrier by Exchange
#           Rifle Gap Reservoir (ID 393508) release from Silt Pool (Account 1) to Grass Valley Canal (ID 390563) via river by exchange to meet simulated
#           Type 11 carrier diversion in operating rule ID 3905630.01 (Grass Valley Canal direct flow right to Dry Elk Valley Irrigation)
#
3935080.01  Opr RifleGap to G.Valley               37503.36902      0.       1 3905630.01        1 393508            1 0                 0       7 NA          NA                  0       0       0    9999
#
##########
#  Type 8   Out-of-Priority Bookover
#           Bookover water stored in Upper Blue Lakes Out-of-Priority (OOP) account (Reservoir ID 363570, Account 2) to the general purpose account in Upper Blue Lakes (Account 3)
#           The OOP diversions via the Upper Blue Lakes storage right (ID 363570.01 - first entry on third line) subordinated to the Green Mountain Reservoir storage right (ID 363543.01)
#           occur via a Type 38 OOP Diversion rule (ID 3635700.08 - second entry on third line)
#           The type 8 OOP bookover simulates once the 363543.01 storage right is paper filled and occurs during the July through October period (12 switches on second line)
#           The amount of water booked over reduces the OOP Plan (ID 363570OOPPLN) by the same amount
#
3635700.15  OOP_Upper_Blue_Bookover                99999.00000    -14.       1 363570            3 363570            2 363543.01         0       8 363570OOPPLN NA                  0       0       0    9999
                                0 0 0 0 0 0 1 1 1 1 0 0
                                363570.01    3635700.08
#
```

```
##########
#  Type 9   Release for Target Contents
#           Release water proportionally from all accounts (Account 0) in Williams Fork Reservoir (ID 513709) to meet target contents in *.tar file
#           (Dest ID = 0 and Dest Account = 0 in operating rule)
#
5137090.15  Opr Williams Fork target                99999.99999      0.       1 0                 0 513709            0 0                 0       9 NA           NA                  0       0       0    9999
#
##########
#  Type 10  General Reservoir Replacement
#           Wolford Mountain Reservoir (ID 503668) releases from Denver R1 Pool (Account 5) over the 1985 to 1996 period to supply reservoir water to a
#           large number of structures without supplying individual operating rules for each. Beneficiaries of reservoir releases from this operating rule
#           have direct flow water right (*.ddr) administration numbers senior to the operating rule's administration number (48965.99994) and variable
#           "ireptyp" in the direct diversion station (*.dds) file set to 1 or -1.
#
5036680.31  Opr Wolf Replace1                       48965.99994      0.       1 0                 1 503668            5 0                 0      10 NA           NA                  0       0    1985    1996
#
##########
#  Type 11  Carrier to a Ditch or Reservoir Using a Direct Flow Right
#           Carry water through Cottonwood Branch Pipeline (ID 720583) using its direct diversion right (ID 720583.01) to Molina Power Plant (ID 720807)
#
7205830.01  Opr Cottonwood-Molina                   37486.00000      0.       1 720807            1 720583.01         1 NA                0      11 NA           NA                  0       0       0    9999
#
#           Carrier to a Reservoir using a Storage
#           Carry water through North Horse Supply Canal (NHorseSup) to Haines Flat Reservoir (ID HainesRes) using its storage right (ID HainesRes.01)
#           The primary difference with the previou rule is the storage right is not administered at the location of the reservoir right but, instead,
#            is administered on a neighboring tributary at the location of Sou2 ID NHorseSup
#
Haines.01   Opr_Fill_Haines_NHorse                    2008.0000      1.       1 HainesRes         1 HainesRes.01      0 NHorseSup         0      11 NA           NA                  0       0       0    9999
                                NHorseSup
#
##########
#  Type 12  Re-operate Water Rights
#           Limit tolerance of reoperation in the model based on user specified administration number (50000.0), as necessary, to stop run-time errors
#           (i.e. ireopx > 1000 iteration limit)
#
ReopLimit.01 Opr_Limit_Reoperation                 99999.99999      0.       1 0                 0 0                 0 0                 0      12 NA           NA                  0       0       0    9999
#
##########
#  Type 13  Index Flow Constraint on an Instream Flow Diversion
#           Operate La Plata Compact as most senior water right (admin. no. 0.00001) to deliver to downstream location (instream flow ID 332999) based on percentage (50%)
#           of index gage(La Plata River at Hesperus - ID 09365500) over June to December period (12 monthly switches for Irrigation Year simulation included on line 2)
#
3329990.01  Opr LaPlata Compact                     0000.00001     12.       1 332999            1 09365500         50 332999.01         1      13 NA           NA                  0       0       0    9999
                                1 1 0 0 0 0 0 1 1 1 1 1
#
##########
#  Type 14  Carrier with Constrained Demand
#           Limit water carried through Willow Creek Feeder (ID 510958) using its senior water right (ID 510958.01) to fill the first two accounts (Destination
#           Account = -2) in Granby Reservoir (ID 514620) by the amount historically diverted by Willow Creek Feeder included in direct diversion demand (*.ddm) file
#
5109580.01  Opr WCrkFeeder to Granby                31258.00000      0.       1 514620           -2 510958.01         1 0                 1      14 NA           NA                  0       0       0    9999
#
```

```
##########
#  Type 15  Interruptible Supply
#           Dedicate Louden Ditch (ID 0400530) junior water right (ID 0400530.03) to instream flow reach (ID BigT_ISF) when downstream gage flows at ID 06741510 drop below
#           3000 acre-feet per month (~50 cfs)
#           One hundred percent of the decree (zero value after water right ID 0400530.03) can be used as an interruptible supply during the May through October period (12 switches on Line 2)
#
ISFDonate   Opr_DirectFlowToISFReach                32224.00000     12.       1 BigT_ISF           1 06741510        3000 0400530.03         0      15 NA           NA                  0       0       0    9999
                                0 0 0 0 1 1 1 1 1 1 0 0
#
##########
#  Type 16  Direct Flow Storage
#           Limit water carried through Willow Creek Feeder (ID 510958) using its senior water right (ID 510958.01) to fill the first two accounts (Destination
#           Account = -2) in Granby Reservoir (ID 514620) by the amount historically diverted by Willow Creek Feeder included in direct diversion demand (*.ddm) file
#           This rule is similar to the Type 14 rule above except that it requires a bypass of 40 percent of the water right, thereby limiting the direct flow storage
#           to 60 percent (variable listed before rule type 16) of the Willow Creek Feeder senior water right
#
5109580.01  Opr WCrkFeeder to Granby                 31258.00000      1.       1 514620            -2 510958.01          1 0                60      16 NA           NA                  0       0       0    9999
#
##########
#
#  Type 17  Rio Grande Compact - Rio Grande
#           Starting in 1969, determine Colorado's Rio Grande Compact delivery requirements to downstream location (ID RGCOM) based on index flows at the Rio Grande
#           at Del Norte gage (ID 08220000) and the Conejos River nr La Sauses (ID 08249000)
#           Include water from source IDs ClosedBasin and NortonSouth
#
RGCOM.01    Opr Compact-RioGrande                          1.00000    -20.    1969 RGCOM             1. 08220000          1. 08249000         -1.      17 NA           Diversion           0       0    1969    9999
                                                                      1985.      0.                   1 ClosedBasin    19200 NortonSouth    -4000
                                1 1 1 1 1 1 1 1 1 1 1 1
#
##########
#  Type 18  Rio Grande Compact - Conejos River
#           Starting in 1969, determine Colorado's Rio Grande Compact delivery requirements to downstream location (ID RGCOM) based on index flows at the Conejos River
#           nr Magote gage (ID 08246500) and the San Antonito River at Ortiz (ID 08247500)
#           Include water from source IDs ClosedBasin and NortonSouth
#
COCOM.01    Opr Compact-Conejos                            1.00000    -20.    1969 COCOM             1. 08246500          1. 08247500          1.      18 NA           Diversion           0       0    1969    9999
                                                                      1985.      0. 08248000           1 ClosedBasin    16000 NortonSouth     4000
                                  1 1 1 1 1 1 1 1 1 1 1 1
#
##########
#  Type 19  Split Channel Operations
#           Currently Under Development
#
##########
#  Type 20  San Juan Reservoir RIP Operation – these operations are no longer used to simulate SJRIP
#
##########
#  Type 21  Wells with Sprinkler Use
#           Operate wells serving sprinkler-irrigated lands first based on input priority (admin. no. 36525.0) senior to ground water rights (*.wer) in order to maximize water supply mode
#
Opr_Spr.01  Opr_Sprinkler                           36525.00000       0.       1 NA                0 NA                0 0                 0      21 NA           NA                  0      -1       0    9999
#
```

```
##########
#  Type 22  Soil Moisture Use
#           Water deliveries in excess of a diversion's consumptive demand can be stored in the soil moisture zone, with this operating rule defining the priority (admin. no. 100000.0)
#           water stored in the soil moisture zone is used (e.g. after surface rights, after well right, etc.).
#
Opr_Soil.01 Opr_Soil_Moisture                    100000.00000       0.       1 NA                0 NA                0 0                 0      22 NA           NA                  0      -1       0    9999
#
##########
#  Type 23  Downstream Call
#           Operate downstream call (modeled as instream flow node ID DwnCall). Priorities of daily calls defined in call *.cal) file. Priority of Type 23 operating rule set as most
#           junior water right in basin to ensure the call's instream flow demand does not simulate prior to any other water rights.
#
Opr_Dwncall Opr_Dwncall                           999999.00000      0.       1 DwnCall           1 N/A               1 0                 0      23 NA           NA                  0       0       0    9999
#
##########
#  Type 24  Direct Flow Exchange of a Pro-Rata Water Right
#           Exchange water diverted in priority associated with portion (100%) of Burlington Canal (ID 0200802) water right (ID 0200802.03) to upstream municipal demand (ID Metro_IN),
#           limited by monthly exchange amounts (ac-ft values listed on line 2)
#
OprBurl.01  Opr_Burlington_to_Metro_In                5205.00000      0.       1 Metro_IN          1 0200802.03       100 NA               0      24 NA           Diversion           0       0       0    9999
        0.      0.      0.   5000.   5000.   5000.   5000.   5000.   5000.   5000.      0.      0. 25000.0
#
##########
#  Type 25  Direct Flow Bypass of a Pro-Rata Water Right
#           Bypass water diverted in priority under Fisher Ditch (ID 0700570) water right (ID 0700507.01) to downstream demand (ID CherokPP)
#           carried through Fisher Ditch with 10% ditch loss (line 2) limited by monthly bypass amounts (ac-ft values listed on line 3)
#
Fish.01     Opr_ChangedFisherToAcctPSCO               4198.00000      1.       1 CherokPP          1 0700570.01      71.3 NA               0      25 NA           Diversion          -1       0       0    9999
                                0700570     10 Carrier
       0.      0.      0.    308.    615.    796.    923.    796.    548.    376.      0.      0.  4366.0
#
##########
#  Type 26  Changed Water Rights Operation
#           Temporarily store a portion (50%) of Eureka Ditch (ID 4700614) changed water right (ID 4700614.01) in a Changed Water Rights plan (ID 614_PLN, Plan Type 13)
#           limited by monthly and annual amounts (ac-ft values listed on line 2)
#           Remaining portion of water right is available to meet any headgate demand
#
614_PLN.01  Eureka_Full_Plan                          13765.00000      0.       1 614_PLN           1 4700614.01        50 NA               0      26 NA           Diversion           0       0       0    9999
   0.   0.  0.  0.  4300.  4300.  4300.  4300.  0.  0.  0.  0.  15000.0
#
##########
#  Type 27  Reservoir or Reuse Plan to a Diversion or Reservoir Direct with or without Destination Reuse
#           Release water from Accounting Plan (ID 614_40PLN) to Eureka Ditch Irrigation Demand (ID 614_40_I) through
#           a carrier (Burlington Canal ID 4700614) (line 2) with a Reuse Plan (ID Reuse)
#           Capacity at the source water right location will be accounted for by referencing the original Changed Water Rights operating rule (Opr ID 614_PLN.01, Type 26) (line 3)
#
614_PLN.04  614_40PLN_to_614_40_I                     13765.00004      1.       1 614_40_I          1 614_40PLN        100 NA               0      27 ReusePln     Diversion          -1       5       0    9999
                                4700614       0        Carrier
                                614_PLN.01
#
```

```
##########
#  Type 28  Reuse Plan to a Diversion or Reservoir by Exchange with or without Destination Reuse
#           Release water from Accounting Plan (ID Compact_Pln) to Irrigation demand (ID CoorsAB_Wtr) via exchange through
#           a carrier (ID 0100501) with a 29 percent conveyance loss
#
CompactEx.1 Compact_to_0100507_I                    18353.10000      1        1 0100507_I          1 Compact_Pln      100 NA                0      28 NA           Diversion          -1       0       0    9999
                                0100501  29   Carrier
#
##########
#  Type 29  Reuse Plan Spill
#           Spill unused water stored in Changed Water Rights plan (ID 614_PLN) since it cannot be carried over to subsequent time steps
#            Spill to the source water right location  (ID 4700614) when spilling a Changed Water Rights plan
#            Spill at the plan location for other types of plan (ID NA)
#
614_PLN.10  614_PLN_Spill                           13765.00009      0.       1 4700614            0 614_PLN            0 NA                0      29 NA           NA                  0       0       0    9999
#
##########
#  Type 30  Reservoir Rediversion
#           Not currently used -
#           Releases from Type 48/Type 49 rules are limited by the destination plan demands, which precludes excess releases being made
#           that would be rediverted under a Type 30 rule
#
##########
#  Type 31  Carrier to a Ditch or Reservoir with Reusable Return Flows
#           Carry water through Pecks Gulch diversion (ID 0700537 on line 3) using its water right (ID 0700537.02) to Hole In the Ground Reservoir
#           (ID 0704492) using portion (100%) of Barr Lake storage right (ID 0200802.01) over the November to March period (12 monthly
#           switches for Irrigation Year included on line 2) with stored water accounted for in Reservoir Reuse Plan (ID CC_HIG_Sto)
#
Pecks.03    Opr_Pecks_to_HIG                        43829.19751    -13.       0 0704492            1 0700537.02         0 N/A               0      31 CC_HIG_Sto   NA                  0       0       0    9999
                                1 1 1 1 1 1 0 0 0 0 0 0
                                0700537
#
##########
#  Type 32  Reservoir and Plan to a Direct Flow or Reservoir or Carrier Direct with or without Destination Reuse
#           Release water from reservoir (ID 0704492) and associated Reservoir Reuse Plan (ID CC_HIG_Sto) to Central City demand (ID CC_WTP)
#           directly with reusable return flows stored in Non Reservoir Reuse Plan (ID CCReusePlan)
#
HIG.01      Opr_HIG_to_CC_WTP                       52731.00001      0.       0 CC_WTP             1 0704492            1 CC_HIG_Sto        0      32 CCReusePlan  NA                  0       0       0    9999
#
##########
#  Type 33  Reservoir and Plan to a Direct Flow or Reservoir or Carrier by Exchange with or without Destination Reuse
#           Release water from reservoir (ID 0203699) and associated Reservoir Reuse Plan (ID WGLksPln) to Thornton demand (ID THIN_DMD)
#           by exchange with reusable return flows stored in Non Reservoir Reuse Plan (ID MetroTh)
#
WGL.04      Opr_WGL_Reusable_To_THIN_DMD            55835.00004      0.       1 THIN_DMD           1 0203699            1 WGLksPln          0      33 MetroTh      Diversion           0       0       0    9999
#
##########
#  Type 34  Reservoir to Reservoir Transfer with Reuse
#           Bookover water stored in Upper Blue Lakes (ID 363570, Account 1) and associated Out-of-Priority Plan (364512OOPPLN) to first five accounts (Account 5)
#           in Dillon Reservoir (ID 364512) on August 1 each year (-1 switch on second line) limited by Colorado Springs Utilities release limit plan operating rule (ID CSULimit.01)
#
3635700.06  Opr_UBlue_to_Dillon_Book                   1.00002     12.       1 364512             5 363570             2 363570OOPPLN      0      34 364512OOPPLN Diversion           0       2       0    9999
                                0 0 0 0 0 0 0 0 0 0 -1 0
                                CSULimit.01
#
```

```
##########
#  Type 35  Import to a Plan
#           Import diversion structure (ID TestImp) stored in accounting plan (ID TestPln)
#           Import diversion structure ID must be the same as the Import plan ID (Plan Type 7)
#
TestImp.01  TestImporttoPlan                            1.00000      0.       1 TestPln           1 TestImp           1 NA                0      35 NA           NA                0.0     0.0       0    9999
#
##########
#  Type 36  Seasonal (daily) On and Off Capability (e.g. Meadow Rights)
#           Operate a direct flow meadow right (ID 0100517.01) for Deuel and Snyder Canal (ID 0100517) through May 15 only
#           (12 monthly switches for Calendar Year simulation included on line 2)
#
Opr_Mead.01 Opr_Meadow_D&S_01                        100.00000      12.       1 0100517           1 0100517.01        0 0                 0      36 NA           NA                  0      -1       0    9999
                                1 1 1 1 -15 0 0 0 0 0 0 0
#
##########
#  Type 37  Augmentation Well
#           Operate augmentation well water right (ID 6405901) to meet an augmentation plan demand (ID 6402517)
#           with lagged depletions from augmentation well pumping accounted for in an augmentation plan (ID 6402517)
#
64025170.09 SEDGWICK Aug Well                       99996.00000       0       1 6402517           1 6405901           0 6402517           0      37 NA           Diversion        0.00    0.00      0    9999
#
##########
#  Type 38  Out-of-Priority Diversion (addresses the upstream storage statute) with operating rule priority senior to diversion structure's water right
#           Operate Con-Hoosier Tunnel (ID 954683) diversions against Green Mountain Reservoir storage right (ID 363543.01)
#           (admin. no. 31257.99995) to that storage right priority over the April to July period (12 monthly swithces for
#           USGS Water Year included on line 2) and account for those diversions in an out-of-priority plan structure (ID 54683OOPPLN)
#
9546830.03  Opr_OOP_Cont_Hoosier                     31257.99995      12.       1 954683            1 363543.01         0 364683.01         0      38 954683OOPPLN Diversion          0       0       0    9999
                                0 0 0 0 0 0 1 1 1 1 0 0
#
##########
#  Type 39  Alternate Point Diversion - currently under development
#           Operate water right (ID Dem_2_Wr#1) to meet demand (ID Dem_2) at alternate point of diversion (ID Alt_Div)
#
Or_AltPoint Opr_AlternatePoint                          1.00000      0.       1 Dem_2             1 Dem_2_Wr#1        1 Alt_Div           0      39 NA           Diversion          0       0       0    9999
#
##########
#  Type 40  South Platte Compact
#           Operate Compact at Stateline (represented by instream flow ID 6499999) to meet South Platte Compact requirement
#           (120 cfs with 6/14/1897 priority date (admin. no. 17332.0), represented as instream flow water right
#           over the April 1 to October 15 season (represented as instream flow demand (*.ifr) for ID 649999)
#           Compact_64x attempts to meet upstream demands (upstream of WD 64) from the Compact Plan (ID Compact_Pln) via exchange
#           Compact_Isf releases remaining water in the Compact Plan (ID Compact_Pln) to meet the Compact Demand (ID 6499999)
#           Works in conjunction with Type 50 rule, see below
#
Compact_64x Opr_Compact_Out_64x                     17332.00000      0.       1 64x               1 Compact_Pln       0 NA                0      40 NA           Diversion        0.0     0.0       0    9999
Compact_Isf Opr_Compact_Out_Isf                     99999.99999      0.       1 6499999           1 Compact_Pln       0 NA                0      40 NA           Diversion        0.0     0.0       0    9999
#
```

```
##########
#  Type 41  Reservoir Storage with Special Limits
#           Implement 1955 exchange as part of Blue River Decree by limiting Green Mountain Reservoir (ID 363543) storage diversions (ID 363543.01)
#           to the first 5 accounts in the reservoir (Destination Account = -5) up to the volume of water stored out-of-priority by Con-Hoosier Tunnel,
#           Upper Blue Lakes, Roberts Tunnel, and Dillon Reservoir, as accounted for in the respective out-of-priority Plans
#           (954683OOPPLN, 363570OOPPLN, 364684OOPPLN, 364512OOPPLN) over the April to July period (12 monthly swithces for USGS Water Year included on line 2)
#
3635430.29  Opr_1955_B_R_Decree_Exch                38628.00000    -16.       1 363543            -5 363543.04          0 NA                 0      41 NA           Diversion           0       0       0    9999
                                0 0 0 0 0 0 1 1 1 1 0 0
                                954683OOPPLN 363570OOPPLN 364684OOPPLN 364512OOPPLN
#
##########
#  Type 42  Plan Reset
#           Zero out accounting plan for Con-Hoosier Tunnel (ID 954683OOPPLN) on March 31 (12 monthly switces for USGS Water Year included on line 2)
#
954683PLN.1 Opr_Reset_C-Hoosier_Plan                99999.99999     12.       1 NA                 0 954683OOPPLN       0 NA                 0      42 NA           NA                  0       0       0    9999
                                0 0 0 0 0 31 0 0 0 0 0 0
#
##########
#  Type 43  In-Priority Well (or T&C) Depletion
#           Meet augmentation requirements accounted for in Augmentation Plan (ID 0102513) with river flows based on input priority (admin. no. 58925.00001)
#
01025130.01 ROTHE In-Priority Lagged                58925.00001       0       1 0102513            1 NA                 0 NA                 0      43 NA           Diversion        0.00    0.00       0    9999
#
##########
#  Type 44  Recharge Well
#           Operate recharge well water right (ID 6406709) to recharge area (ID 6402517_R).
#           Recharge pond seepage accounted for based on seepage characteristics in reservoir structure (*.res) file and  reservoir delay table (*.rrf) file
#
64025170.08 SEDGWICK Recharge Well                  55971.00000       0       1 6402517_R          1 6406709            0 NA                 0      44 NA           Diversion        0.00    0.00       0    9999
#
##########
#  Type 45  Carrier with Transit Loss (allows multiple carriers and associated loses)
#           Carry water through Empire Canal (Carrier ID 0100501) to Empire Reservoir (ID 0103816) using portion (100%) of Empire Reservoir storage right (ID 0103816.01)
#           with losses through carrier (29%)
#
01038160.01 Opr_Empire_Store                        20226.00000       1.      1 0103816            1 0103816.01         0 0100501          100      45 NA           Diversion         0.0     0.0       0    9999
                                0100501 29 Carrier
#
##########
#  Type 46  Multiple Ownership Plans (distributes Plan contents to multiple plans)
#           Split portion of water diverted into Changed Water Rights Plan (ID 614_PLN - see Type 26 above) to number (2)
#           of Changed Water Rights Plans (614_60PLN, 614_40PLN) owned by users of the total portion of
#           water diverted from the river based on their specific percentages (60%, 40%, respectively) of the total portion diverted
#
614_PLN.02  Split_Eureka_Full_Plan_60_40            13765.00002      0.       1 614_60PLN         60 614_PLN           1 NA                 0      46 NA           Diversion           0       2       0    9999
                                                                               614_40PLN         40
#
```

```
##########
#  Type 47 Administration Plan Limits
#          Limit releases associated with plan structure (ID HUPLimitPLN) to monthly and annual amounts listed on Line 2
#          The operating rule that defines the limits of the release limit plan (ID HUPLimit.01) is typically used in General Reservoir Replacement (type 10) or Plan release
#          to demand (type 27/28) operating rules as a limit on the operation of these other operating rules
#
HUPLimit.01 Annual_HUP_Pool_Release_Limit               1.00000      0.       1 NA                1 HUPLimitPLN        4 0                0      47 NA           Diversion           0       1       0    9999
  66000.  66000.  66000.  66000.  66000.  66000.  66000.  66000.  66000.  66000.  66000.  66000.  66000.
#
##########
#  Type 48 Plan or Reservoir Reuse to a Plan Direct
#          Meet term and conditions return flow obligations (ID Burl_RFs) with release of Non Reservoir Reuse Plan supplies (ID MetroTh) directly via the river
#
Metro.09    OprMetroThBurl_RFs                      55835.00014      0.       1 Burl_RFs          0 MetroTh            0 NA                0      48 NA           NA                  0       0       0    9999
#
#
##########
#  Type 49 Plan or Reservoir Reuse to a Plan by Exchange
#          Meet well augmentation plan requirements (ID 0102513) with releases from Recharge Plan supplies (ID 0102528_PlC) via the river by exchange
#
01025130.06 ROTHE Recharge                          58925.00003       0       1 0102513           1 0102528_PlC        0 NA                0      49 NA           Diversion        0.00    0.00       0    9999
#
##########
#  Type 50 South Platte Compact Storage
#          Temporarily store the Compact Instream Flow right (ID 6499999.01) in the Compact accounting plan (ID Compact_Pln) under the instream flow priority (17332.00000)
#          This rule works in conjunction with Type 40, see above
#
Compact_In  Opr_Compact_In                          17332.00000      0.       1 Compact_Pln       1 6499999.01         0 NA                0      50 NA           Diversion         0.0     0.0       0    9999
#
```

4.14 Precipitation File - Monthly (*.prc) or Annual (*.pra)

The evaporation file contains total monthly (12 values per simulation year) or annual (12 average values for every year) evaporation data. The type of data provided is controlled by the variable ***moneva*** from the control file. This file is read by subroutine MDAINP.

```
Row-data       Variable       Description
-------------------------------------------------------------

Control Data
1                             Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1            ibm            Beginning month of data (e.g. 1=Jan)
1-2            iby            Beginning year of data (e.g. 1975)
1-3            iem            Ending month of data
1-4            iey            Ending year of data
1-5            cunit          Units of data
                                 ('FT' or 'IN')
1-6            cyr            Year type
                                 'CYR'= calendar year (1-12)
                                 'WYR'= water year (10-9)
                                 'IYR'= irrigation year (11-12)

Time Series Data
2                             Format (i4, 1x, a12, 12f8.2)
2-1            ipyr           Year
2-2            cpreid         Precipitation station ID
2-3            preprt(1-12,1) Precipitation (in) for months 1-12

Repeat for the number of stations numpre

Repeat for each year of the simulation
```

4.15 Evaporation File - Monthly (*.evm) or Annual (*.eva)

The evaporation file contains total monthly (12 values per simulation year) or annual (12 average values for every year) evaporation data. The type of data provided is controlled by the variable ***moneva*** from the control file. This file is read by subroutine MDAINP.

```
Row-data       Variable       Description
-------------------------------------------------------------

Control Data
1                             Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1            ibm            Beginning month of data
                              Enter 1 for January, 10 for October, etc.
1-2            iby            Beginning year of data
                              For monthly data, enter the year (e.g. 1975)
                              For annual data, enter 0
1-3            iem            Ending month of data
1-4            iey            Ending year of data
1-5            cunit          Units of data
                                 ('FT' or 'IN')
```

```
1-6            cyr            Year type
                                 'CYR'= calendar year (1-12)
                                 'WYR'= water year (10-9)
                                 'IYR'= irrigation year (11-12)

Time Series Data
2                             Format (i4, 1x, a12, 12f8.2)
2-1            ieyr           Year
2-2            cevaid         Evaporation station ID
3-3            evaprt(1-12,1) Evaporation for months 1-12

Repeat for the number ofstations numeva

Repeat for each year of the simulation
```

4.16 Stream Flow File - Monthly (*.rim or *.xbm)

The streamflow file may contain total baseflows or gains for each month of the simulation period. The control variable ***iopflo*** identifies which is expected; total baseflow (1) or gains (2). When this file is generated outside Statemod or is generated by Statemod and saved for historic purposes, it is commonly named *.rim. When this file is generated by the Statemod baseflow module it is typically named *.xbm. The user is recommended to rename a StateMod generated baseflow file named *.xbm to *.rim to ensure the preservation of a historic baseflow file and a continuous flow of results from the baseflow module to the simulation module. This file is read by subroutine MDAINP.

```
Row-data       Variable       Description

Control Data
1                             Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1            ibm            Beginning month of data (e.g. 1=Jan)
1-2            iby            Beginning year of data (e.g. 1975)
1-3            iem            Ending month of data
1-4            iey            Ending year of data
1-5            cunit          Units of data
                                 (' ACFT' or 'CFS')
1-6            cyr            Year type
                                 'CYR'= calendar year (1-12)
                                 'WYR'= water year (10-9)
                                 'IYR'= irrigation year (11-12)

Time Series Data
2                             Format (i4, 1x, a12, 12f8.0)
2-1            iryr           Year
2-2            cistat         Streamflow station ID
2-3            runoff(1-12,1) Streamflow or gain (AF) for months 1-12

Repeat for the number of stations numrun

Repeat for each year of the simulation
```

4.17 Direct Flow Demand File - Monthly (*.ddm)

The monthly direct flow demand file contains demands for direct diversions for each month of the simulation period. Monthly data is required when the diversion station variable ***idvcom*** is set to 1 (monthly total demand) or 3 (monthly irrigation water requirement). Data should be entered in the order of the structure file (*.dds). See Section 7 for a discussion of various approaches available for specifying demand data; demands may be specified as a total at the headgate or as a consumptive irrigation water requirement at the farm. This file is read by subroutine MDAINP.

Row-data	Variable	Description
Control Data		
1		Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1	ibm	Beginning month of data (e.g. 1=Jan)
1-2	iby	Beginning year of data (e.g. 1975)
1-3	iem	Ending month of data
1-4	iey	Ending year of data
1-5	cunit	Units of data (' ACFT' or 'CFS')
1-6	cyr	Year type 'CYR'= calendar year (1-12) 'WYR'= water year (10-9) 'IYR'= irrigation year (11-12)
Time Series Data		
2		Format (i4, 1x, a12, 12f8.0)
2-1	idyr	Year
2-2	cistat	Demand station ID
2-3	diverm(1-12,1)	Demands (AF) for months 1-12
Repeat for the number of stations numdiv		
Repeat for each year of the simulation		

4.18 Direct Flow Demand File - Annual (*.dda)

The annual direct flow demand file contains twelve constant demands which are repeated for each year of the study period. Annual data is required when the diversion station variable ***idvcom*** is set to 2 (annual total demand) or 4 (annual irrigation water requirement). Data should be entered in the order of the structure file (*.dds). This file is read by subroutine MDAINP.

Row-data	Variable	Description
Control Data		
1		Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1	ibm	Beginning month of data (e.g. 1=Jan)
1-2	iby	Beginning year of data (e.g. 1975)
1-3	iem	Ending month of data
1-4	iey	Ending year of data
1-5	cunit	Units of data

```
                                   (' ACFT' or 'CFS')
1-6            cyr             Year type
                                   'CYR'= calendar year (1-12)
                                   'WYR'= water year (10-9)
                                   'IYR'= irrigation year (11-12)

Time Series Data
2                              Format (5x, a12, 12f8.0)
2-1            cistat          Demand station ID
2-2            diverm(1-12)    Demands (AF) for months 1-12

Repeat for the number of stations
```

4.19 Direct Flow Demand Overwrite File - Monthly (*.ddo)

The direct flow demand overwrite file contains monthly demands for each year of the study period for selected structures. This file allows a what if scenario to be evaluated quickly without revising the direct flow demand file. This file is read by subroutine MDAINP.

```
Row-data       Variable        Description

Format (i4, 1x, a12, 12f8.0)
1-1            idyr            Year
1-2            cistat          Demand station ID
1-3            diverm(1-12)    Demands (AF) for months 1-12

Repeat for the number of stations to be overridden

Repeat for each year of the simulation
```

4.20 Instream Flow Demand - Monthly (*.ifm)

The monthly instream flow demand file contains instream flow demands for each month of the simulation period. Data should be entered in the order of the structure file (*.ifs). To allow StateMod to be backward compatible with old data sets, this file is required only when monthly data is required (e.g. when the instream flow station (*.ifs) file variable ***iifcom*** is set to 1).
Note negative monthly demands are estimated to be a forecast which is currently only used by the Rio Grande compact simulations (see operation rule types 17 and 18). Also for use by the Rio Grande compact the variable ***rspilx*** may be used to specify the month when a spill occurred and the prorated portion of the spill attributed to Colorado. Data should be entered by year with stations in any order. This file is read by subroutine MDAINP.

```
Row-data       Variable        Description

Control Data
1                              Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1            ibm             Beginning month of data (e.g. 1=Jan)
1-2            iby             Beginning year of data (e.g. 1975)
1-3            iem             Ending month of data
```

```
1-4            iey            Ending year of data
1-5            cunit          Units of data
                                 (' ACFT' or ' CFS')
1-6            cyr            Year type
                                 ' CYR'= calendar year (1-12)
                                 ' WYR'= water year (10-9)
                                 ' IYR'= irrigation year (11-12)

Time Series Data
2                             Format (i4, 1x, a12, 12f8.0, 10x, f8.2)
2-1            idyr           Year
2-2            cistat         Demand station ID
2-3            diverm(1-12,1) Demands (AF) for months 1-12
                              A negative number is treated as a forecast

Repeat for the number of instream flow stations

Repeat for each year of the simulation

Note rspilx is only used by the Rio Grande operating rules (types 17 and 18).
```

4.21 Instream Flow Demand - Annual (*.ifa)

The instream flow demand file contains 12 monthly instream flow demands for use each year of the simulation. Data should be entered in the order of the structure file (*.ifs). This file is read by subroutine MDAINP.

```
Row-data       Variable       Description

Control Data
1                             Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1            ibm            Beginning month of data (e.g. 1=Jan)
1-2            iby            Beginning year of data (e.g. 0 for annual data)
1-3            iem            Ending month of data
1-4            iey            Ending year of data
1-5            cunit          Units of data
                                 (' ACFT' or 'CFS')
1-6            cyr            Year type
                                 'CYR'= calendar year (1-12)
                                 'WYR'= water year (10-9)
                                 'IYR'= irrigation year (11-12)

Time Series Data
2                             Format (5x, a12, 12f8.0)
2-1            cistat         Instream Flow station ID
2-2            flowr(1-12,1)  Instream flow requirement for months 1-12

Repeat for the number of stations numifr

Repeat for each year of the simulation
```

4.22 Well Demand File - Monthly (*.wem)

The monthly well demand file contains demands for well structures for each month of the simulation period. Data may be entered in any order (i.e. its order is independent of the structure file). Monthly data is required when the diversion station variable ***idvcom*** is set to 1 (monthly total demand) or 3 (monthly irrigation water requirement). Note when a well structure is tied to a diversion the total demand is provided in the direct diversion station file and no monthly well demand data is required. This approach should have the control file (.ctl) variable ***icondem*** set to 6. See Section 7 for a discussion of various approaches available for specifying demand data; demands may be specified as a total at the headgate or as a consumptive irrigation water requirement at the farm. This file is read by subroutine MDAINP.

```
Row-data        Variable        Description

Control Data
1                               Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1             ibm             Beginning month of data (e.g. 1=Jan)
1-2             iby             Beginning year of data (e.g. 1975)
1-3             iem             Ending month of data
1-4             iey             Ending year of data
1-5             cunit           Units of data
                                   (' ACFT' or 'CFS')
1-6             cyr             Year type
                                   'CYR'= calendar year (1-12)
                                   'WYR'= water year (10-9)
                                   'IYR'= irrigation year (11-12)

Time Series Data
2                               Format (i4, 1x, a12, 12f8.0)
2-1             idyr            Year
2-2             cistatw         Demand station ID
2-3             divermw(1-12,1)   Demands (AF) for months 1-12

Repeat for the number of stations numdivw

Repeat for each year of the simulation
```

4.23 Delay (Return Flow) Table - Monthly (*.urm)

The monthly unit response table file contains coefficients to lag return flows. If the variable ***interv*** of the control file is a positive value, then interv values are expected for every pattern. If variable ***interv*** of the control file is a -1, then the number of values are specified for each pattern. Note a daily model (control file variable ***iday=1***) requires a variable number of return values be provided (variable ***interv*** must be negative). This file is read by subroutine MDAINP.

```
Row-data        Variable        Description

Control Data
```

1		Format (free)
1-1	idly	Delay table ID
1-2	ndly(1)	Number of entries in delay table idly Include only if variable interv of the control file is equal to -1
Delay Data		
1-3	dlyrat(j,1)	Delay factor for time period j Include as a percent if variable **Interv** of the control file is positive or equal to -1 Include as a decimal if variable **Interv** of the control file is equal to -100 Include ndly or interv delay entries Repeat for the number of delay tables used in the diversion station file

4.24 Reservoir Target File - Monthly (*.tar or *.tam)

The reservoir target file contains monthly targets for a reservoir's minimum and maximum contents. Data should be entered in the order of the structure (*.res) file. Positive maximum contents are end of month targets. Negative values are forecasted inflows. When forecasted inflows are provided the monthly target is estimated as follows:

Target (im) = Current Storage (im) - (Current Storage (im) - Forecast (im) - End Target) / (Months Remaining +1);

Where:

Target (im) is the reservoir target.

Current Storage (im) is the total reservoir storage in month im.

Forecast (im) is the total inflow for the remaining forecast period. Note for a linear forecast this term is often set to -1.

End Target is the target at the end of the forecast period.

Months remaining is the total of all months remaining to be forecasted in a year.

For example, if the forecast data for April, May, June, July is 1,000 af, -1, -1, and 700 af and the Current Storage in April = 1000, then the Target in May is: 1000 - (1000 - 1 -700)/3 = 900.

This file is read by subroutine MDAINP.

Row-data	Variable	Description
Control Data		
1		Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1	ibm	Beginning month of data (e.g. 1=Jan)
1-2	iby	Beginning year of data (e.g. 1975)
1-3	iem	Ending month of data

```
1-4            iey            Ending year of data
1-5            cunit          Units of data
                                 (' ACFT' or 'CFS')
1-6            cyr            Year type
                                 'CYR'= calendar year (1-12)
                                 'WYR'= water year (10-9)
                                 'IYR'= irrigation year (11-12)

Time Series Data
2                             Format (i4, 1x, a12, 12f8.0, 10x, f8.2)
2-1            iyr            Year
2-2            cistat         Reservoir station ID
2-3            conmin(1-12,1) Minimum reservoir targets (AF) for months
                                 1-12

Time Series Data
3-1            iyr            Year
3-2            xista2         Reservoir station ID
3-3            targetx(1-12,1)   Positive values equal the maximum reservoir
                                 targets (AF) by month. Negative values equal
                                 the forecasted inflow for future months

Repeat for the number of stations numres

Repeat for each year of the simulation
```

4.25 Historic Reservoir Content File - Monthly (*.eom)

The historic reservoir content file (*.eom) contains end of month reservoir content data for each year of the study period. Data should be entered in the order of the structure (*.res) file. This data is only used by the Base Flow module to simulate reservoir storage and evaporation impacts on gaged stream flows. It is used by the report module to compare simulated results to gaged observations. This file is read by subroutine VIRGEN.

```
Row-data       Variable       Description

Control Data
1                             Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1            ibm            Beginning month of data (e.g. 1=Jan)
1-2            iby            Beginning year of data (e.g. 1975)
1-3            iem            Ending month of data
1-4            iey            Ending year of data
1-5            cunit          Units of data
                                 (' ACFT' or 'CFS')
1-6            cyr            Year type
                                 'CYR'= calendar year (1-12)
                                 'WYR'= water year (10-9)
                                 'IYR'= irrigation year (11-12)

Time Series Data
2                             Format (i4, 1x, a12, 12f8.0)
```

```
2-1             iryr           Year
2-2             cistat         Reservoir station ID
2-3             resvol(1-12,1) End of Month reservoir contents

Repeat for the number of stations numres

Repeat for each year of the simulation
```

4.26 Base Flow Data (*.rib)

Base flow data is used by the baseflow module to estimate base flows at river nodes that do not have hisoric records using the following formula:

```
FlowX= (FlowB(1)*coefB(1) + FlowB(2)*coefB(2)+ ....) +
pf * (FlowG(1)*coefG(1) + FlowG(2)*coefG(2)+ ....)

Where:
FlowX=  Flow at intermediate node to be estimated

FlowB=  Base flow station(s)
FlowG=  Gain flow station(s)

pf=     Proration factor for gain term
coefB=  Base flow coefficient
coefG=  Gain flow coefficient
```

The first term ((FlowB(1)*coefB(1) + FlowB(2)*coefB(2)+ ....) typically represents upstream gaged flows. The second term (pf * (FlowG(1)*coefG(1) + FlowG(2)*coefG(2)+ ....) typically represents the gain between gages. This file is read by subroutine VIRGEN.

```
Row-data        Variable        Description

Base Station Data
1                               Format (a12, 8x, i8, 10(f8.3, 1x, a12)
1-1             FlowN           Intermediate river node ID
1-2             mbase           Number of base stations to follow
1-3             coefB(1)        Base flow coefficient
1-4             FlowB(1)        Base station ID

Repeat for the number of gaged flows (mbase)

Proration Data
2                               Format (12x, f8.2, i8, 10(f8.3, 1x, a12)
2-1             pf              Proration factor for gain term
2-2             nbase           Number of gain stations to follow
2-3             coefG(1)        Base flow coefficient
2-4             FlowG(1)        Base station ID

Repeat for the number of gain stations flows (nbase)

Repeat for the number of intermediate nodes where base flows are to be estimated
```

4.27 Historic Streamflow File - Monthly (*.rih)

The monthly historic streamflow file is used by the baseflow module to estimate Base flows at gaged and ungaged locations. The monthly historic streamflow file is also used by the report module to compare simulated results to gaged observations. Note, the base flow module may be executed with missing streamflow data (specified by -999) to allow mans impact to be removed prior to filling missing data gaps using a technique such as regression. This file is read by subroutine VIRGEN.

Row-data	Variable	Description
Control Data		
1		Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1	ibm	Beginning month of data (e.g. 1=Jan)
1-2	iby	Beginning year of data (e.g. 1975)
1-3	iem	Ending month of data
1-4	iey	Ending year of data
1-5	cunit	Units of data (' ACFT' or 'CFS')
1-6	cyr	Year type 'CYR'= calendar year (1-12) 'WYR'= water year (10-9) 'IYR'= irrigation year (11-12)
Time Series Data		
2		Format (i4, 1x, a12, 12f8.0)
2-1	iryr	Year
2-2	cistat	Demand station ID
2-3	runoff(1-12,1)	Gaged streamflow for months 1-12 Enter -999 to indicate missing data

Repeat for the number of gages provided in the river station file (Section 4.4)

Repeat for each year of the simulation

4.28 Historic Diversion File - Monthly (*.ddh)

The monthly historic diversion file is used by the baseflow module to estimate Base flows at gaged and ungaged locations. It is used by the report module to compare simulated results to gaged observations. This file is read by subroutine VIRGEN.

Row-data	Variable	Description
Control Data		
1		Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1	ibm	Beginning month of data (e.g. 1=Jan)
1-2	iby	Beginning year of data (e.g. 1975)
1-3	iem	Ending month of data
1-4	iey	Ending year of data
1-5	cunit	Units of data (' ACFT' or 'CFS')

```
1-6             cyr             Year type
                                   'CYR'= calendar year (1-12)
                                   'WYR'= water year (10-9)
                                   'IYR'= irrigation year (11-12)

Time Series Data
2                               Format (i4, 1x, a12, 12f8.0)
2-1             idyr            Year
2-2             cistat          Demand station ID
2-3             diverm(1-12,1) Recorded diversions for months 1-12

Repeat for the number of demand structures provided in the structure file

Repeat for each year of the simulation
```

4.29 Historic Well Pumping File - Monthly (*.weh)

The monthly historic well pumping file is used by the baseflow module to estimate Base flows at gaged and ungaged locations. It is used by the report module to compare simulated results to gaged observations. This file is read by subroutine VIRGEN.

```
Row-data        Variable        Description

Control Data
1                               Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1             ibm             Beginning month of data (e.g. 1=Jan)
1-2             iby             Beginning year of data (e.g. 1975)
1-3             iem             Ending month of data
1-4             iey             Ending year of data
1-5             cunit           Units of data
                                   (' ACFT' or 'CFS')
1-6             cyr             Year type
                                   'CYR'= calendar year (1-12)
                                   'WYR'= water year (10-9)
                                   'IYR'= irrigation year (11-12)

Time Series Data
2                               Format (i4, 1x, a12, 12f8.0)
2-1             idyr            Year
2-2             cistatw         Well station ID
2-3             divermw(1-12,1)   Well pumping for months 1-12

Repeat for the number of wells provided in the structure file

Repeat for each year of the simulation
```

4.30 San Juan RIP Sedimentation - Annual (*.sjr)

The annual San Juan Recovery Implementation Plan sedimentation plan file is not longer used.

4.31 Irrigation Parameter Yearly Data File - Annual (*.ipy)

The annual CU time series file contains information required to perform calculations using a variable efficiency approach. It is only used when the control file (*.ctl) variable itsfile >= 1. It is formatted exactly the same as the annual time series file used by the consumptive use model (StateCU). The current standard is to provide four water supply irrigation method combinations (Surface Supply Flood Irrigation, Surface Supply Sprinkler Irrigation, Ground Supply Flood Irrigation and Ground Supply Sprinkler Irrigation). For a description of the old (*.ipy file) format, which StateMod still supports, see Section 9.0 Discontinued but Supported File Formats.

Because multiple input file formats may be provided it is recommended the following string be provided near the top of the file before any data: # FileFormatVersion 2. If the format version indicator is not provided StateMod will try to read the file and try to determine the appropriate file type

Row-data	Variable	Description
Control Data		
1		Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1	ibm	Beginning month of data (e.g. 1=Jan)
1-2	iby	Beginning year of data (e.g. 1975)
1-3	iem	Ending month of data
1-4	iey	Ending year of data
1-5	cunit	Units of data ('NA')
1-6	cyr	Year type 'CYR'= calendar year (1-12) 'WYR'= water year (10-9) 'IYR'= irrigation year (11-10)
Time Series Data		
2		Format (i4,1x,a12,3f6.0,2f8.0,f12.0,f3.0,f8.0)
2-1	idly	Year
2-2	ID	Structure ID
2-3	ceff	Conveyance efficiency (decimal)
2-4	feff	Maximum flood efficiency (decimal)
2-5	seff	Maximum sprinkler efficiency (decimal)
2-6	AcreSF	Acres with a Surface Water Supply and Flood Irrigation
2-7	AreaSS	Acres with a Surface Water Supply and Sprinkler Irrigation
2-6	AcreGF	Acres with a Ground Water Supply and Flood Irrigation
2-7	AreaG	Acres with a Ground Water Supply and Flood Irrigation
2-8	mprate	Maximum pumping rate (af/mo)
2-9	gwmode	Ground water use mode 1 = maximum supply mode 2 = mutual ditch supply mode
2-10	areax	Total Irrigated acreage for year idly (ac)

4.32 Consumptive Water Requirement File - Monthly (*.ddc)

The monthly consumptive water requirement (*.ddc) file contains the consumptive requirement for direct diversion and well only structures for each month of the simulation period. For an irrigation structure the consumptive water requirement is commonly called the Irrigation Water Requirement (IWR). Regardless if the structure is used for irrigation or municipal or industrial use the consumptive water requirement is the amount of water that would be consumed by that structure (e.g. no losses or inefficiencies are included). It is only used when the control file (*.ctl) variable efficiency variable (*ieffmax)* = 1. Data should be provided for every diversion and well only structure. If data is inadvertently provided for a Well structures that is also served by both Surface water the data provided under the Diversion ID is used. When data is not provided (e.g. for a municipal or non consumptive demand) the CU requirement is set to the structures demand / average efficiency provided in the diversion station (*.dds) file or well station (*.wes) file, respectively. Data can be entered in any order. This file is read by subroutine MDAINP.

Row-data	Variable	Description
Control Data		
1		Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1	ibm	Beginning month of data (e.g. 1=Jan)
1-2	iby	Beginning year of data (e.g. 1975)
1-3	iem	Ending month of data
1-4	iey	Ending year of data
1-5	cunit	Units of data ('CFS')
1-6	cyr	Year type 'CYR'= calendar year (1-12) 'WYR'= water year (10-9) 'IYR'= irrigation year (11-10)
Time Series Data		
2		Format (i4, 1x, a12, 12f8.0)
2-1	idyr	Year
2-2	cistat	Demand station ID
2-3	diverm(1-12,1)	CU requirement(AF) for months 1-12
Repeat for the number of diversion and Well only stations		
Repeat for each year of the simulation		

4.33 Soil Moisture (StateCU_Structure) File (*.str)

The soil moisture file is the same as the current StateCU structure file. Note that StateMod versions 10.30 and greater use this in order to be consistent with recent StateCU enhancements. For a description of the old (*.str file) format, which StateMod still supports, see Section 9.0 Discontinued but Supported File Formats.

The StateCU structure file (*.str) contains consumptive use parameters by structure that do not change with time. Only the soil moisture data (*.awc) is used by StateMod in order to perform soil moisture accounting. Other consumptive use information contained in the file (e.g. latitude, location, associated climate stations, etc.) are currently not used.

The soil moisture reservoir available to each structure is the parameter *awc* multiplied by the structures area, multiplied by average depth for every structure in the system specified in the control file (*.ctl) by variable *soild* (feet). It is formatted exactly the same as the soil parameter file used by the consumptive use model (StateCU), therefore it often contains data before or beyond the variable *awc*that is not used by StateMod. Data can be entered in any order. This file is read by subroutine MDAINP during the first year and month of the simulation only.

Because multiple input file formats may be provided it is recommended the following string be provided near the top of the file before any data: # FileFormatVersion 2. If the format version indicator is not provided StateMod will try to read the file and determine the appropriate file type.

Row-data	Variable	Description
Control Data		
1		Format (i4, 1x, a12, 12f8.0)
1-1	cistat	Station ID
1-2	dum	Latitude
1-3	dum	Elevation
1-4	dum	Region1 (e.g. County)
1-5	dum	Region2 (e.g. Hydrologic unit)
1-6	dum	Structure Name
1-6	ncli	# of climate stations
1-7	awc	Available water content (fraction)
Format(a12,f6.2,f9.2)		
2-1	dum	Climate ID
2-2	dum	Temperature station weight
2-3	dum	Precipitation station weight
Repeat for the number of stations ncli		

4.34 GIS File (*.gis)

The *.gis file contains reference to files which contain GIS data related to structures and maps used by the Graphic User Interface.

Type	Variable	Description
Control Data		
Format (data type: file name (1))		
streamflow:	filena	streamflow gage file name
diversion:	filena	diversion location file name
reservoirs:	filena	reservoir location file
precipitation:	filena	precipitation station location file name

```
basin:          filena  basin file name
rivers:         filena  hydrology file name
```

4.35 Output Request (*.out)

The output request file contains data which will limit the extent of selected output file requests. Note, the first two rows of data (variables ftype and parameter) are only used by the special printout request (*.xsp). Rows 3 through n contain reference data for the structure(s) to be printed and are used by the standard printout reports (*.xdd, *.xre, *.xir, *.xwe and *.xop). To eliminate the need to type an output request file, one is automatically generated by the check option (-check) for every type of structure in the system. Note the default name for that file is *.xou. It is commonly renamed to *.out and referenced as such in the response file to avoid it being overwritten whenever a new check run is made. Also the structures to be printed by that file default to print nodes where inflow occurs (FLO) and not print other types of nodes (DIV, RES, ISF, WEL, OTH).

Row-data	Variable	Description
Control Data		
1		Format (a72)
1-1	ftype	Output type switch
		Diversion
		Instream Flow
		StreamGage
		Reservoir
		Well
Parameter Data		
2		Format (a72)
2-1	Parameter	For ftype = Diversion, Instream Flow or Streamgage
		Total_Demand
		CU_Demand
		From_River_By_Priority
		From_River_By_Storage
		From_River_By_Exchange
		From_Well
		From_Carrier_By_Priority
		From_Carrier_By_Storage
		Carried_Water
		From_Soil
		Total_Supply
		Total_Short
		CU_Short
		Consumptive_Use
		To_Soil
		Total_Return
		Upstream_Inflow
		Reach_Gain
		Return_Flow
		Well_Depletion
		To_From_GW_Storage

```
                                River_Inflow
                                River_Divert
                                River_By_Well
                                River_Outflow
                                Available_Flow

                                For ftype = Reservoir
                                Initial_Storage
                                River_Priority
                                River_Storage
                                River_Exchange
                                Carrier_Priority
                                Carrier_Storage
                                Total_Supply
                                Storage_Use
                                Storage_Exchange
                                Carrier_Use
                                Total_Release
                                Evap
                                Seep_Spill
                                Sim_EOM
                                Target_Limit
                                Fill_Limit
                                River_Inflow
                                Total_Release
                                Total_Supply
                                River_By_Well
                                River_Outflow

                                For ftype = Well
                                Demand
                                FromWell
                                Short
                                ConsumptiveWaterUse
                                Return
                                Loss
                                FromRiver
                                FromGWStor
                                FromSalvage

3                               Format (a12,1x,a24,1x,a3,1x,i5)
3-1             idreq           Requested ID
                                        Enter ALL, All, all or 0 to get all
                                        Enter -999 to indicate last ID requested)
3-2             rec24           Requested structure name
3-3             idtypx          Requested structure type
3-4             ix              Print switch
                                        0 do not print
                                        1 print

Repeat for each structure
```

4.36 Streamflow File - Daily (*.rid)

The daily streamflow file contains baseflows or a daily pattern for each day of the simulation period. To simplify the preparation of daily data, StateMod allows the user to provide daily data or a pattern to be used with monthly data. When the daily river station variable ***crunidy*** is set to 3 the river station variable ***crunid*** is used to indicate daily data controls and any monthly data provided in the monthly streamflow file (*.rim or *.xbm) is ignored. When the river station variable ***crunidy*** is set to any ID including its own StateMod uses daily data as a pattern to estimate daily data from monthly data as follows:

$$Qd = Dp * Qm / Dm$$

Where:

Qd = daily estimated flow
Dp = daily flow (pattern)
Qm = monthly flow from the monthly flow file (*.rim)
Dm = monthly sum of daily flow (pattern)

This file is only required if the model is operated in a daily mode. Data can be entered with stations entered in any order. This file is read by subroutine DAYDATA.

Row-data	Variable	Description
1		Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1	ibm	Beginning month of data (e.g. 1=Jan)
1-2	iby	Beginning year of data (e.g. 1975)
1-3	iem	Ending month of data
1-4	iey	Ending year of data
1-5	cunit	Units of data ('CFS')
1-6	cyr	Year type 'CYR'= calendar year (1-12) 'WYR'= water year (10-9) 'IYR'= irrigation year (11-12)
Time Series Data		
2		Format (i4, i4, 1x, a12, 31f8.0, f8.0)
2-1	idyr	Year
2-2	cistat	Daily station ID
2-3	virindx(1-31)	Streamflow (cfs) or pattern (unitless) for days 1-31, etc.

Repeat for the number of stream gage stations

Repeat for each year of the simulation

4.37 Direct Flow Demand File - Daily (*.ddd)

The daily direct flow demand file contains direct diversion demands or a daily pattern for each day of the simulation period. Data should be entered in the order of the structure file (*.dds). To simplify the

preparation of daily data, StateMod allows the user to provide daily data or a pattern to be used with monthly data. When the diversion station variable ***cdividy*** is set to 3 the diversion station variable ***cdivid*** is used to indicate daily data controls and any monthly data provided in the monthly direct flow demand file (*.ddm) is ignored. When the diversion station variable ***cdividy*** is set to any ID including its own (**cdivid**) StateMod uses daily data as a pattern to estimate daily data from monthly data using the same approach described under daily streamflow data (Section 4.36).

This file is only required if the model is operated in a daily mode. Data can be entered with stations entered in any order. This file is read by subroutine DAYDATA.

Row-data	Variable	Description
Control Data		
1		Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1	ibm	Beginning month of data (e.g. 1=Jan)
1-2	iby	Beginning year of data (e.g. 1975)
1-3	iem	Ending month of data
1-4	iey	Ending year of data
1-5	cunit	Units of data ('CFS')
1-6	cyr	Year type 'CYR'= calendar year (1-12) 'WYR'= water year (10-9) 'IYR'= irrigation year (11-12)
Time Series Data		
2		Format (i4, i4, 1x, a12, 31f8.2, f8.0)
2-1	iy	Year
2-2	im	Month
2-2	cdividx	Daily station ID
2-3	diverdx(1-31)	Demand (cfs) or pattern (unitless) for days 1-31,
etc.		
Repeat for the number of stations numdiv		
Repeat for each year of the simulation		

4.38 Instream Flow Demand File - Daily (*.ifd)

The daily instream flow demand file contains instream flow demands or a daily pattern for each day of the simulation period. Data should be entered in the order of the structure file (*.ifs). To simplify the preparation of daily data, StateMod allows the user to provide daily data or a pattern to be used with monthly data. When the instream flow station variable ***cifridy*** is set to 3 the instream flow station variable ***cifrid*** is used to indicate daily data controls and any monthly data provided in the annual instream flow demand file (*.ifa) is ignored. When the diversion station variable ***cifridy*** is set to any ID including its own (***cifrid)*** StateMod uses daily data as a pattern to estimate daily data from monthly data using the same approach described under daily streamflow data (Section 4.36).

This file is only required if the model is operated in a daily mode. Data can be entered with stations entered in any order. This file is read by subroutine DAYDATA.

Row-data	Variable	Description
Control Data		
1		Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1	ibm	Beginning month of data (e.g. 1=Jan)
1-2	iby	Beginning year of data (e.g. 1975)
1-3	iem	Ending month of data
1-4	iey	Ending year of data
1-5	cunit	Units of data (' ACFT' or 'CFS')
1-6	cyr	Year type 'CYR'= calendar year (1-12) 'WYR'= water year (10-9) 'IYR'= irrigation year (11-12)
Time Series Data		
2		Format (i4, i4, 1x, a12, 31f8.2, f8.0)
2-1	iy	Year
2-2	im	Month
2-2	cifridx	Daily station ID
2-3	flowrx(1-31)	Demand (cfs) or pattern (unitless) for days 1-31, etc.
Repeat for the number of instream flows stations		
Repeat for each year of the simulation		

4.39 Well Demand File - Daily (*.wed)

The daily well demand file contains well demands or a daily pattern for each day of the simulation period. To simplify the preparation of daily data, StateMod allows the user to provide daily data or a pattern to be used with monthly data. When the well station variable ***cdividwy*** is set to 3 the well station variable ***cdividw*** is used to indicate daily data controls and any monthly data provided in the monthly direct flow demand file (*.wem) is ignored. When the diversion station variable ***cdividwy*** is set to any ID including its own (***cdividw)*** StateMod uses daily data as a pattern to estimate daily data from monthly data using the same approach described under daily streamflow data (Section 4.36).

This file is only required if the model is operated in a daily mode with wells on (control file variable *iwell*=1). Data can be entered with stations entered in any order. This file is read by subroutine DAYDATA.

Row-data	Variable	Description
Control Data		
1		Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1	ibm	Beginning month of data (e.g. 1=Jan)

```
1-2             iby             Beginning year of data (e.g. 1975)
1-3             iem             Ending month of data
1-4             iey             Ending year of data
1-5             cunit           Units of data ('CFS')
1-6             cyr             Year type
                                   'CYR'= calendar year (1-12)
                                   'WYR'= water year (10-9)
                                   'IYR'= irrigation year (11-12)

Time Series Data
2                               Format (i4, i4, 1x, a12, 31f8.2, f8.0)
2-1             iy              Year
2-2             im              Month
2-2             cdividxw        Daily station ID
2-3             diverdxw(1-31)  Demand (cfs) or pattern (unitless) for days 1-31,
etc.

Repeat for the number of wells

Repeat for each year of the simulation
```

4.40 Reservoir Target Content File - Daily (*.tad)

The daily reservoir target file contains reservoir targets or a daily pattern for each day of the simulation period. Data should be entered in the order of the structure (*.res) file. To simplify the preparation of daily data, StateMod allows the user to provide daily data or a pattern to be used with monthly data. When the reservoir station variable ***cresidy*** is set to 3 the reservoir station variable ***cresid*** is used to indicate daily data controls and any monthly data provided in the monthly direct flow demand file (*.tar) is ignored. When the reservoir station variable ***cresidy*** is set to any ID including its own (***cresid)*** StateMod uses daily data as a pattern to estimate daily data from monthly data using the same approach described under daily streamflow data (Section 4.36).

This file only required if the model is operated in a daily mode. Data can be entered with stations entered in any order. This file is read by subroutine DAYDATA.

```
Row-data        Variable        Description

Control Data
1                               Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1             ibm             Beginning month of data (e.g. 1=Jan)
1-2             iby             Beginning year of data (e.g. 1975)
1-3             iem             Ending month of data
1-4             iey             Ending year of data
1-5             cunit           Units of data (' ACFT')
1-6             cyr             Year type
                                   'CYR'= calendar year (1-12)
                                   'WYR'= water year (10-9)
                                   'IYR'= irrigation year (11-12)

Time Series Data
```

```
2                               Format (i4, i4, 1x, a12, 31f8.2, f8.0)
2-1             iy              Year
2-2             im              Month
2-2             cresidx         Daily station ID
2-3             targex2(1-31)   Maximum reservoir target (acft) or pattern for days
1-31

Repeat for the number of stations numres

Repeat for each year of the simulation
```

4.41 Irrigation Water Requirement File - Daily (*.ddx)

The daily consumptive water requirement (*.ddx) file contains the CU requirement for direct diversion and well only structures for each day of the simulation period. It is only used when the control file (*.ctl) variable efficiency control (*ieffmax)* = 1. To simplify the preparation of daily data, StateMod allows the user to provide daily data or a pattern to be used with monthly data. When the diversion station variable ***cdividy*** is set to the diversion station variable ***cdivid*** daily data controls and any monthly data provided in the monthly consumptive water requirement file (*.ddc) is ignored. When the river station variable ***cdividy*** is set to any ID other than its own direct flow station variable ***cdivid.*** StateMod uses daily data as a pattern to estimate daily data using the same approach described under daily streamflow data (Section 4.36).

This file is only required if the model is operated in a daily mode with variable efficiency (control file itsfile=1 or 10). Data can be entered with stations entered in any order. This file is read by subroutine DAYDATA.

```
Row-data        Variable        Description

Control Data
1                               Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1             ibm             Beginning month of data (e.g. 1=Jan)
1-2             iby             Beginning year of data (e.g. 1975)
1-3             iem             Ending month of data
1-4             iey             Ending year of data
1-5             cunit           Units of data
                                   (' ACFT' or 'CFS')
1-6             cyr             Year type
                                   'CYR'= calendar year (1-12)
                                   'WYR'= water year (10-9)
                                   'IYR'= irrigation year (11-12)

Time Series Data
2                               Format (i4, i4, 1x, a12, 31f8.2, f8.0)
2-1             iy              Year
2-2             im              Month
2-2             cresidx         Daily station ID
2-3             targex2(1-31)   Consumptive Water Requirement(cfs) or pattern for
days 1-31
```

Repeat for the number of stations numdiv

Repeat for each year of the simulation

4.42 Delay Table File - Daily (*.dld)

The daily delay table file contains coefficients to lag return flows. If the variable ***interv*** of the control file is a positive value, then interv values are expected for every pattern and data is expects to be provided as a percent. If the variable ***interv*** of the control file is a -1, then the number of values are specified for each pattern and data is expected to be provided as a percent. If the variable ***interv*** of the control file is a -100, then the number of values are specified for each pattern and data is expected to be provided as a decimal. This file is read by subroutine MDAINP.

Row-data	Variable	Description
Control Data		
1		Format (a8, i4, (12f8.2))
1-1	idly	Delay table ID
1-2	ndly(1)	Number of entries in delay table idly Include only if variable interv of the control file is equal to -1 or -100
1-3	dlyratd(j,1)	Delay factor for time period j Include as a percent if variable **interv** of the control file is positive or equal to -1 Include as a decimal if variable **interv** of the control file is equal to -100

Include ndly or interv delay entries

Repeat for the number of delay tables used in the diversion station file

4.43 Historic Streamflow File - Daily (*.riy)

The daily historic streamflow file contains streamflows or a daily pattern for each day of the simulation period. To simplify the preparation of daily data, StateMod allows the user to provide daily data or a pattern to be used with monthly data. When the river station variable ***crunidy*** is set to 3 the river station variable ***crunid*** is used to indicate daily data controls and any monthly data provided in the monthly historic streamflow file (*.rih) is ignored. When the river station variable ***crunidy*** is set to any ID including its own (***crunid)*** StateMod uses daily data as a pattern to estimate daily data using the same approach described under daily streamflow data (Section 4.36).

This file is only required if the model is operated in a daily baseflow mode. Data can be entered with stations entered in any order. This file is read by subroutine DAYDATA.

Row-data	Variable	Description

```
Control Data
1                              Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1             ibm            Beginning month of data (e.g. 1=Jan)
1-2             iby            Beginning year of data (e.g. 1975)
1-3             iem            Ending month of data
1-4             iey            Ending year of data
1-5             cunit          Units of data ('CFS')
1-6             cyr            Year type
                                  'CYR'= calendar year (1-12)
                                  'WYR'= water year (10-9)
                                  'IYR'= irrigation year (11-12)

Time Series Data
2                              Format (i4, i4, 1x, a12, 31f8.0, f8.0)
2-1             idyr           Year
2-2             cistat         Daily station ID
2-3             virindx(1-31)  Historic Streamflow (cfs) or pattern
                                  (unitless) for days 1-31, etc.

Repeat for the number of stream gage stations

Repeat for each year of the simulation
```

4.44 Historic Diversion File - Daily (*.ddy)

The daily historic diversion file contains diversions or a daily pattern for each day of the simulation period. To simplify the preparation of daily data, StateMod allows the user to provide daily data or a pattern to be used with monthly data. When the diversion station variable ***cdividy*** is set to 3 the diversion station variable ***cdivid*** is used to indicate daily data controls and any monthly data provided in the monthly direct flow demand file (*.ddm) is ignored. When the diversion station variable ***cdividy*** is set to any ID including its own (***cdivid)*** StateMod uses daily data as a pattern to estimate daily data using the same approach described under daily streamflow data (Section 4.36).

This file is only required if the model is operated in a daily baseflow mode. Data can be entered with stations entered in any order. This file is read by subroutine DAYDATA.

```
Row-data       Variable       Description
```

```
Control Data
1                              Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1             ibm            Beginning month of data (e.g. 1=Jan)
1-2             iby            Beginning year of data (e.g. 1975)
1-3             iem            Ending month of data
1-4             iey            Ending year of data
1-5             cunit          Units of data ('CFS')
1-6             cyr            Year type
                                  'CYR'= calendar year (1-12)
                                  'WYR'= water year (10-9)
                                  'IYR'= irrigation year (11-12)
```

```
Time Series Data
2                              Format (i4, i4, 1x, a12, 31f8.2, f8.0)
2-1            iy              Year
2-2            im              Month
2-2            cdividx         Daily station ID
2-3            diverdx(1-31)   Historic diversion (cfs) or pattern
                                  (unitless) for days 1-31, etc.

Repeat for the number of stations numdiv

Repeat for each year of the simulation
```

4.45 Historic Well Pumping File - Daily (*.wey)

The daily historic well pumping file contains well pumping or a daily pattern for each day of the simulation period. To simplify the preparation of daily data, StateMod allows the user to provide daily data or a pattern to be used with monthly data. When the well station variable ***cdividyw*** is set to 3 the diversion station variable ***cdividw*** is used to indicate daily data controls and any monthly data provided in the monthly direct flow demand file (*.wem) is ignored. When the diversion station variable ***cdividwy*** is set to any ID including its own (***cdividw)*** StateMod uses daily data as a pattern to estimate daily data using the same approach described under daily streamflow data (Section 4.36).

This file is only required if the model is operated in a daily baseflow mode with wells. Data can be entered with stations entered in any order. This file is read by subroutine DAYDATA.

```
Row-data       Variable       Description

Control Data
1                             Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1            ibm            Beginning month of data (e.g. 1=Jan)
1-2            iby            Beginning year of data (e.g. 1975)
1-3            iem            Ending month of data
1-4            iey            Ending year of data
1-5            cunit          Units of data ('CFS')
1-6            cyr            Year type
                                  'CYR'= calendar year (1-12)
                                  'WYR'= water year (10-9)
                                  'IYR'= irrigation year (11-12)

Time Series Data
2                             Format (i4, i4, 1x, a12, 31f8.2, f8.0)
2-1            iy             Year
2-2            im             Month
2-2            cdividxw       Daily station ID
2-3            diverdxw(1-31) Daily Pumping (cfs) or pattern
                                  (unitless) for days 1-31, etc.

Repeat for the number of wells
```

```
Repeat for each year of the simulation
```

4.46 Historical Reservoir Content File - Daily (*.eoy)

The daily historic reservoir content file contains reservoir contents at the end of the day or a daily pattern for each day of the simulation period. Data should be entered in the order of the structure (*.res) file. To simplify the preparation of daily data, StateMod allows the user to provide daily data or a pattern to be used with monthly data. When the reservoir station variable ***cresidy*** is set to 3 the reservoir station variable ***cresid*** is used to indicate daily data controls and any monthly data provided in the monthly direct flow demand file (*.tar) is ignored. When the reservoir station variable ***cresidy*** is set to any ID including its own (***cresid)*** StateMod uses the daily data as a pattern to estimate daily data using the same approach described under daily streamflow data (Section 4.36).

This file is only required if the model is operated in a daily baseflow mode. Data can be entered with stations entered in any order. This file is read by subroutine DAYDATA.

```
Row-data        Variable        Description

Control Data
1                               Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1             ibm             Beginning month of data (e.g. 1=Jan)
1-2             iby             Beginning year of data (e.g. 1975)
1-3             iem             Ending month of data
1-4             iey             Ending year of data
1-5             cunit           Units of data ('AF')
1-6             cyr             Year type
                                   'CYR'= calendar year (1-12)
                                   'WYR'= water year (10-9)
                                   'IYR'= irrigation year (11-12)

Time Series Data
2                               Format (i4, i4, 1x, a12, 31f8.2, f8.0)
2-1             iy              Year
2-2             im              Month
2-2             cresidx         Daily station ID
2-3             targex2(1-31)   Daily reservoir target (acft) or pattern for days 1-
31

Repeat for the number of stations numres

Repeat for each year of the simulation
```

4.47 Downstream Call File (*.cal)

The downstream call file is used in conjunction with a downstream call operating rule type 23. See Section 4.13.23 for a description of this operating rule. This file is typically only used for a daily application. Therefore, when StateMod is executed in a monthly mode the call specified on day 1 is used to represent the monthly call. Note that this file is currently formatted to match an example file

provided by the user that requested its implementation. Therefore some data contained in that file (e.g. calling structure, priority date) is not used by StateMod. For a monthly analysis this file is read by subroutine MDAINP. For a daily analysis this file is read by subroutine DAYEST.

```
Row-data       Variable       Description

Control Data
1                             Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1            ibm            Beginning month of data (e.g. 1=Jan)
1-2            iby            Beginning year of data (e.g. 1975)
1-3            iem            Ending month of data
1-4            iey            Ending year of data
1-5            cunit          Units of data ('NA')
1-6            cyr            Year type
                                 'CYR'= calendar year (1-12)
                                 'WYR'= water year (10-9)
                                 'IYR'= irrigation year (11-12)

Call Data
1                             Free Format
2-1            icy1           Year
2-2           icm1            Month
2-3           icd1            Day
2-4           dcall1          Administration number of calling right

Repeat for the number of days in simulation
```

4.48 Rio Grande Spill (*.rgs)

The Rio Grande Spill file contains a file that indicates when Elephant Butte Reservoir historically spilled. Note this file is used only when the Rio Grande Compact is simulated (operating rules 17 and 18) to determine when any debt accrued by Colorado is erased. This file is read by subroutine MDAINP.

```
Row-data       Variable       Description

Control Data
1                             Format (i5,1x,i4,5x,i5,1x,i4,a5,a5)
1-1            ibm            Beginning month of data (e.g. 1=Jan)
1-2            iby            Beginning year of data (e.g. 1975)
1-3            iem            Ending month of data
1-4            iey            Ending year of data
1-5            cunit          Units of data ('NA')
1-6            cyr            Year type
                                 'CYR'= calendar year (1-12)
                                 'WYR'= water year (10-9)
                                 'IYR'= irrigation year (11-12)

For Rio Grande Compact Operating Rules only.
2-1            rspilx(1-12)   0= No Elephant Butte Spill
```

```
                                  +n= Elephant Butte Spill Data
                                     The integer portion is the month
                                        of spill (e.g. month 6 = 6)
                                     The decimal portion is the
                                        % of Spill that was Colorado's
                                     Note when a spill occurs:
                                        If Colorado is in debt it is erased
                                        If Colorado is in surplus
                                        their surplus is reduced by %

Repeat for the number of years in the simulation
```

4.49 Plan Data File (*.pln)

The plan station file contains information related to operating a term and condition, well augmentation and reuse plan. It provides data related to the plan including its ID, name, location on the river system, etc. If return flow data is specified for a plan it is provided in the Plan Return File (*.prf). Section 7 provides additional discussion of a plan and their use.

Note that plan efficiency and plan return data can be provided for any plan type, however this information is only used by StateMod for T&C plans (Type 1), Well Augmentation plans (Type 2), and Reuse plans (Types 3 and 4).

- The variable ipeff(1) allows the user to provide either a constant or 12 efficiency values to be used for individual months. If a constant value is provided, it is equal to the value provided with the source structure in the diversion station file (*.dds).

- The variable iprf(1) allows the user to provide either a constant or 12 return flow values to be used for individual months. If a constant value is provided, it is equal to the value provided with the source structure in the diversion station file (*.dds).

Note this file uses a free format read (which is slowly being added to other parts of StateMod). Therefore Plan ID's and Plan names should be provided with no spaces or in double quotes (e.g. instead of My Name enter "My Name" or My_Name). This file is read by subroutine GETPLN.

Row-data	Variable	Description
Station Data		
1		Free Format
1-1	Pid(1)	Plan ID (include _ instead of blanks)
1-2	Pname(1)	Plan name (include _ instead of blanks)
1-3	iPsta(1)	River node where the plan is located
1-4	Pon(1)	On (1) or Off (0) switch
1-5	iPlnTyp(1)	Plan type 1 = Terms and Conditions (T&C) 2 = Well Augmentation 3 = Reuse to a Reservoir 4 = Reuse to a Diversion

```
                                   7 = Import Plan
                                   8 = Recharge (reservoir or canal seepage
                                   9 = Out-of-Priority Diversion or Storage
                                   10 = Special Well Augmentation (e.g.
                                         Designated Basin, Coffin Wells, etc.)
                                   11 = Accounting Plan
                                   12 = Release Limit Plan
                                   13 = Changed Water Right Plan
1-6            Peff(1)          Plan efficiency
                                Enter 0 if not used
                                Enter 1 to read 12 plan efficiency values (%)
                                Enter 999 to use the source structure's
                                   efficiency data
1-7            iPrf(1)          Plan Return Type
                                Enter 0 if no plan return flows will
                                   be calculated
                                Enter 1 for a T&C Plan with return data
                                   in the plan return flow file (*.prf)
                                Enter 8 for a Recharge Plan with return
                                   data in the plan return flow file (*.prf)
                                Enter 999 to use the source structure's
                                   return flow data
1-8            iPfail(1)        Plan Failure Switch
                                Used only for a T&C Plan (iPlnTyp = 1)
                                Enter 0 to not turn plan off if it fails
                                Enter 1 to turn a plan off if it fails
1-9            Psto1(1)         Initial plan storage value (acft)
                                Used only for Plan Types = 3, 9, & 12
1-10           Psource(1)       If the plan type is 8 (recharge) enter
                                   'Reservoir' if the source is reservoir
                                   Seepage and enter 'Diversion' if the
                                   Source is canal loss.
                                If the plan type is not 8 (not recharge)
                                   enter NA or any other comment
1-11           iPAcc(1)         Source Account of the structure where plan water
                                   becomes available (Note this information is
                                   currently used only when the plan type is
                                   recharge (type 8) from a reservoir

Plan Efficiency Data
Include only if the plan efficiency variable (Peff) = 1
Free Format
2-1            Peff(1,j), j=1,12 Plan efficiency for month 1-12
                                Note the first entry corresponds to the first
                                month specified in the control file
```

4.50 Well Augmentation Plan Data File (*.plw)

The well augmentation plan file contains information that allows a well to operate out of priority because it is tied to an augmentation plan. It provides data that ties a plan ID to a well water right ID and the structure served by that well. This file is read by subroutine GetPlnW. The following is noted:

- StateMod allows one well to be tied to more than one augmentation plan. When this occurs the well's water right should be distributed to each augmentation plan. Typically the distribution to each augmentation plan is based on the acres served by each. This distribution limits total pumping by a well to the decreed rate.
- Because a well may be tied to more than one structure the Well Augmentation Plan file (.plw) is tied to both a well right and the structure served by that right. This limits that augmentation requirement for that well to the structure it serves.

Note this file uses a free format read (which is slowly being added to other parts of StateMod). Therefore Plan ID's and Plan names should be provided with no spaces or in double quotes (e.g. instead of My Name enter "My Name" or My_Name).

Row-data	Variable	Description
Free Format		
1-1	cistatP	Plan ID
1-2	cistatW	Well Right ID
1-3	cistatS	Well Structure associated with this Well Right

4.51Plan Return Flow File (*.prf)

The Plan return file contains return flow data that is used to route canal seepage back to the stream over time (generally used with recharge plans) and plan efficiency information (generally used with T&C plans). For recharge plans, if no plan return flow data is provided, any plan seepage is considered a loss. Similarly if the percent return does not equal 100% then the balance (100%-value specified) is considered a loss. For T&C plans, the total amount of water that returns to the stream is calculated as a function of the amount diverted, the efficiency (or inefficiency) of the diverson (eff), and the return flow pattern. The plan return file (*.prf) contains two pieces of data associated with calculating return flows from a plan; where the return flow enters the stream system (crtnid) and when those returns enter the system over time (irtndlPP). The plan station file provides the efficiency value to be used. As described in section 4.49, StateMod allows the user to provide either a constant efficiency value to use over all time or 12 efficiency values to be used for individual months. This file is read by subroutine GETRES.

Row-data	Variable	Description
Control Data		
1		Free Format
1-1	cistat	Plan ID
1-2	crtnid	River node receiving return flow
1-3	pcttotPP(1)	Percent of return flow to this river node
1-4	irtndlPP(1)	Delay (return flow) table for this return flow
Repeat for number of return flow locations		
Repeat for number of plans with return flow data		

4.52 Reservoir Return Flow File (*.rrf)

The Reservoir return file contains return flow data that is used to route reservoir seepage back to the stream over time. If no reservoir return flow data is provided any reservoir seepage is considered a loss. Similarly if the percent return does not equal 100% then the balance (100%-value specified) is considered a loss. This file is read by subroutine GETRES.

Row-data	Variable	Description
Control Data		
1		Free Format
1-1	cistat	Reservoir ID
1-2	crtnid	River node receiving return flow
1-3	pcttotRP(1)	Percent of return flow to this river node
1-4	irtndlRP(1)	Delay (return flow) table for this return flow
Repeat for number of return flow locations		
Repeat for number of reservoirs with return flow data		

4.53 Reach Data File (*.rch)

The Reach Data file is used to summarize diversion comparison, well comparison, and Consumptive Use reports by reach when the Report option (-report) is specified. To eliminate the need to build a Reach Data file, a preliminary one (*.xrh) is generated by the check option (-check) for every diversion and well in the system. This preliminary Reach Data file contains two main components: Reach Data and Node Data. The following are noted:

- Reach data is used to define how one stream reach is connected to another.
- Node data is used to assigned a stream (river) node to a stream reach.
- The default name for the preliminary file created by the check option is *.xrh. This preliminary file is commonly revised in an editor to reassign the Reach Data connectivity. In addition sub reaches may be defined to represent structures not bounded by a stream gage. After editing the Reach Data file is typically renamed to *.rch to avoid it being overwritten every time a new check run is made.
- If a river gage (*.rig) file is provided it is used by the Check option to define stream reaches. If one is not provided the Check optin uses data in the historic stream file (*.rih) to identify stream reaches. As described, this preliminary definition of steram reaches may be redefined by the user in an editor.
- The file format is free. Therefore names like My Name should be entered as a single string with a hyphen (e.g. My_Name) or enclosed in double quotes (e.g. “My Name”).

Row-data	Variable	Description
1	ctype	Free Format

```
1-1             ctype           Reach_Data

2-1             RchIdR          Reach ID
2-2             RchNameR        Reach Name
2-3             RchTo           Reach ID reach goes to
2-4             Rrec24          Reach Name reach goes to
2-5             StaID           Stream ID reach goes to

Repeat row 2 for number of Stream Reaches.

Row-data        Variable        Description
1               ctype           Free Format

1-1             ctype           Node_Data

2-1             StaID           River Station ID
2-2             RchNameX        Reach Name
2-3             iRchX           Associated Reach #
2-4             RchIDX          Reach ID

Repeat row 2 for the number of Stream Nodes.
```

4.54 Plan to Reservoir Recharge Data File (*.plr)

The plan to reservoir recharge file contains information that links a recharge site to an augmentation plan. It provides data that ties a plan ID to a reservoir right, reservoir structure and reservoir owner. StateMod allows one augmentation plan to be tied to more than one recharge sites. This file is read by subroutine GetPlnR.

Note this file uses a free format read (which is slowly being added to other parts of StateMod). Therefore Plan ID's and Plan names should be provided with no spaces or in double quotes (e.g. instead of My Name enter "My Name" or My_Name).

```
Row-data     Variable          Description

Free Format
1-1             cistatP         Plan ID
1-2             cistatR         Reservoir Right ID
1-3             cistatS         Reservoir Structure associated with this Right
1-4             cistatO         Reservoir Owner associated with this plan
```