4.13 Operational Right File (*.opr)

The operational file describes unique operating criteria within the basin. Use of the terms ‘operational rights’ and ‘operating rules’ are used interchangeably herein. The StateMod Model contains the following standard operational rights. This file is read by subroutine OPRINP. Comments, indicated by a # in column 1 may be provided at any location in this file. Because the data associated with this file varies based on the type of operational right selected the input description is repeated for each application.
Beginning with version 12.0 an operating rule file format was adopted that includes six (6) additional variables associated with water reuse, diversion type, etc. For a description of the old (*.par file) format, which StateMod still supports, see the chapter titled **10.0 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.

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**
1	River	Release to the river then divert directly or by exchange
2	Carrier	Release to a carrier. Water is transported to a user by a canal, it is not released to the stream system.
3	Bookover	Transfer from one reservoir account to another account or another reservoir (water is not physically moved)
4	Alternate_Point	Divert at a different location than the water right
5	Out_Of_Priority	Out of Priority

- 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 49 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. The documentation herein includes descriptions of all 49 operating rules in order to be backward compatible and because the original 11 rules are generally simpler to apply.

- Examples of the operating rules are provided in a sample operating rule file (<Chapter4_example_opr>).

- Descriptions of each operating rule and their associated input variables, are included in Sections 4.13.1 to 4.13.49.

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 1. Selecting the appropriate figure based on the source of water, and 2. Selecting the appropriate sub set (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).

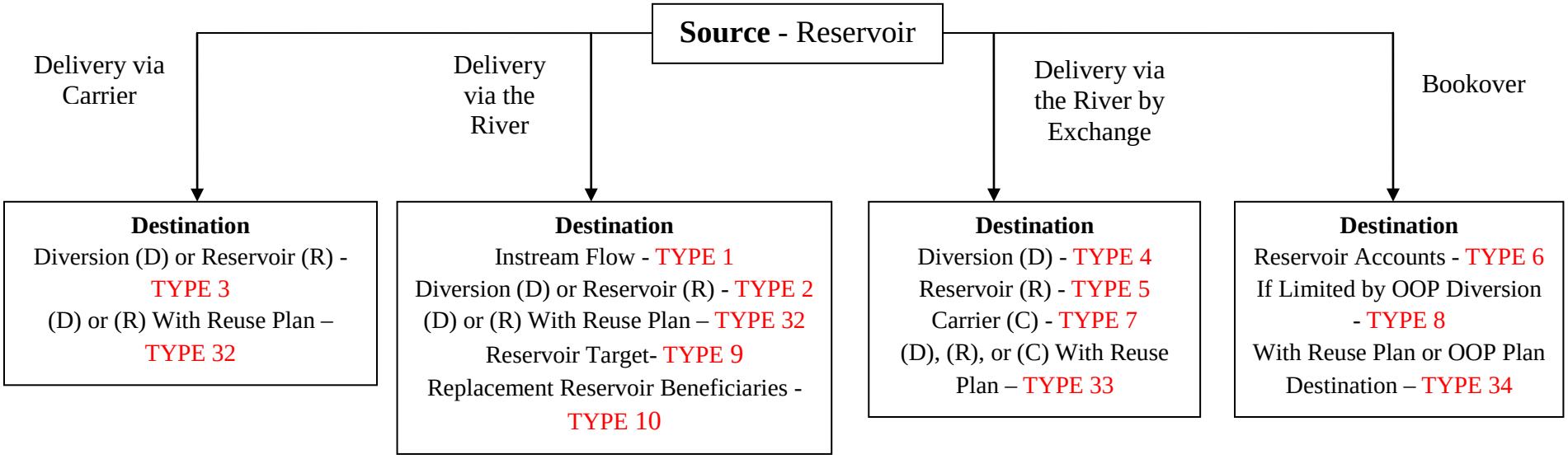
- Example 3 - Release reusable water stored in a Plan (Source) and Reservoir to meet Terms & Conditions on a neighboring tributary (Destination) via a river exchange (Delivery Method)
    - On Figure 3 (Source – Plan Structure) follow the arrow titled "From Reservoir Reuse Plan" to Destination "Terms & 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 operating rule (see Section 4.13.40);

- 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

Operating Rule Types Based on Source and Destination Structures



STATEMOD OPERATING RULES DECISION TREE

Operating Rule Types Based on Source and Destination Structures

Source – Direct Flow Right

Total (100%) Amount of Right

Destination

Carrier (C) to Diversion or Reservoir – TYPE 11
(C) With Loss – TYPE 45
(C) Constrained by Source Ditch Demand – TYPE 14
Diversion or Reservoir by Exchange from Source Structure With Reuse – TYPE 31
Alternate Point of Diversion - TYPE 39
Seasonal Meadow Right - TYPE 36

Pro-Rata Percentage of Diversion Amount or Depletion Amount of Right

Destination

Instream Flow (Interruptible Supply) - TYPE 15
Diversion or With Remainder of Direct Flow Right Used at Source Structure - Direct Delivery - TYPE 24
- Delivery by Exchange - TYPE 25
Reservoir With No Other Use of Direct Flow Right (Diversion Only, Not Depletion) - TYPE 16

STATEMOD OPERATING RULES DECISION TREE

Operating Rule Types Based on Source and Destination Structures

Source – Plan Structure

From Non Reservoir Reuse Plan (e.g. WWTP)

Destination
Diversion, Reservoir, or Carrier
Direct Delivery - TYPE 27
Delivery by Exchange - TYPE 28
Plan Spill (no Carry Over Between Time Steps) - TYPE 29
Well Augmentation Plan or Terms & Conditions Plan
Direct Delivery - TYPE 48
Delivery by Exchange - TYPE 49

From Accounting Plan (i.e. Storage of Pro-Rata Direct Flow Right)

Destination
Split to Multiple Accounting Plans - TYPE 46
Diversion, Reservoir, or Carrier
Direct Delivery - TYPE 27
Delivery by Exchange - TYPE 28
Plan Spill (no Reuse Carry Over Between Time Steps) - TYPE 29
Well Augmentation Plan or Terms & Conditions Plan
Direct Delivery - TYPE 48
Delivery by Exchange - TYPE 49

From Import Plan (i.e. Transbasin Supplies

Destination
Diversion, Reservoir, or Carrier - TYPE 35
Plan Spill (no Reuse Carry Over Between Time Steps) TYPE 29

Well Augmentation Plan or Term & Conditions Plan

Special Plan Rules
Plan Demands Met in Priority by River Flows - TYPE 43

From Reservoir Reuse Plan

Destination
Diversion, Reservoir, or Carrier
Direct Delivery - TYPE 27
Delivery by Exchange - TYPE 28
Plan Spill - TYPE 29
Delivery via Pipeline – TYPE 32
Well Augmentation Plan or Terms & Conditions Plan
Direct Delivery - TYPE 48
Delivery by Exchange - TYPE 49

STATEMOD OPERATING RULES DECISION TREE
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
Navajo Reservoir Release for San Juan RIPRAP - TYPE 20

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
San Juan RIPRAP Releases - TYPE 20
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	Paper exchange between reservoir accounts (bookover)
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	T&C Plan	Reservoir or ReUse Plan	Reservoir, Recharge or ReUse Plan to a T&C Plan Supply a T&C or Augmentation plan from a Reuse Plan, Recharge Plan or a Reservoir
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	ReUse Plan	ReUse Plan Spill Release water from a plan Delivery by the river

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	Direct Flow or Reservoir or Carrier	Import Plan	Import to a Diversion, Reservoir or Carrier with or without Reuse Delivery by the river or carrier
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 Carrier	Water Right	Out-of-Priority Diversion Divert out-of-priority to 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	Instream Flow	Stream Gage	South Platte Compact Limit compact demand to flow downstream of the Washington County line
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	Plan	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

4.13.1 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 monthly 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
```

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)	See Section 7.15 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 maximum system efficiency. Also a +n requires the variable efficiency option (ieffmax) from control file be on. -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             First year of operation

Monthly Data
Free Format
Include only if the monthly 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
Include only if the monthly switch (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 Direct 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)	See Section 7.15 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)	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 monthly 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
Include only if the monthly switch (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 Direct 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 monthly 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
```

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)
                                  See Section 7.15 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.

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             First year of operation Last year of operation

Monthly Data
Free Format
Include only if the monthly 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
```

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, it may be used to transfer water from one storage account to another based on the amount of water diverted by another operating rule specified under variable ciopso(2) (row-data 1-10). Finally if variable iopsou(4,1) (row-data 1-11) is set to 99 the transfer can be limited by the amount specified for diversion structure ciopso(2) (row-data 1-10) for the year and month provided in the direct diversion demand file (*.ddm).

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
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 monthly 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
```

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 7.15 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 monthly 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
Include only if the monthly switch (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 July 2006 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, Frequently Asked Questions, 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 monthly 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
Destination Water Right or Associated Reservoirs		
Include only if the monthly switch (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 monthly switch (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.

```
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 monthly 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

```
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 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 in 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 monthly 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
Include only if the monthly switch (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 monthly 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

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 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.

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 monthly 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
```

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 to not exceed the demand of the structure associated with the source water right (variable ciopso(1) row-data 1-8). The following are noted:

- When the variable iopsou(2,1) 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(2,1) is greater than 1, the diverting structure's demand for the year is limited to the annual value read as variable iopsou(2,1).

- 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 monthly 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 without loss
Include only if the monthly switch (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 monthly 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

Include only if the monthly switch (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 monthly 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

Demand Data

Include only if the monthly switch (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 monthly 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
```

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 monthly 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

4.13.19 Split Channel Operations (ityopr=19)

The type 19 operating rule for split channel operations is currently under development. Standard carrier operating rules for each water right associated with the split channel can be used.

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

The type 20 operating rule was developed to simulate Navajo Reservoir (Division 7) operation under the San Juan Recovery Implementation Plan (SJRIP Hydrology Model Documentation March 24, 2000). Unlike most other operating rules, it requires two rows of data. The first row of data expects:

- The source reservoir (ciopso(1)) and account (iopsou(2,1)).

The second row of data expects:

- sjmina, the minimum available water for the reservoir (acft).
- sjrela, the average release (cfs).

Note this operating rule expects a file of perturbation data provided by a sediment transport analysis, to be provided as part of a time series file (*.ipy). This optional file is provided by setting the control file (*.ctl) variable (itsfile) to 1 to indicate a time series file will be read and providing the response file (*.rsp) the time series files name.

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)	20
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 Data
2                                 Format (12x, 24x, 12x, 4x, 12x, f8.0, f8.0)
2-1             sjmina            Minimum available water (acft)
2-2             sjrela            Average release (af/yr)

Monthly Data
Free Format
Include only if the monthly switch (dumx) = 12 or less than -12
3-1             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
```

4.13.21 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 (see Section 7.10) 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 time series file (*.ipy or *.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 monthly 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

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 monthly 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
```

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 monthly 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
```

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 or reservoir (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.

- **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 (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.

- **Transit losses** between the source and bypass point can be specified by variable OprLoss. Note transit losses are true losses, they are not routed back to the system.

- **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.
    - 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:

        1. 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:

            1. 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:

            2. 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).

3. 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.

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)
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 Note if dumx = ***1-10 or < -12*** carrier loss data cannot be provided for intervening structures +n Transit loss = n% (from Source to Bypass point). Note this is a true loss, returns are not calculated. Also if dumx ***= 1-10 or < -12*** carrier loss data is provided for intervening structures -1 No Transit loss. Note if dumx ***= 1-10 or < -12*** carrier loss data is provided for intervening structures

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 monthly 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 without loss

Include only if OprLoss = 0 and the monthly switch (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 monthly switch (dumx) = 1-10 or < -12
See Section 7.39 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

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
5-12	OprEff(12)	Efficiency in month 12

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 (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 bypass 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), and the destination structure's capacity and the destination structure's demand.

- **Transit losses** between the source and bypass point can be specified by variable OprLoss. Note transit losses are true losses, they are not routed back to the system.

- **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.

    - 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:

        1. 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:

1. 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:

    1. 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).

    2. 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.

```
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)
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 Note if dumx = ***1-10 or < -12*** carrier loss data cannot be provided for intervening structures +n Transit loss = n% (from Source to Bypass point). Note this is a true loss, returns are not calculated. Also if dumx ***= 1-10 or < -12*** carrier loss data is provided for intervening structures -1 No Transit loss. Note if dumx ***= 1-10 or < -12*** carrier loss data is provided for intervening structures

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 monthly 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 without loss

Include only if OprLoss = 0 and the monthly switch (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 monthly switch (dumx) = 1-10 or < -12

See Section 7.39 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(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

Bypass Limits (Monthly and Annual)

Note: Must include 13 values

Free Format

4-1	OprMax(1,1-12)	Monthlybypass limit (af/mo)
4-13	OprMax(1,13)	Annual bypass 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 Not currently used (ityopr=26)

The type 26 operating rule is not currently in use.

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

The type 27 operating rule provides a method to release water from a Reservoir or ReUse plan or Out-of-Priority (OOP) Plan, or Accounting plan to a diversion or reservoir directly via the river or by a carrier. The following are noted:

- 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 7.23 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 7.23 for more details about plans).
- An "**OOP Plan**" is a special structure type that is associated with a diversion or storage taken out-of-priority by a type 38 operating rule.
- If the source is a Reuse or Accounting Plan, the destination may be reusable (e.g. creuse is a reuse plan (type 3, 4, 5 or 6)).
- 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)).
- If the variable OprLimit is set to 0 no operating rule ID should be provided in row 4. In general, the variable OprLimit should be set to 0 if the release is not constrained to monthly and annual limits and the source structure is not a carrier to this operating rule.
- 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 the variable OprLimit is set to 2 the operating rule ID specified in row 4's monthly and annual limits **will be decreased and limit** the amount release. 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 the variable OprLimit is set to 3 the operating rule ID specified in row 4 **will limit** a release to the amount diverted by the operating rule in row 4.

- If the variable copso2 is set to a T&C plan the terms and conditions associated with a prior water transfer are calculated when the water is used by this operating rule. T&C demands are calculated using efficiency data provided with this operating rule, return flow data provided with the plan file (*.pln). Specifically when the source 2 (ciopso(2)) is set to a T&C plan:

    - The efficiency data used to calculate the T&C obligation is expected in row 5.

    - Other T&C data associated with a T&C obligation (return flow location, percent and table) are provided in a plan return flow file (*.prf).

    - Both standard and fixed T&C (return patterns) can be provided. If the source 2 account (iopsou(4,k) is set to 1, the return flow pattern provided is treated as a standard return flow pattern. If the source 2 account (iopsou(4,k) is set to 2 the return flow pattern is treated as a fixed return flow pattern. Note a standard return pattern is independent of time; it extends from the current time step to the specified number of future time steps. For example a monthly model that diverts in June will estimate November return flows using data provided for return flow value 6 (6 months into the future). A fixed return pattern is time dependent; it estimates a monthly return based on a specified monthly return value. For example a monthly model that diverts in June will estimate November T&C requirements (return flows) using data provided for return flow value 11 (November). When a fixed return pattern is used any returns that may be assigned to a month prior to the time a diversion occurs are not included (e.g. an April obligation = 0 if the diversion occurs in June). Also the fixed return pattern is consistent with the year type modeled (e.g. return flow value 1 = January for a calendar year analysis, 1 = October for a water year analysis,and 1 = November for an irrigation year analysis).

- 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.

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 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 Note if dumx = ***1-10 or < -12*** carrier loss data cannot be provided for intervening structures +n Transit loss = n% (from Source to Bypass point) Note this is a true loss that Does not return to the system. Also if dumx ***= 1-10 or < -12*** carrier loss data that returns to the system is provided for intervening structures. -1 No Transit loss. Note if dumx ***= 1-10 or < -12*** carrier loss data that returns to the system is provided for intervening structures

Miscellaneous Limits

1-16	OprLimit	0 Do not adjust Monthly or Annual Operational limits. Also **do not recognize** the capacity of the structure associated with the operational rule in row 4 is already adjusted. 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. 2 **Decrease monthly and annual releases** **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. 3 Limit the amount released by the amount diverted by the operational rule 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 the monthly 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 without loss
Include only if OprLoss = 0 and the monthly switch (dumx) = 1-10 or < -12
Format (36x, 10a12)

3a-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 monthly switch (dumx) = 1-10 or < -12
See Section 7.39 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) > 0
Free Format

4-1	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 If OprLimit=3, Operating Rule ID for which diversions by that rule will **LIMIT** the Amount released

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

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

The type 28 operating rule provides a method to release water from a Reservoir, ReUse Plan, Accounting Plan or Out-of-Priority (OOP) Plan to a diversion or reservoir or carrier by exchange. The following are noted:

- 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 7.23 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 7.23 for more details about plans).

- An “OOP Plan” is a special structure type that is associated with a diversion or storage taken out-of-priority by a type 38 operating rule.

- If the source is a Reuse or Accounting Plan, the destination may be reusable (i.e. creuse is a reuse plan (type 3, 4, 5 or 6)).

- 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)).

- If the variable OprLimit is set to 0 no operating rule ID should be provided in row 4. In addition, because the capacity of the source structure of the operating rule ID specified in row 4 has already been adjust the source structure’s capacity **may limit** the amount diverted. In general, the variable OprLimit should be set to 0 if the release is not constrained to monthly and annual limits and the source structure is not a carrier to this operating rule.

- If the variable OprLimit is set to 1 the operating rule ID specified in row 4 **will limit** its monthly and annual limits adjusted by the amount released. Also because the capacity of the source structure of the operating rule ID specified in row 4 has already been adjust the source structure’s capacity will not limit the amount diverted.

- If the variable OprLimit is set to 2 the operating rule ID specified in row 4 **will limit** a release to that operating rule’s monthly and annual limits. Also because the capacity of the source structure of the operating rule ID specified in row 4 has already been adjust the source structure’s capacity will not limit the amount diverted.

- If the variable OprLimit is set to 3 the operating rule ID specified in row 4 **will not limit** a release to that operating rule’s monthly and annual limits. However because the capacity of the source structure of the operating rule ID specified in row 4 has already been adjust the source structure’s capacity will not limit the amount diverted.

- If the source 2 variable (ciopso2) is set to a T&C plan the terms and conditions associated with a prior water transfer are calculated when the water is used by this operating rule. The variable iousou(4,1) is used to indicate how T&C demands are calculated.

    - 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:

        1. 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:

        2. 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:

        1. 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).

        2. 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 row 5. Note the CU Factors typically represent negotiated valued 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.

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 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 Note if dumx = ***1-10 or < -12*** carrier loss data cannot be provided for intervening structures +n Transit loss = n% (from Source to Bypass point) Note this is a true loss, returns are not calculated. Also if dumx ***= 1-10 or < -12*** carrier loss data is provided for intervening structures. -1 No Transit loss. Note if dumx ***= 1-10 or < -12*** carrier loss data is provided for intervening structures

Miscellaneous Limits

1-16	OprLimit	0 Do not adjust Monthly or Annual Operational limits. Also **do not recognize** the capacity of the structure associated with the operational rule in row 4 is already adjusted. 1 Adjust 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. 2 Limit monthly or annual **releases** by the 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. 3 Do not adjust Monthly or Annual Operational limits. **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 monthly 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 without loss
Include only if OprLoss = 0 and the monthly switch (dumx) = 1-10 or < -12
Format (36x, 10a12)

3a-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 monthly switch (dumx) = 1-10 or < -12
See Section 7.39 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) > 0
Free Format

4-1	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

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

5-1	OprFac(1)	CU factor in month 1
5-2	OprFac(2)	CU factor in month 2
...		... ...
5-12	OprFac(12)	CU factor in month 12
		Repeat for number of return flow locations

4.13.29 ReUse or Accounting Plan Spill (ityopr=29)

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

- 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 7.23 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 7.23 for more details about plans).

- 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)) should 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.

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)	Supply Reservoir ID or ReUse 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 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 monthly 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

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 (type 26) 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 (type 26) 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	0.0

Miscellaneous Limits

1-16	OprLimit	0.0

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 monthly 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 without loss

Include only if the monthly switch (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 monthly 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 without loss
Include only if the monthly switch (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 Reuse Plan to a User Direct (ityopr=32)

The type 32 operating rule provides a method to release water from a reservoir and a reservoir reuse plan (plan type 3 or 5) to a reservoir, direct flow structure or a carrier located downstream of the reservoir. Also it can make a direct release from the reservoir to a diversion or 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 delivery method is the river 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 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 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)	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 7.15 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 monthly 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 without loss
Include only if the monthly switch (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 Reuse Plan to a User by Exchange (ityopr=33)

The type 33 operating rule provides a method to release water from a Reservoir and Reservoir Reuse plan to a reservoir, direct flow structure 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 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 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)	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 7.15 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 monthly 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 without loss
Include only if the monthly switch (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.
- 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 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	NA

Conveyance Loss (%)

1-15	OprLoss	0

Miscellaneous Limits

1-16	OprLimit	0 Do not adjust Monthly or Annual Operational limits 1 Limit monthly or annual **releases** by the limits of the operational rule specified in 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 the monthly 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

Associated Operating Rule
Include only if the switch (OprLimit) =2
Free Format

3-1	cx	Operating Rule ID for which monthly and Annual limits will **LIMIT** the amount released

Intervening Structure Data without loss
Include only if the monthly switch (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 Diversion or Reservoir or Carrier with or without Reuse (ityopr=35)

The type 35 operating rule provides a method to import water from outside the system to a reservoir, direct flow structure or a carrier. The imported water may be reused if the variable creuse is set to a reuse plan. In addition, this operating rule can be used to constrain a diversion to the capacity of up to 10 intervening structures or carriers. Note that an import structure should be specified with the same ID in both the diversion station file (*.dds) and plan file (*.pln). Finally monthly import values should be specified as negative demands in the diversion demand file (*.ddm).

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 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 or reservoir ID or carrier 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)	Diversion ID where imported water enters the system
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	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 monthly 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 without loss

Include only if the monthly switch (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
```

4.13.36 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. 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 Switch	Monthly and Intervening Structure +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 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 monthly switch (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 monthly switch (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 monthly 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 without loss		

```
Include only if the monthly switch (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
                                    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            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 monthly 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		
Include only if the monthly switch (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 Alternate Point location. The destination is a diversion. 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. 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.

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 Diversion ID
1-7	iopdes(2,1)	Enter 1
Supply Data		
1-8	ciopso(1)	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)	Alternate Point Location
1-11	iopsou(4,1)	Enter 1
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 monthly 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 without loss
Include only if the monthly switch (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 (ityopr=40)

The Type 40 operating rule simulates the South Platte Compact by limiting an instream flow (Compact Structure) to not benefit from (call out) any water rights located above an index gage (Balzac at the Washington County line). This compact, in general, limits Colorado's commitment to deliver water to Nebraska based on the gain that occurs between the gage at Balzac (Washington County line) and the gage at the state line (Julesburg). Specifically the type 40 rule calculates the compact demand as follows:

Dmax= max(0, Qd (Julesburg) – Qu (Balzac))
Dcompact = min(Qdecree, Qdemand, Dmax)

Where:
Dcompact is the compact diversion
Dmax is the maximum diversion
Qd is the flow at the downstream station (Julesburg gage)
Qu is the flow at the upstream station (Balzac gage)
Qdecree is the compact decree (120 cfs)
Qdemand is the compact demand (120 cfs during the irrigation season, April 1 - Oct 15)

```
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	Destination Instream Flow
1-7	iopdes(2,1)	Destination Account, enter 1

Supply Data

1-8	ciopso(1)	River ID of the Upstream flow station (Balzac)
1-9	iopsou(2,1)	0
1-10	ciopso(2)	River ID of the Downstream flow station (Julesburg)
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	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 monthly 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

Associated Water Right

Include only if the monthly switch (dumx) = 1-10 or < -12

Format (36x, 10a12)

3-1	intern(1,1)	For +dumx, Enter dumx limiting

```
                                   associated instream flow water rights
                                For -dumx, Enter abs(dumx)-12
                                   associated instream flow water rights
```

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 monthly 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
Limiting OOP Plan Volume Data		
Include only if the monthly switch (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 monthly 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
```

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 monthly 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

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 monthly 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 without loss
Include only if the monthly switch (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. Transit losses may be true losses from the system or routed back to the system using the return flow properties of the carrier. 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.

- 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).

- If carrier losses are calculated (OprLoss>0), the plan (creuse) can be used to route return flows to a recharge plan. The plan ID specified must be a recharge plan (type 8).

- 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 non 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).

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 Note if dumx = **1-10 or < -12** carrier loss data cannot be provided for intervening structures +n Transit loss = n% (from Source to Bypass point). Note this is a true loss, returns to the system are not calculated. Also if dumx **= 1-10 or < -12** carrier loss data that returns to the system is provided for intervening structures. -1 No Transit loss Note if dumx **= 1-10 or < -12** carrier loss data that returns to the system is provided for intervening structures

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.

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 7.39 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
```

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 whos demand
                                      will limit the amount diverted.
```

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 user's individual 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.

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 monthly 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
```

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 beginning of every simulation year.
- 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)	1
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 monthly 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
Operating Limits (Monthly and Annual)		
Include if OprLimit = 1		
3-1	OprMax(1,1-12)	Monthly operating limit (af/mo)
3-13	OprMax(1,13)	Annual operating 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 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 7.23 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.

- 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.

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 Transmtn reuse plan (type 5, 6 or 7) or 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)	48
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 monthly 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

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. 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 7.23 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.

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 Transmtn reuse plan (type 5, 6 or 7) or 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 monthly 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