

### VI.5.3B OPERATIONAL FORECAST PROGRAM HYDROLOGIC COMMAND LANGUAGE (HCL) INPUT EXAMPLES

#### Introduction

This Section contains sample Hydrologic Command Language (HCL) input for a variety of typical runs of the Operational Forecast Program (FCST).

The examples not only illustrate the HCL input for typical runs but also show various ways in which the FCST program can be used.

The examples are primarily intended to show runs involving the use of more than one Function and illustrate the relationship between Functions. Examples of the input for single Function runs are given under each Function in Section VI.5.3C [[Hyperlink](#)].

In all of the examples it is assumed that no Local HCL defaults have been set except that the output time zone (NOUTZ) and daylight savings switch (NOUTDS) Techniques are assumed to be set to meet the user's requirements. In reality the user would set default values to meet other Local requirements and reduce the HCL input.

#### Examples

##### **Example 1. Preprocessors for entire user area**

This example shows the HCL input for a run of all the preprocessors for the entire user area. Two days of observed data are included (most recent day plus the inclusion of late observations from the previous day), but only the most recent day is displayed. Five days of future MAPX, MAT, MAPE and RRS time series values are produced. No future MAP values are generated. The MAP Function uses a convective radius of 20 miles to limit the search for point estimators and uses MDR data to time distribute daily MAP estimates into 6 hour values. The last date with observed data defaults to today at 12Z. The following results are displayed: observed and estimated non-zero daily precipitation, all 6 hour precipitation, MDR data, observed temperature data, PE station data and all RRS observations. There are 2 Carryover Groups that require MAP computations.

```
@SETOPTIONS
  STARTRUN *-02
  ENDRUN   *+05
  PRLASTDY
  CGROUP  USERCG1
  CONVEC  20.
  MDRDIST
  PRTPP24(2)
  PRTPP6
  PRTMDR
  PRTTINST
  PRTT24
```

```

    STNPE(2)
    RRSALLOB
@COMPUTE MAP
@SETOPTIONS
    CGROUP  USERCG2
    PRTPP24(0)
    PRTPP6(0)
    PRTMDR(0)
@COMPUTE MAP
@COMPUTE MAPX
@COMPUTE MAT
@COMPUTE MAPE
@COMPUTE RRS
@STOP

```

If the preprocessors were to be executed routinely in this manner then an HCL Procedure could be created to simplify the input even further. Since the use of the convective radius option would change depending on storm type then the CONVEC Technique would be left out of the Procedure. Thus if an HCL Procedure named ALLPP was created then the same run as above could be made by entering:

```

@SETOPTIONS
    CONVEC 20.
@EXECUTE ALLPP

```

### **Example 2. Forecast Group run**

This example shows the HCL input for a run of a single Forecast Group. First the MAP Function is run for the Forecast Group to update the MAP time series based on precipitation reports that have been received since MAP was last run. The MAP Function always estimates missing station data for the entire user area, but MAP time series will only be computed for the area specified. The other preprocessors are always run for the entire area and could be added to this example if needed. For the MAP Function, the options used are: the Tulsa data estimation method, MDR used to fill in zero amounts, 6 hour stations to determine time distribution and displays of the daily and 6 hour data.

For the Forecast Function (FCEXEC) several runtime modifications are entered to modify the runoff, discharges and model variables. If this Forecast Group is downstream of other Forecast Groups, the upstream inflows are obtained from the most recent runs of these upstream areas.

In this example it is assumed that observed data are available through OZ of the current day (i.e. this is an evening forecast run). MAP is only run for the latest 12 hours, whereas FCEXEC starts 2 days ago. The MAP output will be on unit 8, whereas FCEXEC output will be on unit 6.

```

@SETOPTIONS
    LSTCMPDY *00Z
    STARTRUN *

```

```

FGROUP BASINX
ESTTULSA
MDREST24(1)
PRTPP24(2)
PRTPP6
PPPRINT(8)
@COMPUTE MAP
@SETOPTIONS
  STARTRUN *-02
  ENDRUN  *+05
MOD
  .ROCHNG 030118Z
  SEG1  .4  .2  0  .8
  SEG2  0  .4  1.2
  .TSCHNG 0229 0302
  SEGUP FPX QINE 6 400 800 1000 1500 2000 1700 1500
  SEGX FPY STG 12 12.4 15 18
  .WECHNG 0301
  SEGD  6.7
  SEGM  8.1
  SEGB  4.7
  .UHGCHNG 0302
  SEG10 0 2 7 10 7 4 2 1 / UP
  SEG10 4 8 7 5 3 1 / DOWN
  ENDMOD
@COMPUTE FCEXEC
@STOP

```

Actual, rather than relative, dates are required for MODS so that if the MOD cards are left in the HCL input stream on subsequent runs, the MODS will only apply to the periods for which they were intended.

A generalized HCL Procedure also could be defined for use with any Forecast Group through the use of symbolic parameters in the Procedure definition. The default values of the symbolic parameters are assigned when the Procedure is defined. These values then can be changed at run time. An example of the definition of such a Procedure is as follows:

```

@DEFINEL PROCEDURE FGRUN
  PXEST=CONVEC
  MDRUSE=N
  MDRLMT=0
  FGROUP=DUMMY
  STARTMAP=*-01
  STARTFC=*-02
  LASTOB=*
@SETOPTIONS
  LSTCMPDY &LASTOB
  STARTRUN &STARTMAP
  FGROUP &FGROUP
  &PXEST
  MDREST24(&MDRUSE) &MDRLMT
  PRTPP24(2)
  PRTPP6

```

```

    PPRINT(8)
@COMPUTE MAP
@SETOPTIONS
    STARTRUN &STARTFC
    ENDRUN *+05
@COMPUTE FCEXEC
@STOP
END

```

The partial area run for Forecast Group BASINX shown at the beginning of this example can be executed using the generalized FGRUN Procedure with the following input:

```

@SETOPTIONS
    MOD
    All MODS in effect
    ENDMOD
@EXECUTE FGRUN LASTOB=*00Z STARTMAP=* FGROUP=BASINX
    PXEXT=ESTTULSA MDRUSE=Y STARTFC=*-01

```

### **Example 3. Save carryover run**

Carryover can be saved only when an FCEXEC Carryover Group run is made. Normally a carryover save run is made after all the data are posted and processed and all adjustments (MODS) are determined (sometimes referred to as the 'final' run of the day). A carryover save run will take longer to complete than a CGROUP run where carryover is not saved due to the extra computations and disk accesses required.

In the example, the run starts 2 days ago so that any late data from the previous day is included in the carryover values. Carryover is saved for today, but carryover for yesterday, if available, will be automatically updated. No future data are included since these data do not affect today's carryover. The MODS that are currently in effect are stored by Forecast Group names in files. All FCEXEC printout (hydrograph displays, etc.) is turned off. In addition to the FCEXEC Function, two other Functions are included in this example. The CGSTATUS Function displays a table showing which dates carryover is available and the PRINTOPS Function displays a summary of current conditions for the snow and Sacramento models.

```

@SETOPTIONS
    CGROUP USERGG
    STARTRUN *-02
    ENDRUN *
    SAVETDY
    PRINTOUT(0)
    MOD
        .INCLUDE BASINA
        .INCLUDE BASINB
        .INCLUDE BASINC
        .INCLUDE BASIND
    ENDMOD
@COMPUTE FCEXEC

```

```

@COMPUTE CGSTATUS
@SETOPTIONS
  PRNTCGRP USERCG
  PRNTLAST 1
  PRNTOPER SNOW-17 SAC-SMA
@COMPUTE PRINTOPS
@STOP

```

An HCL Procedure could be created from these instructions, named FINAL for example, to reduce the HCL input. The input for the carryover save run would then become:

```
@EXECUTE FINAL
```

#### Example 4 - QPF or contingency run

No future precipitation data were used in the previous examples. This example shows a run where future MAP data are input and translated into time series by the FMAP Function. The future MAP time series are then used by the FCEXEC Function to generate QPF or contingency forecasts at points of interest.

The HCL input could be:

```

@SETOPTIONS
  LSTCMPDY *
  MOD
  .FMAP6 030318Z
  AREA17-AEA8 .5 2.0 1.0 0.5
  AREA6 01. 1.5 1. .5
  AREA29 0 .2 .5 2. 1. .5
  ENDMOD
@EXECUTE QPFFPX

```

where the HCL Procedure contains the instructions to produce a run using future precipitation for the river network above a certain flow point. The Procedure QPFFPX contains:

```

@SETOPTIONS
  FGROU FPX
  INCLUDE QPFOPT
  PLOTHYD (FPX)
  PLOTHYD (FPM)
  PLOTHYD (FPZ)
@COMPUTE FMAP
@COMPUTE FCEXEC
@SETOPTIONS
  FUTPRECP(0)
  PRINTOUT(0)
@COMPUTE FCEXEC
@STOP

```

The named option QPFOPT contains the QPF related options for FCEXEC and the ENDRUN value for both FMAP and FCEXEC.

```
STARTRUN *-01
ENDRUN  *+10
FUTPRECP(1)
PLOTTHYD(0)
```

In this example future MAP time series values are first input via the .FMAP6 MOD to define the QPF pattern. The special Forecast Group FPX is then run. This special Forecast Group contains the Segments needed to produce a QPF forecast at point X, a point where QPF forecasts are frequently requested. The QPFOPT named option sets the run period, turns the future precipitation flag 'on' for the FCEXEC Function and turns all hydrograph plots 'off'. Next hydrograph plots are turned 'on' for only those points where a QPF forecast is needed. After the QPF forecast is computed, the FCEXEC Function is run again with future precipitation and printout 'off' in order to reset all time series in the Processed Data Base back to their pre-QPF condition. If this last step is not included then a subsequent regular forecast run for a downstream FGROUP could use upstream inflows stored in the Processed Data Base that contain QPF generated flows.