

# OHD RATING CURVE TOOL

## 1. Description

The OHD Rating Curve tool includes:

- A USGS RDB to FEWS Ratings xml translator
- A simple text to FEWS Ratings xml translator

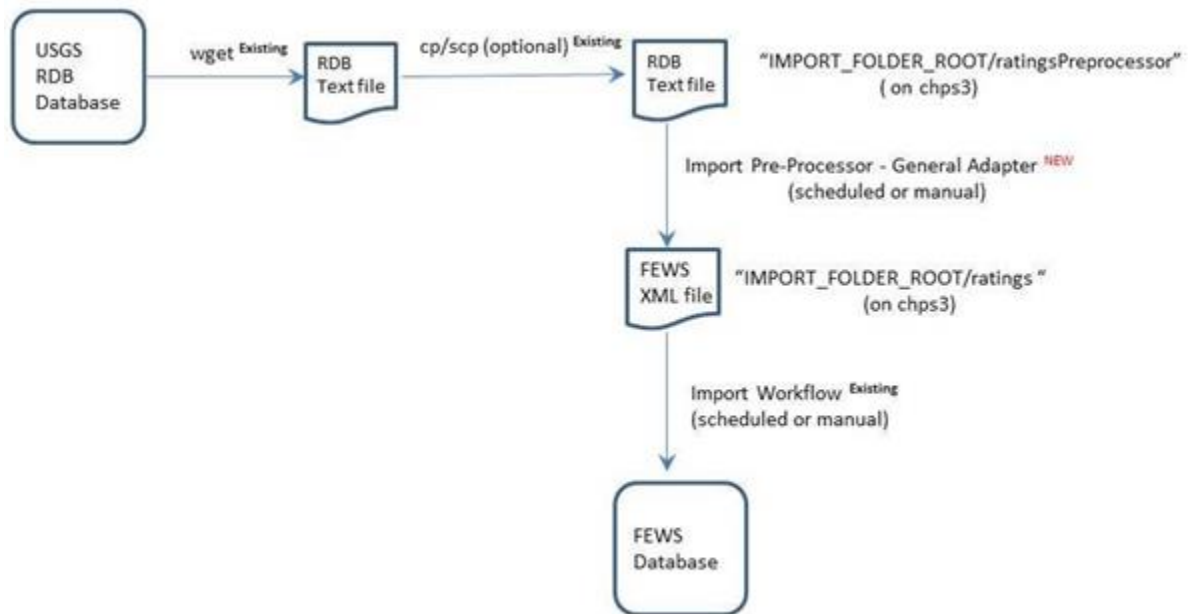
The above translators will produce log messages in FEWS to report success/failure (including information to help decode failures)

The proposed OHD Rating Curve Tool uses a daily CRON job and FEWS scheduled workflows to get Ratings into the FEWS database. The outline of the job is as follows:

- Download RDB files (external RFC cron/script)
- Convert to FEWS XML (OHD Rating Curve Tool – this Utility)
- FEWS-Import Ratings Workflow (existing FEWS workflows)

The OHD rating curve tool allows multiple RDB or simple text files as input and produces a single XML file to be imported by CHPS.

The following diagram shows the actual flow of how the USGS rating curve will be imported into CHPS.



RDB files will be converted to FEWS XML rating curve format following the business logic in the FEWS Rating Schema.

The same path is used for TXT files where rating curve information is defined as key and values pairs. When using TXT files, the TXT input is translated to the FEWS XML rating curve without any extra business logic.

## 2. Utility Parameters

The OHD rating curve tool uses an XML representation of model parameters where each parameter is captured within a separate XML tag. Each tag represents a pre-defined mapping of USGS number to FEWS location identifier.

The table below shows the available parameter tags.

Name	Type	Required [Yes/No]	Comment
USGSNUMBER_TO_LOCATIONID_MAPPING	Table	Yes	USGS Number to Location Id mapping

Sample Parameters xml file:

```

...
<parameter id="USGSNUMBER_TO_LOCATIONID_MAPPING">
  <table>
    <columnIds A="usgsNumber" B="locationID"/>
    <row A="15266110" B="SKLA2"/>
    <row A="15284000" B="MATA2"/>
    <row A="15275100" B="CHRA2"/>
    <row A="15041201" B="TKUA2"/>
  </table>
</parameter>
...

```

### 3. Utility Input

The input files (RDB or TXT) are converted by the rating curve tool into FEWS XML format following the FEWS XML Schema definition. The Rating Curve Tool uses the input file name extension to differentiate the input type format. RDB file name extension is used to identify the input file RDB and TXT file name extension is used to identify the input type TXT.

Below is a table that shows the required fields to create the FEWS rating curve XML file.

#### 3.1 Input file RDB

Below is an example of the input RDB file and a table that show the fields required to create the FEWS rating curve XML file.

RDB files can be obtained in two different ways:

From the web use -

[https://waterdata.usgs.gov/nwisweb/get\\_ratings?site\\_no=03284000&file\\_type=exsa](https://waterdata.usgs.gov/nwisweb/get_ratings?site_no=03284000&file_type=exsa)

On LINUX use -

“wget https://waterdata.usgs.gov/nwisweb/data/ratings/exsa/USGS.03284000.exsa.rdb”.

Where the text in red is the USGS site id and can be change to obtain different set of RDB files.

An extract example of the RDB file as follow:

```
# //UNITED STATES GEOLOGICAL SURVEY http://water.usgs.gov/
# //NATIONAL WATER INFORMATION SYSTEM http://water.usgs.gov/data.html
# //DATA ARE PROVISIONAL AND SUBJECT TO CHANGE UNTIL PUBLISHED BY USGS
# //RETRIEVED: 2013-09-09 20:45:41
# //WARNING
# //WARNING The stage-discharge rating provided in this file should be
# //WARNING considered provisional and subject to change. Stage-discharge
# //WARNING ratings change over time as the channel features that control
# //WARNING the relation between stage and discharge vary. Users are
# //WARNING cautioned to consider carefully the applicability of this
# //WARNING rating before using it for decisions that concern personal or
# //WARNING public safety or operational consequences.
# //WARNING
# //FILE TYPE="NWIS RATING"
# //DATABASE NUMBER=01 DESCRIPTION=" Standard data base for this site."
# //STATION AGENCY="USGS " NUMBER="15041200 " TIME_ZONE="AKST" DST_FLAG=Y
# //STATION NAME="TAKU R NR JUNEAU AK"
# //DD NUMBER=" 2" LABEL="Discharge (ft3/s)"
# //PARAMETER CODE="00060"
# //RATING SHIFTED="20130909200000 AKDT"
# //RATING ID=" 6.0" TYPE="STGQ" NAME="stage-discharge" AGING=A
# //RATING REMARKS="Updated for high flow measurements, describes V1 applied to rating 5.1"
# //RATING EXPANSION="logarithmic"
```

```

# //RATING OFFSET1=26.00
# //RATING_INDEP ROUNDING="2223456782" PARAMETER="Gage height (ft)"
# //RATING_DEP ROUNDING="222233332" PARAMETER="Discharge (ft3/s)"
# //RATING_DATETIME BEGIN=20081001000500 BZONE=AKDT END=20120930235959 EZONE=AKDT AGING=A
# //RATING_DATETIME COMMENT="start R 6.0 at new WY 2009"
# //RATING_DATETIME BEGIN=20121001000000 BZONE=AKDT END=23821230090000 EZONE=AKST AGING=W
# //RATING_DATETIME COMMENT="carry R 6.0 to WY 2010"
# //SHIFT_PREV BEGIN="20130705153100" BZONE="AKDT" END="-----" EZONE="----"
# //SHIFT_PREV STAGE1="30.00" SHIFT1="0.12" STAGE2="34.70" SHIFT2="0.12" STAGE3="39.50" SHIFT3="0.00"
# //SHIFT_PREV COMMENT="Start fill shift above effective range of shift on outburst peak, mmt's 200-201 after peak indicated fill."
# //SHIFT_NEXT BEGIN="-----" BZONE="----" END="-----" EZONE="----"
# //SHIFT_NEXT STAGE1="----" SHIFT1="----" STAGE2="----" SHIFT2="----" STAGE3="----" SHIFT3="----"
# //SHIFT_NEXT COMMENT=" "
INDEP   SHIFT   DEP      STOR
16N     16N     16N     1S
28.08   0.12    1300    *
28.09   0.12    1310
28.10   0.12    1320
28.11   0.12    1340
28.12   0.12    1350
28.13   0.12    1360
28.14   0.12    1370
28.15   0.12    1390
28.16   0.12    1400
28.17   0.12    1410
28.18   0.12    1430
28.19   0.12    1440
28.20   0.12    1450
28.21   0.12    1460
28.22   0.12    1480
28.23   0.12    1490
28.24   0.12    1500
.....
45.40   0.00    134000
45.41   0.00    134000
45.42   0.00    135000
45.43   0.00    135000
45.44   0.00    135000
45.45   0.00    135000
45.46   0.00    135000
45.47   0.00    135000
45.48   0.00    136000
45.49   0.00    136000
45.50   0.00    136000  *

```

FEWS XML Schema has a series of fields mark as *required*; the required fields are show in **red** in the table below. To see the details of required fields in the FEWS XML Schema you can refer to the following url:  
[http://fews.wldelft.nl/schemas/version1.0/pi-schemas/pi\\_ratingcurves.xsd](http://fews.wldelft.nl/schemas/version1.0/pi-schemas/pi_ratingcurves.xsd)

The purpose of this table is to identify the fields (if available) in a USGS RDB file that should be used to fill the FEWS Rating Curve xml file.

<b>FEWS schema component</b>	<b>if needed, USGS field equivalent (in quotes) or other way to determine</b>	<b>OHD Comment</b>
timeZone	not needed	Expressed as an

		offset from GMT (default 0)
locationId	no USGS field -  (but the USGS number that maps to the locationID is in the field "STATION: NUMBER")	pre-defined mapping of USGS# to location id in the parameters XML file.
qualifierId	not needed	Used when existing attributes not enough to distinguish 2 time series
startDate	no USGS field  defined by user as either: 1. an absolute date or 2. number of days back, relative to the import date	use property "relativeStartTimeInDaysBeforeT0" or "startTimeInMMDDYYYYHHZ" defined in module configuration
endDate	not needed	
longName	not needed	
stationName	"STATION: NAME"	
stageUnit	"RATING_INDEP: PARAMETER"	Recognized FEWS string for units (e.g. FT, CFS, etc.)
dischargeUnit	"RATING_DEP: PARAMETER"	Recognized FEWS string for units (e.g. FT, CFS, etc.)
sourceOrganisation	"STATION: AGENCY"	
sourceSystem	not needed	
Comment	will store existing USGS fields defined in the RDB file	use property "metaDataFields" defined in module configuration to identify which fields
creationDate	not needed	Date of import into CHPS (CHPS may add this on its own)
creationTime	not needed	Date of import into CHPS (CHPS may add this on its own)
region	not needed	
interpolationMethod	"RATING: EXPANSION"	Either "linear" or "logarithmic"
minStage	no USGS field.  use the minimum value in the rating curve	
maxStage	no USGS field	

	use the maximum value in the rating curve	
For each row in the table of values <ul style="list-style-type: none"> <li>● Stage</li> <li>● Discharge</li> <li>● logScaleStageOffset</li> </ul>	Use column 1 (Stage) and column 2 (Discharge) values below of the table below rows labeled as headers (# //)  INDEP SHIFT DEP STOR 16N 16N 16N 1S 28.08 0.12 1300 *	

### 3.2 Input file TXT

The input TXT file format is converted by the rating curve tool to FEWS XML format. Below is an example of the input TXT file and a table that show the fields required to create the FEWS rating curve XML file.

Most of the fields in the input TXT file are used without any processing prior to insertion into the FEWS XML file except for: “*locationId*” which is translated using the predefined mapping of USGS# to location Ids. The optional “*qualifierId*” is preprocessed to remove the incremental number that differentiates it from the others. “*Stage*”, “*discharge*” and “*logScaleStageOffset*” are preprocessed to set each row value in in the FEWS XML schema.

An example of the input TXT file follows:

```
locationId=08340500
qualifierId1="qualifierId 1"
qualifierId2="qualifierId 2"
startDate="0426201012Z"
stationName="KENTUCKY RIVER AT LOCK 10 NEAR WINCHESTER, KY"
stageUnit="FT"
dischargeUnit="CFS"
sourceOrganisation="USGS"
comment="ID="14.0" TYPE="STGQ" NAME="stage-discharge" AGING=A"
interpolationMethod="logarithmic"
minStage=8.8
maxStage=45.14
stage1=8.8
discharge1=5.0
logScaleStageOffset1=8.7
stage2=8.9
discharge2=10.0
logScaleStageOffset2=8.7
stage3=8.95
discharge3=14.0
logScaleStageOffset3=8.7
stage4=9.0
discharge4=20.0
logScaleStageOffset4=8.7
stage5=45.14
```

discharge5=123000.0  
logScaleStageOffset5=8.7

FEWS XML schemas have a series of fields mark as *required*, which are shown in **red** in the table below. To see the details of required fields by FEWS XML Schema you can refer to the following url: [http://fews.wldelft.nl/schemas/version1.0/pi-schemas/pi\\_ratingcurves.xsd](http://fews.wldelft.nl/schemas/version1.0/pi-schemas/pi_ratingcurves.xsd)

The purpose of this table is to identify the fields (if available) in a TXT file that should be used to fill the FEWS Rating Curve xml file.

FEWS schema component	if needed, TXT field equivalent or other way to determine	OHD Comment
timeZone	not needed	Use the default value defined in module configuration
<b>locationId</b>	locationId	pre-defined mapping of USGS# to location id in the parameters XML file.
qualifierId	qualifierId1, qualifierId2	Multiple qualifier Ids are allowed in FEWS XML Schema, in order to differentiate each qualifier id an incremental number was added to each one.
<b>startDate</b>	startDate	Start data in format <i>startTime</i> in MMDDYY YYHHZ is expected
endDate	endDate	
longName	longName	
stationName	stationName	
<b>stageUnit</b>	stageUnit	Value is a recognized FEWS string for units (e.g. FT, CFS, etc.)
dischargeUnit	dischargeUnit	Values is a recognized FEWS string for units (e.g. FT, CFS, etc.)
sourceOrganisation	sourceOrganisation	
sourceSystem	sourceSystem	
comment	comment	
creationDate	creationDate	
creationTime	creationTime	

region	region	
interpolationMethod	interpolationMethod	Values are either "linear" or "logarithmic"
minStage	minStage	
maxStage	maxStage	
For each row in the table of values <ul style="list-style-type: none"> <li>● Stage</li> <li>● Discharge</li> <li>● logScaleStageOffset</li> </ul>	stage1 discharge1 logScaleStageOffset1 stage2 discharge2 logScaleStageOffset2 stage3 discharge3 logScaleStageOffset3 ...	In order to differentiate each row in the table an incremental number was added to each field to identify the row.

#### 4. Zero Flow Stage

The Zero Flow Stages is controlled by the property “zeroFlowStage” in the ModuleConfigFiles/ratingcurve/ConvertRDBRatings.xml and ConvertTXTRatings.xml files. If this property is set to TRUE then Zero Flow Stage computation is trigger otherwise the standard Rating Curve Tool computation is used.

The following is a high level description of how Zero Flow Stage is computed; with examples with and without Zero Flow Stage computed.

1. If the Zero Flow Stage is already defined with an existing offset, we keep it and no computation is required. Logic is already in place in previous version of Rating Curve Tool software.

No Zero Flow Stage computed.

2. If more than one Zero Flow Stage is already defined for the existing offset at the first stage/discharge pair. In this particular case we removed all Zero Flow Stages and we keep the largest stage, we use the zero flow stage as the offset for all the stages greater than or equal to the zero flow stage and less than or equal to the original offset.

Without Zero Flow Stage (BEFORE):

```
<row stage="1.49" discharge="0.0" logScaleStageOffset="149"/>
<row stage="1.51" discharge="0.0" logScaleStageOffset="1.49"/>
<row stage="1.53" discharge="0.02" logScaleStageOffset="1.49"/>
<row stage="1.55" discharge="0.11" logScaleStageOffset="1.49"/>
<row stage="1.56" discharge="0.2" logScaleStageOffset="1.49"/>
```



```

<row stage="1.58" discharge="0.49" logScaleStageOffset="1.49"/>
With Zero Flow Stage (AFTER):
<row stage="1.51" discharge="0.0" logScaleStageOffset="1.51"/>
<row stage="1.53" discharge="0.02" logScaleStageOffset="1.51"/>
<row stage="1.55" discharge="0.11" logScaleStageOffset="1.51"/>
<row stage="1.56" discharge="0.2" logScaleStageOffset="1.51"/>
<row stage="1.58" discharge="0.49" logScaleStageOffset="1.51"/>

```

3. If the Zero Flow Stage is not defined with an existing offset at the first stage/discharge pair. We compute the Zero Flow Stage values and we set it as the Minimum Stage value at zero flow. Also, use the Zero Flow Stage as the offset for all stages greater than or equal to the zero flow stage and less than or equal to the original offset.

Without Zero Flow Stage (BEFORE):

```

<minStage>1.8</minStage>
  <maxStage>INF</maxStage>
  <row stage="1.8" discharge="7.5" logScaleStageOffset="1.8"/>
  <row stage="1.96" discharge="12.0" logScaleStageOffset="1.8"/>
  <row stage="2.0" discharge="13.0" logScaleStageOffset="1.8"/>
  <row stage="3.0" discharge="60.0" logScaleStageOffset="1.8"/>
  <row stage="3.53" discharge="98.0" logScaleStageOffset="1.8"/>
  <row stage="4.0" discharge="139.0" logScaleStageOffset="1.8"/>

```

With Zero Flow Stage (AFTER):

```

<minStage>1.12</minStage>
  <maxStage>INF</maxStage>
  <row stage="1.23" discharge="0.07" logScaleStageOffset="1.12"/>
  <row stage="1.58" discharge="3.1" logScaleStageOffset="1.12"/>
  <row stage="1.96" discharge="12.0" logScaleStageOffset="1.8"/>
  <row stage="2.0" discharge="13.0" logScaleStageOffset="1.8"/>
  <row stage="3.0" discharge="60.0" logScaleStageOffset="1.8"/>
  <row stage="3.53" discharge="98.0" logScaleStageOffset="1.8"/>

```

4. If the Zero Flow Stage is not defined and there are no offset defined or just a 0.00 feet offset defined in the USGS rating curve. We compute the Zero Flow Stage values and we set it as the Minimum Stage value at zero flow. Also, use the Zero Flow Stage as the offset for all stages greater than or equal to the zero flow stage and less than or equal to the original offset.

Without Zero Flow Stage (BEFORE):

```

<minStage>2.0</minStage>
  <maxStage>INF</maxStage>
  <row stage="2.0" discharge="77.0" logScaleStageOffset="2.0"/>
  <row stage="2.01" discharge="80.0" logScaleStageOffset="2.0"/>
  <row stage="2.12" discharge="120.0" logScaleStageOffset="2.0"/>
  <row stage="2.9" discharge="550.0" logScaleStageOffset="2.0"/>

```

```

<row stage="3.0" discharge="625.0" logScaleStageOffset="2.0"/>
<row stage="3.03" discharge="649.0" logScaleStageOffset="2.0"/>
<row stage="4.0" discharge="1620.0" logScaleStageOffset="2.0"/>
  With Zero Flow Stage:

```

With Zero Flow Stage (AFTER):

```

<minStage>1.51</minStage>
<maxStage>INF</maxStage>
<row stage="1.51" discharge="0.0" logScaleStageOffset="1.51"/>
<row stage="1.53" discharge="0.02" logScaleStageOffset="1.51"/>
<row stage="1.55" discharge="0.11" logScaleStageOffset="1.51"/>
<row stage="1.56" discharge="0.2" logScaleStageOffset="1.51"/>
<row stage="1.58" discharge="0.49" logScaleStageOffset="1.51"/>
<row stage="1.6" discharge="0.96" logScaleStageOffset="1.51"/>
<row stage="1.62" discharge="1.7" logScaleStageOffset="1.51"/>
<row stage="1.7" discharge="7.5" logScaleStageOffset="1.51"/>
<row stage="1.76" discharge="16.0" logScaleStageOffset="1.51"/>
<row stage="1.89" discharge="45.0" logScaleStageOffset="1.51"/>
<row stage="2.0" discharge="77.0" logScaleStageOffset="2.0"/>
<row stage="2.01" discharge="80.0" logScaleStageOffset="2.0"/>
<row stage="2.12" discharge="120.0" logScaleStageOffset="2.0"/>
<row stage="2.9" discharge="550.0" logScaleStageOffset="2.0"/>
<row stage="3.0" discharge="625.0" logScaleStageOffset="2.0"/>
<row stage="3.03" discharge="649.0" logScaleStageOffset="2.0"/>
<row stage="4.0" discharge="1620.0" logScaleStageOffset="2.0"/>

```

5. If the Zero flow stage is not defined with a negative discharge as the first or second discharge value. We compute the Zero Flow Stage values and we set it as the Minimum Stage value at zero flow. Also, use the Zero Flow Stage as the offset for all stages greater than or equal to the zero flow stage and less than or equal to the original offset.

Without Zero Flow Stage (BEFORE):

```

<minStage>-0.33</minStage>
<maxStage>13.6</maxStage>
<row stage="-0.33" discharge="0.98" logScaleStageOffset="-0.42"/>
<row stage="-0.3" discharge="3.0" logScaleStageOffset="-0.42"/>
<row stage="-0.2" discharge="11.0" logScaleStageOffset="-0.42"/>
<row stage="-0.1" discharge="21.0" logScaleStageOffset="-0.42"/>
<row stage="0.0" discharge="32.0" logScaleStageOffset="-0.42"/>
<row stage="0.1" discharge="44.0" logScaleStageOffset="-0.42"/>
<row stage="0.2" discharge="56.0" logScaleStageOffset="-0.42"/>
<row stage="0.3" discharge="69.0" logScaleStageOffset="-0.42"/>

```

With Zero Flow Stage (AFTER):

```

<minStage>-0.36</minStage>
<maxStage>13.6</maxStage>
<row stage="-0.33" discharge="0.98" logScaleStageOffset="-0.42"/>

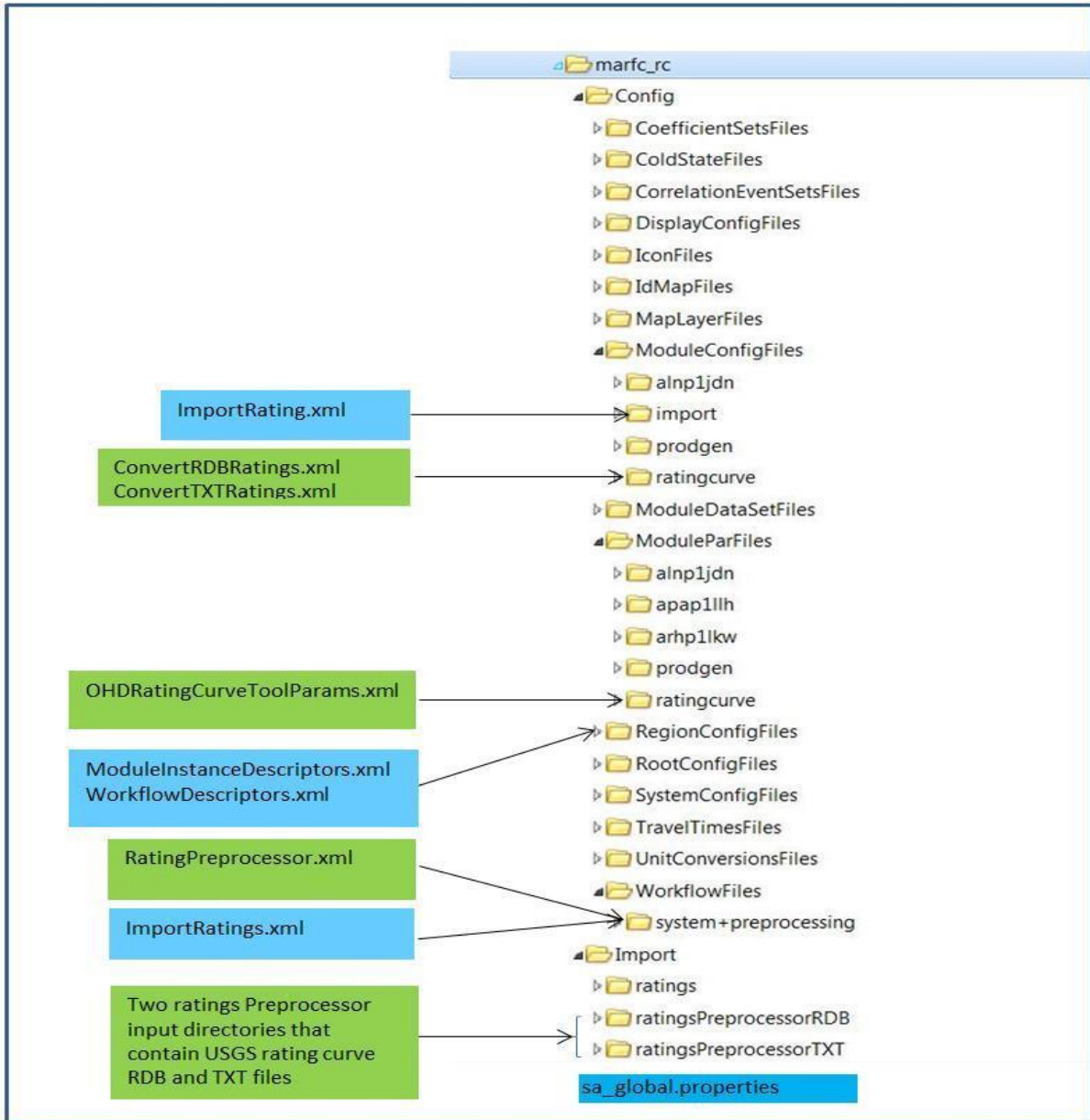
```

```
<row stage="-0.3" discharge="3.0" logScaleStageOffset="-0.42"/>
<row stage="-0.2" discharge="11.0" logScaleStageOffset="-0.42"/>
<row stage="-0.1" discharge="21.0" logScaleStageOffset="-0.42"/>
<row stage="0.0" discharge="32.0" logScaleStageOffset="-0.42"/>
<row stage="0.1" discharge="44.0" logScaleStageOffset="-0.42"/>
<row stage="0.2" discharge="56.0" logScaleStageOffset="-0.42"/>
```

## 5. Configuring the OHD Rating Curve Tool in FEWS

### 5.1 Affected Configuration Files

The image to the right summarizes all the configuration files affected by the installation steps provided herein. The xml filenames in a **green box** are new files and in a **blue box** are those which are to be modified.



This table shows important XML examples from a number of files and explains their purpose.

XML snippets	Required [Yes/No]	RDB , TXT or Both	Purpose
<b>Properties in ModuleConfigFiles/ratingcurve/ConvertRDBRatings.xml and ConvertTXTRatings.xml</b>			
<int key="printDebugInfo" value="0"/>	Yes	Both	Specifies whether INFO and/or DEBUG messages are logged.

			DEBUG messages will only appear if the property "printDebugInfo" ≠ 0
<string key="inputType" value="TXT"/>	Yes	Both	If "inputType" is "TXT", then it must be defined in ConvertTXTRatings.xml. Otherwise, "RDB" must be defined in ConvertRDBRatings.xml
<string key="pathToRatingsInputFile" value="\$IMPORT_FOLDER_RATING_TXT\$"/>	Yes	Both	Specifies the directory where all input files will be converted.  Both "\$IMPORT_FOLDER_RATING_TXT\$" and "\$IMPORT_FOLDER_RATING_RDB\$" variables are defined in sa/oc_global.properties file. The "IMPORT_FOLDER_RATING_TXT" must be used in ConvertTXTRatings.xml and "IMPORT_FOLDER_RATING_RDB" must be used in ConvertRDBRatings.xml
<string key="pathToRatingsOutputFile" value="\$IMPORT_FOLDER_RATING\$"/>	Yes	Both	Specifies the directory where all generated files will be placed.  The "IMPORT_FOLDER_RATING" variable must be defined in sa/oc_global.properties file
<string key="relativeStartTimeInDaysBeforeT0" value="15"/> Or <string key="startTimeinMMDDYYYYHHZ" value="0101197012Z"/>	Yes	RDB	One of "relativeStartTimeInDaysBeforeT0" or "startTimeinMMDDYYYYHHZ" is required to define for the startDate.
<string key="metaDataFields" value="RATING ID, RATING NAME, RATING REMARKS, STATION NAME, STATION NUMBER"/>	No	RDB	The RATING ID, RATING NAME, RATING REMARKS, STATION NUMBER and STATION NAME are shown in the RDB file. It represents what extra fields to include as Rating Curve comments.
<string key="useMaxStageInRatingCurveAsMaxStage" value="TRUE"/>	No	RDB	It needs to define the max stage of the RatingCurve using the maximum stage in the stage/discharge pairs. Otherwise, the default "INF" is used.

<code>&lt;string key="zeroFlowStage" value="TRUE"/&gt;</code>	No	RDB	Specified if zero Flow Stage should be computed when not present in the input file. Otherwise, the default " <b>FALSE</b> " is used.
<code>&lt;string key="ratingCurvePrecision" value="half-foot"/&gt;</code>	No	RDB	The ratingCurvePrecision should be either " <b>whole-foot</b> ", " <b>tenth-foot</b> ", or " <b>half-foot</b> " (default).
<b>ModuleParFiles/ratingcurve/OHDRatingCurveToolParams.xml</b>			
<pre> &lt;group id="default"&gt;   &lt;parameter id="USGSNUMBER_TO_LOCATIONID_MAPPING"&gt;   &lt;table&gt;     &lt;columnIds A="usgsNumber" B="locationID"/&gt; &lt;row A="15024800" B="STKA2"/&gt;     ...   &lt;/table&gt; &lt;/parameter&gt; &lt;/group&gt; </pre>	Yes	Both	This is an example to add the USGS number that is mapped to the locationID in FEWS (i.e Additional USGS Number by adding <row> tag and replace the value of column A and B).

## 5.2 Installing OHD Rating Curve Tool into FEWS

There are several configuration files that need to be setup.

### 1. ConvertXXXRatings.xml (ModuleConfigFiles)

- Make a directory for the ratingcurve tool,
  - e.g. ModuleConfigFiles/ratingcurve
- Copy the ConvertRDBRatings.xml and ConvertTXTRatings.xml files from the links below to the "ratingcurve" directory

[ModuleConfigFiles/ratingcurve/ConvertRDBRatings.xml](#)

[ModuleConfigFiles/ratingcurve/ConvertTXTRatings.xml](#)

### 2. ImportRating.xml (ModuleConfigFiles/import)

- Replace the "`<importType>NWS-DATACARD-RATING-CURVE</importType>`" line with the "`<parserClassName>nl.wldelft.fews.pi.PiRatingCurveParser</parserClassName>`" line. (optional – this may already be in place)

### 3. OHDRatingCurveToolParams.xml (ModuleParFiles)

- Make a directory for the ratingcurve tool,
  - e.g. ModuleParFiles/**ratingcurve**
- Copy the OHDRatingCurveToolParams.xml from the link below to the “ratingcurve” directory

[ModuleParFiles/ratingcurve/OHDRatingCurveToolParams.xml](#)

### 4. ModuleInstanceDescriptors.xml (RegionConfigFiles)

- Register the new moduleInstances at the bottom of the file by adding lines below:

```
<!-- Begin - OHD Rating Curve Tool -->
  <moduleInstanceDescriptor id="OHDRatingCurveToolParams">
    <moduleId>GeneralAdapter</moduleId>
  </moduleInstanceDescriptor>
  <moduleInstanceDescriptor id="ConvertRDBRatings">
    <moduleId>GeneralAdapter</moduleId>
  </moduleInstanceDescriptor>
  <moduleInstanceDescriptor id="ConvertTXTRatings">
    <moduleId>GeneralAdapter</moduleId>
  </moduleInstanceDescriptor>
<!-- End - OHD Rating Curve Tool -->
```

### 5. WorkflowDescriptors.xml (RegionConfigFiles)

- Register the new “RatingsPreprocessor” workflow at the bottom of the file by adding the lines below:

```
<!-- OHD RatingCurve Tool -->
  <workflowDescriptor id="RatingsPreprocessor" name="RatingsPreprocessor"
forecast="false" visible="true" allowApprove="false">
  <description>OHD RatingCurve Converter</description>
</workflowDescriptor>
<!-- End OHD RatingCurve Tool -->
```

### 6. RatingsPreprocessor.xml (WorkflowFiles/System+preprocessing)

- Copy the RatingsPreprocessor.xml file from the link below to the existing “System+preprocessing” directory

[WorkflowFiles/System+preprocessing/RatingsPreprocessor.xml](#)

### 7. ImportRatings.xml (WorkflowFiles/System+preprocessing)

- Add the lines below before the moduleInstanceId “ImportRating”

```
<activity>
  <runIndependent>true</runIndependent>
  <workflowId>RatingsPreprocessor</workflowId>
</activity>
```

## 8. xx\_global.properties (%REGION\_HOME %)

- Add the following properties if they do not already exist:

```
IMPORT_FOLDER_RATING_RDB=$IMPORT_FOLDER_ROOT$/ratingsPreprocessorRDB
IMPORT_FOLDER_RATING_TXT=$IMPORT_FOLDER_ROOT$/ratingsPreprocessorTXT
```

**Note:** xx is sa or oc

**REGION\_HOME** is the standalone or oc directory used to run CHPS

## 9. Create ratingPreprocessorRDB and ratingPreprocessorTXT directories (%REGION\_HOME%/Import)

```
$cd REGION_HOME/Import
$mkdir -p ratingPreprocessorRDB ratingPreprocessorTXT
```

## 6. Running and Viewing the OHD Rating Curve Tool

- To prepare the USGS RDB and TEXT input files to be converted, do the following:

1. Copy USGS RDB files to Import/ratingsPreprocessorRDB directory

Example:

```
cp USGS.15024800.exsa.rdb REGION_HOME/Import/ratingsPreprocessorRDB
```

2. Copy USGS TEXT file to Import/ratingsPreprocessorTXT directory

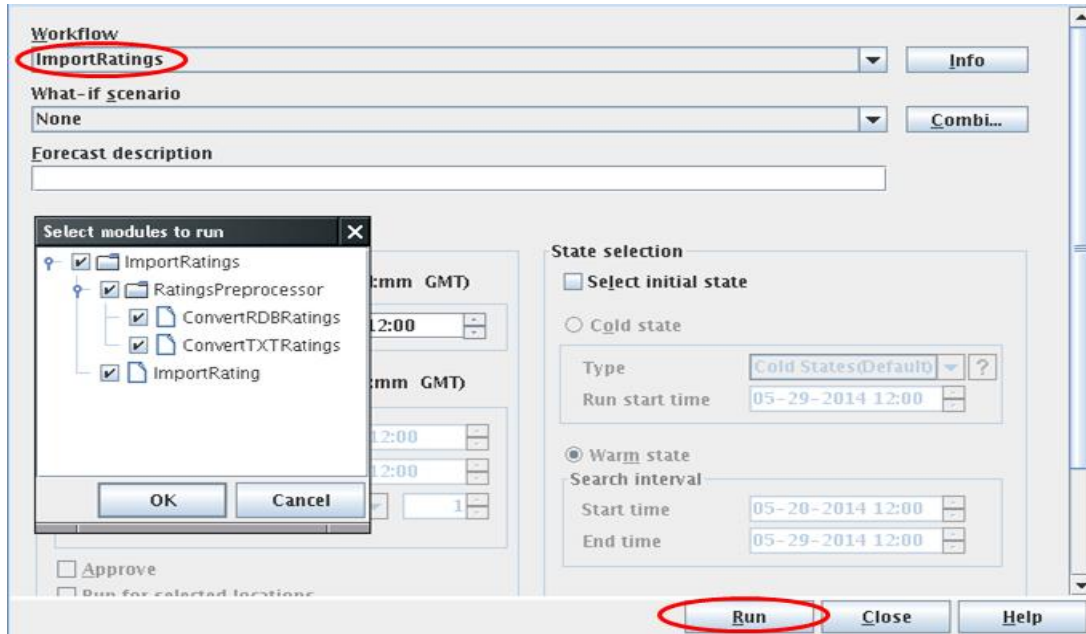
Example:

```
cp USGS_15052500.txt REGION_HOME/Import/ratingsPreprocessorTXT
```

- To run and view the Rating Curve, do the following:

1. Start CHPS
2. Click on  (Manual Forecast) icon
3. Select “**ImportRatings**” workflow






4. Click “Run” button.
5. Wait for the message “Workflow ImportRatings Completed” in the “Logs” window.
6. Click on “Logs” window and press F12/J to open database viewer
7. Check Rating Curve successfully imported
  - Select “ImportRatings” workflow
  - Select and right click on any “locationId”
  - Select “Show rating curve”.

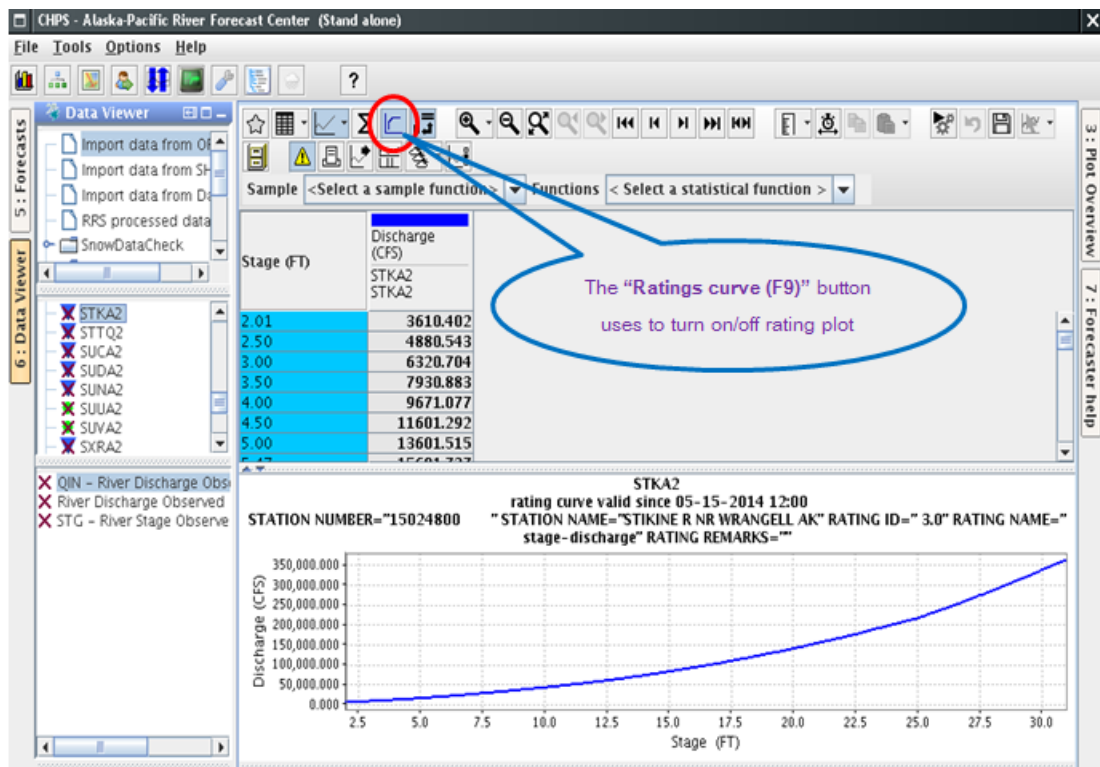
```

Rating curves
<?xml version="1.0" encoding="UTF-8"?>
<RatingCurves xmlns="http://www.wdelft.nl/fews/PI" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.wdelft.nl/fews/PI http://fews.wdelft.nl/schemas" >
  <timeZone>0.0.0.</timeZone>
  <ratingCurve>
    <header>
      <locationId>STKAZ </locationId>
      <startDate date="2014-05-15" time="12:00:00"/>
      <stationName>STKAZ </stationName>
      <stageUnit>FT </stageUnit>
      <dischargeUnit>CFS </dischargeUnit>
      <comment>STATION NUMBER="15024800" STATION NAME="STIKINE R NR WRANGELL AK" RATING ID=" 3.0" RATING NAME="stage-discharge" RATING REMARKS="" </comment>
    </header>
    <table>
      <interpolationMethod>logarithmic</interpolationMethod>
      <minStage>2.01 </minStage>
      <maxStage>INF </maxStage>
      <row stage="2.01" discharge="3610.402"/>
      <row stage="2.5" discharge="4880.5435"/>
      <row stage="3" discharge="6320.7036"/>
      <row stage="3.5" discharge="7930.883"/>
      <row stage="4" discharge="9671.077"/>
      <row stage="4.5" discharge="11601.292"/>
      <row stage="5" discharge="13601.515"/>
      <row stage="5.470001" discharge="15601.737"/>
      <row stage="5.500001" discharge="15801.76"/>
    </table>
  </ratingCurve>
</RatingCurves>

```

8. Display Rating Curve within FEWS
  - Click on “Data Viewer” tab
  - Select rating “locationId” in second pane of Data View window
  - Select any “parameter” in third pane of Data View window
  - Click on  “Plots” tab

**Note:** To display ratings, the parameter choice is not really important, selecting the locationId is the needed step.



## 7. FEWS Adapter Used

N/A

## 8. Common Issues

Issues	Possible causes
<b>WARNING MESSAGE</b>	
There are no offsets or zero-flow ordinates defined. You may want to redefine this rating with an estimated zero-flow ordinate. minStage set to X	There are no offset values defined in the input RDB file. And the first ordinate value read is a non-zero value.
Offsets are defined, but a shift has been applied and the lowest ordinate is below the lowest offset. You may want to redefine this rating with an estimated zero-flow ordinate and an additional lower offset. minStage set to X	The first offset value is bigger than the first ordinate value read in the RDB file. All ordinates values lower than the first offset values are ignored.
Output Files in directory: "OUTPUT_RATING_CURVE_DIR" could not be saved to work dir: "WORK_DIR", it	The run info property " <b>pathToRatingsOutputFile</b> " must be defined and must contain a directory that

does not exist or cannot be written to.	exists and can be written to.
DischageUnit: "DISCHARGEID" for file "FILE_NAME" is not defined as valid. Using the default value of: CFS	The discharge unit found in the input RDB file does not match one of the defined as valid units. The default value of CFS is used instead.
StageUnit: "STAGE_UNIT" for file: FILE_NAME" is not defined as valid. Using the default value of: Gage height (ft)	The stage unit value was not found in the input RDB file a default value is set.
For locationId: LOCATION_ID the first two Stages values in the file "FILE_NAME" are equals. An error will occur if Zero Flow Stage value is computed. Input file processed without Zero Flow Stage flag enable.	The first two Stages values provided in the input RDB file used to compute the Zero Flow Stage are equals. If these values are used during the Zero Flow Stage calculation an error will produce wrong output data at the minimum stage value.
<b>ERROR MESSAGE:</b>	
LocationId: "LOCATION_ID" for file "FILE_NAME" could not be found in parameters xml file. Please check OHDRatingCurveToolParams.xml under ModuleParFiles/ratingcurve directory.	The "Station Number" read from the RDB file is not defined in the parameters xml file (OHDRatingCurveToolParams.xml). A matching "Station Number" to Location Id must be defined in the parameters xml file.
DischageUnit: "DISCHARGE_UNIT" for file: "FILE_NAME" is not defined as valid.	The valid discharge unit are: <b>Discharge (ft3/s)</b> and <b>Discharge (cfs)</b>
StageUnit: "STAGE_UNIT" for file: "FILE_NAME" is not defined as valid.	The valid stage unit is: <b>Gage height (ft)</b>
Rating curves for file: "FILE_NAME" not processed	The RDB file will not be converted to a rating curve xml format and will not be ingested by CHPS.
LocationId: "LOCATION_ID" for file: "FILE_NAME" has less than two stage-discharge values defined. Need at least 2 stage-discharge values defined for minStage and maxStage"	The number of stage-discharge is minor to two. At least two must exist to be a valid RDB file.
Please provide correct information from run info in the model parameter file name: "INPUT_PARAM_FILE" does not exist!	The input parameter xml path or file name defined in the run info is invalid.
Parameter XML file is not defined in the runInfo file	Parameter XML file is not defined in the run Info file
"pathToRatingsInputFile" is not defined in the runInfo file	The run info is missing the property " <b>pathToRatingsInputFile</b> "
Output directory, "OUTPUT_DIR", does not exist or cannot be written to.	The run info property " <b>pathToRatingsOutputFile</b> " has the wrong path, or the path is not writable.
Rating Curve output directory is not defined or empty, the following property must exist: "pathToRatingsOutputFile"	The run info is missing the property " <b>pathToRatingsOutputFile</b> "
Input Rating Curve file type: " inputType", must be one of: "RDB" or "TXT"	The run info property " <b>inputType</b> " is empty or does not have one of the values " <b>RDB</b> " or " <b>TXT</b> "
Input Rating Curve file type is not defined or empty, must be one of: "RDB" or "TXT"	The property " <b>inputType</b> " was not defined in the run info file. The valid values are

	<b>“RDB” or “TXT”</b>
Rating Curve start time is not defined or empty, one of following properties must exist: "relativeStartTimeInDaysBeforeT0" or "startTimeinMMDDYYYYHHZ"	The run info property "relativeStartTimeInDaysBeforeT0" or <b>“startTimeinMMDDYYYYHHZ”</b> is missing.
Rating Curve precision: "ratingCurvePrecision" does not have a valid format. It must be one of the following: "half-foot", "tenth-foot", "whole-foot " Using default value: "half-foot"	Rating curve precision has the wrong value set. It could have only one of the following values: <b>“half-foot, whole-foot or tenth-foot”</b> . If this value is not set correctly or not present, the default value of <b>“half-foot”</b> is used.
"DischageUnit: DISCHARGE_UNIT " for file: "FILE_NAME" is not defined as valid.	The discharge unit is not found in the input RDB file.
The file: "FILE_NAME" could not be process as it contains negatives flow values.	Only positive flow values could be used as part of the Zero Flow Stage computation.
<b>INFO MESSAGE:</b>	
No RDB input files to convert. Please check ratingsPreprocessorRDB under Import directory ...	The import directory is empty or the files do not have the RDB extension.
No TXT input files to convert. Please check ratingsPreprocessorTXT under Import directory ...	The import directory is empty or the files do not have TXT extension.