**How to use the   
Standard Methods Automated Records Tool (SMART)**

The following assumes SMART has been installed on your NWIS server.

1. There are 4 files that should be managed by a local SMART coordinator. These are;
2. The files “include” and “exempt”. These files are used to limit which stations SMART will process. Only one of these files can be used to limit the stations processed. If SMART is to process site visits and discharge measurements for all stations, both of these files should remain empty. If the Science Center wishes to limit the stations SMART processes two choices exist. If the file “include” is populated with a list of station numbers or agency codes and station numbers, SMART will process site visits and discharge measurements for only those stations contained in the file. If no agency code is supplied, SMART assumes the agency code is USGS. Site visits and discharge measurements associated with all other stations will not be processed. If the file “include” contains any entries the file “exempt” will not be evaluated. If the file “include” is empty and the file “exempt” is populated with a list of station numbers or agency codes and station numbers all site visits and discharge measurements associated with stations not contained in the file will be processed. Site visits and discharge measurements associated with the stations contained in the file will not be processed.
3. The file “smartCntrl” contains the default values for parameters used by the SMART application. The parameters and their values are discussed in the installation instructions.
4. The file “stationSpecificData” contains parameters and values for a specific station where the default values in “smartCntrl” are judged to be inappropriate. The parameter values that can be modified are;

* Apply shifts (-as) – the legitimate values are “y” or “n”. The recommended default for SMART is “y” which tells the application to perform a shift analysis and modify the current shift-variation diagram. If a decision is made to not apply shifts at a site the parameter and value combination of “–asn” can be added to the file “stationSpecificData”.
* APPLYGHCOR – Y or N, apply type 1 gage height corrections returned in the upload file to NWIS, yes or no. Type 1 data corrections currently are passed back to NWIS by the ART software. As type 1 data corrections are returned by SWAMI, expected to be in a 4.11 version of SWAMI, automated entry of data corrections for SWAMI files will be available.
* dbNum (-dn) – the NWIS data base number to use for this station. The most common data base number used by Science Centers is “01”.
* Peak Definition (-pd) – the peak definition value. The recommended default value for SMART is 0.33 feet. This value has worked successfully during the ART deployment and SMART Beta testing. The only exception seems to be small coastal streams along Lake Michigan. In this case the value can be lowered using an entry in the file “stationSpecificData”.
* Maximum Shift (-ms) – the maximum shift allowed at this site. The recommended default for SMART is “2.00” feet.
* User e-mail (-un) – an additional email address to whom SMART will send the summary report. If the entry does not include the character “@”, SMART appends “@usgs.gov” to the entry.
* As an example entries in the file “stationSpecificData” to   
  -- not apply shifts at station 0399999 the entry would be  
  03999999 –asn  
  -- to change the peak definition value at 03999998 the entry would be  
  03999998 –pd0.23  
  -- to change the maximum shift value at 03999997 the entry would be  
  03399998 –ms0.75  
  -- to change all the three parameters in the preceding examples at one site the entry would be  
  03999999 –asn –pd0.23 –ms0.75

1. Use of SMART with electronic data files imported or dragged and dropped into Site Visit requires little user interaction,
2. The only action required by a user entering a site visit or discharge measurement using electronic data file is to review the work done by the SMART application. The “cron” jobs that make up the SMART application, will notice the file when it is inserted into NWIS by Site Visit and process the site visit or discharge measurement data contained in the electronic data file.
3. SMART retrieves all hydrologic data values from the NWIS database. At this time the only values read from the original electronic data file are the user name contained in the data file and the software package used to create the data file. The user name contained in the data file will be used to e-mail that user the reports generated by SMART. This value must be a valid Lotus internet user id. That is [jkiesler@usgs.gov](mailto:jkiesler@usgs.gov) not James L. Kiesler. If the software package used to create the data file supports returning type 1 data corrections or user supplied V-diagrams in the electronic data file SMART will read those values from the original data file and apply them to the hydrologic record.  
     
   In the near future as SWAMI and ART are modified to return Type 1 data corrections within the electronic data file these value will be read from the electronic data file and applied to the gage height record. ART will be modified to return user supplied V-diagrams in the electronic data file and these values will also be read and applied to the discharge record.
4. Parameter values used by SMART are set for the Science Center in the file “smartCntrl”. Several of these parameters can be adjusted for a specific station using the file “stationSpecificData”.
5. When submitting multiple discharge measurements on the same day, process the discharge measurement you wish to shift to first. For measurements made prior to that measurement date and time any shift-variation diagrams modified by SMART and associated with those measurements will not be applied. Unfortunately, SMART will apply shift-variation diagrams for discharge measurements made after that initial discharge measurement date and time. It is a good practice to review SMART’s work after a discharge measurement has been processed, especially the shift diagrams applied by SMART. This review is very critical when multiple discharge measurements are processed by SMART.  
     
   One note, ART currently and a future release of SWAMI, will allow the user to note in the electronic data file that a discharge measurement should not be used in shift computations.
6. When a measurement is removed and reentered into NWIS, the user should remove all shift diagrams and data corrections applied since the previous discharge measurement. If the shifts and data corrections are not removed SMART may not apply the proper corrections to the record.
7. Using command-line SMART to process a hand-entered discharge measurement or to rework a previously entered discharge measurement.
8. To run SMART from the command line the user needs to issue the command clsmart.pl –sn######## -sdYYYYMMDDHHNNSS –edYYYYMMDDHHNNSS  
   where ######## is the USGS station number (-sn)  
   YYYYMMDDHHNNSS is the year month, day, hour, minutes, and seconds for the starting date (-sd) or ending date (-ed).

* If the user is processing one measurement only the starting data and time is needed. If there is only one measurement on the day or all measurements on the day should be processed the time component is not needed.

1. The clsmart.pl command creates a queue, which will be processed the next time the “cron” job is run. The recommended default between “cron” runs in 1 minute.
2. If the command clsmart.pl cannot be found, it most likely was not placed in a path to which the user has access to during the installation.
3. The usage for the command line version of SMART can be seen by issuing the command clsmart.pl without a list of arguments.
4. The last action required by a user entering a site visit or discharge measurement using the command line version is to review the work done by the SMART application.
5. Output
6. SMART creates an abbreviated text report that is the body of an e-mail sent to the user identified in the original electronic data file and other users identified in the file “smartCntrl”. Attached to that e-mail is an HTML document that contains all data entered into NWIS for the site visit and any discharge measurements during the site visit.
7. Individuals who receive the SMART reports can come from an entry in the file “smartCntrl”, go2 filters on the local server, or go2 filters stored in SIMS/RMS. The options are controlled by entries in the file “smartCntrl”
8. At least one local person’s e-mail name should be entered as part of the SMART support entry in the file “smartCntrl”. The individuals listed in the entry receive e-mails when SMART has a problem processing a site visit or discharge measurement.
9. Identifying whether SMART is running.
10. There is a file maintained in the SMART home directory named smartStatus.txt. Information is written to this file every time SMART is started by the cron, even if no site visits or discharge measurements are processed. By examining the file the SMART coordinators can determine is SMART is running or has hung. Listed below is the content of the smartStatus.txt file

* 09-08-2011 @ 15:07:02: SMART found no queues to process.
* 09-08-2011 @ 15:07:01: SMART starting to process the look for queue files
* 09-08-2011 @ 15:07:00: SMART found no measurement to process. Now looking to see if other queues containing measurements to process exists. $lookBack: 1<-->$statusNumLines: 10
* 09-08-2011 @ 15:07:00: SMART starting to look for site visits entered using an electronic data file
* 09-08-2011 @ 15:06:04: SMART found no queues to process.
* 09-08-2011 @ 15:06:02: SMART starting to process the look for queue files
* 09-08-2011 @ 15:06:02: SMART found no measurement to process. Now looking to see if other queues containing measurements to process exists. $lookBack: 1<-->$statusNumLines: 10
* 09-08-2011 @ 15:06:01: SMART starting to look for site visits entered using an electronic data file
* 09-08-2011 @ 15:05:02: SMART found no queues to process.
* 09-08-2011 @ 15:05:01: SMART starting to process the look for queue files

1. How to determine if SMART is hung.
2. There have been no reported incidents during the last two months of Beta testing where SMART has hung or started to run-away and prevent users from using NWIS.
3. Has SMART hung

* Generally if SMART hangs the issues is with the EXPECT script storing the data corrections or shift corrections in NWIS. To determe if SMART has hung.
* Use the command “ps –ef | grep spr.p” to determine if there are any SMART processes running.
* If there is a smart process running change directories to the smart log file and issues the command “ls –l –t –r”. The most recent file will be at the bottom of the list. Look at the contents of that log file several times over a few minutes. If the file is not changing the likely hood is that SMART has hung. One note, it may take 5 or more minutes each for the EXPECT scripts to store the data and shift corrections.
* If SMART has hung kill all process related to the SMART process identified with the “ps –ef | grep “spr.p” command above.

1. During one Beta release SMART started to create multiple NWIS processes, enough that it locked out users from NWIS. If this should happen again a kill script is furnished, kill.pl, that can be run to removed all SMART processes.