Standard Operating Procedure (SOP) 10: Data Deliverable Creation, Validation, Acceptance and Dissemination, Version 2.06

Weather and Climate Monitoring Protocol

Arctic (ARCN), Central Alaska (CAKN), and Southeast Alaska (SEAN) Inventory and Monitoring Networks

Change History

Previous Version #	Revision Date	Revised By	Changes	Justification	New Version #
1.00	12/20/2006	P. Sousanes	Added last line to 1st paragraph	Incorporated comments from peer review	1.01
1.01	April 2017	B. Johnson K. Hill S. Miller P. Sousanes	Updated SOP provides details on annual deliverable products and the technical specifications for producing them.	Moved from external data management to internal data management; formalized publication of metadata products.	2.0
2.0	April 2018	B. Johnson M. Bower K. Hill P. Sousanes	Revisions to selected data field definitions, formats, precisions and validation rules.	Correct inconsistencies noticed during first full year of formal deliverable processing.	2.01
2.01	November 2019	B. Johnson M. Bower K. Hill P. Sousanes	Revise WC_C and WC_F criteria.	Clarifications.	2.02
2.02	April 2021	P. Sousanes K. Hill	Revise WC_H criteria Clarification on archiving paths for deliverables	Formal NRDS not needed for this level of reporting. Clarification	2.03
2.03	February 2024	Sousanes	Revisions to how WC_B is processed	Changes to ArcGIS software, proprietary access issues	2.04
2.04	April 2025	T. Ziomek P. Sousanes	Updated figure10A-3. Revised deliverables for WC_H. Minor revisions to naming conventions and software versions,	Changes in accordance with new workflow. Standardized naming conventions and removed restrictive versioning for proprietary software that changes often.	2.05
2.05	April 2026	T. Ziomek P. Sousanes	In WC_G sections (page 10-22 & 10-44) referenced NPS Data	SEAN is currently following these guidelines and creating data packages.	2.06

			Publication Best Practices Sharepoint site.	CAKN & ARCN will start in FY 2027.	

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Overview

The outcome of the network's climate monitoring program takes the form of ten formal deliverable products, described in Table SOP-10.1. These include data products, detailed metadata products required so users may properly interpret the data, and associated NPS reports. The deliverables were chosen so that the research community may effectively make use of the data over the long term, without relying on future availability of key personnel or other agency resources.

The specific algorithms for building them are detailed below in this SOP (except deliverables WC_H and WC_J, which are covered in SOP 12, and deliverable WC_A, addressed in SOP 13).

Appendix SOP 10-A, which follows the procedure sections, documents the technical specifications of each deliverable. Technical content includes, among other things, specific criteria that must be met by each deliverable in order to be considered valid. Until a deliverable is formally accepted as valid, it may not be installed in the authoritative repository from which it gets disseminated. Validity, in this context, means that the content fully meets documented technical criteria; it does not refer to accuracy/precision of measurements nor of the suitability of data to be used for a specific purpose.

The authoritative repository used by all these deliverables is the NPS DataStore. Permanent archiving, disaster recovery, and public accessibility of the deliverables are accomplished through the enterprise facilities built into the DataStore. Versions of deliverables from other sources are not authoritative.

Table SOP-10.1. Complete list of the specific data products created, validated, accepted, and disseminated by this monitoring program.

Deliverable Title	Description	Provided to Customers as	Frequency Produced	Responsibilities		
				Builder	Validator	Acceptor
WC_A: Protocol Narrative-PIP-QAP-DQS-SOP Sets	The detailed document set defining this weather and climate monitoring program throughout its history and published as NRR reports (except SOP Sets) in the NPS DataStore.	PDF files.	New documents as needed, but always prior to the field maintenance season they operate on.	Project Leader	Peer Review Panel	Regional I&M Coordinator
WC_B: Site map	Map documenting location of stations participating in network's climate monitoring. Spatial coordinates (longitude/latitude) in a CSV file.	JPEG or PNG and CSV files	As needed to accommodate new sites.	Project Staff	Project Leader	Project Leader
WC_C: Site visit worksheets	One worksheet per site for a weather year containing one tab for each visit documenting in a standard form the condition of the site, actions taken, and final configuration. Packaged as a cumulative set of all worksheets for all stations in a particular weather year zipped into one file.	Windows files in XLSX format, wrapped into a single ZIP file.	One zip file per year created after completion of all field work.	Project Staff	Project Leader	Project Leader
WC_D: Datalogger program code	The program source code installed into dataloggers for all stations over a field season. They authoritatively document the exact nature of parameters collected.	A ZIP of text files containing all versions of programs used by stations in a field season.	One zip file per year created after completion of all field work.	Project Staff	Project Leader	Project Leader
WC_E: Site photo sets	One set of photos per site per field season used to document physical conditions.	Windows JPEG data files wrapped into a single ZIP file for each site/year.	One ZIP file per site per year created after completion of all field work.	Project Staff	Project Leader	Project Leader

Deliverable Title	Description	Provided to Customers as	Frequency Produced	Responsibilities		
				Builder	Validator	Acceptor
WC_F: Station downloads	The cumulative collection of RAWS station observations in Campbell Scientific .DAT format. It is extracted from the station datalogger during each visit to each site. Multiple years are stored in a ring buffer in the station and the entire buffer is captured on each visit. No data corrections are directly applied to this Processing Level 0 product.	Windows data files of datalogger output in .DAT format wrapped into a single ZIP file for each field season.	One ZIP file per field season containing typically one downloaded file from each station visited that year.	Project Staff	Project Leader	Project Leader
WC_G: RAWS corrected data	The collection of RAWS output for each station in ASCII CSV format at NOAA Processing Level 1B having duplicate readings removed, standard formatting applied, measurement units made consistent, and quality flags plus selected metadata added. This contains all network station data for all years and all stations.	One Windows ASCII CSV data file for each station maintained that covers all years for the station. 2026 update to include a machine readable data package.	Annually, after the WC_F station downloads and WC_C site visit worksheets are accepted.	Project Staff	Project Leader	Project Leader
WC_H: Annual operations report	Annual resource brief and/or operations report in the form of a PDF.	One PDF file.	One PDF file per year created after completion of all field work	Project Leader	Project Leader	Project Leader
WC_I: Calibration certificate images	Scanned images of sensor calibration records provided by instrument vendor/servicer having printed dates that are in one calendar year.	One PDF file covering all instruments in the year.	One PDF file per calendar year following receipt of the year's last calibrated instrument.	Project Staff	Project Leader	Project Leader
WC_J: Periodic report	Multi-year climate analysis based in the parameters collected by stations, written in the form of an NPS NRR publication.	One PDF file.	Once every ten years.	Project Leader	Peer Review Manager	Regional I&M Coordinator

Notes: Unless otherwise specified, year refers to calendar year. A field season refers to an annual summer period when normal station maintenance and retrieval of collected data are performed. The Builder is responsible for creating a deliverable. The Validator is responsible for evaluating whether a candidate deliverable meets the quality criteria specified in Appendix A. The Acceptor documents that a valid candidate deliverable is the best product available and installs it in the repository.

The General Acceptance Process

Table SOP-10.1 recommends for each deliverable the team members who fill the role of Builder, Validator, and Acceptor. These roles may be delegated as circumstances require, but to improve the accuracy of validation it is most desirable that the Builder of a product be a different person than the Validator of the product.

The Builder creates a deliverable product by following the steps specified for it in SOP 10. (Note that all deliverables undergo acceptance, regardless of whether they are tabular data or some other kind of information.) When complete, the Builder submits the product (which is always in the form of a computer file) to the Validator for formal quality assessment. In the event the submission fails validation, the Builder reviews the report provided by the Validator, rebuilds a corrected deliverable, and submits this for validation. The steps and roles are depicted in flowchart form in Figure SOP-10.1.

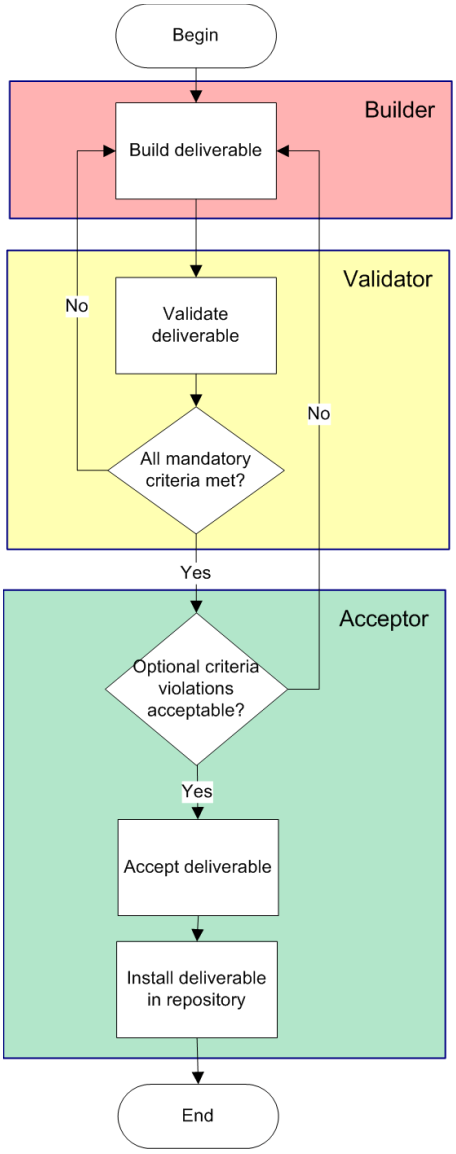


Figure SOP-10.1. Tasks and user roles required by the acceptance process.

The Validator accepts product submissions from the Builder and evaluates their quality according to the criteria specified for the product in Appendix A. The Validator then reports to the other team members by email, listing any quality exceptions encountered. Most deliverables have both Mandatory Criteria and Optional Criteria specified in Appendix A. Mandatory criteria violations are so serious as to require the deliverable submission to be rejected *in toto*. For example, a deliverable specified as being a PDF file type that turns out to internally have spreadsheet XLSX format would typically violate mandatory criteria. Optional criteria suggest possible errors are present which should be reviewed before considering issuing acceptance. For example, parameters falling outside the expected domain or values missing from important fields are often addressed in optional criteria.

The Acceptor reviews the validation report for submissions that have already passed all mandatory criteria. Optional criteria violations are considered and, if corrections are possible, the Acceptor returns the candidate to the Builder for revision and resubmission to the Validator. If all optional criteria are met or if optional criteria violations are not correctable, then the Acceptor attests that the deliverable's quality level meets the written quality standards by adding a sentence to that effect in the Notes section of the appropriate repository reference. The Acceptor then installs, or directs to be installed, the accepted product into the authoritative repository from which it will be disseminated. If an accepted deliverable in the repository is subsequently found to have errors, a new corrected version of accepted data may be produced. The method is the same as that used for generating the deliverable from scratch. After acceptance, the new file is uploaded to DataStore and marked as the latest version.

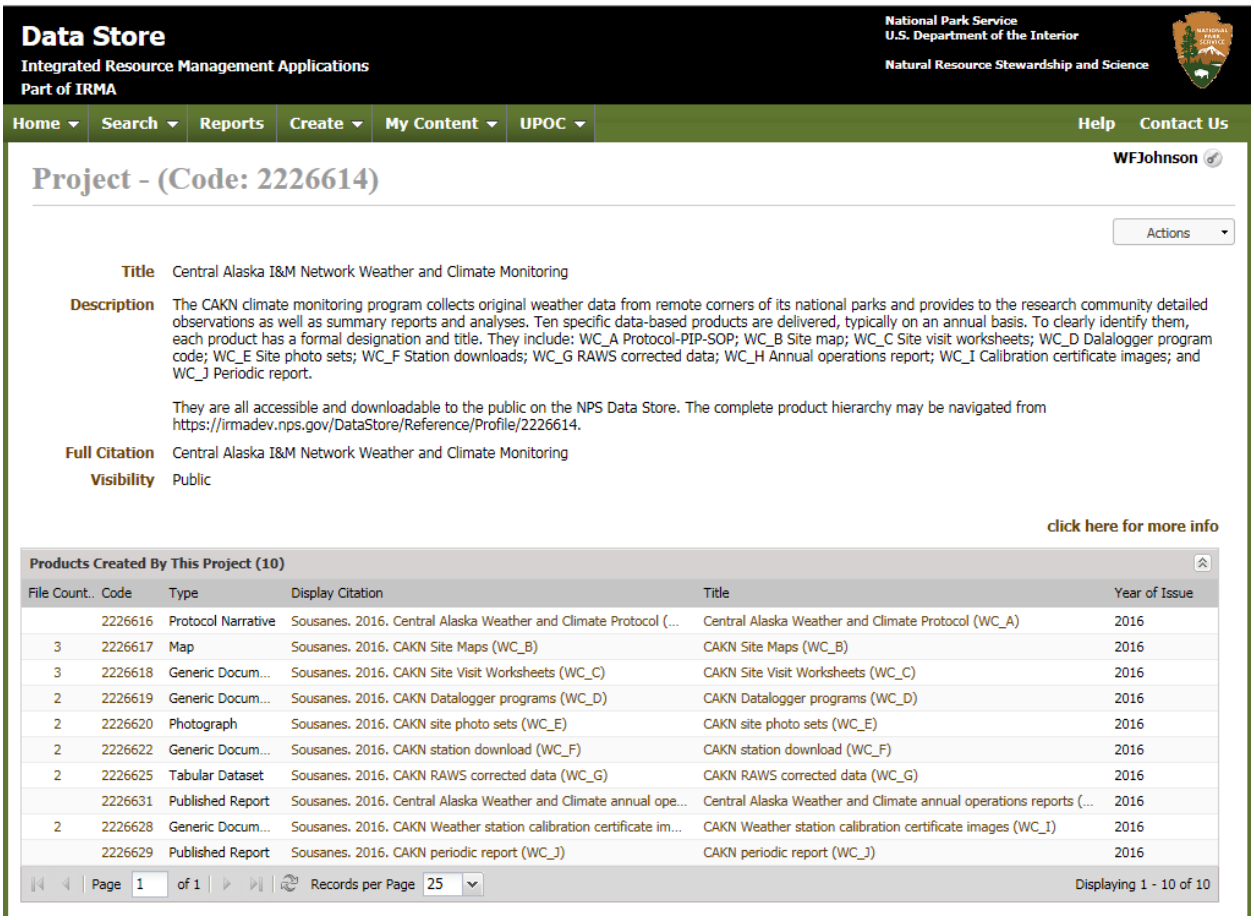
In order to keep track of the work completed as well as what still needs to be done, a spreadsheet similar to the example in Figure SOP-10.2 should be maintained at the root of the project directory.

	A	B	C	D	E	F	G
1	CAKN Climate Monitoring Deliverable Status						
2	Work Year	Deliverable	Most Recently Sent to Validation	Latest Validation Result	Accepted on	Accepted by	Installed in Repository
3	2018	WC_A	[not scheduled for 2018]				
4	2018	WC_B	[not scheduled for 2018]				
5	2018	WC_C	10/10/2018	Passed	10/15/2015	PS	10/15/2015
6	2018	WC_D	11/5/2018	Passed	11/6/2018	PS	11/10/2018
7	2018	WC_E	10/17/2018	Failed			
8	2018	WC_F	12/12/2018	Passed	12/12/2018	PS	12/12/2018
9	2018	WC_G	12/15/2018	Passed	12/17/2018	PS	
10	2018	WC_H					
11	2018	WC_I	1/7/2019	Failed			
12	2018	WC_J	[not scheduled for 2018]				
13	2017	WC_A	[not scheduled for 2017]				
14	2017	WC_B	[not scheduled for 2017]				
15	2017	WC_C	10/5/2017	Passed	10/17/2017	PS	12/1/2017
16	2017	WC_D	10/16/2017	Passed	10/20/2017	PS	12/1/2017
17	2017	WC_E	11/1/2017	Passed	11/1/2017	PS	11/1/2017
18	2017	WC_F	12/1/2017	Passed	12/5/2017	PS	1/14/2018
19	2017	WC_G	12/21/2017	Passed	12/21/2017	PS	1/14/2018

Figure SOP-10.2. Suggested content for a deliverable status tracking sheet.

Repository structure

All deliverables are installed in the NPS DataStore repository. A PROJECT reference is created for each network's weather and climate vital sign monitoring (Figure SOP-10.3). Individual PRODUCT references are created for each deliverable and/or for each year. Suggested product reference types to use for each deliverable are specified in their Appendix A entries. Accepted deliverables may be uploaded as holdings to the corresponding product reference (Figure SOP-10-4) or to the appropriate year reference.



File Count..	Code	Type	Display Citation	Title	Year of Issue
	2226616	Protocol Narrative	Sousanes. 2016. Central Alaska Weather and Climate Protocol (...	Central Alaska Weather and Climate Protocol (WC_A)	2016
3	2226617	Map	Sousanes. 2016. CAKN Site Maps (WC_B)	CAKN Site Maps (WC_B)	2016
3	2226618	Generic Docum...	Sousanes. 2016. CAKN Site Visit Worksheets (WC_C)	CAKN Site Visit Worksheets (WC_C)	2016
2	2226619	Generic Docum...	Sousanes. 2016. CAKN Datalogger programs (WC_D)	CAKN Datalogger programs (WC_D)	2016
2	2226620	Photograph	Sousanes. 2016. CAKN site photo sets (WC_E)	CAKN site photo sets (WC_E)	2016
2	2226622	Generic Docum...	Sousanes. 2016. CAKN station download (WC_F)	CAKN station download (WC_F)	2016
2	2226625	Tabular Dataset	Sousanes. 2016. CAKN RAWS corrected data (WC_G)	CAKN RAWS corrected data (WC_G)	2016
	2226631	Published Report	Sousanes. 2016. Central Alaska Weather and Climate annual ope...	Central Alaska Weather and Climate annual operations reports (...	2016
2	2226628	Generic Docum...	Sousanes. 2016. CAKN Weather station calibration certificate im...	CAKN Weather station calibration certificate images (WC_I)	2016
	2226629	Published Report	Sousanes. 2016. CAKN periodic report (WC_J)	CAKN periodic report (WC_J)	2016

Figure SOP-10.3. Mockup of a DataStore project reference, having links to all formal deliverables produced by the monitoring program.

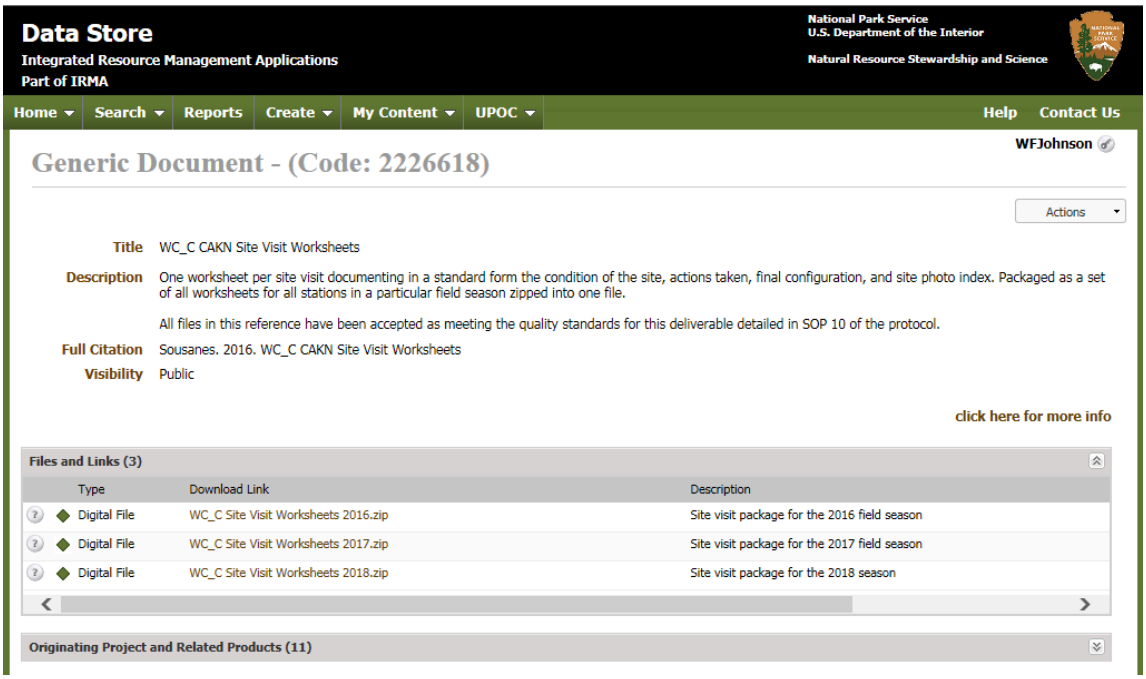


Figure SOP-10.4. Mockup of a DataStore deliverable reference, having links to all downloadable files for the particular deliverable.

Note that deliverables WC_A and WC_J are formal publications required to have their own separate individual NRR references in the repository. New references under the weather and climate project reference are still created for these three deliverables. They are managed as DataStore "cross-references" which point to the already-existing publication references (Figure SOP-10.5). Similarly, there is also a main reference for WC_E photo sets that cross references to a group of subordinate references, one for each station.

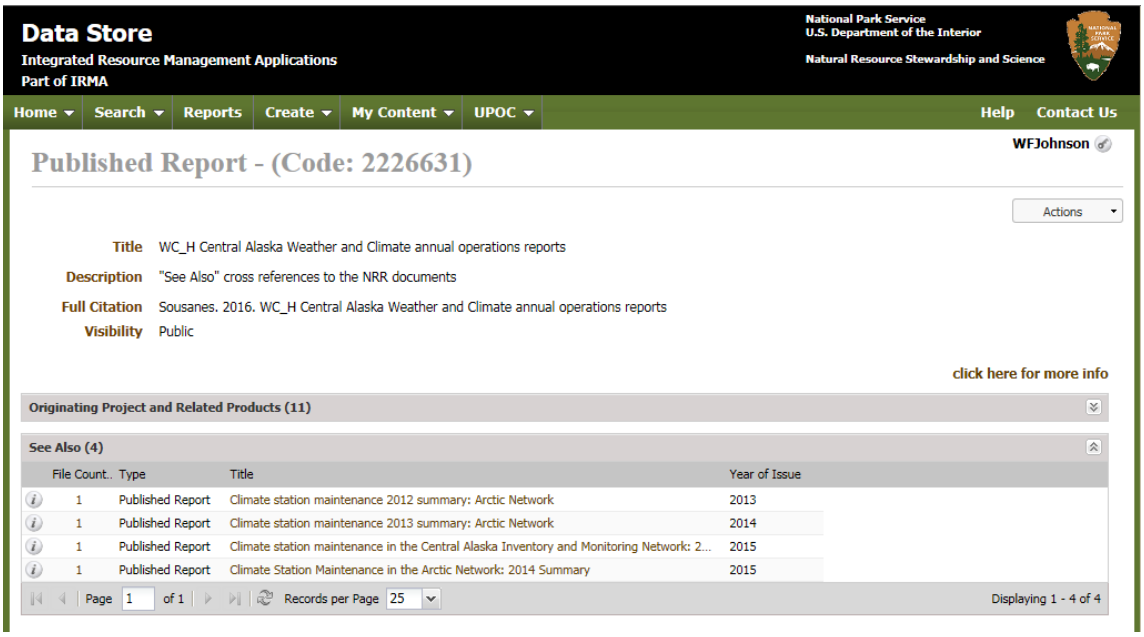


Figure SOP-10.5. Mockup of a DataStore published report deliverable reference, having links to all downloadable file references for the particular deliverable.

This structure permits users to go to the project and cleanly navigate through every permanent item the monitoring program has created. It also provides the mechanism to ensure products will persist in complete documented form after the authors have departed the project.

The single project reference and ten product references need to be created before the repository may be used by the monitoring program.

Processing the protocol, PIP, and SOP documents (WC_A)

This deliverable documents the details of the monitoring program itself. Its processing follows the current formal publication methods defined by the Inventory and Monitoring Division for these special items and is not addressed in this SOP.

Processing the site map deliverable (WC_B)

Summary

This deliverable documents the locations of network-operated stations, past and current. It is used to inform data users of site locations, to illustrate publications, and to assist in logistics communications (SOP 2).

WC_B is a package of two objects: a JPEG or PNG image of the network vicinity with labeled markers superimposed, and a CSV file listing the station name, GPS location, NWS site identifier, date commissioned, and date decommissioned. This deliverable is created at the program's inception and may be updated occasionally to indicate new sites as well as sites that have been deactivated.

Detailed steps

Builder tasks

If this is the initial map being created for the project:

- Create a network folder to house the WC_B product, its updates, and related files.
- Using ArcGIS Pro or similar tool, create a new map file. Export map image as a JPEG or PNG file.
- Use a resolution suitable for printers such as 300x300 pixels.
- Name the file "WC_B_yyyy uuuu Weather and Climate site maps.JPG OR PNG". In the event of multiple revisions in one year, append a letter to the year portion.

Save the .csv file to "WC_B_yyyy uuuu Weather and Climate site maps.CSV".

Validator tasks

Record receipt of the candidate file in the tracking sheet.

Validate against criteria in Appendix A.

Record "passed" or "failed" in the result column of the tracking sheet.

If there are any mandatory errors, return the file to the Builder for correction and resubmission.

If there are no mandatory errors, notify the Acceptor that the candidate is valid and ready for acceptance.

- Provide listing of any optional errors.
- Explain where to find the successful candidate file.

Acceptor tasks

Review any optional errors.

If it appears some of the optional errors are correctible, return the candidate to the Builder for revision and resubmission. Otherwise continue.

Issue acceptance for the valid deliverable file and install file as a holding in the repository.

- Update the tracking sheet with the acceptance date and person accepting.
- Open the DataStore reference that houses all the WC_B deliverables (SEAN) or the reference that houses the most recent year of deliverables (ARCN and CAKN).
- Add one new sentence to the Notes section of the reference attesting to the acceptance of the added deliverable; specify at least filename of the holding, protocol/SOP Set version which defines the quality criteria, person accepting the product, and date it was accepted.

Ensure the permission level of the reference is appropriate for the product's sensitivity.

Upload the two files as holdings (SEAN) or upload the file to the File and Links tab in the Generic Dataset reference (ARCN and CAKN).

If this is a revised file set for an existing deliverable, then add holding descriptions that explains this.

Update the tracking sheet with the date the accepted deliverable was installed in the repository.

Notify any interested parties of the deliverable's availability.

Processing the site visit worksheets deliverable (WC_C)

Summary

Stations are generally visited once per year in order to download the datalogger's observations, replace selected instruments with those freshly calibrated, assess the current state of the installation, and perform preventive maintenance. Occasionally an annual visit may be missed due to, say, inclement weather or depleted travel funding. But it is also possible to visit an installation more than once per year if emergency repairs are needed and resources are available.

The actions taken, conditions encountered, and suggestions for improvement are recorded on a standardized Site Visit Worksheet (SOP 9). This may be in the form of Excel on a field device, or on paper which is later transferred to Excel at the office.

At the end of the field season, the calendar year's spreadsheet files are zipped into a package, run through quality control processes, accepted as meeting required quality standards, installed in the authoritative repository, and disseminated to the scientific community to inform their interpretation of our data.

Detailed steps

<u>Builder tasks</u>

Collect all spreadsheet files created during the annual maintenance effort.

Copy all the year's Site Visit Worksheets from the field laptops to a network folder.

For any sheets that may have been recorded only on paper, enter them into Excel using the latest version of the spreadsheet as template.

Standardize the tab names.

Open each spreadsheet file and set the name of the tab as the date the site visit was made.

If a site had more than one visit during the calendar year, copy the content of the second visit to the second tab in the station's spreadsheet. The result should be one spreadsheet per station each year, but if multiple visits were made to a station, multiple tabs should be present in that one file.

Delete any empty spreadsheet tabs.

Save each file using a name of the form WC_C_yyyy_sssss.XLSX where "yyyy" is the year the site visit was made and "sssss" is a NWS Site Identifier.

ZIP the year's individual program files into a package named WC_C_yyyy.ZIP where "yyyy"is the calendar year covered. Do not include sheets from multiple visits beyond the first one; the sheet for the first visit already has additional tabs documenting any subsequent visits.

Notify the validator that the WC_C candidate is ready; .

<u>Validator tasks</u>

Record receipt of the candidate file in the tracking sheet.

Validate against criteria in Appendix A. Note SOP 9 content will also be needed in order to perform the optional validations.

Record "passed" or "failed" in the result column of the tracking sheet.

If there are any mandatory errors, return the file to the Builder for correction and resubmission.

If there are no mandatory errors, notify the Acceptor that the candidate is valid and ready for acceptance.

Provide listing of any optional errors.

Explain where to find the successful candidate file.

Acceptor tasks

Review any optional errors.

If it appears some of the optional errors are correctible, return the candidate to the Builder for revision and resubmission. Otherwise continue.

Issue acceptance for the valid deliverable file and install file as a holding in the repository.

Update the tracking sheet with the acceptance date and person accepting.

Open the DataStore reference that houses all the WC_C deliverables.

Add one new sentence to the Notes section of the reference attesting to the acceptance of the added deliverable; specify at least filename of the holding, protocol/SOP Set version which defines the quality criteria, person accepting the product, and date it was accepted.

Open the DataStore reference that houses all the WC_C deliverables (SEAN) or the reference that houses the most recent year of deliverables (ARCN and CAKN).

Ensure the permission level of the reference is appropriate for the product's sensitivity.

Upload the file as a holding (SEAN) or upload the file to the File and Links tab in the Generic Dataset reference (ARCN and CAKN).

If this is a revised file for an existing deliverable, then add a holding description that explains this.

Update the tracking sheet with the date the accepted deliverable was installed in the repository.

Notify any interested parties of the deliverable's availability.

Processing the datalogger program source deliverable (WC_D)

Summary

A RAWS datalogger computer periodically reads instrument values, recalculates raw inputs into engineering units (°F, MPH, inches of precipitation, etc.), aggregates them over time, and stores them for collection during maintenance visits. The sampling frequencies, unit types, and methods of aggregation are enforced by the datalogger following specifications in its program source code.

The programming is occasionally revised to support new instruments and/or new standards of measurement. The definitive documentation on the exact nature of the data collected during a particular period is the program source code that was in operation during collection, which is the content of this deliverable.

During annual station maintenance a pre-developed revised program may be installed to support new instruments or measurement standards (SOP 9). At the end of the field season, any revised source program files are zipped into a package, run through quality control processes, accepted as meeting required quality standards, installed in the authoritative repository, and disseminated to the scientific community to inform their interpretation of our data.

Detailed steps

Builder tasks

Collect all updated programs installed during the annual maintenance effort.

Copy the actual source programs installed from the field laptops to a network folder.

Locate the Site Visit Worksheets (WC_C) that were filled out during station visits that year and indicate the date new programs were actually put into operation.

Edit the deployment date into each source code file.

Use the proper software tool for the datalogger (CSI LoggerNet, for example).

There should be metadata embedded in the file as comments (see Appendix A), and date deployment took place is a particularly important item to include.

Save each file using a name of the form WC_D_yyyy_sssss_u.ext where "yyyy" is the year it was revised, "sssss" is a NWS Site Identifier, "_u" is an optional string used to make the filename unique in the event programming was updated more than once during the calendar year, and "ext" is the standard extension expected by the programming tools.

ZIP the year's individual program files into a package named WC_D_yyyy.ZIP where "yyyy"is the calendar year covered.

Notify the validator that the WC_C candidate is ready; explain where to find the file – there may be various versions floating around with the same or similar name.

Validator tasks

Record receipt of the candidate file in the tracking sheet.

Validate against criteria in Appendix A.

Record "passed" or "failed" in the result column of the tracking sheet.

If there are any mandatory errors, return the file to the Builder for correction and resubmission.

If there are no mandatory errors, notify the Acceptor that the candidate is valid and ready for acceptance.

Provide listing of any optional errors.

Explain where to find the successful candidate file.

Acceptor tasks

Review any optional errors.

If it appears some of the optional errors are correctible, return the candidate to the Builder for revision and resubmission. Otherwise continue.

Issue acceptance for the valid deliverable file and install file as a holding in the repository.

Update the tracking sheet with the acceptance date and person accepting.

Open the DataStore reference that houses all the WC_D deliverables (SEAN) or the reference that houses the most recent year of deliverables (ARCN and CAKN).

Add one new sentence to the Notes section of the reference attesting to the acceptance of the added deliverable; specify at least filename of the holding, protocol/SOP Set version which defines the quality criteria, person accepting the product, and date it was accepted.

Ensure the permission level of the reference is appropriate for the product's sensitivity.

Upload the file as a holding (SEAN) or upload the file to the File and Links tab in the Generic Dataset reference (ARCN and CAKN).

If this is a revised file for an existing deliverable, then add a holding description that explains this.

Update the tracking sheet with the date the accepted deliverable was installed in the repository.

Notify any interested parties of the deliverable's availability.

Processing the site photo sets deliverable (WC_E)

Summary

During each site's annual maintenance visit a set of 17 photographs are taken (SOP 9). Eight are taken at compass points facing toward the station. Eight more are taken at the same points but facing away from the station. One final picture is taken of the open equipment cabinet, documenting its physical configuration. These photos are intended to inform the users of conditions, such as high vegetation, the may impact the quality of instrument readings.

If multiple visits are made to a station in a year in order to perform emergency maintenance, only the primary scheduled visit's photos are kept in deliverable WC_E.

Photos are always in JPEG format and landscape orientation. They are taken in the order and direction specified in SOP 9, with each image name documented in the proper location on the chart on the site visit sheet. Since camera capabilities change regularly, no absolute resolution or exposure parameters are specified. Any image-altering post-processing, such as color alteration or digital zooming, should be disabled on the camera.

One ZIP file is maintained for each station's photo documentation for each year. Each ZIP normally contains 17 JPEGs. There is a DataStore reference for WC_E that contains only "see-also" cross reference links. Each link points to an individual station reference. Within the individual station reference are uploaded JPEGs in the form of one zip package of 17 JPEGs for each year.

Detailed steps

<u>Builder tasks</u>

Accumulate all JPEG files for the season by downloading from the camera to a work folder on the network.

Locate the site visit sheets for the year and use them to identify the location of each JPEG file for each station.

Create a set of directories in a work folder, one for each station. Download the photo set for each station into the folder for that station.

In each station folder, rename the 16 main files using the form WC_E_ sssss_yyyy__x_ddd.JPG where "yyyy" is the calendar year, "sssss" is the NWS Site Identifier, "x" is set to T if the photo is taken facing toward the station or A if it is taken facing away from the station, and "ddd" is the compass point the camera is pointing to. "ddd" may be either two or three characters, depending on the compass point. The other parts of the filename must be the exact length illustrated. If the site visit sheets do not clearly document the camera file locations, the correct name may often be determined by looking at each photo, knowing the GOES antenna always points south.

In the station folders, rename each cabinet (17th) file as WC_E_ sssss_ yyyy _CABINET.JPG.

For each station, create a zip containing the 17 images using a tool such as 7-ZIP or Windows Explorer/Send To Compressed Folder. Name each resulting file using the form WC_E_sssss_yyyy_.ZIP.

Notify the validator that the WC_E candidate set is ready. Specify where to find the ZIP files.

Validator tasks

Record receipt of the candidate file set in the tracking sheet.
Validate against the criteria listed in Appendix A.
Record "passed" or "failed" in the result column of the tracking sheet.
If there are any mandatory errors, return the file to the Builder for correction and resubmission.
If there are no mandatory errors, notify the Acceptor that the candidate is valid and ready for acceptance.
Provide listing of any optional errors.
Explain where to find the successful candidate files.

Acceptor tasks

Browse through the candidate file packages using a tool like Windows Explorer for due diligence.
Issue acceptance for the valid deliverable file and install file as a holding in the repository.
Update the tracking sheet with the acceptance date and person accepting.
Open the DataStore reference that houses all the WC_E deliverables (SEAN) or the reference that houses the most recent year of deliverables (ARCN and CAKN).
Iterate through the individual station references in the "See Also" section. For each station:
Add one new sentence to the Notes section of the reference attesting to the acceptance of the added deliverable; specify at least filename of the holding, protocol/SOP Set version which defines the quality criteria, person accepting the product, and date it was accepted.
Ensure the permission level of the reference is appropriate for the product's sensitivity.
Open each individual station reference and upload its zip file as a holding (SEAN) or upload the file to the File and Links tab in the Generic Dataset reference (ARCN and CAKN).
If this is a revised file that supersedes an existing deliverable, then add a holding description that explains this.
Update the tracking sheet with the date the accepted deliverable was installed in the repository.
Notify any interested parties of the deliverable's availability.

Processing the station downloads deliverable (WC_F)

Summary

Network RAWS stations undergo a maintenance visit, usually once per year. During this visit, the datalogger's ring buffer of observations is downloaded to a laptop computer. The ring buffer is sized to contain multiple years of data. These data are the most accurate record of observations from the station's instruments. (While the same data are also transmitted over GOES telemetry, due to our extreme environment and remote locations GOES regularly experiences missing and damaged messages.)

DAT files are collected from stations during the field season (SOP 9) and copied to a secure network location. After all stations have been visited for the season, their DATs are named according to standard, zipped into one annual file, run through quality control processes, accepted as meeting required quality standards, installed in the authoritative repository, and disseminated to the scientific community. Data in this deliverable is at NOAA data processing Level 0 [http://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels, referenced 2/29/2016]. It is never altered from the original instrument-produced content.

Be aware that station observation timestamps in this deliverable reflect Alaska Daylight Time. This differs from the WC_G deliverable which, instead, employs UTC for date and time.

Detailed steps

<u>Builder tasks</u>

Determine all DAT files for the season are stored on the network.
Copy the files to a work folder.
In the work folder, rename all files using the form WC_F_pppp_sssss_bbbbbbbbbbbb-eeeeeeeeeeee.DAT where "pppp" is the park unit designator, "sssss" is the NWS Site Identifier, "bbbbbbbbbbbb" is the beginning record timestamp and "eeeeeeeeeeee" is the ending timestamp. (For example, WC_F_DENA_RUGA2_201806151400-201905300900).
ZIP the individual DAT files into one file named WC_F_yyyy.ZIP where "yyyy" is the calendar year covered.
Notify the validator that the WC_F candidate is ready; explain where to find the file – there may be various versions floating around with the same or similar name.

<u>Validator tasks</u>

Record receipt of the candidate file in the tracking sheet.
Validate against the criteria listed in Appendix A.
Record "passed" or "failed" in the result column of the tracking sheet.
If there are any mandatory errors, return the file to the Builder for correction and resubmission.
If there are no mandatory errors, notify the Acceptor that the candidate is valid and ready for acceptance.

There are no optional validation criteria for this deliverable, so no report is necessary.
Explain where to find the successful candidate file.

Acceptor tasks

Browse through the candidate file using a tool like Windows Explorer for due diligence.

Issue acceptance for the valid deliverable file and install file as a holding in the repository.

- Update the tracking sheet with the acceptance date and person accepting.
- Open the DataStore reference that houses all the WC_F deliverables (SEAN) or the reference that houses the most recent year of deliverables (ARCN and CAKN).
- Add one new sentence to the Notes section of the reference attesting to the acceptance of the added deliverable; specify at least filename of the holding, protocol/SOP Set version which defines the quality criteria, person accepting the product, and date it was accepted.
- Ensure the permission level of the reference is appropriate for the product's sensitivity.
- Upload the file as a holding (SEAN) or upload the file to the File and Links tab in the Generic Dataset reference (ARCN and CAKN).
- If this is a revised file for an existing deliverable, then add a holding description that explains this.

Update the tracking sheet with the date the accepted deliverable was installed in the repository.

Notify any interested parties of the deliverable's availability.

Processing the RAWS corrected data deliverable (WC_G)

Summary

The latest WC_F station download files must be accepted before work can be done on WC_G. The accepted WC_F is then run through the quality control, formatting, and flagging steps according to the methods detailed in SOP 11. The resulting data is at NOAA processing Level 1B [http://www.ngdc.noaa.gov/wiki/index.php?title=NOAA_Processing_Levels, referenced 2/29/2016].

WC_G is a monolithic cumulative file that contains all weather data from all network stations since the inception of the program. It is managed in DataStore using the versioning feature (SEAN), or updated annually in DataStore as a Generic Dataset (ARCN and CAKN).

The WC_G deliverable is sent through validation cycles, followed by acceptance, installation in the authoritative repository, and dissemination to the research community.

Be aware that observation timestamps in this deliverable reflect Coordinated Universal Time (UTC). This differs from the WC_F deliverable which, instead, employs Alaska Daylight Time for date and time.

In 2026 the WC_G file will be used to create a data package that will be published on NPS Data Store to improve the transparency and accessibility of NPS data. Data packages are modern, machine-readable, citable science products. These guidelines will be used: NPS Data Publication Best Practices. This SOP will be updated once the workflow is finalized.

Detailed steps

Builder tasks

Download the accepted WC_F of interest from the DataStore to a local work folder.

In order to assure repeatability of this work, one should not take the chance of using DAT files other than those obtained from the authoritative repository. Other files may diverge.

Unzip the WC_F into its constituent DAT files.

Process the WC_F following the detailed steps explained in SOP 11.

Export quality controlled data from Aquarius using the Generator Application (Appendix 10-B)

Upload to a local work folder each complete cumulative station CSV file that was created during SOP 11.

In the work folder, rename the files using the form WC_G _yyyy_sssss.CSV where "yyyy" is the most recent calendar year from which data have been included and "sssss" is the NWS station ID.

Notify the validator that the WC_G candidate is ready; explain where to find the file – there may be various versions floating around with the same or similar name.

Validator tasks

Record receipt of the candidate file in the tracking sheet.

Validate against the criteria listed in Appendix A.

Record "passed" or "failed" in the result column of the tracking sheet.

If there are any mandatory errors, return the file to the Builder for correction and resubmission.

If there are no mandatory errors, notify the Acceptor that the candidate is valid and ready for acceptance.

Provide listing of any optional errors.

Explain where to find the successful candidate file set.

Acceptor tasks

Review any optional errors.

If it appears some of the optional errors are correctible, return the candidate to the Builder for revision and resubmission. Otherwise continue.

Issue acceptance for the valid deliverable file and install file as a holding in the repository.

Update the tracking sheet with the acceptance date and person accepting.

Open in edit mode the DataStore reference that houses the most recent WC_G deliverable set (SEAN) or the reference that houses the most recent year of deliverables (ARCN and CAKN).

Verify current reference metadata is perfect – it will not be correctable once a new version of the deliverable is installed.

Upload the file to the File and Links tab in the Generic Dataset reference (ARCN and CAKN)

Update the version (SEAN only).

Under the "Version History" tab, press the "+Add" button on the mid left of the screen.

Click to agree that the current reference will be frozen forever.

In the "Version Management" dialog box, press the radio button for cloning this reference to create a new version. Supply an explanation why a new version is being created (e.g., Include latest data through field season 2021). Press "Submit".

A new reference will be built (SEAN only). Edit additional information into it.

Fill in under the "Core" tab "Date Published" and "Content end date". Add one sentence to the "Notes" section attesting to the acceptance of the added deliverable; specify at least protocol/SOP Set version which defines the quality criteria, person accepting the product, and date it was accepted.

Under the "Files and Links" tab upload the newly accepted deliverable file sets.

If for some reason this deliverable changes to the sensitive class, mark that using the "Permissions" tab.

Press the "Activate" button to save the new reference.

Update the products in the weather and climate project reference (SEAN only)

Open the project reference for editing – there's only one.

Open the "Products" tab.

Delete the obsolete product reference for the WC_G tabular dataset.

Add the new version reference to the product list.

Activate the project reference.

Update the tracking sheet with the date the accepted deliverable was installed in the repository.

Notify any interested parties of the deliverable's availability.

Processing the annual operations report (WC_H)

This deliverable summarizes each season's operations. See SOP 12 for details regarding the annual operations report.

Processing the calibration certificate images deliverable (WC_I)

Summary

The network employs a number of different instruments in its weather stations. They are periodically serviced and calibrated in order to maintain adequate performance. When maintenance providers ship serviced instruments back to the network these are typically accompanied by paper acceptances attesting to their accuracy and providing calibration factors. Calibration reports may be used to verify accuracy of readings as well as, in some cases, provide values for correcting previous readings by accounting for sensor drift over time (SOP 11).

Paper certificates of compliance and testing results are filed during the course of a calendar year. After all certificates have been received for the subject calendar year, they are sorted, scanned into a PDF file, run through quality control processes, accepted as meeting required quality standards, installed in the authoritative repository, and disseminated to the scientific community.

Detailed steps

Builder tasks

Scan certificates into one PDF.

After the calendar year is complete, retrieve the folder of certificates.

Verify that the date of each document falls in the proper year.

Sort the pages in an order that simplifies retrieval: instrument model followed by instrument serial number is suggested.

Orient the physical pages so nothing in the PDF file will be upside down or sideways.

Scan the documents into a PDF file.

Name it using the form WC_I_yyyy.PDF where "yyyy" is the calendar year covered (Example: WC_I_2019.PDF).

Set the scanner for 2-sided scanning.

Set the scanner to ignore blank page sides, if that is supported.

Review the PDF file.

Match the count of pages in the file with the count of physical pages *2 (realizing there will be fewer in the PDF if blank pages were skipped during scanning).

Check all the pages are right side up.

Make needed corrections using a PDF editing tool such as Adobe Acrobat DC

Notify the validator that the WC_I candidate is ready; explain where to find the file – there may be various versions floating around with the same or similar name.

Validator tasks

Record receipt of the candidate file in the tracking sheet.

Validate against criteria in Appendix A.

Record "passed" or "failed" in the result column of the tracking sheet.

If there are any mandatory errors, return the file to the Builder for correction and resubmission.

If there are no mandatory errors, notify the Acceptor that the candidate is valid and ready for acceptance.

Provide listing of any optional errors.

Explain where to find the successful candidate file.

Acceptor tasks

Review any optional errors.

If it appears some of the optional errors are correctible, return the candidate to the Builder for revision and resubmission. Otherwise continue.

Issue acceptance for the valid deliverable file and install file as a holding in the repository.

Update the tracking sheet with the acceptance date and person accepting.

Open the DataStore reference that houses all the WC_B deliverables.

Add one new sentence to the Notes section of the reference attesting to the acceptance of the added deliverable; specify at least filename of the holding, protocol/SOP Set version which defines the quality criteria, person accepting the product, and date it was accepted.

Ensure the permission level of the reference is appropriate for the product's sensitivity.

Upload the file as a holding (SEAN) or upload the file to the File and Links tab in the Generic Dataset reference (ARCN and CAKN).

If this is a revised file for an existing deliverable, then add a holding description that explains this.

Update the tracking sheet with the date the accepted deliverable was installed in the repository.

Notify any interested parties of the deliverable's availability.

Processing the periodic report (WC_J)

This deliverable is a detailed analysis done at least every ten years. It is processed according to the formal Inventory and Monitoring Division methods currently in effect for Natural Resource Report publications. See SOP12 for details regarding the periodic report.

Appendix SOP 10-A. Detailed deliverable definitions

It is necessary to define in full detail the content, nature, and domain of each deliverable. Complete definitions support subsequent interpretation of the products. They also provide a venue for setting specific quality criteria used in validating and accepting each product.

To illustrate the scope of this program, high level data flow diagrams show sources and sinks of data, along with explanatory names for the data each provides and each accepts.

Then Appendix A defines every deliverable supported by the network's climate monitoring program. It follows templates laid out in SOP 302: Data Management Considerations in Protocol Development of Johnson and Moynahan (2008). Using their method, the top-level description of a deliverable is explained using a single form named either A, B, C, or D. The specific form used for a particular deliverable depends on the nature of the deliverable's content. Deliverables of a tabular type are further defined with a form X, where the structure of the table is described. Each individual attribute (*i.e.,* column, field) of a table is then defined in detail using a form Y.

Each deliverable is also documented with a low-level data flow diagram. These diagrams explain exactly where underlying data come from, what processes are applied to them, where they are stored, and who is responsible for performing each task used to create and maintain them.

References

Johnson, W. F., and B. J. Moynahan. 2008. Data management plan: Southeast Alaska network. Natural Resource Report NPS/SEAN/NRR—2008/058. National Park Service, Fort Collins, Colorado.

High Level Data Flows

Rectangles in Figure SOP-10.A.1 are either "sources" which provide original data, "sinks" that receive data, or entities that do both. The central circle represents a "process" which, at this top level, represents the network's whole monitoring program. Each arrow indicates what data are being worked with and the single direction in which they flow.

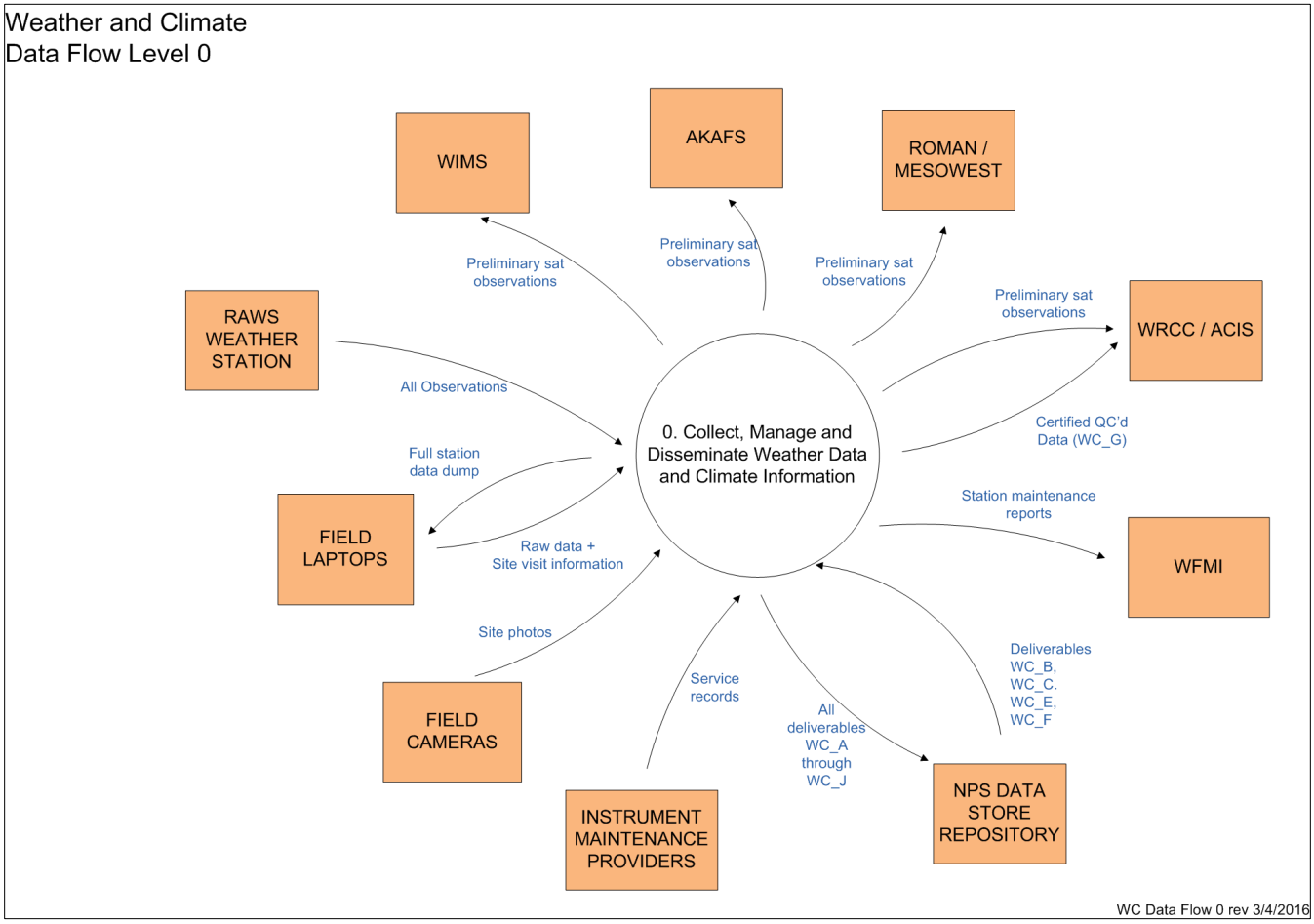


Figure SOP-10.A.1. Level zero data flow for the weather and climate monitoring program.

The top level of abstraction may be decomposed into the multiple processes depicted in Figure SOP-10.A.2. The figure shows there are two distinctly independent processes operating in the monitoring program. Yellow sources/sinks work with hourly, preliminary satellite data. The "yellow" domain is designed and operated by agencies external to NPS. The separate pink sources/sinks deal both with annual, fully quality controlled data as well as with the complete metadata required for proper data interpretation. It is in this domain the network satisfies its charge by producing, correcting, accepting, permanently storing, and disseminating to the research community the deliverables specified in Table SOP-10.1.

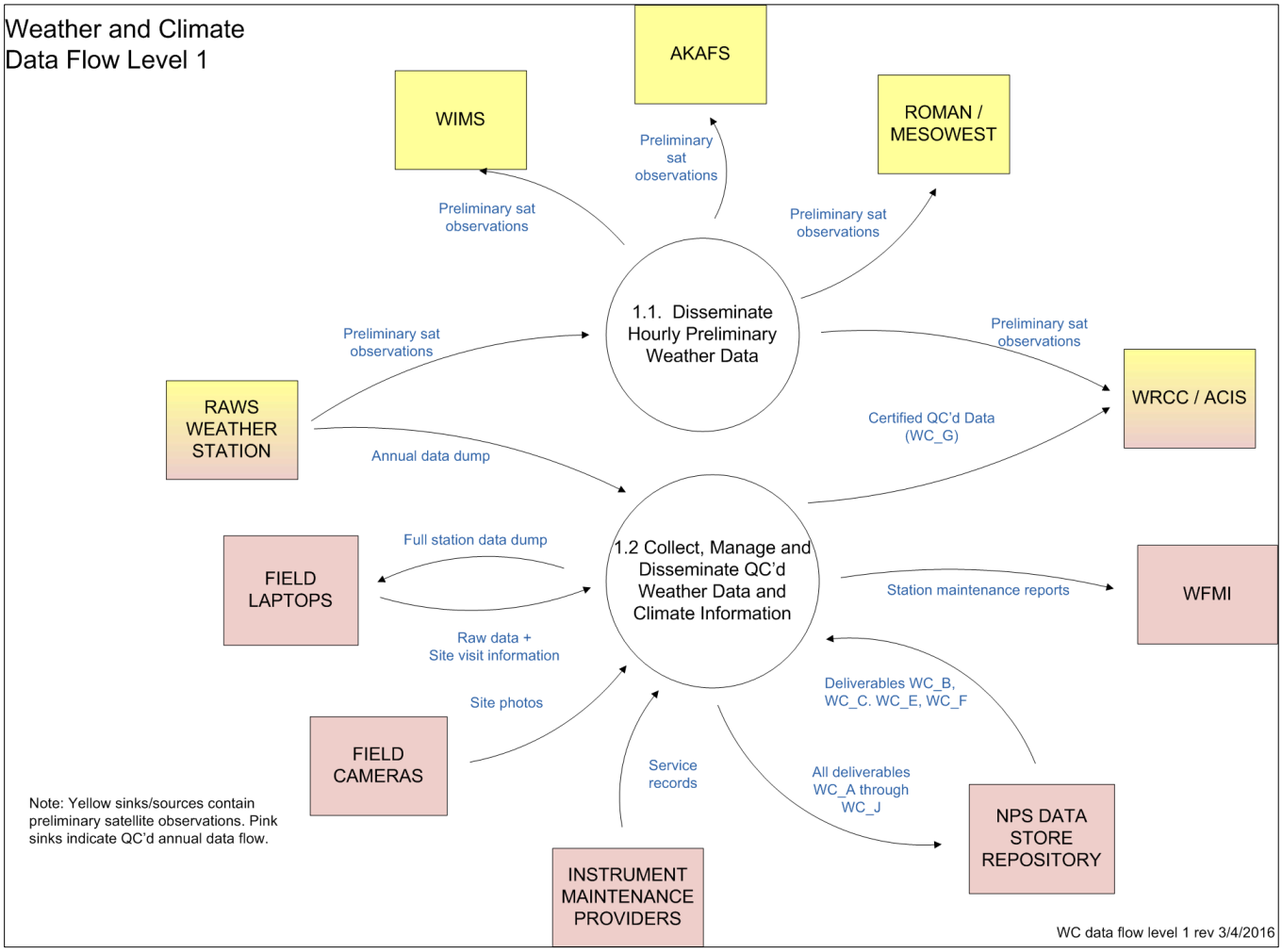


Figure SOP-10.A.2. At level one two distinct data flows are serviced through two different processes.

WC_B: Site map

Purpose of Deliverable

This deliverable documents the locations of network-operated stations, past and current. It is used to inform data users of site locations, to illustrate publications, and to assist in logistics communications. It is a two-part deliverable consisting of station locations in the form of (A) JPEG or PNG image files and (B) a CSV file with locations and attributes. They all represent the same data, only in different formats. They are all stored as holdings under one DataStore reference having reference type Map.

Frequency Produced

One deliverable is produced at the beginning of the monitoring program. Updated versions may be produced sporadically to document new and/or discontinued weather stations.

Prerequisites

Data Flow

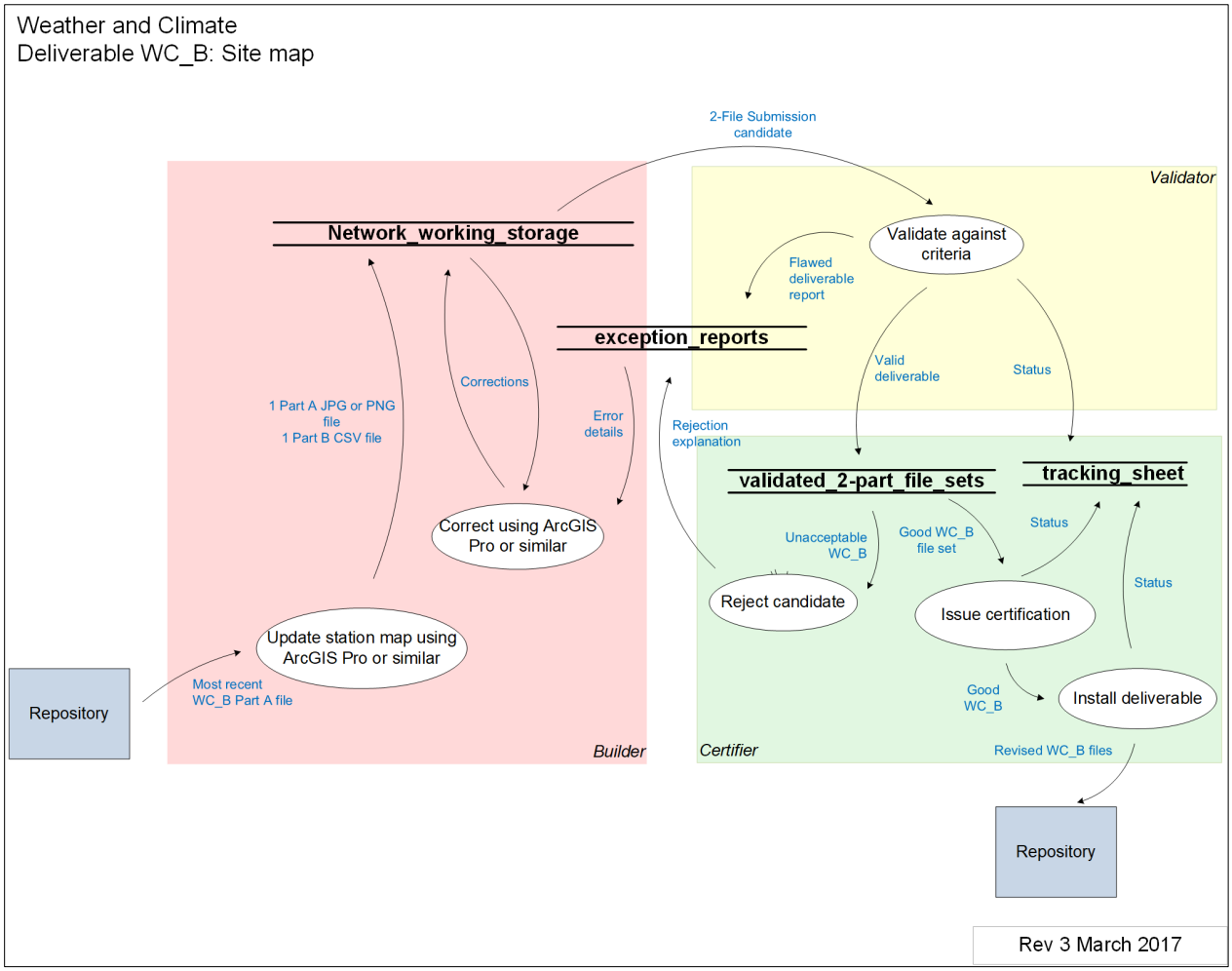


Figure SOP-10.A.3. Data flow required to generate deliverable WC_B: site map.

Deliverable Definition

Form C: Non-tabular Data Deliverable

Vital Sign: Weather and Climate	*Deliverable ID:* WC_B part A	*Deliverable Title:* Site map
File Format: JPEG or PNG	*Associated Software and Version*: Browsers, etc.	*Revision Date/Protocol Version:* 02-01-2024 / SOP-2024
Expected Frequency: Sporadic	*Repository reference type / sensitivity:* Generic Document / not sensitive	*Submission Unit:* none
What purpose does this deliverable serve? Inform users of locations of weather stations and date range of operation, suitable for publications.		
Summary of content: One JPEG or PNG image file showing network map with location markers.		
Mandatory validation criteria: 1. The filename must conform to the format "WC_B_yyyyx uuuu Weather and Climate site maps.JPG" where "yyyy" is the year during which this product had been updated, "x" is an optional single letter for uniqueness, and "uuuu" is the network's unit code. 2. The stations depicted must contain at least the set of stations in the immediately earlier version of the product. (That is, once included in an accepted WC_B, a station may not be deleted.) 3. Every operational station must be labeled with a NWS Site Identifier and a date commissioned. (Date decommissioned is optional.) 4. The image must show a map of the network vicinity.		
Optional validation criteria: None.		
Deliverable ID of any other network data products required to create this product: A prior version of the WC_B part ACSV file is required in order to make an updated version.		
Description and source of any outside data required to create this product: None.		

Deliverable Definition

Form C: Non-tabular Data Deliverable

Vital Sign: Weather and Climate	*Deliverable ID:* WC_B part C	*Deliverable Title:* Site map
File Format: CSV	*Associated Software and Version*:	*Revision Date/Protocol Version:* 2-1-2024 / SOP-2024
Expected Frequency: Sporadic	*Repository reference type / sensitivity:* Generic Document / not sensitive	*Submission Unit:* none
What purpose does this deliverable serve? Inform users of locations of weather stations and date range of operation. Easily exportable file format for general use.		
Summary of content: One CSV file containing station information: Place, latitude, longitude, elevation, status, NWS station identifier, date commissioned, date decommissioned, owner (I&M network).		
Mandatory validation criteria: 1. The filename must conform to the format "WC_B_yyyyx uuuu Weather and Climate site maps.KMZ" where "yyyy" is the year during which this product had been updated,"x" is an optional single letter for uniqueness, and "uuuu" is the network's unit code. 2. The stations depicted must contain at least the set of stations in the immediately earlier version of the product. (That is, once included in an accepted WC_B, a station may not be deleted.) 3. Each station must include the name, location, latitude, longitude, and elevation. 4. Each point must be tagged with a NWS Site Identifier, status (operating or decommissioned), date commissioned, date decommissioned, and owner (I&M Network). 5. The station locations must all be within the bounding box of the network.		
Optional validation criteria: None.		
Deliverable ID of any other network data products required to create this product:		
Description and source of any outside data required to create this product: None.		

WC_C: Site visit worksheets

Purpose of Deliverable

Weather stations are typically visited once per year in order to copy collected data since the last visit as well as to perform preventive maintenance and revise configurations. The actions taken and new configuration details are recorded in fixed format Excel spreadsheets. These are used by staff to track the ongoing state of all installations and also to inform data users of exceptional conditions that impact data coverage and quality.

Frequency Produced

One deliverable is produced each year containing all worksheets completed in the course of performing maintenance visits to weather stations. It may only be built after termination of all field activities for the year.

Prerequisites

None.

Data Flow

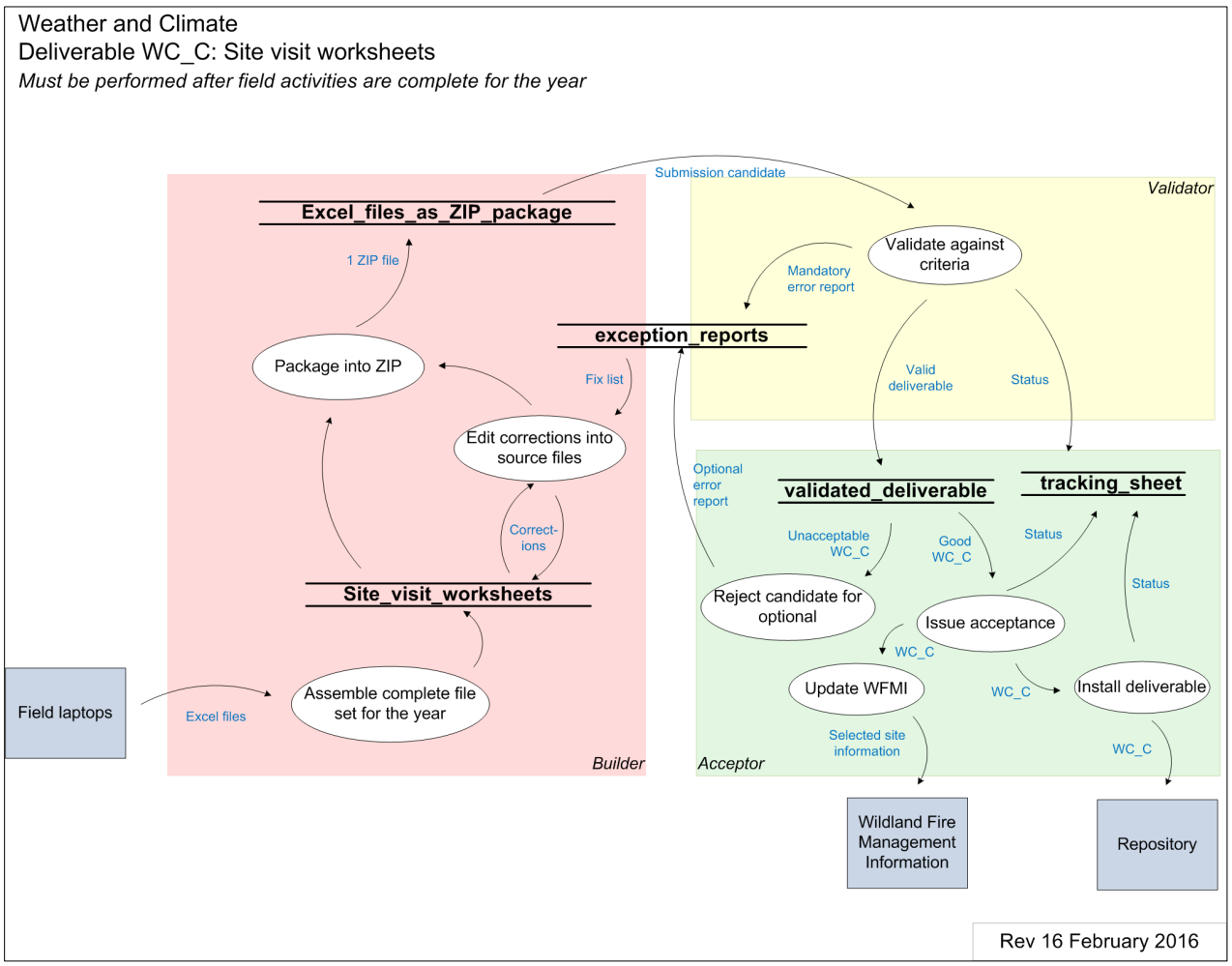


Figure SOP-10.A.4. Data flow required to generate deliverable WC_C: site visit worksheet.

Deliverable Definition

Form C: Non-tabular Data Deliverable

Vital Sign: Weather and Climate	*Deliverable ID:* WC_C	*Deliverable Title:* Site visit worksheets
File Format: ZIP of XLSX files	*Associated Software and Version*: PKUNZIP, WINRAR, etc. And Excel 2010 or later	*Revision Date/Protocol Version:* 02-16-2016 / SOP-2016
Expected Frequency: One file per year	*Repository reference type / sensitivity:* Generic Document / not sensitive	*Submission Unit:* Calendar year

What purpose does this deliverable serve?

These are used by staff to track the ongoing state of all installations and also to inform data users of exceptional conditions that impact data coverage and quality.

Summary of content:

Collection of Excel XLSX files containing site visit information zipped into an annual package. It covers all site visits taking place in a calendar year. Each station during a year is documented using only one XLSX, regardless of how many times the station was visited that year. The XLSX may have multiple tabs, each tab reflecting one visit.

Mandatory validation criteria:

1. Must successfully open using a LZM decoding tool such as 7-ZIP or WINRAR.
2. The single annual filename must conform to the format WC_C_yyyy.ZIP where "yyyy" is the year during which stations had been updated with the constituent program code files.
3. Files within each year's ZIP package must all conform to the naming format WC_C_yyyy_sssss.XLSX where "yyyy" is a year, and "sssss" is a NWS Site Identifier. The "yyyy" must match the weather year of the visit date recorded near the top of the sheet. The "sssss" must match the NWS ID value entered in the sheet.
4. All XLSX files must open successfully in Microsoft Excel for Windows 2016 or later version.

Optional validation criteria:

1. XLSX file content should follow the model content depicted in SOP 9.
2. Every tab name should reflect the visit date.

Deliverable ID of any other network data products required to create this product:

None.

Description and source of any outside data required to create this product:

None.

WC_D: Datalogger program code

Purpose of Deliverable

This deliverable provides to data users the documentation required to properly interpret fields recorded by each station at any given time.

Weather stations may sport many configurations. These configurations may change frequently. Data records produced under one configuration may have very different content under a different configuration. There may be variations in parameters measured, units of measure, frequency of collection, and level of aggregation. The datalogger "program" is actually a precise explanation of the exact nature of data collected while the program is running on a station.

Frequency Produced

One deliverable is produced each year containing all programs newly installed in stations during each calendar year. It may only be built after termination of all field activities for the year.

Prerequisites

WC_C Site visit worksheet must be accepted before building WC_D.

Data Flow

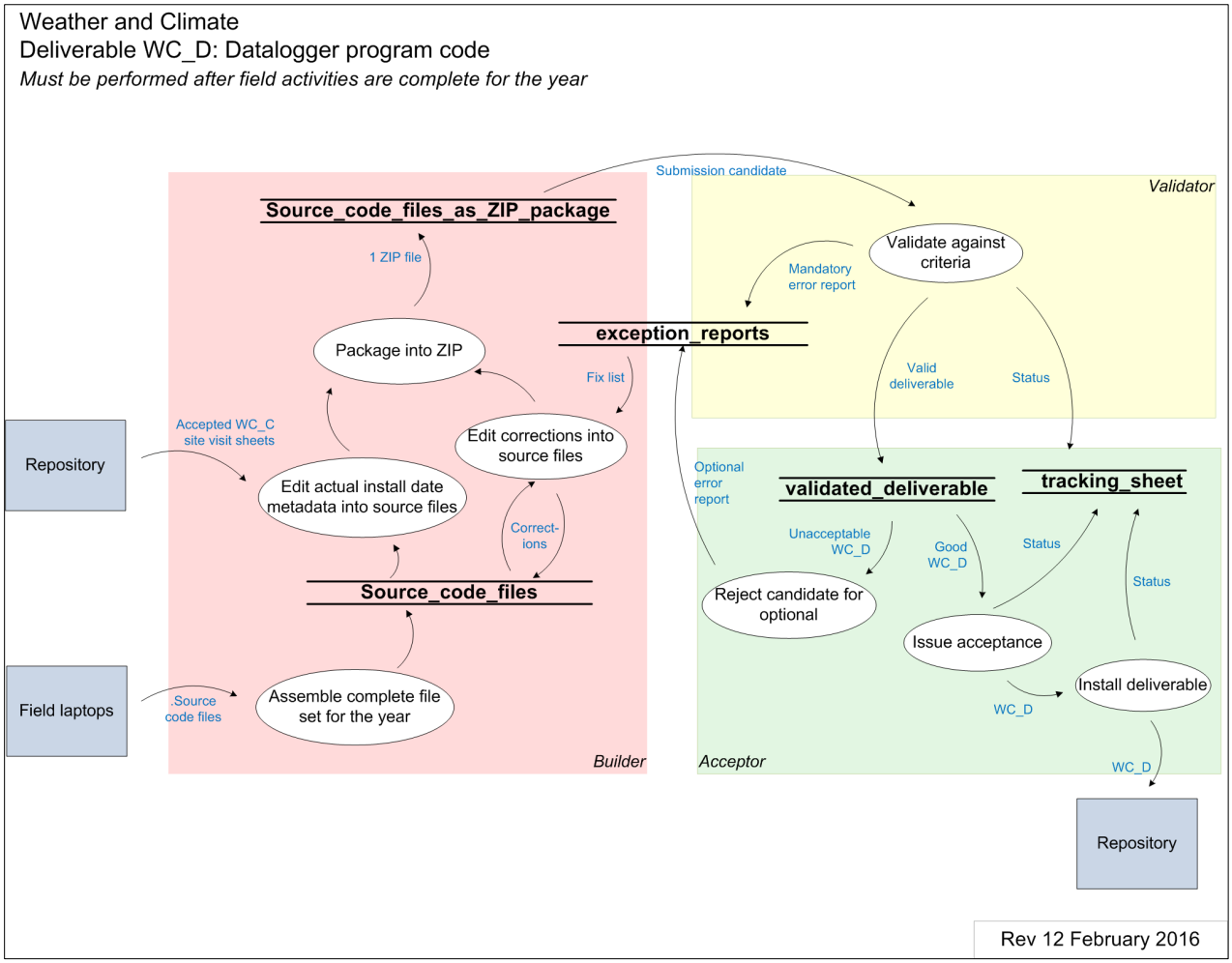


Figure SOP-10.A.5. Data flow required to generate deliverable WC_D: datalogger program code.

Deliverable Definition
Form C: Non-tabular Data Deliverable

Vital Sign: Weather and Climate	*Deliverable ID:* WC_D	*Deliverable Title:* Datalogger program code
File Format: ZIP of text files	*Associated Software and Version*: PKUNZIP, WINRAR, etc	*Revision Date/Protocol Version:* 03-07-2016 / SOP-2016
Expected Frequency: One file per year	*Repository reference type / sensitivity:* Generic Document / not sensitive	*Submission Unit:* Calendar year

What purpose does this deliverable serve?
This deliverable provides to data users the documentation required to properly interpret fields recorded by each station at any given time.

Summary of content:
Collection of ASCII text files containing datalogger program source code (typically having a .CR1 extension) zipped into an annual package. It covers all programs installed or updated in a calendar year.

Mandatory validation criteria:
1. Must successfully open using a LZM decoding tool such as 7-ZIP or WINRAR.
2. The single annual filename must conform to the format WC_D_yyyy.ZIP where "yyyy" is the year during which stations had been updated with the constituent program code files.
3. Files within each year's ZIP package must all conform to the naming format WC_D_yyyy_sssss_u.ext where "yyyy" is the year it was revised, "sssss" is a NWS Site Identifier, "_u" is an optional string used to make the filename unique in the event programming was updated more than once during the calendar year, and "ext" is the standard extension expected by the programming tools.
4. The constituent program files, when opened with a text tool like NOTEPAD, must contain visible ASCII text. Included in that text must be a line of metadata specifying the date this program went into actual operation on the station.

Optional validation criteria:
1. Each constituent file should start with metadata in the form of comments addressing: Controller make/model. Instrument makes/models employed for this configuration. Filename when installed on station. The name of the program file loaded into the datalogger. The name of the file used as the basis for this file (*i.e.,* the preceding version used in the datalogger). A change log listing the date every change was edited into the functionality of the program and the exact nature of every change made.

Deliverable ID of any other network data products required to create this product:
WC_C site visit sheets.

Vital Sign:	*Deliverable ID:*	*Deliverable Title:*
Weather and Climate	WC_D	Datalogger program code
Description and source of any outside data required to create this product: No outside data but the proprietary IDE tool supplied by the vendor of the station datalogger is needed (*e.g.,* Campbell Scientific CR1000 datalogger using the LoggerNet programming environment).		

WC_E: Site photo sets

Purpose of Deliverable

During regular annual station site visits a set of photographs is taken documenting the physical conditions around the station. A photo is also taken of the equipment cabinet to document its physical configuration. These may be of use by researchers in accounting for issues regarding questionable data.

Frequency Produced

One deliverable ZIP file is produced for each station each year, stored in individual station references. That is, if there are 12 stations operating in the network, there will be 12 deliverable ZIP files in the repository for each year.

Prerequisites

WC_D site visit worksheets should be accepted before processing WC_E. WC_D's map of filenames to photo locations is required.

Data Flow

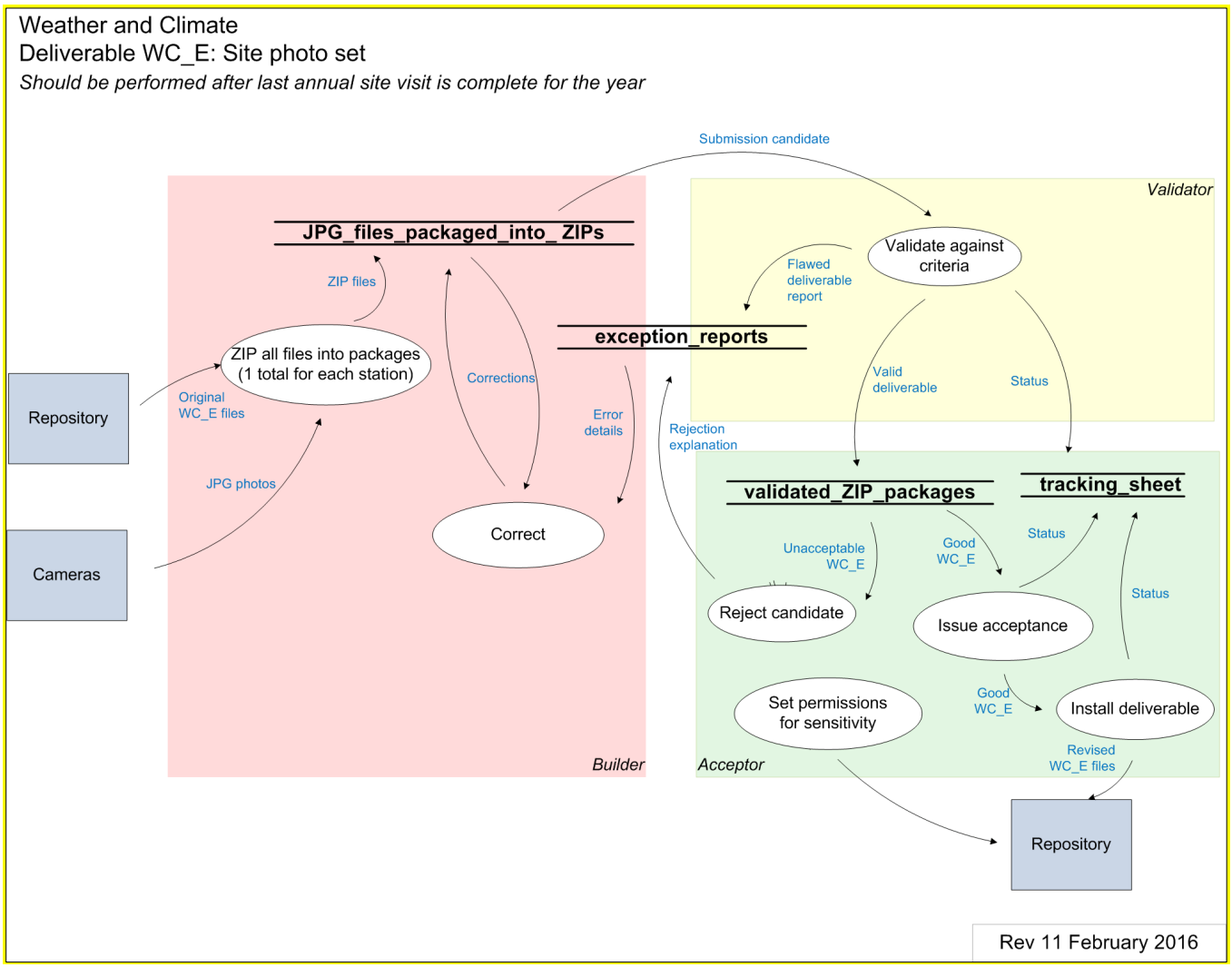


Figure SOP-10.A.6. Data flow required to generate deliverable WC_E: site photo sets.

Deliverable Definition

Form C: Non-tabular Data Deliverable

Vital Sign: Weather and Climate	*Deliverable ID:* WC_E	*Deliverable Title:* Site photo sets
File Format: ZIP of JPEGs	*Associated Software and Version*: PKUNZIP, WINRAR, etc. plus PhotoShop, browsers, etc.	*Revision Date/Protocol Version:* 03-11-2016 / WC SOP-2016
Expected Frequency: One ZIP file per station per year	*Repository reference type / sensitivity:* Photograph / not sensitive	*Submission Unit:* Station per year

What purpose does this deliverable serve?

WC_E documents each station's physical site conditions with photographs. This may be useful in researching causes of questionable data. It also documents the physical content of each station's equipment cabinet to aid in troubleshooting.

Summary of content:

A separate annual ZIP file is maintained in the repository for each station. ZIP files contain site photos, typically 17 for each year the station received a site visit.

Mandatory validation criteria:

1. Must successfully open using a LZM decoding tool such as 7-ZIP or WINRAR.
2. Each filename must conform to the format WC_E_sssss_yyyy.ZIP where "sssss" is the NWS Site Identifier and "yyyy" is the calendar year the photos were taken.
3. Files within each station's ZIP package must all conform to the naming format WC_E_sssss_yyyy_x_ddd.JPG where "sssss" is the NWS Site Identifier, "yyyy" is the calendar year, "x" is set to T if the photo is taken facing toward the station or A if it is taken facing away from the station, and "ddd" is the compass point the camera is pointing to. "ddd" may be either two or three characters depending on the compass point. The other parts of the filename must be the exact length illustrated. An additional allowable form is WC_E_sssss_yyyy_CABINET.JPG.

Optional validation criteria:

1. There should be one ZIP present for each station for which there is a site visit worksheet.
2. There should be 17 displayable image files in each annual station file.
3. Images should depict: 8 looking inward, 8 looking outward, and 1 of the equipment cabinet.
4. Files whose names have "x" set to T should contain an image that includes a weather station.
5. Files whose names include CABINET should contain an image of an equipment cabinet.

Deliverable ID of any other network data products required to create this product:

WC_D site visit worksheets.

Description and source of any outside data required to create this product:

Camera JPG files taken during site visits, as described in SOP 9.

WC_F: Station download

Purpose of Deliverable

Weather stations collect periodic observations and store them in datalogger memory. The circular buffer typically holds several years of the most recent data. Complete buffer contents are downloaded during annual maintenance visits and brought back to the office for processing. WC_F serves as the basis for providing researchers with complete data products that are corrected and enhanced by undergoing extensive quality control.

Note these same observations are transmitted hourly over the GOES satellite system which then populates various repositories. Unfortunately, given the remoteness and extreme conditions the network's stations face, GOES sometimes experiences missed messages and values in error. The various repositories typically do not allow their copies of GOES data to be improved by taking advantage of network quality control processes.

Frequency Produced

One deliverable is produced each year containing all station buffers downloaded during the field season and packaged in the form of one ZIP file.

Prerequisites

None.

Data Flow

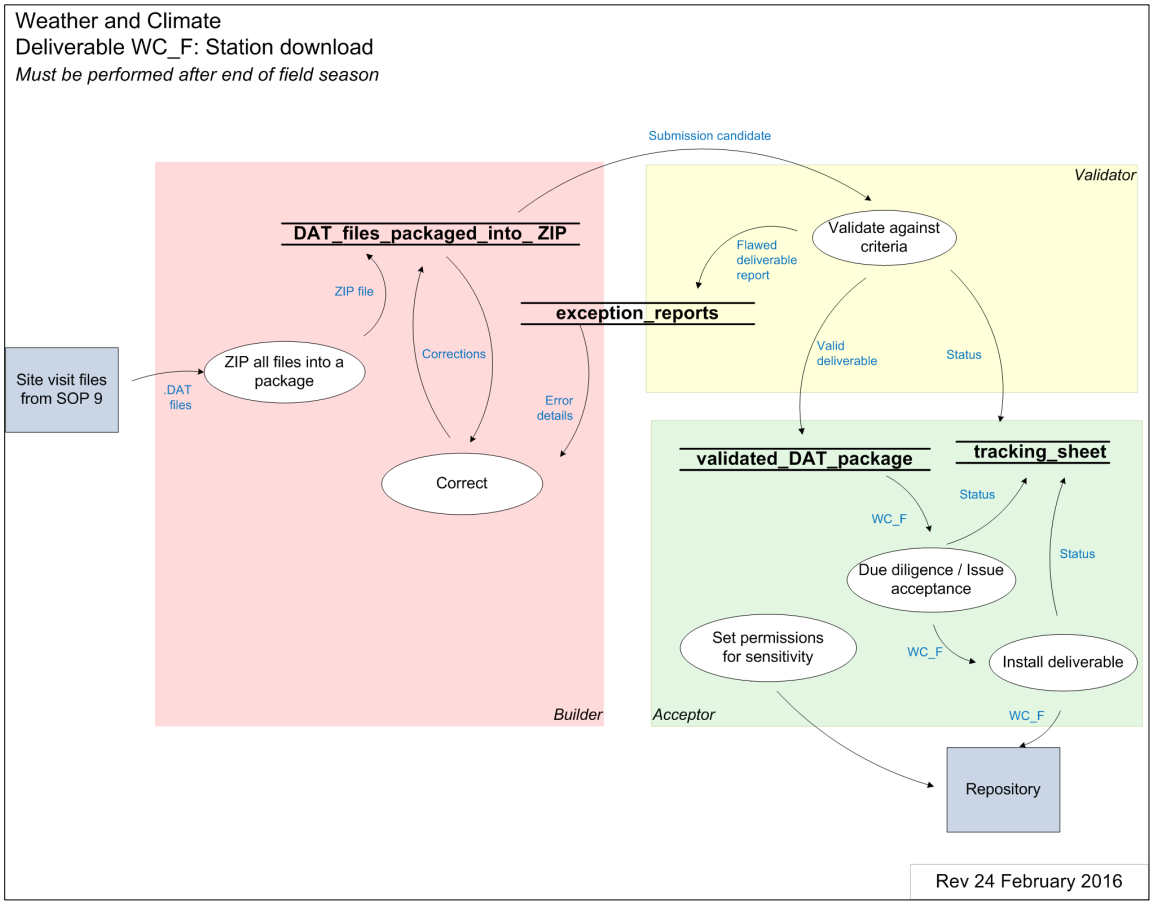


Figure SOP-10.A.7. Data flow required to generate deliverable WC_F: station download.

Deliverable Definition

Form C: Non-tabular Data Deliverable

Vital Sign: Weather and Climate	*Deliverable ID:* WC_F	*Deliverable Title:* Station download
File Format: ZIP	*Associated Software and Version*: PKUNZIP, WINRAR, etc.	*Revision Date/Protocol Version:* 04-24-2018 / WC SOP-2018
Expected Frequency: One zip file containing about 15 ASCII "DAT" files per year	*Repository reference type / sensitivity:* Generic Document / not sensitive	*Submission Unit:* Calendar year

What purpose does this deliverable serve?

This complete original data set collected by stations over multiple years is used as the basis for generating consistently formatted, quality-controlled, metadata-annotated climate research data (WC_G). It directly feeds into the correction processing described in SOP 11

Summary of content:

ASCII files in proprietary ".DAT" format are downloaded from RAWS stations during the field season and zipped together into a single deliverable of "Level 0" data. Because this constitutes the record of original source data, it may not be edited. Therefore, validation and quality control are necessarily limited in scope.

Mandatory validation criteria:

1. Must successfully open using a LZM decoding tool such as 7-ZIP or WINRAR.
2. Filename must conform to the format WC_F_yyyy.ZIP where "yyyy" is the calendar year covered.
3. Files within the ZIP package must all conform to the naming format WC_F_pppp_sssss_bbbbbbbbbbbb-eeeeeeeeeeee.DAT where "pppp" is the park unit designator, "sssss" is the NWS Site Identifier, "bbbbbbbbbbbb" is the beginning record timestamp and "eeeeeeeeeeee" is the ending timestamp. (For example, WC_F_DENA_RUGA2_201806151400- 201905300900). Timestamps are always in the Alaska Daylight Time zone and represent YYYYMMDDHHMM.

Optional validation criteria:

1. The individual files when opened in notepad should appear to have header lines followed by numeric content in comma-separated-value form.
2. The first header line should have embedded in it the filename of the datalogger operating program that was used to capture the content of this file.

Deliverable ID of any other network data products required to create this product:

None.

Vital Sign:	*Deliverable ID:*	*Deliverable Title:*
Weather and Climate	WC_F	Station download
Description and source of any outside data required to create this product: Downloaded station datalogger DAT files taken during site visits, as described in SOP 9.		

WC_G: RAWS corrected data

Purpose of Deliverable

WC_G is the collection of all RAWS output for all stations in ASCII CSV format at Processing Level 1B having duplicate readings removed, standard formatting applied, consistent measurement units enforced, and quality flags plus selected metadata added (see SOP 11).

This provides researchers and data aggregators Level 1B containing the monitoring program's best corrected data in a single file.

In 2026 the WC_G file will be used to create a data package that will be published on NPS Data Store to improve the transparency and accessibility of NPS data. Data packages are modern, machine-readable, citable science products. These guidelines will be used: NPS Data Publication Best Practices. This SOP will be updated once the workflow is finalized.

Frequency Produced

One deliverable containing one cumulative file for each station containing all years is produced annually.

Prerequisites

WC_F for the field year involved must be accepted.

Data Flow

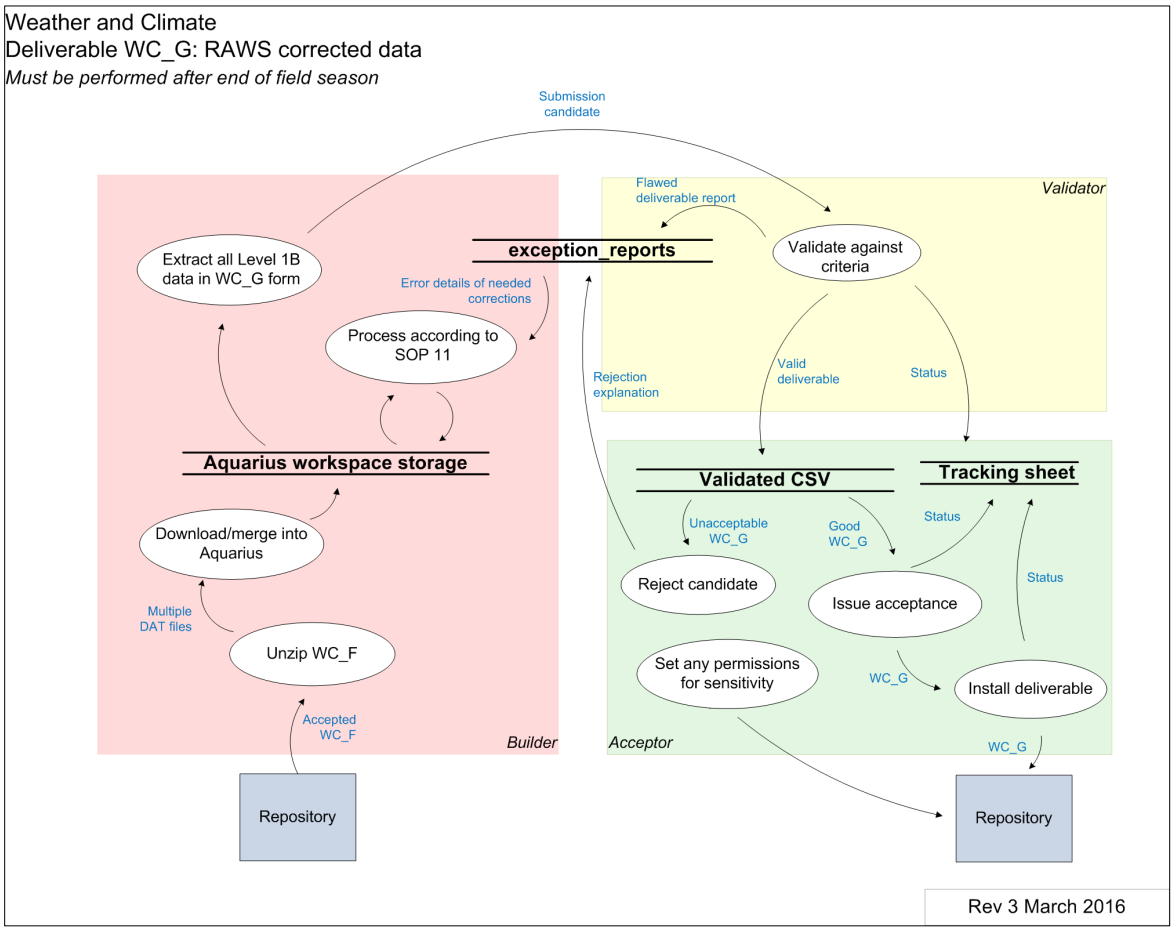


Figure SOP-10.A.8. Data flow required to generate deliverable WC_G: RAWS corrected data.

Deliverable definition forms:

Form D: Tabular Data Deliverable

Vital Sign: Weather and Climate	*Deliverable ID:* WC_G	*Deliverable Title:* RAWS corrected data
File Format: CSV	*Associated Software and Version*: various	*Revision Date/Protocol Version:* 3-4-2016 / WC SOP-2016
Expected Frequency: One cumulative file created every season for each station	*Repository reference type / sensitivity:* Tabular data / not sensitive	*Submission Unit:* Station
What purpose does this deliverable serve? This provides researchers with Processing Level 1B corrected weather data up through each station's most recent site visit.		
Identifiers of relations that compose the tabular deliverable ("Relations" are tables or files that provide information which may be represented in a grid format. Each relation listed must be fully defined in its own accompanying Form X.): WC_G_yyyy_sssss.CSV, where yyyy is 4-digit year indicating the most recent calendar year represented in the file and sssss is the station's NWS ID.		
Deliverable ID of any other SEAN data products required to create this product: WC_F containing the associated most recent year.		
Description and source of any outside data required to create this product: This deliverable's content is extracted from the cumulative Aquarius database used for quality control processing (SOP 11).		

Form X: Table Definition

Vital Sign: Weather and Climate	*Relation identifier:* WC_G_yyyy_sssss.CSV	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018/ WC SOP-2018	*Type of relation:* ○ Database table ◉ Data file	*Estimated rows:* 8,760/station/year
Unique key for this relation: STATION_ID || TIMESTAMP_UTC		
Purpose: Comma separated values of quality-controlled observations from RAWS weather stations, including post-acquisition quality assessments and selected metadata.		

Identifiers of attributes defined over this relation ("Attributes" are columns of the grid. Each attribute must be defined in an accompanying Form Y.):

The first line of each file consists only of the special attribute:

HEADER

The remaining lines contain these attributes:

STATION_ID	TIMESTAMP_UTC
RNIN	RNIN_QUALITY
WSM	WSM_QUALITY
WDD	WDD_QUALITY
ATF	ATF_QUALITY
RHP	RHP_QUALITY
BVV	BVV_QUALITY
WDDP	WDDP_QUALITY
WSMP	WSMP_QUALITY
SRW	SRW_QUALITY
SDI	SDI_QUALITY
AT1H	AT1H_QUALITY
AT1L	AT1L_QUALITY
STF	STF_QUALITY
STF_DEPTH	STF2
STF2_QUALITY	STF2_DEPTH
STF3	STF3_QUALITY
STF3_DEPTH	STF4
STF4_QUALITY	STF4_DEPTH
STF5	STF5_QUALITY
STF5_DEPTH	QUALITY_COMMENT
PROTOCOL_SOP_ID	UPDATED_BY
UPDATE_TIMESTAMP	

Mandatory validation criteria involving multiple attributes: The unique key (above) must never be duplicated. The number of station files must not be smaller than the number of stations in the network.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* header	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* n/a	*Relation (from Form X):* WC_G_yyyy_sssss.CSV

Purpose:
Heading containing fixed keywords used to designate content of columns in remainder of file. The keywords must be comma-separated. This single header record must be the first record of each file. The keywords are immutable: no variations are acceptable.

Data type:	Varchar(1024)
Maximum length	1024
Required:	Yes
Measurement units:	n/a
Format:	Unformatted string
Case:	Ignored
Mandatory validation rules for this attribute (in order of application):	1. Must be present and must contain all of the following substrings: STATION_ID, TIMESTAMP_UTC, RNIN, RNIN_QUALITY, WSM, WSM_QUALITY, WDD, WDD_QUALITY, ATF, ATF_QUALITY, RHP, RHP_QUALITY, BVV, BVV_QUALITY, WDDP, WDDP_QUALITY, WSMP, WSMP_QUALITY, SRW, SRW_QUALITY, SDI, SDI_QUALITY, AT1H, AT1H_QUALITY, AT1L, AT1L_QUALITY, STF, STF_QUALITY, STF_DEPTH, STF2, STF2_QUALITY, STF2_DEPTH, STF3, STF3_QUALITY, STF3_DEPTH, STF4, STF4_QUALITY, STF4_DEPTH, STF5, STF5_QUALITY, STF5_DEPTH, QUALITY_COMMENT, PROTOCOL_SOP_ID, UPDATED_BY, UPDATE_TIMESTAMP
Optional validation rules for this attribute:	None.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* STATION_ID	*Used by deliverable ID:* WC_G
Revision date / protocol version: 3-7-2016 / WC SOP-2016	*Default report heading:* Station	*Relation (from Form X):* WC_G_yyyy_sssss.CSV

Purpose: Identifier used to designate the particular station from which data were collected. Specifically, the 5-character NWS Site Identifier for weather station reports. For example, UPRA2 is the station id for Upper Charley River RAWS. All letters must be upper case.	
Data type:	Varchar(5)
Maximum length	5
Required:	Yes
Measurement units:	n/a
Format:	n/a
Mandatory validation rules for this attribute (in order of application):	1. Must be present. 2. Must not contain lower case letters.
Optional validation rules for this attribute:	None

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* TIMESTAMP_UTC	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Date Recorded	*Relation (from Form X):* WC_G_yyyy_sssss.CSV

Purpose: Date and time the observation was taken, using the Universal Coordinated Time (UTC) zone and 24-hour clock. Daylight savings time is not recognized by UTC.	
Data type:	Varchar(16)
Maximum length	16
Required:	Yes
Measurement units:	Date Time
Format:	yyyy-mm-dd hh:mm
Mandatory validation rules for this attribute (in order of application):	1. Must be present. 2. Must represent a valid a date and time. 3. Must not be a date beyond the current one at point of validation. 4. Must not be a date before 2003.
Optional validation rules for this attribute:	None.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* RNIN	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Accumulated Rain (inches)	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: Accumulated rain level in inches since the last instrument reset.		

Data type:	Real number
Maximum length	6
Required:	No
Measurement units:	Inches
Format:	nnn.nn
Mandatory validation rules for this attribute (in order of application):	If present and RNIN_QUALITY = 31: 1. Must represent a valid real number. 2. Must be >= 0.00
Optional validation rules for this attribute:	1. Should be between 0.00 and 100.00. 2. If present, RNIN_QUALITY should be present.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* RNIN_QUALITY	*Used by deliverable ID:* WC_G
Revision date / protocol version: 3-8-2016 / WC SOP-2016	*Default report heading:* RNIN Data Quality	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: A code indicating the judged data quality: -2 – Unusable: does not meet required basic quality level - cannot be used. 6 – Suspect: see comment to determine if it is suitable for a particular purpose. 31 – Good: no exceptions encountered.		

Data type:	Varchar(2)
Maximum length	2
Required:	no
Measurement units:	n/a
Format:	n/a
Mandatory validation rules for this attribute (in order of application):	1. If present, must be one of '-2', '6', or '31'.
Optional validation rules for this attribute:	1. If present, RNIN should also be present. 2. If not '31' QUALITY_COMMENT should not be empty.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* WSM	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Wind Speed (MPH)	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: Wind speed in miles per hour. Taken as the mean of readings encountered over the preceding 60 minutes.		
Data type:	Real	
Maximum length	5	
Required:	no	
Measurement units:	Miles per hour	
Format:	nnn.n	
Mandatory validation rules for this attribute (in order of application):	If present and WSM_QUALITY = 31: 1. Must represent a valid real number. 2. Must be between 0.0 and 150.0.	
Optional validation rules for this attribute:	1. Should be between 0.0 and 120.0.	

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* WSM_QUALITY	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* WSM Data Quality	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: A code indicating the judged data quality: -2 – Unusable: does not meet required basic quality level - cannot be used. 6 – Suspect: see comment to determine if it is suitable for a particular purpose. 31 – Good: no exceptions encountered.		
Data type:	Varchar(2)	
Maximum length	2	
Required:	no	
Measurement units:	n/a	
Format:	n/a	
Mandatory validation rules for this attribute (in order of application):	1. If present, must be one of '-2', '6', or '31'.	
Optional validation rules for this attribute:	1. If present, WSM should also be present. 2. If not '31' QUALITY_COMMENT should not be empty.	

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* WDD	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Wind Direction (degrees)	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: Wind direction in degrees. Taken as the mean of readings encountered over the preceding 60 minutes.		
Data type:	Integer	
Maximum length	3	
Required:	no	
Measurement units:	Degrees	
Format:	nnn	
Mandatory validation rules for this attribute (in order of application):	If present and WDD_QUALITY = 31: 1. Must represent a valid integer. 2. Must be between 0 and 360.	
Optional validation rules for this attribute:	None.	

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* WDD_QUALITY	*Used by deliverable ID:* WC_G
Revision date / protocol version: 3-8-2016 / WC SOP-2016	*Default report heading:* WDD Data Quality	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: A code indicating the judged data quality: -2 – Unusable: does not meet required basic quality level. 6 – Suspect: see comment to determine if it is suitable for a particular purpose. 31 – Good: no exceptions encountered.		
Data type:	Varchar(2)	
Maximum length	2	
Required:	no	
Measurement units:	n/a	
Format:	n/a	
Mandatory validation rules for this attribute (in order of application):	1. If present, must be one of '-2', '6', or '31'.	
Optional validation rules for this attribute:	1. If present, WDD should also be present. 2. If not '31' QUALITY_COMMENT should not be empty.	

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* ATF	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Air Temperature (F)	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: Air temperature in degrees Fahrenheit. Taken as the mean of readings encountered over the preceding 60 minutes.		

Data type:	Real
Maximum length	6
Required:	no
Measurement units:	Degrees Fahrenheit
Format:	[-]nnn.n
Mandatory validation rules for this attribute (in order of application):	If present and ATF_QUALITY = 31: 1. Must represent a valid real number. 2. Must be between -100.0 and 150.0
Optional validation rules for this attribute:	1. Should be between -70.0 and 110.0

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* ATF_QUALITY	*Used by deliverable ID:* WC_G
Revision date / protocol version: 3-8-2016 / WC SOP-2016	*Default report heading:* ATF Data Quality	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: A code indicating the judged data quality: -2 – Unusable: does not meet required basic quality level. 6 – Suspect: see comment to determine if it is suitable for a particular purpose. 31 – Good: no exceptions encountered.		

Data type:	Varchar(2)
Maximum length	2
Required:	no
Measurement units:	n/a
Format:	n/a
Mandatory validation rules for this attribute (in order of application):	1. If present, must be one of '-2', '6', or '31'.
Optional validation rules for this attribute:	1. If present, ATF should also be present.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* RHP	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Relative Humidity %	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: Relative humidity in percent. Taken as the mean of readings encountered over the preceding 60 minutes.		

Data type:	Integer
Maximum length	3
Required:	no
Measurement units:	Percent
Format:	nnn
Mandatory validation rules for this attribute (in order of application):	If present and RHP_QUALITY = 31: 1. Must represent a valid integer. 2. Must be between 0 and 100.
Optional validation rules for this attribute:	None.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* RHP_QUALITY	*Used by deliverable ID:* WC_G
Revision date / protocol version: 3-8-2016 / WC SOP-2016	*Default report heading:* RHP Data Quality	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: A code indicating the judged data quality: -2 – Unusable: does not meet required basic quality level. 6 – Suspect: see comment to determine if it is suitable for a particular purpose. 31 – Good: no exceptions encountered.		

Data type:	Varchar(2)
Maximum length	2
Required:	no
Measurement units:	n/a
Format:	n/a
Mandatory validation rules for this attribute (in order of application):	1. If present, must be one of '-2', '6', or '31'.
Optional validation rules for this attribute:	1. If present, RHP should also be present. 2. If not '31' QUALITY_COMMENT should not be empty.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* BVV	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Battery (Volts)	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: Relative humidity in percent. Taken as the mean of readings encountered over the preceding 60 minutes.		

Data type:	Real
Maximum length	4
Required:	no
Measurement units:	Volts
Format:	nn.n
Mandatory validation rules for this attribute (in order of application):	If present and BVV_QUALITY = 31: 1. Must represent a valid real number. 2. Must be between 0.00 and 20.00.
Optional validation rules for this attribute:	1. Should be between 11.0 and 16.0.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* BVV_QUALITY	*Used by deliverable ID:* WC_G
Revision date / protocol version: 3-8-2016 / WC SOP-2016	*Default report heading:* BVV Data Quality	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: A code indicating the judged data quality: -2 – Unusable: does not meet required basic quality level. 6 – Suspect: see comment to determine if it is suitable for a particular purpose. 31 – Good: no exceptions encountered.		

Data type:	Varchar(2)
Maximum length	2
Required:	no
Measurement units:	n/a
Format:	n/a
Mandatory validation rules for this attribute (in order of application):	1. If present, must be one of '-2', '6', or '31'.
Optional validation rules for this attribute:	1. If present, BVV should also be present. 2. If not '31' QUALITY_COMMENT should not be empty.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* WSMP	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Peek Wind Speed (MPH)	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: Peek wind direction in miles per hour. Taken as the highest reading encountered over the past 60 minutes.		

Data type:	Real
Maximum length	5
Required:	no
Measurement units:	Miles per hour
Format:	nnn.n
Mandatory validation rules for this attribute (in order of application):	If present and WSMP_QUALITY = 31: 1. Must represent a valid real number. 2. Must be between 0.0 and 150.0.
Optional validation rules for this attribute:	1. Should be between 0.0 and 120.0

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* WSMP_QUALITY	*Used by deliverable ID:* WC_G
Revision date / protocol version: 3-8-2016 / WC SOP-2016	*Default report heading:* WSMP Data Quality	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: A code indicating the judged data quality: -2 – Unusable: does not meet required basic quality level. 6 – Suspect: see comment to determine if it is suitable for a particular purpose. 31 – Good: no exceptions encountered.		

Data type:	Varchar(2)
Maximum length	2
Required:	no
Measurement units:	n/a
Format:	n/a
Mandatory validation rules for this attribute (in order of application):	1. If present, must be one of '-2', '6', or '31'.
Optional validation rules for this attribute:	1. If present, WSMP should also be present. 2. If not '31' then QUALITY_COMMENT should not be empty.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* WDDP	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Peek Wind Direction	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: Peek wind direction in degrees of the WSMP reading in this record. North is both 0° and 360°.		

Data type:	Integer
Maximum length	3
Required:	no
Measurement units:	Degrees
Format:	nnn
Mandatory validation rules for this attribute (in order of application):	If present and WDDP_QUALITY = 31: 1. Must represent a valid integer. 2. Must be between 0 and 360.
Optional validation rules for this attribute:	None.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* WDDP _QUALITY	*Used by deliverable ID:* WC_G
Revision date / protocol version: 3-8-2016 / WC SOP-2016	*Default report heading:* WDDP Data Quality	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: A code indicating the judged data quality: -2 – Unusable: does not meet required basic quality level. 6 – Suspect: see comment to determine if it is suitable for a particular purpose. 31 – Good: no exceptions encountered.		

Data type:	Varchar(2)
Maximum length	2
Required:	no
Measurement units:	n/a
Format:	n/a
Mandatory validation rules for this attribute (in order of application):	1. If present, must be one of '-2', '6', or '31'.
Optional validation rules for this attribute:	1. If present, WDDP should also be present. 2. If not '31' then QUALITY_COMMENT should not be empty.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* SDI	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Snow depth (inches)	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: Depth of snow at the site in inches. Taken as the mean of readings encountered over the past 60 minutes.		

Data type:	Real
Maximum length	5
Required:	no
Measurement units:	inches
Format:	nnn.n
Mandatory validation rules for this attribute (in order of application):	If present and SDI_QUALITY = 31: 1. Must represent a valid real number. 2. Must be between 0.0 and 500.0.
Optional validation rules for this attribute:	None.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* SDI_QUALITY	*Used by deliverable ID:* WC_G
Revision date / protocol version: 3-8-2016 / WC SOP-2016	*Default report heading:* SDI Data Quality	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: A code indicating the judged data quality: -2 – Unusable: does not meet required basic quality level. 6 – Suspect: see comment to determine if it is suitable for a particular purpose. 31 – Good: no exceptions encountered.		

Data type:	Varchar(2)
Maximum length	2
Required:	no
Measurement units:	n/a
Format:	n/a
Mandatory validation rules for this attribute (in order of application):	1. If present, must be one of '-2', '6', or '31'.
Optional validation rules for this attribute:	1. If present, SDI should also be present. 2. If not '31' then QUALITY_COMMENT should not be empty.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* SRW	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Solar Radiation (w/m^2)	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: Solar radiation in Watts per square meter. Taken as the mean of readings encountered over the preceding 60 minutes.		

Data type:	Real
Maximum length	6
Required:	no
Measurement units:	Watts /m^2
Format:	nnnn.n
Mandatory validation rules for this attribute (in order of application):	If present and SRW_QUALITY = 31: 1. Must represent a valid real number. 2. Must be between 0.0 and 1500.0.
Optional validation rules for this attribute:	1. Should be between 0.0 and 1100.0.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* SRW_QUALITY	*Used by deliverable ID:* WC_G
Revision date / protocol version: 3-8-2016 / WC SOP-2016	*Default report heading:* SRW Data Quality	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: A code indicating the judged data quality: -2 – Unusable: does not meet required basic quality level. 6 – Suspect: see comment to determine if it is suitable for a particular purpose. 31 – Good: no exceptions encountered.		

Data type:	Varchar(2)
Maximum length	2
Required:	no
Measurement units:	n/a
Format:	n/a
Mandatory validation rules for this attribute (in order of application):	1. If present, must be one of '-2', '6', or '31'.
Optional validation rules for this attribute:	1. If present, SRW should also be present. 2. If not '31' then QUALITY_COMMENT should not be empty.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* AT1H	*Used by deliverable ID:* WC_G
Revision date / protocol version: 24-23-2018 / WC SOP-2018	*Default report heading:* High Temperature (F)	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: Atmospheric temperature in degrees Fahrenheit. Taken as the highest reading encountered over the preceding 60 minutes.		

Data type:	Real
Maximum length	6
Required:	no
Measurement units:	Degrees Fahrenheit
Format:	[-]nnn.n
Mandatory validation rules for this attribute (in order of application):	If present and AT1H_QUALITY = 31: 1. Must represent a valid real number. 2. Must be between -100.0 and 150.0
Optional validation rules for this attribute:	1. Should be between -70.0 and 110.0.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* AT1H_QUALITY	*Used by deliverable ID:* WC_G
Revision date / protocol version: 3-8-2016 / WC SOP-2016	*Default report heading:* AT1H Data Quality	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: A code indicating the judged data quality: -2 – Unusable: does not meet required basic quality level. 6 – Suspect: see comment to determine if it is suitable for a particular purpose. 31 – Good: no exceptions encountered.		

Data type:	Varchar(2)
Maximum length	2
Required:	no
Measurement units:	n/a
Format:	n/a
Mandatory validation rules for this attribute (in order of application):	1. If present, must be one of '-2', '6', or '31'.
Optional validation rules for this attribute:	1. If present, AT1H should also be present. 2. If not '31' then QUALITY_COMMENT should not be empty.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* AT1L	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Low Temperature (F)	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: Atmospheric temperature in degrees Fahrenheit. Taken as the lowest reading encountered over the preceding 60 minutes.		

Data type:	Real
Maximum length	6
Required:	no
Measurement units:	Degrees Fahrenheit
Format:	[-]nnn.n
Mandatory validation rules for this attribute (in order of application):	If present and AT1L_QUALITY = 31: 1. Must represent a valid real number. 2. Must be between -100.0 and 150.0.
Optional validation rules for this attribute:	1. Should be between -70.0 and 110.0.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* AT1L_QUALITY	*Used by deliverable ID:* WC_G
Revision date / protocol version: 3-8-2016 / WC SOP-2016	*Default report heading:* AT1L Data Quality	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: A code indicating the judged data quality: -2 – Unusable: does not meet required basic quality level. 6 – Suspect: see comment to determine if it is suitable for a particular purpose. 31 – Good: no exceptions encountered.		

Data type:	Varchar(2)
Maximum length	2
Required:	no
Measurement units:	n/a
Format:	n/a
Mandatory validation rules for this attribute (in order of application):	1. If present, must be one of '-2', '6', or '31'.
Optional validation rules for this attribute:	1. If present, AT1L should also be present. 2. If not '31' then QUALITY_COMMENT should not be empty.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* STF	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Soil Temperature 1 (F)	*Relation (from Form X):* WC_G_yyyy_sssss.CSV

Purpose:
Soil temperature in degrees Fahrenheit from a buried sensor. Taken as the mean of readings encountered over the preceding 60 minutes. Depth used for this observation is specified in the STF_DEPTH attribute.

Data type:	Real
Maximum length	6
Required:	no
Measurement units:	Degrees Fahrenheit
Format:	[-]nnn.n
Mandatory validation rules for this attribute (in order of application):	If present and STF_QUALITY = 31: 1. Must represent a valid real number. 2. Must be between -100.0 and 150.0.
Optional validation rules for this attribute:	1. Should be between -65.0 and 110.0.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* STF_QUALITY	*Used by deliverable ID:* WC_G
Revision date / protocol version: 3-8-2016 / WC SOP-2016	*Default report heading:* STF Data Quality	*Relation (from Form X):* WC_G_yyyy_sssss.CSV

Purpose:
A code indicating the judged data quality:

-2 – Unusable: does not meet required basic quality level.
6 – Suspect: see comment to determine if it is suitable for a particular purpose.
31 – Good: no exceptions encountered.

Data type:	Varchar(2)
Maximum length	2
Required:	no
Measurement units:	n/a
Format:	n/a
Mandatory validation rules for this attribute (in order of application):	1. If present, must be one of '-2', '6', or '31'.
Optional validation rules for this attribute:	1. If present, STF should also be present. 2. If not '31' then QUALITY_COMMENT should not be empty.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* STF_DEPTH	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Soil 1 Depth (cm)	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: Depth in centimeters of buried STF sensor used for this observation.		

Data type:	Integer
Maximum length	3
Required:	no
Measurement units:	centimeters
Format:	nnn
Mandatory validation rules for this attribute (in order of application):	1. If present must represent a valid integer.
Optional validation rules for this attribute:	1. If STF is present, STF_DEPTH should be present. 2. Should be between 1 and 100.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* STF2	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Soil Temperature 2 (F)	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: Soil temperature in degrees Fahrenheit from a buried sensor. Taken as the mean of readings encountered over the preceding 60 minutes. Depth used for this observation is specified in the STF2_DEPTH attribute.		

Data type:	Real
Maximum length	6
Required:	no
Measurement units:	Degrees Fahrenheit
Format:	[-]nnn.n
Mandatory validation rules for this attribute (in order of application):	If present and STF2_QUALITY = 31: 1. Must represent a valid real number. 2. Must be between -100.0 and 150.0.
Optional validation rules for this attribute:	1. Should be between -65.0 and 110.0.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* STF2_QUALITY	*Used by deliverable ID:* WC_G
Revision date / protocol version: 2-9-2016 / WC SOP-2016	*Default report heading:* STF2 Data Quality	*Relation (from Form X):* WC_G_yyyy_sssss.CSV

Purpose:
A code indicating the judged data quality:

-2 – Unusable: does not meet required basic quality level.
6 – Suspect: see comment to determine if it is suitable for a particular purpose.
31 – Good: no exceptions encountered.

Data type:	Varchar(2)
Maximum length	2
Required:	no
Measurement units:	n/a
Format:	n/a
Mandatory validation rules for this attribute (in order of application):	1. If present, must be one of '-2', '6', or '31'.
Optional validation rules for this attribute:	1. If present, STF2 should also be present. 2. If not '31' then QUALITY_COMMENT should not be empty.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* STF2_DEPTH	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Soil 2 Depth (cm)	*Relation (from Form X):* WC_G_yyyy_sssss.CSV

Purpose:
Depth in centimeters of buried STF2 sensor used for this observation.

Data type:	Integer
Maximum length	3
Required:	no
Measurement units:	centimeters
Format:	nnn
Mandatory validation rules for this attribute (in order of application):	1. If present must represent a valid integer.
Optional validation rules for this attribute:	1. If STF2 is present, STF2_DEPTH should be present and greater than STF_DEPTH. 2. Should be between 1 and 100.

Vital Sign: Weather and Climate	*Attribute identifier:* STF3	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Soil Temperature 3 (F)	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: Soil temperature in degrees Fahrenheit from a buried sensor. Taken as the mean of readings encountered over the preceding 60 minutes. Depth used for this observation is specified in the STF3_DEPTH attribute.		

Data type:	Real
Maximum length	6
Required:	no
Measurement units:	Degrees Fahrenheit
Format:	[-]nnn.n
Mandatory validation rules for this attribute (in order of application):	If present and STF3_QUALITY = 31: 1. Must represent a valid real number. 2. Must be between -100.0 and 150.0.
Optional validation rules for this attribute:	1. Should be between -65.0 and 110.0.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* STF3_QUALITY	*Used by deliverable ID:* WC_G
Revision date / protocol version: 3-8-2016 / WC SOP-2016	*Default report heading:* STF3 Data Quality	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: A code indicating the judged data quality: -2 – Unusable: does not meet required basic quality level. 6 – Suspect: see comment to determine if it is suitable for a particular purpose. 31 – Good: no exceptions encountered.		

Data type:	Varchar(2)
Maximum length	2
Required:	no
Measurement units:	n/a
Format:	n/a
Mandatory validation rules for this attribute (in order of application):	1. If present, must be one of '-2', '6', or '31'.
Optional validation rules for this attribute:	1. If present, STF3 should also be present. 2. If not '31' then QUALITY_COMMENT should not be empty.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* STF3_DEPTH	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Soil 3 Depth (cm)	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: Depth in centimeters of buried STF3 sensor used for this observation.		

Data type:	Integer
Maximum length	3
Required:	no
Measurement units:	centimeters
Format:	nnn
Mandatory validation rules for this attribute (in order of application):	1. If present must represent a valid integer.
Optional validation rules for this attribute:	1. If STF3 is present, STF3_DEPTH should be present and > STF2_DEPTH. 2. Should be between 1 and 100.

Vital Sign: Weather and Climate	*Attribute identifier:* STF4	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Soil Temperature 4 (F)	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: Soil temperature in degrees Fahrenheit from a buried sensor. Taken as the mean of readings encountered over the preceding 60 minutes. Depth used for this observation is specified in the STF4_DEPTH attribute.		

Data type:	Real
Maximum length	6
Required:	no
Measurement units:	Degrees Fahrenheit
Format:	[-]nnn.n
Mandatory validation rules for this attribute (in order of application):	If present and STF4_QUALITY = 31: 1. Must represent a valid real number. 2. Must be between -100.0 and 150.0.
Optional validation rules for this attribute:	1. Should be between -65.0 and 110.0.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* STF4_QUALITY	*Used by deliverable ID:* WC_G
Revision date / protocol version: 3-8-2016 / WC SOP-2016	*Default report heading:* STF4 Data Quality	*Relation (from Form X):* WC_G_yyyy_sssss.CSV

Purpose:
A code indicating the judged data quality:
-2 – Unusable: does not meet required basic quality level.
6 – Suspect: see comment to determine if it is suitable for a particular purpose.
31 – Good: no exceptions encountered.

Data type:	Varchar(2)
Maximum length	2
Required:	no
Measurement units:	n/a
Format:	n/a
Mandatory validation rules for this attribute (in order of application):	1. If present, must be one of '-2', '6', or '31'.
Optional validation rules for this attribute:	1. If present, STF4 should also be present. 2. If not '31' then QUALITY_COMMENT should not be empty.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* STF4_DEPTH	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Soil 4 Depth (cm)	*Relation (from Form X):* WC_G_yyyy_sssss.CSV

Purpose:
Depth in centimeters of buried STF4 sensor used for this observation.

Data type:	Integer
Maximum length	3
Required:	no
Measurement units:	centimeters
Format:	nnn
Mandatory validation rules for this attribute (in order of application):	1. If present must represent a valid integer.
Optional validation rules for this attribute:	1. If STF4 is present, STF4_DEPTH should be present and > STF3_DEPTH. 2. Should be between 1 and 100.

Vital Sign: Weather and Climate	*Attribute identifier:* STF5	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Soil Temperature 5 (F)	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: Soil temperature in degrees Fahrenheit from a buried sensor. Taken as the mean of readings encountered over the preceding 60 minutes. Depth used for this observation is specified in the STF5_DEPTH attribute. If present, this sensor should be deeper than STF4.		

Data type:	Real
Maximum length	6
Required:	no
Measurement units:	Degrees Fahrenheit
Format:	[-]nnn.n
Mandatory validation rules for this attribute (in order of application):	If present and STF5_QUALITY = 31: 1. Must represent a valid real number. 2. Must be between -100.0 and 150.0.
Optional validation rules for this attribute:	1. Should be between -65.0 and 110.0.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* STF5_QUALITY	*Used by deliverable ID:* WC_G
Revision date / protocol version: 3-8-2016 / WC SOP-2016	*Default report heading:* STF5 Data Quality	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: A code indicating the judged data quality: -2 – Unusable: does not meet required basic quality level. 6 – Suspect: see comment to determine if it is suitable for a particular purpose. 31 – Good: no exceptions encountered.		

Data type:	Varchar(2)
Maximum length	2
Required:	no
Measurement units:	n/a
Format:	n/a
Mandatory validation rules for this attribute (in order of application):	1. If present, must be one of '-2', '6', or '31'.
Optional validation rules for this attribute:	1. If present, STF5 should also be present. 2. If not '31' then QUALITY_COMMENT should not be empty.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* STF5_DEPTH	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Soil 5 Depth (cm)	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: Depth in centimeters of buried STF5 sensor used for this observation.		

Data type:	Integer
Maximum length	3
Required:	no
Measurement units:	centimeters
Format:	nnn
Mandatory validation rules for this attribute (in order of application):	1. If present must represent a valid integer.
Optional validation rules for this attribute:	1. If STF5 is present, STF5_DEPTH should be present and > STF4_DEPTH. 2. Should be between 1 and 100.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* QUALITY_COMMENT	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Record Quality Comment	*Relation (from Form X):* WC_G_yyyy_sssss.CSV
Purpose: Explanation as to why some values in this record are of suspect or bad quality.		

Data type:	Varchar(1024)
Maximum length	1024
Required:	no
Measurement units:	n/a
Format:	n/a
Mandatory validation rules for this attribute (in order of application):	Must be <= 1024 characters.
Optional validation rules for this attribute:	None.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* PROTOCOL_SOP_ID	*Used by deliverable ID:* WC_G
Revision date / protocol version: 4-23-2018 / WC SOP-2018	*Default report heading:* Network _ Protocol _ SOP	*Relation (from Form X):* WC_G_yyyy_sssss.CSV

Purpose:
An identifier that directs the user to the exact version of protocol and SOP used in generating this record. For example data collected according to CAKN's protocol narrative 2006 and SOP set for 2018 would be designated CAKN_2006_SOP-2018. Data collected according to the protocol implementation plan for SEAN stamped 2017 and SOP package 2020 would use SEAN_PIP-2017_SOP-2020.

Data type:	Varchar(24)
Maximum length	24
Required:	Yes
Measurement units:	n/a
Format:	n/a
Mandatory validation rules for this attribute (in order of application):	1. Must be present.
Optional validation rules for this attribute:	None.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* UPDATED_BY	*Used by deliverable ID:* WC_G
Revision date / protocol version: 2-10-2016 / WC SOP-2016	*Default report heading:* Updated By	*Relation (from Form X):* WC_G_yyyy_sssss.CSV

Purpose:
The userid of the builder responsible for most recently editing this record in the QC processing, regardless of whether it is new or a revised version.

Data type:	Varchar(24)
Maximum length	24
Required:	Yes
Measurement units:	n/a
Format:	n/a
Mandatory validation rules for this attribute (in order of application):	1. Must be present.
Optional validation rules for this attribute:	None.

Form Y: Column Definition

Vital Sign: Weather and Climate	*Attribute identifier:* UPDATE_TIMESTAMP	*Used by deliverable ID:* WC_G
Revision date / protocol version: 2-10-2016 / WC SOP-2016	*Default report heading:* Updated On	*Relation (from Form X):* WC_G_yyyy_sssss.CSV

Purpose:
The date and time this record was most recently changed at any point in the QC processing, regardless of whether it is new or a revised version. Date uses local Alaska time. Time uses a 24-hour clock.

Data type:	Varchar(16)
Maximum length	16
Required:	Yes
Measurement units:	n/a
Format:	yyyy-mm-dd hh:mm
Mandatory validation rules for this attribute (in order of application):	1. Must be present. 2. Must be a valid date.
Optional validation rules for this attribute:	None.

WC_I: Calibration certificate images

Purpose of Deliverable

Weather station instruments are periodically serviced and recalibrated. Different instrument models require varying service intervals, typically between 2 and 5 years. When a unit is returned to the program from the servicer it is accompanied by certificates specifying the latest calibration parameter values and attesting to their accuracy. Researchers need to find these in order to verify the reliability of readings. They may also be used in some cases to develop factors for adjusting values to correct for sensor drift over time.

Frequency Produced

One deliverable is produced each year containing all certificates received in a calendar year. Since a full year is covered, this deliverable cannot be produced until after the subject year ends.

Prerequisites

None.

Data Flow

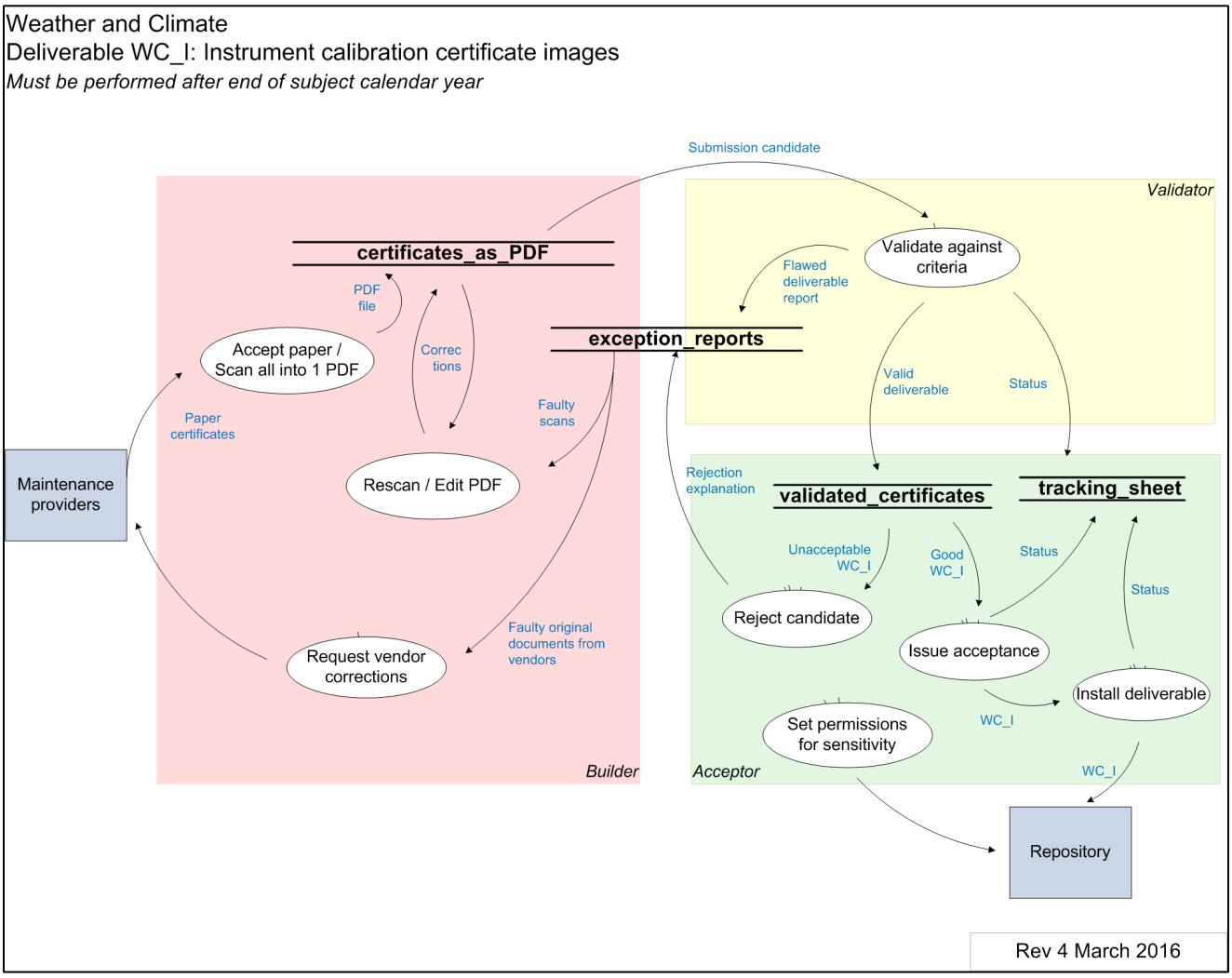


Figure SOP-10.A.9. Data flow required to generate deliverable WC_I: calibration certificate images.

Deliverable Definition

Form C: Non-tabular Data Deliverable

Vital Sign: Weather and Climate	*Deliverable ID:* WC_I	*Deliverable Title:* Calibration certificate images
File Format: PDF	*Associated Software and Version*: Adobe Acrobat	*Revision Date/Protocol Version:* 01-20-2016 / SOP-2025
Expected Frequency: One file per year	*Repository reference type / sensitivity:* Generic Document / not sensitive	*Submission Unit:* Calendar year
What purpose does this deliverable serve? Documents the calibration parameters for all weather station sensors serviced during the calendar year. Used to attest to the accuracy of readings and document sensor drift over time.		
Summary of content: Scanned images of all calibration certificates dated with the current calendar year saved as a single PDF file.		
Mandatory validation criteria: 1. Must successfully open using Adobe Acrobat. 2. Filename must conform to the format WC_I_yyyy.PDF where "yyyy" is the calendar year covered. 3. Must contain only documents that are dated in the current calendar year. 4. All documents must be related to instrument calibration, maintenance or servicing.		
Optional validation criteria: 1. Images should be free from artifacts that obscure significant content.		
Deliverable ID of any other network data products required to create this product: None.		
Description and source of any outside data required to create this product: Paper calibration certificates from manufacturers.		

Appendix SOP 10-B. Building CSV files using the WC_G Generator application

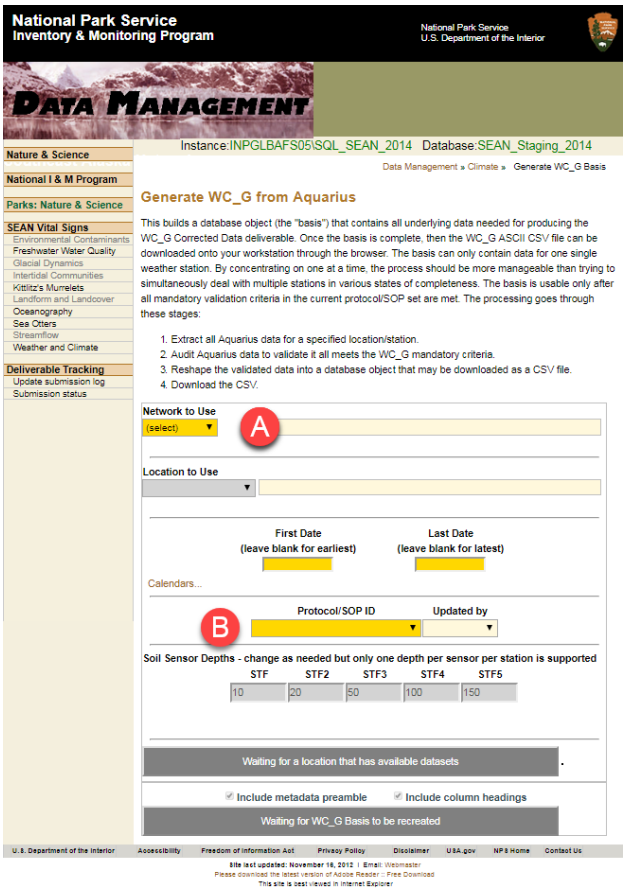
The WC_G Generator is a custom application developed to extract final quality-controlled data for a station from the Aquarius facility, validate it meets all mandatory criteria, and create a CSV file that meets the specifications in Appendix SOP-10A. One file per station is generated, but each contains all data for the period of record.

Prerequisites must first be met:

- The station whose WC_G is to be generated must have completed the entire quality control process.
- Aquarius datasets associated with the station that are to be included in the WC_G product must be named following the rules specified in SOP 11.
- The generator employs objects in a SQL Server database built for the purpose. Descriptive database tables should be current. These include items such as formal dataset citation, Protocol/SOP references, names of those responsible for creating the WC_G, and allowable WFMI parameter codes.

Detailed steps

Enter the URL http://sean-dm.glba.nps.gov/WC_G_generate5_DM.aspx into your browser to start the application. The startup screen, below, should appear.



Define the content desired in the WC_G

At bullet A select the network to work with. It is possible to work with multiple networks in multiple browser windows at the same time. However, within a network only one station may be generated at a time. Attempts to simultaneously generate multiple stations in one network, even using different workstations, will lead to undefined file content.

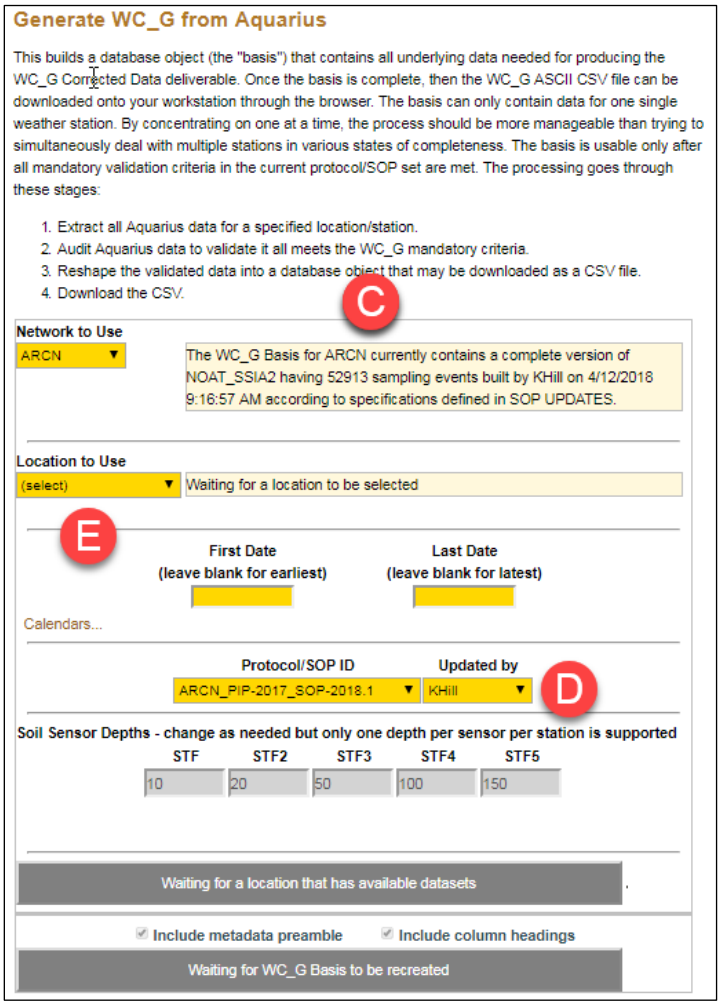
Notice the dropdown box at bullet B contains the formal Protocol/SOP ID that will get stamped on every record produced. The default value is the most recent version for the network chosen but more choices may be selected from.

It may take a few seconds for the app to respond to your network selection. Notice that a wait cursor ( ) may appear. Be patient and wait for the normal cursor to return. (There are several other places in the app where a wait cursor may appear – possibly for up to ten minutes duration when dealing with very large datasets.)

After the network has been selected, the current content of the WC_G Basis for the network is shown at bullet C, below.

The D dropdown now reflects names of those recognized as possible generators of the product. Pick yours. All WC_G records for the station chosen will be stamped with this name

The E dropdown box also gets filled with all locations defined in Aquarius for that network. Select one and wait briefly.



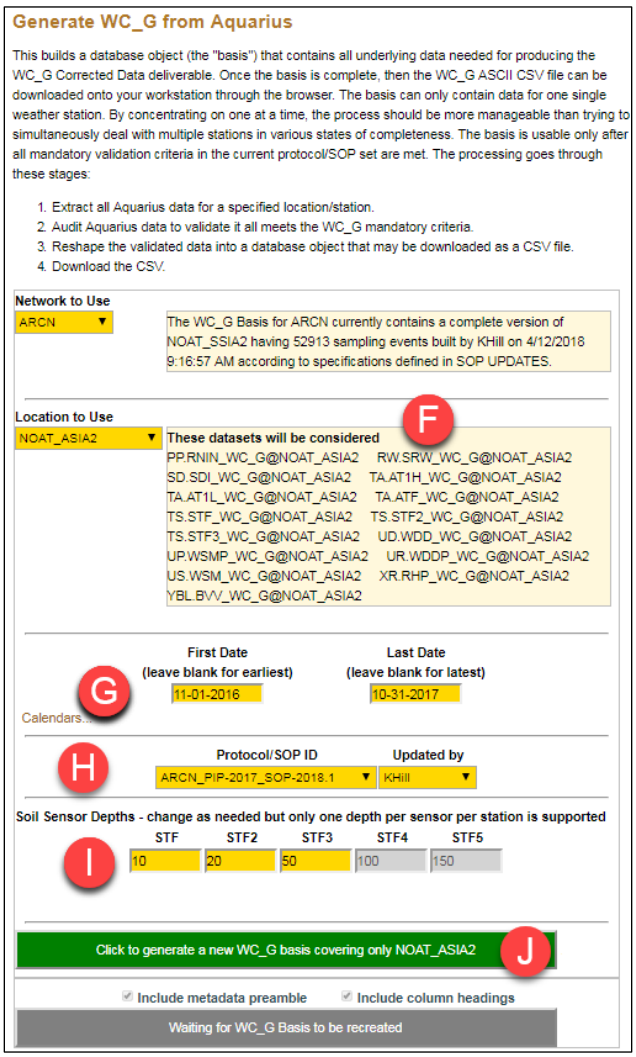
After selecting a location (Aquarius-speak for "station"), the app will find all datasets associated with that location. During QC a number of datasets may be produced for various purposes covering the same location and parameter. Only those whose name includes "WC_G" will be included in the final WC_G product. Those datasets get listed in F for your approval. If no datasets are displayed, then that station has not completed the final QC process.

One may limit the amount of data extracted by specifying a date range in G. If no first date is specified data will be brought in starting at the earliest observation in the datasets. If no last date is specified it will use observations through the most recent.

The protocol/SOP package ID must be selected from the dropdown at H. Also, the person creating the new deliverable must be specified. These are stamped on every record and are mandatory.

The app examines the datasets and determines which, if any, soil temperature depth levels are recorded. It assigns the standard depths in cm to those as default (see I). If you know that other depths were employed at the station, then adjust the figures to match. It is not practical at this time to assign different depth values to, say, STF2 for different records made at the same station. Only one depth is supported per sensor.

When enough information has been provided on the screen for a WC_G to be produced, the button at J is enabled. Review the screen specifications and press J to create the "Basis" database object.



Audit Aquarius data to validate it all meets the WC_G mandatory criteria

The app extracts all relevant data from Aquarius and then validates it against all mandatory criteria specified in Appendix SOP10-A. This may take a while.

If anything fails validation, a report will appear on the screen reporting the offending records. Corrections must be made in Aquarius before attempting another generation process.

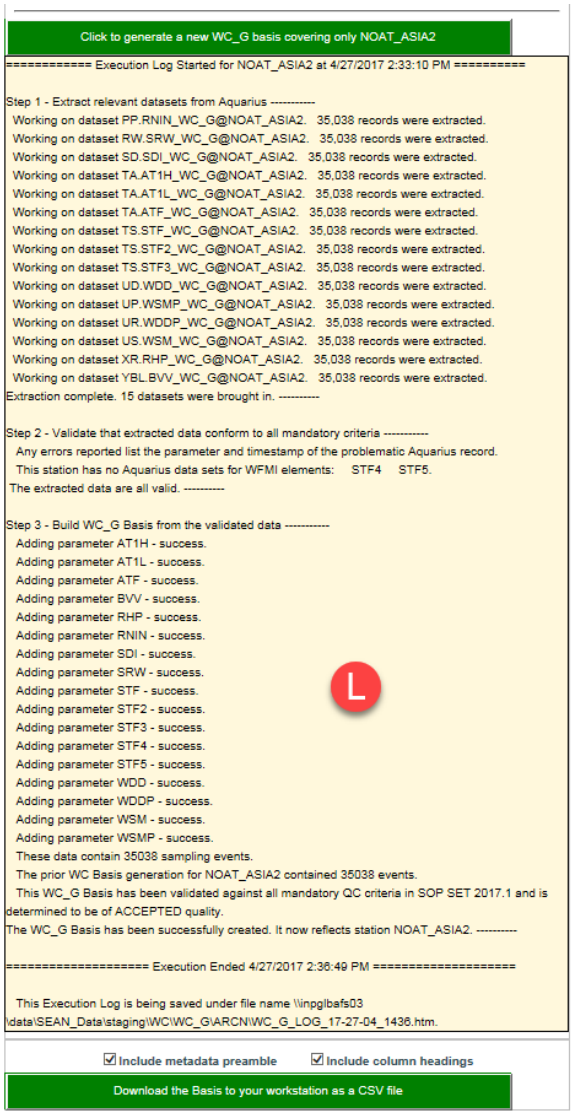
If validation is successful, those possible parameters for which no data were found are listed in the report and the app proceeds to build the Basis.

Reshape the validated data into a database object that may be downloaded as a CSV file

All data and screen entries are gathered together and woven into a single database table whose content mirrors that specified for WC_G.

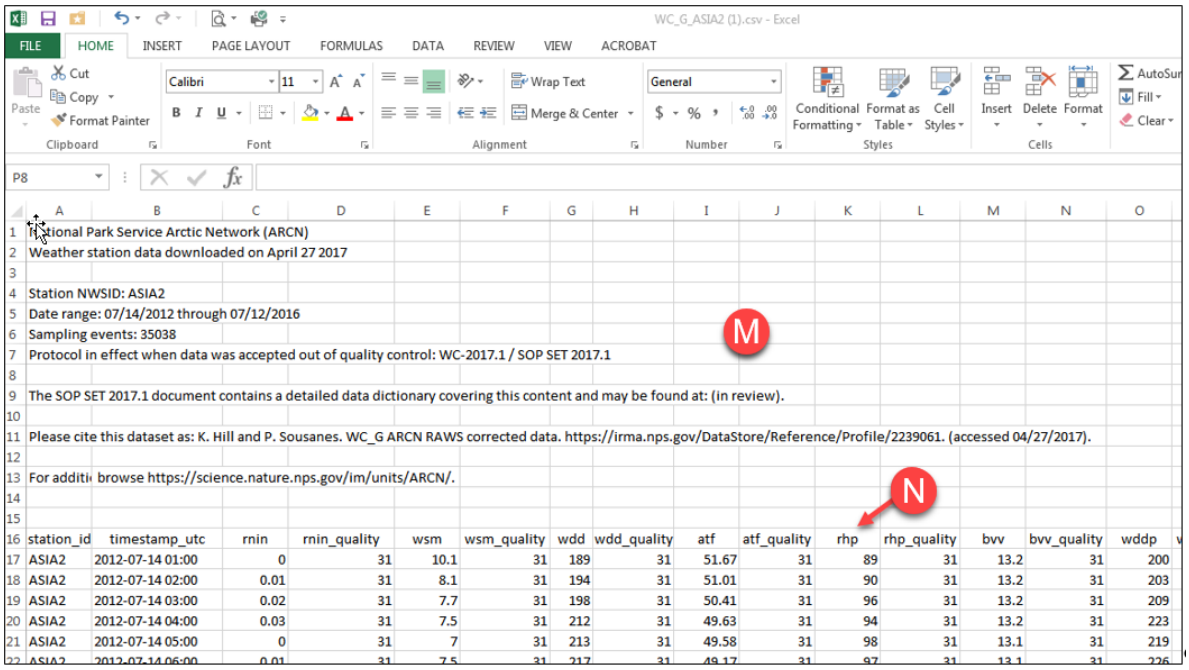
The content is presumed to be Accepted because it was generated from the final approved QC'd data in Aquarius. Separate approval is not required.

Once a Basis build attempt finishes, a report is generated of the results. A successful execution report is illustrated, below, at L. An audit trail of these executions is retained for future reference at the UNC listed at the bottom of the report.



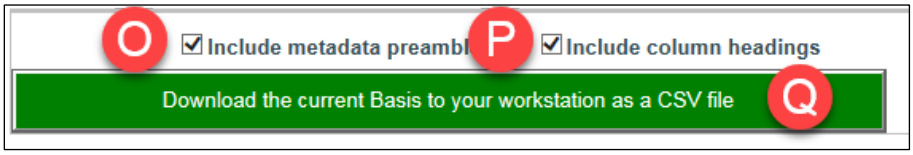
Download the CSV

Once the basis is successfully built, its content may be downloaded over your browser. The CSV file may optionally include a preamble that cites the data, protocol package, date of creation, and other useful metadata (M). A one-line column heading may also be included (N).



	station_id	timestamp_utc	rnin	rnin_quality	wsm	wsm_quality	wdd	wdd_quality	atf	atf_quality	rhp	rhp_quality	bvv	bvv_quality	wddp
17	ASIA2	2012-07-14 01:00	0	31	10.1	31	189	31	51.67	31	89	31	13.2	31	200
18	ASIA2	2012-07-14 02:00	0.01	31	8.1	31	194	31	51.01	31	90	31	13.2	31	203
19	ASIA2	2012-07-14 03:00	0.02	31	7.7	31	198	31	50.41	31	96	31	13.2	31	209
20	ASIA2	2012-07-14 04:00	0.03	31	7.5	31	212	31	49.63	31	94	31	13.2	31	223
21	ASIA2	2012-07-14 05:00	0	31	7	31	213	31	49.58	31	98	31	13.1	31	219

If the intent is to subsequently concatenate several stations together into one file, it may be convenient to leave the preamble off of all except the first file by unchecking box O.

Similarly, if the one-line column header is not desired, uncheck the box at P to suppress it.

Press the green Q button at the bottom of the page to begin the download. You will be asked to save the file under a default name. An alternate name may be given. The opportunity to directly open it may be possible depending on the model and configuration of your browser. But the final product will be loaded onto your workstation one way or another.