

Standard Operating Procedure (SOP) 10: Data Deliverable Creation, Validation, Acceptance and Dissemination, Version 2.0

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

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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 Data Store. Permanent archiving, disaster recovery, and public accessibility of the deliverables are accomplished through the enterprise facilities built into the Data Store. 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 Data Store.	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.	ESRI layer, JPEG, and KMZ files	As needed to accommodate new sites.	Project Staff	Project Leader	Project Leader
WC_C: Site visit worksheets	One worksheet per site 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 field season 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

				Responsibilities		
Deliverable Title	Description	Provided to Customers as	Frequency Produced	Builder	Validator	Acceptor
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
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 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.	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 report summarizing operations and data in the form of an NPS NRR or NRDS publication. Deliverable WC_D is a prerequisite.	One PDF file.	One PDF file per year created after completion of all field work	Project Leader	Peer Review Manager	Network Program Manager

Deliverable Title	Description	Provided to Customers as	Frequency Produced	Responsibilities		
				Builder	Validator	Acceptor
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.

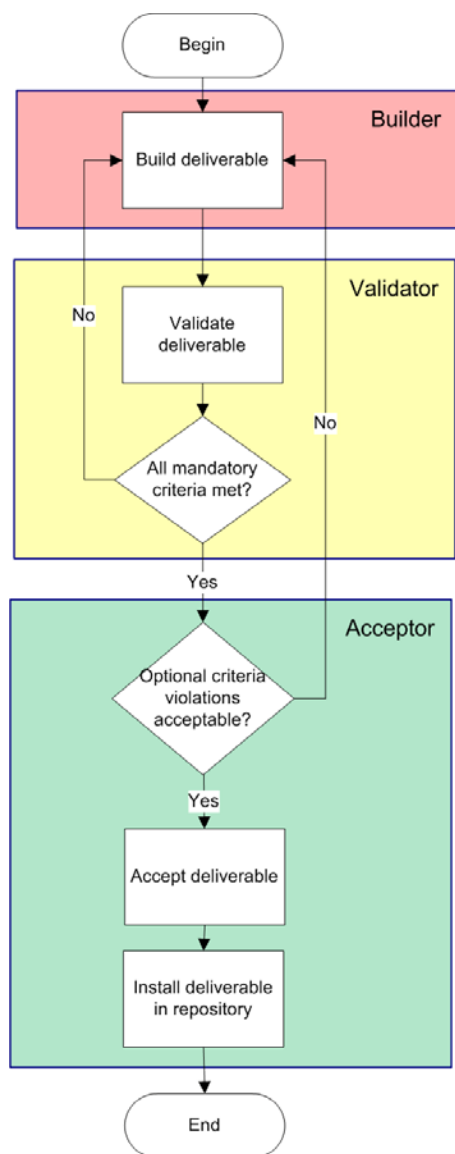


Figure SOP-10.1. Tasks and user roles required by the acceptance process.

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 the Acceptor judges content within a submission falls into the "sensitive" category, redaction is accomplished by withholding permissions on the holding in Data Store from all except those authorized to see such items.

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 Data Store 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 Data Store 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, totaling 10. The product reference type and permission level to use for each deliverable is specified in its Appendix A entry. Accepted deliverables are uploaded as holdings to the corresponding product reference (Figure SOP-10-4).

Data Store
Integrated Resource Management Applications
Part of IRMA

National Park Service
U.S. Department of the Interior
Natural Resource Stewardship and Science



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Project - (Code: 2226614) WFJohnson

Actions ▾

Title Central Alaska I&M Network Weather and Climate Monitoring

Description The CAKN climate monitoring program collects original weather data from remote corners of its national parks and provides to the research community detailed observations as well as summary reports and analyses. Ten specific data-based products are delivered, typically on an annual basis. To clearly identify them, each product has a formal designation and title. They include: WC_A Protocol-PIP-SOP; WC_B Site map; WC_C Site visit worksheets; WC_D Datalogger program code; WC_E Site photo sets; WC_F Station downloads; WC_G RAWS corrected data; WC_H Annual operations report; WC_I Calibration certificate images; and WC_J Periodic report.

They are all accessible and downloadable to the public on the NPS Data Store. The complete product hierarchy may be navigated from <https://irmadev.nps.gov/DataStore/Reference/Profile/2226614>.

Full Citation Central Alaska I&M Network Weather and Climate Monitoring

Visibility Public

[click here for more info](#)

Products Created By This Project (10)

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

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

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Natural Resource Stewardship and Science



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Generic Document - (Code: 2226618)

WFJohnson

Actions

Title

WC_C CAKN Site Visit Worksheets

Description

One worksheet per site visit documenting in a standard form the condition of the site, actions taken, final configuration, and site photo index. Packaged as a set of all worksheets for all stations in a particular field season zipped into one file.

All files in this reference have been accepted as meeting the quality standards for this deliverable detailed in SOP 10 of the protocol.

Full Citation

Sousanes. 2016. WC_C CAKN Site Visit Worksheets

Visibility

Public

click here for more info

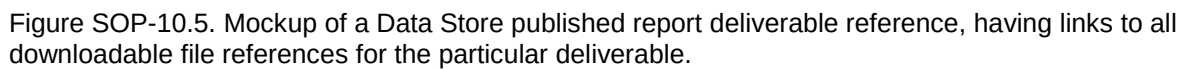
Files and Links (3)

Type	Download Link	Description
Digital File	WC_C Site Visit Worksheets 2016.zip	Site visit package for the 2016 field season
Digital File	WC_C Site Visit Worksheets 2017.zip	Site visit package for the 2017 field season
Digital File	WC_C Site Visit Worksheets 2018.zip	Site visit package for the 2018 season

Originating Project and Related Products (11)

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

Note that deliverables WC_A, WC_H 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 Data Store “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.



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 three objects: a JPEG image of the network vicinity with labeled markers superimposed, an ESRI layer package of just the station locations, and a KMZ file typically used with Google products. 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 ArcMap 10.x or similar tool, create a new MXD file using an appropriate NPS template.

Copy the desired background imagery file depicting the network's locale to the folder.

Add a data reference for the background imagery to the MXD.

Create a point feature name STATION having attributes for NWS Site Identifier, descriptive name, date commissioned and date decommissioned.

Enter the RAWS station information into the point feature, leaving date decommissioned null for this original map.

Select a symbology that includes labels listing the station designator and both dates.

If this is a revised version of WC_B:

Open the latest version of the MXD file in ArcMap 10.x or similar tool.

Update the station point feature.

Never delete an existing point that had been used historically – it may be referenced in the historical dataset.

If a site gets abandoned, fill in the date decommissioned attribute – this is the indicator a station had been used but is no longer collecting data.

Replace the background imagery if desired.

Save the point feature as a layer package named WC_B_yyyy uuuu Weather and Climate site maps.LPK, where "yyyy" is the calendar year the LPK was created and uuuu is the 4-character unit code of the network.

In the rare case that the WC_B deliverable is revised more than once in a calendar year, make second and subsequent LPK names unique by appending a letter to the year portion of the filename. (For example, the first version of WC_B in 2016 is named "WC_B_2016 SEAN Weather and Climate site maps.LPK" while the second would be "WC_B_2016A SEAN Weather and Climate site maps.LPK", third "WC_B_2016B SEAN Weather and Climate site maps.LPK", etc.)

Export map image as a JPEG file.

Use a resolution suitable for printers such as 300x300 pixels.

Name the file “WC_B_yyyy uuuu Weather and Climate site maps.JPG”. In the event of multiple revisions in one year, append a letter to the year portion in the manner described for saving the LPK files.

Save the point feature to “WC_B_yyyy uuuu Weather and Climate site maps.LPK.KMZ”.

Select only the feature classes that will be exported to KML (typically just station point features) – then resave the MXD file with that reflected.

Use the “Map to KML” tool from the toolbox.

Name multiple revisions in the same year analogously to what’s done with LPKs.

Notify the validator that the WC_B candidate is ready; explain where to find the three files that comprise WC_B – 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 Data Store 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 three files as holdings.

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

Builder tasks

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; 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. 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 Data Store 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.

Open the Data Store reference that houses all the WC_C deliverables.

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

Upload the file as a holding.

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 Data Store reference that houses all the WC_D 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.

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 Data Store 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

Builder tasks

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 Data Store reference that houses all the WC_E deliverables.

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.

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.

Detailed steps

Builder tasks

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.

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.

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 Data Store reference that houses all the WC_F 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.

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 Data Store using the versioning feature.

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

Detailed steps

Builder tasks

Download the accepted WC_F of interest from the Data Store 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.

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 Data Store reference that houses the most recent WC_G deliverable set.

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

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. 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

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 and is processed according to the formal Inventory and Monitoring Division methods currently in effect for Natural Resource Report publications. 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 Pro.

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 Data Store 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.

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_H)

This deliverable is a multi-year analysis of network climate status and trends. 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 for data, along with 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.

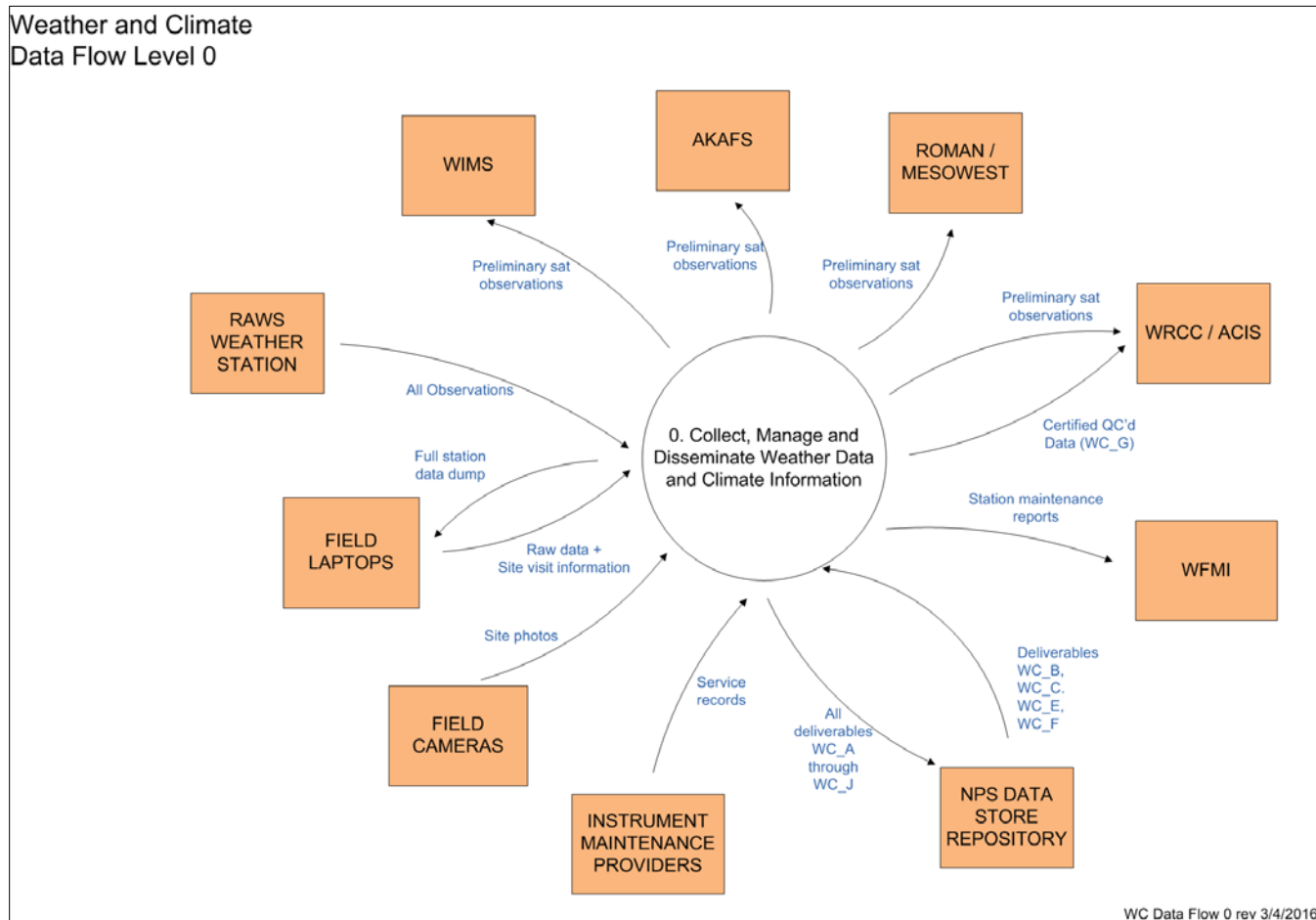


Figure SOP-10.A.1. Level zero data flow for the weather and climate monitoring program.

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.

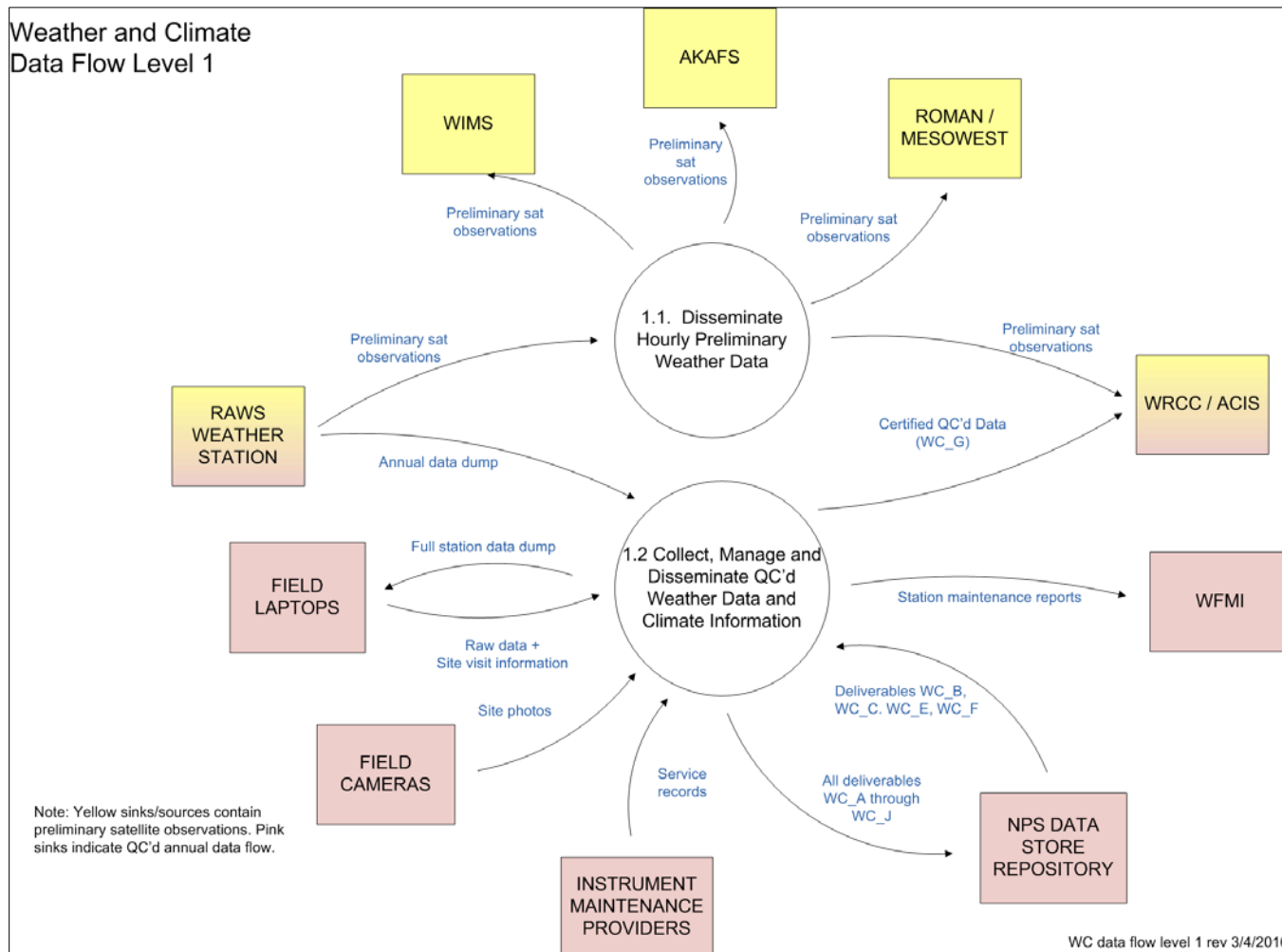


Figure SOP-10.A.2. At level one two distinct data flows are serviced through two different processes.

Purpose of Deliverable

Frequency Produced

Prerequisites

Data Flow

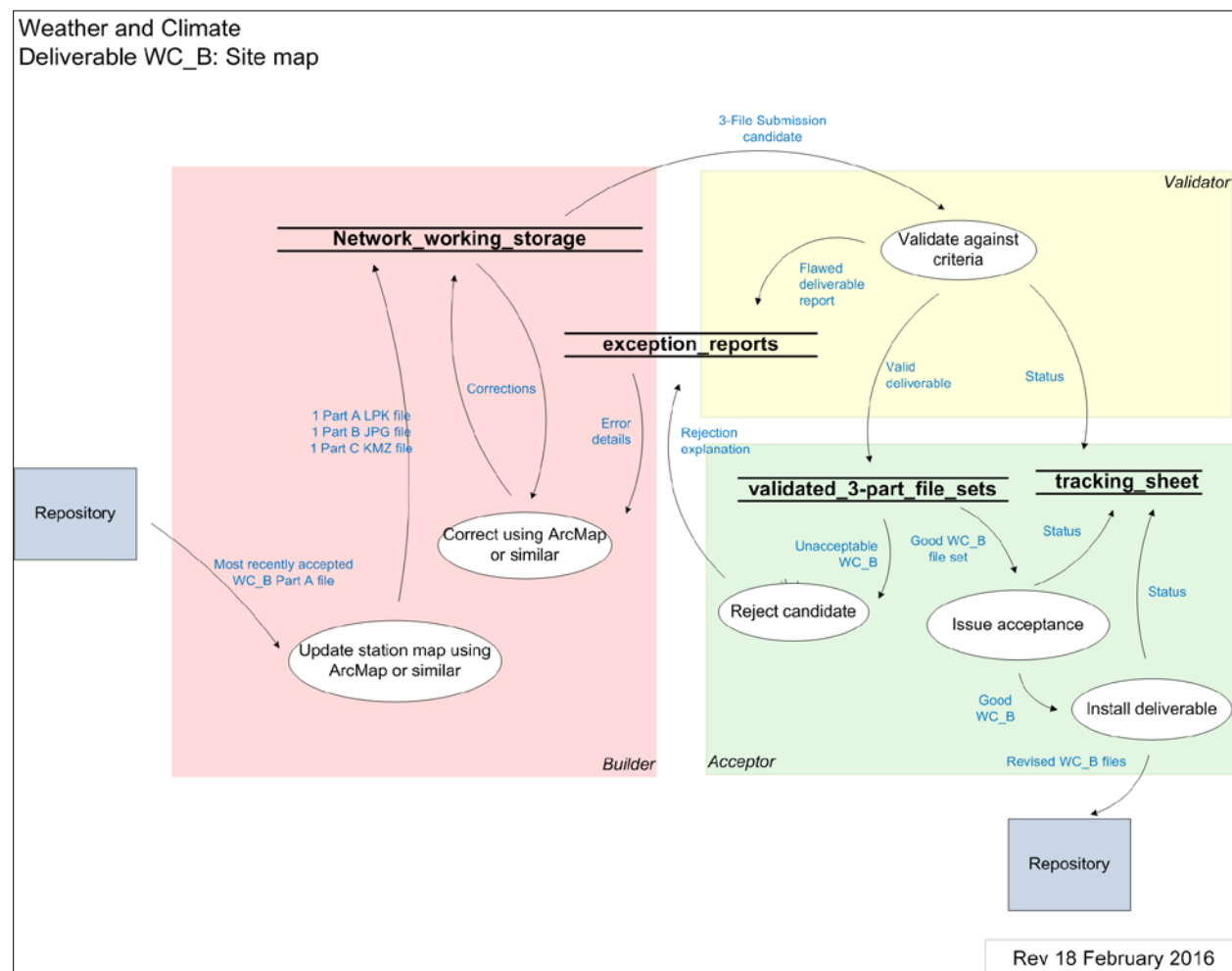


Figure SOP-10.A.3. Data flow required to generate deliverable WC_B: site map.

Deliverable Definition

Form C: Non-tabular Data Deliverable

<i>Vital Sign:</i> Weather and Climate	<i>Deliverable ID:</i> WC_B part A	<i>Deliverable Title:</i> Site map
<i>File Format:</i> ESRI layer package	<i>Associated Software and Version:</i> ArcMap 10.1 and later	<i>Revision Date/Protocol Version:</i> 03-07-2017 / SOP-2017
<i>Expected Frequency:</i> Sporadic	<i>Repository reference type / sensitivity:</i> Generic Document / not sensitive	<i>Submission Unit:</i> none
<i>What purpose does this deliverable serve?</i> Inform users of locations of weather stations and date range of operation, suitable for GIS mapping.		
<i>Summary of content:</i> One LPK layer package file containing a point feature named STATION.		
<i>Mandatory validation criteria:</i> 1. The filename must conform to the format “WC_B_yyyyx uuuu Weather and Climate site maps.LPK” where “yyyy” is the year during which this product had been updated, “x” is an optional single letter, and “uuuu” is the network’s four-character unit code. 2. The file must successfully open in ArcMap or similar GIS product. 3. The STATION feature 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.) 4. STATION must include attributes for NWS Site Identifier, descriptive name, date commissioned and date decommissioned. 5. Every operational station must be labeled with a NWS Site Identifier and a date commissioned. (Date decommissioned is optional.) 6. The station locations must all be within the bounding box of the network.		
<i>Optional validation criteria:</i> None.		
<i>Deliverable ID of any other network data products required to create this product:</i> A prior version of this WC_B part A LPK file is required in order to make an updated version.		
<i>Description and source of any outside data required to create this product:</i> None.		

Deliverable Definition

Form C: Non-tabular Data Deliverable

<i>Vital Sign:</i> Weather and Climate	<i>Deliverable ID:</i> WC_B part B	<i>Deliverable Title:</i> Site map
<i>File Format:</i> JPEG	<i>Associated Software and Version:</i> Browsers, etc.	<i>Revision Date/Protocol Version:</i> 03-07-2017 / SOP-2017
<i>Expected Frequency:</i> Sporadic	<i>Repository reference type / sensitivity:</i> Generic Document / not sensitive	<i>Submission Unit:</i> none
<i>What purpose does this deliverable serve?</i> Inform users of locations of weather stations and date range of operation, suitable for publications.		
<i>Summary of content:</i> One JPEG image file showing network map with location markers.		
<i>Mandatory validation criteria:</i> 1. The filename must conform to the format “WC_B_yyyx uuuu Weather and Climate site maps.JPG” where “yyyx” 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.		
<i>Optional validation criteria:</i> None.		
<i>Deliverable ID of any other network data products required to create this product:</i> A prior version of the WC_B part A LPK file is required in order to make an updated version.		
<i>Description and source of any outside data required to create this product:</i> None.		

Deliverable Definition

Form C: Non-tabular Data Deliverable

<i>Vital Sign:</i> Weather and Climate	<i>Deliverable ID:</i> WC_B part C	<i>Deliverable Title:</i> Site map
<i>File Format:</i> Google KMZ	<i>Associated Software and Version:</i> Google Earth, Google Maps	<i>Revision Date/Protocol Version:</i> 03-07-2017 / SOP-2017
<i>Expected Frequency:</i> Sporadic	<i>Repository reference type / sensitivity:</i> Generic Document / not sensitive	<i>Submission Unit:</i> none
<i>What purpose does this deliverable serve?</i> Inform users of locations of weather stations and date range of operation, suitable for use with software that recognizes Google KMZ format.		
<i>Summary of content:</i> One KMZ file containing station locations.		
<i>Mandatory validation criteria:</i> 1. The filename must conform to the format “WC_B_yyyx uuuu Weather and Climate site maps.KMZ” where “yyyx” 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 file must successfully open in Google Earth or similar GIS product. 3. 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.) 4. Each point must be tagged with a NWS Site Identifier, descriptive name, date commissioned and date decommissioned. 5. Every operational station must be labeled with a NWS Site Identifier and a date commissioned. (Date decommissioned is optional.). 6. The station locations must all be within the bounding box of the network.		
<i>Optional validation criteria:</i> None.		
<i>Deliverable ID of any other network data products required to create this product:</i> A prior version of the WC_B part A LPK file is required in order to make an updated version.		
<i>Description and source of any outside data required to create this product:</i> 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

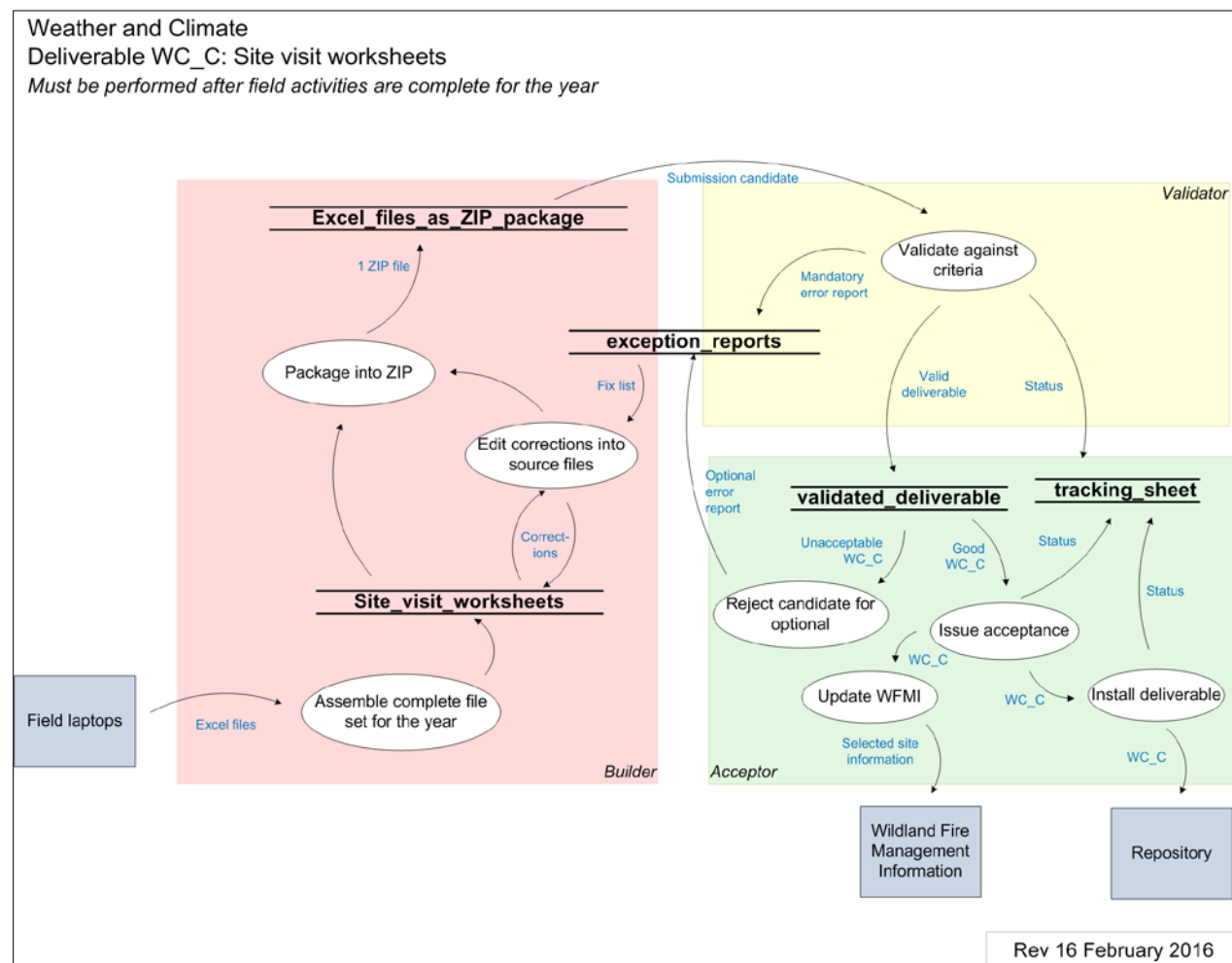


Figure SOP-10.A.4. Data flow required to generate deliverable WC_C: site visit worksheet.

Deliverable Definition

Form C: Non-tabular Data Deliverable

<i>Vital Sign:</i> Weather and Climate	<i>Deliverable ID:</i> WC_C	<i>Deliverable Title:</i> Site visit worksheets
<i>File Format:</i> ZIP of XLSX files	<i>Associated Software and Version:</i> PKUNZIP, WINRAR, etc. And Excel 2010 or later	<i>Revision Date/Protocol Version:</i> 02-16-2016 / SOP-2016
<i>Expected Frequency:</i> One file per year	<i>Repository reference type / sensitivity:</i> Generic Document / not sensitive	<i>Submission Unit:</i> Calendar year
<i>What purpose does this deliverable serve?</i> 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.		
<i>Summary of content:</i> 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.		
<i>Mandatory validation criteria:</i> 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. 4. All XLSX files must open successfully in Microsoft Excel for Windows 2010 or later version 5. Each XLSX is limited to one tab, reflecting one visit to one station.		
<i>Optional validation criteria:</i> 1. XLSX file content should follow the model content depicted in SOP 9.		
<i>Deliverable ID of any other network data products required to create this product:</i> None.		
<i>Description and source of any outside data required to create this product:</i> 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

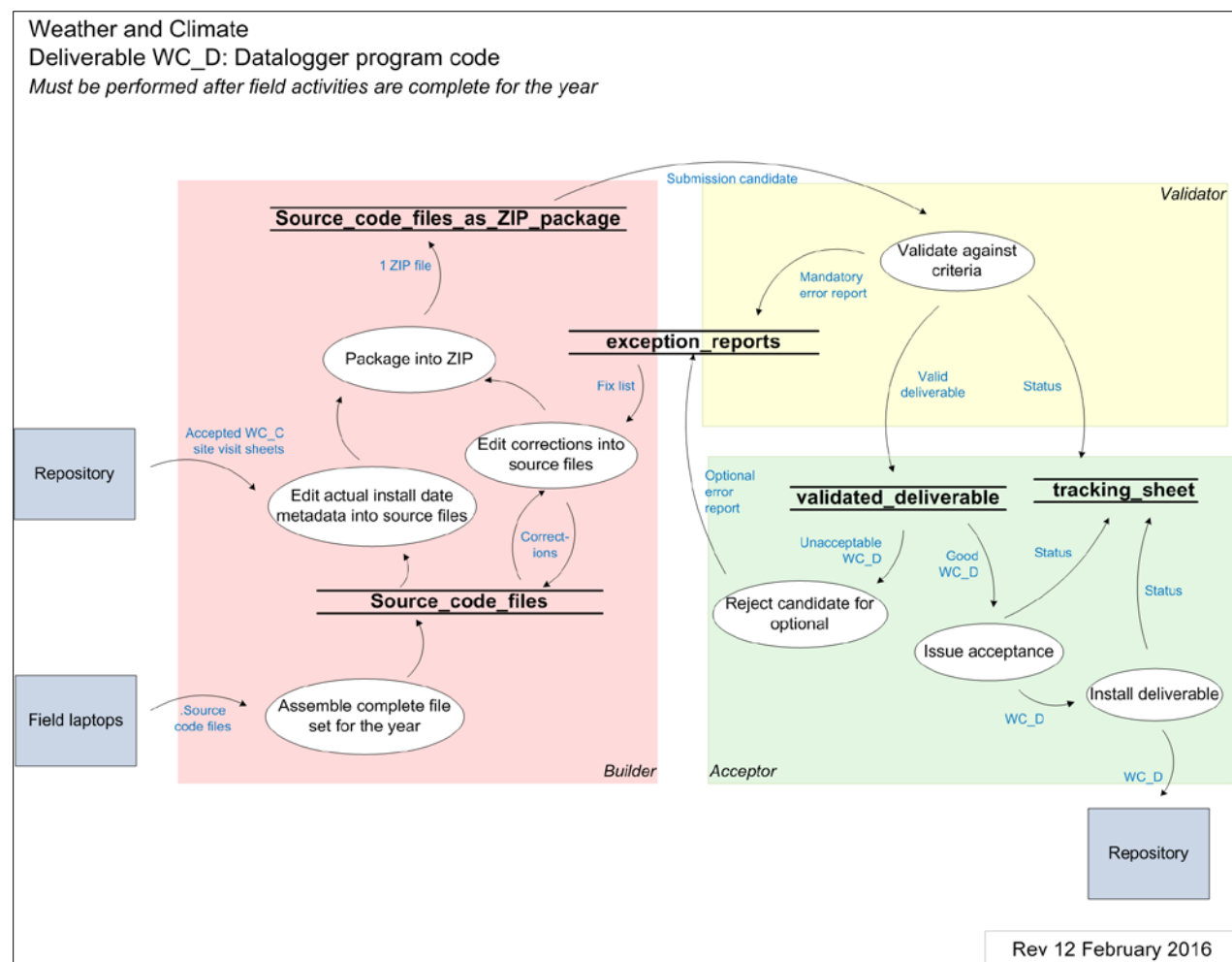


Figure SOP-10.A.5. Data flow required to generate deliverable WC_D: datalogger program code.

Deliverable Definition

Form C: Non-tabular Data Deliverable

<i>Vital Sign:</i> Weather and Climate	<i>Deliverable ID:</i> WC_D	<i>Deliverable Title:</i> Datalogger program code
<i>File Format:</i> ZIP of text files	<i>Associated Software and Version:</i> PKUNZIP, WINRAR, etc	<i>Revision Date/Protocol Version:</i> 03-07-2016 / SOP-2016
<i>Expected Frequency:</i> One file per year	<i>Repository reference type / sensitivity:</i> Generic Document / not sensitive	<i>Submission Unit:</i> Calendar year
<i>What purpose does this deliverable serve?</i> This deliverable provides to data users the documentation required to properly interpret fields recorded by each station at any given time.		
<i>Summary of content:</i> 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.		
<i>Mandatory validation criteria:</i> 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.		
<i>Optional validation criteria:</i> 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>i.e.</i>, 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.		
<i>Deliverable ID of any other network data products required to create this product:</i> WC_C site visit sheets.		

<i>Vital Sign:</i> Weather and Climate	<i>Deliverable ID:</i> WC_D	<i>Deliverable Title:</i> Datalogger program code
<i>Description and source of any outside data required to create this product:</i> 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

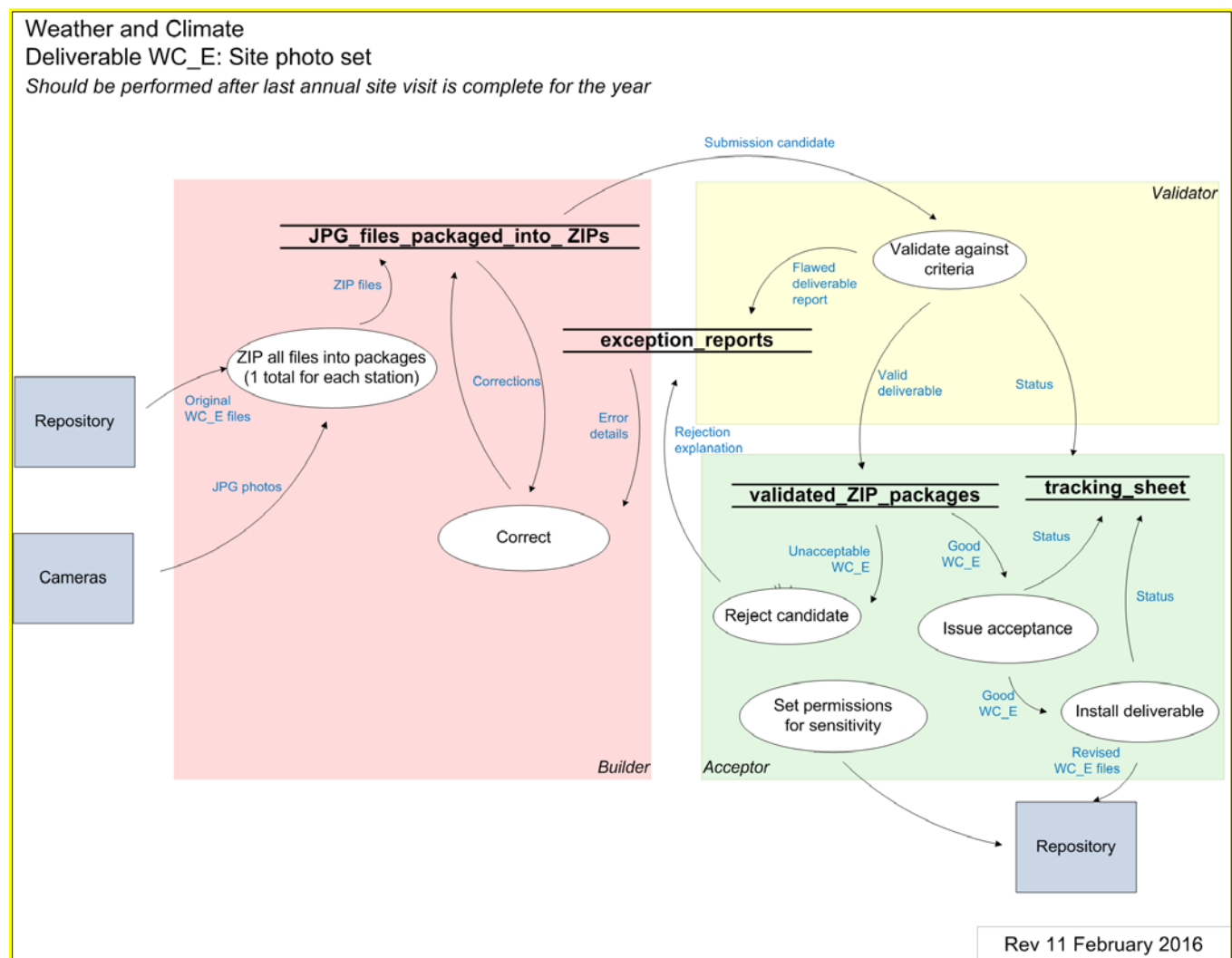


Figure SOP-10.A.6. Data flow required to generate deliverable WC_E: site photo sets.

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
<i>What purpose does this deliverable serve?</i> 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.		
<i>Summary of content:</i> 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.		
<i>Mandatory validation criteria:</i> 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.		
<i>Optional validation criteria:</i> 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.		
<i>Deliverable ID of any other network data products required to create this product:</i> WC_D site visit worksheets.		
<i>Description and source of any outside data required to create this product:</i> 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

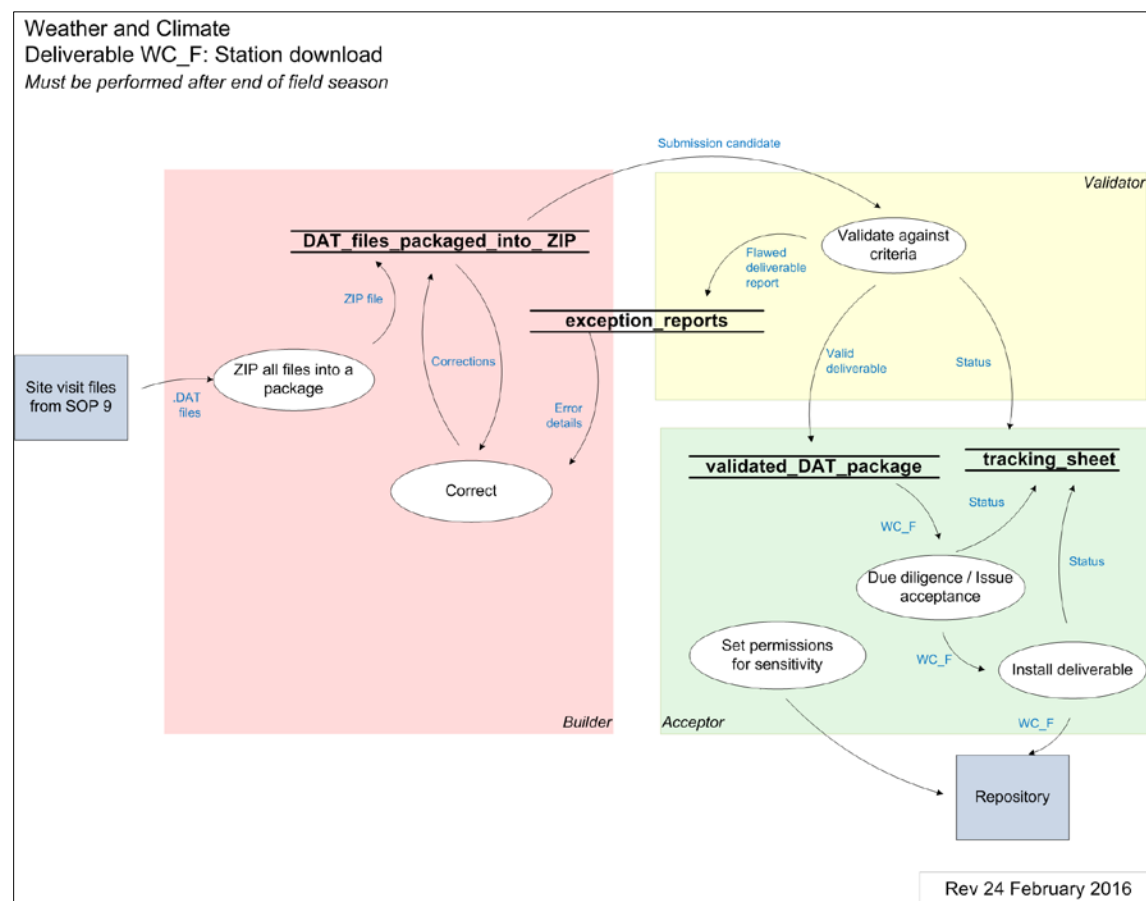


Figure SOP-10.A.7. Data flow required to generate deliverable WC_F: station download.

Deliverable Definition

Form C: Non-tabular Data Deliverable

<i>Vital Sign:</i> Weather and Climate	<i>Deliverable ID:</i> WC_F	<i>Deliverable Title:</i> Station download
<i>File Format:</i> ZIP	<i>Associated Software and Version:</i> PKUNZIP, WINRAR, etc.	<i>Revision Date/Protocol Version:</i> 01-22-2016 / WC SOP-2016
<i>Expected Frequency:</i> One zip file containing about 15 ASCII "DAT" files per year	<i>Repository reference type / sensitivity:</i> Generic Document / not sensitive	<i>Submission Unit:</i> Calendar year
<i>What purpose does this deliverable serve?</i> 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		
<i>Summary of content:</i> 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.		
<i>Mandatory validation criteria:</i> 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).		
<i>Optional validation criteria:</i> The individual files when opened in notepad should appear to have header lines followed by numeric content in comma-separated-value form.		
<i>Deliverable ID of any other network data products required to create this product:</i> None.		
<i>Description and source of any outside data required to create this product:</i> 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.

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

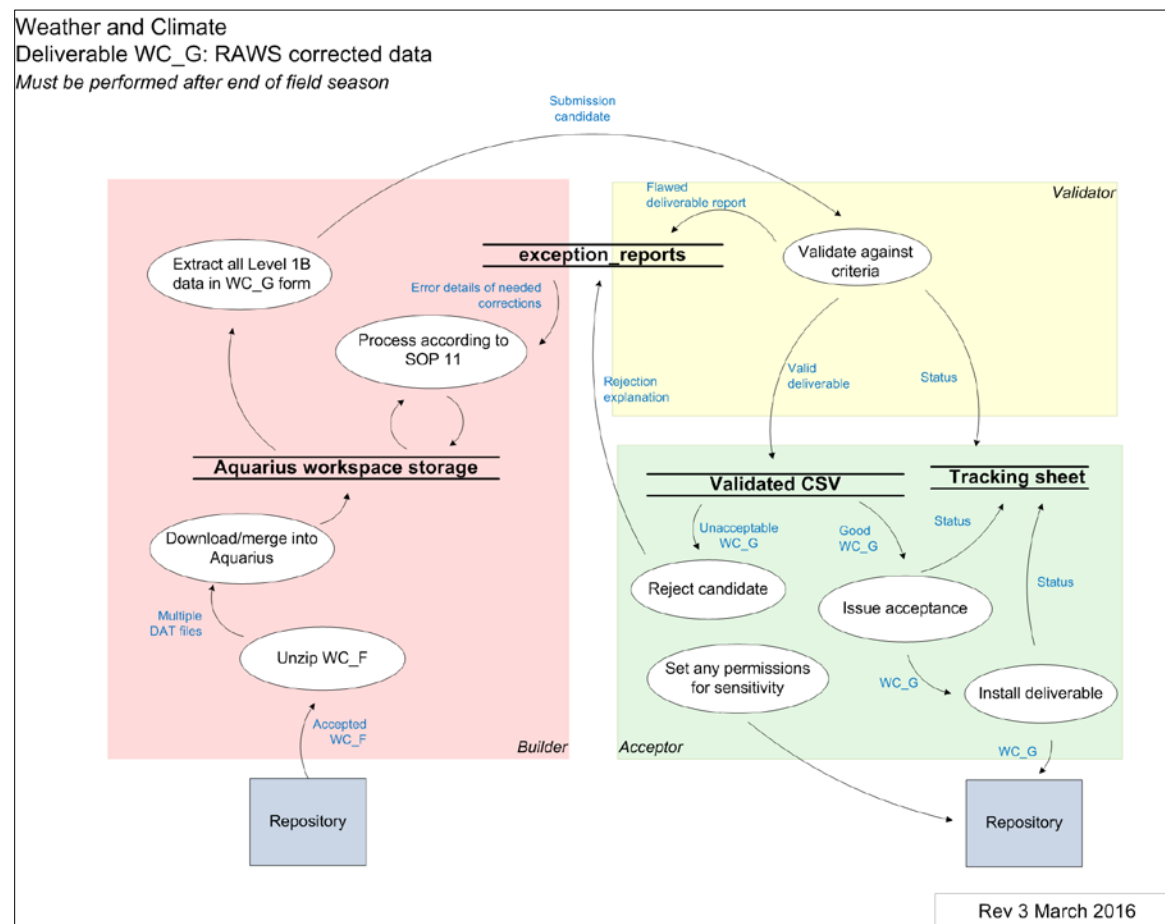


Figure SOP-10.A.8. Data flow required to generate deliverable WC_G: RAWS corrected data.

Deliverable definition forms:

Form D: Tabular Data Deliverable

<i>Vital Sign:</i> Weather and Climate	<i>Deliverable ID:</i> WC_G	<i>Deliverable Title:</i> RAWS corrected data
<i>File Format:</i> CSV	<i>Associated Software and Version:</i> various	<i>Revision Date/Protocol Version:</i> 3-4-2016 / WC SOP-2016
<i>Expected Frequency:</i> One cumulative file created every season for each station	<i>Repository reference type / sensitivity:</i> Tabular data / not sensitive	<i>Submission Unit:</i> Station
<i>What purpose does this deliverable serve?</i> This provides researchers with Processing Level 1B corrected weather data up through each station's most recent site visit.		
<i>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.):</i> WC_G_YYYY_SSSS.CSV, where YYYY is 4-digit year indicating the most recent calendar year represented in the file and SSSS is the station's NWS ID.		
<i>Deliverable ID of any other SEAN data products required to create this product:</i> WC_F containing the associated most recent year.		
<i>Description and source of any outside data required to create this product:</i> 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: 4-6-2016 / WC SOP-2016	Type of relation: ☐ Database table ☒ Data file	Estimated rows: 10,000/year * n years * m stations = 130,000
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	
WSPMPH	WSPMPH_QUALITY	
SDI	SDI_QUALITY	
SRW	SRW_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	
BP	BP_QUALITY	
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

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> header	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-11-2016 / WC SOP-2016	<i>Default report heading:</i> n/a	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(1024)	
<i>Maximum length</i>	1024	
<i>Required:</i>	Yes	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	Unformatted string	
<i>Case:</i>	Ignored	
<i>Mandatory validation rules for this attribute (in order of application):</i>	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, WSPMPH, WSPMPH_QUALITY, SDI, SDI_QUALITY, SRW, SRW_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, BP, BP_QUALITY, QUALITY_COMMENT, PROTOCOL_SOP_ID, UPDATED_BY, UPDATE_TIMESTAMP	
<i>Optional validation rules for this attribute:</i>	None.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> STATION_ID	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 3-7-2016 / WC SOP-2016	<i>Default report heading:</i> Station	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(5)	
<i>Maximum length</i>	5	
<i>Required:</i>	Yes	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. Must be present. 2. Must not contain lower case letters.	
<i>Optional validation rules for this attribute:</i>	None	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> TIMESTAMP_UTC	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 3-4-2016 / WC SOP-2016	<i>Default report heading:</i> Date Recorded	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(16)	
<i>Maximum length</i>	16	
<i>Required:</i>	Yes	
<i>Measurement units:</i>	Date Time	
<i>Format:</i>	yyyy-mm-dd hh:mm	
<i>Mandatory validation rules for this attribute (in order of application):</i>	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 2004.	
<i>Optional validation rules for this attribute:</i>	None.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> RNIN	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> Accumulated Rain (inches)	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> Accumulated rain level in inches since the last instrument reset.		
<i>Data type:</i>	Real number	
<i>Maximum length</i>	6	
<i>Required:</i>	No	
<i>Measurement units:</i>	Inches	
<i>Format:</i>	nnn.nn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present: 1. Must represent a valid real number. 2. Must be ≥ 0.00	
<i>Optional validation rules for this attribute:</i>	1. Should be between 0.00 and 100.00.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> RNIN_QUALITY	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 3-8-2016 / WC SOP-2016	<i>Default report heading:</i> RNIN Data Quality	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(2)	
<i>Maximum length</i>	2	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present, must be one of ‘-2’, ‘6’, or ‘31’.	
<i>Optional validation rules for this attribute:</i>	1. If present, RNIN should also be present. 2. If not ‘31’ QUALITY_COMMENT should not be empty.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> WSM	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 3-7-2016 / WC SOP-2016	<i>Default report heading:</i> Wind Speed (MPH)	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> Wind speed in miles per hour. Taken as the mean of readings encountered over the preceding 60 minutes.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	3	
<i>Required:</i>	no	
<i>Measurement units:</i>	Miles per hour	
<i>Format:</i>	nnn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present: 1. Must represent a valid integer. 2. Must be between 0 and 150 if WSM_QUALITY is 0.	
<i>Optional validation rules for this attribute:</i>	1. Should be between 0 and 120.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> WSM_QUALITY	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> WSM Data Quality	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(2)	
<i>Maximum length</i>	2	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present, must be one of ‘-2’, ‘6’, or ‘31’.	
<i>Optional validation rules for this attribute:</i>	1. If present, WSM should also be present. 2. If not ‘31’ QUALITY_COMMENT should not be empty.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> WDD	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> Wind Direction (degrees)	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> Wind direction in degrees. Taken as the mean of readings encountered over the preceding 60 minutes.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	3	
<i>Required:</i>	no	
<i>Measurement units:</i>	Degrees	
<i>Format:</i>	nnn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present: 1. Must represent a valid integer. 2. Must be between 0 and 359.	
<i>Optional validation rules for this attribute:</i>	None.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> WDD_QUALITY	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 3-8-2016 / WC SOP-2016	<i>Default report heading:</i> WDD Data Quality	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(2)	
<i>Maximum length</i>	2	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present, must be one of '-2', '6', or '31'.	
<i>Optional validation rules for this attribute:</i>	1. If present, WDD should also be present. 2. If not '31' QUALITY_COMMENT should not be empty.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> ATF	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> Air Temperature (F)	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> Air temperature in degrees Fahrenheit. Taken as the mean of readings encountered over the preceding 60 minutes.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	4	
<i>Required:</i>	no	
<i>Measurement units:</i>	Degrees Fahrenheit	
<i>Format:</i>	[-]nnn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present: 1. Must represent a valid integer. 2. Must be between -100 and 150 if ATF_QUALITY is 0.	
<i>Optional validation rules for this attribute:</i>	1. Should be between -70 and 110	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> ATF_QUALITY	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 3-8-2016 / WC SOP-2016	<i>Default report heading:</i> ATF Data Quality	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(2)	
<i>Maximum length</i>	2	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present, must be one of ‘-2’, ‘6’, or ‘31’.	
<i>Optional validation rules for this attribute:</i>	1. If present, ATF should also be present.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> RHP	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> Relative Humidity %	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> Relative humidity in percent. Taken as the mean of readings encountered over the preceding 60 minutes.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	3	
<i>Required:</i>	no	
<i>Measurement units:</i>	Percent	
<i>Format:</i>	nnn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present: 1. Must represent a valid integer. 2. Must be between 0 and 100 if RHP_QUALITY is 0.	
<i>Optional validation rules for this attribute:</i>	None.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> RHP_QUALITY	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 3-8-2016 / WC SOP-2016	<i>Default report heading:</i> RHP Data Quality	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(2)	
<i>Maximum length</i>	2	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present, must be one of ‘-2’, ‘6’, or ‘31’.	
<i>Optional validation rules for this attribute:</i>	1. If present, RHP should also be present. 2. If not ‘31’ QUALITY_COMMENT should not be empty.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> BVV	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> Battery (Volts)	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> Relative humidity in percent. Taken as the mean of readings encountered over the preceding 60 minutes.		
<i>Data type:</i>	Real	
<i>Maximum length</i>	4	
<i>Required:</i>	no	
<i>Measurement units:</i>	Volts	
<i>Format:</i>	nn.n	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present: 1. Must represent a valid real number. 2. Must be between 0.0 and 20.0 if BVV_QUALITY is 0.	
<i>Optional validation rules for this attribute:</i>	1. Should be between 11.0 and 16.0.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> BVV_QUALITY	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 3-8-2016 / WC SOP-2016	<i>Default report heading:</i> BVV Data Quality	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(2)	
<i>Maximum length</i>	2	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present, must be one of ‘-2’, ‘6’, or ‘31’.	
<i>Optional validation rules for this attribute:</i>	1. If present, BVV should also be present. 2. If not ‘31’ QUALITY_COMMENT should not be empty.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> WSMP	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> Peek Wind Speed (MPH)	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> Peek wind direction in miles per hour. Taken as the highest reading encountered over the past 60 minutes.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	3	
<i>Required:</i>	no	
<i>Measurement units:</i>	Miles per hour	
<i>Format:</i>	nnn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present: 1. Must represent a valid integer. 2. Must be between 0 and 150 if WSMP_QUALITY is 0.	
<i>Optional validation rules for this attribute:</i>	1. Should be between 0 and 120.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> WSMP_QUALITY	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 3-8-2016 / WC SOP-2016	<i>Default report heading:</i> WSMP Data Quality	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(2)	
<i>Maximum length</i>	2	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present, must be one of ‘-2’, ‘6’, or ‘31’.	
<i>Optional validation rules for this attribute:</i>	1. If present, WSMP should also be present. 2. If not ‘31’ then QUALITY_COMMENT should not be empty.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> WDDP	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> Peek Wind Direction	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> Peek wind direction in degrees of the WSMP reading in this record. North is both 0° and 360°.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	3	
<i>Required:</i>	no	
<i>Measurement units:</i>	Degrees	
<i>Format:</i>	nnn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present: 1. Must represent a valid integer. 2. Must be between 0 and 360 if WDDP_QUALITY is 0.	
<i>Optional validation rules for this attribute:</i>	None.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> WDDP_QUALITY	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 3-8-2016 / WC SOP-2016	<i>Default report heading:</i> WDDP Data Quality	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(2)	
<i>Maximum length</i>	2	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present, must be one of ‘-2’, ‘6’, or ‘31’.	
<i>Optional validation rules for this attribute:</i>	1. If present, WDDP should also be present. 2. If not ‘31’ then QUALITY_COMMENT should not be empty.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> SDI	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> Snow depth (inches)	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> Depth of snow at the site in inches. Taken as the mean of readings encountered over the past 60 minutes.		
<i>Data type:</i>	Real	
<i>Maximum length</i>	6	
<i>Required:</i>	no	
<i>Measurement units:</i>	inches	
<i>Format:</i>	nnn.nn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present: 1. Must represent a valid real number. 2. Must be between 0.00 and 500.00 if SDI_QUALITY is 0.	
<i>Optional validation rules for this attribute:</i>	None.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> SDI_QUALITY	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 3-8-2016 / WC SOP-2016	<i>Default report heading:</i> SDI Data Quality	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(2)	
<i>Maximum length</i>	2	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present, must be one of ‘-2’, ‘6’, or ‘31’.	
<i>Optional validation rules for this attribute:</i>	1. If present, SDI should also be present. 2. If not ‘31’ then QUALITY_COMMENT should not be empty.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> SRW	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> Solar Radiation (w/m ²)	<i>Relation (from Form X):</i> WC_G_yyyy_ssss.CSV
<i>Purpose:</i> Solar radiation in Watts per square meter. Taken as the mean of readings encountered over the preceding 60 minutes.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	4	
<i>Required:</i>	no	
<i>Measurement units:</i>	Watts /m ²	
<i>Format:</i>	nnnn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present: 1. Must represent a valid integer. 2. Must be between 0 and 1,500 if SRW_QUALITY is 0.	
<i>Optional validation rules for this attribute:</i>	1. Should be between 0 and 900.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> SRW_QUALITY	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 3-8-2016 / WC SOP-2016	<i>Default report heading:</i> SRW Data Quality	<i>Relation (from Form X):</i> WC_G_yyyy_ssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(2)	
<i>Maximum length</i>	2	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present, must be one of ‘-2’, ‘6’, or ‘31’.	
<i>Optional validation rules for this attribute:</i>	1. If present, SRW should also be present. 2. If not ‘31’ then QUALITY_COMMENT should not be empty.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> AT1H	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> High Temperature (F)	<i>Relation (from Form X):</i> WC_G_yyyy_ssss.CSV
<i>Purpose:</i> Atmospheric temperature in degrees Fahrenheit. Taken as the highest reading encountered over the preceding 60 minutes.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	4	
<i>Required:</i>	no	
<i>Measurement units:</i>	Degrees Fahrenheit	
<i>Format:</i>	[-]nnn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present: 1. Must represent a valid integer. 2. Must be between -100 and 150 if AT1H_QUALITY is 0.	
<i>Optional validation rules for this attribute:</i>	1. Should be between -70 and 110.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> AT1H_QUALITY	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 3-8-2016 / WC SOP-2016	<i>Default report heading:</i> AT1H Data Quality	<i>Relation (from Form X):</i> WC_G_yyyy_ssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(2)	
<i>Maximum length</i>	2	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present, must be one of '-2', '6', or '31'.	
<i>Optional validation rules for this attribute:</i>	1. If present, AT1H should also be present. 2. If not '31' then QUALITY_COMMENT should not be empty.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> AT1L	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> Low Temperature (F)	<i>Relation (from Form X):</i> WC_G_yyyy_ssss.CSV
<i>Purpose:</i> Atmospheric temperature in degrees Fahrenheit. Taken as the lowest reading encountered over the preceding 60 minutes.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	4	
<i>Required:</i>	no	
<i>Measurement units:</i>	Degrees Fahrenheit	
<i>Format:</i>	[-]nnn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present: 1. Must represent a valid integer. 2. Must be between -100 and 150 if AT1L_QUALITY is 0.	
<i>Optional validation rules for this attribute:</i>	1. Should be between -70 and 110.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> AT1L_QUALITY	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 3-8-2016 / WC SOP-2016	<i>Default report heading:</i> AT1L Data Quality	<i>Relation (from Form X):</i> WC_G_yyyy_ssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(2)	
<i>Maximum length</i>	2	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present, must be one of '-2', '6', or '31'.	
<i>Optional validation rules for this attribute:</i>	1. If present, AT1L should also be present. 2. If not '31' then QUALITY_COMMENT should not be empty.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> STF	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> Soil Temperature 1 (F)	<i>Relation (from Form X):</i> WC_G_yyyy_ssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	4	
<i>Required:</i>	no	
<i>Measurement units:</i>	Degrees Fahrenheit	
<i>Format:</i>	[-]nnn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present: 1. Must represent a valid integer. 2. Must be between -100 and 150 if STF1_QUALITY is 0.	
<i>Optional validation rules for this attribute:</i>	1. Should be between -65 and 110.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> STF_QUALITY	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 3-8-2016 / WC SOP-2016	<i>Default report heading:</i> STF1 Data Quality	<i>Relation (from Form X):</i> WC_G_yyyy_ssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(2)	
<i>Maximum length</i>	2	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present, must be one of ‘-2’, ‘6’, or ‘31’.	
<i>Optional validation rules for this attribute:</i>	1. If present, STF should also be present. 2. If not ‘31’ then QUALITY_COMMENT should not be empty.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> STF1_DEPTH	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> Soil 1 Depth (cm)	<i>Relation (from Form X):</i> WC_G_yyyy_ssss.CSV
<i>Purpose:</i> Depth in centimeters of buried STF1 sensor used for this observation.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	3	
<i>Required:</i>	no	
<i>Measurement units:</i>	centimeters	
<i>Format:</i>	nnn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present must represent a valid integer.	
<i>Optional validation rules for this attribute:</i>	1. If STF is present, STF1_DEPTH should be present. 2. Should be between 1 and 100.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> STF2	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> Soil Temperature 2 (F)	<i>Relation (from Form X):</i> WC_G_yyyy_ssss.CSV
<i>Purpose:</i> 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. If present, this sensor should be deeper than STF.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	4	
<i>Required:</i>	no	
<i>Measurement units:</i>	Degrees Fahrenheit	
<i>Format:</i>	[-]nnn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present: 1. Must represent a valid integer. 2. Must be between -100 and 150 if STF2_QUALITY is 0.	
<i>Optional validation rules for this attribute:</i>	1. Should be between -65 and 110.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> STF2_QUALITY	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> STF2 Data Quality	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(2)	
<i>Maximum length</i>	2	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present, must be one of ‘-2’, ‘6’, or ‘31’.	
<i>Optional validation rules for this attribute:</i>	1. If present, STF2 should also be present. 2. If not ‘31’ then QUALITY_COMMENT should not be empty.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> STF2_DEPTH	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> Soil 2 Depth (cm)	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> Depth in centimeters of buried STF2 sensor used for this observation.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	3	
<i>Required:</i>	no	
<i>Measurement units:</i>	centimeters	
<i>Format:</i>	nnn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present must represent a valid integer.	
<i>Optional validation rules for this attribute:</i>	1. If STF2 is present, STF2_DEPTH should be present. 2. Should be between 1 and 100.	

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> STF3	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> Soil Temperature 3 (F)	<i>Relation (from Form X):</i> WC_G_yyyy_ssss.CSV
<i>Purpose:</i> 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. If present, this sensor should be deeper than STF2.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	4	
<i>Required:</i>	no	
<i>Measurement units:</i>	Degrees Fahrenheit	
<i>Format:</i>	[-]nnn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present: 1. Must represent a valid integer. 2. Must be between -100 and 150 if STF3_QUALITY is 0.	
<i>Optional validation rules for this attribute:</i>	1. Should be between -65 and 110.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> STF3_QUALITY	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 3-8-2016 / WC SOP-2016	<i>Default report heading:</i> STF3 Data Quality	<i>Relation (from Form X):</i> WC_G_yyyy_ssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(2)	
<i>Maximum length</i>	2	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present, must be one of ‘-2’, ‘6’, or ‘31’.	
<i>Optional validation rules for this attribute:</i>	1. If present, STF3 should also be present. 2. If not ‘31’ then QUALITY_COMMENT should not be empty.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> STF3_DEPTH	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> Soil 3 Depth (cm)	<i>Relation (from Form X):</i> WC_G_yyyy_ssss.CSV
<i>Purpose:</i> Depth in centimeters of buried STF3 sensor used for this observation.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	3	
<i>Required:</i>	no	
<i>Measurement units:</i>	centimeters	
<i>Format:</i>	nnn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present must represent a valid integer.	
<i>Optional validation rules for this attribute:</i>	1. If STF3 is present, STF3_DEPTH should be present. 2. Should be between 1 and 100.	

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> STF4	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> Soil Temperature 4 (F)	<i>Relation (from Form X):</i> WC_G_yyyy_ssss.CSV
<i>Purpose:</i> 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. If present, this sensor should be deeper than STF3.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	4	
<i>Required:</i>	no	
<i>Measurement units:</i>	Degrees Fahrenheit	
<i>Format:</i>	[-]nnn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present: 1. Must represent a valid integer. 2. Must be between -100 and 150 if STF4_QUALITY is 0.	
<i>Optional validation rules for this attribute:</i>	1. Should be between -65 and 110.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> STF4_QUALITY	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 3-8-2016 / WC SOP-2016	<i>Default report heading:</i> STF4 Data Quality	<i>Relation (from Form X):</i> WC_G_yyyy_ssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(2)	
<i>Maximum length</i>	2	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present, must be one of ‘-2’, ‘6’, or ‘31’.	
<i>Optional validation rules for this attribute:</i>	1. If present, STF4 should also be present. 2. If not ‘31’ then QUALITY_COMMENT should not be empty.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> STF4_DEPTH	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> Soil 4 Depth (cm)	<i>Relation (from Form X):</i> WC_G_yyyy_ssss.CSV
<i>Purpose:</i> Depth in centimeters of buried STF4 sensor used for this observation.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	3	
<i>Required:</i>	no	
<i>Measurement units:</i>	centimeters	
<i>Format:</i>	nnn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present must represent a valid integer.	
<i>Optional validation rules for this attribute:</i>	1. If STF4 is present, STF4_DEPTH should be present. 2. Should be between 1 and 100.	

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> STF5	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> Soil Temperature 5 (F)	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	4	
<i>Required:</i>	no	
<i>Measurement units:</i>	Degrees Fahrenheit	
<i>Format:</i>	[-]nnn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	If present: 1. Must represent a valid integer. 2. Must be between -100 and 150 if STF5_QUALITY is 0.	
<i>Optional validation rules for this attribute:</i>	1. Should be between -65 and 110.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> STF5_QUALITY	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 3-8-2016 / WC SOP-2016	<i>Default report heading:</i> STF5 Data Quality	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(2)	
<i>Maximum length</i>	2	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present, must be one of ‘-2’, ‘6’, or ‘31’.	
<i>Optional validation rules for this attribute:</i>	1. If present, STF5 should also be present. 2. If not ‘31’ then QUALITY_COMMENT should not be empty.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> STF5_DEPTH	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-9-2016 / WC SOP-2016	<i>Default report heading:</i> Soil 5 Depth (cm)	<i>Relation (from Form X):</i> WC_G_yyyy_ssss.CSV
<i>Purpose:</i> Depth in centimeters of buried STF5 sensor used for this observation.		
<i>Data type:</i>	Integer	
<i>Maximum length</i>	3	
<i>Required:</i>	no	
<i>Measurement units:</i>	centimeters	
<i>Format:</i>	nnn	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. If present must represent a valid integer.	
<i>Optional validation rules for this attribute:</i>	1. If STF5 is present, STF5_DEPTH should be present. 2. Should be between 1 and 100.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> QUALITY_COMMENT	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-10-2016 / WC SOP-2016	<i>Default report heading:</i> Record Quality Comment	<i>Relation (from Form X):</i> WC_G_yyyy_ssss.CSV
<i>Purpose:</i> Explanation as to why some values in this record are of Suspect or bad quality.		
<i>Data type:</i>	Varchar(1024)	
<i>Maximum length</i>	1024	
<i>Required:</i>	no	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	None.	
<i>Optional validation rules for this attribute:</i>	None.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> PROTOCOL_SOP_ID	<i>Used by deliverable ID:</i> WC_G
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<i>Revision date / protocol version:</i> 2-10-2016 / WC SOP-2016	<i>Default report heading:</i> Network – Protocol – SOP	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> 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 2007 and SOP set 2018 would be designated CAKN_2007-SOP_2018. Data collected according to the protocol implementation plan for SEAN stamped 2017 and SOP set 2020 would use SEAN_PIP_2017-SOP_2020.		
<i>Data type:</i>	Varchar(24)	
<i>Maximum length</i>	24	
<i>Required:</i>	Yes	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. Must be present.	
<i>Optional validation rules for this attribute:</i>	None.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> UPDATED_BY	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-10-2016 / WC SOP-2016	<i>Default report heading:</i> Updated By	<i>Relation (from Form X):</i> WC_G_yyyy_sssss.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(24)	
<i>Maximum length</i>	24	
<i>Required:</i>	Yes	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	n/a	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. Must be present.	
<i>Optional validation rules for this attribute:</i>	None.	

Form Y: Column Definition

<i>Vital Sign:</i> Weather and Climate	<i>Attribute identifier:</i> UPDATE_TIMESTAMP	<i>Used by deliverable ID:</i> WC_G
<i>Revision date / protocol version:</i> 2-10-2016 / WC SOP-2016	<i>Default report heading:</i> Updated On	<i>Relation (from Form X):</i> WC_G_YYYY_SSSSS.CSV
<i>Purpose:</i> 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.		
<i>Data type:</i>	Varchar(16)	
<i>Maximum length</i>	16	
<i>Required:</i>	Yes	
<i>Measurement units:</i>	n/a	
<i>Format:</i>	yyyy-mm-dd hh:mm	
<i>Mandatory validation rules for this attribute (in order of application):</i>	1. Must be present.	
<i>Optional validation rules for this attribute:</i>	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

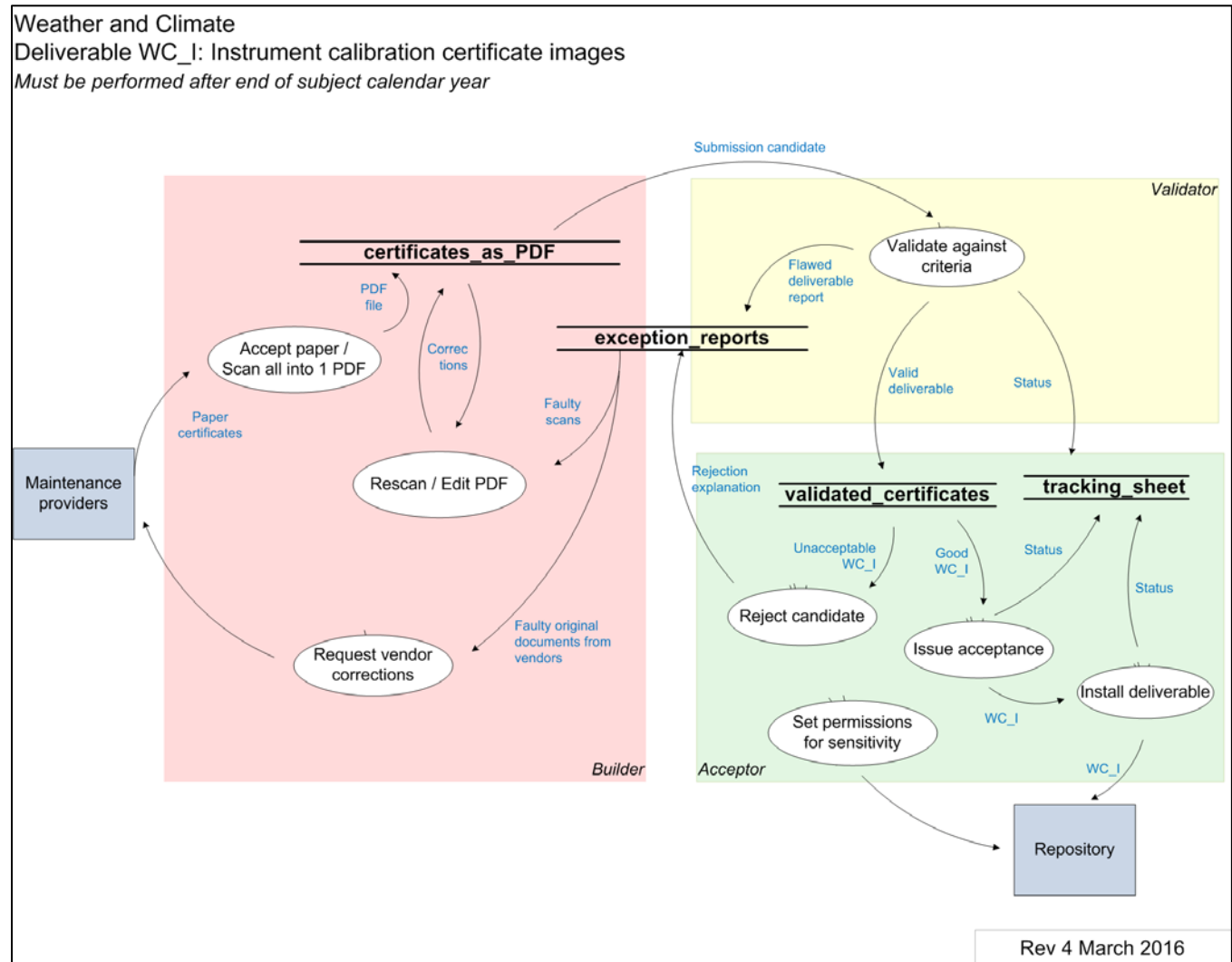


Figure SOP-10.A.9. Data flow required to generate deliverable WC_I: calibration certificate images.

Deliverable Definition

Form C: Non-tabular Data Deliverable

<i>Vital Sign:</i> Weather and Climate	<i>Deliverable ID:</i> WC_I	<i>Deliverable Title:</i> Calibration certificate images
<i>File Format:</i> PDF	<i>Associated Software and Version:</i> Adobe Acrobat Reader 2015 or later version	<i>Revision Date/Protocol Version:</i> 01-20-2016 / SOP-2016
<i>Expected Frequency:</i> One file per year	<i>Repository reference type / sensitivity:</i> Generic Document / not sensitive	<i>Submission Unit:</i> Calendar year
<i>What purpose does this deliverable serve?</i> 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.		
<i>Summary of content:</i> Scanned images of all calibration certificates dated with the current calendar year saved as a single PDF file.		
<i>Mandatory validation criteria:</i> 1. Must successfully open using Adobe Acrobat Reader DC 2015.0 or later. 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.		
<i>Optional validation criteria:</i> 1. Images should be free from artifacts that obscure significant content.		
<i>Deliverable ID of any other network data products required to create this product:</i> None.		
<i>Description and source of any outside data required to create this product:</i> 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_generate_DM.aspx into your browser to start the application. The startup screen, below, should appear.

National Park Service
Inventory & Monitoring Program

National Park Service
U.S. Department of the Interior

DATA MANAGEMENT

Southeast Alaska Network

Instance: INPGLBAFS05\SQL_SEAN_2014 Database: SEAN_Staging_test_2014

Data Management » Climate » Generate WC_G Basis

Generate WC_G from Aquarius

This builds a database object (the "basis") that contains all underlying data needed for producing the WC_G Corrected Data deliverable. Once the basis is complete, then the WC_G ASCII CSV file can be downloaded onto your workstation through the browser. The basis can only contain data for one single weather station. By concentrating on one at a time, the process should be more manageable than trying to simultaneously deal with multiple stations in various states of completeness. The basis is usable only after all mandatory validation criteria in the current protocol/SOP set are met. The processing goes through these stages:

1. Extract all Aquarius data for a specified location/station.
2. Audit Aquarius data to validate it all meets the WC_G mandatory criteria.
3. Reshape the validated data into a database object that may be downloaded as a CSV file.
4. Download the CSV.

Network to Use
(select)

Location to Use

Protocol/SOP ID **Updated by**

Soil Sensor Depths - change as needed but only one depth per sensor per station is supported

STF	STF2	STF3	STF4	STF5
10	20	50	100	150

Waiting for a location that has available datasets

☒ Include metadata preamble ☒ Include column headings

Waiting for WC_G Basis to be recreated

U.S. Department of the Interior Accessibility Freedom of Information Act Privacy Policy Disclaimer USA.gov NPS Home Contact Us

Site last updated: November 18, 2012 | Email: Webmaster
Please download the latest version of Adobe Reader :: Free Download
This site is best viewed in Internet Explorer

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 but, as protocols get updated, more choices may be selected from. All networks recognize the same protocol packages, so the choices are the same regardless of network chosen.

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 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.

Generate WC_G from Aquarius

This builds a database object (the "basis") that contains all underlying data needed for producing the WC_G Corrected Data deliverable. Once the basis is complete, then the WC_G ASCII CSV file can be downloaded onto your workstation through the browser. The basis can only contain data for one single weather station. By concentrating on one at a time, the process should be more manageable than trying to simultaneously deal with multiple stations in various states of completeness. The basis is usable only after all mandatory validation criteria in the current protocol/SOP set are met. The processing goes through these stages:

1. Extract all Aquarius data for a specified location/station.
2. Audit Aquarius data to validate it all meets the WC_G mandatory criteria.
3. Reshape the validated data into a database object that may be downloaded as a CSV file.
4. Download the CSV.

Network to Use

ARCN

The WC_G Basis for ARCN currently contains a complete version of NOAT_ASIA2 having 35038 sampling events built by K Hill on 4/27/2017 9:47:42 AM according to specifications defined in SOP SET 2017.1.

Location to Use

(select)

Waiting for a location to be selected

Protocol/SOP ID
SOP SET 2017.1

Updated by
K Hill

Soil Sensor Depths - change as needed but only one depth per sensor per station is supported

STF	STF2	STF3	STF4	STF5
10	20	50	100	150

Waiting for a location that has available datasets

☒ Include metadata preamble ☒ Include column headings

Waiting for WC_G Basis to be recreated

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.

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. 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 H is enabled. Review the screen specifications and press H to create the “Basis” database object.

Generate WC_G from Aquarius

This builds a database object (the “basis”) that contains all underlying data needed for producing the WC_G Corrected Data deliverable. Once the basis is complete, then the WC_G ASCII CSV file can be downloaded onto your workstation through the browser. The basis can only contain data for one single weather station. By concentrating on one at a time, the process should be more manageable than trying to simultaneously deal with multiple stations in various states of completeness. The basis is usable only after all mandatory validation criteria in the current protocol/SOP set are met. The processing goes through these stages:

1. Extract all Aquarius data for a specified location/station.
2. Audit Aquarius data to validate it all meets the WC_G mandatory criteria.
3. Reshape the validated data into a database object that may be downloaded as a CSV file.
4. Download the CSV.

Network to Use

ARCN

The WC_G Basis for ARCN currently contains a complete version of NOAT_ASIA2 having 35038 sampling events built by KHill on 4/27/2017 9:47:42 AM according to specifications defined in SOP SET 2017.1.

Location to Use

NOAT_ASIA2

These datasets will be considered

PP.RNIN_WC_G@NOAT_ASIA2	RW.SRW_WC_G@NOAT_ASIA2
SD.SDI_WC_G@NOAT_ASIA2	TA.AT1H_WC_G@NOAT_ASIA2
TA.AT1L_WC_G@NOAT_ASIA2	TA.ATF_WC_G@NOAT_ASIA2
TS.STF_WC_G@NOAT_ASIA2	TS.STF2_WC_G@NOAT_ASIA2
TS.STF3_WC_G@NOAT_ASIA2	UD.WDD_WC_G@NOAT_ASIA2
UP.WSMP_WC_G@NOAT_ASIA2	UR.WDDP_WC_G@NOAT_ASIA2
US.WSM_WC_G@NOAT_ASIA2	XR.RHP_WC_G@NOAT_ASIA2
YBL.BVV_WC_G@NOAT_ASIA2	

Protocol/SOP ID

SOP SET 2017.1

Updated by

KHill

Soil Sensor Depths - change as needed but only one depth per sensor per station is supported

STF	STF2	STF3	STF4	STF5
10	20	50	100	150

Click to generate a new WC_G basis covering only NOAT_ASIA2

☒ Include metadata preamble ☒ Include column headings

Waiting for WC_G Basis to be recreated

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 J. An audit trail of these executions is retained for future reference at the UNC listed at the bottom of the report.

Click to generate a new WC_G basis covering only NOAT_ASIA2

===== Execution Log Started for NOAT_ASIA2 at 4/27/2017 2:33:10 PM =====

Step 1 - Extract relevant datasets from Aquarius -----
Working on dataset PP.RNIN_WC_G@NOAT_ASIA2. 35,038 records were extracted.
Working on dataset RW.SRW_WC_G@NOAT_ASIA2. 35,038 records were extracted.
Working on dataset SD.SDI_WC_G@NOAT_ASIA2. 35,038 records were extracted.
Working on dataset TA.AT1H_WC_G@NOAT_ASIA2. 35,038 records were extracted.
Working on dataset TA.AT1L_WC_G@NOAT_ASIA2. 35,038 records were extracted.
Working on dataset TA.ATF_WC_G@NOAT_ASIA2. 35,038 records were extracted.
Working on dataset TS.STF_WC_G@NOAT_ASIA2. 35,038 records were extracted.
Working on dataset TS.STF2_WC_G@NOAT_ASIA2. 35,038 records were extracted.
Working on dataset TS.STF3_WC_G@NOAT_ASIA2. 35,038 records were extracted.
Working on dataset UD.WDD_WC_G@NOAT_ASIA2. 35,038 records were extracted.
Working on dataset UP.WSMP_WC_G@NOAT_ASIA2. 35,038 records were extracted.
Working on dataset UR.WDDP_WC_G@NOAT_ASIA2. 35,038 records were extracted.
Working on dataset US.WSM_WC_G@NOAT_ASIA2. 35,038 records were extracted.
Working on dataset XR.RHP_WC_G@NOAT_ASIA2. 35,038 records were extracted.
Working on dataset YBL.BVV_WC_G@NOAT_ASIA2. 35,038 records were extracted.
Extraction complete. 15 datasets were brought in. -----

Step 2 - Validate that extracted data conform to all mandatory criteria -----
Any errors reported list the parameter and timestamp of the problematic Aquarius record.
This station has no Aquarius data sets for WFM1 elements: STF4 STF5.
The extracted data are all valid. -----

Step 3 - Build WC_G Basis from the validated data -----
Adding parameter AT1H - success.
Adding parameter AT1L - success.
Adding parameter ATF - success.
Adding parameter BVV - success.
Adding parameter RHP - success.
Adding parameter RNIN - success.
Adding parameter SDI - success.
Adding parameter SRW - success.
Adding parameter STF - success.
Adding parameter STF2 - success.
Adding parameter STF3 - success.
Adding parameter STF4 - success.
Adding parameter STF5 - success.
Adding parameter WDD - success.
Adding parameter WDDP - success.
Adding parameter WSM - success.
Adding parameter WSMP - success.
These data contain 35038 sampling events.
The prior WC Basis generation for NOAT_ASIA2 contained 35038 events.
This WC_G Basis has been validated against all mandatory QC criteria in SOP SET 2017.1 and is determined to be of ACCEPTED quality.
The WC_G Basis has been successfully created. It now reflects station NOAT_ASIA2. -----

===== Execution Ended 4/27/2017 2:36:49 PM =====

This Execution Log is being saved under file name \\npglbats03\data\SEAN_Data\staging\WC\WC_GIARCN\WC_G_LOG_17-27-04_1436.htm.

☒ Include metadata preamble ☒ Include column headings

Download the Basis to your workstation as a CSV file

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 (K). A one-line column heading may also be included (L).

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	National Park Service Arctic Network (ARCN)														
2	Weather station data downloaded on April 27 2017														
3															
4	Station NWSID: ASIA2														
5	Date range: 07/14/2012 through 07/12/2016														
6	Sampling events: 35038														
7	Protocol in effect when data was accepted out of quality control: WC-2017.1 / SOP SET 2017.1														
8															
9	The SOP SET 2017.1 document contains a detailed data dictionary covering this content and may be found at: (in review).														
10															
11	Please cite this dataset as: K. Hill and P. Sousanes. WC_G ARCN RAWs corrected data. https://irma.nps.gov/DataStore/Reference/Profile/2239061 . (accessed 04/27/2017).														
12															
13	For additional browse https://science.nature.nps.gov/im/units/ARCN/ .														
14															
15															
16	station_id	timestamp_utc	rnin	rnin_quality	wsm	wsm_quality	wdd	wdd_quality	atf	atf_quality	rhq	rhq_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
22	ASIA2	2012-07-14 06:00	0.01	31	7.5	31	217	31	49.17	31	97	31	12.1	31	226

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 M.

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

Press the green O 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 or the opportunity to directly open it is possible depending on the model and configuration of your browser. But the final product will be loaded onto your workstation one way or another.