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Operations and Services

Surface Observing Program (Land), NWSPD 10-13

AVIATION AND SYNOPTIC OBSERVATIONS

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SUMMARY OF REVISIONS: This directive procedure replaces NWSI 10-1301 "Surface Observing (Land) dated January 16, 2008. This directive replaces sections 2.1, 2.2, 3.1, 4 and Appendices A, B and F of NWSI 10-1302 "Instrument Requirements and standards for the NWS Surface Observing Program (Land)" dated October 4, 2005. This directive also replaces the following directive procedures: NWSI 10-1303 "Inspection Procedure Guideline-Surface Observation Sites" dated October 17, 2003, NWSI 10-1306 "Supplementary Aviation Weather Reporting Station Program" dated December 26, 2006, and NWSI 10-1308 "Surface Observing Programs at Federal Aviation Administration Sites" dated September 7, 2006. This directive also replaces Weather Service Observing Handbook #7, dated July 1996. This revision consolidates the directives and sections of directives that were specific to the aviation and synoptic observation programs. Changes were made to eliminate duplication of information. Word changes were made to improve readability, to clarify the information, and to reflect current practices. Four forms were updated to reflect current practices. These forms will replace existing ones and will only be available electronically. Appendix A changes the responsibility to provide printed handbooks and instructions to providing website links to material for observing programs that are no cost to the government. Appendix C added the responsibility of NWS Headquarters to provide inspection reports to FAA Headquarters, at their request.

Signed January 26, 2010
David B. Caldwell Date
Director, Office of Climate,
Water, and Weather Services

Aviation and Synoptic Observing - Land

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1. General. This instruction and attached appendices describe the National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS) methods and procedures for oversight of aviation and synoptic observing programs at land stations. As used in this instruction, "observation program" refers to all station activities, equipment, schedules, and procedures related to making, recording, or disseminating the aviation and/or synoptic observations for which the station is responsible.

2. Aviation Observing Programs. NWS provides aviation observations in support of national requirements and international commitments. The NWS provides quality observations through automated means whenever possible at designated locations. The NWS provides quality control of the Federal Aviation Administration (FAA)-sponsored sites. At other locations, aviation observations are provided through manual methods. NWS and FAA staff, federal or contract, responsible for aviation weather observations should provide those observations as described in FAA Order 7900.5, "Surface Weather Observing," which can be found at: http://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.information/documentID/12891.

2.1 Automated Surface Observing Systems (ASOS). An unattended ASOS meets all requirements to support the forecast and warning programs of the NWS. In the Alaska and Pacific Regions, NWS staff will augment and backup ASOS in accordance with the Aviation Service Levels assigned to their station. The FAA federal and contract employees augment and backup ASOS in accordance with the Aviation Service Standard Levels assigned to their stations. A link to the current list of assigned Aviation Service Standard Levels can be found under "Links" at: http://www.weather.gov/om/forms/

2.2 Supplementary Aviation Weather Reporting Stations (SAWRS). The NWS will support the aviation industry through the management of the SAWRS program. Details on the operation of SAWRS are given in Appendix A, "SAWRS Program." Observations at SAWRS are provided as described in NWS Observing Handbook No. 8, "Aviation Weather Observations for SAWRS" which can be found at: http://www.weather.gov/om/forms/resources/WSOH8.pdf.

2.3 FAA-Sponsored Sites. The NWS will provide quality control for FAA-sponsored observing sites in accordance with Appendix B.

2.4 Aviation Paid (A-Paid) and Aviation Voluntary (A-Voluntary) Observing Program. The NWS regions can fund and establish A-Paid and A-Voluntary observing stations in order to carry out their aviation forecast responsibilities. These stations and their equipment are sited and configured in accordance with Appendix D, "Instrument Requirements and Standards for the NWS Aviation and Synoptic Observing Programs (Land)."

3. Synoptic Observation Program. NWS provides synoptic observations in support of national requirements and international commitments. NWS will provide observations through automated means at designated ASOS sites. At other locations synoptic observations will be provided by manual methods. NWS staff responsible for synoptic weather observations will produce the observations as described in Federal Meteorological Handbook No. 2 (FMH-2), "Surface Synoptic Codes," which can be found at: http://www.ofcm.gov/fmh2/fmh2.htm. NWS regions can fund and establish Synoptic Paid (S-Paid) observing stations in order to carry out their forecast responsibilities.

4. Compensation. Paid observers are usually paid on a per observation basis. The payment rates will be determined by the Regional Headquarters (RH).

5. Responsibilities of NWS Organization:

5.1 National Weather Service Headquarters (NWSH). National coordination for development, drafting and issuance of policy and guidance for provision of aviation and synoptic observations is shared by three offices. These offices are the Office of Climate, Water and Weather Services (OCWWS), Office of Operational Systems (OOS), Office of Science and Technology (OST), and the Office of the Chief Information Officer (OCIO). Their responsibilities are described below.

OCWWS provides guidance and direction for the execution of the surface observation program. To carry out this responsibility OCWWS:

a. Establishes requirements for aviation and synoptic observing programs.

b. Coordinates and negotiates with other government agencies on national and international matters pertaining to aviation and synoptic observing policies, procedures, and requirements, especially as related to sites with human observers. This includes certification of observers, inspection of observing sites, and quality control of observations.

c. Sets standards for accuracy and siting of weather instruments based on Office of Federal Coordinator for Meteorology (OFCM) documents.

d. Prepares and makes available documentation and forms for use in aviation and synoptic observing programs.

OOS provides guidance and direction for operation and maintenance of the systems that provide surface observations. To carry out this responsibility OOS:

a. Develops policy and procedures for operation and maintenance of surface observing systems.

b. Manages national operational surface observing systems. This includes, but is not limited to, developing implementation plans for surface observing systems and managing execution of the plans; conducting routine and ad hoc meetings and leading and coordinating inter agency efforts to identify and resolve operational issues; managing the Operations & Maintenance (O&M) budget for surface observing systems, and; providing help desk operational support from the Sterling Field Support Center.

c. Tests and evaluates new systems and integration of subsystems prior to implementation, provides guidance for software development to support new systems, and tests new software loads prior to implementation.

d. Provides direction and guidance to field maintenance personnel, conduct engineering studies of system performance and initiate corrective actions as

necessary, requisition shipment of systems and subcomponents to field sites and control logistic supply.

e. Provides observing system logistics, reconditioning, and calibration support from central facility, the National Logistic Support Center (NLSC), Kansas City, Missouri.

OST provides project management for developing, acquiring, and initially deploying new technology and systems. To carry out this responsibility OST:

a. Manages execution of project management and development programs. Assess science and technology options, prepares solutions and develops plans to meet service requirements. Plans, coordinates, and manages technical infusion and evolution program.
b. Leads and manages systems engineering, development, integration, testing of and initial deployment of observing systems. Approves all systems engineering changes; reviews system performance; identifies needs for system changes. Manages risk reduction activities.

OCIO, Telecommunication Operations Center, Telecommunications Gateway, ASOS Operations and Monitoring Center (AOMC) provides a vital service for the Automated Surface Observing System (ASOS) program through its maintenance monitoring support for all fielded ASOS sites and remote access to ASOS site-specific parameter and configuration files, and a precision time-source via a toll-free number.

a. The AOMC support of ASOS includes remote diagnosis of maintenance alerts reported by ASOS when a problem or issue is encountered. At completion of its diagnosis, the AOMC will notify the designated maintenance focal point of the problem for resolution by an NWS technician. Additionally, the AOMC tracks and reports on ASOS data availability through the tracking of ASOS METAR observations

b. The AOMC also maintains the master database of ASOS site configuration information. The database consists of ten files for each site with more than 3500 specific items which define everything about the site from sensor configuration to the digitized voice identification of its airport name. These files are transferred to and from the AOMC automatically as changes occur at each individual site. In addition, the AOMC provides access to a precision time source linked to the National Institute of Standards and Technology (NIST) in Boulder, CO, which helps keep all ASOS system clocks synchronized.

5.2 National Weather Service Regional Headquarters. NWS RH's are responsible for field office compliance with directives established by OCWWS. RH coordinates with other government agencies at the regional level. Regions will:

a. Ensure field offices implement aviation and synoptic observing programs in compliance with national directives.

b. Review and approve or disapprove requests of field offices to establish or close the following types of observing stations (see Sections 6-8):

(1) A-Paid, A-Voluntary, and S-Paid.

(2) SAWRS.

c. Document agreements, and any fees, for observing services between the NWS and the observer. Use NOAA Form 36-14 (http://www.corporateservices.noaa.gov/%7Enoaaforms/eforms/nf3614r1.pdf) for the A-Paid and S-Paid programs. Details for the SAWRS program are found in Appendix A.

d. Provide Contract Officer's Technical Representative(s) for contract observing sites.

e. Perform station visitations/inspections at NWS field offices. Alaska and Pacific Regions also perform non-NWS observation site inspections.

f. Notify OCWWS of suspension of any observing program.

5.3 National Weather Service Field Offices. The data provided by the aviation and synoptic observing programs is vital to the completion of the NWS mission. The Meteorologist-in-Charge (MIC) ensures personnel and resources are directed to:

a. Provide and disseminate observations.

b. Manage/supervise observing programs.

c. Perform quality control of observations.

d. Perform and report on station visitations/inspections.

e. Maintain an updated technical library either hard copy or easy access to the links identified below. The library will consist at a minimum of the following:

(1) Office of Federal Coordinator for Meteorology

(a) Federal Meteorological Handbook (FMH) #1, Surface Weather Observations and Reports (http://www.ofcm.gov/fmh-1/fmh1.htm)

(b) FMH #2, Surface Synoptic Codes (http://www.ofcm.gov/fmh2/fmh2.htm)

(c) Federal Standard for Siting Meteorological Sensors at Airports (http://www.ofcm.gov/siting/text/a-cover.htm)

(2) Observing Handbooks and Related Documents:

(a) WSOH #8 Aviation Weather Observations for SAWRS (http://www.weather.gov/om/forms/resources/WSOH8.pdf)

(b) FAA Order 7900.5 Surface Weather Observing (http://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.information/documentID/12891)

(c) FAA Order 7210.3, Facility Operation and Administration, especially Chapter 2, sections 9 and 10 (http://www.faa.gov/air_traffic/publications/atpubs/FAC/).

(d) FAA AC 91-14D, Altimeter Setting Sources (http://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/23147)

(3) ASOS Documentation (http://www.nws.noaa.gov/asos/) :

(a) ASOS Software Users Manual

(b) ASOS User's Guide

(c) ASOS Ready Reference Guide

(4) Training Documentation:

(a) Training Guide in Surface Weather Observations (http://www.weather.gov/om/forms/resources/SFCTraining.pdf)

(b) International Cloud Atlas (abridged Atlas) or cloud chart

6. Procedure for Establishing Observation Sites. New sites can be established at locations from which meteorological data are required if:

a. funds, both one-time and recurring, are available, and

b. the Meteorologist-in-Charge or his/her representative has determined the location satisfies all applicable siting criteria defined in FMH #1, Federal Standard for

Siting Meteorological Sensors at Airports, and Appendix D. The site location must allow the observer to evaluate all elements within the period of the observation.

6.1. Determination of Station Elevation (H_p).

a. At new airport stations, H_p will be equal to the Field Elevation (H_a) rounded to the nearest foot.

b. At non-airport stations, H_p should be equal to the height of the barometer (H_z) rounded to the nearest foot.

c. If there is reason to issue new elevation data for an existing station, H_p will be revised in accordance with either a. or b. above if the difference between the old and revised H_p exceeds 50 feet.

6.2. Preparation of Pressure-Reduction Tables. NWSH will prepare these tables for individual stations upon request. To obtain these tables, the following information must be provided to OOS, Field Systems Operations Center, Observing Systems Branch (OPS22):

a. Station name and type,

b. Field elevation (H_a), station elevation (H_p), and height of barometer (H_z), all to the nearest foot, and

c. Latitude and longitude (in degrees and minutes).

d. Average annual temperature for the station.

7. Historical File of Aviation and Synoptic Observation Forms. Retain corrected copies of the aviation and synoptic observation forms on station for 90 days. After 90 days the copies can be offered to a local public library, public institution, or university, etc., capable of archiving the data for public use. If no local user can be found, the forms should be destroyed after the retention requirement has been satisfied. The National Climatic Data Center (NCDC) is considered the official source of observation data.

8. Procedure for Discontinuing Observation Programs Due to Station Closures. Adhere to the following procedures when a decision is made to close a station:

a. NWS will not maintain observations at closed stations.

b. NWS can agree to requests by others wishing to continue the observation program. In such a case, the requesting party must agree to assume responsibility for funding all costs of the program above and beyond costs incurred by NWS to provide normal support functions.

c. If a non-Federal Government party assumes observational responsibility, all NWS owned aviation and synoptic observation equipment will be removed and retained by the NWS forecast offices for future use or returned to the National Logistics Support Center (NLSC), Kansas City, Missouri.

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1. SAWRS Program. SAWRS are established by aviation interests but receive observation program guidance and management by the NWS. There are various station configurations depending on whether manual observers or an automated weather observing platform is the source of weather observations.

1.1 SAWRS. A station where an observer is the source of weather observations and there is not a commissioned ASOS, automated weather observing system (AWOS), or automated weather sensors systems (AWSS). The SAWRS observer is the source of the official observation if no Federal or contract weather observers are on duty. Section 4 provides procedures for management of SAWRS.

1.2 Backup Supplementary Aviation Weather Reporting Station (BSAWRS). A staffed station where a commissioned AWOS/AWSS is the source of weather observations. The BSAWRS observer provides backup to the AWOS/AWSS if no Federal or contract weather observers are on duty. A BSAWRS cooperator can be a Non-FAA Control Tower which is not under contract to the FAA. Section 5 provides procedures for management of BSAWRS.

1.3 Supplementary Aviation Weather Reporting Station-II (SAWRS-II). A staffed station where a commissioned ASOS is the source of weather observations. The SAWRS-II observer provides backup to the ASOS if no Federal or contract weather observers are on duty. Section 6 provides procedures for management of SAWRS-II.

2. NWS and Cooperator Responsibilities:

2.1 The Office of Climate, Water, and Weather Services (OCWWS) at NWSH. OCWWS will:

a. Coordinate and establish national policy for the program.

b. Develop documentation and coordinate interagency documentation requirements.

c. Consult with FAA headquarters and manage national level issues.

2.2 Regional Headquarters. Regional Headquarters will:

a. Approve or deny requests to establish supplementary aviation weather reporting stations. Upon receipt of request, the NWS RH should consult with appropriate FAA regional Service Area's Flight Standard District Office or Technical Standards and Evaluation Branch to evaluate the station request.

b. Upon request, evaluate the feasibility of using weather observations from one airport to permit Federal Aviation Regulations (FARs) Part 135 operations at another airport. Refer to Section 3.2 for guidelines.

c. Coordinate management of the program with the supervising Weather Forecast Offices, where applicable. Where a RH supervises the site, it will also be

responsible for the items listed in Section 2.3.

2.3 Weather Forecast Offices (WFO). WFOs supervise all SAWRSs in their county warning area, if not supervised by the RH. The meteorologist in charge of the supervising WFO will:

a. Coordinate management of the program with the NWS RH.

b. Establish a cooperative agreement, using WS Form 10-13-7 (figure A-1), between the NWS and the SAWRS cooperator. The WFO will require the cooperator to fulfill the responsibilities indicated on the form before the agreement is signed.

c. Provide forms and website links to applicable observing handbooks, training handbooks, and instructions required for taking and recording observations.

d. Provide technical guidance to the cooperator in the establishment and perform the initial, as well as the semi-annual inspection of a station.

e. Administer certification examinations to observers.

f. Provide quality control of observations and observational guidance as requested.

g. Perform and report on station visitations/inspections.

2.4 Cooperators. Cooperators will sign a WS Form 10-13-7 with the NWS. The form will provide terms and responsibilities, the cooperator agrees to:

a. Provide, install, operate, relocate if necessary, protect and maintain, all manual or backup observing equipment in accordance with NWS aviation observing program standards in Appendix D and applicable observing handbooks.

(1) Equipment used for the altimeter setting will be an ASI or DASI, or any other facility station pressure instrument with certification and calibration traceable to NIST, or

(2) Equipment will meet the minimum requirements as specified in FAA Advisory Circular 91-14, Altimeter Setting Sources, section 3.b with current FAA certification and approval. This document can be found at: http://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/23147

b. Provide space to properly site and operate equipment in accordance with Appendix D.

c. Provide observations to company aircraft and, when required, to a designated NWS or FAA facility.

d. Provide at least one person certified to observe and record the weather observation or element(s) in accordance with this instruction, and applicable observing handbooks.

e. Mail the original observational forms to a NWS facility as directed.

f. Make all observations taken and recorded, available to all other local aviation interests.

g. Inform the supervising WFO or NWS RH when a change in flight schedules results in a change in the schedule of observations.

h. Annotate and return the certificates of former employees to the issuing authority.

i. Permit NWS officials access to the station.

j. Provide additional services as listed on WS Form 10-13-7.

k. Provide appropriate documentation identifying their altimeter source as approved for use per FAA AC 91-14D, Altimeter Setting Sources, which can be found at: http://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentID/23147.

l. Provide transportation, meals, and lodging (if necessary) for inspections.

3. General Management Procedures. The FAA has requirements for weather reporting at airports serviced by air taxi and commuter air carriers, outlined in sections 135.213 and 135.225 of the FAR. The NWS supports this FAA requirement through program management.

3.1 Recruitment. The NWS does not recruit cooperators.

3.2 Guidelines for FARs Part 135.213(b):

3.2.1 Requests. Part 135, paragraph 213(b) stipulates, in some cases, air taxi and commercial operator pilots may conduct instrument flight rules operations at an airport using weather observations taken at another airport. Such procedures will only be authorized when, after investigation by the NWS and the FAA Flight Standards District Office, it is found the standards of safety for operations allow the deviation.

3.2.2 Evaluations. The NWS recommendation concerning the representativeness of observations should be made by the NWS RH using the following guidelines:

a. If the weather observing sites are less than 10 miles apart, an evaluation of the terrain and/or obstructions between the sites for representativeness should be undertaken.

b. If weather observing sites are more than 10 miles apart, a thorough assessment of terrain, obstructions, climatology, etc., will be carried out to determine if critical aviation weather elements taken at one point can be representative of what is occurring at the other.

3.2.3 Recommendations. Each request should be coordinated among the NWS regional staff. Recommendations should be made to the requesting FAA Flight Standards District Office, for action, not to the operator involved and should be confined to stating if the weather observations from one location can be expected to be generally representative of the weather occurring at the other location. Recommending any other particular course of action to the FAA should be avoided.

3.3 Commissioned Automated Observing Systems. If an automated observing system is commissioned at a location, it will be the **official source of aviation weather observations** for the location.

3.4 Multiple Cooperators at the Same Location. When two or more cooperators are requesting the establishment of a station or the change of an existing program, the applicants will indicate in writing the agreement they have with each other. This agreement will be filed as an appendix to WS Form 10-13-7.

a. Multiple Cooperator Operations. A single set of instruments will be used in taking official observations from a location. Cooperators will make mutual arrangements for providing and sharing common observing equipment. If this is not practical, due to distance or other reasons, exceptions to the above instruction can be allowed after approval by the NWS RH. Station documentation will include the details on which instrument set is used for each specific observation program. Only one observation at a given time is the official observation for any airport.

3.5 Observation Dissemination. The aviation weather observations will be available locally for all airport users. At a minimum, the observation will be on display for viewing by all aviation interests on the airport. Regional recommendations for exceptions to this policy can be approved by the Director, Office of Climate, Water, and Weather Services.

3.6 Government Owned Facilities. Cooperators supplementing NWS or FAA observing programs may use Government facilities and equipment in accordance with established procedures and subject to the concurrence of the respective agency. Such usage will not compromise the security of Government property.

a. Authorization. When authorized to use Government Owned facilities, the SAWRS cooperators will be held reasonably accountable and responsible for the security of the property on the facility. The WS Form 10-13-7 will be annotated in the cooperators responsibility section when the cooperator is authorized to use a Government facility.

b. Annotation. The annotation will be as follows:

"Ensure the security of the Government owned facility and equipment. The cooperator will be responsible and accountable for the damage or loss of property while the facility is occupied by the cooperator. Access to the Government facility will be strictly controlled and limited to cooperator staff approved by the Government for the purpose of taking and disseminating aviation weather observations. The cooperator staff is restricted to using the equipment necessary and approved for the SAWRS program. The cooperator will maintain strict control of, and accountability for, office keys and/or lock codes. Any Government supplied keys will not be duplicated. The use of Government telephones is restricted to official Government business. Any unauthorized use of Government telephones will be billed directly to the cooperator. Except as otherwise provided by law, the Government will not be responsible for the loss of, or damage to, the cooperator's equipment, or death or injury to the cooperator or the cooperator's employees. Failure to comply with these provisions will result in the immediate loss of authorization to use the Government facility and Government action to recover for any damages or losses."

3.7 Instrumentation. The requirements and standards for meteorological instruments will comply and otherwise be consistent with policies for NWS aviation observing programs in Appendix D.

3.8 Certification of Observers. All SAWRS observers will be certified weather observers in compliance with NWSI 10-1304 Certification of Observers

3.9 Inspections. Inspections will follow the standards in Appendix C including use of the appropriate WS Form 10-13-9 inspection checklist and the WS Form 10-13-10 inspection report. Observing programs will be inspected twice a year by a representative of the supervising weather forecast office or the RH in compliance with Appendix C. SAWRS is a no cost program to the government, therefore inspection costs will be incurred by the Cooperators. This includes transportation, meals, and lodging, if necessary.

4. Procedures for Management of SAWRS. Each NWS RH or supervising WFO provides observation technical guidance, observer certification, station inspections, and quality control to ensure the SAWRS cooperator properly conducts the aviation weather observation program.

4.1 Aviation Observations. Observations are taken and recorded in accordance with standards and instructions provided in this document and NWS Observing Handbook Number 8 (WSOH #8).

a. The WS Form 10-13-7 provides a schedule of observations provided by SAWRS. The FAR determines the schedule of observations as follows:

(1) FAR Parts 121 and 135 - Non-Scheduled Operations. One observation should be taken, recorded, and reported to the aircraft, if practical, 30 minutes prior to approach or departure, but in no case later than the commencement of each approach or departure. Under changing conditions,

additional SPECI reports will be taken, recorded, and reported to the aircraft with the frequency specified by instructions in WSOH #8 until the approach or departure is completed. Observations should be discontinued upon the completion of each operation.

(2) FAR Parts 121 and 135 - Scheduled Operations. When scheduled flight operations are conducted, observations are to be taken in accordance with instructions in WSOH #8 and reported beginning at least 1 hour prior to scheduled arrival and continuing until the actual departure of the aircraft. If the departure is scheduled more than 1 hour after the arrival, observations should be discontinued after the arrival until immediately prior to the scheduled departure.

b. At stations where SAWRS observers supplement observations taken by the FAA (during the hours the FAA operations are closed), and the observing equipment is shared by Government. The cooperator may install and maintain a communication system.

c. At stations where the NWS provides terminal aviation forecasts (TAF), observations will be communicated to the FAA facility for long-line transmission. A phone call or fax, if used, will be at the expense of the SAWRS cooperator.

d. Dew point temperatures will be reported by SAWRS observers if a TAF is prepared for the location.

4.2 Documentation. The NWS provides each SAWRS with website links to the WSOH #8 and the NWS Training Guide for Surface Observations.

5. Procedures for Management of BSAWRS. Each NWS RH or supervising WFO provides observation technical guidance, observer certification, station inspections and quality control to help ensure the BSAWRS properly conducts the aviation weather observation program.

5.1 Aviation Observations. The observers provide backup to AWOS/AWSS. Such backup should be provided in accordance with standards and instructions in this document and the applicable AWOS/AWSS Observer Handbook. Backup of the AWOS/AWSS observations will be in the format as described in WSOH # 8 and instructions set by the system manufacturer.

a. Details of the understanding between the NWS RH and the BSAWRS will be described on WS Form 10-13-7. A BSAWRS cooperator must agree to the following terms:

(1) The observers have received operator training for overriding and restoring the automated system at no cost to the NWS,

(2) The hours of backup agree with the time of observations listed on the WS Form 10-13-7.

b. Only Non Federal AWOS/AWSS equipped with an observer terminal (OT) are capable of being augmented by the observers. The observer will not have access to an OT at a Federal AWOS/ASOS, since a configuration change of having two OT's has caused problems with data. If problems develop, it is the responsibility of the BSAWRS to ensure the AWOS/AWSS communications are turned off and put into a "test" status prior to initiating the BSAWRS observations, as detailed in the AWOS/AWSS Operators Handbook. Any expenses incurred will be with the cooperator.

c. Quality control responsibility for AWOS/AWSS equipment belongs to the FAA, the AWOS/AWSS owner, and/or manufacturer.

d. Backup situations range from failure of a single sensor to total systems outage resulting in loss of all data processing and communications to the system being in "test" status following a maintenance action. To backup AWOS/AWSS, the BSAWRS cooperator must document site specific backup procedures in coordination with the supervising WFO or the NWS RH.

5.2 Backup of AWOS/AWSS. The observer will provide backup for critical element failures during AWOS/AWSS outages in accordance with the observing handbooks. An element is considered failed if it is missing, garbled or unquestionably erroneous. Critical elements are listed below:

a. Wind direction, speed, and character (gusts, squalls, etc),

b. Visibility,

c. Present Weather (Augmented in remarks),

d. Sky Condition,

e. Temperature/Dew Point, and

f. Altimeter Setting.

5.3. Documentation. Provide each BSAWRS with website links to the WSOH #8 and the NWS Training Guide for Surface Observations.

6. Procedures for Management of SAWRS-II. Each NWS RH or supervising WFO provides observation technical guidance, observer certification, station inspections and quality control to help ensure the SAWRS-II properly conducts the aviation weather observation program.

6.1 Aviation Observations. The SAWRS-II observer provides backup to ASOS. Such backup should be provided in accordance with standards in this instruction, FAA Order 7900.5, and in WSOH #8.

a. The SAWRS-II cooperator will not have access to an ASOS Operator Interface Device (OID), and will not edit ASOS observations. There will be backup observations and no augmentation of ASOS at a SAWRS-II site.

(1) The cooperator will have a method of determining current data being reported by the ASOS. Methods can range from a telephone call to the ASOS voice line to a cooperator funded and maintained video display unit.

b. The ASOS will remain in operational mode whenever possible. It will not be turned off when observational elements are missing. To back up ASOS, the cooperator must develop site specific procedures in coordination with the supervising WFO and NWS RH.

(1) The SAWRS-II will notify the supervising NWS WFO office when ASOS appears to be disabled or malfunctioning.

(2) If an element appears to be erroneous, the ASOS AOMC will be notified by the supervising NWS WFO office. The AOMC will turn off report processing for the specific sensor in question when requested by the NWS staff.

c. SAWRS-II observations will not be taken while ASOS is functional and reporting the elements. SAWRS-II sites will coordinate with the supervising WFO prior to backup of the ASOS.

d. Two types of SAWRS-II observations can be reported, both of which are dependent on the operational status of ASOS. The observations will follow the standards in WSOH #8.

(1) Missing Element Observation. Missing element observations will be recorded on the WS Form MF1M-10C as a corrected observation by the SAWRS-II observer. Missing element observations will be recorded only when one or more of the following critical elements is missing from the ASOS:

(a) Wind (direction, speed, and character),

(b) Visibility,

(c) Present Weather,

(d) Sky Condition,

(e) Temperature/Dew Point (Dew Point is required only if a terminal aviation forecast is provided for the location),

(f) Altimeter Setting.

(2) SAWRS-II operators will report complete observations following the standards in WSOH #8 if ASOS is wholly disabled.

e. Communications

(1) At sites where the NWS provides TAFs, a complete observation, including remarks, should be phoned or faxed to the appropriate AFSS, or to the appropriate to the NWS office for OCONUS sites, for long line transmission. The phone call or fax will be at the expense of the SAWRS-II cooperator unless other arrangements such as a hot line or 800 toll free number are already in place. The appropriate NWS/FAA office will transmit a corrected observation in accordance with applicable observing handbooks.

(2) SAWRS-II operators will not send corrected observations containing missing elements or complete observations directly into any network or data distribution system except for local airport use.

6.2 Documentation. The NWS provides each SAWRS-II with website links to the WSOH #8, the NWS Training Guide for Surface Observations, and the FAA Order 7900.5.

WS Form 10-13-7
(11-09)
(Ref: NWSI 10-1301)

U.S. Department Of Commerce
National Oceanic and Atmospheric Administration
National Weather Service

COOPERATIVE AGREEMENT FOR AVIATION WEATHER OBSERVATIONS

Station	State	Effective Date

Name of Cooperator	Time of Observations

I. Responsibilities of the Government:

1. Provide website links to applicable observing handbooks, training handbook, instructions and hardcopy forms required for taking and recording observations,
2. Provide technical guidance to the cooperator in the establishment and perform the initial inspection of a station.
3. Administer certification examinations to observers.
4. Conduct two station inspection visits annually.
5. Provide quality control of observations and technical guidance as requested.

II. Responsibilities of the Cooperator:

1. Provide, install, operate, relocate if necessary, protect and maintain, all manual or backup observing equipment in accordance with NWS standards as described in NWSI 10-1301 Appendix D and WSOH #8.
   a. Provide documentation that equipment used for the altimeter setting has certification and calibration traceable to NIST, or
   b. Provide documentation from the FAA that the altimeter source is calibrated and approved for use with approved instrument approach procedures per FAA AC 91-14D, section 3.b..
2. Provide space to properly site and operate equipment in accordance with NWSI 10-1301 Appendix D.
3. Abide with the instructions of the current NWSI 10-1301 and related directives regarding the establishment, operation, and supervision of SAWRS Stations, especially in the dissemination of missing element observations or complete observations.
4. Provide at least 1 qualified person certified to observe and record the weather observation or element(s) in accordance with NWSI 10-1301, and WSOH #8 handbook,
5. Provide, in the event of failure or outage of the automated system during the "Time of Observations" specified in this agreement, NWS certified weather observers to take, and record manual back up weather observations in accordance with the practices and procedures published in NWSI 10-1301, and WSOH #8 handbook, current edition.
6. Provide observations to own company aircraft, and when required, to a designated NWS or FAA facility.
7. Make all observations taken and recorded, available to all other local aviation interests.
8. Inform the NWS when a change in flight schedules results in a change in the schedule of observations.
9. Mail the original observational forms to a NWS facility as directed.
10. Annotate and return to the issuing authority the certificates of:
    a. employees who terminate their involvement in the observational program, or
    b. employees who move to other locations. If observations are required at the observer's new location, the certificate will be revalidated by the NWS and forwarded to the new duty station.
    c. All certificates remain the property of the National Weather Service.
11. Permit NWS officials access to the station
12. Provide transportation, meals, lodging (if necessary) for inspections.
13. Provide additional services as listed below:

III. This agreement may be terminated by either party upon written notice to the other.

COOPERATOR		NOAA, NATIONAL WEATHER SERVICE	
BY		BY	
TITLE		TITLE	
CITY - STATE - ZIP CODE	DATE	OFFICE	DATE

Figure A-1. WS Form 10-13-7, Cooperative Agreement for Aviation Weather Observations

APPENDIX B - Aviation Observing Program at Federal Aviation Administration Sites

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3. Federal Aviation Administration Non-Federal Observing Program B-2

1. Introduction. This Appendix establishes NWS operating methods for the aviation weather observing programs at staffed FAA sponsored weather observing sites. Section 3 describes the FAA sponsored non-Federal observing program (NF-OBS). This appendix has been approved by the FAA.

2. Procedure. At sites staffed by FAA employees or contract employees the FAA is responsible for the augmentation and backup of the automated weather observing systems, or the manually provided observation. FAA employees and FAA funded or partially funded observing personnel operate under FAA Order 7900.5, Surface Weather Observing (http://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.information/documentID/12891), and FAA Order 7210.3, Facility Operation and Administration (http://www.faa.gov/air_traffic/publications/atpubs/FAC/).

2.1 Standards. The aviation weather observing programs at FAA sites follow standards and FAA requirements as described in FAA Orders 7210.3 and 7900.5.

2.2 Quality Control. The WFOs and WSOs maintain a quality control program as instructed in Appendix C and NWSI 10-1305 Observational Quality Control - General.

2.3 Certification.

a. The NWS provides weather observer certificates to all FAA sponsored weather observing personnel in accordance with NWSI 10-1304 Certification of Observers.

b. Upon successful completion of the initial NWS inspection, the Regional Director or designated representative issues a site certificate of approval to each staffed FAA site providing weather observations. The WS Form 10-13-8 (figure B-1) is the site certificate of approval for FAA observing sites. The certificate is revoked

if the conditions described in Appendix C Section 5.2.4.b have occurred.

2.4 Station Inspections. The NWS provides station inspections at FAA sites in accordance with Appendix C.

3. Federal Aviation Administration Non-Federal Observing Program: This Section states the procedure the NWS will follow to support the FAA's NF-OBS Program. The NF-OBS program allows the NF-OBS observers to perform augmentation and backup of a commissioned ASOS at no cost to the Federal Government.

The NWS RH cooperates with the FAA in establishing the NF-OBS agreement(s) at no cost to the Federal Government. The cooperative agreements are established between the NF-OBS provider and the FAA. Each NWS RH establishes a point of contact with the corresponding FAA Service Area. The NWS RH advises the FAA if any terms of the agreements conflict with existing NWS policy.

The NWS issues observing certificates following the instructions regarding Limited Aviation Weather Reporting Stations (LAWRS) instructions described in NWSI 10-1304 Certification of Observers. The observer uses the FAA rules and guidelines, including FAA Order 7900.5, Surface Weather Observing. The NWS inspects the NF-OBS sites initially and on a recurring annual basis as described in Appendix C.

The NWS does not provide any backup meteorological sensors to the NF-OBS provider. All NF-OBS provided backup sensors must be sited in accordance with Office of Federal Coordinator for Meteorological Services and Supporting Research handbook, "Federal Standard for Siting Meteorological Sensors at Airports." The staff of NWS WFO's or RH work with the NF-OBS provider to coordinate observer certification, station inspection, and other issues as they arise. If the NF-OBS provider does not meet all obligations the NWS will inform the appropriate FAA region, and take appropriate action as described in Appendix C paragraph 5.2.4.b.

Each RH maintains a listing of NF-OBS Programs in their region and informs OPS22 of new, or changes to, each NF-OBS location. When the number of NF-OBS exceeds 10, OPS22 will notify OOS, Operations Division, Maintenance Branch (OPS12) to invoice the FAA for payment. Procedures for this invoicing are described in the NWS and FAA Memorandum of Agreement for Operations, Maintenance and Planned Improvement of ASOS (Agreement Number 74631, dated September 22, 2000).

United States Department of Commerce

National Oceanic and Atmospheric Administration

CERTIFICATE OF APPROVAL

This is to certify that the Federal Aviation Administration Site at

meets the standards established by the National Weather Service and is designated a National Weather Service approved observing location.

The validity of this certificate will be re-determined during each official National Weather Service visit to the above named facility.
If certification is no longer required, forward this certificate to the National Weather Service office having jurisdiction over your facility.

WS Form 10-13-8
(10-09)
Ref: NWSI 10-1301

Figure B-1. WS Form 10-13-8, Site Certificate of Approval

APPENDIX C - Inspection Procedure Guidelines-Aviation and Synoptic Observation Sites

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1. General. An effective aviation and synoptic observing program depends on each observation site conforming to national and agency standards and guidelines. One of the most effective ways to ensure that standards and guidelines are being met is through first-hand evaluation of the observing programs at each staffed observing site. Visiting observing sites can also be used to provide initial and additional technical assistance, as time and resources permit.

1.1 Purpose. This appendix establishes standard guidelines for carrying out inspections of all aviation and synoptic observation programs and observation program management review by

NWS field offices, NWS RH and NWSH.

1.2 Scope. Aviation and synoptic observation programs include:

a. Staffed NWS observing offices including Weather Forecast Offices (WFOs), Weather Service Offices (WSOs) and Data Collection Offices (DCOs).

b. NWS Contract Meteorological Offices (NWSCMO).

c. Paid, Part Time Basic Stations (A-Paid, A-Voluntary).

d. Synoptic Paid Stations (S-Paid).

e. LAWRS.

f. FAA Contract Weather Observing Stations (FCWOS), sometimes recognized as Contract Weather Offices (CWO) by FAA.

g. Non-Federal Observing Stations (NF-OBS).

h. SAWRS, subdivided into:

(1) SAWRS - Manual observation site.

(2) SAWRS-II - Backup for the ASOS.

(3) BSAWRS - Backup and augmentation for the AWOS.

2. Responsibilities of NWS Organization. NWS staff managing or working within the aviation and synoptic observing program are not required to hold an observing certificate in order to conduct station inspections.

2.1 National Weather Service Headquarters (NWSH). NWSH will:

a. Develop required documentation and forms.

b. Coordinate interagency documentation requirements.

c. Ensure FAA headquarters obtains needed documents.

2.2 Regional Headquarters. Regional Headquarters will:

a. Coordinate with FAA Regional Service Area Planning Implementation Manager (PIM).

b. Inspect the NWS field offices with aviation and synoptic observation program

and/or with oversight of such programs.

(1) Routine inspection visits for observation program review by RH personnel, or their assigned representative, should be made to staffed NWS offices at least once every two years.

(2) The supervisor of each field office should be notified of each planned visit as far in advance as possible. The supervisor should also be notified of any planned visits in their county warning and forecast area (CWA). Changes in the visitation schedule should also be brought to the attention of the field station.

(3) At the discretion of the RH, the person performing the aviation and synoptic observations inspection should review other station programs at NWS offices.

(4) At the conclusion of the inspection, the NWS program management should be reviewed with the supervisor.

c. Where a RH supervises the non-NWS field office site, it will also be responsible for the items listed in Section 2.3.

2.3 Weather Forecast Offices (WFO). The supervisory NWS field office personnel inspect all aviation and synoptic observing sites within their CWA. The MIC is responsible for the visitation program, and he/she should designate the individuals tasked to inspect observing stations. Individuals appointed to this task will be knowledgeable in the program reviewed.

a. The supervisory field office Data Acquisition Program Managers (DAPM) or the Observing Program Leader (OPL) and Hydro-Meteorological Technicians (HMTs) (or other inspectors designated by the MIC) are responsible for:

(1) Visits to staffed observing stations to review and report on the observational programs and procedures, including the backup or augmentation of an automated system.

(2) Checks to ensure that the proper site exposure is maintained, e.g., whether new construction has caused an obstruction, and note any conditions that would adversely affect the performance of the observing sensors.

b. Electronics technicians (ET) are responsible for visits to staffed and Federal un-staffed automated observing stations for calibration of equipment and for ensuring continuous proper exposure of the surface observing sensors.

c. Calibration, and the proper sensor exposure of the AWOS, is solely the responsibility of the FAA.

3. Pre-Inspection Activity and Guidelines:

3.1 Advance Notification of Inspection. The MIC at each NWS field office and/or the supervising person of all other aviation and synoptic observing programs (e.g., FAA tower chief, airport manager, etc.) scheduled for inspection should be notified of each planned visit as far in advance as possible. Whenever practical, visits should be scheduled so that the supervisor of the aviation and synoptic observing program are contacted before the inspector begins work at the station and prior to departure.

3.2 Advance Preparation for Inspection. Prior to making an inspection, the person designated as the inspector should review all pertinent information regarding the station. Such advance preparation will permit the inspector, in many cases, to concentrate efforts in the particular station's known problem areas, thereby making better use of time. Include the following advance preparation activities:

a. Consider type of observing program to be inspected and forms and checklists required (e.g., WS Form 10-13-9 - "Aviation and Synoptic Observation Inspection Checklist" (figure C-1) and WS Form 10-13-10 – "Aviation and Synoptic Observation Station Inspection Report" (figure C-2)).

b. Ensure all manuals and forms to be used are the correct ones and up to date, (e.g., FAA Orders 7900.5, 7210.3 Chapter 2 Sections 9, 10, and NWSH #8).

c. Review previous aviation and synoptic program inspection report.

d. Review reports from other regional and local forecast office personnel who recently visited the station.

e. Review station personnel roster, making note of recent personnel changes. (Note: It is desirable for the inspector to recognize the names of all the observing and supervisory personnel at the station to be visited.) Prepare a list of certified observers from the regional listing (name, certificate number, and programs certified) for each station to be visited on WS Form 10-13-10. Review and update each list when checking the observer certificates at the station being visited.

f. Review observing errors detected at the supervising office by use of computer based "check surface observation" programs or quality control reports from local, regional, and/or national sources.

g. Review appropriate station description, instrumentation, and information forms (local and regional produced forms are also acceptable).

h. Spot check recently transmitted observations and compare them with recorded observations if applicable.

i. Determine the lowest instrument approach minimum (visibility/ceiling) for each

station to be visited as published in the FAA Digital Terminal Procedures Publication (digital-TPP). This can be found at http://www.naco.faa.gov/. Compare these values to those used at the station.

4. The Observation Site Inspection. The following guidelines are intended to assist inspectors from RH and supervising field offices in maximizing the effectiveness of observation site inspections:

4.1 Frequency and Duration of Inspections. Supervising field office or regional personnel should conduct inspection visits to all staffed aviation and synoptic observing sites at least once each year. Additional visits may be required for sites having recent changes in equipment, programs, or personnel, or when records indicate less than a satisfactory observation program exists.

a. Allow sufficient time to completely review the observation program. Since observational programs vary in complexity and/or content, the visitation time can range from a few hours to a full day. Depending on requirements and availability, additional time may be needed for technical assistance.

4.2 Conducting the Aviation and Synoptic Observation Program Review. WS Form 10-13-9, Aviation and Synoptic Observation Inspection Checklist, is provided to assist the inspector in conducting a complete program review. Use of the form is mandatory. The inspector will find it helpful in that most significant aspects of the program are included in a checklist that can be retained for future use. It should also be used as an action item list, and if requested by the site supervisor and copying facilities are available, a copy should be left at the field station. The checklist contains a rating column with identifiers for the different types of observing programs. Use the appropriate column for the type of station you are inspecting. The types of observing programs are listed below.

a. Four observation program specific versions of the WS Form 10-13-9 and the WS Form 10-13-10 are available at: http://www.nws.noaa.gov/om/forms/.

(1) Non-Federal (SAWRS—manual observation, BSAWRS – backup and/or augmentation of AWOS, SAWRS-II –backup to ASOS observation program)

(2) ASOS/AWOS augmentation and backup observation program (FAA LAWRS, FAA AFSS, NF-OBS, FCWOS, NWS, NWSCMO)

(3) Manual Federal observation programs (FAA LAWRS, FAA AFSS, FCWOS, NWS, NWSCMO)

(4) A-Paid, A-Voluntary, S-Paid NWS funded manual observation programs

b. The inspection checklist includes, but is not limited to, the following areas:

(1) Arrangement of Observing Facilities. Determine if the site for taking visual observations satisfies the requirements in Appendix D, easy access is provided to evaluate the celestial dome, and the site is situated according to FAA order 7210.3 section 2-9-7. At airports, evaluate if the location of meteorological sensors comply with requirements established in the Federal Standard for siting Meteorological Sensors at Airports, which can be found at: http://www.ofcm.gov/siting/text/a-cover.htm. Briefly evaluate the lighting and safety of observing facilities and that the observer has unobstructed view of:

(a) At least half of each quadrant of the natural horizon with no more than 45 degrees continuous obstruction.

(b) At least 80 percent of the celestial dome (that portion of the sky which would be visible provided, due to the absence of human-made structures, there was an unobstructed view of the horizon in all directions from the observation site), and the ambient night lighting will not present a sky evaluation problem at the location.

(c) The direction from which weather most often approaches the station.

(2) Pressure. The pressure/altimetry program is one of the most critical elements at a surface observation site and must be thoroughly checked for equipment and observation procedure accuracy. Many programs depend on accurate pressure observations, and transmitted pressures are used by the FAA and other aviation interests for control and separation of air traffic.

(a) Pressure comparisons should be made by the inspector, comparing the traveling standard with the home station standard and backup instruments on each visit to **NWS sites**. Pressure comparisons for non-NWS sites are not required except for OCONUS offices.

(b) Pressure comparisons for ASOS should be accomplished by electronic technicians. Offices with Precision Digital Barometers (PDB) will provide comparisons as outlined in Appendix D Section 8. The inspector will check, comparing the traveling standard with the home station standard. Backup instrument checks will adhere to the below instruction.

(c) Instruction for non-NWS pressure instrument daily operations will adhere to WSOH #8, Chapter 8 (SAWRS) or FAA Order 7210.3, Chapter 2 Section 10.

(d) With each inspection or a new establishment of a SAWRS, the NWS inspector will require the cooperator to produce documentation establishing that the equipment used for the altimeter setting has certification and calibration traceable to NIST, or that the altimeter(s) are FAA approved as an altimeter source, per FAA AC 91-14D section 3.b.(4) and Appendix D section 6.5 of this document. Thirty days grace period will be allowed to accomplish this task. Failure to meet this requirement will result in suspension and/or closure of the station.

(3) Temperature and Humidity. Proper exposure and accuracy of the temperature and humidity instrumentation (if needed) are critical in aviation weather observations. Proper exposure of primary instrumentation and for adequate backup should be checked closely, in accordance with Appendix D and agency specific requirements. For example, the FAA may not require some locations to provide back-up instrumentation for temperature and dewpoint. Temperature comparatives should comply with the station's appropriate observing handbook.

(4) Precipitation. Ensure precipitation equipment (if needed) is properly exposed and adequate back-up equipment is maintained in accordance with Appendix D. Observation procedures should be checked for compliance with instructions in the station's appropriate observing handbook.

(5) Wind. Visual checks of the wind equipment (if needed) should be made to determine if readings appear to be accurate and are properly observed. Proper annotation of recording charts (when available) should be checked. Wind sensor exposure should be checked.

(6) Ceiling. Review exposure and operation of equipment (if needed). Observation procedures should be monitored, and ceiling height tables should be checked for accuracy if appropriate. If recorder charts are still in use, ensure proper annotation.

(7) Observing Procedures.

(a) Time must be allowed to monitor the observer's routine duties for proper and efficient observation methods. At NWS and FAA offices and contract sites, the station should have a set of instructions for observing, disseminating, and quality control of observations.

(b) Review a sample of records for completeness, neatness, and accuracy if applicable. To ensure that observations have been correctly disseminated and that errors have been corrected properly on MF1M-10C forms, review several days of transmitted reports with the corresponding days of MF1M-10C forms (exception: many

sites will not use forms and will be backing up automated systems).

(8) Observational Aids and References. Check visibility charts for currency and proper format. Check that daytime and nighttime visibility markers are properly identified on the chart. Check the criteria of special observations for accuracy. The latest "FAA Digital Terminal Procedures Publication (digital-TPP) should be used to check the local special criteria.

(9) General. Check for administrative and miscellaneous items not covered elsewhere.

4.3 Critique. Upon completion of the station visitation, the inspector should verbally discuss strengths and discrepancies of the program as noted on the completed WS Form 10-13-9, Aviation and Synoptic Observation Inspection Checklist, with the station manager and the supervising observer. Leave a copy of the WS Form 10-13-9, if copying facilities are available, so corrective actions can be started.

5. Post-Inspection Activities:

5.1 Station Inspection Reports. Upon completion of each station visitation, the inspector prepares a clearly written narrative report using the format on the form, WS Form 10-13-10, Aviation and Synoptic Observation Station Inspection Report. The report will include:

a. Information requested in the heading:

(1) Name of station visited.

(2) Type of station inspected. Manual (FAA LAWRS, FCWOS, NWS, NWSCMO, SAWRS, A-PAID, A-VOLUNTARY, S-PAID) or staffed automated (FAA LAWRS, FCWOS, NWS, NWSCMO, NF-OBS, BSAWRS, SAWRS-II).

(3) Person preparing report and title; should be the inspector.

(4) The supervising station and the dates of the visit.

(5) Station Rating.

(6) Type of visit, e.g. routine, follow-up, or unannounced inspection.

b. Persons contacted.

c. Justification for rating.

(1) Any aspects of the station's program that is unusually favorable. In this category, include such items as might be adopted at other stations.

(2) An objective appraisal of the effectiveness of the observing program as conducted at the station. If rating is Unsatisfactory or Conditionally Unsatisfactory, identify the items (minuses) that contribute to that rating.

d. Specific actions which should be taken to improve the program or to correct the deficiencies. These may include instructional changes, facilities improvements, improvements in the program or personnel skills, etc. Establish a target date for the completion of each action and determine the responsible party.

(1) Contract sites are bound to the requirements of their contracts, so appropriate language should be used. The following terms should be used as guidelines:

(a) "Required" is used to describe an action that needs to be taken to achieve a satisfactory rating.

(b) "Recommend" is used to describe an action that should be taken to ensure a continued satisfactory rating.

(c) "Consider" is used to describe an action that is seen as a best practice but does not affect the rating.

(2) Whenever feasible, photographs of documented deficiencies, e.g., exposure of sensors, safety hazards, etc. should be included. These are especially useful for discussion purposes at the RH.

e. Concise assessment of each of the areas inspected.

f Other information considered pertinent to the program.

g. A list of all observers and their certificate numbers.

h. Pressure comparison results, if applicable.

5.2 Action Items. Action items identified in the Checklist and Report must be followed-up to ensure corrections to deficiencies have been corrected.

5.2.1 Required of NWS Offices. All follow-up action items should be accomplished as promptly as possible. Report the office's follow up actions in a memorandum to the RH as the actions are completed. In case the action is not completed within 30 days after the visit, the station should submit a progress report.

5.2.2 Required for Contract NWS Offices and A-Paid Observers. A copy of WS Form 10-13-10 should be provided to the contractor or paid observer within one week upon return to the home office. A response should be requested by a specified date to close out any action items. A

follow-up visit or phone call should be conducted to ensure deficiencies are corrected.

5.2.3 For Non-NWS Offices. A copy of WS Form 10-13-10 should be provided to the station's supervisor within one week upon return to the home office. A written response should be requested by a specified date to close out any action items. A follow-up visit should be conducted to ensure deficiencies are corrected.

5.2.4 Unsatisfactory or Conditionally Unsatisfactory Ratings. If a station is rated unsatisfactory or conditionally unsatisfactory, notify the appropriate regional observing program manager. If the station is an NWS contract location, notify the NWS regional contracting officer's technical representative (COTR) as soon as possible. If the station is an FAA site, the regional observing program manager should contact the appropriate FAA Service Area Planning Implementation Manager (PIM). After each unsatisfactory or conditionally unsatisfactory rating, a follow-up inspection should be conducted within 30 days. The follow-up report must address all items rated as unsatisfactory during the first inspection.

a. If an NWS station is again rated unsatisfactory during the follow-up inspection, take the following actions:

(1) Contact the regional observing program manager

(2) If the location is a NWS contract location, notify the NWS regional COTR immediately.

(3) If after two follow-up visits, the program is still unsatisfactory, the observing program should be suspended for that location.

b. If an FAA station is again rated unsatisfactory during a follow-up inspection, the regional observing program manager should contact the appropriate FAA Service Area PIM and inform them of developments.

(1) If after two follow-up inspection visits, the unsatisfactory condition persists for a particular FAA observing program, notify the NWS regional observing program manager. The NWS regional observing program manager notifies:

(a) NWSH, OCWWS, Observing Services Division, and

(b) the FAA Service Area PIM to request that the observing program be suspended.

5.3 Disposition of WS Forms 10-13-9 and 10-13-10. Submit the completed WS Form 10-13-10 to the appropriate NWS RH for review and appropriate actions. Send the 10-13-10 to NWSH electronically at B-33@noaa.gov, using the type of station and the location identifier at a minimum in the email subject line, e.g. Report for FCWOS SBN. Provide a copy of the 10-13-10 to the station manager of the observing program that was inspected. Make available and

distribute additional copies of the completed 10-13-10 form to other appropriate supervising offices (see regional supplements for distribution responsibilities). NWSH will ensure FAA Headquarters receives the 10-13-10.

a. Retain completed WS Forms 10-13-9 and 10-13-10 at the inspecting field offices for at least 3 years and the 10-13-10 at the RH for at least 2 years.

b. The latest Station Inspection Report, regardless of recency, should be retained at the inspecting field offices for information and continuity until superseded.

6. Special Criteria:

6.1 Unannounced Inspections. On an occasional basis, unannounced or surprise inspections can be conducted. These unannounced inspections can be especially useful at contract weather observing locations to ensure performance is at a consistently acceptable level and to identify problem areas that would otherwise not be detected. The inspection official should have reasonable confidence of access to the station prior to the inspection visit being conducted.

a. Unannounced inspections should be considered when a supervisory office has determined that a particular station's program has fallen well below the expected surface aviation and synoptic observing standards, and all other attempts to correct the situation have been exhausted. For example:

(1) A station is a candidate for an unannounced inspection after a thorough review of the aviation and synoptic observing program has been conducted, and it is evident that the observational program does not conform with the established standards, or it is assessed that critical equipment verifications are not maintained (e.g., pressure comparisons if applicable).

(2) There are persistent observing errors as detected by the quality control program at the supervisory office, or by quality control reports from regional and/or national sources, and no effort is apparent from the station to improve despite repeated warnings.

(3) A station has a history of conditionally unsatisfactory or unsatisfactory ratings, constant follow-ups, and no improvement without constant urging.

b. Reports from other sources recently visiting the station, or that maintain contact with the station, indicate irregularities deemed to be serious enough to compromise aviation safety. Reports of uncertified observers, sensors out of calibration, substandard sensors being used, observers sleeping during shifts, or leaving the observing facilities to perform other activities, etc., should alert the supervisory office that an unannounced inspection would be in order to determine whether the performance level of the station meets established standards.

6.2 Station Ratings. The overall rating of a aviation and synoptic observation station should

be carefully considered.

a. The following are guidelines for the station evaluation:

(1) Excellent should be considered if all ratings on the WS Form 10-13-9 are pluses ("+") and in the opinion of the inspector, the station exceeds expected standards.

(2) Satisfactory should be considered if the minuses ("-") on WS Form 10-13-9 can be fixed quickly, and in the opinion of the inspector, the station meets or exceeds expected standards.

(3) Conditionally Unsatisfactory should be considered if the program has a significant number of minuses ("-") on WS Form 10-13-9, but not enough to warrant a rating of unsatisfactory. If the program fails to improve to satisfactory within 30 days, an Unsatisfactory rating will be given.

(4) Unsatisfactory should be considered if there are numerous minuses ("-") on WS Form 10-13-9 and in the opinion of the inspector, the station overall program does not meet or is below expected standards.

b. The inspector's experience, and knowledge of the observing program, should allow them to detect the strengths and weaknesses of the station and should give the inspector the ability to recognize aspects of the observing program that would be unusually favorable. The rating of a station should not be determined solely by the number of pluses and minuses recorded on WS Form 10-13-9.

c. The "grace periods" listed on the 10-13-9 for certain elements are the time limits for correcting unacceptable conditions. The 10-13-9 remarks section or the WS Form 10-13-10 explaining an unsatisfactory rating will include the grace periods. This instruction is not intended to include every foreseeable situation; a station could be given a particular rating for any good reason that is well documented.

WS FORM 10-13-9
(11-09)
(Ref. NWSI 10-1301)

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

AVIATION & SYNOPTIC OBSERVATION INSPECTION CHECKLIST

Observing Station		**Type of Facility** ☐ **ASOS** ☐ **AWOS** ☐ **Manual** ☐ **Other** Describe Other: _____
Date of Visit		**Service Standard Level** (for ASOS/AWOS Facilities) ☐ **A** ☐ **B** ☐ **C** ☐ **D**
Prepared by		☐ **NWS** ☐ **SAWRS** ☐ **NWSCMO** ☐ **BSAWRS** ☐ **FCWOS** ☐ **SAWRS-II** ☐ **LAWRS** ☐ **A-Paid** ☐ **NF-OBS** ☐ **A-Voluntary** ☐ **S-Paid** ☐ **Other** ☐ **FSS** _____
Title		
Supervising Station		

Instructions: Use this checklist during the inspection. Make entries and remarks as required or necessary. Use the appropriate column to rate the type of observing program you are inspecting, as identified below. Shaded box indicates this item is not normally used in this type of program. "NA" may be annotated when item is Non-Applicable.
Disposition: File this with the Station Inspection Report, WS Form B-33.

Type of Observing Program: Use the numbered column under "Rating" corresponding to the type of observing program listed below. Completely shaded boxes indicate "NA", but can be used if appropriate to that site.
1 = Non-Federal – SAWRS-manual; BSAWRS-backup of AWOS; SAWRS-II-backup of ASOS
2 = ASOS/AWOS Backup & Augmentation – LAWRS, FCWOS, NF-OFS, NWS, NWSCMOS
3 = Manual, Federal – LAWRS, FCWOS, NWS, NWSCMO
4 = NWS Funded Manual – A-Paid, A-Voluntary, S-Paid

Ratings:
Rate each item with either a "+", "–", or "NA".
"+" can mean excellent, satisfactory, conditionally unsatisfactory, or yes.
"–" can mean unsatisfactory, conditionally unsatisfactory, or no.
An element receiving a "–" rating must have an explanation for corrective action to be taken or recommended procedures to follow.

Inspection Guide	**Rating**				**Remarks Section**
1. Arrangement of Facilities	**1**	**2**	**3**	**4**	Remarks
Location of observing site is adequate. (If no, explain in remarks)					☐Backup ☐Manual ☐Backup and Augmentation Remark _____
Location of weather sensors adequate.					
Adequate safety devices (sufficient lighting, guardrails or stairs, etc).					
Location of ASOS ACU.					
ASOS OID/AWOS OT in good condition.					

AVIATION & SYNOPTIC OBSERVATION INSPECTION CHECKLIST (con't) page 2 of 5

2. Pressure	1	2	3	4	Remarks
Automated System ☐Primary ☐Backup					☐ASOS ☐AWOS ☐SAWS ☐AWSS Remarks:
ASI/DASI ☐Primary ☐Backup					☐DASI ☐ASI
→ All comparison corrections displayed at, or near, DASI/ASI. If not, instruct office to post corrections.					
Aircraft Altimeter (SAWRS only) ☐Primary ☐Backup					☐One ☐Two
→ FAA documentation stating the altimeter source is approved for use with approved instrument approach procedures.					Per FAA AC 91-14D, section 3.b.(4) Remarks:_____
→ Use/Condition of aircraft altimeters (No Grace Period)					
→ Calibrated within the past 24 months. (No Grace Period)					
Other ☐Primary ☐Backup					☐Barograph ☐Other _____
→ Other pressure instruments operated correctly (specify in remarks).					
Routine comparisons completed in accordance with FAA Order 7210.3, Chapter 2, Section 10. (No Grace Period if Primary; 7 day Grace Period of Backup of Automated System)					☐Daily if 2 altimeters ☐3 times a week with ramp aircraft ☐Adjacent station
Routine comparisons completed in accordance with NWOH #8. (No Grace Period if Primary; 7 day Grace Period of Backup of Automated System)					☐Daily if 2 altimeters ☐3 times a week with ramp aircraft ☐Adjacent station
Comparisons properly logged on MF1M-10 or FAA Form 7230-4.					
Comparison satisfactory with inspecting official's traveling standard if applicable. (7 day Grace Period for backup of automated systems.)					**NWS Sites only except OCONUS**
Surveyed Height of pressure sensor on file with NWS.					
Correct height of instrument posted on or near the instrument.					
Pressure Reduction tables satisfactory.					
Instruments installed properly. (No Grace Period)					
Condition of instrument(s).					
Backup available. (7 day grace period)					
Backup Procedures for automated systems clearly understood by observers.					

AVIATION & SYNOPTIC OBSERVATION INSPECTION CHECKLIST (con't) page 3 of 5

3. Temperature and Humidity	**1**	**2**	**3**	**4**	Remarks
Temperature and dewpoint instruments properly functioning and in good condition. (30 day Grace Period) (N/A LAWRS)					List Instruments:
Dewpoint properly computed.					
Temperature and dewpoint backup provided for automated systems. (N/A LAWRS)					
Temperature and Dewpoint data provided. (30 day Grace Period)					
Weekly Hygrothermometer checks? (N/A LAWRS)					
Condition of instrument shelter. Adequate supplies (muslin wicks, batteries, etc) (N/A LAWRS)					
Location, general condition and exposure of instruments. (Where in use)					
4. Precipitation (N/A SAWRS, LAWRS)	**1**	**2**	**3**	**4**	Remarks
Condition of precipitation equipment. (Identify type(s) in remarks) (Where in use)					
Condition of snowboard					
Measuring stick					
Exposure of precipitation measuring instruments. (Where in use)					
Correct procedures used in measuring and identifying precipitation.					
5. Wind	**1**	**2**	**3**	**4**	Remarks
Method for determining Direction and Speed properly. (Identify method in remarks)					Remarks: _____
Estimation Procedures understood by Observer.					
Gusts and Squalls understood by Observer.					
Exposure of equipment.					
Supports for equipment.					
Equipment meets minimum accuracy standards. (30 day Grace Period)					
Speed recorded in knots and accurate to within 10%. (30 day Grace Period, if equipment is required)					
True direction recorded and accurate to within 10 degrees. (30 day Grace Period, if equipment is required)					
6. Ceiling (15 day grace period)	**1**	**2**	**3**	**4**	Remarks
LBC's balloons, ceiling lights, clinometers in satisfactory condition. (Where in use)					
Operation of equipment understood.					
Helium available and safely stored. (Where balloons are in use)					
Observational procedures for backing up automated equipment followed. (Where balloons are in use)					

AVIATION & SYNOPTIC OBSERVATION INSPECTION CHECKLIST (con't) page 4 of 5

7. Observing Procedures	1	2	3	4	Remarks
Aviation Service Level responsibilities understood. (Automated systems sites)					
Proper Log on/off procedures followed for ASOS/AWOS. (Level C LAWRS, enables/disables ALDARS)					
Observers familiar with visibility markers.					
Observers understand correct procedures for reporting and backing up prevailing visibility for ASOS/AWOS					
Tower Visibility reported correctly.					
Procedures for reporting RVR. (where applicable)					
Pilot reports utilized.					
Remarks encoded properly when required.					
Corrections to observations performed as required.					
Practice observations taken. (Backup sites)					
Adequate on-the-job training for new observers.					
Adequate arrangements for notification of observers in the event of an aircraft mishap.					
Observers understand correct procedures in the event of an aircraft mishap.					
Number of observations taken in your presence. (Indicate number in remarks.)					
Observations taken in your presence performed adequately. If not, recommend training and notify NWS Regional Office.					
Examination of observing certificates.					
All observers certified and current. (No Grace Period)					
Quality control/quality assurance of observations conducted on site.					
Review of 30 day record of observations.					
Observations reported on time.					
Observation records neat and legible.					
WS Form B-14 properly completed.					
All recorder charts annotated as required by Observing Handbooks. (List recorder charts and equipment)					

AVIATION & SYNOPTIC OBSERVATION INSPECTION CHECKLIST (con't) page 5 of 5

8. Observational Aids and References	**1**	**2**	**3**	**4**	Remarks
Visibility charts available. (30 day Grace Period)					
Night time visibility markers indicated					
Visibility charts appear accurate. (Initial and date charts)					
Cloud Atlas or cloud charts available.					
Table of Speci criteria available and correct. (Notify NWS Region for ASOS problems; notify FAA Service Area for AWOS problems.)					
FAA Order 7900.5 current and available. (N/A SAWRS)					
WSOH #8 current and available. (SAWRS)					
FMH #2 available. (S-Paid only)					
Appropriate ASOS or AWOS guides available.					
Station instructions adequate for observing, disseminating and quality control of observations.					
Other aids available. (Training guides, Users Guides, station duty manual, reference guides, etc.)					
Training aides utilized.					
9. General	**1**	**2**	**3**	**4**	Remarks
Required telephone numbers available. (supervising station, AOMC, etc).					
Valid agreement in place and signed. (SAWRS, A-Paid, S-Paid, NF-OBS)					
Cooperator willing to make observations available to other users (7 day grace period)					

10. Rating/Comments

Overall Rating:

☐ **Excellent** ☐ **Satisfactory** ☐ **Conditionally Unsatisfactory** ☐ **Unsatisfactory**

Provide justification for rating and any additional remarks:

Figure C-1. WS Form 10-13-9, Aviation and Synoptic Observation Inspection Guide

WS FORM 10-13-10
(10-09)
Ref: NWSI 10-1301

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC AMINISTRATION
NATIONAL WEATHER SERVICE

AVIATION & SYNOPTIC OBSERVATION STATION INSPECTION REPORT

☐ **Manual** ☐ **Staffed Automated**

STATION AND TYPE	
PREPARED BY	
TITLE	
HOME STATION	
DATE(S) OF VISIT	

RATING	**TYPE OF VISIT**
☐ EXCELLENT	☐ COMPLETE VISITATION
☐ SATISFACTORY	☐ 1st FOLLOW-UP
☐ CONDITIONALLY UNSATISFACTORY	☐ 2nd FOLLOW-UP
☐ UNSATISFACTORY	☐ Other

INSTRUCTIONS – Provide the results of the station inspection in narrative form following the outlined format.

Distribute via email to the following: Station Inspected, Supervisory Station, Regional Headquarters, NWS Headquarters (B-33@noaa.gov). Include the type of station and the location identifier at a minimum in the email subject line. If station or supervisory station does not have email access, mail a hard copy.

1. Persons Contacted:
2. Justification for Rating:
3. Actions with target completion dates:
4. Summarize the following areas inspected:
   a. Arrangement of Facilities:
   b. Pressure:
   c. Temperature and Humidity:
   d. Precipitation:
   e. Wind:
   f. Ceiling:
   g. Observing Procedures:
   h. Observational Aids and Facilities:
   i. General:
5. Other Comments:

TOTAL CORRECTION OF MERCURY BAROMETER RELATIVE TO NWS PRIMARY STANDARD	BAROMETER NUMBER	TOTAL CORRECTION (From Block 56 on WS Form B-1)

WS FORM 10-13-10
(10-09)

Figure C-2. WS Form 10-13-10, Aviation and Synoptic Observation Station Inspection Report.

APPENDIX D - Instrument Requirements and Standards for the NWS Aviation and Synoptic Observing Programs (Land)

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1. General. This appendix describes the requirements and standards for meteorological sensors used in the aviation and synoptic observing programs staffed or overseen by the NWS. The standards are for sensor resolution, accuracy, siting and exposure. If standards can not be met by equipment in place, the standards should be achieved as stations are changed, equipment is installed, programs are modified, or new stations are established.

2. Standards for Sensors Used in the Observing Programs. The standards in this appendix pertain to individual instruments or meteorological sensors. For some automated systems, data collection platforms (DCP) integrate and disseminate sensor data. Any data provided by DCPs will meet standards set for the observing program the system supports. The minimum standards for accuracy and resolution of sensors used by aviation and synoptic programs are established by FMH #1. All sensors used in the aviation program staffed or overseen by the NWS will adhere to these standards. Section 6 contains a listing of the aviation observing program instrument requirements and standards. Section 7 contains a listing of the synoptic observing program instrument requirements.

3. Siting and Exposure of Meteorological Sensors. Standards will be followed as closely as possible to ensure uniformity of observations. Siting and exposure standards define and establish requirements. The implementation of these should be flexible to achieve a balance between meteorological representativeness, space availability, and cost effectiveness. The NWS will follow the guidelines documented in the Federal Standard for Siting Meteorological Sensors at Airports (http://www.ofcm.gov/siting/text/a-cover.htm).

4. Visibility Charts. All aviation weather observing stations reporting visibility will have a visibility chart. If more than one location is used for visibility observations, a separate chart will be prepared for each location. The phrase "visibility chart" includes any documentation providing a graphical display identifying location and distance to day and nighttime visibility markers. The supervising official at a NWS-funded or SAWRS observing station is responsible for preparing and keeping the visibility charts current. At an FAA-funded site, the facility air traffic manager is responsible for preparing and maintaining the visibility charts. The supervising WFO or RH will check visibility charts at the observing site for proper format and reasonableness during inspection visits.

5. Visual Elements. Observer has unobstructed view of:

a. At least half of each quadrant of the natural horizon with no more than 45 degrees continuous obstruction.

b. At least 80 percent of the celestial dome (that portion of the sky which would be visible provided, due to the absence of human-made structures, there was an unobstructed view of the horizon in all directions from the observation site), and the ambient night lighting will not present a sky evaluation problem at the location.

c. The direction from which weather most often approaches the station.

6. Instrument Requirements and Standards for the NWS Aviation Observing Program. This Section provides minimum instrument requirements and sensor performance standards for conducting the aviation observing program staffed or overseen by the NWS. All backup instruments will meet the performance standards.

6.1 Commissioning Systems and Sensors. Activate and commission sensors of automated systems that are procured and maintained by the NWS before operational use. The commissioning of major systems, e.g., ASOS, will be in accordance with NWSPD 80-2, System Commissioning and Decommissioning Individual sensors in automated systems will not be commissioned prior to the commissioning of the entire system. The commissioning of stand-alone individual sensors will be accomplished in accordance with NDS instructions. Commissioning or certification of Federal and non-Federal AWOS are the responsibility of the FAA.

6.2 Relocating of Systems or Sensors. Responsibility for managing and funding the relocation of observing systems or sensors rests with the agency requiring the move. Relocation of an ASOS will be approved by the ASOS Configuration Control Board before any move, in accordance with NWSI 30-1203, Configuration Management for Operational Systems.

6.3 ASOS Sensors. Details on sensors used at ASOS stations are given in the ASOS Site Technical Manual and the ASOS Users Guide (http://www.nws.noaa.gov/asos/).

6.4 Sensors for Determining Cloud Heights. The sensors used as cloud height indicators are:

a. Laser-beam ceilometer incorporated in an automated system.

b. Balloons are required for use only at SAWRS designated by the RH for daytime observations. Use of lights with the balloons is authorized for night observations.

c. Ceiling lights (used at night). Ceiling lights are required for use only at SAWRS taking night observations, unless balloons with lights are available.

d. Procurement of ceiling lights and balloons for SAWRS is the responsibility of the SAWRS.

6.4.1 Requirement for Cloud Height Indicators. All stations staffed or overseen by the NWS taking observations at airports with at least one precision approach runway will be equipped with a cloud height indicator.

Cloud Height Sensor Performance Standard		
Parameter	Accuracy	Range
Height of cloud base in feet	±3 Reportable Values	0 - 12,000 feet (minimum)
The resolution for sensors used as cloud height indicators is the reportable values for cloud heights as defined in the Federal Meteorological Handbook No. 1, Surface Weather Observations and Reports.		

Figure D-1. Cloud Height Sensor Performance Standard.

6.4.2 Required Backup Equipment for Cloud Heights. No backup equipment is required for reporting cloud heights. If backup sensors are used, they will meet the cloud height indicator performance standard. Cloud heights can be estimated in accordance with WSOH #8.

6.5 Sensors for Determining Pressure. All stations staffed or overseen by the NWS will be equipped with an approved pressure sensor. All NWS staffed pressure sensors will be compared routinely following applicable procedures. Refer to Section 8 for procedures on comparisons. The following pressure sensors are approved for use at locations staffed or overseen by the NWS.

a. ASOS/AWOS Pressure sensors. At any location with a commissioned ASOS or an AWOS, the automated pressure sensors will be the barometric home station standard (HSS) for the aviation program.

b. Precision Digital Barometer (PDB). The PDB will be used as the barometric HSS for the upper-air program and other meteorological programs not associated with the ASOS. At NWS offices with both a aviation and synoptic observing program and an upper-air program, the ASOS will be the HSS for the surface observing program, and a PDB will be the HSS for the upper-air and other meteorological programs. The PDB will be used by NWS staffed and NWS Contract staffed locations as a backup sensor to the ASOS.

c. Paroscientific Digiquartz model 760-16B. The Paroscientific model 760-16B is the traveling standard barometer directly traceable to the Primary Standard Barometer at the NWS National Pressure Standards Laboratory. The traveling standard will be:

(1) Used for comparing the ASOS pressure sensors by NWS electronics technicians.

(2) Used for comparisons with the PDB pressure sensors by NWS field operations staff.

(3) Returned to the NWS National Pressure Standards Laboratory annually for calibration.

d. Aircraft type Altimeters. These sensors are authorized for use only at SAWRS locations. Unless otherwise designated by the RH, each SAWRS requires two of these sensors. It is the responsibility of the SAWRS to procure and provide FAA approval documentation (memo or email) that these sensors remain properly calibrated and approved by FAA according to standards in FAA Advisory Circular 91-14.

e. Precision Aneroid Barometers, Altimeter Setting Indicators, and Digital Altimeter Indicators. These sensors may be used in manual observing programs such as SAWRS, BSAWRS, SAWRS-II, A-Paid, and NF-OBS, at locations designated by the RH provided certification and calibration is traceable to the National Institute of Standards and Technology (NIST).

Pressure Sensor Performance Standard				
Parameter	**Units**	**Accuracy**	**Range**	**Resolution**
Station Pressure	Inches of Mercury	±0.02 inches of Hg	22-35 inches of Hg	0.005 inches of Hg
Altimeter Setting	Inches of Mercury	±0.02 inches of Hg	22-35 inches of Hg	0.01 inches of Hg
Sea-Level Pressure	Hectopascals	±0.68 hPa	800-1100 hPa	0.1 Hectopascals

Figure D-2. Pressure Sensor Performance Standard.

6.6 Temperature Sensors. All NWS staffed stations will have a temperature and dew point sensor meeting the performance standards, unless otherwise stated. SAWRS designated by the RH are exempt from the required dew point sensor. The following temperature and dew point sensors may be used in the aviation program.

a. Hygrothermometer.

b. Thermometers. Liquid-in-glass or electronic.

c. Psychrometer. Liquid-in-glass or electronic.

Temperature/Dew Point Sensor Performance Standard				
Parameter	**Units**	**Accuracy**	**Range**	**Resolution**
Temperature	Degrees Celsius	±1.1 ±0.6 ±1.1	−62 to −50 −50 to +50 +50 to +54	0.1 0.1 0.1
Dew Point	Degrees Celsius	±2.2 ±1.7 ±1.1	−34 to −24 −24 to −01 −01 to +30	0.1 0.1 0.1

Figure D-3. Temperature/Dew Point Sensor Performance Standard.

6.7 Requirement for Backup Temperature Sensors. All stations staffed or overseen by the NWS will have a backup temperature and dew point sensor(s) unless otherwise noted. SAWRS designated by the RH are exempt from backup dew point sensors. Where the hygrothermometer or similar system is the station standard, it should be backed up with any of the items listed in section 7. A liquid-in-glass thermometer system will include spare thermometers.

6.8 Wind Measuring Sensors. All stations staffed or overseen by the NWS will have a wind sensor meeting the performance standards. Wind measuring sensors should be mechanical, electrical, sonic, or other devices meeting the wind sensor performance standard.

Wind Sensor Performance Standard				
Parameter	**Units**	**Accuracy**	**Range**	**Resolution**
Direction	degrees	±5 degrees when speed is ≥5 knots	1 to 360 degrees	10 degrees
Speed and Character	knots	±1 knot up to 10 knots ±10% above 10 knots	2 to 90 knots	1 knot
Wind Sensors used to support the aviation program will have the capability to generate a derivable 2 minute average wind speed and direction.				

Figure D-4. Wind Sensor Performance Standard.

6.9 Requirement for Backup Wind Measuring Sensors. No backup sensors are required for reporting winds. Backup wind direction and speed can be estimated. If backup sensors are used, they will meet the wind sensor performance standard.

6.10 Visibility Sensors. Visibility sensors are required at automated observing stations staffed or overseen by the NWS.

Visibility Sensor Performance Standard			
Visibility from Standard Visibility Sensor	**Percentage of Data Within or Exceeding Given Range**		
	At least 80% Within	**No more than 18% Exceed**	**No more than 2% Exceed**
0 through 1 1/4	±1/4	±1/2	±1
1 ½ through 1 3/4	+1/4, −1/2	+1/2, −3/4	±1
2 through 2 1/2	±1/2	±1	±1
3	+1/2, −1	±1	±1
4 through 10	±1 RV*	±2 RV*	±2 RV*
*RV = Reportable value, all other values in miles.			

Figure D-5. Visibility Sensor Performance Standard

6.11 Precipitation Gauges. The NWS standard for measuring precipitation is the 8 inch non-recording precipitation gauge. All NWS staffed locations will have one. At NWS staffed locations, the 8 inch gauge will be used as back-up for ASOS. Precipitation gauges are not required at SAWRS.

Precipitation Gauge Performance Standard			
Parameter	**Accuracy**	**Range**	**Resolution**
Liquid Precipitation Accumulated Amount	±0.02 inches or 4 percent of hourly amount (whichever is greater)	0-10"/Hour	0.01 inches
Snow Depth	0 to 5 inches- ±0.5 inches >5 to 99 inches - ±1.0 inch	0 to 99 inches (auto)	1 inch
Freezing Precipitation	Detection occurs whenever 0.01" accumulates	0 to 40 inches	0.01 inches
Frozen Precipitation (water equivalent)	±0.04 inches or 1% of total accumulation	0 to 40 inches	0.01 inches

Figure D-6. Precipitation Gauge Performance Standard.

6.12 Snow Shields. At NWS staffed locations wind shields will be used on any operational or backup precipitation gauge at stations reporting data for climatology where the average annual snowfall is ten inches or more.

7. Instrument Requirements for the NWS Synoptic Observing Program: Stations staffed or overseen by the NWS that provide synoptic observations will have, as a minimum, the following instruments adhering to the performance standards of the aviation observing program:

a. Temperature sensors capable of providing ambient air temperature, dew point and daily maximum and minimum temperatures.

b. An approved NWS pressure sensor,

c. a wind direction and speed system, and

d. an ASOS precipitation gauge, or a standard 8 inch precipitation gauge.

e. Other equipment can be added to the station as necessary to satisfy additional requirements.

8. Precision Digital Barometer Comparison Procedures. This Section provides procedures and the form for conducting barometer comparisons using the precision digital barometer. Table D-3 provides a summary of the following policies.

8.1 NWS Offices with an Upper Air Program. At the time of annual calibration, the NWS field office will receive a replacement PDB from OPS12 at NWS headquarters, and notification to return the current PDB. The point of contact for replacement of these instruments is OPS12 at 301-713-1834.

A verification of the PDB readings will be conducted at least once every 6 months with the NWS Digiquartz Paroscientific Inc., model 760-16B Traveling Standard.

a. The verification will be done by comparing the sensor pressure of the PDB with the Traveling Standard.

b. The PDB and Traveling Standard will be positioned within 1 foot of each other in the vertical and 3 feet in the horizontal during the verification. The procedure will consist of two verification readings taken no less than 15 minutes apart. For each reading, the uncorrected sensor pressure will be read to the closest 0.001 inch of mercury (Hg). The verification will be documented using WS Form 10-13-4 (figure D-7).

c. If both readings are within 0.007 inch of Hg when compared to the Traveling Standard, no further action is required.

d. If either of the readings of the PDB deviates more than 0.007 inch of Hg from the Traveling Standard discontinue use of both instruments and consult with the regional surface program manager and the Maintenance Branch to determine which of the instruments may be deficient.

8.2 NWS Offices without an Upper Air Program: The PDB will not be calibrated annually by the Pressure Standards Laboratory at these locations, but will be compared at least once every 6 months against the Traveling Standard.

a. The comparison will be done by comparing sensor pressure of the PDB with the Traveling Standard.

b. The PDB and the Traveling Standard will be within 1 foot of each other in the vertical and 3 feet in the horizontal during the comparison. The procedure will consist of two comparisons taken no less than 15 minutes apart. For each comparison, the uncorrected sensor pressure will be read to the closest 0.001 inch of Hg. The comparisons will be documented using WS Form 10-13-4 (8-05).

c. If both readings are within 0.02 inch of Hg when compared to the Traveling Standard, no further action is required.

d. If either of the readings of the PDB deviates more than 0.02 inch of Hg from the Traveling Standard, the PDB will be removed from service and returned to the NWS Pressure Standards Laboratory for recalibration.

e. Every 5 years the Maintenance Branch will inform each NWS field site of the 5-year recalibration through the delivery of a replacement PDB.

8.3 ASOS Backup. No correction will be applied to the PDB when used as the operational backup to ASOS. If for any reason the ASOS pressure data is not available, PDB readings for altimeter and sea level pressure will be read and used to backup those elements in the aviation and synoptic observation.

8.4 Notification Procedure. OPS12 will be notified immediately of any deficient instrument. A replacement PDB will be shipped via overnight delivery. OPS12 will maintain the computer storage disks containing station dependent data, including r-values. The data files from these disks will be entered into the PDB's memory by OPS12 prior to a new PDB being delivered to field locations. NWS field staff should verify station dependent data within the PDB's memory upon receipt of the PDB.

Table D-1. Summary Table.

Precision Digital Barometer Comparison Policy			
Program	**Function**	**Calibration**	**WFO Comparison Requirement**
NWS Offices with an Upper Air Program and No ASOS	Home Station Standard/ Operational Barometer	1) Initial calibration before deployment. 2) Annually after initial deployment. 3) Consultation with region and the Maintenance Branch if PDB deviates more than 0.007 inch from Traveling Standard.	A verification of the PDB readings will be conducted at least once every six months with the Traveling Standard.
NWS Offices with an Upper Air Program and Collocated with a commissioned ASOS	1) Home Station Standard/ Operational Barometer for Upper Air 2) Operational Backup to ASOS	1) Initial calibration before deployment. 2) Annually after initial deployment. 3) Consultation with region and the Maintenance Branch s more than 0.007 inch from Traveling Standard.	A verification of the PDB readings will be conducted at least once every six months with the Traveling Standard.
NWS Offices with an ASOS and no Upper Air Program	Operational Backup to ASOS	1) Initial calibration before deployment. 2) Recalibration every five years. 3) Recalibration required if PDB deviates more than 0.02 inch from Traveling Standard.	The PDB will be compared at least once every six months with the Traveling Standard.
NWS Offices with no Upper Air and no ASOS Programs	Home Station Standard/ Operational Barometer	1) Initial calibration before deployment. 2) Recalibration every five years. 3) Recalibration required if PDB deviates more than 0.02 inch from Traveling Standard.	The PDB will be compared at least once every six months with the Traveling Standard.

WS Form 10-13-4 (8-05) Ref: 10-1301	U.S. Department of Commerce National Oceanic and Atmospheric Administration National Weather Service	Station:		
Precision Digital Barometer (PDB) Comparison/Verification Form See detailed instructions for preparation of form on page 2)		Station Elevation:	PDB Elevation:	Field Elevation (If applicable):

Year/Quarter (1)	Traveling Standard Serial Number (2)	PDB Serial Number (3)	Readings from Traveling Standard (4)		Readings from PDB (5)		Differences from Traveling Standard (6)	
			1st reading (4a)	*2nd reading (4b)*	*1st reading* (5a)	*2nd reading (5b)*	*1st reading* (6a)	*2nd reading* (6b)

WS Form 10-13-4
(8-05)
Ref: 10-1301

Figure D-7. WS Form 10-13-4, PBD Comparison/Verification Form

Guide for Preparing Form

Headings: Enter Station name in plain language, e.g., WFO Green Bay, Wisconsin
Enter Location as Latitude/Longitude e.g., 44.29 North 88.08 West

Col. 1 - Enter the year and quarter the comparison is made. The required verifications/comparisons should be made during the first month of each alternating quarter. The format for Year/Quarter should be consistent, e.g. 99/1st.

Col. 2 - Enter the serial number for the Traveling Standard used to compare the PDB.

Col. 3 - Enter the serial number of the PDB being compared.

Col. 4a - Enter the first sensor pressure reading from the Traveling Standard to the closest 0.001 inch of Mercury (Hg), e.g., 30.014

Col. 4b - Enter the second sensor pressure reading (taken at least 15 minutes away from the 1st reading) from the Traveling Standard.

Col. 5a - Enter the first sensor pressure reading (taken at same time as reading in 4a) from the PDB to the closest 0.001 inch of Hg.

Col. 5b - Enter the second sensor pressure reading (taken at same time as reading in 4b) from the PDB to the closest 0.001 inch of Hg.

Col. 6a - Enter the difference between 4a and 5a to the closest 0.001 inch of Hg.

Col. 6b - Enter the difference between 4b and 5b to the closest 0.001 inch of Hg.

For the upper air locations: Notify the regional surface observing manager and W/OPS12 at NWSH if either 6a or 6b exceeds 0.007 inches of Hg.

For non-upper air locations: Notify the regional surface observing manager and W/OPS12 at NWSH if either 6a or 6b exceeds 0.02 inches of Hg.

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Figure D-8. Comparison/Verification Form (back side)