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***Operations and Services***
***Surface Observing Program (Land), NDSPD 10-13***

***Observational Quality Control - General***

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***SUMMARY OF REVISIONS:*** This directive supersedes Weather Service Operations Manual Chapter B-60, Observational Quality Control - General, Issuance 99-06, dated December 17, 1999

Signed by September 30, 2002
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Director, Office of Climate,
Water, and Weather Services

# Observational Quality Control - General

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1. Purpose. This instruction defines the role and responsibility of the National Weather Service (NWS) in performing the quality control (QC) of manual and automated observations.

2. General. Weather and hydrologic analyses and forecasts are dependent on the quality of observational data. The accuracy of climatological records is also dependent on the quality of observations. The observations must conform to standards to ensure high quality data. These demands can be met in part by a thorough and effective quality control program. Local observational data collected at the Weather Forecast Office (WFO) and River Forecast Center (RFC) are subjected to manual and automated QC routines. These data include, but are not limited to reports from the Automated Surface Observing System (ASOS), manual aviation observing stations, cooperative observing stations, local mesonet data providers, hydrological observation stations, marine reporting stations, upper air stations, and radar stations. These stations and systems employ a variety of sensor technologies, siting criteria, and observing practices. This diversity introduces variability in the quality, accuracy, timeliness, and precision of the data being

measured and reported. When these differences are excessive, they should be reconciled, and as appropriate, corrected in a timely fashion to the extent allowed by local resources.

The QC of manual and automated observations consists of two activities: preventive and corrective.

a. Preventive activities include setting observing standards, observer training, observer certification, station inspections, and internal QC of automated systems.

b. Corrective QC is accomplished through a three-tier system:

(1) real-time QC prior to transmission of the observation;

(2) near real-time QC monitoring and review activities within 1-2 hours after the observation is transmitted;

(3) national, regional, and local post real-time QC on selected observations performed centrally two or more hours after data transmission.

3. Responsibility and Organization. The following paragraphs outline the quality control responsibilities of Weather Service Headquarters, National Centers for Environmental Prediction (NCEP), Regional Headquarters Offices, WFOs, and RFCs.

3.1 National Weather Service Headquarters. The Office of Climate, Water, and Weather Services (OCWWS) provides national policy, procedures, and standards for QC of manual and automated observations. OCWWS coordinates QC of observations with other NWS offices and Federal, state, and local agencies. OCWWS develops and distributes observer training materials and coordinates administration of observer certification examinations. Within OCCWS, the Hydrologic Services Division evaluates requirements for hydrometeorological data QC received from the Hydrologic Services Divisions at Regional Headquarters and field offices. The Office of Hydrological Development supports QC procedures used in hydrologic operations at WFOs and RFCs.

3.2 National Centers for Environmental Prediction. The NCEP Central Operations (NCO) and other NCEP Centers in Washington maintain a near constant quality control operation under the supervision of the Data Management and Quality Assessment Branch supervisor. The NCEP senior duty meteorologist (SDM) is responsible for guaranteeing that accurate data reports are received in near real time and in sufficient quantity for use in analyses and numerical forecast models. The NCEP SDM is responsible for making the final decision on the quality of individual types of upper air data, including satellite and aircraft data, and generally supervises the quality control performed by other Centers on various types of surface land and sea data. Quality controlled data is additionally archived for model development and is also sent to the National Climatic Data Center (NCDC) for climatological and historical archiving. The monitoring and reviewing of observational data is accomplished by:

a. NCO upper air data decoders which check and correct data for format errors for both NCEP analyses and models, and for Advanced Weather Interactive Processing System (AWIPS) use.

b. automated quality control programs which weigh, correct and delete data.

c. manual quality control which can intervene and make the final decision on the quality of data by modifying or deleting the data or by countermanding automated quality control decisions.

d. weekly and monthly reports on individual upper air data sites concerning the quantity, quality and timeliness of data reported, and also on the flight performance of the radiosondes, are sent to the OCWWS and the Regional Headquarters for their use in the management and assessment of their observational quality control programs.

3.3 Regional Headquarters Offices. The Regional Headquarters are responsible for administering the observational QC program within their region in accordance with policies, procedures, and standards established by OCWWS. The Regional Headquarters' activities include conducting periodic inspection visits to WFOs; resolving regional QC issues; administering the observer certification program; and serving as Contracting Officer Technical Representative for NWS weather observing contracts.

3.4 Weather Forecast Office (WFO). The meteorologist in charge (MIC) is responsible for execution of the QC program for observations within the designated county warning area (CWA) and hydrologic service area (HSA) of the WFO. The authority to carry out this responsibility may be delegated to the data acquisition program manager (DAPM) or other personnel designated by the MIC. Duties associated with the QC program include, but are not limited to:

a. monitoring and reviewing observations.

b. taking corrective action as appropriate.

c. station inspection visitations.

d. observer training as local resources permit.

e. administering observer certification examinations.

3.5 River Forecast Center. When appropriate, the RFCs should participate in the coordination of NWS observational network-related issues, including the design, development, and maintenance of these networks. RFCs rely on hydrometeorological data from networks operated by the NWS and other agencies such as the U.S. Geological Survey, U.S. Army Corps of Engineers, and local cooperators. Data from these networks are simultaneously received at RFCs and WFOs through real-time distribution mechanisms. While WFOs have responsibility for QC of data from both the

NWS cooperative network and other hydrometeorological networks, RFCs also perform quality control of data used in their hydrologic modeling and forecast operations.

4. Overall Quality Control Program. The quality of observational data is maintained through observer training and certification, station visitation, observation monitoring and review, program oversight and coordination. With expanding volume of data available at NWS offices from automated sensor networks, sophisticated automated QC routines are increasingly essential for ensuring the integrity of the data provided to the user community.

4.1 Observer Training and Certification. Observer training programs must ensure minimum proficiency standards for providing complete, accurate, and timely observations. The NWS, Federal Aviation Administration, and Department of Defense (DOD) conduct Federal observer training programs, that may include formal classroom and on-site training. The NWS is responsible for all civilian weather observer certification, with the exception of DOD sponsored sites. Supplementary Aviation Weather Reporting Station personnel training is provided through the private sector.

4.2 Station Visitations. The responsibility for administering the station visitation program is shared between the Regional Headquarters and MIC. Detailed information on the station visitation program is contained in NWSI 10-1303 and regional Supplements to the NWS directives system (NDS). QC personnel performing station visitations and inspections will be knowledgeable of the program they are reviewing.

4.3 Observation Monitoring and Review. The MIC will ensure WFO personnel assigned QC activities monitor and review observational data from all stations within the CWA and HSA.

a. Monitoring includes examining observations and noting problems. Monitoring also includes taking corrective actions (near real time).

b. Review includes checking weather records to ensure completeness, correctness, and consistency of transmitted reports. Review also involves responding in a timely and effective manner to QC reports and summary statistics (post real time).

4.4 Program Oversight and Coordination.

4.4.1 National Weather Service Headquarters. The OCWWS, through NDS policy and procedure directives, provides national guidance, direction, and oversight for QC of manual and automated observations. The OCWWS coordinates with headquarters of other agencies on various QC issues such as observing policy, procedures, monitoring and review, training, and user education.

4.4.2 National Centers for Environmental Prediction. NCEP has a World Meteorological Organization (WMO) obligation to produce standard monthly reports concerning the quantity and quality of many types of data as well as producing standard measures of NCEP model forecast

skill. In addition, NCEP produces additional reports on data problems as necessary. Besides these reports, NCEP receives similar reports from other international meteorological centers. As a result of this exchange of information with other centers, problem sites can be placed on a reject list, if needed, until the problem is corrected. Meanwhile, problem sites are contacted, missing data problems are resolved and modelers can be notified of significant changes in forecast skill.

4.4.3 Regional Headquarters Offices. The Regional Headquarters implement OCWWS policy and provide regional guidance, direction, and oversight to the field office. They issue and maintain NDS Supplements on various QC issues and assist the field in interpreting and clarifying national guidance and directives.

4.4.4 Weather Forecast Office. The WFO provides oversight for meteorological and hydrologic QC operations, ensures observations are representative of surrounding locations, and coordinates with other Federal, state, and local agencies and private sector entities to resolve QC problems.

4.4.5 River Forecast Center. The RFC provides oversight for meteorological and hydrologic QC operations for input into hydrologic models and coordinates with the WFOs to resolve problems.

5. Forms and Reports - General. Station inspection forms and reports, observer certification examination summaries (for applicable programs), and periodic QC reports and assessments are essential to gauge the health of the observing program. They provide a statistical foundation to assess performance, isolate deficiencies and identify remedies. Station inspection forms and other reports should be objective, factual, and complete. Specific details for what must be contained in these forms and other reports are described in NDS policy and procedures directives and Regional Supplements.