

NATIONAL WEATHER SERVICE INSTRUCTION 10-941

JULY 26, 2019

**Operations and Services
Hydrological Services Program, NWSPD 10-9**

FLOOD WARNING SYSTEMS

NOTICE: This publication is available at: <http://www.nws.noaa.gov/directives/>

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SUMMARY OF REVISIONS: This directive supersedes NWS Instruction 10-941, *Flood Warning Systems*, dated April 5, 2017. Two changes have been made to this directive.

1. The last sentence in Section 1, Page 2 has been deleted.
2. The first sentence in Section 3 of Appendix A has had “his” changed to “his/her”.

Signed

7/12/2019

Andrew Stern

Date

Director

Analyze, Forecast & Support Office

Flood Warning Systems

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1. Introduction. This chapter provides instructions for cooperation between the National Oceanic and Atmospheric Administration’s National Weather Service (NWS) and owner-operators of flood warning systems (FWS). FWS support NWS field office operations by providing near real-time hydrometeorological data that would otherwise be unavailable. Owner-operated FWS types include (1) Automated Local Evaluation in Real-Time (ALERT) systems; (2) Integrated Flood Observing and Warning System (IFLOWS); and (3) networks using non-ALERT, non-IFLOWS technology.

2. NWS Flood Warning System Interface. If a FWS owner-operator wants to use Federal government radio frequencies, then data products from the FWS will be compatible with a NWS-supported data ingest interface. If there is a written agreement between the NWS and the FWS owner-operator, the signatory for the NWS will ensure the interfaces between the FWS and the NWS Advanced Weather Interactive Processing System (AWIPS) are in accordance with NWS computer security and change management policies. The signatory for the NWS will ensure the hydrometeorological data products from the operator’s FWS are:

- a. Supporting the NWS's hydrologic and meteorological forecast operations for the cooperator's area; and
- b. Arriving at NWS frequently enough to support routine forecast and warning operations, monitor critical hydrometeorological events, and support radar-based precipitation processing.

3. Radio Frequency Authorizations. NWS policy is to hold radio transmitter licenses only for units that it owns, operates, and maintains. NWS no longer will apply for new licenses on behalf of FWS owners.

4. Memorandum of Agreement (MOA). A MOA should be established by the local forecast office, with concurrence from the regional headquarters, to set forth the responsibilities of the NWS and the FWS cooperator. The MOA should:
 - a. Clearly define the responsibilities of the NWS and cooperators for design, installation, implementation, operation, data archive and maintenance of the FWS; and
 - b. Provide for appropriate levels of coordination during floods.

Appendices A and B of this document contain more detailed information about a MOA and the process for generating one. An annual review should be conducted by the local Weather Forecast (WFO) with the FWS operator to ensure all parties clearly understand their responsibilities as outlined in the MOA.

5. Technical Assistance. In working with FWS cooperators, NWS WFO personnel may:
 - a. Designate a primary NWS contact point (focal point), and at least one back-up contact point at the local NWS forecast office, for routine coordination; concerning FWS training, maintenance, operations, and related issues. If the primary/backup focal points are unavailable during flooding, the Meteorologist- In-Charge or his/her designee will act as the FWS cooperator point of contact;
 - b. Advise on site specific gage locations;
 - c. Provide specific information about NWS communications interfaces that will allow the FWS cooperator to provide data to AWIPS successfully;
 - d. Provide a letter of support for FCC applications;
 - i. The FWS cooperator may ask the local office for a letter of support. This letter of support is needed by the FWS cooperator, who is a non-Federal entity, to ask permission of the FCC to use a Federal Hydrologic frequency;
 - ii. The local office will decide if it writes a letter of support for the FWS cooperator;
 1. If the office determines there is a benefit to the data, it is empowered to write this letter; or,
 2. If the office determines there is no benefit to the NWS, the office can decline to write this letter;
 - iii. The FWS cooperator is free to seek another Federal partner to write this letter of support, or to seek the use of another frequency;
 - iv. The following URL provides information about the process for a FWS operator to obtain a Federal Communications Commission (FCC) license for a Federal Hydrologic frequency:
<http://water.weather.gov/afws/workshop.php>;
 - e. Provide information on flood forecasts and warnings;

- f. Assist the FWS cooperator in determining ways to obtain or access NWS products;
- g. Develop local forecasting procedures in conjunction with the appropriate NOAA/NWS River Forecast Center;
- h. Distribute warning information; and
- i. Conduct outreach with the FWS cooperator's flash flood coordinators and local authorities, including network observers. The scope of outreach may include:
 - i. The NOAA/NWS flood/flash flood warning program;
 - ii. Local flood warning programs;
 - iii. Need for emergency response planning;
 - iv. How to establish and maintain observer networks; or,
 - v. Periodic drills to test the system.

Appendix A: Memorandum of Agreement

1. Uses for an Agreement

An agreement, also termed a Memorandum of Agreement (MOA), Interagency Agreement (IAA) or Memorandum of Understanding (MOU), is used to specify the terms under which the NWS engages in collaborative undertakings in which the parties have a mutual interest. NWS recommends the use of written agreements to clearly establish each party's FWS responsibilities. Such agreements are "good-faith" efforts to adhere to mutually beneficial conditions. Aside from obvious areas of agreement, the MOA should also include language that tries to anticipate and address worst-case situations, such as when one party fails to fulfill its obligations, or wishes to withdraw or amend terms. The MOA should be periodically reviewed to assure that it is current. In most cases, a well-run FWS with active participants will seldom refer to the MOA. Experience shows, however, that the MOA becomes very important as time passes. Participating parties' policies and personnel will inevitably change. The MOA serves as a reminder to all participants of the institutional obligations made by their predecessors, and the periodic reviews of the MOA enable all parties to continually reassess their commitments and communicate them to others.

The NOAA Office of General Counsel has determined that FWS agreements are most appropriately classified as Joint Project Agreements, as defined in 31 USC Section 1525. The stipulations of a Joint Project Agreement are:

- Any non-profit, research or any public organization, including other federal organizations may participate
- Projects focus on matters of mutual interest to all participating parties
- Projects could not be done as effectively without the participation of all parties
- Project is essential to the Department of Commerce and NOAA missions

2. Critical Agreement Requirements

All agreements will include the following elements, terms and conditions, as appropriate:

- Project Title
- Citation of Agreement, Program, and Legal Authority
- Identity of All Parties
- Purpose and Scope
- Responsibilities of Each Party
- Data Access – The NWS desires to have full and unrestricted access to the data. Please see NWS Directive (NDS)1-1201 *Obtaining Environmental Data from External Parties* (<http://www.nws.noaa.gov/directives/sym/pd00112001curr.pdf>) for further details regarding terms and conditions that may apply if full and unrestricted access to the data cannot be granted.
- Period of Performance
- Resource Requirements
- Non-monetary Resources (if applicable)
- Channels and Protocols for working relationships and liaisons

- Guidelines for Release of Technical and Public Information regarding the project, including rights for data access and use
- Method for Dispute Settlement
- Termination/Cancellation Clause
- Performance Standards and Review Procedures
- Approving Signatures and Clearances

These points have been encapsulated in a generic MOA (Appendix B) that is available for use by NWS offices working with FWS owner-operators. More information about data sharing agreements can be found at the NWS Chief Information Officer best practices Google site at https://sites.google.com/a/noaa.gov/nws-best-practices/nws-hq/cio/data_agreements.

3. Signatories

The decision of who may be a signatory is left to the NWS Assistant Administrator or his/her delegated representative. The cooperator's FWS signatory may be anyone with sufficient authority to act on behalf of his/her agency in matters of this type. Such authority is likely to vary widely among cooperators. Because the operation of a FWS is likely to require a commitment of local resources, it may be beneficial (though not required) to obtain an MOA signed by a mayor, county commissioner, or other local official with authority to appropriate resources for the FWS.

Appendix B: General Memorandum of Agreement Template



MEMORANDUM OF AGREEMENT
ESTABLISHING A JOINT PROJECT
FOR AUTOMATED WATER LEVEL AND RAIN GAGING SYSTEM
BETWEEN THE
NATIONAL WEATHER SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE
AND

_____ Agreement No. XX-XX-XX-XXX

I. PARTIES

This document constitutes an Agreement between the National Weather Service (NWS) of the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce, and _____, for the installation, operation, maintenance, and transfer of data from sensing equipment installed across the county.

II. LEGAL AUTHORITIES

The NWS has authority to participate in this data collection project with _____ under:

1. 15 U.S.C. § 313 et seq., which provides that the National Weather Service, under the direction of the Secretary of Commerce, shall have charge of the forecasting of weather, the issue of storm warnings, the display of weather and flood signals for the benefit of agriculture, commerce, and navigation...the distribution of meteorological observations as may be necessary to establish and record the climatic conditions of the United States, or as are essential for the proper execution of the foregoing duties; and

2. 15 U.S.C. § 1525, the Department of Commerce's Joint Project authority, which provides that the Department may enter into joint projects with nonprofit, research, or public organizations on matters of mutual interest, the cost of which is equitably apportioned.

III. PURPOSE

The purpose of this agreement is to establish and outline the respective responsibilities of each Party in developing and implementing a program for the installation and operation of an Automated Flood Warning System of x number of water level monitoring gages and y number of precipitation gages across part of a certain area for the purpose of providing advance warning of flooding.

This project is necessary and essential to further the mission of the NWS in that it will improve flood forecasts in a flood prone area, as well as providing additional observations to improve spatially estimated precipitation.

The NWS has determined that this project cannot be done as effectively without the participation of _____, because _____ will purchase the equipment used to monitor the designated area. _____

IV. BACKGROUND [optional]

There are several rivers that flow through the County, and flooding is a frequent occurrence. To assist in monitoring the flood potential, _____ has purchased and installed automated warning system river and rain gages in areas upstream of the more major communities. These gages are located to provide maximum advanced warning to possible flooding for downstream communities.

NWS personnel need reliable real-time data in order to make timely flood forecasts and warnings. Data from this network of gages will greatly enhance NWS's ability to fulfill the mission of the Department.

V. MUTUAL INTEREST OF THE PARTIES

This activity is of mutual interest to both of the parties because automated gauging:

- Allows for remote sensing of hydrologic data, thereby increasing awareness of _____ to potential flooding problems.
- Allows _____ to make better and faster decisions in the protection of people, property, and infrastructure.
- Saves time and resources in the monitoring of water levels across this area.
- Allows the National Weather Service to better monitor rainfall amounts and water levels for the possibility of flooding, thereby allowing for timelier and more accurate forecasts and warnings for the protection of life and property.

VI. RESPONSIBILITIES OF THE PARTIES

The respective responsibilities for each party are identified below as follows:

A. *NWS will:*

1. Provide a means for data transfer from _____ to NWS systems via appropriate electronic data storage and transfer at (*specify location(s)*).
2. Monitor the data from the gage network and notify _____ of any gage malfunctions.
3. Utilize data from the automated gage equipment and provide hydrometeorological forecast and warning service for the area served by the equipment as appropriate.
4. Provide or redistribute this data to other public entities as necessary to inform them of hydrometeorological conditions via NWS products and services in an open and unrestricted manner.

B. _____ *will:*

1. Purchase, install and maintain all components of the gage network, including all rain gages and water level gages and associated hardware.
2. Assume ownership of the equipment and responsibility for costs of replacement components in case of failure, for the economically feasible lifetime of the equipment to be determined by _____.
3. Maintain all structural elements of the system. Title to any equipment purchased under this Agreement shall remain vested with the purchaser of that equipment, which is _____.
4. Permit the NWS to disclose or redistribute data provided by the gage network in whole or in part in an open and unrestricted manner.
5. Conduct calibration tests of equipment on a routine basis.
6. Evaluate and establish datum levels, and water level thresholds at which Watches, Advisories, or Warnings may be required.

VII. EQUITABLE APPORTIONMENT OF COSTS

No transfer of financial resources will occur under this Agreement. The costs of this activity are equitably apportioned; The NWS's estimated costs for this project over the next 5 years are x dollars. _____'s estimated costs for this project over the next 5 years are y dollars. Details can be found in Attachment A.

In the event that either party to this Agreement anticipates funding limitations that would result in the failure to meet all or any portion of their responsibilities, the responsible party will promptly notify the appropriate contact person for this Agreement. Pursuant to each Party's in-kind contributions, all costs incurred by the Parties under this Agreement shall be equitably apportioned among the Parties, with each Party bearing its own costs of performance under this Agreement.

Due to the nature of this agreement and the mutual benefit provided to both Parties, completion of each Party's responsibilities under this Agreement is subject to the availability of appropriated funds. Each Party will be responsible for obtaining its own funding for the activities agreed upon by the Parties. If adequate appropriations are not forthcoming, the Parties may terminate this Agreement upon mutual written consent.

VIII. CONTACTS

The contact persons of each party to this agreement are:

For NWS:

Name:
Title:
Address:
Telephone: Fax: Email:

Name:
Title:
Address:
Telephone: Fax: Email:

For Cooperator:

Name:
Title:
Address:
Telephone: Fax: Email:

Name:
Title:
Address:
Telephone: Fax: Email:

IX. PERIOD OF AGREEMENT AND MODIFICATION/ TERMINATION

Duration: This agreement will become effective when signed by all parties, and will be effective for a period of five years. The parties will review the agreement annually to determine whether it should be renewed or canceled.

Termination: Any Party may terminate this agreement by providing 60 days written notice to the other party. In the event this agreement is terminated, each party shall be solely responsible for the payment of any expenses it has incurred.

Amendments: On a quarterly basis, both parties may reassess, study needs, funding availability, and public benefit from this agreement. The Agreement may be amended at any time by mutual written consent of the Parties.

X. OTHER PROVISIONS

Should disagreement arise on the interpretation of the provisions of this agreement, or amendments and/or revisions thereto, that cannot be resolved at the operating level, the area(s) of disagreement shall be stated in writing by each party and presented to the other party for consideration. If agreement on interpretation is not reached within thirty days, the parties shall forward the written presentation of the disagreement to respective higher officials for appropriate resolution.

Under the Inspector General Act of 1978, as amended, 5 USC App. 3, a review of this agreement may be conducted at any time. The Inspector General of the Department of Commerce, or any of his or her duly authorized representatives, shall have access to any pertinent books, documents, papers and records of the parties to this agreement, whether written, printed, recorded, produced, or reproduced by any mechanical, magnetic or other process or medium, in order to make audits, inspections, excerpts, transcripts, or other examinations as authorized by law.

[Include if partner is another Federal Agency] Nothing herein is intended to conflict with current NWS or _____ directives. If the terms of this agreement are inconsistent with existing directives of either of the parties entering into this agreement, then those portions of this agreement which are determined to be inconsistent shall be invalid, but the remaining terms and conditions not affected by the inconsistency shall remain in full force and effect. At the first opportunity for review of the agreement, all necessary changes will be accomplished either by an amendment to this agreement or by entering into a new agreement, whichever is deemed expedient to the interest of both parties.

IN WITNESS THEREOF, the Parties have duly acknowledged the aforementioned representations and executed this interagency agreement.

AGREED TO AND BY:

Cooperator

Name, Title
Address
Address

Date _____

NWS

Name, Title
Address
Address

Date _____

Attachment A to Memorandum of Agreement

In-Kind Contributions From Each Party for a Five Year Term of Agreement

_____ : Will be responsible for carrying out the duties as described in Section VI.B. This includes the initial purchase and installation of the gages and future maintenance and calibration of the gages. _____'s initial cost for the gages will be x dollars and annual costs for maintenance will be approximately y dollars per year totaling z dollars over five years.

NWS: Will be responsible for carrying out the duties as described in Section VI.A. This includes labor costs for the initial set up for data monitoring and transfer as well, labor estimates for future data quality control, and forecast and warning service totaling z dollars as follows:

Communications - 8 hours (4hrs x 2 GS-13s)	u dollars
Database - 15 hours (GS-12)	v dollars
Data QC - approx 50 hours (GS-12) for 5 years	w dollars
Forecasts - approx 40 hours (GS-11) for 5 years	<u>x dollars</u>
TOTAL =====>	y dollars
Add 29.22% for benefits =====>	z dollars