



Flood Plan 2016

Arkansas Water Science Center, Little Rock, Arkansas

INTRODUCTION

The southern Midwestern United States has been recognized as a hotspot for flooding, given its proximity to the Gulf of Mexico (O'Connor and Costa, 2003). The state of Arkansas is particularly prone to extreme flooding because of the steep, rugged nature of the topography of the Ouachita Mountains and the Ozark Plateaus and the nearly flat nature of the topography of the Mississippi River delta. The purpose of this plan is to establish a set of guidelines to be followed by Arkansas Water Science Center (WSC) Field Services Unit personnel in the collection of streamflow and water quality data during flood events. During floods, a special urgency exists because good time management is critical to obtaining discharge measurements, water quality samples, and high water marks where they are needed. Rigid rules cannot be established for flood situations because no two floods or the same or cover the same geographic

area; however, these guidelines will provide a framework within which the WSC can operate flexibly in a flood situation.

The plan includes information to assist field and office personnel in planning for a flood, determining where discharge measurements are needed during a flood, and in communicating flood information to interested agencies or individuals as rapidly as possible.

RESPONSIBILITIES AND DUTIES

The Lower Mississippi Gulf WSC's Field Services Unit personnel in the Little Rock and the Fayetteville offices are responsible for the planning and execution of data-collection activities during high-water or flood events. In the case of localized or routine high-water events, data collection activities are carried out by the office and individuals assigned to field sites in the area where the high-water or flood event is occurring.

Based upon data from the state's network of USGS streamflow gaging stations and precipitation gages, Go2 and GoPlot outputs, the USGS WaterWatch website, Doppler radar images from NOAA's website and/or local TV stations, and reports from the National Weather Service, U.S. Army Corps of Engineers, field personnel, civilians, and other sources, the Flood Coordinator or the Assistant Flood Coordinator will decide when a flood condition or a potential flood condition exists that requires close operational control at the WSC level.

When major flooding occurs, the Flood Coordinator is responsible for activating the Flood Plan, checking with field personnel regarding their availability, and for the control and coordination of work assignments. In the absence of the WSC Flood Coordinator, the Assistant Flood Coordinator will act in his/her place. The Flood Coordinator is responsible for keeping the WSC Director informed of all flood-related activities.

Stage-discharge ratings for Daily- and Partial-record streamflow gaging stations are auto-analyzed daily at 05:00 and again at 12:00 by the computer programs Go2 and GoPlot. All Field Services Unit personnel are automatically emailed the Go2 and GoPlot outputs for their assigned field sites and routinely use them to decide which gaging stations are in need of discharge measurements and to ensure that discharge measurements are made at sites with incomplete ratings. Sites in need of high-stage discharge measurements to define their ratings usually take higher priority over other sites during flood situations. Also, because of the difficulties involved in reaching watersheds with small drainage areas in time to make peak discharge measurements, it is sometimes necessary to position crews near these watersheds in anticipation of high-water or flooding conditions.

Field Personnel

While on scheduled field trips, field personnel are responsible for keeping themselves informed of possible flooding in the State and especially in their assigned field area by listening to newscasts, weather summaries, and forecasts. If a report of flooding in their field area is heard, the field person should notify their supervisor and the WSC Flood Coordinator and proceed as directed.

Field personnel should exercise sound judgment on priorities while in the field and should not drive past a station that is flooding, unless instructed otherwise, when only an assumption of flooding at a station farther away is available. During extreme floods, stage and discharge data should be obtained at discontinued stations if the record collected at such a station

was reasonably long. Field personnel should keep themselves informed of the locations of discontinued sites in their field area and consult the Flood Coordinator about the necessity of a visit to a discontinued site.

Photographs, preferably digital versions, should be obtained of flooding, high water marks, and of any unusual occurrences in the vicinity of gaging stations during the flood event. Pictures of unusual flow conditions and/or damage to gaging and highway structures are valuable aids during post-flood operations and analysis of surface-water records. Photographs should be supplemented by adequate field notes and sketches to insure proper identification at a later date.

It is important that WSC personnel working in the field and personnel working at the Fayetteville Field Office evaluate potential flood conditions quickly and objectively relay their evaluations by telephone call, text message, email, or instant message to the Flood Coordinator.

The following are required of field personnel:

1. Ensure that your equipment is ready for emergency flood measurements at all times.
2. During weekends and holidays when weather conditions indicate a possibility of flooding, keep your supervisor informed on how and where you may be reached.
3. While on flood trips, communicate with the Flood Coordinator a minimum of two times daily to inform them of your findings and to coordinate your next move.
4. Flag high-water marks, if possible, at all stations visited during or after a flood peak.
5. Report unusual flow phenomena observed in the field, such as flood waves, drift jams, and sand waves. Notes written on 9-275 field forms or recorded in SWAMI files are acceptable.
6. If possible, take pictures of unusual flow phenomena, high water marks, and any other unusual conditions such as damage to gage structures, bridges, roads, and controls.
7. Obtain local newspapers with flood stories, as they are valuable in preparing a flood report.

Water Quality

The Arkansas Water Science Center conducts an extensive water quality storm sampling program state-wide.

The water-quality network flood coordinator and flood coordinator work together during events to ensure that samples are collected in the most representative manner possible (i.e., EWI, EDI,

grab, etc), discharge measurements are made at sites that require them, holding times are met (esp. for autosampler sites) and that all cooperators' event requirements are met.

Fayetteville Office

The Fayetteville office is located in the northwestern part of Arkansas near the Beaver Lake (White River) and Illinois River watersheds. Streamflow and water quality in both watersheds are monitored extensively by USGS. The office conducts a storm-sampling program that includes a total of 13 sites.

In cooperation with Beaver Water District, integrated samples are collected four times annually at four major tributaries to Beaver Lake: White River, Richland Creek, War Eagle Creek, and the West Fork of the White River.

In cooperation with Ozark Water Watch (formerly the Upper White River Foundation), four storm-event samples are collected annually on two tributaries of Table Rock Lake, Kings River and Long Creek.

In cooperation with the City of Springdale, two storm-event samples are collected annually at each of four sites on Spring Creek, two sites on upper Clear Creek upstream of Lake Fayetteville, and one site on Brush Creek upstream of Lake Elmdale. A discharge measurement is made at each site when the water sample is collected. At the time of this writing, the City of Springdale was considering altering the storm sampling program for the 2012 calendar year to focus on two rise, peak, and fall samples at each of two sites on Spring Creek, but the contract has not yet been written or signed.

The above-mentioned water quality sampling programs are the Fayetteville Field Office's main focus during storm events. When major flooding occurs, the focus shifts to sites experiencing the flooding, with emphasis on sites maintained in cooperation with Beaver Water District, the Buffalo National River, and the U.S. Army Corps of Engineers.

National Weather Service issues river forecasts for one site managed by the Fayetteville office: site 07050500, Kings River near Berryville. The stage-discharge rating is well-defined throughout the range of stage with 618 measurements to date, but special attention should be given paid to the site during flood events in case of equipment malfunction or failure.

If flooding occurs in other parts of the state but not in northwestern Arkansas, field office staff can be dispatched to parts of the State where personnel are needed. The Supervisory Technician working in the Fayetteville office is responsible for the control and coordination of work assignments for field office personnel during routine storm-event water-quality sampling and discharge measurements in the northwestern portion of the State, and for communicating with the Field Services Unit Chief and the Flood Coordinator about field office activities during routine high-water and major flood events.

FLOOD PERSONNEL

WSC Field Services Unit personnel, their contact information, assigned vehicles, and their areas of assignment are listed in Tables 1 (Little Rock Office) and 2 (Fayetteville Office), located at the end of this document. Contact information for USGS Central Region personnel and Arkansas WSC IT support personnel are listed in Table 3. Contact information for other agencies is listed in Table 4.

Appendix E provides a set of tables listing streamflow gaging stations by area of

assignment. Maps of all field sites in the State are obtained through the Station Information Management System (SIMS). The procedure for obtaining these maps is listed at the beginning of Appendix E.

Flood Coordinators

- WSC Flood Coordinator Data Chief, W.E. Baldwin
- Assistant Flood Coordinator Field Operation Chief, J. Gillip
- Water-Quality Network Field Operations Chief, A.D. Lasker

PRE-FLOOD PLANNING

Extreme rain events can happen during any month of the year in Arkansas; however, most of the annual precipitation occurs during the months of February-June. Extreme rain events are also becoming fairly common during hurricane season (August-October). During the above-mentioned times of year, Field Services Unit personnel should pay particularly close attention to long-range weather forecasts, climate outlooks issued by the National Weather Service, and regional streamflow conditions on the USGS WaterWatch website. Equipment and field vehicles should be serviced and ready for a flood event at all times.

Flood personnel should familiarize themselves with Water Mission Area Policy Memorandum No. 2011.01, Policy and Guidelines for Response, Documentation, and Reporting of Flood Events, issued April 21, 2011. The full document is included in this flood plan in Appendix F.

Flood Coordinator

1. Update the WSC’s Flood Plan yearly.
2. Be alert to flood potentials by obtaining weather and stream information from:
 - a. Radio and television reports
 - b. National Weather Service reports (by telephone, internet, email, or other communication)
 - c. U.S. Army Corps of Engineers Reservoir Regulation reports
 - d. Reports from field personnel or civilian observers
 - e. USGS streamflow gaging stations
 - f. USGS WaterWatch website
3. Arrange a flood-stage reporting service with observers at stations where information is not available by other methods or where equipment has failed.
4. Arrange field schedules to keep personnel in flooded and flood-prone areas as needed. Refer to the Station Information Management System (SIMS) for maps of assigned field areas and locations of sites within those field areas.

5. Prepare the WSC office for flood coordination. The WSC has a glass-topped rainfall-plotting map showing locations of surface-water and rainfall reporting stations, a flood planning file, necessary flood reporting forms, and communications information.
6. Refer to Go2 and GoPlots to determine which gaging stations need measurements, the ranges of stage that measurements are needed at, and that ratings are properly maintained.
7. Inform all field personnel of the WSC overtime policy during flood operations.
8. Arrange liaison between the WSC and other WSCs and agencies as necessary.

The Flood Coordinator will inform the WSC Director of aerial photo needs and areas to be covered. Contracting will then be arranged at the WSC level as outlined in WRD Memorandum 90.22 (Appendix C)

Aerial photographs of major floods should be obtained, if possible, from professional companies or agencies. The following company may be contacted to perform this type of work:

Harris Aerial Surveys
Spring Branch Road
Mountain Home, Arkansas 72653 Phone: 501-481-5151

Field Personnel

Each regularly assigned field person should keep themselves up to date on what flood measurements are needed at each site in their area, and of the locations of discontinued sites in their area. Field folders and station descriptions for discontinued sites in the field person's area should be carried along with those for current sites in case a flood measurement is necessary at such a site.

It is the responsibility of all field personnel to check their stream gaging equipment regularly and make necessary repairs as needed to ensure maximum performance during field operation. A complete set of stream gaging equipment and tools is maintained by each field person with an assigned vehicle. Equipment for emergency use is stored in the WSC and Field Office warehouses.

Appendix D lists the minimum equipment that should be carried in each vehicle regularly assigned for stream gaging. Some items listed are flood-specific. Other resources that may be necessary or helpful for executing streamflow measurements during floods are:

1. A copy of the WSC Flood Plan.

2. A copy of the latest water data report for gaging stations at which measurements are planned (The “extremes for current year” statements may be helpful)
3. Station descriptions for the regular and discontinued stations at which measurements are planned.
4. TWRI, Book 3, Chapter A8: "Discharge Measurements at Gaging Stations.”
5. TWRI, Book 3, Section A, Chapter 22: “Measuring Discharge with Acoustic Doppler Current Profilers from a Moving Boat.”
6. Arkansas Water Science Center Acoustic Discharge Measurement Quality-Assurance Plan

Acoustic Doppler Current Profilers will be checked out by each field person with an assigned vehicle prior to leaving the office for their scheduled field trip or for flood duty. ADCP users should refer to the WSC’s Acoustic Discharge Measurement Quality Assurance Plan for guidance on proper techniques and procedures for executing acoustic discharge measurements in normal and extreme conditions. For guidance on proper maintenance and use of current meters, ADCPs, and for guidance on field procedures for executing discharge measurements, technicians should refer to: Rantz and others, 1982 and Turnipseed and Sauer, 2010.

COMMUNICATIONS DURING FLOODS

Internal

During a flood, each field party should report by telephone, text message, email, or instant message often to the Flood Coordinator or Assistant Flood Coordinator. Timely communications are vital during flood activities and contact must be made with the Flood Coordinator a minimum of two times a day. Personnel should be prepared to transmit the following information for each gaging station visited:

1. Measured gage height and discharge
2. Time of measurement or observation
3. Percent difference of measured discharge from rated discharge and indicated shift
4. Stage trend-rising/falling/steady
5. Peak gage height, if peak has occurred
6. Weather and road conditions

7. Condition of station and damages, if any

External

WSC, Regional, and Headquarters offices of the Geological Survey are often called upon to furnish information on floods to other agencies, the press, and to members of Congress. It is the duty of the WSC Flood Coordinator or his assistant to alert the WSC Director, who will then alert the Regional and Washington offices to the occurrence, or possibility of occurrence, of flooding in the state of Arkansas.

Contact information for USGS Regional personnel is listed in Table 3; contact information for other agencies is listed in Table 4. Both tables are located at the end of this document. Project Alert is further discussed in WRD Memorandums 90.22 (Appendix A) and 97.08 (Appendix B).

Flood Warning Sites

National Weather Service River Forecast Sites

GUIDANCE FOR FIELD AND OFFICE PROCEDURES

Standard USGS protocols and guidelines pertaining to proper techniques and methods used in measuring streamflow and sampling water quality are to be followed by field personnel at all times during flood events (Rantz and others, 1982; Sauer and Turnipseed, 2010; Turnipseed and Sauer, 2010; Dalrymple and Benson, 1967; USGS, variously dated).

For the 2012 Water Year, special attention should be paid to recent Office of Surface Water technical memorandums pertaining to hydroacoustics measurements, notably OSW Technical Memo 2011.04, Policy on the Use of HydroAcoustics Software and Firmware and OSW Technical Memo 2011.08, Exposure time for ADCP moving-boat discharge measurements made during steady flow conditions.

Flood frequency at gaged sites is computed using a log-Pearson Type III regression using annual peaks for a given station and following Bulletin 17B guidelines (Interagency Advisory Committee on Water Data, 1982). Flood frequency at ungaged sites is computed using a regional regression model for the appropriate region (Hodge and Tasker, 1995), weighted with station discharge where possible. Consideration should be given to recent OSW Technical Memorandums 2011.03, Technical Resources for Regionalization Studies and 2011.06, Regional Streamflow Analyses.

POST-FLOOD OPERATIONS

Additional data requirements may become apparent as a flood scenario develops. Typical follow-up operations may include:

1. Emergency repair of stations damaged during flooding. This can involve temporary shelters and equipment, or assigning an observer during station down time.
2. Follow-up measurements must be made to confirm rating shifts related to changes in the control resulting from scour or fill during flooding.

Station re-visits are crucial to verification of proper gage operation following flood events.

3. If necessary, an indirect measurement program must be organized and implemented. The need for indirect measurements and their priority will be coordinated by the Data Chief.
5. Flood profiles should be marked and surveyed following extreme events. The need and priority for flood profiles will be determined by the WSC's Flood Specialist.
6. Employees should be provided adequate post-flood office time to process ADCP measurements, update stage-discharge ratings, and to update surface water and water quality records for sites measured or sampled during the event.

SAFETY

It is the responsibility of all supervisors to see that prescribed safety precautions and instructions are followed, and it is the responsibility of each employee to insure his/her own safety and that of fellow employees at all times. A streamflow measurement is not worth a human life and common sense must be used where danger may be involved. For a good discussion of safety practices, field personnel may refer to the Safety and Environmental Health Handbook 445-1-H.

Some of the most important safety procedures to be followed are listed below:

1. Wear seat belts in your vehicle.
2. Personnel are to abide by the Traffic Control Plan that has been developed for each station.
3. Wear PFDs when working in boats, on bridges, and while making wading discharge measurements.
4. Practice proper lifting techniques.
5. If in doubt about the safety of making a wading measurement, opt for a bridge, manned boat, or cableway measurement if possible.
6. Discharge measurements should not be attempted or continued when an electrical storm is occurring in the area.
7. Select the proper measuring equipment to handle the conditions expected.

Table 1. Flood personnel and contact information for Little Rock Office

Name	USGS cell #
Baldwin, Bill	501-553-5411
Funkhouser, Jaysson	501-766-3663
Kresse, Tim	501-749-4346
Jonathan Gillip	479-263-0184
Lasker, Dwight	501-515-3504
Carter, Chris	501-553-1367
Will Harmon	501-804-2457
Davis, Kevin	501-416-2753
Martin, Kane	501-553-5414
Franks, Steve	479-719-2220
Chris Charles	501-297-0218
Williams, Anita	501-516-6398
Fleming, Joey	501-553-5413
Mandy Hughes	501-617-0940
Mays, Tyler	501-590-6029
Wallace, Ted	501-515-3689
Daniel Current	501-297-0217
Caleb Miller	501-912-5533
Jones, Adam	501-553-1471

Table 2. Flood personnel and contact information for Fayetteville Office

Name	USGS cell #
Hubbs, Kevin	479-304-8507
Wagner, Dan	501-553-5410
Killion, Ferrell	501-553-5412
Thompson, Ben	501-813-6567
Nick Barsotti	479-225-2664

Table 3. Other important USGS contact information

Name	Title	Phone #
Arkansas WSC IT Support Staff		
Jackson, Barry	IT Specialist	501-347-5031 (cell)
Cole, Randall	IT Specialist	501-554-6017 (cell)
Martin, Cliff	IT Specialist	501-590-6070 (cell)
Lanier, Atticus	IT Specialist	501-228-3634 (office)
Brossett, Bubba	NWIS DBA	501-658-3667 (USGS cell);
USGS Central Region Contacts		
Holmes, Bob	OSW Flood Specialist	573-308-3581 (office)

Table 4. Contact information for other agencies

Agency	Location	Phone
US Army Corps of Engineers	Little Rock	501-324-6236
	Memphis	901-544-3360
	Tulsa	918-669-7366
	Vicksburg	601-631-5053
	Arkadelphia	870-246-4146
	McGehee	870-222-4575
	Arkadelphia	870-246-4146
	Dardanelle Dam	479-968-5008
	Trimble Dam	479-452-0488

REFERENCES

- Benson, M.A., and Dalrymple, Tate, 1967, General field and office procedures for indirect discharge measurements: U.S. Geological Survey Techniques of Water Resources Investigations, book 3, chap. A1, 30 p., available at <http://pubs.usgs.gov/twri/twri3-a1/>.
- Hodge, S.A., and Tasker, G.D., 1995, Magnitude and frequency of floods in Arkansas: U.S. Geological Survey Water-Resources Investigation Report 95-4224, 52 p.
- Interagency Advisory Committee on Water Data, 1982, Guidelines for determining flood flow frequency: Reston, Virginia., U.S. Geological Survey, Bulletin 17B of the Hydrology Subcommittee, Office of Water Data Coordination, 183 p., available at http://water.usgs.gov/osw/bulletin17b/dl_flow.pdf.
- O'Connor, J.E., and Costa, J.E., 2003, Large floods in the United States—where they happen and why: U.S. Geological Survey Circular 1245, 13 p.
- Rantz, S.E. and others, "Measurement and computation of streamflow: Measurement of stage and discharge," USGS Water-Supply Paper 2175, volume 1, 1982, available at http://pubs.usgs.gov/wsp/wsp2175/html/WSP2175_vol1.html.

Sauer, V.B., and Turnipseed, D.P., 2010, Stage measurement at gaging stations: U.S. Geological Survey Techniques and Methods book 3, chap. A7, 45 p., available at <http://pubs.usgs.gov/tm/tm3-a7/>.

Turnipseed, D.P., and Sauer, V.B., 2010, Discharge measurements at gaging stations: U.S. Geological Survey Techniques and Methods book 3, chap. A8, 87 p., available at <http://pubs.usgs.gov/tm/tm3-a8/>.

U.S. Geological Survey, variously dated, National field manual for the collection of water-quality data: U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, chaps. A1-A9, available online at <http://pubs.water.usgs.gov/twri9A>.

APPENDIX A

United States Department of the Interior
GEOLOGICAL SURVEY RESTON, VA 220092

In Reply Refer To:
WGS-Mail Stop 419

WATER RESOURCES DIVISION MEMORANDUM NO. 90.22

Subject: **PROGRAMS AND PLANS--Project Alert** Regarding Floods and Other Significant Hydrologic Events, and Its Relevance to the National Summary Report

Project Alert has been a successful operation since early 1976. Its purpose is to notify U.S. Geological Survey (USGS) and Department of the Interior officials of significant or unusual hydrologic events so that they may disseminate information about the event to the news media and arrange for emergency operations, if necessary. This memorandum reiterates the purpose of Project Alert, revises the reporting method, updates the persons to be contacted, and supersedes Water Resources Division (WRD) Memorandum No. 88.52, dated May 13, 1988.

Knowledge of what is happening on the national water scene and reporting what we observe to the Department of the Interior, the Congress, and the public are important parts of the USGS mission. While local and State officials have the most immediate need for information about significant hydrologic events, Regional Hydrologists, the Chief Hydrologist, the Director, and the Secretary of the Interior also need to be kept informed of changing water conditions. The USGS Public Affairs Offices (Reston and Menlo Park) provide primary contact with the news media. Our immediate contact with the Public Affairs Offices will permit them to distribute information about hydrologic events and USGS observations to the public. Prompt information on events also enables the Division to plan emergency operations and coordinate them with the Headquarters' offices of other Federal agencies.

Each WSC Director should continue to monitor significant hydrologic and water-related events and promptly send the basic facts about each event to WRD's Hydrologic Information Unit (HIU) via PRIME electronic mail. Although the Districts have primary responsibility for describing and reporting significant hydrologic events, Regional Office and research program personnel should also report significant events that come to their attention and coordinate such reports with the appropriate District Chief. Please alert the HIU by telephone that the message is imminent (see (2), page A2 of Attachment A). The HIU has been preparing and disseminating memorandums based on reports of significant hydrologic and water-related events within the USGS and will continue that work. For those events of major news value at State or national levels and about which the USGS may be asked to comment or advise, the preliminary information should be conveyed to Reston personnel even during nonoffice hours. Procedures for reporting such events are described in Attachment A. Attachment B contains additional guidance regarding the coverage of events for the National Water Summary report.

Attachment A also contains a listing of all memorandums based on those reports written by the HIU since WRD Memorandum No. 88.52 was issued. We urge all personnel to continue their assistance in making Project Alert a success.

Phil Cohen
Chief Hydrologist

2 Attachments

Distribution: A, B, S, FO, PO

This memorandum supersedes WRD Memorandums No. 8.52 (May 13, 1988); No. 85.121 (July 26, 1985); No. 84.79 (April 30, 1984); No. 82.65 (April 8, 1982); No. 79.84 (March 28, 1979); No. 78.121 (July 6, 1978); and No. 76.139 (May 25, 1976).

Attachment A

PROJECT ALERT

The purpose of Project Alert is to notify U.S. Geological Survey and Department of the Interior officials of significant or unusual hydrologic events so that they may disseminate information about the event to the news media and arrange for emergency operations, if necessary.

Descriptions of significant or unusual water events of interest should include the following:

- o Floods and the imminent threat of floods--Information should include all of those data shown on the attached form, used for the National Water Conditions. **If all information is not readily available, prompt reporting is more important: additional information can be relayed later.** This report format does fit electronic mail -- California, Nevada, Virginia, West Virginia, and other States used it to submit data for floods which affected many sites in those States in the last several years. (Note that when a peak discharge exceeds that for the 10 forecasts, rainfall data, and damage estimates are helpful for background. Floods with recurrence intervals of less than 10 years are not to be reported unless lives are lost or damages are widespread or sizable (in the hundreds or thousands of dollars). Information desired by the Public Affairs Office for record-high or near-record-high streamflows or where damages are newsworthy is shown on page A4 of this attachment.

- o Lake and reservoir levels--Extremely high or low water levels and associated effects on shorelines, water quality, or water supplies.

- o Droughts--Locations and extent of areas affected by persistent low flows, low reservoir levels, declining ground-water levels, and dry soil moisture conditions that may restrict water use and affect crops and wildlife. Provisional data should include date, stream name and location, gaging station number, discharge, drainage area, recurrence interval, and comparative ranking with previous low flows. Data on rainfall, soil moisture conditions, and damage estimates are helpful for background. Descriptions of emergency actions taken by local agencies to conserve water, reduce demand, or obtain emergency supplies also will help put the event in perspective.

- o Toxic and radiological spills--Reports of significant toxic and radiological spills in waterways, lakes, reservoirs, and on the ground should include date, water body name, location and nature of spill, amount of spill, water supplies endangered, and cleanup actions being taken. Effects might include fishkills, temporary closing of water-treatment plants downstream from the spills, closing of water bodies to swimming or fishing, or closing of wells.

- o Ground-water levels--Location and extent of unusually high or low ground-water levels and their effects.

- o Ground-water contamination--Reports of newly discovered ground-water contamination should include date of discovery, well location, contaminant, extent of contamination, and

actions being taken such as the closing of wells or well fields. Population affected by the closure of a water-supply well would be useful for background interest. Contaminants include, but are not limited to, salt, radioactive materials, petroleum products, organics, trace metals, nitrates, and bacteria.

Other water-related events of unusual severity that should be reported include, but are not limited to, ice jams, mudflows, and subsidence. If an event is determined to be newsworthy, then speed in reporting the event is essential.

To facilitate the flow of information, the following actions should be taken:

(1) As soon as preliminary data are available, they should be sent to the Chief, Hydrologic Information Unit, TGROSS, via electronic mail (cc to JFRETWELL, KVSARMA, and RPHIPPS). The responsible recipients in both WRD and the Public Affairs Offices can then retrieve and use this information with the understanding that it is preliminary and subject to change. In the event that the communications with the National Node Prime is impossible “short” reports may be telephoned to the Hydrologic Information Unit or telefaxed to Headquarters (General Services Unit, FTS 959-5295), while “long” reports and voluminous flood data should be telefaxed.

(2) Field personnel should then telephone the following people to inform them that an event has occurred and that preliminary information is available on the Prime. (Note that all phones of the Hydrologic Information Unit, FTS 959-6814 through 6819, are served by “PHONEMAIL” and can thus take unattended messages.)

(a) During Reston working hours, contact:

Chief, Hydrologic Information Unit Alternate:

Tom Ross (FTS) 959-6814 (TGROSS) Judy Fretwell (FTS) 959-6819 (JFRETWELL)

(b) During Reston nonworking hours (nights, weekends, and holidays) contact one of the following at home:

(1) Tom Ross (703) 758-9095 (2) Judy Fretwell (703) 620-3620

(3) The individuals listed above will relay the information to one of the following Public Affairs Office contacts (who in turn may telephone for additional information from the District Offices in the States where the significant hydrologic events are occurring):

Office Home

Donovan Kelly (FTS) 959-4459 (703) 338-4044

Don Finley (FTS) 959-4461 (703) 435-2412

Becky Phipps (FTS) 959-4414 (703) 476-8388

NATIONAL WATER CONDITIONS FLOOD REPORTING FORM

Appendix A--continued

FLOOD TABLES FOR PROJECT ALERT AND THE NATIONAL WATER CONDITIONS

The data for columns 1-3 and 5-7 should be those that are in the “manuscript” for the station. Non-contributing drainage area requires a footnote. The data in columns 8-12 are for the present flood. An initial report on floods should not be delayed if all data for columns 8-12 is not available. **Data required for columns 4 (Period of known floods) and 12 (Recurrence interval) are explained below.**

Period of known floods does not necessarily correspond with period of record in the station manuscript. If the period of record is fragmentary or historical flood data outside the period of record are cited in the manuscript and those historical data have been used in flood-frequency analysis for the station, the period of known floods should correspond with the extended period of record used in the analysis. For example: the period of record for a station is shown as 1902-09, 1919-32, 1946 to current year, the maximum discharge occurred in 1957, and that maximum discharge is known to be higher than any that occurred during the gaps in record; the period of known floods is then 1902 to current year and would be shown as 1902 in column 12.

Recurrence interval (years) gives the recurrence interval in years only when the recurrence interval is 100 years or less. The ratio of the discharge of the current flood to the discharge of the 100-year flood is given when the current flood exceeds the 100-year flood.

A completed table, as published in the August 1989 NWC, is shown below.

FLOOD DATA FOR SELECTED SITES IN ALASKA, AUGUST 1989				Maximum flood previously known			Maximum during present flood				
WRD Station number	Streams and places of determination	Drainage areas mi ²	Period of known floods	Date	Stage (feet)	Discharge(cfs)	Discharge				Recur-rence interval(years)
							Date	Stage (feet)	Cfs	Cfs per mi ²	
15273900	South Fork Campbell Creek at canyon mouth near Anchorage	25.20	1967-79, 1981, 1989	Aug. 12, 1981	4.21	476	Aug. 28	4.35	530	21.0	30
15274300	North Fork Campbell Creek near Anchorage	13.40	1967-84, 1989-	Aug. 9, 1971	12.18	107	28	a. Not determined.(a)	115	8.58	15
15274550	Little Campbell Creek at Nathan Drive near Anchorage	b. Approximately.b15	1986-	Oct. 11, 1986	11.04	61	26	12.1	135	9.0	(a)
15274600	Campbell Creek near Spenard	69.7	1966-	Oct. 11, 1975	20.89	472	26	21.8	870	12.5	100
157251--	Chester Creek at Arctic Boulevard at Anchorage	27.2	1967-85, 1988-	Sept. 11, 1975	4.37	175	26	5.59	420	15.4	c. Recurrence interval greater than 100 years. Value shown is approximate ratio of discharge to that of 100-year flood.c1.24
15281000	Knik River near Palmer	1,180	d. Includes a period when annual glacier-dam release floods occurred.d1948-87, 1989-	Jan. 18, 1958 Aug. 17, 1979	e. Site and datum then in use.e25.3	f. From glacier-dam release.f355,000g. Peak discharge other than from glacier-dam releases. g60,200	27		b90,000	76	b100

Provisional data; subject to revision

Appendix A--continued

PROJECT ALERT MEMORANDUMS--MAY 14, 1988 THROUGH FEBRUARY 26, 1996

06/07/88Oil Contamination on Oregon's Rogue River
07/12/88Severe Floods in Albuquerque, New Mexico
07/15/88Jokulhlaups from Tahoma Glacier, Mount Rainier, Washington
07/28/88Jokulhlaups from Tahoma Glacier, Mount Rainier, Washington
02/07/89Toxic Chemical Spill in Helena, Montana
02/17/89Flooding in Kentucky
04/07/89Severe Flooding in North Dakota
04/26/89Low Flows Measured in Wisconsin
04/27/89Update on Coollidge Dam Leak in Arizona
05/24/89Severe Flooding in Texas
05/31/89Flooding in Ohio
06/06/89Flooding in Michigan
06/20/89Storms in Alabama and Florida
06/26/89Flooding in Pennsylvania
06/30/89Second Episode of Severe Flooding in Houston, Texas Area
07/07/89Flooding Causes Two Drownings in North Carolina
07/11/89Severe Floods in Wilmington, Delaware Area
08/29/89Flooding in Anchorage, Alaska Area
09/19/89Severe Flooding in Fayetteville, North Carolina
09/19/89Hurricane Hugo Causes Severe Damages on U.S. Virgin Islands and Puerto Rico
09/25/89Severe Flooding in Jacksonville, Florida
09/28/89Hurricane Hugo Causes Severe Damage in South Carolina
10/12/89Heavy Rains Causes Urban Flooding in Parts of Florida October 9-10
01/11/90Severe Flooding in Washington and Oregon
02/26/96Disseminating information about floods, droughts, and other significant hydrologic events to the public

FLOOD NEWS REPORT FORM FOR USE BY USGS PUBLIC AFFAIRS OFFICE

USGS WATER SCIENCE CENTER/STATE _____

DATE _____

NAME OF PREPARER _____ TELEPHONE _____

NAME OF STREAM _____

LOCATION OF GAGE _____

PEAK STREAMFLOW IN CFS _____

RECURRENCE INTERVAL (YEARS OR RATIO TO 100-YEAR FLOOD IF > 100 YEARS) _____

DATE OF PEAK _____ TIME OF PEAK _____

IS THIS A NEW PEAK OR RECORD? NO YES (SKIP 7)

LAST TIME THIS FLOW WAS EXCEEDED: DATE _____

(IF CURRENT PEAK IS NOT PEAK OF RECORD FLOW IN CFS _____

AT THE TIME OF MEASUREMENT/READING, FLOW WAS (CHECK ONE):

AT ITS PEAK _____ NON-PEAK INCREASING _____ DECREASING _____

PREVIOUS RECORD HIGH:

FLOW IN CFS _____ DATE _____

STAGE IN FEET _____ DATE _____ (IF NOT CONCURRENT WITH

PEAK FLOW)

1. OTHER INFORMATION:

NOTE: When reporting streamflow for a flood, give at least the highest flow/stage which has occurred so far. This information is always important but is of particular interest if the previous record high has been exceeded, even if flow has not yet peaked. Also, data indicating how flow is changing, both before and after the peak occurs, is important when reporting major floods on large rivers.

Appendix A--continued

ATTACHMENT B

NATIONAL WATER SUMMARY

The Hydrologic Information Unit (HIU) staff will prepare the hydrologic events section of the National Water Summary report from information provided by the Water Science Centers for Project Alert and newspaper articles provided by a news-clipping service. (See, for example, p. 12-19 of Water-Supply Paper 2300, "National Water Summary 1985.") Using these as a guide, HIU or Branch of National Water Summary (BNWS) staff may contact Water Science Centers to request that they review brief statements describing selected events, verify or insert statistics describing the magnitude and severity of the events, and submit sketch maps showing the location and extent of the events. For some events, such as spills or fishkills, the Water Science Center may have to contact State agencies to verify descriptions of remedial actions taken after the event and to obtain official damage estimates. The most severe and significant hydrologic events of the year will also be described in somewhat more detail in the annual Summary. No follow-up information to a Project Alert report for National Water Summary purposes is requested until a Water Science Center is contacted by the staff of HIU or BNWS.

APPENDIX B

November 12, 1996

WATER RESOURCES DIVISION MEMORANDUM NO. 97.08

Subject: PROGRAMS AND PLANS--PROJECT ALERT--Disseminating Information About Extreme Events to the Public

The new U.S. Geological Survey (USGS) Strategic Plan stresses the bureau's role to "provide national leadership in maintaining earth science data and making them readily available." One of the strategic actions of that goal is to "ensure access to and use of USGS data and information to all interested users." Therefore, a critical Water Resources Division responsibility is to quickly communicate accurate information about extreme events, such as floods and droughts, and(or) hazardous conditions, such as sinkhole collapses and dam and bridge failures related to flooding to:

1. Local officials and local media. 2. Headquarters.

The WSC's first priority is to report information about extreme events and (or) hazardous conditions, which are within the purview of the USGS and documented by USGS personnel, to local emergency- response agencies and the public via local news media. This information should be communicated in a form that is most useful to the recipients. The method of release--direct communication, press release, Internet, etc.--is left to the discretion of the local manager.

Once our obligation to the public and local officials has been satisfied, the Director, or Director designee should notify Headquarters of the event via Project Alert. Project Alert is used by the Division to inform the Director, the Department of the Interior (DOI), and Congress of critical water-related events and the USGS role in dealing with these events. The information that you communicate locally through news releases, the Internet, etc., will be the primary vehicle used by the Division to inform these other audiences.

To simplify Project Alert reporting, templates have been created and are available on the World Wide Web at:

<http://h2o.usgs.gov/project_alert>

The page includes a form for reporting events, plus other information about Project Alert. Once you exit the template, electronic mail will be sent automatically to all Project Alert recipients. If you do not receive an acknowledgment of receipt of your message within 4 hours, please call (703) 648-5699.

In addition to Project Alert, the USGS has a Domestic Emergency Notification System (DENS) that should be used to immediately report a sudden catastrophic event, such as an earthquake, volcanic eruption, toxic spill near public supply inlets, etc. Information received by DENS is transmitted to the Director, the Secretary of the Interior, and the President, as appropriate. If an event occurs in your State, and you are unclear as to whether you should report it to the DENS, ask yourself the following:

Will the White House or DOI Secretary be embarrassed by learning of the event from an external rather than an internal source?

Would the White House or Secretary ask, "Why didn't someone call me?"

Are departmental assets, personnel, or resources deeply involved?

Is the situation likely to worsen with time?

If the answer to any of these questions is yes, report the event using the DENS pager, (800) 759-8888, enter pin number 202-2415, and follow the voice instructions. The system is staffed 24 hours per day, and someone will return your call to get more information.

In summary, all extreme events should be reported to Headquarters via Project Alert. Sudden catastrophic events should be reported using both the Project Alert and the Domestic Emergency Notification Systems.

Realizing that this reporting responsibility is an additional task that must be met during extreme events when WSC staffs are already heavily committed, we appreciate your cooperation and assistance in meeting this critical goal for the USGS.

Lewis V. Wade Assistant Chief Hydrologist for Water Information

Distribution: E

This memorandum supersedes WRD Memorandum No. 96.15.

This memorandum is being distributed electronically only.

APPENDIX C--EMERGENCY AERIAL PHOTOGRAPHY MEMORANDUM

United States Department of the Interior GEOLOGICAL SURVEY WASHINGTON, D.C.
20242

Code 4351 4416

August 10, 1971

WATER RESOURCES DIVISION MEMORANDUM NO. 90.22

Subject: **PROGRAMS AND PLANS**--Emergency Aerial Photography for Flood Mapping

Aerial photography which shows areas inundated by major floods is extremely valuable to our program of mapping flood-prone areas and to related work which the Division is doing under the Flood Insurance Act. Data on inundated areas can be obtained in this manner at a small fraction of the cost of ground surveys after the flood has passed.

Unless advanced planning is done, there is insufficient time to contract for aerial photography after a flood begins. This memorandum describes the advance planning that should be done, and establishes procedures for expediting the contracting of emergency aerial photography. These procedures have been jointly worked out with the Procurement Officer and should enable the District Chiefs to contract for photography in emergency situations.

The District Chief should contact and prepare a list of commercial aerial photography companies capable of flood photography satisfying the required specifications. The District Chief should be aware of the reaches of streams where photography should be obtained. As noted in WRD Memorandum No. 72.06 concerning the National Program for Managing Flood Losses, special effort should be made to obtain photography in inundated areas where topographic quadrangle maps are not available.

At the time of a flood occurrence, the District Chief should determine the qualified photographers on his list. The photographer that is best qualified to handle the particular job should be contacted to perform the service and issued a Purchase Order, incorporating the emergency aerial photography package. The District Chief should document competitive prices from three possible sources in support of his final selection on a separate note to the file, which should be kept on each Purchase Order issued.

A copy of this completed form should be attached to each copy of the Purchase Order to be issued in accordance with prescribed procedures. A sample Purchase Order is attached for your guidance. Please note that the original Purchase Order has been modified to indicate that the contractor invoice shall be submitted to the District Chief, rather than directly to Budget and Finance. The District Chief shall certify on the invoice that the services have been received, and forward the invoice to Budget and Finance.

If the total cost of the work is estimated to be over \$1,500, prior approval should be obtained by telephone from the Office of the Assistant Chief Hydrologist for Operations; if over \$2,500, prior approval should be obtained by telephone from the Branch of Contracts, Geological Survey (telephone numbers 202-343-2322 or 3759). In the latter case, a Form 1036 should be attached to the accounting copy of the Purchase Order. Procedures for obtaining approval of funds for photography under the National Program for Managing Flood Losses are described in WRD Memorandum No. 72.06.

A copy of all Purchase Orders issued for the purpose of emergency aerial photography should be sent to the Operations Section, Code 4100 2812, Washington, D.C.

J.S. Cragwall, Jr.
Assistant Chief Hydrologist for Operations

Attachments

WRD Distribution: A, S, FO, SL

APPENDIX D

List of Stream-gaging Equipment

The following list of equipment should be the minimum carried by each field person in their assigned vehicle (some equipment pertains to flood situations only):

- SonTek ADV, OTT ADC, Price pygmy meter, or other current meter for making wading measurements
- AA batteries for SonTek ADV. Charging cable for OTT ADC.
- Kevlar tagline and stakes
- Wading rod

- Discharge measurement note sheets: forms 9-275G and/or 9-275I, PDA with SWAMI, or PC with SWAMI and PDA emulator
- ADCP and accessories (GPS, depth sounder, boat, extra fins, drag sock, mounting hardware as required)
- Thermistor (preferably with Celsius scale)
- Rope for tethering ADCP from bridge (may need up to 200 ft, should be a high tensile-strength rope)
- Locking D-Rings for attaching ropes to ADCPs and cableways
- ROV for cableway measurements (if applicable), equipment necessary to operate ROV at cableway (i.e., generator and DeWalt drill for automated HS Hornets, 24V battery for Rickly ROV)
- 7.5 AH, 26 AH, 35 AH, 55 AH batteries (for ADCPs and in case a replacement is needed at a station)
- Type-AA current meter
- DMXpert or other click counter, if applicable
- Click-counting headset with batteries
- Type-A reel
- Weight pins
- Weight hangers
- 15, 30, 50, and 100 lb sounding weights
- Heavy wire cutters (capable of cutting A-reel cable)
- Handline for AA meter
- Type A bridge crane w/3- or 4-wheel base
- Bridge board for Type-A reel
- Warning signs, sign stands, and frames (2 Shoulder Work and/or USGS Water Survey Crew signs at a minimum)
- Flagging Traffic supplies—2 each of “one lane bridge 500, 1000, and 1500 ft” signs, frames, stands; 2 stop/slow signs; pair of 2-way radios; 2 trucks with light bars
- Cones (minimum of 10)
- Spotlight(s)
- AC Generator and extension cord(s)
- AC inverter
- 2-way radios (minimum 1 set for discharge measurement crew, 1 additional set if flagging traffic)
- Laptop computer with necessary communications programs and software installed (including drivers for USB-serial adaptor(s))
- Communications hardware: i.e., serial cable(s), DCP-specific cables (i.e., Vaisala 555 cable), USB-serial converter, multi-port USB-serial converter (for ADCP mmts with GPS, depth sounder inputs), Parani bluetooth radio (for communication with RDI StreamPro ADCP), null modem adaptor (for DA 522+ DCPs), USB memory stick (to back up measurements), wireless card for remote internet access
- Charging cables for laptop PC, cell phones, spotlights, rechargeable battery
- USGS 10A voltage regulator w/ AC wall outlet adaptor (doubles as a 12V battery charger)

- HWM kit: Hammer, nails, flagging tape, HWM disks, wire-style flags, wooden stakes, hand level, sharpie marker, orange marking paint
- 50-ft steel tape and weight (for tape-downs)
- Hand tools, including a 12" adjustable wrench or 1 1/8" box-end wrench for changing N₂ tanks at sites with Conoflow bubblers
- Hardhat
- PFD
- Rain gear
- Chest waders with felt boots
- Hip waders
- First aid kit
- Flashlight(s) and headlamp
- Extra set(s) of clothes
- Waterproof (Gore-Tex) steel- or safety-toe boots

Appendix E: List of Field Sites by Field Area

Notes on field sites: For Site Type, D=daily discharge; P=partial discharge (peak discharge only); S=stage only; ADEQ=measurements 4X per year for ADEQ; Precipitation=rain gage only.

- Google Earth maps of any and all field trips can be obtained by accessing SIMS, selecting the appropriate office, choosing the desired field trip from the drop-down menu under the search method “By field trip,” and then clicking the “Go” button. The list of sites comprising the field trip is displayed in the bottom of the window and the user can then select the “Map Trip” link at the top of the list of field sites.

Fayetteville Office Field Trip Assignments

Fayetteville Northwest Trip-Technician: Walter F. Killion III

Site ID	Site Name	Site Type
07050500	Kings River near Berryville	D
07194800	Illinois River at Savoy	D
07195000	Osage Creek near Elm Springs	D
07194880	Osage Creek near Cave Springs	D
07195400	Illinois River at Hwy 16 near Siloam Springs	D
07195430	Illinois River at Hwy 59 South of Siloam Springs	D
07195800	Flint Creek at Springtown	D
07195855	Flint Creek near West Siloam Springs, OK	D
07196900	Baron Fork at Dutch Mills	D

Fayetteville South-Technician: Collin Reinhardt

Site ID	Site Name	Site Type
07247000	Poteau River at Cauthron	D
07249400	James Fork near Hackett	D
07250935	Jones Creek at	D

	Winfrey	
07250965	Frog Bayou at Winfrey	D
07250974	Jack Creek near Winfrey	D
07251500	Frog Bayou at Rudy	P
07252000	Mulberry River near Mulberry	D
07249800	Lee Creek at Short, OK	D
07249920	Little Lee Creek near Nicut, OK	D
07249985	Lee Creek near Short, OK	D
07250085	Lee Creek at Lee Creek Reservoir near Van Buren, AR	D

Fayetteville Northeast-Technician: Shelley Todd

Site ID	Site Name	Site Type
07053207	Long Creek at Denver	P
07053250	Yocum Creek near Oak Grove	D
07054410	Bear Creek near Omaha	P
07055646	Buffalo River near Boxley	D
07055660	Buffalo River at Ponca	D
07055680	Buffalo River at Ptuit	D

Beaver Lake Inflows-Technician: Kevin Hubbs

Site ID	Site Name	Site Type
07048550	West Fork White River east of Fayetteville	D
07048600	White River near Fayetteville	D
07048800	Richland Creek at Goshen	D
07049000	War Eagle Creek near Hindsville	D

Fayetteville Student Trip-Technicians: Blake Whittle and Drew Ensminger

Site ID	Site Name	Site Type
07048480	Town Branch at B.R. 62 at Fayetteville	D
07048490	Town Branch Trib at Hwy 16 at Fayetteville	D
07194809	Niokaska Creek at Township Street at Fayetteville	D
07194806	Spring Creek at Sanders Ave. at Springdale	D
07194933	Spring Creek at Hwy 112	D

Little Rock Office Field Trip Assignments

North Central Trip-Technician: Dwight Lasker

Site ID	Site Name	Site Type
07055607	Crooked Creek at Kelly Crossing at Yellville	D
07055875	Richland Creek near Witts Spring	D
07056000	Buffalo River near St. Joe	D
07056515	Bear Creek near Silver Hill	D
07056700	Buffalo River near Harriet	D
07260990	North Fork Cadron Creek near Quitman	D
07075000	Middle Fork of Little Red River at Shirley	P
07075300	South Fork of Little Red River at Clinton	D
07261000	Cadron Creek near Guy	D

Northeast Trip-Technician: Ted Wallace

Site ID	Site Name	Site Type
07058980	Bennetts River at Vidette	P
07059450	Big Creek near Elizabeth	P
07077652	Lost Creek at Floyd Street at Jonesboro	D
07057370	White River near Norfork	D
07072000	Eleven Point River near Ravenden Springs	D
07077380	Cache River at Egypt	D
07077660	Bayou DeView near Gibson	ADEQ

Little Rock Trip-Technician: Tyler Mays

Site ID	Site Name	Site Type
07076950	Wattensaw Bayou north of Hazen	ADEQ
07077555	Cache River near Cotton Plant	D
07263000	South Fourche LaFave River near Hollis	P
07263012	Fourche LaFave River near Aplin	D
07263300	Maumelle River at Maumelle Dam at Natural Steps	D
07263500	Arkansas River at Little Rock	S
07263555	Fourche Creek at University Ave. at Little Rock	D
07263580	Rock Creek at 36 th St. at Little Rock	D
07264000	Bayou Meto near Lonoke	D
07076517	Little Red River near Dewey	D
07076540	Big Creek near Searcy	D

South Trip-Technician: Tyler Mays

Site ID	Site Name	Site Type
07265280	Arkansas River at Pendleton	S
07362100	Smackover Creek near Smackover	D
07362500	Moro Creek near Fordyce	D
07363500	Saline River near Rye	D
07364185	Bayou Bartholomew near Portland	D
07369680	Bayou Macon at Eudora	D
07263650	Arkansas River at Pine Bluff	S
07363200	Saline River near Sheridan	D
07363400	Hurricane Creek below Sheridan	D
07364115	Bayou Barthomew near Ladd	ADEQ
07365800	Cornie Bayou near 3 Creeks	ADEQ
07364600	Bayou DeLoutre near ElDorado	ADEQ
07362550	Moro Creek near Banks	ADEQ

Glenwood Trip-Technician: Steve Franks

Site ID	Site Name	Site Type
07356000	Ouachita River near Mount Ida	D
07359002	Ouachita River at Rammel Dam above Jones Mill	D
07359610	Caddo River near Caddo Gap	D
07360200	Little Missouri River near Langley	D
07360180	Little Missouri River at Albert Pike	D
07359770	Caddo River near Amity	ADEQ
07260500	Petit Jean River at Danville	D
07261500	Fourche LaFave River near Gravelly	D
07258500	Petit Jean River near Booneville	D
07260000	Dutch Creek at Waltreak	D

Southwest Trip-Technician: Kane Martin

Site ID	Site Name	Site Type
07340000	Little River near Horatio	D
07361500	Antoine river at Antoine	D
07341200	Saline River near Lockesburg	D
07339500	Rolling Fork near DeQueen	P
07340500	Cossatot River near DeQueen	P
07341000	Saline River near Dierks	P
07349440	Bodcau Creek near Lewisville	ADEQ
07338720	Mountain Fork near Hatfield	ADEQ
07339780	Rolling Fork at County Road Bridge	ADEQ
07344300	Days Creek Southeast of Texarkana	ADEQ

Boat Trip-Technician: Rotates all-section

Site ID	Site Name	Site Type
07061000	White River at Batesville	D
07064000	Black River near Corning	D
07069000	Black River at Pocahontas	D
07069500	Spring River at Imboden	D
07072500	Black River at Black Rock	D
07074420	Black River at Elgin Ferry	D
07074500	White River at Newport	D
07074850	White River near Augusta	D

07076750	White River at Georgetown	D
07077000	White River at DeValls Bluff	D

Hardy Trip-Technician: Kevin Davis

Site ID	Site Name	Site Type
07069170	Warm Fork Spring River near Thayer	ADEQ
07069190	Mammoth Spring at Mammoth Spring	D
07069220	Spring River near Mammoth Spring	D
070692657	Myatt Creek North of Saddle	D
07069266	Spring River near Hardy	ADEQ
07069295	South Fork Spring River at Saddle	D
07069305	Spring River at Town Branch Bridge at Hardy	D
07074000	Strawberry River near Poughkeepsie	P

South QW trip-Technician: Joey Fleming

Site ID	Site Name	Site Type
07337000	Red River at Index	D
07340300	Cossatot River near Vandervoort	D
07362000	Ouachita River at Camden	D
07362000	Ouachita River at Camden (Auxiliary gage)	A
07364133	Bayou Bartholomew at Garrett Bridge	D
07364150	Bayou Bartholomew near McGehee	D
07340300	Cossatot River near Vandervoort	D

West Central Trip-Technician: Elizabeth Beavers

Site ID	Site Name	Site Type
07256500	Spadra Creek at Clarksville	P
07257006	Big Piney Creek at Hwy 164 near Dover	D
07257200	Little Piney Creek near Lamar	P
07257500	Illinois Bayou near Scottsville	D
07257693	Huckleberry Creek near Augsburg	D
0725769402	Unnamed Tributary Creek near Augsburg	D
07260620	Chickalah Creek near Chickalah	ADEQ
07260640	Petit Jean River at Centerville	S
07260673	West Fork Point Remove Creek near Hattievile	D
07260800	Arkansas River at Morrilton	S
07261090	Cypress Creek near Birdtown	D

Hot Springs Trip-Technician: Joey Fleming

Site ID	Site Name	Site Type
07358250	Whittington Creek at Whittington Park at Hot Springs	D
07358253	Whittington Creek at Tunnel Entrance at Hot Springs	D
07358257	Hot Springs Creek upstream of tunnel entrance at Hot Springs	D
07358284	Hot Springs Creek downstream of Grand Ave. at Hot Springs	D
07358550	Gulpha Creek at Hot Springs	D
07363000	Saline River at Benton	D
07359002	Ouachita River at Rammel Dam	D
07358280	Hot Springs at Hot Springs	S
07363270	Hurricane Creek near Sardis	ADEQ
343045093054901	Music Mountain near Blacksnake Rd. at Hot Springs	Precipitation
343114930420001	South Slope of Sugarloaf Mountain at Hot Springs	Precipitation

Maumelle Trip-Technician: Jan Heavener

Site ID	Site Name	Site Type
07263295	Maumelle River at Williams Junction	D
07263296	Maumelle River near Wye	D
072632962	Bringle Creek at Martindale (ISCO sampler)	D
072632966	Lake Maumelle at State Hwy 10 near Wye	D
072632971	Yount Creek near Martindale (ISCO sampler)	D
072632982	Reece Creek at Little Italy (ISCO sampler)	D
07362579	South Alum Creek near Jessieville	D
07362587	Alum Fork Saline River near Reform	D
072632968	Pigeon Roost Creek at Lake Maumelle	D

East QW Trip-Technician: Steve Franks

Site ID	Site Name	Site Type
07047942	L'Anguille River near Colt	D
07047950	L'Anguille River at Palestine	D
07076634	Little Red River at Judsonia	S
07047947	Second Creek near Palestine	D

Greers Ferry QW Trip-Technician: Dwight Lasker & others

Site ID	Site Name	Site Type
07060710	North Sylamore Creek near Fifty-Six	D
07060500	White River at Calico Rock	D
07060728	White River at Allison	S

APPENDIX F: Water Mission Area Policy Memorandum No. 2011.01

In Reply Refer To:
Office of Surface Water
Mail Stop 415

Sunset Date: March 2015

April 21, 2011

Memorandum

Distribution: GS-W A, GS-W B, GS-W WSC Directors, GS-W CD, GS Rex, GS-DO AD

From: /s/ William H. Werkheiser
Associate Director for Water

WATER MISSION AREA POLICY MEMORANDUM NO. 2011.01

Subject: PROGRAMS AND PLANS--Policy and Guidelines for Response, Documentation, and Reporting of Flood Events

The purpose of this memorandum is to provide policy and guidance to U.S. Geological Survey (USGS) Water Science Centers (Centers) regarding their responsibilities before, during, and after riverine and coastal flooding.

Priority Flood Activities

The USGS, as the nation's premier earth science agency, is expected by cooperators, emergency management agencies, news media, and the public to provide hydrologic information prior to, during, and after flooding, with a particular expectation that USGS will disseminate near real-time flood data and flood summaries on the World Wide Web. The role of the USGS related to floods response activities has greatly expanded over the years as commitments at all levels of government have increased.

Accordingly, Centers must prepare for and respond decisively and consistently to all flood events. One crucial step toward ensuring that USGS's basic flood responsibilities are met is to clearly describe the flood-related products and services that Centers are expected to provide. During flood events, Centers must give priority to:

1. ensuring that streamgages critical to the needs of cooperators and emergency management agencies are functioning,

2. verifying and extending stage-discharge ratings at active streamgages through discharge measurements based upon priority given in the Center's Flood Plan, and
3. keeping near real-time stage and discharge information accurate and up-to-date in NWISWeb.

For the purpose of describing a Center's flood responsibilities; it is useful to categorize flood events as follows:

Category I Flood: Flooding in one or more river basins (8-digit hydrologic cataloging units) that result in peak streamflows with probabilities greater than 2-percent annual exceedance probability (AEP) (formerly known as the 50-year flood).

Category II Flood: Flooding in one or more river basins that results in peak streamflows generally in the 2 percent to 1 percent AEP range lasting less than 2 weeks in duration for all locations or weather-related storm-surge or tsunami-induced flooding that results in widespread inundation of coastal property.

Category III Flood: 1) Flooding in one or more river basins that results in peak flows that have an AEP of less than 1 percent; 2) Flooding in one or more river basins that results in peak streamflows generally in the 2 percent to 1 percent AEP range that last more than 2 weeks in duration for a large part of the watershed(s) (8-digit hydrologic cataloging units); 3) a localized flood that results in numerous deaths and extensive property damage; or 4) weather-related storm-surge or tsunami-induced flooding that inundates a large area of coastline resulting in large amounts of property damage and/or loss of life. Usually a Category III flood event will result in a Federal disaster declaration.

Accurate categorizations of flood events are difficult at the onset of flooding and normally only become possible as the event unfolds. A listing of the continuum of Center flood responsibilities has been prepared and is shown in tables 1, 2, and 3. It should be noted that some of the "During" and "After" flood responsibilities involve data collection and/or analysis that are considered extraordinary activities, resulting in extraordinary costs and therefore beyond what a Center might be able to fund with their existing resources. Extraordinary flood activities are denoted with a "1" in tables 2 and 3. In addition, during Category II and III flooding, there may be extraordinary costs incurred by a Center in the conduct of keeping streamgages operational and rating curves updated. These costs are eligible for consideration of reimbursement, but not guaranteed. Attachment 1 provides clarification about extraordinary costs. Funding of extraordinary costs is discussed under "Funding Sources and Tracking Expenses" below.

Funding Sources and Tracking Expenses

Historically, Centers have assumed responsibility for determining, documenting, and reporting the occurrence, magnitude, and frequency of extreme hydrologic events in the United States. This expectation coupled with the decreasing certainty of supplemental funding sometimes places Centers in financial risk during major floods (Category II and III floods). To minimize the financial risk, Centers will work with their Regional Executive (REx), in concert with the National Flood Coordinator (NFC) and Mission Area leaders, to attempt to secure funds for the extraordinary flood costs at the lowest administrative level possible. If extraordinary costs (incurred and projected) are expected to approach 5 percent of a Center's net (after overhead removed) streamgage program funding and efforts to cover extraordinary costs at lower administrative levels have not been fully successful, the NFC and REx will bring the funding need before both the Water and Natural Hazards Associate Director (AD) in an attempt to manage financial resources. If necessary, the NFC, REx and ADs may bring the issue to the Hazard Response Executive Committee (HREC) for guidance and potential funding alternatives. HREC is chaired by the USGS Deputy Director with the mission to provide executive direction, oversight, and support to USGS managers in responding to major hazard events. The charter for HREC can be found at: http://www.usgs.gov/emergency/docs/hrec_charter.pdf. To ensure a consistent consideration and treatment of extraordinary flood costs, the definition of the extraordinary flood costs and routine flood costs are defined in Attachment 1.

Centers should conduct extraordinary flood activities with knowledge and approval of the REx. For those extraordinary flood activities which involve discontinued stations and miscellaneous sites, only the minimum number of discontinued stations or miscellaneous sites needed to adequately define the extent, magnitude, and frequency of an event will be considered for funding assistance at administrative levels beyond the local Center. The minimum number of locations will be determined by consensus of the Center Surface Water Specialist, Water Science Field Team Surface Water Specialist, NFC, and other appropriate Office of Surface Water (OSW) staff.

The USGS has national guidelines and procedures for tracking expenses associated with hazard responses. Centers should work with their Regional Management Officer to utilize current procedures described in USGS Instructional Memoranda (IM) to track extraordinary flood costs.

Summary

When major flood events occur, Centers are called upon to perform tasks beyond the routine role of keeping streamgages functional and making streamflow measurements. Similarly, a Center's traditional post-flood duties have expanded as a result of Federal, State, and local governments' heightened commitment to rapid delivery of assistance to flood victims. The magnitude and extent of flooding and associated toll on life and property, customarily dictate the appropriate level of effort necessary for a Center to fulfill their mission responsibilities. These responsibilities include providing accurate, timely stream-stage and streamflow information before and during flooding and, afterward, documenting the setting, causes, and hydrologic significance of the flooding. A Center, in appropriate consultation and collaboration with the REx, NFC, and HREC, will continue to be the primary source for fulfilling the role of flood data gatherer, interpreter, and disseminator to meet both societal and scientific needs.

References

Rantz, S.E., 1982, Measurement and computation of streamflow, U.S. Geological Survey Water-Supply Paper 2175, 631 p.

2 Attachments

Distribution: A, B, DC, DC, CD, REXs, AD

This memorandum supersedes WRD Memorandum No. 2000.12, dated July 20, 2000

Table 1. —Before Flooding tasks to be performed by the Centers as part of their hydrologic data and information program
Prepare and maintain a flood plan, making it easily accessible to USGS personnel via the intranet.
Establish a Center Flood Coordinator (CFC) and someone to interact with the media. Ensure the CFC is fully knowledgeable in how to use the appropriate mechanisms to fully engage the National Weather Service River Forecast Center (RFC) (such as NWSChat)
Update the peak flow file annually.
Identify streamgages where stage and discharge information are critically important to cooperators and emergency management agencies during floods.
Work with the RFC to identify critical model points that coincide with USGS streamgages to familiarize Center personnel about those streamgages which may need emergency rating extensions during a major flood in support of the RFC. See attachment 2 for detailed guidance on rating extensions.
Develop a program to properly extend stage-discharge ratings at all RFC forecast locations to the 0.5 percent AEP flood level. Centers may use NSIP funds to extend ratings. Guidance for rating extensions is provided in Rantz (1982, p334)
Maintain all streamgages (including stage-only stations) equipped with telemetry (satellite, telephone, VHF radio, etc.) on NWISWeb.
Periodically test existing redundant systems for receiving and processing real-time flood data, including hot-backup LRGS data retrieval and NWIS-RT data processing. Review backup sensors, data loggers, and transmission sources at streamgages and alert Center IT staff to non-standard NWIS update needs during floods.
Conduct or participate in interagency coordination meetings for the purpose of explaining the Water and Natural Hazards Mission Areas responsibilities and develop sound working relationships with emergency management officials and key water resource program managers and technical staff.
Develop means to quickly disseminate flood information to governmental agencies that are likely to access USGS data during flood events. <i>Examples include: il.water.usgs.gov/flood , in.water.usgs.gov/flood ,and NWSChat (utilized heavily in the Mississippi River basin)</i>
Work with Office of Communications to develop and implement proactive interagency, news media, and public emergency communications products designed to provide timely flood information and explain our role in monitoring and analyzing flood data.
Pre-arrange for assistance (mutual aid) from other Centers for those times when flood response efforts exceed local resources, including: field, office, and communications/reporting assistance.
Make connection with the FEMA regional office and Corps of Engineers Districts to discuss ways USGS can assist them during and after major floods. FEMA may have particular interest particularly with flood inundation mapping and flood frequency characterization. USGS has an active flood-inundation mapping group (see http://water.usgs.gov/osw/flood_inundation/)

Task	Flood Category		
	I	II	III
Assess the category of flooding and then notify Project Alert either by email (GS-W Project Alert@usgs.gov) or using the Web: http://water.usgs.gov/project_alert/alert_form.html	X	X	X
Alert the USGS National Flood Coordinator (NFC) about the flooding. Flood or storm team coordination conference calls may be held. For coastal flooding, the storm team lead will be notified and involved in all coordination conference calls.	X	X	X
Activate interagency, news media, and emergency communication procedures. Use NWSChat where appropriate, particularly to push rating changes to the appropriate National Weather Service River Forecast Center (RFC).		X	X
Monitor stage data transmissions frequently to provide initial quality assurance of provisional data and identification of problems at critical streamgages. In the event a streamgage is destroyed, depending on availability, an OSW-owned Rapid Deployment Gage (RDG) may be requested by visiting the following HIF Web site: http://1stop.usgs.gov/uo/	X	X	X
Assign field teams to visit malfunctioning streamgages, assess and correct problems. If necessary, establish an alternative method of determining and reporting stage data from critical streamgage sites.	X	X	X
Obtain direct measurements of extreme flows at active streamgages to verify existing ratings or provide information for the modification of emergency rating extensions. Communicate rating changes to appropriate cooperators including RFC and Corps of Engineers offices	X	X	X
Document the measurement section used and what type of measuring instrument(s) worked at that magnitude of streamflow for future reference.	X	X	X
Extend stage-discharge ratings to new peak stages based on new discharge measurements and provide the information to requesting agencies as soon as possible. Do emergency rating extensions as necessitated by flood emergency (see attachment 2).	X	X	X
To determine or verify the areal extent of flooding, determine peak flow at selected discontinued streamgages and miscellaneous sites by direct flow measurement or flag sufficient high-water marks to obtain indirect measurement of streamflow after floods recede. 1		X	X
Compile table of peak flood information, including location, historic peak of record, peak stage, peak streamflow,	X	X	X

1 Unless funded by the Center or Cooperator, requires approval to be considered for cost reimbursement

date and time, and estimate of AEP. This table can be easily modified for ready communication with cooperators, NFC, and other agencies. Consider adding a link on the Center real time NWIS page.			
Discuss with the Regional Executive (REx) and NFC the potential funding sources outside the Center. REx and NFC will determine if involvement of Hazard Response Executive Committee (HREC) is warranted.		X	X
Table 2. (cont'd)—During Flooding tasks and potential tasks for Centers to perform by Category of flooding			
	Flood Category		
Task	I	II	III
Flag peak high-water marks for selected stream reaches for use in determining flood profiles as part of a flood study. In addition, consider flagging high-water marks in locations where historic peak stage data are available such at historic buildings along rivers. ¹		X	X
Work with the USGS Geospatial Liaison(s) assigned to your State or Region to assess the need, availability, and cost of obtaining and sharing the appropriate aerial and satellite imagery. ¹ If warranted, invoke the International Charter Space and Major Disasters in order to obtain free satellite imagery of the event.		X	X
Collect sediment and/or water quality samples at selected stations, as called for in Center flood plan. ¹	X	X	X

Table 3—After Flooding tasks and potential tasks for Centers to perform based on category of flooding			
	Flood Category		
Task	I	II	III
Repair and replace damaged streamgage structures and equipment.	X	X	X

Conduct indirect measurements of streamflow where appropriate to the USGS mission. 2	X	X	X
Finish compilation table of flood peaks at active streamgages, discontinued streamgages, and miscellaneous sites. Table should include location, historic peak of record, peak stage, peak streamflow, date and time, period of record, rank, and estimate of AEP (for those locations where streamflow is known within a reasonable accuracy (+/- 20 percent).		X	X
Obtain NWS estimates of precipitation that caused or contributed to the flooding, along with rainfall AEP estimates when they become available.		X	X
Conduct surveys of high water profiles and document flooding extent along selected stream reaches. 1		X	X
Prepare proposals and conduct special analysis, studies, and reports as deemed appropriate. ¹		X	X
Participate, as appropriate, in disaster-recovery and disaster assessment meetings and reconnaissance trips upon request from emergency-management or similar agencies (for example, FEMA State EMA's, COE, BOR, NWS).		X	X

2 Unless funded by the Center or Cooperator, requires approval to be considered for cost reimbursement