

river rise began during the night, and by daybreak the 10-foot flood stage was reached with the level increasing at the rate of 1 foot per hour. A flash flood watch was issued by Washington WSFO at 5:30 a.m. on June 21 and a warning 45 minutes later. The level rose rapidly through the day, cresting at 9 p.m. at a stage of 19.6 feet. This is 9.6 feet above flood and exceeds the previous record set in 1940 by 1.4 feet.

The actual forecast operation, conducted by WSO Roanoke and RDO Raleigh, N.C., consisted of issuing warnings and advisories of a descriptive nature. The only statements that might be considered actual stage forecasts were those issued at 11:25 a.m. and 6:00 p.m. on June 21. The former stated that this flood would approach the record of 18.25 feet. At the time of issuance, however, the stage was already 15.5 feet, and the river was rising 1 foot per hour. The 6 p.m. statement declared that the river was near crest, and it was within 0.6 feet and 3 hours of it. The foregoing is not to be construed as a criticism of the operation. This RDO is not served by an RFC and must prepare its own forecasts by means of a rudimentary procedure. Cooperation by radio and TV stations is said to have been excellent. As a result of their broadcasts—and of the efforts of the local civil defense organization, and a limited number of calls by NWS personnel—the warning was spread very quickly. It was received with apathy by some people who did not believe the water could rise high enough to bother them. Others, however, took action to reduce property damage.

The river gage is equipped with a telemark connected through the switchboard of the Appalachian Power Co. This went out of service at 11 a.m. on June 21, when the connecting lines were inundated. Service was restored 25 hours later. In the interim, power company employees supplied slope-gage readings.

Potomac River Basin

Warnings of flash floods and river crests were adequate. Generally, protective action by communities was timely and responsive. Early projections of crest heights, which were low, were subsequently updated in response to continued rain. Communications between WSFO Washington and the District of Columbia Civil Defense Operations Center require improvement. Incidents of unnecessary loss of life reflected a lack of public acceptance of the seriousness of the situation.

Weather forecasts and flash flood watches and warnings for the Potomac River Basin are prepared by RFC Harrisburg and disseminated through WSFO (RDO) Washington.

Watches and warnings were issued by WSFO Washington to Associated Press, United Press International, local radio and television, Red Cross, and civil defense, by means of a local teletypewriter loop and VHF-FM radio. Other offices were notified by telephone. The office's telephone warning list requires 44 calls.

A flash flood watch was issued for northern Virginia, to include the counties immediately west of Washington, D.C., at 6:00 p.m. on June 20. A forecast for "heavy rain at times" was issued at 9:40 a.m., June 21. This forecast was for the immediate forecast period (today). When heavy rain began during the morning, the flash flood watch was changed to a warning at 12:45 p.m., June 21.

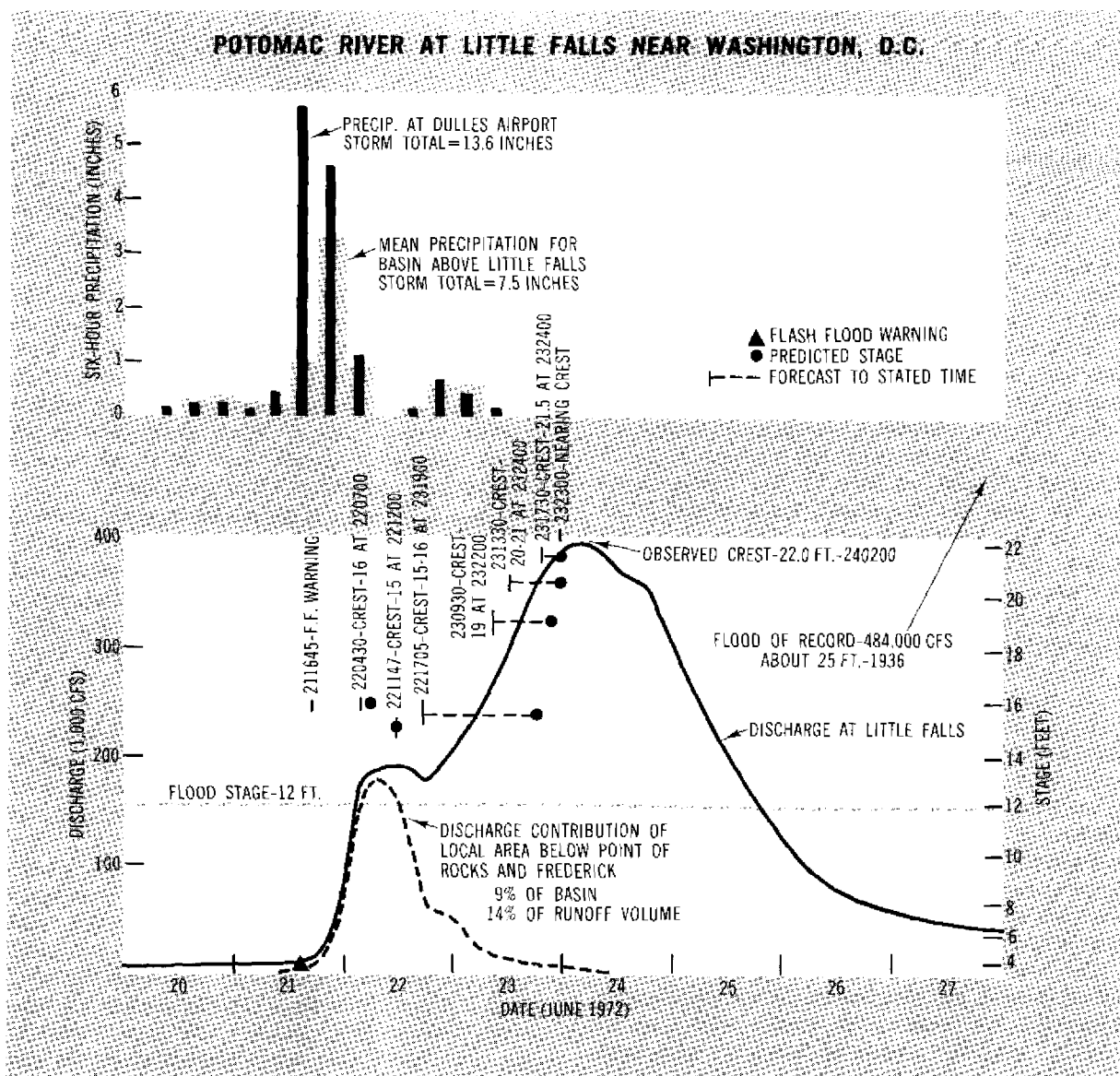
A flash flood warning for the Washington area was issued Wednesday, June 21, at 4:45 p.m. At 6:13 p.m., based on a radar report, the civil defense and police of Alexandria were notified by telephone of impending heavy rain, and evacuation of Four-Mile Run was recommended. A few hours later, Four-Mile Run had risen to record flood level. At 6:00 p.m. on June 21, WSFO Washington, in its capacity as a Hurricane Warning Office, issued a bulletin on tropical storm Agnes, indicating that large stream flooding was expected to be near record-high level throughout the Carolinas and Virginia that night and farther northeast Thursday.

Initial flood crest forecasts were low. However, subsequent predictions, reflecting the continuous heavy rains, repeatedly raised the crest value until the final crest was accurately predicted for Little Falls 11 hours in advance, and for Frederick, Md., about 23 hours in advance. Predictions for the Wisconsin Avenue gage, which is the most important gage for Washington, were complicated by the loss of readings from the gaging site, substitution of readings from a previously unused gage at Key Bridge, and the loss of communications with RFC Harrisburg.

The river forecasts for the Potomac and Monocacy Rivers are normally prepared by RFC Harrisburg and disseminated by WSFO Washington. Because of communications outages between the two offices, WSFO Washington prepared the later forecasts.

There was not optimum coordination between the WSFO Washington and the District of Columbia Civil Defense Operations Center. The Center, which includes the mayor's emergency command post, did not have the information needed to equate crest heights with the potential flooding impact.

The public's primary source of information was radio and television. Surrounding communities reacted well, but there were some minor problems. For the most part, public understanding and reaction



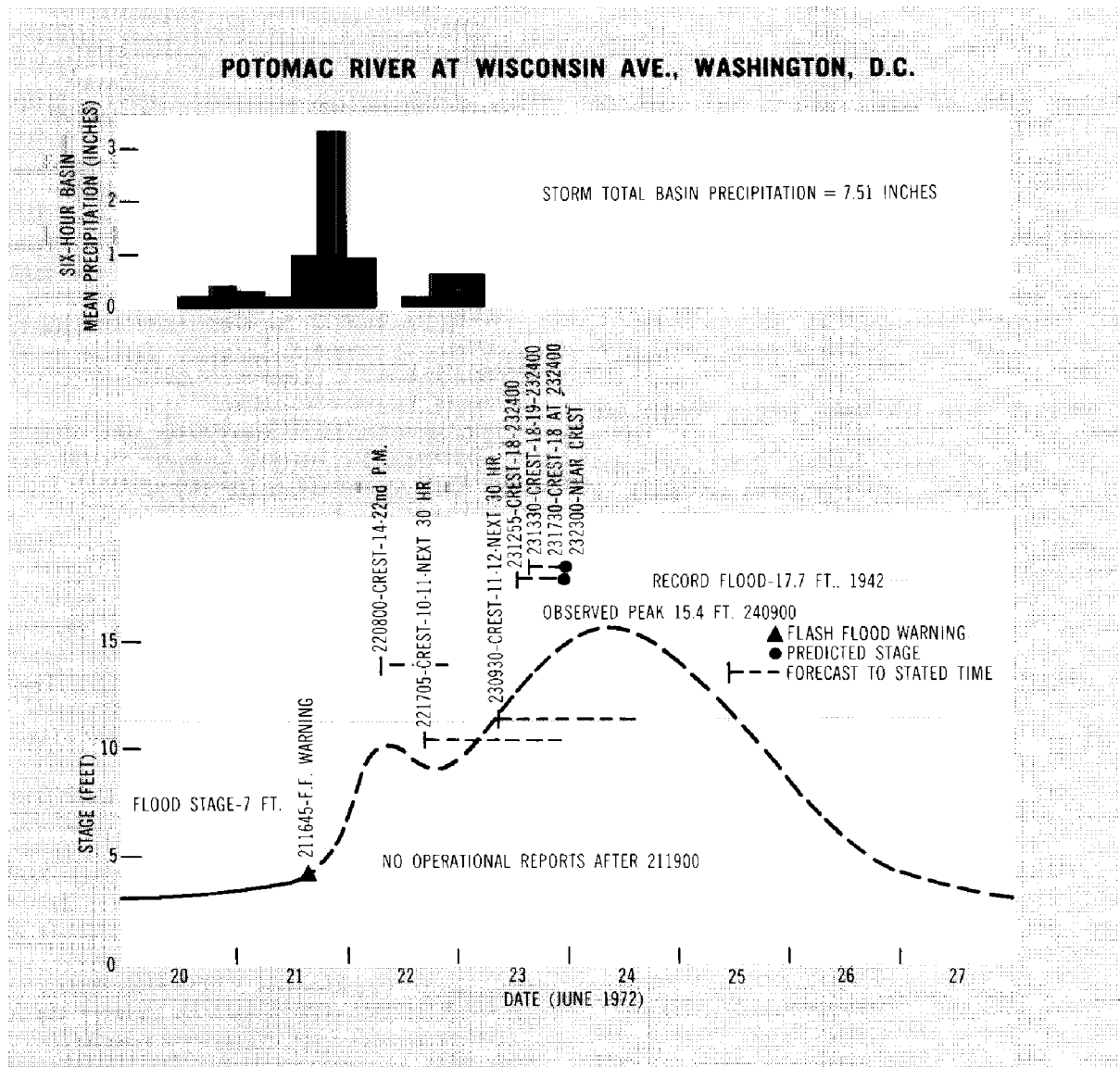
was slow, perhaps bordering on disbelief. Two lives were lost in the District of Columbia when a family went wading in Rock Creek and the two children were swept away from their parents. The Red Cross reports 21 lives lost at unspecified locations in Maryland.

Potomac River at Little Falls Near Washington, D.C.

Little Falls is the last station on the main stem of the Potomac above tidewater. Stages at this gage do not directly relate to flood problems in the Washington, D.C., metropolitan area, but discharge forecasts for Little Falls are used to produce the stage forecasts for the Wisconsin Avenue gage located in the tidal reach.

Rain began in the basin about noon on Tuesday, June 20, and continued at a light-to-moderate rate for 24 hours. During the afternoon and evening of

Wednesday, June 21, it became heavy in the basin with the greatest concentration in the local area immediately above Little Falls. Dulles Airport, which is in this area, recorded 5.74 inches in one 6-hour period and 11.88 inches in the 24-hour period ending at 7 a.m. on Thursday, June 22. The heavy rains caused an almost immediate rise of the river. Flood stage of 12 feet, caused solely by rainfall in the local area, was reached 10 hours after the rise began. An initial peak of 13.5 feet occurred at 2 p.m. on Thursday, June 22. This was followed by a slight drop as the local area runoff receded. Then, as the water from the main portion of the basin moved in, a secondary rise began and continued for 32 hours. The crest of 22 feet was reached on Saturday, June 24, at 2 a.m. This was 10 feet above flood stage but about 3 feet below the record flood of March 1936.



The Washington area had been under a flash flood watch since 9:25 p.m. on Tuesday, June 20, and a flash flood warning was issued at 4:45 p.m. on Wednesday, June 21, at about the time the heavy rain began. The continuing rain required frequent updating of stage forecasts issued during the rise.

There is not much property subject to flooding in the vicinity of the Little Falls gage. Those persons on the warning list were notified, and the forecasts were further publicized through civil defense and local radio and TV stations. Because of the short lead time, precautions were minimal and damage was heavy. Numerous homes in the Seneca area were badly damaged, as were recreational facilities along the river.

The forecast operation was extremely difficult both for RFC Harrisburg and for RDO Washington. A number of factors contributed to this. The initial

rise to flood stage was caused by extremely heavy rain in the local area. The reporting network has very few gages in that area, and the intense rains were not adequately sampled.

While observed rainfall is the quantity used to forecast the initial response at this gaging station, prediction of the main flood wave is based primarily on observed discharge at upstream points. The final forecast for Little Falls is a function of the observed hydrographs at Point of Rocks on the main stem and Frederick on the Monocacy River, the principal tributary to the lower Potomac. RDO lost contact with the river-gaging stations at Frederick and Point of Rocks 37 hours and 19 hours, respectively, before the crest was reached at Little Falls.

Another complicating factor was the fact that, while this was not a record flood for this reach of the Potomac, it was the highest since the gaging and

forecast point had been moved to the present site in 1965. Consequently, the stage-discharge relation for Little Falls was an extension above the previous maximum experienced at this site. This extension has been found to be in error by 1.8 feet.

The Little Falls gage remained operative throughout the event.

The forecast operation was affected by loss of power to the RFC computer at 8 00 a.m. on Friday, June 23. Final forecasts had to be prepared manually.

Potomac River at Wisconsin Avenue, Washington, D.C.

This gage, located at the foot of Wisconsin Avenue in Georgetown, is the principal forecast point for the tidal reach of the river at Washington. The response of the river at this point to rainfall in the basin occurs about 2 hours later than at Little Falls. Consequently, when the intense storm occurred on the evening of Wednesday, June 21, the level rose sharply, and passed the 7-foot flood stage at midnight. An initial peak of just over 10 feet occurred late in the morning of Thursday, June 22. This was followed by a brief fall. Then, as the main flood wave moved in, the level again began to rise to a crest of 15.4 feet at 9 a.m. on Saturday, June 24. This was 8 feet above flood stage, but 2.3 feet below the record flood of 1942.

A flash flood warning was issued at 4:45 p.m. on Wednesday, June 21. Normally, a warning of this type would be considered applicable to small streams in the area but not to lands adjacent to the tidal reach of the Potomac. There was, in fact, no indication at this time that the stage at Wisconsin Avenue would rise above flood level within a few hours. The first actual stage forecast was issued Thursday, June 22, at 8 a.m. at the time the initial 10-foot peak occurred. It called for a continued rise to 14 feet later in the day. When the level began to drop a short time later, this was revised to 10 to 11 feet. When the secondary rise began, forecasts were steadily increased, and shortly after noon on Friday, June 23, called for a crest of 18 to 19 feet, which would have been an all-time record had it occurred.

Many aspects of this forecast and warning operation must be considered unsatisfactory. All of the technical problems that complicated the Little Falls forecast also affected the forecast for Wisconsin Avenue. In addition, the telemetering device at Wisconsin Avenue failed at 7 p.m. on Wednesday, June 21, when the rise had barely begun. RDO Washington was able to obtain stage reports from a city employee who was reading a staff gage at Key Bridge, ½-mile upstream from the Wisconsin Avenue gage. At the time of the peak, the staff gage

was reading 1.4 feet higher than the gage at Wisconsin Avenue.

NWS was criticized—not because of the quality of the forecasts—but because those forecasts consisted only of anticipated stages. The critics maintained that NWS personnel should have advised them what land areas would be inundated and what action should be taken.

While the flood in the Washington area was not disastrous, it caused fairly heavy damage to both private and public property. Four deaths were reported in the immediate area.

Because of the loss of power to the RFC computer at Harrisburg, the last two forecasts for this point were based on manual computations.

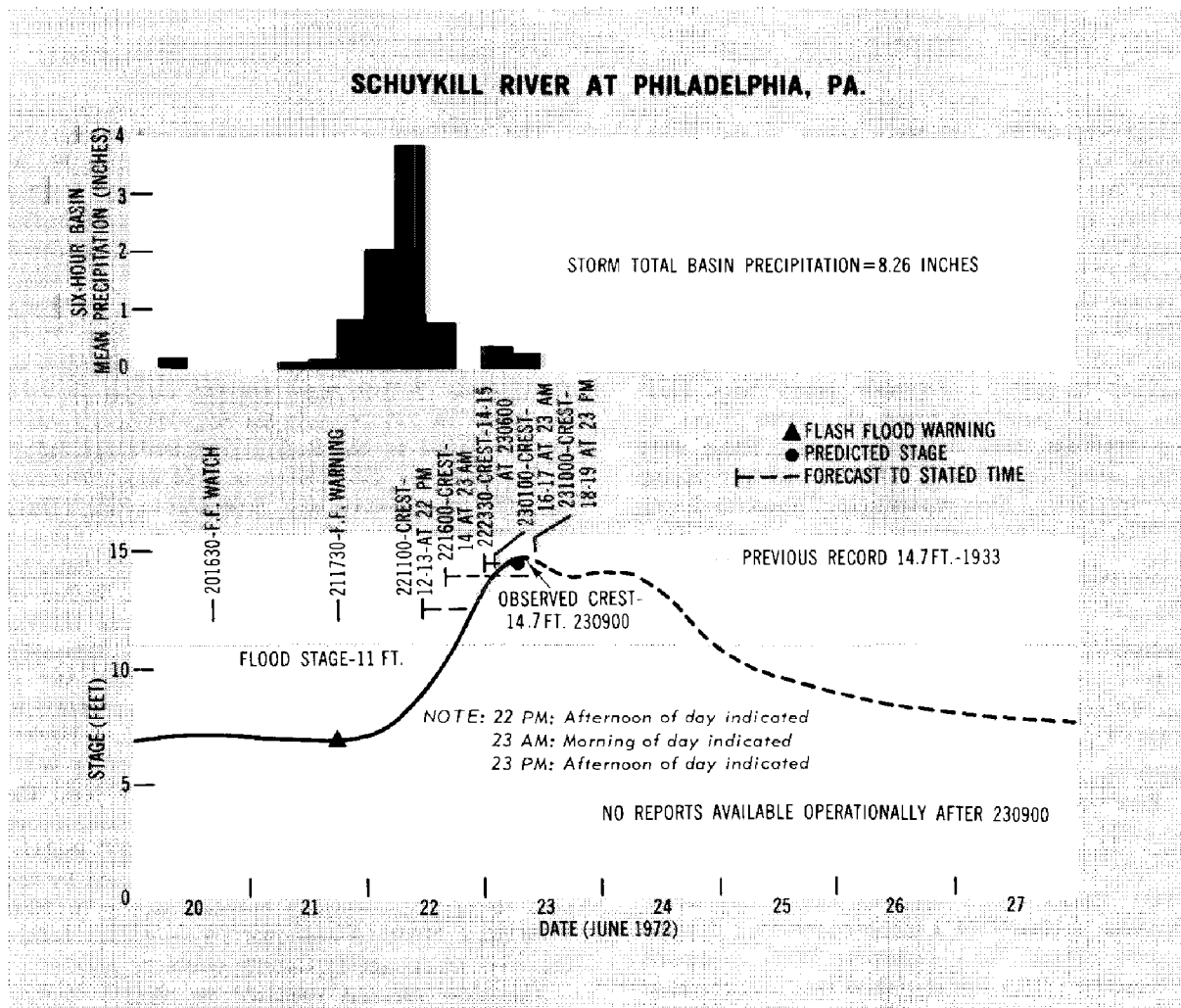
Schuylkill River Basin

Early forecasts of flood and flash flood conditions were timely and, although low, brought good response from appropriate action agencies. After June 22 river gages above Reading were not operating; observations from a gage in Reading made possible accurate predictions for points downstream. Evacuation and rescue efforts prevented large losses of life. The principal problem was dissemination of forecasts and warnings to the public.

Weather forecasts for the Schuylkill River Basin are prepared at WSFO Philadelphia. River stage forecasts are normally prepared by RFC Harrisburg. However, during the widespread flooding, WSO Trenton, using previous RFC guidance and the system's forecast procedure, issued river forecasts for the Schuylkill River. Area flash flood watches and warnings are also issued by WSFO Philadelphia and by WSO Trenton. Action agencies received the information through State civil defense systems and/or State Police teletypewriter circuit. The general public received warnings through radio and television, which were serviced by Associated Press or United Press International. (In this area, there are very few subscribers to the NOAA Weather Wire Service.) The news wire services gave bulletin status to all weather warnings. However, from 30 minutes to an hour sometimes elapsed between the issuance of a warning and its receipt by the radio/television studio.

The first forecast of heavy rain was issued by WSFO Philadelphia at 5:00 p.m. on June 20, indicating heavy rain that night. A flash flood statement was issued by WSO Trenton at 7:30 a.m., June 22, for the upper Schuylkill.

All river gages in the Schuylkill basin except the power company staff gage at Reading became inoperative during the afternoon of June 22. The result was a total lack of information on river stages above Reading, but forecasts for points below Reading were good.



NWS radars closest to the Schuylkill River Basin are located at Patuxent River, Md, Atlantic City, N.J., and New York, N.Y. These radars do not provide the adequate information on rates of precipitation over the basin that is needed for flood and flash flood warning services.

An additional man was temporarily detailed by Eastern Region Headquarters to the WSO staff at Trenton, N.J., on June 21. The Meteorologist-in-Charge, WSFO Philadelphia, was not on duty, but the office had sufficient personnel available during the emergency.

Although some action agencies were unable to relate the river stage forecasts to probable flooding, civil defense and other action agencies responded extremely well and can be credited with keeping loss of life to a minimum. Two lives were lost. Generally, people apparently did not appreciate the severity of the flood. NWS received compliments from the mayor, borough manager, and newspaper editor from Pottstown.

Newsmen in the area felt that the lack of public response may have been due to a too frequent

issuance of watches, which the public comes to ignore.

Schuylkill River at Philadelphia, Pa.

Rain began in the basin on the morning of Wednesday, June 21. The intensity was light during the afternoon and early evening, but became heavy during the night. The area had been under a flash flood watch since 4:30 p.m. on Tuesday, the 20th, and the first warning was issued at 5:30 p.m., Wednesday, in anticipation of the heavy rain. By daybreak on Thursday the 22d, the river was beginning to rise and at 5:30 p.m. the 11-foot flood stage was reached. The rain began to taper off during the afternoon. The river continued to rise through the night, cresting at 9 a.m., Friday, June 23. The maximum stage was 14.7 feet, equal to the flood in 1933 but 3 feet below the record of 17 feet set in October 1869.

Crest forecasts were issued throughout the period of the rise. Those issued shortly before and at the time of the crest called for a secondary rise, 3 to 4 feet higher than the first crest. A secondary crest did occur, but it was lower than the first.

Extensive precautions were taken in the Philadelphia area, consisting of the placing of highway barricades and the evacuation of residences in the northern suburbs. While damage was heavy in the Schuylkill basin as a whole, it was light in and around Philadelphia. Three deaths were reported.

While the river gage survived the flood, the telemark was out of service from the time of the crest to the end of the event. During that period, stage reports were not available operationally. Forecasts for this point are based, to a large extent, on stage readings from upstream points. These were almost completely lacking. The stations (proceeding downstream) and their reporting performance during the flood are as follows:

Berne: Out of service permanently at 1 p.m. on June 22.

Reading: Reported crest of 31.5 feet at 4:30 a.m. on June 23. Report was received at RFC at 9:00 a.m. This crest was 9.5 feet above the previous record of 22 feet set in May 1942.

Pottstown: Last report was at midnight on June 22. River stage was 20.9 feet and said to be rising. It eventually went 9 feet higher. The previous record of 21 feet was set in February 1902.

Norristown: This is the last main stem station before Philadelphia. Therefore it is most important in making river forecasts for Philadelphia. While no reports were received from this station at the time, the river at Norristown crested at 24.5 feet on June 23. The previous record of 21 feet was set in August 1933.

Genesee River Basin

The initial flash flood warning for the basin's headwaters was issued after flooding had occurred in several communities. Subsequent issuances provided good lead time for protective action downstream. There was no loss of life reported on the Genesee, and understanding of the warnings was exceptionally good. A potential dam failure was averted by good coordination between the Corps of Engineers and WSO Rochester.

WSFO Buffalo prepares zone weather forecasts for upper New York State, including the Genesee River Basin. This basin is outside the jurisdiction of a River Forecast Center. River stage forecasts are prepared by RDO Rochester. Flash flood watches and warnings for the Genesee are issued through WSFO Buffalo and transmitted to WSO Rochester by telephone and RAWARC* for distribution. Dissemination is made through news wire services, local teletypewriter loop, VHF-FM, and a telephone warning list. There is no NOAA Weather Wire Service in New York State.

The first forecast of rain and thunderstorms was issued by WSFO Buffalo at 5:00 a.m., June 20. At 6:20 a.m., June 21, WSO Rochester called Buffalo to report that Scio, N.Y., had received 2.76 inches of rainfall in 12 hours, and the river was 2 feet above flood stage. Ten minutes later, forecasters in Buffalo heard on commercial radio that schools in Wellsville, N.Y., were closed because of flooding. These two communities are located on the headwaters of the Genesee. A flash flood warning for the Genesee River and its tributaries in the Scio/Wellsville vicinity was issued by the Buffalo forecaster and called to Rochester for distribution at 7:00 a.m., Wednesday. The zone forecast was revised to include a flash flood warning.

At 7:35 a.m., June 21, WSO Rochester reported that Scio had received an additional 1.6 inches of rain in 1 hour. Flooding in Wellsville and Bolivar areas, heavy rain in Steuben County, and overflowing in Hornell, N.Y., were reported over NAWAS* at 7:40 a.m. The flash flood warning was extended to include Allegheny, Livingston, Steuben, Schuyler, Yates, and Ontario Counties and distributed by WSO Rochester at 8:30 a.m. that day. At 10:30 a.m., the city of Wellsville lost power, and communications were disrupted. NAWAS was used by WSFO Buffalo, but time lags of up to an hour were caused by the need to read the warning bulletins slowly to New York State NAWAS headquarters in Albany before the relay to Allegheny County could be effected.

The river forecast prepared by WSFO Buffalo and disseminated by WSO Rochester is given in table 1.

The lower Genesee River Basin was subjected to the successive rains of two large weather systems on June 21 and 22, which produced two separate but cumulative flash floods in the Genesee headwaters on these days.

Flooding along the main stem of the Genesee did not take place until Friday, June 23. River statements and warnings were issued well in advance of flood occurrence. On June 24, the flood control dam at Mt. Morris, N.Y.—which is normally empty—became filled to capacity and threatened to cause a major disaster if it were to collapse. The Corps of Engineers contacted WSO Rochester to advise them of the need to relieve pressure on the structure. Personnel at RFC Hartford responded to WSO Rochester's request to calculate a safe flow level and advised that a flow level not to exceed 15,000 cubic feet per second would be required to prevent disastrous flooding downstream. Residents who would be affected by the flow were given 5 hours' notice (by the Corps) to evacuate before the water was

*NAWAS—National Warning System, primarily a conference telephone system operated by Civil Defense

Table 1.—River forecast for Genesee River

Station	Flood stage	Previous flood record	River Stage Forecast			Date & time (EDT) river first reached flood stage	Crest, date & time (EDT)
			Date & time issued (EDT)	Forecast stage	Effective date & time (EDT)		
GENESEE RIVER Portageville	17'	28 9' 1956	21/10:45 p.m.	21.0'		Unknown	22.0' 23/12:00 noon

released from the dam. Some flooding occurred as a result of the relief flow, but the greater threat was averted.

No warnings were issued for the flooding that occurred at Wellsville about 2:30 a.m., June 21. The local radio station was critical of NWS. The station's telephone call to WSFO Buffalo was answered by a recorded message of general weather information. The station is on WSO Rochester's call list, but its staff asserts that no call was received.

The emergency situation in WSO Rochester was complicated by the retirement of the Meteorologist-in-Charge, who was absent on terminal leave. The slack was taken up effectively by WSFO Buffalo, and the vacant position was filled quickly by dispatching an acting Meteorologist-in-Charge from Albany.

Susquehanna River Basin

Flood and flash flood warnings for the Susquehanna River Basin ranged from excellent—as in Wilkes-Barre, where a long lead time permitted the evacuation of up to 100,000 persons and prevented a major loss of life—to warnings with a minimum lead time, as in Harrisburg. Public dissemination of warnings for many small towns along the Chemung River was inadequate. Public response varied from excellent to poor. The reason for the great variation in performance of the warning system was the erratic nature of torrential rains, which in some cases brought very rapid river rises. On balance, according to Gov. Milton J. Shapp, NWS has "every reason to be proud" of its performance.

Weather forecast responsibility for the Susquehanna Basin is divided between the Pittsburgh, Philadelphia, Albany, and Buffalo WSFOs. All river forecasts are prepared by RFC Harrisburg.

A flash flood watch was issued at 11:00 a.m. on the morning of June 21 by RFC (RDO) Harrisburg for much of the Susquehanna Basin. A flash flood warning issued at 3:00 p.m. that day, as extremely heavy precipitation began, assured excellent lead time before critical stages could develop on smaller streams.

Perhaps the most outstanding issuance of the whole disaster was a flood forecast sent by RFC Harrisburg to the civil defense office in Wilkes-Barre

at 3:00 a.m. on Friday, June 23. This forecast stated that the Susquehanna at Wilkes-Barre was expected to crest at 40 feet, at 8:00 a.m. on June 24, 7 feet above the flood of record. The forecast triggered a mass evacuation of 80,000 to 100,000 persons by civil defense authorities, and is unquestionably responsible for preventing a disaster of unimaginable magnitude.

Forecasts were distributed to the public and public safety officials by means of the NOAA Weather Wire, the news wire services, and available civil defense and State Environmental Protection Agency systems. Personal telephone contact provided the only warnings for many areas. In Pennsylvania, the NOAA Weather Wire did not have sufficient subscribers to make it an adequate warning medium. In New York State, where the NOAA Weather Wire is not installed, broadcasters monitored other stations and maintained contact by telephone. Normal dissemination of forecasts through RDO Binghamton for the Chemung River is by telephone.

Flood warning bulletin #1 was issued by WSO (RDO) Binghamton, N.Y., at 9:30 a.m. on June 21, for Steuben, Chenango, and Tioga Counties, which encompass the cities of Hornell, Painted Post, Corning, and Elmira. This bulletin, advising "all interests to take maximum protective action immediately," was distributed by telephone to a calling list which included Elmira and Corning radio and TV stations. At 10:15 a.m., the flood warning bulletin was extended to include additional counties, and, at 11:00 a.m., the extended warning was telephoned to area radio and TV stations as part of the local forecast. At 4:00 p.m., June 21, flash flood warning bulletin #2 was issued for Steuben, Chemung, Tioga, Broome, Chenango, Cortland, and Otsego Counties. Although the bulletins were repeatedly broadcast, there was a consensus that "there was no recollection of warnings."

Crest forecasts issued during the progress of the storm required frequent upward revisions to reflect the continuous heavy rainfall. This situation was prevalent throughout the river basin. The performance of the local radio and television stations was exemplary. In general, they were the principal means of warning citizens and, in some cases, they were the only avenue of warning, remaining on the air for

80 to 90 hours until the emergency was over. Most stations exercised good judgment in filtering rumors and avoiding sensationalism, refusing to broadcast reports of broken dams, for example, until the information could be verified. Many small stations invested large sums of money in long-distance telephone calls to obtain continuous information on weather and flood conditions.

The staffs of all NWS offices in the basin performed admirably under extremely hazardous emergency working conditions. The staffing capacity for RFC Harrisburg was stretched near the breaking point as the effects of Agnes spread throughout the entire assigned forecast area.

As the flood rose to above-record proportions, 22 river gaging stations out of 60 on the river became inoperative or were destroyed, and communications systems began deteriorating. Portions of the Federal-State Radio River and Rainfall Reporting Network became inoperative.

Power failures were prevalent throughout the Susquehanna Basin, affecting the timely collection of rainfall and river information as well as the preparation and dissemination of flood forecasts. Failure of the power system supplying RFC Harrisburg, at 7:14 a.m. on June 23, was most critical. The Center's staff then had to perform forecast operations manually, under lantern light. When the telephone and teletypewriter system at RFC Harrisburg failed, time-consuming emergency methods were employed to collect substation reports and disseminate forecasts. The staff was able to make outgoing calls, and this made it possible to obtain minimum data. There were no signals to indicate incoming calls.

Public understanding and reaction varied. In the Covington/Mansfield area of Pennsylvania, one man was awakened in his mobile home and informed of the flood approach. He responded by turning over and going back to sleep. Instances were cited of people refusing to leave their homes, necessitating dangerous rescue efforts later, which cost the life of at least one rescuer in Painted Post, N.Y. At the other end of the scale, many people in Selinsgrove, Pa., reacted quickly enough to save personal belongings and even appliances. There was both criticism and praise for NWS operations, leavened by a widespread feeling that "everyone was having his problems" in this short-fuse phenomenon.

The Williamsport Mayor, John R. Coder, the local radio and TV media, and the Lycoming County Civil Defense Director expressed praise for the dedicated service rendered by the staff of WSO Williamsport. In Williamsport, Pa., the malfunctioning of a river gage, used by WSO Williamsport for its reports to the community, occasioned a complaint by the Ly-

coming County Commissioner.

Both flash floods and river floods occurred at Harrisburg, and the public was confused by the two types of warnings. Flash flood warnings requiring immediate action were in effect while river flood warnings were predicting flooding some hours later. For example, the publisher of the *Harrisburg Patriot News* reported that he and his staff came to work at 4:00 a.m. on Thursday morning, June 22. At 7:00 a.m., the river stage on the Susquehanna at Harrisburg was 11.2 feet, 5.8 feet below flood stage. But at 10:00 a.m. the newspaper staff was evacuated from its offices, with the loss of one life. Flash flood warnings were in effect at that time because of heavy rains during the night. The flooding of the *Patriot News* was from flash flooding on Paxton Creek. The Susquehanna reached the flood stage of 17 feet at Harrisburg at 2:00 p.m. that evening.

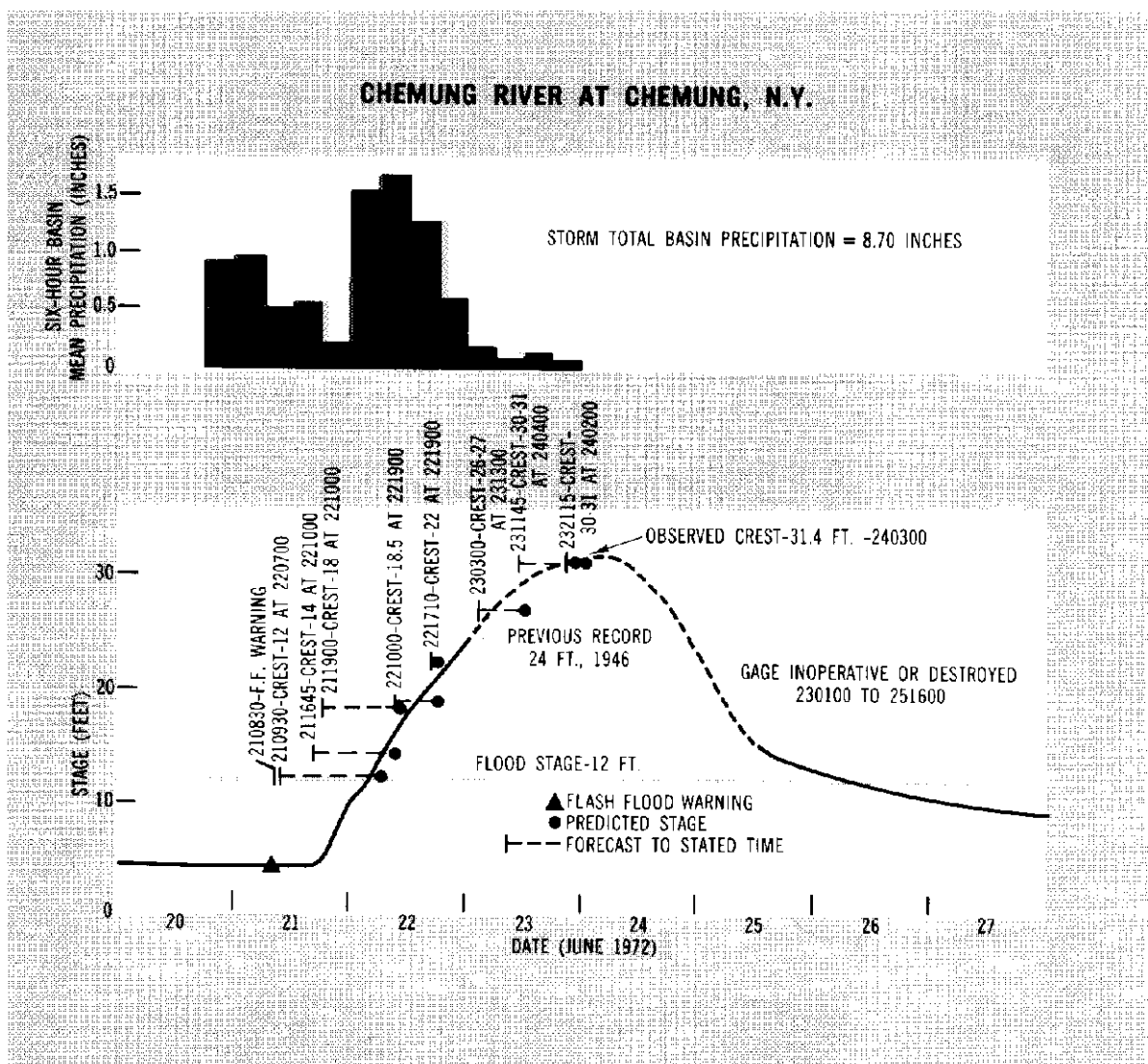
The effectiveness of the support provided is described in the following letter from Milton J. Shapp, Governor of Pennsylvania, to the Hydrologist-in-Charge of RFC Harrisburg:

"On behalf of the people of Pennsylvania and the Commonwealth Government, I extend to you and your fellow workers in the Federal-State River Forecasting Service our sincere thanks for the highly valued service so capably rendered in connection with last month's disastrous flood.

"The June 20 flash flood watch, changed to a warning the following day, provided people in the Lower Susquehanna River Valley with initial notice and forecast of things to come. During the next several days, the widespread disruption of communications systems and facilities admittedly resulted in some delays in the normal dissemination of crest forecasts and similar information. Nonetheless, the vital messages did 'get through'.

"Should there be any doubt as to the value of the forecast operations, I need cite only the 40-foot crest predictions for Wilkes-Barre, which came early Friday morning, June 23. Passed to the Luzerne County officials by our State Civil Defense Director, with a recommendation that everyone 'behind the dikes' be evacuated, that single bit of essential information unquestionably was responsible for the saving of countless human lives, which otherwise would have been lost.

"You and your associates have every reason to be proud of your contribution to our common safety."



Chemung River at Chemung, N.Y.

Significant rainfall began in the basin on the evening of June 20. The area had not been under a watch, and the first flash flood warning was issued by RDO Binghamton at 8:30 a.m. on June 21. At this time, sizeable rises had started in the headwaters but no rise had yet taken place at the station. The rainfall through June 21 was associated with a cold front. By the time precipitation ended late on June 23, tropical storm Agnes had contributed about 4 inches for a 4-day total of 8.7 inches over the basin. The heaviest amounts were in the upper portion of the drainage. A crest of 31.4 feet occurred on the morning of June 24. This is 19 feet above flood stage and 7 feet above the previous record of 24 feet in May 1946. The gage was destroyed. It became inoperative about 24 hours before the crest was reached, while the river stage was 8 feet below the maximum. Final forecasts for this point were prepared manually after power to the RFC computer was lost.

Failure of communication facilities in the area hampered protective and rescue operations. Information on the extent of these operations is sketchy.

Property damage in the area was extremely heavy. While no deaths have been reported in Chemung, there are said to have been 19 drownings in the upper basin near Corning.

Susquehanna River at Wilkes-Barre, Pa.

On the morning of June 21, no rain was falling in or near Wilkes-Barre, but the flood crest then developing above Chemung would eventually affect this area. A flash flood watch was issued at this time and replaced by a warning during the afternoon. Rain began in the area immediately north of Wilkes-Barre later on June 21 and continued through June 23, producing 6 inches in the local drainage below Chemung. This, added to the flood wave caused by even heavier rain above Chemung, produced a crest of 40.6 feet on the evening of June 24. This is 18.6 feet above flood stage and 7.5 feet above the previous record set in 1936. Preparation