

UNITED STATES DEPARTMENT OF COMMERCE
WEATHER BUREAU
WASHINGTON

May 23, 1958

IN REPLY, PLEASE ADDRESS
CHIEF, U. S. WEATHER BUREAU
WASHINGTON 25, D. C.
AND REFER TO

C-3.1

MEMORANDUM

TO: Area and State Climatologists, Substation Inspectors, Field Aides, WRPCs, River Forecasts Centers, River District Offices, and Area Engineers (with copies to Regional Offices for information)

FROM : Office of Climatology

SUBJECT : Climatological Services Memorandum No. 65

1. INFORMAL MINUTES OF THE 6TH MEETING OF THE NATIONAL RESEARCH COUNCIL, ADVISORY COMMITTEE ON CLIMATOLOGY: By invitation of the Chairman the meeting was held on the campus of the University of Missouri, Columbia, Missouri, March 24-25, 1958.

Present: Members: Dr. J. H. Longwell, Chairman
Dr. Phil E. Church
Dr. W. Wendell Hewson
Dr. T. F. Malone
Dr. W. E. Reifsnyder

Representing Earth Sciences Division, NRC:
Dr. William R. Thurston

Weather Bureau Personnel:
Dr. H. E. Landsberg
Dr. G. L. Barger
Mr. M. L. Blanc
Mr. W. C. Palmer
Mr. L. A. Joos
Mr. J. D. McQuigg

Principal Investigators on Weather Bureau Contracts:
Kansas State College - Dr. William van der Bijl
University of Missouri - Dr. Wayne L. Decker
Iowa State College - Dr. R. H. Shaw

Part-time present, by invitation:
Dean emeritus Miller, School of Agriculture,
University of Missouri

The research groups who were represented made progress reports on their respective projects. It was gratifying to note that in spite of the overlap of the general theme of the investigation almost no duplication of effort exists and a high degree of coordination of the various projects was

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accomplished through this meeting. Some very interesting results have been obtained already.

For example, Dr. Shaw indicated that in Iowa he found that pond evaporation is about .61 of the standard evaporation pan. This coefficient is considerably lower than that found by others in different settings. The mid-summer losses in Iowa are .18" per day on an average. Experiments were started to use plastic covers over the soil to determine separately transpiration and evaporation. Considerable difficulties were encountered which will have to be overcome by later experiments.

Dr. van der Bijl, who had prepared a comprehensive report on the current status of the evapotranspiration question, indicated the line which will be taken in the future. This will primarily be a check on the aerodynamic procedure and will run parallel with another investigation planned by Kansas State on the problem of shelter belts.

Dr. Decker presented the results of the measurements of losses on a number of experimental plots and indicated that the data could be most effectively represented by the Penman procedure of calculation.

Dr. Barger reported on the Project NC26 and the fitting of Gamma distributions to the rainfall data. In the tabulation of weekly results there are some apparent singularities but validity of these remains to be verified.

Mr. Palmer's attempt to obtain a definition of drought severity and obtaining a classification of a disaster category was well received. As a result of Mr. Blanc's talk considerable discussion ensued about the use of the new neutron scattering meter for soil moisture determinations. It was brought out that the Agricultural Research Service was likely to order up to 100 of these devices for use by cooperative agricultural experiment stations.

As a result of the discussions the Committee felt that the so-called "book-keeping methods" of soil moisture determinations should be continued until the radiological devices become more readily available and sufficiently practical for the purposes. The value of soil temperature measurements was stressed and a need exists for the Weather Bureau to expand its observational program at selected stations in this direction. There was a feeling that the present WMO depth of measurements (10, 20, 50, 100 cm.) are not adequate and that in a few places measurements to perhaps 7 meters ought to be instituted in order to determine the heat balance with greater accuracy. Considerable time was also devoted to the discussion of use of devices to obtain the radiation temperature of the soil surface. The Committee would like to see Weather Bureau research expanding in this direction. Instrumentation of some of the agro-climatic stations with Livingston atmometers or black Bellani plates was suggested. Dean Longwell mentioned the probability that some of the problems are likely to be tackled in the future by the agro-climatic laboratory for the Great Plains which is in the plans of the Agricultural Research Service.

On March 25th the Committee met in executive session to discuss preparation of its report.

2. CLIMATES OF THE STATES: Plans are going forward to issue "Climates of the States" as a part of the "Climatology of the U. S. series, with a separate for each state.

As planned, each separate would consist of five sections as follows:

I. The narrative description of the climate of each state. Most of these texts were written a few years ago by State Climatologists. They are now being reviewed by State and Area Climatologists.

II. A table of Mean Temperature and Precipitation for each state, similar to the table of the same name published in the letter supplement series. These have now been printed for all but 11 states and would be reproduced as they are.

III. A table of freeze data presenting average last dates in spring and first in fall of 5 freeze thresholds along with length of freeze-free period and number of occurrences of each threshold value during the period.

IV. A table of Normals, Means, and Extremes for each first order station in the state. This will be a reproduction of these tables from the latest LCD annuals.

V. A number of maps presenting climatological data for the states.

3. SUBSTATION INSPECTION: The Central Office is making a staff study of the inspection program. We have been asked two questions :

- a. Can we furnish concrete, documented evidence of the deterioration of substation observations or networks during the past few years?
- b. Can we furnish complaints received from non-Weather Bureau users concerning the quality of substation observational data.

All recipients of this CSM who can help us answer these two queries are urged to write us their comments at an early date. Reports from the NWRC and the WRPC's are particularly desired.

4. TORNADO ARTICLE IN STATE MUNICIPAL REVIEWS: A copy of an excellent article, "Tornadoes Can Be Disastrous", by State Climatologist, Mr. James D. McQuigg, in the Missouri Municipal Review is attached to this CSM. It is suggested that State Climatologists in those areas where tornadoes or other severe storms commonly occur consider the preparation of the climatological portion of a similar article for their state. Completion of the article and issuance in State Municipal Reviews should be accomplished by the local MIC (where he is not the State Climatologist).

In addition to providing timely information, the articles in the Municipal Reviews may help stimulate the local governments in the establishment of local tornado reporting and warning networks. Such networks are an effective method of independent community action in protecting their residents from threatening severe storms.

The address of the executive officer of each State Municipal League is also attached to this CSM.

5. PUBLICATIONS DEALING WITH CLIMATOLOGY: From time to time State Climatologists send us a copy of a publication, obtained locally, which treats of Climatology. In such cases we would like to get 3 copies, one for the C.O. Library, one for the NWRC and one for us. All 3 copies could be sent to this office.

6. DIAL-TYPE THERMOMETERS: Dial-type maximum-minimum thermometers employing bi-metallic strips as sensing elements have been in use for several years, and there is general agreement that all weather observers would find it easier to use the dial-type instrument than the standard liquid-in-glass types. The Weather Bureau has tested all of the bi-metallic strip dial-type thermometers as they have been placed on the market, and has found that all of them lack sufficient accuracy for official use as air thermometers, and have other defects when used as soil thermometers. A dial-type maximum-minimum thermometer using a mercury-in-steel sensing element has recently been developed, and this instrument shows great promise. It has proven to be accurate and dependable in tests in the laboratory and at Silver Hill Observatory. Prototypes have been distributed for further field testing. A long-stem model has recently been delivered to Silver Hill for testing as a soil thermometer. If this instrument lives up to its early promise it may revolutionize temperature-measuring techniques in our surface observation and climatological observation programs, for it would permit radical changes in our instrument shelters. Research in this field is continuing, and will be reported at intervals.

7. CLIMATOLOGICAL DIVISIONS: REF: Memo of 0-2.52 dated March 12, 1956. The referenced memo asked State Climatologists to review and, where necessary, revise climatological divisions. This has now been done and the revised divisions are shown on pages 6 and 7 of the November 25, 1957 National Weekly Weather and Crop Bulletin. These divisions are also used in the Climatological Data publications and in the 25-year Mean Temperature and Precipitation tables. Eventually they will be used in the 'Climates of the States' and probably in a table of Comparative Data in the CD.

We feel that the divisions generally are satisfactory although there are a few cases of discontinuity at state lines.

We are now close to the point where any further extensive changes in divisions would result in much wasted effort so we would like to discourage such changes.

However, if any State or Area Climatologist feels that any further changes are needed we should be advised of them as soon as possible, not later than June 30, 1958.

8. RECENT AIR CONDITIONING JOB: An interesting job was recently done at the NWRC for an organization concerned with air conditioning installations. Details of this job as reported by the NWRC are as follows:

- (a.) Approximately 400 station records were tabulated, using hourly data for readily available record, averaging about 8 years, but with a priority list of stations for which 10-years were used.
- (b.) Only the cooling season, June, July, August and September were used.
- (c.) The primary emphasis was on detailed frequency distribution of wet bulb temperature essentially by whole degree classes with the exception of the low values and one open end class at the top. Two basic spreads were used to encompass northern and southern latitudes.
- (d.) Since the most economical method of deriving these frequencies was by the use of the 101 electronic statistical machine, advantage was taken of the fact that additional counts could be accumulated as a by-product without additional cost. To attempt to furnish useful information on coincident weather with high wet bulbs the ASHVE tabulations were used as a guide, and a wet bulb temperature selected which was exceeded approximately 20% of the hours. For each observation equalling or exceeding this wet bulb temperature, the following was included:
 - i. Frequency of coincident dry bulb temperature in 3° F classes.
 - ii. Frequency of coincident wind; calm, 0-10 MPH (to 8 compass points), 11-20 MPH (to 8 compass points), and more than 20 MPH.
 - iii. Frequency of coincident precipitation.
- (e.) The frequencies specified in c and d above were obtained in a single 101 pass.

- (f.) The summary cards were then passed through the 650 and mean frequencies by month and by season computed and listed.
- (g.) The cumulative average frequencies were listed (one line per station), with the station name and elevation. We understand that this set of data is to be printed for distribution to design engineers.

9. CLIMATOLOGICAL SUBSTATION SUMMARIES: REF: CSM #60, Item 2. The substation climatological summaries, prepared in cooperation with various agencies, continue to be well received. The following is taken from a letter to the Chief of Bureau from the Manager of the Carlsbad, N. Mexico, Chamber of Commerce who is also President of the New Mexico Chamber of Commerce Managers Association.

"As President of the New Mexico Chamber of Commerce Manager's Association, I wish to commend you and your staff for what I feel is one of the finest examples of community relations I have had the pleasure of seeing recently. I know I speak for all members of our organization in expressing our gratitude to you in making this very worth while Climatological Summary available to us."

These summaries have been well received by the public, and we hope eventually to have some 500 of them issued. The total published is now 163.

10. DATA FROM CAA STATIONS: Several years ago, CAA stations were relieved of the responsibility of observing and recording such climatological elements as extreme temperatures and precipitation, as a concession to especially heavy work loads. At the present time, at least 11 CAA stations do not record these elements. For the remaining CAA stations, WRPC,s are furnishing State Climatologists advance copies of daily extreme temperatures, precipitation, and snowfall by means of either Forms 612-14, extra copies of "Preliminary Listing of Form 1009", or listings of #3 cards. State Climatologists may occasionally find it necessary to refer to hourly observations of CAA stations. They should request photocopies of the appropriate daily records from the WRPC, if within 45 days after the end of the data month, or from the NWRC thereafter.

11. THE SUBPOENA PROCESS: The following was taken from a memo to a State Climatologist:

"Since the subpoena process is at the heart of the United States judicial system, it has been the policy of the Weather Bureau to cooperate unreservedly except in those cases where furnishing information either in person or through certified records would be inimical to the public interest. Actually there has been no case in the memory of officials now in the Central Office wherein such a finding has been made, i.e., that furnishing of information would have been inimical to the public interest.

"Since you have not indicated that supplying the required information would be inimical to the public interest, we must advise that instructions in Weather Bureau Manual, Volume III, Chapter D-6601, that apply otherwise

should be followed. In other words if the attorneys are unwilling to accept certified copies of the records and cannot be persuaded to engage a private meteorologist, we see no alternative to obeying the subpoena."

12. SUPERVISION OF STATE CLIMATOLOGIST: Technical supervision of the State Climatologist is by the Area Climatologist in the field and by the Office of Climatology in Washington. A number of papers have been written by State Climatologist and sent directly to the Central Office for approval. It is suggested that papers for presentation or publication be sent thru the immediate technical supervisor (the Area Climatologist) enroute to the Office of Climatology.

13. NEW DIRECTOR AT THE NWRC: Mr. Roy L. Fox, formerly Meteorologist in Charge at Honolulu, T. H. is the new Director of the NWRC.

Dr. Gerald Barger, formerly the Central Area Climatologist, is now the Assistant Director of the NWRC. Dr. Barger's successor at Ames, Iowa has not yet been selected, hence correspondence normally directed to him as CAC should be sent to this office instead.

14. CLIMATOLOGICAL PUBLICATIONS FURNISHED: Chapter I, II, and III of F. A. Brooks "An Introduction to Physical Microclimatology", published by the University of California has been sent to each State and Area Climatologist, to the WRPC's and to the NWRC.

15. NATIONAL ATLAS BASE MAPS: A new U. S. base map on Albers equal-area projection has been printed to facilitate the preparation of the series of charts for the National Atlas. It is printed in two sizes. The larger size is of the scale 1 to 5 M, about 24 x 38 1/2 inches, and shows the topography by shading for 7 intervals of elevation, latitude and longitude by 1° intervals, state and county outlines, county names, and the names and CD index numbers for about 200 first order stations. The smaller size is of the scale 1 to 10 M, about 12 x 19 inches, and contains the same information as the larger size, except that counties are omitted. These are work bases, but the various overlays from which they were prepared can be used to build up other maps. A few copies of the base maps will be sent to each State Climatologist, Area Climatologist, WRPC, Regional Office, and the NWRC.

Mr. H. C. S. Thom of the Office of Climatology is the Weather Bureau representative of "The Committee on a National Atlas of the United States." A committee has been appointed also in the Office of Climatology to supervise this project. It may be desirable to send some of the preliminarily analyzed charts to the State Climatologists for assistance in the peculiarities that prevail in the individual states. If conveniently available, we would like copies of any climatic charts you may have prepared in the last few years, such as mean or normal monthly and annual charts of temperature and rainfall.

16. SPECIAL ARTICLES FOR WEEKLY WEATHER AND CROP BULLETIN NATIONAL SUMMARY:

In the 3 1/2 years this Bulletin has been printed in 8 pages, over 120 special feature articles and about 50 short, current unusual weather summaries have been carried. Many of these have been reprinted in other publications, and in a few cases it was necessary to make reprints. During the past year less space has been available in the Bulletin due to a suggestion through the Department of Commerce that we print for 200 cities tabulations of temperature and precipitation for the past month and the normal or averages for the following month. More space will now be available for special articles due to reduction in the size of the regular charts and to dropping the normal monthly temperature and precipitation tabulation in 2 months.

We would like to remind Area and State Climatologists that special articles and unusual weather features that have an informative, educational, or general interest are much appreciated. The indexes printed in the last issues in the years 1955, 56, and 57 show the types of articles carried in the Bulletin. Articles are not limited to those prepared by the Weather Bureau personnel. We have carried several contributions from outside sources, especially by persons engaged in research where the weather is an important factor. This is more appropriate now since the National Bulletin has become a joint Weather Bureau and Agricultural Marketing Service publication. Special articles should be forwarded through the Area Climatologists for preliminary review and recommendations. Summaries on current or recent unusual or very damaging weather should be sent directly to the Office of Climatology with a carbon copy to the Area Climatologist.

FOR WRPC'S

17. AMENDMENTS TO PROCEDURES: The following instructions have been issued to the WRPC's.

Paragraph 1010.035. The following sentence should be added to the parenthesized item in lower portion of the paragraph:

"The monthly means are half the sum of the monthly maximum and monthly minimum temperatures."

Paragraph 1009.652. Please insert the following additional footnote immediately above the subscription price notation:

"General weather conditions in the U. S. for each month are described in the publications MONTHLY WEATHER REVIEW and the monthly CLIMATOLOGICAL DATA, NATIONAL SUMMARY, either of which may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C."



H. E. Landsberg
Director, Office of Climatology

GUIDE TO CLIMATOLOGICAL SERVICES MEMORANDUM NO. 65

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1. The first part of the document is a list of names and titles, including "Mr. J. H. ...", "Mr. W. B. ...", and "Mr. C. D. ...".
 2. The second part is a list of dates, starting with "1911" and "1912".
 3. The third part is a list of locations, including "New York", "Chicago", and "Boston".
 4. The fourth part is a list of organizations, including "The American ...", "The National ...", and "The International ...".
 5. The fifth part is a list of events, including "The ... Conference", "The ... Meeting", and "The ... Session".
 6. The sixth part is a list of publications, including "The ... Journal", "The ... Magazine", and "The ... Review".
 7. The seventh part is a list of awards, including "The ... Medal", "The ... Prize", and "The ... Fellowship".
 8. The eighth part is a list of honors, including "The ... Degree", "The ... Title", and "The ... Order".
 9. The ninth part is a list of memberships, including "The ... Society", "The ... Club", and "The ... Association".
 10. The tenth part is a list of affiliations, including "The ... Institute", "The ... Center", and "The ... Foundation".

Tornadoes Can Be Disastrous

Most of us are quite complacent about things that we have never experienced. The attitude seems to be that because they have never happened to us that there isn't any chance that they ever will. We read about these things happening to others, and we feel sorry for the less fortunate, but aside from that we do not get very excited. One of these is a tornado. Too often we take the position that since one has never struck our immediate vicinity it never will.

Without any doubt many of the 29 tornadoes that struck Missouri last year struck in places where never before had such a thing occurred. It is quite true that in only a few were there any deaths or injuries, but despite that there were 55 deaths and nearly 700 injured and the property loss was tremendous.

Our information cannot be complete, since there could well have been more actual funnels than were accounted for, but a total of 42 were reported, and in one vicinity that was visited at least four short lived tornadoes were accounted for, and in the Desloge-Cantwell-French Village area several funnels were involved.

There also appears to be a feeling among many that there is a definite tornado season, and on the basis of reports there is some truth in this, but in 1957 funnels were reported in five separate months, and they range from January to December. May accounted for fifteen, but in December, seven communities were visited with three injured and four deaths reported. Another fallacious idea is that some areas are more susceptible than others. In 1957 tornadoes were reported from Golden City to Dunklin County in the south part of the state and from St. Louis County on the east to Jackson County on the west. The central portion and the northwestern portion were the only ones not reporting any in 1957, but in previous years they too have been visited by tornadoes.

The greatest recorded number of deaths in one year resulting from tornadoes in Missouri since records were begun in 1916 was in 1927. On May 9, 1927, at 3:06 p.m. a tornado hit Poplar Bluff, killing 74, injuring over 300, and damaging most of the buildings in the town. As the storm moved from the Arkansas border toward Poplar Bluff, 12 others were killed. On September 29th of that year, another tornado moved through St. Louis, killing 72 and doing millions of dollars worth of damage. Altogether, some 176 persons lost their lives in tornadoes in Missouri in the year 1927.

Several of the 1957 tornadoes in Missouri passed through heavily populated areas, causing 55 known deaths. Without Weather Bureau warnings, the casualties would have been much greater.

We are fast approaching the season when tornadoes and damaging thunderstorms are more likely to

By JAMES D. McQUIGG
State Climatologist, U. S. Weather Bureau
Columbia, Missouri

occur. As warm, moist air begins moving back up from the Gulf of Mexico, the threat of these storms increases. Tornadoes have been known to occur in every month of the year in Missouri, but are most likely from March through July.

What to Do?

Unlike an automobile accident, tornadoes, as of now, cannot be prevented, but that does not mean that you are completely helpless. Your Weather Bureau is prepared to give the kind of help that can and will result in saving lives, but the total effectiveness of their advance warning can only be realized with proper local organization and cooperation. Several Missouri communities already have a local plan to distribute advance warnings to local citizens.

Improved Weather Bureau forecast techniques, radar equipment, and severe storm reporting networks, supplemented by reports from police, civil defense, ground observer corps, pilots of aircraft, and other citizens make it less and less likely that a tornado could approach a populated area without some kind of *warning*. When severe weather is *forecast* for your area, if at all possible, keep your radio or television set turned on so that you will receive further information on the development of the storm.

The Weather Bureau puts out several kinds of releases to radio, television, and other news outlets during severe weather. One type is a *Tornado Forecast*. This means that weather patterns are shaping up to make it *likely* that tornadoes will occur. The wording of a *Tornado Forecast* will include the time of beginning and probable ending, and the general area involved. A second type of release is a *Tornado Warning*. This means a tornado is known to be in progress, and persons in its path are warned of its approach. This type of release is very specific as to time and the storm path involved.

This year, radio and television stations will be preceding a *Tornado Warning* by the "Conelrad" attention signal. This will serve two purposes:

A. It will alert people that an important bulletin is to be broadcast.

B. It can be used to "trigger" special receivers that can be left muted until the Conelrad signal is used, at which time the volume of the set comes up, and the *Tornado Warning* will be received. This can be especially useful in schools, hospitals, etc.

Community Action

After the Weather Bureau has issued *forecasts* of likely tornadoes, or warnings of tornadoes known to be in progress, each community has the responsibility

for protecting itself. There are two main ways this can be accomplished:

A. Education of individuals

B. Community action plans

Under (A), what is your community doing to teach people the precautions to take during a tornado? Under (B), what plan does your community have for making sure your citizens know when *Tornado Warnings* or *Tornado Forecasts* are out for your vicinity?

The Weather Bureau has some excellent literature to help you answer both of the questions above. Each Weather Bureau office in the state has been assigned a group of counties for which it is immediately responsible for tornado *forecasts* and *warnings*.

If you have any questions about how your community can become better prepared for the tornado season just ahead, write or visit the Weather Bureau station that has responsibility for your area.

These stations are located in Kansas City, St. Joseph, Columbia, St. Louis and Springfield. The Memphis, Tennessee, station is responsible for two Missouri counties, Dunklin and Pemiscot. The areas covered by the various stations follow an irregular outline, and should the reader be in doubt as to the station responsible for his particular area, the information will be supplied by the League office on request.

Community Action Against Tornadoes

Last September the Weather Bureau prepared the following "question and answer" report that can be effective provided a community acts in *advance*. Nothing can be gained by putting off organizing, but it is altogether possible that such advance preparation can and will save the lives of some of your neighbors and friends and only a minimum of effort is required.

DOES EVERY TOWN NEED PROTECTION FROM TORNADES?

Any town can be struck by tornadoes. Advance action can save lives and reduce public alarm.

WHAT CAN OUR TOWN DO ABOUT TORNADES?

Organize a local reporting and warning network.

HOW?

By having everyone living within 20 miles understand that they should *Promptly* report any tornado they observe to a community warning center.

WHAT IS A COMMUNITY WARNING CENTER?

An office that is open all the time, such as the police station, or telephone office.

WHAT HAPPENS WHEN A TORNADE IS REPORTED?

A prearranged alarm is sounded, and farmers in the storm's path are notified by telephone. In larger towns, radio and television stations can also broadcast the alarm.

WHAT ELSE SHOULD A WARNING CENTER DO?

1. Notify any nearby towns in the path of the tornado.

2. Telephone the nearest Weather Bureau office "collect" so that other areas can be warned.

HOW CAN THE WARNING NETWORK BE KEPT ACTIVE?

By having trial runs at intervals and by public reminders.

WHAT SHOULD PEOPLE DO WHEN THEY HEAR THE TORNADE SIGNAL OR ALARM?

Take cover at once in a safe shelter, preferably underground (see Tornado Safety Rules for details).

WHERE CAN WE GET A SUPPLY OF TORNADE SAFETY RULES?

The nearest Weather Bureau office has copies which you can reproduce and distribute, or you can order from the Government Printing Office, Washington, D. C. for \$1.25 a hundred.

NOTES TO TORNADE OBSERVERS.

Observers should be alert for tornadoes when their localities are included in tornado forecasts issued by the Weather Bureau; also when the sky has an unusually threatening appearance.

Prompt reports to the warning center are a **MUST**. Delay can be fatal if telephone lines are blown down.

Report the direction the tornado is moving, as well as its location.

HOW TO RECOGNIZE A TORNADE.

A tornado is usually seen as a dark funnel-shaped cloud, spinning rapidly and extending toward the earth from the base of a thundercloud. When near by, a tornado sounds like the roar from hundreds of airplanes.

Even though a funnel-shaped cloud may hang down from a larger cloud, as occasionally happens when the sky is threatening, it is not a tornado unless it has the rapidly-rotating motion.

THE END OF A TORNADE THREAT.

The danger of tornadoes usually has ended as soon as the clouds have cleared, and the wind shifts to the west, with the air feeling cooler and drier. In areas where tornadoes have been forecast, the Weather Bureau issues "all-clear" broadcasts when the threat of further tornadoes has passed.

A FEW STATEMENTS FROM TORNADE SAFETY RULES.

Safety precautions to be taken when a tornado is approaching include:

1. Take shelter in a storm cellar, or underground excavation.
2. When underground protection is not available, take shelter along the inside walls of the lower floors of a strongly reinforced building, in the southwest basement corner of a house (preferably frame), or under heavy furniture along an inside wall of a house.
3. In open country, move away at right angles to the path of the approaching tornado. If there is no time to escape, lie flat in the nearest ditch or depression in order to avoid flying debris.

AMERICAN MUNICIPAL ASSOCIATION
 DIRECTORY OF EXECUTIVE OFFICERS OF STATE MUNICIPAL LEAGUES

March 1958

Mr. Ed E. Reid, Executive Director Alabama League of Municipalities 24 South Hull Street Montgomery 2, Alabama	Amherst 2-2566 <u>Amherst 3-1042</u>	Mr. Allen E. Pritchard, Jr., Exec. Dir. League of Kansas Municipalities Capitol Federal Building Topeka, Kansas	Central <u>3-6433</u>
Mrs. Lucy Mick, Executive Secretary League of Alaskan Cities Box 1764 Palmer, Alaska	Palmer <u>3121</u>	Mr. Carl B. Wachs, Executive Secretary Kentucky Municipal League University of Kentucky Lexington 29, Kentucky	<u>3-3944</u>
Mr. John J. DeBolske, Executive Director League of Arizona Cities and Towns 846 Security Building Phoenix, Arizona	Alpine <u>4-1066</u>	Mrs. Gladys Hughes, Secretary Louisiana Municipal Association 539 Raymond Building Baton Rouge, Louisiana	<u>3-5244</u>
Mr. Glenn Zimmerman, Executive Director Arkansas Municipal League 416 Maple Street North Little Rock, Arkansas	Franklin <u>5-6429</u>	Mr. Frank G. Chapman, Executive Secretary Maine Municipal Association 97 Water Street Hallowell, Maine	Mayfair <u>3-8429</u>
Mr. Richard Carpenter, Executive Director League of California Cities Hotel Claremont Berkeley 5, California	Thornwall <u>3-3083</u>	Mr. Edmund C. Mester, Executive Secretary Maryland Municipal League Box 276 College Park, Maryland	Warfield 7-3800 <u>Ext. 515</u>
Mr. Jay T. Bell, Executive Director Colorado Municipal League 2300 Broadway Boulder, Colorado	Hillcrest <u>3-0707</u>	Mr. John H. Huss, Director Michigan Municipal League 205 South State Street Ann Arbor, Michigan	Normandy <u>2-3246</u>
Mr. Gordon T. Butler, Executive Secretary Florida League of Municipalities 301 Exchange Building Jacksonville 1, Florida	Elgin <u>5-5479</u>	Mr. C. C. Ludwig, Executive Secretary League of Minnesota Municipalities University of Minnesota Minneapolis 14, Minnesota	FE 2-8158 <u>Ext. 6185</u>
Mr. W. E. George, Director Georgia Municipal Association 603 Fulton Federal Building Atlanta, Georgia	Murray <u>8-0472</u>	Mr. W. J. Caraway, Exec. Vice President Mississippi Municipal Association 203 Lamar Life Building Jackson, Mississippi	<u>5-3791</u>
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