5 Years of Coordination

Meteorology in the Federal Government

Office of the Federal Coordinator for Meteorological Services and Supporting Research

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Washington, DC

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OFFICE OF THE FEDERAL COORDINATOR FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH

Meteorology in the Federal Government

-- 25 Years of Coordination

FCM-I4-1990

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FOREWORD

In 1989, the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) observed the 25th anniversary of its founding. Recognizing the possible loss of considerable background information on its first quarter century, OFCM requested Alonzo Smith, long-time Deputy Federal Coordinator, to prepare this review. It provides a brief summary of past activities of the office and some discussion of current programs. It makes available to the reader a record of the evolution of the office over the 25-year period and recognizes many of the individuals who played important roles. Those of us in the office today hope that the publication of this document will help to express our appreciation for the foresight and extraordinary good judgement demonstrated by our predecessors in developing the coordination mechanisms which we currently employ. Meteorology in the Federal Government would be far different today without the coordination mechanisms they put in place.

Robert L. Carnahan
Federal Coordinator

Robert M. White, the first Federal Coordinator

CHAPTER 1

INTRODUCTION

Within the Nation's meteorological community, the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) is unique. One of the least known but most influential organizations in the Federal Government, it is the only government office responsible for promoting the coordination and cooperation among the agencies involved in weather service activities and supporting research. These services and supporting research amount to more than $2 billion annually.

The founding of OFCM more than 25 years ago stemmed from a growing concern in the early 1960s of the Executive Branch and Congress over the proliferation of meteorological programs throughout the Federal Government. This concern was expressed in two significant ways. First, at the request of the House Committee on Appropriations of the Congress, the Bureau of the Budget (now the Office of Management and Budget (OMB)) in the Executive Office of the President undertook a survey of Federal meteorological activities. Published in March 1962, the survey found that 15 Federal agencies were engaged in significant meteorological programs in support of their missions. Among other things, the survey concluded:

"a. A central meteorological service cannot feasibly perform all meteorological activities for all agencies.

b. With the exception of the U.S. Weather Bureau [now the National Weather Service], the organization of meteorological services resulted from historical development based on ad hoc accommodation to needs and to scientific and technological advances.

c. Pressures being exerted by scientific and technical advances within and upon the field of meteorology and the accelerating growth of expenditures required strengthening of existing arrangements for planning and coordinating meteorological programs."

Second, in Public Law 87-843 (Section 304) of the Department of Commerce (DOC) Appropriation Act 1963, Congress expressed its concern over proliferation of Federal meteorological programs in the following manner: "The Bureau of the Budget shall provide the Congress in connection with the budget presentation of fiscal year 1964 and each succeeding year thereafter, a horizontal budget showing (a) the totality of the programs for meteorology, (b) specific aspects of the program and funding assigned to each agency, and (c) the estimated goals and financial requirements."

In response to these concerns, on November 13, 1963, the Bureau of the Budget issued Circular A-62 (Appendix A) setting forth policies and procedures for the coordination of Federal meteorological services. Keyed to Public Law 87-843, the Circular authorized the Department of Commerce to "establish procedures designed to facilitate a systematic and continuing review of basic and specialized meteorological requirements, services and closely related supporting research" and to "prepare and keep current a plan and obtain periodic information on its implementation for the efficient utilization of meteorological services and supporting research."

Subsequently, on January 23, 1964, the Department of Commerce issued an implementation plan (Appendix B), which provided for a Federal Coordinator for Meteorological Services and Supporting Research, together with an appropriate interdepartmental committee structure.

CHAPTER 2

Getting Established and Building a Future

First Phase--1964 to 1967

The Department of Commerce (DOC) implementation plan for a Federal Coordinator for Meteorological Services and Supporting Research, issued on January 23, 1964, outlined a committee structure consisting of the Federal Committee for Meteorological Services and Supporting Research (FCMSSR) and Interdepartmental Committees for Meteorological Services (ICMS) and Applied Meteorological Research (ICAMR).

The Assistant Secretary of Commerce for Science and Technology, J. Herbert Holloman, was named Chairman of the Federal Committee. The Chief of the U.S. Weather Bureau, Robert M. White, was named Federal Coordinator and was assigned a full-time Deputy Federal Coordinator, Donald J. Moore. The Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) was physically and organizationally placed in the Department of Commerce rather than in the U.S. Weather Bureau.

The role of the Federal Committee was to provide high-level policy guidance for the Federal Coordinator, to review and validate proposed Federal meteorological plans, and to resolve differences arising from the preparation, monitoring, and coordination of Federal meteorological activities. All agencies having need for meteorological services, either for their internal operations or a part of the direct service to a clientele group, were to be represented on the Federal Committee.

Interdepartmental committees were to be assigned the principal work: coordination of meteorological activities; the systematic and continuing review of basic and specialized meteorological requirements, services, and supporting research; and the preparation and maintenance of a Federal meteorological plan. Membership on ICMS was to consist of the commanders of the military weather

services, the Director of the National Meteorological Service, and representatives of equivalent status in user departments and agencies. Membership on ICAMR would include senior managers and directors of departmental or agency programs of applied meteorological research. The ICMS would establish subcommittees along service lines (basic and specialized), while ICAMR would establish subcommittees along functional lines (observation, data processing, etc.).

Issues that could not be resolved at the Federal Committee level would be referred to the heads of agencies concerned. If an issue still could not be resolved, it would then be referred to the Executive Office of the President.

OFCM was established in early 1964. By the end of 1964, the full time staff consisted of ten professionals and five sub-professionals, including four senior personnel on detail from other agencies.

Organizationally, the OFCM had three staff elements:

- o Operations Evaluation Group
- o Operating Program Division
- o Supporting Research Division

The Operations Evaluation Group (OEG) provided staff assistance to the Federal Coordinator for analyses of Federal meteorological activities, as well as analyses of specific areas of overlap or interface among the various agencies. The Operating Program Division (OPD) had primary cognizance of the services committees. The Supporting Research Division (SRD) had oversight of the research subcommittees.

At the same time OFCM was evolving, significant changes were occurring within the agencies that had a direct impact on the U.S. Weather Bureau and OFCM. In July 1965, the Chief of the U.S. Weather Bureau (USWB) became Administrator of the newly established Environmental Science Services Administration (ESSA). His responsibilities were expanded to include the activities of the

U.S. Coast and Geodetic Survey. As a result, ESSA took on broader responsibilities, and attention to the OFCM and its activities began to diminish.

Other changes occurred in the interdepartmental committees, which averaged about seven meetings a year through 1967. In August 1967, the military membership on the Interdepartmental Committee for Meteorological Services (ICMS) was affected by the establishment of the Office of the Special Assistant for Environmental Services (SAES) in the Office of the Joint Chiefs of Staff, Department of Defense. At that time, Brig. Gen. Roy W. Nelson, USAF, was named to head SAES and to represent the military weather services on ICMS. The original agency membership of ICAMR, however, remained stable. In November 1967, John F. Kincaid, Assistant Secretary for Science and Technology, replaced Holloman as Chairman of FCMSSR.

Second Phase 1968 to 1979

Beginning in 1968, significant changes in the staffing and management of OFCM began to take place. In 1969, Myron Tribus, the newly appointed Assistant Secretary for Science and Technology, replaced Kincaid as Chairman of FCMSSR.

Perhaps the most significant event that occurred during this period was the formation in 1970 of the National Oceanic and Atmospheric Administration (NOAA). Under the reorganization plan issued by the Executive Branch, ESSA, including the U.S. Weather Bureau, was incorporated into NOAA, and prior ESSA/USWB legislative and executive authorities became applicable to the new agency. Robert M. White, former Chief of the U.S. Weather Bureau and head of ESSA, became Administrator of NOAA, a much larger organization, which also included the National Marine Fisheries Service and the Sea Grant program office.

The increased activity in the marine area placed heavy demands on the new NOAA, which became a quasi-independent agency within Commerce that no longer reported to the Assistant Secretary for

Science and Technology. The Assistant Secretary was relieved of the responsibility of serving as the Chairman of FCMSSR. As a result, for a short time the Administrator of NOAA was both Federal Coordinator and Chairman of FCMSSR. In 1972, however, realizing that a conflict could arise in the event of an appeal or resolving interagency disputes, White relinquished his duties as Federal Coordinator to Richard E. Hallgren, Associate Administrator for Environmental Monitoring and Prediction, NOAA. (See Table 1)

Hallgren served as the Federal Coordinator until 1973, when he was reassigned to the National Weather Service (NWS). During the interim, several staffing changes occurred in the OFCM. C. Edward Roache replaced Hallgren as Federal Coordinator in 1973, and Clayton E. Jensen replaced Roache later that year. In 1975, Edward S. Epstein replaced Jensen and served until 1978. In 1978, when Hallgren returned to NOAA as the Assistant Administrator for Oceanic and Atmospheric Services (OAS), he resumed duties as Federal Coordinator for a second term until he was replaced by Thomas B. Owen in 1979.

Concurrently, several other staffing changes occurred in the Federal Coordination structure. In 1977, when Robert White departed from NOAA, George S. Benton, the Associate Administrator of NOAA, became Chairman of FCMSSR. From 1974 to 1978, the position of Deputy Federal Coordinator was vacant, but in the latter year, Robert E. Beck assumed that position. In 1980, he was replaced by William S. Barney.

Also during the 1970 to 1979 period, OFCM's functions were distributed throughout the offices of the Associate Administrator for Environmental Monitoring (EM). ICMS was assigned to one section of EM, and the research subcommittees to another. One of EM's responsibilities was to provide the chairmen for the interdepartmental committees. Other elements of EM involved a wide range of national and international programs.

	CHAIRMAN, FEDERAL COMMITTEE		FEDERAL COORDINATOR		DEPUTY FEDERAL COORDINATOR	
YEAR	NAME	POSITION	NAME	POSITION	NAME	POSITION
1964	HOLLOMON	ASS'T. SECR. S&T, DOC	WHITE	CHIEF, U.S. WEATHER BUR	MOORE	FULLTIME
1965				ADMIN. ESSA		
1966						
1967	KINCAID				ROACHE	DEP. ASSOC. ADMIN. (EM) NOAA
1968						
1969	TRIBUS					
1970				ADMINISTRATOR, NOAA		
1971	WHITE	ADMINISTRATOR, NOAA				
1972			HALLGREN	ASSOC. ADMIN. (EM), NOAA		
1973			ROACHE/JENSEN	DEP. ASSOC. ADMIN. (EM), NOAA		
1974			JENSEN		VACANT	VACANT
1975			JENSEN/EPSTEIN			
1976			EPSTEIN	ASSOC. ADMIN. (EM), NOAA		
1977						
1978	BENTON	ASSOC. ADMIN., NOAA	EPSTEIN/HALLGREN	ASST. ADMIN. (OAS), NOAA	BECK	DEP. ASSOC. ADMIN. (EM) NOAA
1979			HALLGREN			
1980			OWEN		BARNEY	FULLTIME
1981	FRANK	ADMINISTRATOR, NOAA	BARNEY	FULLTIME	SMITH	
1982						
1983						
1984	BYRNE					
1985						
1986	CALIO		CARNAHAN			
1987					ALMAZAN	
1988	EVANS					
1989	KNAUSS					

TABLE 1: HISTORY OF STAFFING OF THE POSITIONS OF CHAIRMAN, FEDERAL COMMITTEE AND FEDERAL AND DEPUTY FEDERAL COORDINATOR

CHAPTER 3

New Challenges for OFCM.

World Weather Program (WWP)

In 1968, following Senate Concurrent Resolution 67, the President designated the Department of Commerce (DOC), to be the lead agency in coordinating the U.S. participation in the World Weather Program (WWP). At that time, the Federal Committee for Meteorological Services and Supporting Research (FCMSSR) expanded its coordination activities to include the WWP and established an interdepartmental committee to coordinate the Federal agencies participation. FCMSSR directed OFCM to develop a national plan for the program.

The international activities relating to meteorological services and data exchange have been carried out under the World Weather Program of the World Meteorological Organization, which is a specialized agency of the United Nations. The World Weather Program comprises the World Weather Watch (WWW) and the Global Atmospheric Research Program (GARP). These programs were designed to extend the range and accuracy of weather forecasts, as well as to understand the physical basis of climate and climatic change and to establish new bonds of international cooperation.

The Barbados Oceanographic and Meteorological Experiment (BOMEX), the first of the GARP experiments, was conducted in 1969 as a cooperative venture between the United States and the Government of Barbados. The GARP Atlantic Tropical Experiment (GATE), the first international GARP research effort involving many nations, included participants from both developed and developing countries. Twelve nations, among them the United States, made substantial contributions to the experiment. Six U.S. Federal agencies contributed resource personnel, funding, and equipment -- the Departments of Commerce, Defense, Transportation, and State; the National Science Foundation; and the

National Aeronautical and Space Administration. OFCM used some of the expertise developed in BOMEX in preparation for GATE.

The Federal Committee exerted much influence on the Federal agencies' participation in the World Weather Programs, especially GATE. During the six-year period 1968 to 1974, it devoted a major portion of its meetings to discussing U.S. participation in the WWP. Richard E. Hallgren, during the time he served as the Director of ESSA's Office of WWP, played a key role in keeping the FCMSSR informed and in requesting its support. The agencies were very cooperative and committed major resources to the WWP. With the concurrence of the Federal Committee, Myron Tribus, the Chairman, sent an interagency budget summary to the Bureau of the Budget for Fiscal Year 1971. The Bureau was supportive of the program and the agencies participation.

International Field Year for the Great Lakes (IFYGL)

Another program to which OFCM contributed was the International Field Year for the Great Lakes (IFYGL). A joint U.S.-Canadian effort that was part of UNESCO's International Hydrological Decade (1965-1974), IFYGL was a program of coordinated research into the physical, chemical, and biological aspects of Lake Ontario. Originally planned to span an 18-month period of intensive data collection beginning in April 1970, the Field Year phase was rescheduled and covered a 12-month period that began in April 1972 (Department of Commerce, 1981).

OFCM contributed staff support to IFYGL. William S. Barney, who had earlier served as project manager of BOMEX, led the field phase of IFYGL experiment in and around Lake Ontario.

CHAPTER 4

The Revitalization of OFCM.

Studies and Investigations of Meteorological Activities

The late 1970s were characterized by a flurry of investigations of meteorological activities of the Federal agencies, including a general concern that the Federal weather program was too expensive. A comprehensive list of inquiries, hearings, studies, and reports is given in the "Cross Cut Review of Federal Weather Programs, Field Report, September 1980," (Department of Commerce, 1980). Investigative activities included Congressional hearings and studies, OMB-directed studies and reports by the General Accounting Office (GAO), and internal reviews by the Federal agencies. The National Academy of Sciences (NAS), at the request of NOAA, studied the impact of scientific and technological developments on the operation of the National Weather Service. NAS also reviewed the national goals of the atmospheric sciences. In 1979, the National Advisory Committee on Oceans and the Atmosphere (NACOA) issued a report on the reorganization of the Federal effort in oceanic and atmospheric affairs.

Also in 1979, the GAO report "The Federal Weather Program Must Have Stronger Central Direction," (General Accounting Office, 1979), found that the Federal weather program was fragmented and costly. The report concluded that, to reduce the costs and to meet civil and military requirements more effectively, Federal agencies needed strong central coordination and direction. According to the GAO report, the Federal weather program suffered from the lack of:

- Firm leadership
- Comprehensive short- and long-range planning
- In-depth, systematic program reviews
- An independent, full-time staff to make such plans and reviews.

The Department of Commerce's response to the GAO report was generally positive. Some excerpts from that response follow.

Regarding the issue of strengthening DOC's role and reestablishing the OFCM as a staff office:

> "We have no objection to Congress reaffirming the Department of Commerce's central agency role for coordinating both requirements for weather services and the best way to meet them. OMB Circular A-62 is sufficient basis for these roles. We believe it inappropriate for one agency to be assigned in legislation the responsibility and authority to review other agencies' budgets. It is appropriate to have the Federal Coordinator provide analysis for OMB with the full knowledge and cooperation in the FCMSSR.
>
> We are in agreement that there is an important role for the Office of Federal Coordinator and will review the level and potential sources of staff and other resources for the Office. We will also consult with other agencies for the detailing of their personnel to assist us.
>
> We agree in principle that the Office of the Federal Coordinator should be a staff office independent from operating matters."

Regarding the issues of more comprehensive planning and systematic program reviews, DOC was less than enthusiastic:

> "A very significant increase in the Federal Coordinator's level of effort would be needed to develop a plan or plans as envisioned by the General Accounting Office (GAO). The preparation of such a complex overall plan in sufficient detail to be a road map for action would be extremely difficult and costly to develop and keep current. It may be more useful and less costly to prepare a conceptual plan presenting as national weather system which would show agency roles, missions and programs. This would be less of a program requirements plan and more of a 'where are we going in the next five to seven years' that could be very useful to OMB, the agencies involved, and Congress.

> Going beyond the review and recommendation to the Federal Committee and OMB was not the intent of Circular A-62 nor is it the most effective means for coordinating weather activities in the Federal Government. An adequate review of agency programs can be accomplished by performing detailed analyses for use by OMB and the agencies as input to the budget review process."

Subsequently, in 1980 DOC restored OFCM to an independent function with a full-time staff. Thomas B. Owen, Assistant Administrator (OAS), NOAA, was then the Federal Coordinator, and William S. Barney was Deputy Federal Coordinator. Earlier in 1978, Barney replaced Robert E. Beck as Deputy Federal Coordinator, a position that had been vacant since 1974. Beck's secondary function was Deputy Federal Coordinator, as he was also serving as Deputy Associate Administrator (EM). Barney's primary function was Deputy Federal Coordinator, but he had other responsibilities as Chief of the Special Projects Office.

In 1981, William Barney replaced Thomas Owen as Federal Coordinator, and Alonzo Smith was designated the Deputy Federal Coordinator. With the retirement of Barney in 1986, Robert L. Carnahan became Federal Coordinator. In 1987, James A. Almazan replaced Smith as Deputy Federal Coordinator. (See Table 1)

To assist OFCM in the coordination of the Federal weather programs, the participating agencies assigned senior-level representatives. The Department of Defense assigned Colonel Alfred Molla, USAF, and Captain Corington Alexander, USN; the Federal Aviation Administration assigned Herbert Brody, a GS-15 Engineer; and the National Weather Service appointed Russell McGrew, a GS-15 Meteorologist. Since 1983, the agencies have changed liaisons several times, but the representation is still at the senior level.

In 1985, DOC's Office of Inspector General reviewed the OFCM as part of a President's Council on Integrity and Efficiency (PCIE) project to examine possible duplication and overlap in weather data collection, processing and dissemination systems. The PCIE project was a joint effort of the Inspectors General from the Departments

of Commerce, Defense and Transportation. The title of the report is "The Federal Coordinator for Meteorology Needs to Strengthen Central Planning and Review of Automated Weather Systems," (Department of Commerce, 1985).

The Inspector General (IG) review revealed that:

- OFCM had not established procedures for documenting formal, systematic reviews of weather requirements, services, and research.

- OFCM had not developed a comprehensive plan for integrating major agency weather programs and system development efforts.

- The FCMSSR had not provided policy guidance to the Federal Coordinator.

The IG also reviewed OFCM's ability to evaluate meteorological programs as a staff office of the National Weather Service and concluded that the OFCM had established the interagency participation and cooperation necessary for effective coordination. For OFCM to continue evolving into a more structured process for achieving cost savings, the IG recommended that the OFCM establish a program council for coordinating Automated Weather Information Systems (AWIS). The AWIS program council's responsibility would be to develop a plan that would integrate agency AWIS requirements. Other IG recommendations directed OFCM:

- To perform cross-cut studies to review agency weather programs and requirements.

- To review agency analyses of alternatives for satisfying new requirements, including existing or planned capabilities of other agencies.

- To document OFCM studies and make the information available to interested parties in the decision-making and budgeting processes.

- To develop and maintain a multi-year functional plan that would integrate Federal weather programs.

- To prepare a quarterly status report of coordination activities for review by the FCMSSR.

The OFCM comments on the above IG recommendations were that OFCM would:

- Initiate cross-cut studies at the request of OMB or other participating agencies.

- Review agency analyses of alternatives for satisfying new requirements. [OFCM discussed this subject with the members of the AWIS and JAWOP program councils at the respective meetings in February and March 1986.]

- Document cross-cut studies and make them available to interested parties upon request.

- Develop and maintain a multi-year functional plan that integrates Federal weather programs.

- Prepare for FCMSSR's review quarterly reports on coordination activities.

In 1988, the Office of Inspector General (OIG) completed its final audit of OFCM. The report concluded that the OFCM continues to provide a good forum for coordinating Federal weather programs, but does not consistently function as the formal review mechanism to identify and reduce unwarranted duplication in Federal automated weather systems. The Inspector General

recommended that OFCM prepare a report by October 15 of each year that provides OMB and the OIG with information needed to monitor automated weather systems on a government-wide basis.

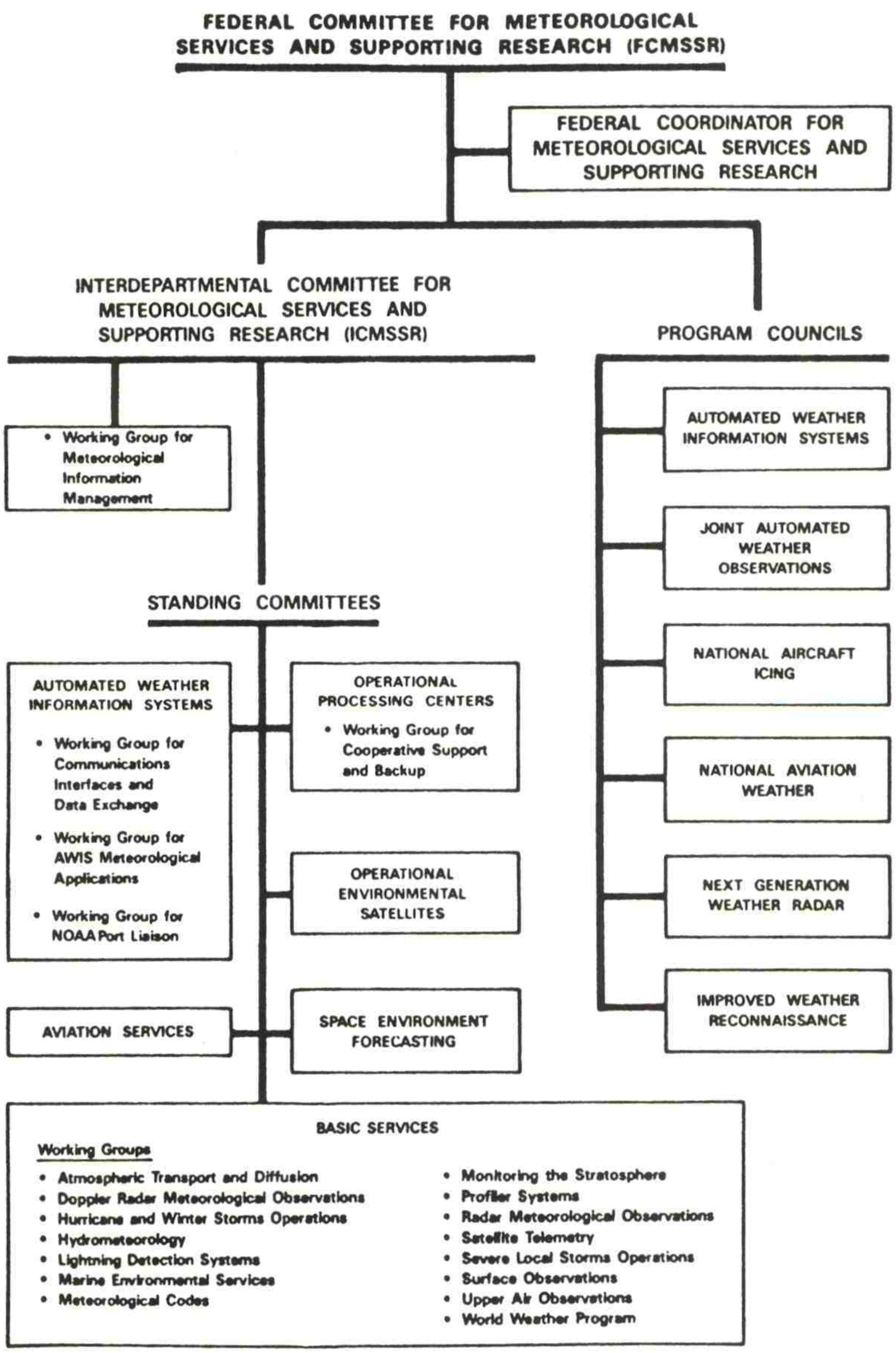
OFCM agreed to consult with and provide to OMB an annual cross-cut budget analysis for the major weather programs, including automated systems.

Reorganizing the Federal Coordination Structure

OFCM has a broad and varied set of functions, tasks and activities. The Figure shows the coordination structure as it exists in 1990. Although it is similar to the structure of the 1960s, some of the functions are quite different. In many ways, the activities and plans of the OFCM are closely linked to and fully support the primary functions of coordination and planning. These prime activities are necessary to provide the systematic and continuing review of Federal meteorological programs required by the Office of Management and Budget (OMB) Circular A-62. The greatest portion of the OFCM effort is devoted to the coordination of meteorological programs and services among the agencies. The committee structure serves the full range of planning and coordination activities. It provides the forums where day-to-day, ongoing activities are coordinated; where changes to current programs are outlined and discussed; and where future requirements for services and procedures are identified to other agencies. The results are documented in operations plans, studies, analyses, standards, and proposals. OFCM, in preparing the annual Federal Plan for Meteorological Services and Supporting Research, reviews requirements for Federal meteorological programs and services and also documents the agencies' weather programs and activities.

OFCM provides management oversight for the program councils and the committee structure. An innovation of the 1980s, the Program Councils were established by the Federal Coordinator to meet the need for specific guidance for projects of high interest to the FCMSSR. The first of these was the NEXRAD Program Council, which evolved from an interagency advisory group

FIGURE



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established by FCMSSR in 1979 to provide management guidance to the NEXRAD program. Subsequently, realizing that a program council is a valuable management tool, the Federal Coordinator established others. By 1990, there were six:

- o Automated Weather Information Systems Program Council (AWISPC)
- o Improved Weather Reconnaissance Program Council (IWRPC)
- o Joint Automated Weather Observation Program Council (JAWOPC)
- o National Aircraft Icing Program Council (NAIPC)
- o National Aviation Weather Program Council (NAWPC)
- o NEXRAD Program Council (NPC).

Each of these councils is comprised of decision-level representatives of the agencies directly concerned with the specific program area. The representatives are generally at a higher management level than those on the interdepartmental committees. This is a reflection of the vested interests that the respective program managers have in joint ventures such as the NEXRAD program. The program councils are chaired by the Federal Coordinator.

Fundamentally, the revised committee structure functions much as it did in the 1960s. FCMSSR provides high-level policy guidance to the Federal Coordinator and resolves conflicting interests in preparing, monitoring, and coordinating Federal meteorological plans. ICMSSR coordinates meteorological activities and reviews the activities of the standing committees. To help the standing committees, the ICMSSR established a number of working, ad hoc

and task groups. ICMSSR also reviews and validates proposed Federal meteorological plans, previously a responsibility of FCMSSR.

This shift in oversight responsibility from FCMSSR to ICMSSR seems to have occurred because FCMSSR met so infrequently -- only once in 1980, 1988 and again in 1989 -- or may have been due to the stability of membership in ICMSSR. The chairmanship of FCMSSR changed five times during the 1980s. In succession, the chairmen were George Benton, who was NOAA's Associate Administrator, followed by NOAA Administrators Richard Frank, John Byrne, Anthony Calio, William Evans, and John A. Knauss. On the other hand, the chairman of ICMSSR changed only twice -- William S. Barney from 1980 to 1986 and Robert L. Carnahan from 1986 to the present. The expanded role of the ICMSSR has the approval of the agencies and OMB.

CHAPTER 5

A Decade of Significant Progress for the OFCM--1980 to 1989

Coordination Milestones

In the spirit and the letter of OMB Circular A-62, OFCM devotes a major part of its effort to coordinating meteorological programs. A list of the activities is documented in the annually prepared "Federal Plan for Meteorological Services and Supporting Research" and "Coordination of Meteorological Services and Supporting Research in the Federal Government," (Harrison, 1988) which appeared in the AMS Bulletin. A summary of the activities and plans follows.

Next Generation Weather Radar (NEXRAD)

During the late 1970s, the Departments of Commerce (DOC), Defense (DOD), and Transportation (DOT) stated a common need for a radar system with improved capabilities for detecting and monitoring hazardous weather.

In 1976 under the leadership of Edwin Kessler, Director of the National Severe Storms Laboratory, NOAA, established the Joint Doppler Operational Project (JDOP) to investigate the real-time use of the Doppler radar data in identifying tornado storms. Earlier demonstrations of the use of Doppler radar to observe weather date back to the late 1950s but were not directed toward real-time use of the data. The JDOP tests, conducted in 1977, 1978, and 1979 at the National Severe Storms Laboratory (NSSL) in Norman, Oklahoma, showed that a Doppler radar offers marked improvement for early and accurate identification of thunderstorm hazards, especially tornadoes and squall lines. As part of JDOP, a set of Doppler weather radar design characteristics was established that formed a basis for the design of the NEXRAD radar.

In parallel with the JDOP activity, FCMSSR set up an interagency Working Group on Next Generation Weather Radar (WG/NGWR). This working group was the focus for interagency weather radar development and planning activities, including the preparation of a NEXRAD Concept Paper, completed in mid-1979. The concept paper outlined an approach for the development, procurement, and operation of a joint (DOC, DOD, DOT) national weather radar network. Specifically, it recommended prompt action to establish a joint program-management activity, define agency responsibilities, establish detailed program plans, and initiate requirement definition and specification preparation.

In 1979, the OFCM, supported by an interagency staff, developed a NEXRAD cross cut analysis for OMB. Jack Hinkelman represented the DOT and Major Cam Tidwell and Captain David Bonewitz represented the U.S. Air Force. Robert E. Beck of OFCM chaired the group. This analysis discussed mission responsibilities of the user agencies, inadequacies of the present weather radar system, alternative methods of meeting user requirements, and funding and development requirements.

The analysis concluded that replacing aging weather radars was a valid requirement. It agreed that the NEXRAD System with a Doppler capability would dramatically improve warnings and would provide new information of major significance to aircraft safety. However, it stated that consideration should be given to a mix of Doppler and non-Doppler radars, and that careful study should be given to the decision between a mixed and a full Doppler system. The analysis further concluded that the fundamental technology to support NEXRAD had been developed, but that a substantial amount of work remained to transfer Doppler radar technology to operational use in the field. It supported the establishment of a Joint System Program Office (JSPO) and recommended approval of the NEXRAD concept, including the FY 1981 budget requests for NEXRAD development.

In 1979, DOC, DOD and DOT established the Joint System Program Office (JSPO) within the National Oceanic and Atmospheric Administration to plan, define, acquire, and deploy a "Next Generation Weather Radar" (NEXRAD) network. Because DOC was assigned the lead role for the NEXRAD Program, JSPO was located in that department. To monitor the progress of the NEXRAD Program, the Federal Committee established an oversight committee, which was the genesis of the NEXRAD Program Council. The charter members of NPC were Richard E. Hallgren, DOC, Colonel Elbert W. Friday, DOD, and Neal A. Blake, FAA. The Federal Coordinator chaired the NPC. The NEXRAD Program Council provides policy guidance and oversight to JSPO and is aided in its coordination efforts by the Ad Hoc Group for Doppler Weather Radar Observation.

Initial staffing of JSPO included representatives from National Oceanic and Atmospheric Administration (NOAA), the Air Force, and the Federal Aviation Administration (FAA), plus two individuals from the OFCM -- Arthur L. Hansen and Samuel P. Williamson. Hansen was JSPO's first Director. In 1981, Hansen departed from NOAA and for a brief time, Colonel Alfred Molla, Assistant Federal Coordinator, Department of Defense (Army and Air Force) was detailed to JSPO as Acting Director. Subsequently, Colonel Molla returned to the OFCM and retired from the Air Force a short time later. Anthony Durham was appointed permanent JSPO Director. In 1989, Samuel Williamson replaced Durham as Director.

National Aircraft-Icing-Technology Program

In late 1983 at the suggestion of Neal A. Blake of FAA, a subgroup of the FCMSSR and other high-level officials in DOD, FAA, and NASA agreed to promote greater coordination in aircraft icing. In 1984, OFCM established the National Aircraft Icing Program Council.

The Council is responsible for developing and maintaining a technology plan and for providing policy guidance for its execution. In 1986, its Working Group for Aircraft Icing published an initial plan, the National Aircraft Icing Technology Plan, (Department of Commerce, 1986a), which has dual objectives: (1) to improve aircraft icing technologies for the current generation of aircraft and (2) to promote advances in aircraft icing technology that will be needed by 1995 to meet national aeronautical goals for new generations of aircraft. This plan also presents a comprehensive list of aircraft icing research needs and objectives, describes the efforts now under way, and proposes the areas of need. It recognizes that the scope, definitions, and priorities may change as the National Aircraft Icing Technology Plan is implemented and that an update will be needed to reflect accomplishments and changes in agency missions and goals.

One section of the technology plan, "Detecting, Monitoring and Forecasting" was addressed in detail in the National Plan to Improve Aircraft Icing Forecasts, prepared for the Committee for Aviation Services by an ad hoc group on Aircraft Icing Forecasts and published in 1986 (Department of Commerce, 1986b).

In FY 1989, OFCM provided funding to the National Center for Atmospheric Research to develop a research strategy to implement the plan for icing forecasts. Subsequently, the FAA established a six-year funding schedule beginning in FY 1990 to achieve the goals set forth in the plan. The objective of this preliminary effort is to identify the latest technology and equipment for reducing the research risks and program cost and to provide the Federal Government by 1996 the capability to make improved forecasts of aircraft icing.

Lightning-Detection Networks

In 1983, the Office of the Inspector General, DOC, issued a management audit report that indicated the significance of the threat of lightning to life and property and the need to improve severe weather forecasting. It stated that a number of agencies were

active in programs directed toward lightning detection and encouraged the DOC to determine the action necessary to improve the Nation's lightning-detection program.

Subsequently, the DOC member of ICMSSR requested that OFCM undertake a study to document the Federal agencies' interest in lightning detection, including existing and planned programs. The study, completed in early 1985, revealed that extensive systems exist for the detection and tracking of cloud-to-ground lightning. These systems are organized in networks operated by various Federal agencies, universities, and private industry.

OFCM obtained support from the Departments of Commerce, Defense and Transportation for an experiment by the State University of New York at Albany (SUNYA) to demonstrate the usefulness of a national lightning-detection network. The experiment takes advantage of three existing lightning-detection networks, which together cover most of the United States. The networks are operated by the Bureau of Land Management in the Western United States, the National Severe Storms Laboratory in the central United States, and the SUNYA in the East. The SUNYA detection systems are owned by the Electric Power Research Institute. Interagency activity is coordinated through the OFCM Working Group for Lightning-Detection Systems. The experiment is scheduled to end in March 1991.

Automated Weather Information Systems (AWIS)

Automated Weather Information Systems (AWIS) is the generic term used within the Federal coordination mechanism to refer to the weather information handling systems of the various Federal agencies. The agencies are pursuing AWIS to reduce labor-intensive functions; to reduce the time required to collect, process, and interpret weather data; to reduce the time to produce forecasts, warnings, and special tailored products; and to distribute these products to users expeditiously. Major agency systems classified as AWIS are the Department of Commerce's Advanced Weather Interactive Processing System for the 1990s (AWIPS-90), the

Federal Aviation Administration's Central Weather Processor (CWP), the U.S. Air Force's Automated Weather Distribution System (AWDS), and the U.S. Navy's Naval Environmental Display Station (NEDS). These systems include communications to collect and distribute raw data, information, and processed products. Excluded from AWIS are the observation subsystems and the supercomputers at the major centers.

In 1986, working under guidance from the Committee for Automated Weather Information Systems, the Working Group for Communication Interfaces and Data Exchange (WG/CIDE) published the first revision to a 1982 document entitled Standard Formats for Weather Data Exchange Among Automated Weather Information Systems. WG/CIDE also produced another standards document entitled Standard Telecommunication Procedures for Weather Data Exchange. The latter standard is based upon the Federal Information Processing Standard 100, which is compatible with a similar document produced by the International Standards Organization.

The AWIS Program Council, which consists of high-level representatives from the Departments of Commerce, Defense and Transportation, was established during February 1986 as part of the Federal coordination mechanism for meteorology. The initial members of the program council were Richard E. Hallgren, DOC; Brig. Gen. George E. Chapman, USAF, and Captain Edward J. Harrison, Jr., USN, DOD; and Neal A. Blake, FAA. In 1987, ICMSSR established the Committee for Automated Weather information Systems (CAWIS), and in 1988, OFCM published the Federal Plan for the Coordination of AWIS Programs. Subsequently, several working groups were established to coordinate activities relative to problems common to the agencies.

Meteorological Information Management

In May 1987, at the suggestion of the National Environmental Satellite, Data and Information Service of NOAA, the OFCM

recommended that ICMSSR establish a Working Group for Meteorological Information Management.

The development of new higher-resolution atmospheric observational systems, the operational deployment of large-scale graphic and alphanumeric communication and display systems, and the transition from traditional paper and film displays for graphical and satellite imagery to automated digital displays, have created a virtual explosion of meteorological information. The tremendous volume and complexity of new information threatens to overwhelm present-day archival systems and lead to confusion and serious inefficiencies in the application of retrospective data to scientific and operational needs.

At the same time, there is a growing demand for retrospective meteorological data to support research initiatives, such as analysis of global change, and operational uses such as military planning and environmental and engineering studies. These factors have led to proliferation of retrospective databases and the possibility of duplication of effort and development of incompatible databases by Federal agencies, other producers, and users. The purpose of the working group is to:

- Review Federal meteorological information plans.
- Plan for a National reference system for meteorological data and information.
- Coordinate information processing standards with the National Bureau of Standards.
- Prepare a coordinated Federal Plan for meteorological information management.

The objective of the Federal Plan is to review agency plans and requirements, develop guidelines for new data systems, develop a national reference system for retrospective databases, and devise a coordination mechanism. The goal is to ensure that user needs are

considered and that duplication of effort is eliminated insofar as possible.

Special Projects Integrated into the OFCM

When William S. Barney served as Chief of the Special Projects Office (SPO) of NOAA in the 1970s, the office consisted of select personnel with a variety of specialties, including logistics, engineering, data and program management, and military and civil meteorological operations. In 1980, when Barney became Deputy Federal Coordinator, some of his SPO responsibilities remained with him. At that time, SPO was disestablished and incorporated into the OFCM, including the SPO personnel. Among the major projects the SPO and the OFCM supported were the following:

Three-Mile Island Accident

At the request of the Departments of Commerce and Energy and the Federal Emergency Management Administration (FEMA), SPO provided logistical support to the Three-Mile Island nuclear accident in March of 1979 near Harrisburg, Pennsylvania. OFCM was instrumental in getting timely support from the Department of Defense to airlift critical equipment to the area.

Iran Weather Project

At the request of the Departments of Commerce and State, SPO provided technical and logistical support to Iran to develop a national weather program. OFCM provided some staff and administrative support to the program. (This was prior to the deposition of the Shah of Iran in 1979.)

Kingdom of Saudi Arabia Weather Project

At the request of the Departments of Commerce and State, SPO provided technical and logistical support to Saudi Arabia to develop a national weather program. The OFCM provided administrative support to the U.S. contingents in the Kingdom during the period 1981 to 1985.

Interdepartmental Board for Cooperation (IBC) of NOAA and the Department of Defense

In 1971, NOAA and the Department of Defense (DOD) established the IBC as a joint military contingency planning group. NOAA appointed Donald Moore, a former Federal Coordinator, to the Board and the OFCM provided staff support. During their tenure as Federal Coordinator in 1972-1975, Edward Roache and Clayton Jensen served on the IBC. William S. Barney replaced Jensen in 1975. In 1986, the Director of the NOAA Corps became the NOAA representative to the IBC. Today, the Department of Defense representatives and one of the other OFCM members provide staff support to the IBC.

Improved Weather Reconnaissance System (IWRS)

IWRS is an evolutionary system that has its roots in a natural disaster that occurred more than two decades ago. In August 1969, Hurricane Camille struck the Gulf Coast near Bay St. Louis, Mississippi and caused 256 deaths and about $1.4 billion in damage. It was the third costliest storm in this century.

Subsequently, a team of investigators surveyed the devastation, and reviewed the reports, forecasts, and the data available to the forecasters. The team also surveyed the aerial reconnaissance programs and equipment of the U.S. Navy, U.S. Air Force, and ESSA. Following the investigation and a report to the Vice President, President Richard M. Nixon requested a special study to ensure that the best available aircraft and equipment would be used in all future reconnaissance missions. In September 1969, only one

month after Camille, Robert M. White, Administrator of ESSA, announced the results of a special survey designed to improve aerial weather reconnaissance. Programs to upgrade both aircraft and instrumentation were to receive special emphasis and be accelerated.

The program to upgrade the instrumentation aboard the Air Force WC-130s started in 1970 with the Advanced Weather Reconnaissance System (AWRS). In 1975, the AWRS program became a joint undertaking of both the U.S. Air Force and NOAA. In 1979, DOC contracted for two major components of IWRS: the Aircraft Distributed Data System (ADDS), Omega Dropsonde Windfinding System (ODWS), and AFSATCOM satellite link. After several years of developmental effort, the Air Force decided to proceed to implement the system and asked the OFCM to manage the project.

In 1987, OFCM requested proposals for twelve operational IWRS and two ground stations. A member of the OFCM staff is the program manager and coordination is carried out through the IWRS Program Council. As of 1990, the installation of the IWRS equipment is complete and the Air Force is providing substantially improved reconnaissance data.

Geostationary Operational Environmental Satellite Data Collection System (GOES-DCS)

In an effort to assure effective use of the GOES-DCS, the OFCM and the Office of Water Data Coordinator (OWDC) jointly supported the compilation of a National Plan for GOES-DCS. The OWDC is the counterpart to OFCM in the U.S. Geological Survey, Department of Interior. The OWDC is responsible for carrying out the mandate of OMB Circular A-67 to coordinate and maintain a water data collection system for the Nation.

In 1985, Nancy Lopez of OWDC suggested that OFCM and OWDC jointly sponsor an interagency working group to coordinate requirements for satellite telemetry. The group was formed and named the Satellite Telemetry Interagency Working Group

(STIWG). STIWG focuses on telemetry data that relate to hydrologic, meteorologic, oceanic and other environmental data. The Group serves as a bridge between two interagency entities: the OFCM's Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR) and OWDC's Interagency Advisory Committee for Water Data (IACWD). STIWG reports directly to ICMSSR's Committee for Basic Services (CBS) and IACWD's Hydrology Subcommittee. The Federal agencies involved in satellite telemetry are eligible for membership.

Mesoscale Weather Support for the Department of Defense (DOD)

Since 1989, at the request of DOD, OFCM has been assisting DOD in the development of a plan to focus on operational requirements and supporting research for mesoscale meteorology. The plan will be internal to DOD. The senior DOD representative to OFCM is serving as the project leader. The plan will focus on DOD's research and development efforts to achieve operational capability in weather support for a technologically advanced battlefield/battle environment in the year 2000 and beyond.

Plans and Publications

The preparation of Federal plans is a major responsibility of the Federal Coordinator and requires extensive planning and coordination. Generally, Federal plans are prepared for each of the specialized meteorological services and for meteorological programs common to two or more agencies. In most cases, the preparation of Federal plans is facilitated by the existence of individual agency plans for the service or program involved. The Federal Coordinator compiles information from the involved agencies and proposes a unified plan for consideration. Current publications of the Federal Coordinator for Meteorology are listed in Table 2.

Annually, OFCM issues the Federal Plan for Meteorological Services and Supporting Research, which contains detailed reports on the many activities of the Office as well as resource information, items on the National Climate Program and the World Weather

TABLE 2

Current Publications of OFCM

Title	Date	Number
Federal Plan for Meteorological Services and Supporting Research, Fiscal Year 1992	April 1991	FCM-P1-1991
National Plan for Space Environment Services and Supporting Research: 1988-1992	July 1988	FCM-P10-1988
National Severe Local Storms Operations Plan	September 1990	FCM-P11-1990
National Hurricane Operations Plan	April 1991	FCM-P12-1991
National Winter Storms Operations Plan	December 1990	FCM-P13-1990
Federal Plans for Mutual Support and Cooperative Backup Among Operational Processing Centers	March 1985	FCM-P14-1985
National Plan for Stratospheric Monitoring, 1988-1997	July 1989	FCM-P17-1989
National Plan for Tropical Cyclone Research	December 1990	FCM-P25-1990
Preliminary National Plan for Lightning Detection Systems	June 1988	FCM-P22-1988
Federal Plan for the Coordination of Automated Weather Information System Programs	May 1988	FCM-P23-1988
Federal Meteorological Handbook No. 1 - Surface Observations	April 1988	FCM-H1-1988
Federal Meteorological Handbook No. 2 - Surface Synoptic Codes	December 1988	FCM-H2-1988
Federal Meteorological Handbook No. 10 - Rocketsonde Observations	December 1988	FCM-H10-1988
Federal Meteorological Handbook No. 11- Doppler Radar Meteorological Observations		
Part B - Doppler Radar Theory and Meteorology	June 1990	FCM-H11B-1990
Part C - WSR-88D Products and Algorithms	February 1991	FCM-H11C-1991
Directory of Atmospheric Transport and Diffusion Models, Equipment, and Projects	March 1991	FCM-I3-1991
Tropical Cyclone Studies	December 1988	FCM-R11-1988
Tropical Cyclone Studies Supplement	August 1989	FCM-R11-1988 S
Interdepartmental Meteorological Data Exchange System Report, IMDES	July 1990	FCM-R12-1990
Federal Meteorological Requirements 2000	October 1990	FCM-R13-1990
Standard Formats for Weather Data Exchange Among Automated Weather Information Systems	May 1990	FCM-S2-1990
Standard Telecommunication Procedures for Weather Data Exchange	July 1989	FCM-S3-1989
Federal Standard for Siting Meteorological Sensors at Airports	May 1987	FCM-S4-1987

Program, and descriptions of agency weather programs. Additional publications have included plans and reports on aircraft icing, aviation weather requirements and services, and standard formats and telecommunication procedures for weather data exchange.

A number of other publications are periodically revised or prepared. These include the National Hurricane Operations Plan, National Severe Local Storms Operations Plan, National Plan for Space Environmental Services and Supporting Research, National Operations Plan for Drifting Data Buoys, Federal Plans for Mutual Support and Cooperative Backup Among Operational Processing Centers, and Federal Plan for Stratospheric Monitoring and Early Detection of Change, as well as a Federal Plan for the Coordination of AWIS Programs and a revision of the Federal Meteorological Handbook (FMH) series.

Since the late 1960s, OFCM has coordinated the interagency activities of operational weather processing and communications centers, including the NWS's National Meteorological Center, Suitland, Maryland, and the DOD's Air Force Global Weather Central, Offutt Air Force Base, Nebraska, and Fleet Numerical Oceanography Center, Monterey, California. Mutual support and backup among these centers to provide effective and economic use of available resources are important to our national interest.

In 1980, OFCM assumed the responsibility to revise Federal Meteorological Handbooks (FMH) using the existing interdepartmental coordination infrastructure of committees and working groups. Prior to 1980, the National Weather Service had the responsibility for revising FMHs. By common consent of OFCM and NWS, OFCM would use the interdepartmental coordination infrastructure to revise FMHs. The FMH series includes observing and reporting practices for surface, upper air, radar, and meteorological rocket observations.

OFCM reevaluates the status of the FMH series and modifies each handbook, if appropriate, to:

- highlight responsibility for preparation and maintenance

- develop a mechanism to ensure that the FMHs remain current and complete

- assure the merging of information from new or automated technology

- meet requirements for utility of the primary users

- reenforce the status of each handbook as the Federal standard for observing and reporting the meteorological phenomena and parameters by which the atmosphere is usually described.

Many OFCM working groups of the Committee for Basic Services participate in this task.

Other Activities

American Meteorological Society (AMS) Conference on Interactive Information and Processing Systems

In 1983, the DOD Missile Range Commanders Council and OFCM agreed to co-sponsor an interactive processing (IP) conference at the NASA Goddard Space Flight Center, Maryland. Prior to that time, the Range Commanders Council, which consisted of the commanders of missile test ranges, had hosted the interactive processing conferences. In 1984 and 1985, OFCM sponsored the conferences, which were chaired by OFCM staff member G. Stanley Doore, and included IP exhibits as part of its program.

Since 1985, The American Meteorological Society has hosted the IP conference in conjunction with its annual business meetings. At the annual meeting in 1990, in Anaheim, California, there were 80 IP exhibits. The annual conferences are today recognized as the largest and most successful of the Society's meetings.

Large-scale Computers for Operational Forecasting and Atmospheric Modeling Research

In November 1969, the Federal Committee (FCMSSR) agreed that expanded support and an ultrahigh-speed computational capability were needed for numerical modeling and simulation of the atmosphere. As a result, FCMSSR established a Working Group on Computers to develop a plan for the use of higher-capability computers for research and mathematical modeling of the global atmosphere. In 1970, after reviewing the first report of the Working Group on Computers, FCMSSR asked the Federal Coordinator to study computer requirements for operational weather services, to integrate these research requirements, and to develop alternatives satisfying the combined requirements. Subsequently, the Interdepartmental Committee for Meteorological Services (now ICMSSR) established an Ad Hoc Group on Operational Computer Requirements to undertake that responsibility.

Because of its concern about computer resources, in 1976 the FCMSSR requested that OFCM schedule a Request for Information (RFI) from the computer industry. Later that year, OFCM held RFI briefings at NOAA Headquarters. About 60 persons attended. Five vendors of very large-scale computer systems--Control Data, Cray Research, Systems Development Corporation, Goodyear and Burroughs--presented their ideas on computer systems that would execute code for a hydrodynamic model twenty five times faster than the systems that were available at that time. Seymour Cray, the developer of the Cray system and the senior industry official present, presented the briefing for Cray Research.

In 1985, OFCM scheduled a second RFI, which was hosted by the NOAA Geophysics Fluid Dynamics Laboratory in Princeton, New Jersey. All of the major computer manufacturers participated. About 50 persons from the United States, Canada, and the United

Kingdom attended. This activity has lead to the establishment of an informal interagency computing group which meets regularly to coordinate requirements and developments in this dynamic field.

The Modernization and Restructuring of the National Weather Service

Background

OFCM has faced many challenges over the past 25 years, but none will be as challenging as coordination of Federal weather programs during the modernization and restructuring of the National Weather Service (NWS).

The Federal agencies have traditionally shared in the observation and exchange of hydrometeorological data. The existing national observing networks are sparse and limited in their coverage of the Nation's atmosphere. The Department of Transportation's Federal Aviation Administration and Department of Defense have joined the NWS in acquiring major new technologies and in coordinating geographical placement of new radars and automated surface observing systems, thereby providing more uniform national coverage by these land-based systems. New geostationary meteorological satellites, which complement the new radars and automated surface observing systems, are being procured by NOAA. Data from these new observing systems will be shared by each participating agency and will be available throughout the Nation.

In 1988, the President signed Public Law 100-685, which specifies conditions for planning and reporting on the progress of the modernization and restructuring of the NWS. The law also requires identification of the improvements in basic services that are required for severe weather forecasts and warnings. In early 1989, DOC submitted a strategic plan for the modernization and restructuring of the NWS to the OMB. An implementation plan was issued in 1990.

The Role of OFCM

OFCM's role in the modernization and restructuring process will be peripheral in some respects and direct in others. To ensure a smooth integration of new technological systems into the modernization and restructuring process, OFCM will work closely with NWS and other Federal agencies to coordinate the many changes that will take place. The major technologies are:

A. Automated Surface Observing System (ASOS).

More than 1,000 ASOS systems across the Nation will be providing data on pressure, temperature, wind direction and speed, runway visibility, cloud ceiling heights, and type and intensity of precipitation on a nearly continuous basis. The 1,000 ASOS sites include approximately 750 airport installations under the jurisdiction of the FAA and approximately 250 NWS sites. DOD is also considering the acquisition of additional units. Interagency aspects are coordinated through the JAWOP Council.

B. Next Generation Weather Radars (NEXRAD).

NWS plans to operate about 120 NEXRAD systems; the remainder of the NEXRAD systems will be located at FAA and DOD locations. Guidance for the program comes from the NEXRAD Program Council.

C. Satellite Upgrades.

For severe weather and flood warnings and short-range forecasts, cloud imagery and atmospheric sounding data from the geostationary meteorological satellites will continue to be a major data source. For longer-range forecasting,

soundings from the polar orbiting satellites will provide the primary data for National Meteorological Center numerical forecast models. The OFCM forum for interagency discussions of these developments is the Committee on Operational Environmental Satellites.

D. **National Center Advanced Computer Systems.**

Warnings and forecasts prepared by NWS offices in the 1990s will rely heavily on the basic analyses and guidance products provided by the National Meteorological Center, especially for periods of 36 hours and beyond. These increased demands require the acquisition of a dedicated Class VII computer with a processing capability an order of magnitude greater than the Class VI computer. Interagency concerns relative to these developments are coordinated through the Committee on Operational Processing Centers (COPC).

E. **Advanced Weather Interactive Processing Systems (AWIPS).**

AWIPS will be the nerve center of the operations. It will receive and integrate high-resolution data from the observation systems, the centrally collected data, and the centrally prepared analysis and guidance products from the National Meteorological Center. AWIPS is one of the programs coordinated through the OFCM's Automated Weather Information Systems Program Council (AWISPC).

OFCM's major task will be to ensure that any adverse impact on services to the Nation is minimal during the transition period. OFCM will

cooperate with NWS's Transition Program Office to keep the Federal agencies informed of the transition process. The entire coordination infrastructure will be at the disposal of the Federal agencies to make certain their interests are protected during the transition process.

Current Relationship with the Office of Management and Budget

The working relationship of the OFCM and OMB has entered a new phase during the last four or five years. At the beginning of each fiscal year, OFCM presents a cross-cut budget of Federal agencies' major automated systems for weather observations, communications, and processing. The budget analysis includes budget requests for the next fiscal year and the out-years and the total cost of the system or program.

Since 1986, in response to the Inspector General's recommendation in its audit of the OFCM in 1985, OFCM has submitted several cross-cut analyses to OMB. The recommendation stated that OFCM is to perform cross-cut studies of major agency weather programs and requirements as needed.

Prior to publication each fiscal year, OMB reviews OFCM's Federal Plan for Meteorological Services and Supporting Research. This working relationship also involves meetings and frequent interaction between OMB and OFCM personnel. Starting in 1990, OFCM revised the structure of the Federal Plan to make the budget analysis more useful to the OMB examiners.

Current Relationship with the Subcommittee for Atmospheric Research

The Subcommittee on Atmospheric Research (SAR), originally the Interdepartmental Committee for Atmospheric Sciences (ICAS), was established in 1959 by the Federal Council for Science and Technology (FCST). It was the principal mechanism for coordination of research in atmospheric sciences within the Federal

Government until 1977. At that time, FCST and its subordinate organizations were abolished and replaced by the Federal Coordinating Council for Science, Engineering and Technology (FCCSET). SAR succeeded ICAS and became a Subcommittee of the FCCSET Committee on Atmosphere and Oceans (CAO). In 1987, CAO was disestablished and replaced by the Committee on Earth and Environmental Sciences (CEES), under which SAR is now a standing subcommittee.

The primary goal of SAR is to improve the planning and coordination of atmospheric research activities among the agencies involved, primarily the U.S. Departments of Agriculture, Commerce, Defense (Army, Navy, Air Force), Energy, Interior, and Transportation; Environmental Protection Agency; National Aeronautics and Space Administration; and National Science Foundation. Also, observers from several other agencies, such as OFCM, the National Climate Program Office, and the Office of Science and Technology Policy, participate in SAR.

SAR publishes the National Atmospheric Sciences Program, a retrospective report that is distributed widely. The 1984-87 report summarized the atmospheric research budgets for that period and focused the involvement by agencies in atmospheric sciences and major field programs. Since 1987, the Deputy Federal Coordinator for Meteorology has attended SAR meetings as a liaison observer. A joint ICMSSR-SAR meeting was held in 1988 to review programs of mutual interests, e.g., lightning detection and monitoring of the stratosphere. OFCM and SAR are cooperating to see that their publications are mutually supportive and prepared without duplication of effort.

CHAPTER 6

Summary

The Office of the Federal Coordinator for Meteorology (OFCM) is one of the least known but most influential organizations in the Federal Government. It is the only office within the Federal Government responsible for promoting the coordination and cooperation among the agencies involved in operational weather service activities and supporting research.

OFCM activities began more than 25 years ago as a result of a growing concern in the 1960s on the part of the Executive Branch and Congress over the proliferation of meteorological programs throughout the Federal Government. At the request of the House of Representatives Committee on Appropriations, the Bureau of the Budget (now the Office of Management and Budget) surveyed the Federal meteorological activities and found that 15 Federal agencies engaged in significant meteorological activities. The survey concluded that centralizing meteorological services would not be feasible but that strengthening the coordination among them would be beneficial.

Subsequently, Congress enacted Public Law 87-843 (Section 304) of the Department of Commerce Appropriation Act of 1963, which required the Bureau of Budget to provide the Congress with a fiscal summary each year of the:

- totality of the programs for meteorology,
- specific aspects of funding assigned to each agency,
- the estimated goals and financial requirements.

In response, the Bureau of the Budget issued Circular A-62, which called on the Department of Commerce (DOC) to establish procedures to review basic and specialized meteorological requirements, and to prepare a plan and to compile periodic information on its implementation. In response to the Circular, DOC issued an implementation plan that created the Office of the Federal Coordinator for Meteorology (OFCM) and outlined an interdepartmental committee structure.

In 1980, DOC reorganized OFCM as an independent function with a full-time staff. To assist OFCM in coordinating the Federal weather programs, the participating agencies assigned senior-level representatives. OFCM coordinating structure was revised. In addition to the Federal and interdepartmental committees, OFCM added program councils to provide specific guidance for special programs.

During the decade of the 1980s, the OFCM achieved many milestones in coordinating special projects and Federal weather programs such as:

- Next Generation Weather Radar (NEXRAD) Program
- National Aircraft-Icing-Technology Program
- National Program for Lightning-Detection System
- Automated Weather Information Systems (AWIS)
- Meteorological information management.

Finally, the relationship between OFCM and OMB entered a new phase during the past five years. Each fiscal year OFCM prepares a cross-cut budget of major automated systems for weather observations and communications. OMB reviews the Federal Plan for Meteorological Services and Supporting Research, prior to

publication each year. Generally, there is direct interaction between OFCM and OMB staffs during the budget analysis process.

In retrospect, the history of OFCM has been one of accomplishments, diversity, and exemplary service to the Federal weather program. With continuing and increasing demands for cost effectiveness in government, it can be expected that OFCM will play an increasing role in the coordination of meteorological activities in the future.

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APPENDIX A

Executive Office of the President

Bureau of the Budget
Washington, D.C. 20503

November 13, 1963 Circular No. A-62

TO THE HEADS OF EXECUTIVE DEPARTMENTS AND ESTABLISHMENTS

SUBJECT: Policies and procedures for the coordination of Federal meteorological services.

1. *Purpose and coverage.* This Circular prescribes policy guidelines and procedures for planning and conducting Federal meteorological services and applied research and development to improve such services.

The guidelines are designed to improve organizational arrangements and procedures for the planning and conduct of Federal meteorological programs with the objective of meeting essential user requirements most effectively and economically. The guidelines (a) reaffirm the central role of the Department of Commerce with respect to basic meteorological services; (b) clarify the respective responsibilities of the Department of Commerce and the user agencies for basic and specialized meteorological services; (c) establish procedures to facilitate coordination and the timely resolution of outstanding issues; (d) provide for evaluating user requirements within the context of a balanced and integrated Federal plan; and (e) fix responsibility for continuing and systematic review of meteorological services and supporting research.

Policies and procedures with respect to basic research in meteorology are not within the purview of this Circular because such research is only indirectly related to improvement of weather services and often has other objectives. The Federal Council for Science and Technology will continue to have cognizance over basic research in the atmospheric sciences, which includes meteorology. This also includes the supporting applied meteorological research, as defined herein, in terms of its dependence upon and contribution to the atmospheric sciences.

2. *Statement of meteorological services and requirements.* For purposes of this Circular:

a. "Basic meteorological services" include all activities, that are possible within the given state of meteorological science, required to produce or complete a description in time and space of the atmosphere. In general the products of this process are meteorological in nature and are not necessarily useful in such form for the operational needs of users. These services also include those activities required to derive from raw data the products needed by the

general public in their normal everyday activities and for the protection of their lives and property.

The general functions involved in providing basic meteorological services include:

(1) Measurements of the meteorological characteristics of the atmosphere, made with sufficient density and frequency to meet the needs of the general public and the common needs of all users.

(2) Collection of these measurements for processing.

(3) Analyses and prognoses of meteorological variables, including estimates of their probable error distribution, and interpretation of the analyses and prognoses for meeting the needs of the general public.

(4) Distribution of these meteorological analyses and prognoses to outlets for subsequent interpretation for the operational needs of all users, and the distribution and display of operational products to meet the needs of the general public.

b. "Specialized meteorological services" include those activities, derived generally from the output of the basic meteorological services, which produce those products needed to serve the operational needs of particular user groups. These user groups include, among others: aviation, agriculture, business, commerce, and industry.

The general functions involved in providing these services include:

(1) Establishment of parameters needed to serve solely a particular operational purpose.

(2) Collection of data from specialized measurements which conform with the established parameters.

(3) Analysis of the data obtained from specialized measurements.

(4) Interpretation of the analyzed data and the making of prognoses to meet the operational needs of users.

(5) Distribution and display of these specialized products to meet the needs of individual users or groups.

c. "Supporting research" includes those applied research and development activities whose immediate objective is the improvement of the basic and specialized meteorological services as defined herein.

d. "User agency" is an agency whose mission requires meteorological services either for its internal operations or as part of its direct services to a clientele group. "Mission requirements" include those requirements directly related to the primary mission of the agency. When such mission involves direct services to a clientele group requiring the provision of meteorological services it is included within the terms of this definition. Also, when the agency has no such clientele relationships but its internal operations require the provision of meteorological services, its mission is included within the terms of this definition.

e. "Common requirements of other agencies" include the needs for basic meteorological services necessary to support their specialized meteorological services. Such requirements also include those needs for specialized meteorological services common to two or more agencies.

3. *Coordination of meteorological services.*

a. The Department of Commerce, with the advice and assistance of other agencies concerned, will establish procedures designed to facilitate a systematic and continuing review of basic and specialized meteorological requirements, services and closely related supporting research. The Department will undertake such reviews with the objectives of (1) establishing, and revising as appropriate, needed basic services, and (2) advising other agencies on the need for and organization of specialized services. The objectives of these continuing reviews are to assure a timely identification of need for new or revised services and to develop those services, either basic or specialized, that most efficiently meet the need.

b. The Department of Commerce, to the maximum extent practicable and permitted by law, will provide those basic meteorological services and supporting research needed to meet the requirements of the general public or the common requirements of other agencies. The Department of Commerce will arrange for the conduct of such services by the Department, by other agencies, or by non-Federal organizations, depending upon the most effective and economical arrangements.

c. User agencies will arrange for specialized meteorological services and supporting research when their mission requirements cannot be effectively accommodated through the basic services and supporting research. Before supporting specialized meteorological services and research, the user agency should obtain the views of the Department of Commerce as to whether its requirements can be met satisfactorily through the basic meteorological services and supporting research, including appropriate adjustments therein. The Department of Commerce will, to the extent consistent with effective and economical use of resources, conduct the specialized services that support the mission requirements of user agencies.

d. The above provisions will not apply to (1) the division of responsibilities between the Department of Commerce and the National Aeronautics and Space Administration for development of meteorological satellites; and (2) meteorological activities involving special military security considerations. Arrangements with respect to the foregoing activities will be set forth in separate determinations.

4. *Development of a Federal plan.*

a. The Department of Commerce will prepare and keep current a plan, and obtain periodic information on its implementation, for the efficient utilization of meteorological services and supporting research. The purpose of such planning is to achieve the maximum integration of current and future services and research consistent with the effective and economical accom-

general public in their normal everyday activities and for the protection of their lives and property.

The general functions involved in providing basic meteorological services include:

(1) Measurements of the meteorological characteristics of the atmosphere, made with sufficient density and frequency to meet the needs of the general public and the common needs of all users.

(2) Collection of these measurements for processing.

(3) Analyses and prognoses of meteorological variables, including estimates of their probable error distribution, and interpretation of the analyses and prognoses for meeting the needs of the general public.

(4) Distribution of these meteorological analyses and prognoses to outlets for subsequent interpretation for the operational needs of all users, and the distribution and display of operational products to meet the needs of the general public.

b. "Specialized meteorological services" include those activities, derived generally from the output of the basic meteorological services, which produce those products needed to serve the operational needs of particular user groups. These user groups include, among others: aviation, agriculture, business, commerce, and industry.

The general functions involved in providing these services include:

(1) Establishment of parameters needed to serve solely a particular operational purpose.

(2) Collection of data from specialized measurements which conform with the established parameters.

(3) Analysis of the data obtained from specialized measurements.

(4) Interpretation of the analyzed data and the making of prognoses to meet the operational needs of users.

(5) Distribution and display of these specialized products to meet the needs of individual users or groups.

c. "Supporting research" includes those applied research and development activities whose immediate objective is the improvement of the basic and specialized meteorological services as defined herein.

d. "User agency" is an agency whose mission requires meteorological services either for its internal operations or as part of its direct services to a clientele group. "Mission requirements" include those requirements directly related to the primary mission of the agency. When such mission involves direct services to a clientele group requiring the provision of meteorological services it is included within the terms of this definition. Also, when the agency has no such clientele relationships but its internal operations require the provision of meteorological services, its mission is included within the terms of this definition.

plishment of mission requirements. The plan should include: (1) all civilian meteorological services and supporting research, and (2) those meteorological services (basic and specialized) and supporting research programs of the military which are significantly affected by, or which affect, civilian meteorological services and supporting research.

The plan will be directed towards relating such meteorological services and research to requirements, as established by the user agencies. It will also serve to develop the coordinating arrangements needed for the optimal use of the basic and related specialized meteorological services and supporting research in an efficient overall system.

b. Planning should be directed towards the establishment of both long-range and intermediate agency objectives and the development of programs related to both sets of objectives. The Department of Commerce should assure that the plan, relating proposed programs to fiscal year and longer range objectives, is available for the annual preview of the various agencies' budgets for Fiscal Year 1966 and thereafter. The plan should clearly identify planning assumptions, any unresolved interagency issues, and the views of the agencies and concerned with respect thereto.

c. In preparing and revising the plan, the Department of Commerce will obtain the advice and assistance of the principal agencies providing or utilizing meteorological services. To this end the Department should establish appropriate arrangements for obtaining continuing advice from the principal agencies concerned. The Department should exercise the leadership in assuring the differences of opinion are resolved expeditiously. The division of responsibilities among agencies for provision of meteorological services and supporting research will, insofar as practicable and permitted by law, conform with the guidelines set forth under section 3 above.

5. *Overall review procedures.*

When major differences among agencies cannot be resolved through consultation, the head of any agency concerned may refer the matter to the appropriate agency within the Executive Office of the President for consideration. The Presidential staff agencies will keep each other currently informed of meteorological issues and will cooperate in achieving their timely resolution.

APPENDIX B

DEPARTMENT OF COMMERCE PLAN FOR IMPLEMENTATION OF BUREAU OF THE BUDGET CIRCULAR A-62, NOVEMBER 13, 1963

1. Background. Bureau of the Budget Circular A-62, November 13, 1963, entitled "Policies and Procedures for the Coordination of Federal Meteorological Services: prescribes policy guidelines and procedures for planning and conducting Federal meteorological services and applied research and development to improve such services. The guidelines set forth in the circular:

a. Reaffirm the central role of the Department of Commerce with respect to basic meteorological services.

b. Clarify the respective responsibilities of the Department of Commerce and the user agencies for basic and specialized meteorological services.

c. Establish procedures to facilitate coordination and the timely resolution of outstanding issues.

d. Provide for evaluating user requirements within the context of a balanced and integrated Federal plan.

e. Fix responsibility for continuing and systematic review of meteorological services and supporting research.

Policies and procedures with respect to basic research in meteorology are not within the purview of the Circular. The Federal Council for Science and Technology continues to have cognizance over all basic research in the atmospheric sciences. In addition, the provisions of the Circular do not apply to (1) the division of responsibilities between the Department of Commerce and the National Aeronautics and Space Administration for development of meteorological satellites: and (2) meteorological activities involving special military security considerations.

2. Responsibility of the Department of Commerce. The operative portions of the Circular assign the following responsibilities to the Department of Commerce:

a. "The Department of Commerce, with the advice and assistance of other agencies concerned, will establish procedures designed to facilitate a systematic and continuing review of basic and specialized meteorological requirements, services and closely related supporting research. The Department will undertake such reviews with the objectives of (1) establishing, and reviewing as appropriate, needed basic services and (2) advising other agencies on the need for and organization of specialized services."

"The Department of Commerce will prepare and keep current a plan, and obtain periodic information on its implementation, for the efficient utilization of meteorological services and supporting research. The purpose of such planning is to achieve the maximum integration of current and future services and research consistent with the effective and economical accomplishment of mission requirements."

3. The Office of the Federal Coordinator for Meteorology. (See Attachment #1). To carry out the responsibilities outlined above in conjunction with implementation of BOB Circular A-62, the Department of Commerce plan provides that:

a. An Office for the coordination of Federal meteorological activities be established within the Office of the Assistant Secretary for Science and Technology of the Department of Commerce.

b. Dr. Robert M. White direct the activities of this office on behalf of the Department and hold the title of Federal Coordinator for Meteorology.

c. The Federal Coordinator have a permanent full-time staff headed by a Deputy Federal Coordinator for Meteorology.

Organizationally, the Office of the Federal Coordinator will be composed of the following staff elements:

(1) Operations Evaluation Group
(2) Operating Program Division
(3) Supporting Research Division

The Operations Evaluation Group will provide staff assistance to the Federal Coordinator for analyses of Federal meteorological activities as required to make assessments of economic and fiscal consequences of proposed actions. This group will also undertake independent analyses of specific areas of overlap or interface between the activities of the various agencies and render quantitative information on the consequences of various decision alternatives. While the Operations Evaluation Group will perform special studies for the Federal Coordinator, the Operating Program and Supporting Research Divisions will work closely with the interdepartmental committees (discussed in Paragraph 5, below) in the coordination and review of Federal meteorological requirements, services and supporting research and in the compilation of the Federal Meteorological Plan. These divisions will act as the permanent secretariat for the interdeparmental committees.

4. The Federal Committee for Meteorological Services and Supporting Research. The purpose of this Committee will be to provide high-level policy guidance to the Federal Coordinator, to review and validate proposed Federal meteorological plans, and to resolve differences which may arise in connection with the preparation, monitoring and coordination of the Federal meteorological plan. Each of the following agencies has need for meteorological services either for its internal operations or as a part of its direct service to a clientele group and will be represented by a member on the Federal Committee for Meteorological Services and Supporting Research.

Department of Commerce
Department of Defense
Department of Agriculture
Department of the Treasury
Department of Health, Education and Welfare
Federal Aviation Agency
National Aeronautics and Space Administration
National Science Foundation
Atomic Energy Commission

In addition, the Bureau of the Budget will be invited to designate an observer for attendance at Committee meetings. Representation should be at the Assistant

Secretary level or the equivalent such that Committee members can commit their agencies and speak authoritatively for them. Chairmanship will rest with Dr. J. Herbert Hollomon, Assistant Secretary of Commerce for Science and Technology. This will facilitate coordination of meteorological research between this Committee and the Interdepartmental Committee for Atmostpheric Sciences.

5. Interdepartmental Committees for Meteorological Services and Research. The principal work of coordination of meteorological activities; the systematic and continuing review of basic and specialized meteorological requirements, services and supporting research; and the preparation and maintenance of a Federal Meteorological Plan will be carried on within the following two key committees and their appropriate subcommittees:

a. Interdepartmental Committee for Meteorological Services

b. Interdepartmental Committee for Applied Meteorological Research

Membership on the Interdepartmental Committee for Meteorological Services will consist of the Commanders of the Military Weather Services, the Director of the National Meteorological Service and representatives of equivalent status in user departments or agencies. Membership on the Interdepartmental Committee for Aplied Meteorological Research will consist of senior managers and directors of departmental or agency programs of applied meteorological research. Chairmanship of these two committees will be vested in the Weather Bureau members.

6. Appeal and Arbitration. The Chairman, Federal Committee for Meteorological Services and Supporting Research will refer problems to the heads of agencies concerned when resolution cannot be obtained at the Federal Committee level. In the unlikely possibility that some problems are still unresolved, they will be referred to the Executive Office of the President for resolution.

7. Federal Meteorological Plan. The proposed content of the Federal Meteorological Plan required by the Circular is outlined in Attachment #2.

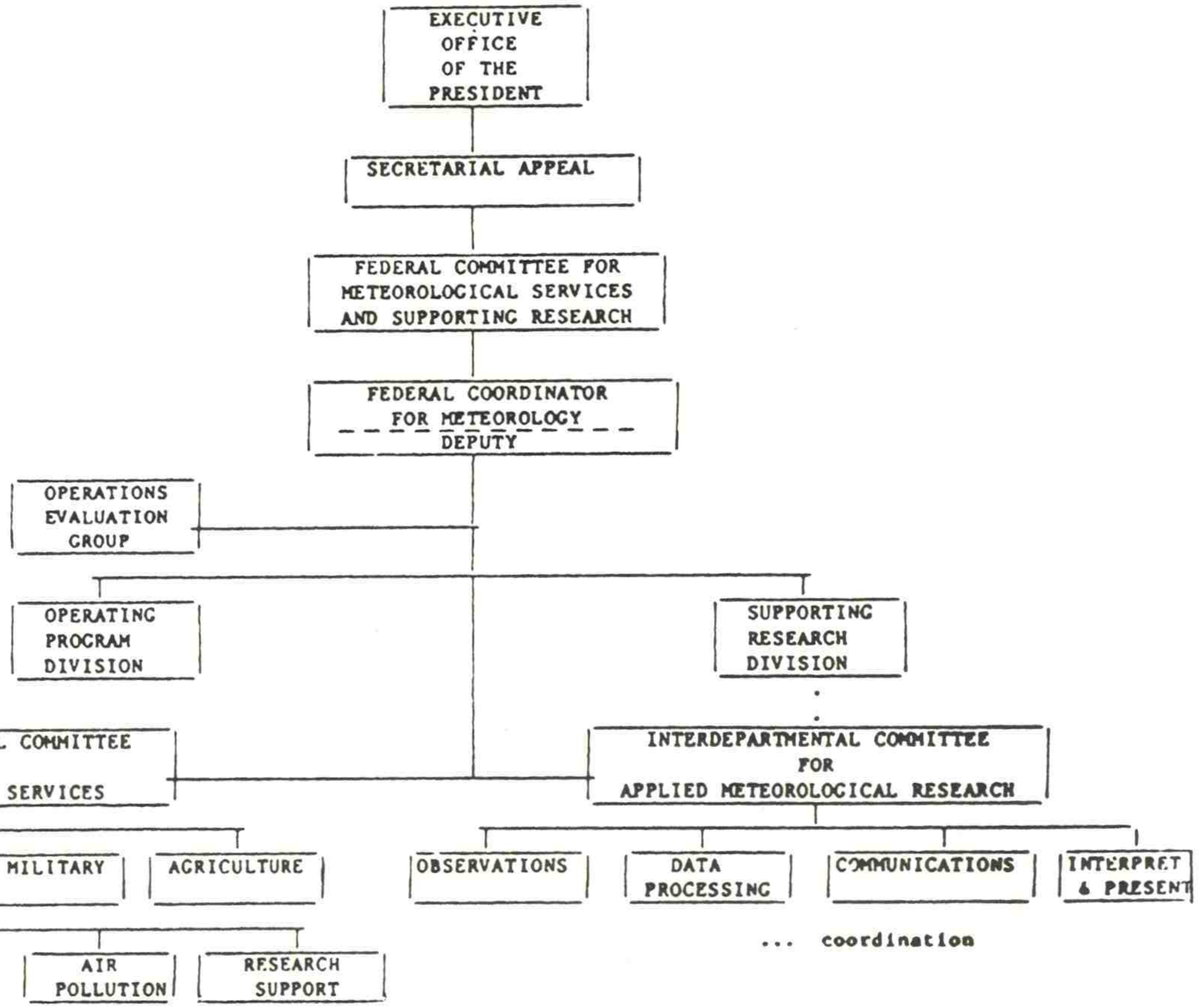
8. Staffing the Office of the Federal Coordinator for Meteorology. The proposed staffing of the full-time personnel of the Office of the Federal Coordinator for Meteorology is given in Attachment #3. The importance of obtaining staff personnel with extensive knowledge and experience in major user areas such as civil aviation and the military services is well recognized. For this reason, primary agencies involved in or concerned with meteorological support will be asked to designate high-level personnel to work on detail in one or more of the staff positions under the direction of the Federal Coordinator as a part of the permanent staff. All agencies who operate weather services or are users of such services will be invited to designate representatives on the appropriate committees and subcommittees. While these committees and subcommittees will meet only periodically, some of the agencies requiring a close working relationship with the Federal Coordinator may wish to assign additional full-time representatives to the Office of the Federal Coordinator for Meteorology to represent them on the various subcommittees.

9. Status of Other Meteorological Coordinating Groups. There exist several mechanisms for coordinating meteorological activities in the Federal

Government. Coordinating groups, such as the National Coordinating Committee for Aviation Meteorology (NACCAM) and the recently formed FAA-WB Task Organization will be considered for possible absorption into the proposed coordinating structure. The NACCAM functions, especially in the areas of aviation, would be undertaken by the Aviation Services Subcommittee of the Interdepartmental Committeee for Meteorological Services. Many of the activities of the present FAA-WB Task Group might effectively be absorbed within the proposed mechanism.

10. Schedule of Implementation of BOB Circular A-62

	1964
Establishment of Office of Federal Coordinator for Meteorology	In Process
Designation of Membership on Federal Committee for Meteorological Services and Supporting Research	4th Week January
Recruiting of Staff	January - June
Designation of Agency Personnel for Detail to Office of Federal Coordinator for Meteorology	1st Week February
Establishment of Interdepartmental Committee Structure	2nd Week February
Designation of Membership on Committees and Subcommittees	3rd Week February
Commence Work on Federal Meteorological Plan	3rd Week February


EXECUTIVE OFFICE OF THE PRESIDENT
SECRETARIAL APPEAL
FEDERAL COMMITTEE FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH
FEDERAL COORDINATOR FOR METEOROLOGY
DEPUTY
OPERATIONS EVALUATION GROUP
OPERATING PROGRAM DIVISION
SUPPORTING RESEARCH DIVISION
INTERDEPARTMENTAL COMMITTEE FOR METEOROLOGICAL SERVICES
INTERDEPARTMENTAL COMMITTEE FOR APPLIED METEOROLOGICAL RESEARCH
BASIC
AVIATION
MILITARY
AGRICULTURE
OBSERVATIONS
DATA PROCESSING
COMMUNICATIONS
INTERPRET & PRESENT
MARINE
SPACE OPERATIONS
AIR POLLUTION
RESEARCH SUPPORT
... coordination

ATTACHMENT # 2

PROPOSED CONTENT OF FEDERAL METEOROLOGICAL PLAN

1. The Federal Plan for Meteorology will be organized by meteorological service programs. A service program will consist of three distinct sections:

(1) a description of the requirement
(2) a 5-year operating program plan (including equipment & facilities)
(3) the supporting research program

Each of these sections will be further broken down into the following four functional areas:

(a) Observations
(b) Data Processing
(c) Communications
(d) Interpretation and Presentation

2. The Committee and subcommittee structure has been designed to facilitate the preparation of the Federal Plan. Primary responsibilitiy for each service program will rest with the appropriate service subcommittee. It will be the subcommittee's responsibility to develop its supporting research program in conjunction with the Interdepartmental Committee for Applied Meteorological Research and its funcitonally-alligned supporting research subcommittees.

3. The following service programs are now envisaged as encompassed by the Federal Meteorological Plan:

Basic Services
Civil Aviation
Military
  Air Force
  Navy
  Army
Agriculture
Marine
Air Pollution
Space Operations
Research Support

The Operating Program Division will have primary cognizance over the work of the services subcommittees while the Supporting Research Division will oversee the work of the research subcommittees.

ATTACHMENT #3

PLANNED STAFFING OF OFFICE OF FEDERAL COORDINATOR

Federal Coordinator	Dr. Robert White
Deputy Federal Coordinator	GS-17 or P1 313
Secretary	GS-7
Operations Evaluation Group	
Operations Analyst	GS-16
Operations Analyst	GS-15
Operations Analyst	GS-14
Secretary	GS-6
Operating Program Division	
Meteorologist	GS-16
Meteorologist	GS-15
Meteorologist	GS-14
Secretary	GS-6
Supporting Research Division	
Meteorologist	GS-16
Meteorologist	GS-15
Meteorologist	GS-14
Secretary	GS-6

Recapitulation (excluding Dr. White)	10	professionals
	4	subprofessionals
	14	

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OFFICE OF THE FEDERAL COORDINATOR
FOR METEOROLOGICAL SERVICES
AND SUPPORTING RESEARCH
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Deputy Federal Coordinator	Dr. James A. Almazan
Administrative Assistant	Rosalie Smith
Secretary	Ernestine Shields
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Asst Federal Coordinator DOT/FAA . .	Craig Goff
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