

SECTION 2

RESOURCE INFORMATION AND AGENCY PROGRAM UPDATES

The tables in this section summarize fiscal information of the federal government for fiscal years (FY) 1998 and 1999. The funds shown are those used to provide meteorological services and associated supporting research that has as its immediate objective the improvement of these services. Fiscal data are current as of the end of June 1998 and are subject to

later changes. The data for FY 1999 do not have legislative approval and do not constitute a commitment by the United States Government. The budget data are prepared in compliance with Section 304 of Public Law 87-843, in which Congress directed that an annual horizontal budget be prepared for meteorological programs conducted by the federal agencies.

AGENCY OBLIGATIONS FOR METEOROLOGICAL OPERATIONS AND SUPPORTING RESEARCH

Table 2.1 contains fiscal information, by agency, for meteorological operations and supporting research. The table shows the funding level for FY 1998 based on Congressional appropriations, the budget request for FY 1999, the percent change, and the individual agencies' percent of the total federal funding for FY 1998 and FY 1999.

DEPARTMENT OF AGRICULTURE (USDA)

The USDA budget request for FY 1999 is \$28.1 million for operations and supporting research and represents a 0.2 percent decrease from the requested FY 1998 funding level of \$28.14 million. The USDA assists the Department of Commerce in determining farmers' needs for weather information and in disseminating the information to them. Major USDA activities related to weather observations include incremental modernization of the snow telemetry (SNOTEL) system operated by the Natural Resources Conservation Service (NRCS) and the replacement of manual fire rating stations with remote automated weather stations (RAWS) by the Forest Service. The SNOTEL and RAWS networks provide cooperative data for NOAA's river forecast activities, the irrigation water supply estimates, and Bureau of Land Management operations. The modernization of the RAWS completed the testing phase for acceptance in operations.

For supporting research, the USDA requests \$15.5 million to focus on the interactions of weather and climate with plant and animal production and water resources management. The goal of supporting research is to develop and disseminate information and techniques to ensure an abundance of high-quality agricultural commodities and products while minimizing the adverse effects of agriculture on the environment. The research budget does not include the

coordinated effort with EPA on ultraviolet radiation. The Forest Service supports a research program, initiated in 1988, for a long-term monitoring network to assess potential effects of global climate change and variability on forest health and productivity. Work also continues in forestry ecological systems modeling.

DEPARTMENT OF COMMERCE (DOC)

All reported DOC meteorological activities are within the National Oceanic and Atmospheric Administration (NOAA). The NOAA FY 1999 total congressional request of \$1.36 billion for meteorological programs represents a 15.5 percent increase over the FY 1998 appropriated funds. NOAA's FY 1999 operations and supporting research requests for major line-office activities are described below:

Weather Services. For FY 1999, the National Weather Service (NWS) requests a total of \$670.8 million. This request includes \$502.2 million for operations, research, and facilities (OR&F), \$152.8 million for systems acquisition, and \$15.8 million for construction. Compared with FY 1998, OR&F realizes a net increase of \$44.2 million, and the procurement, acquisition, and construction accounts realize a net decrease of \$45.6 million.

The request supports the modernized operations of the NWS and investments in the Natural Disaster Reduction Initiative. The request for the NWS will support the provision of weather and flood warnings and forecasts to the public, and will continue to improve the overall warning lead time for tornadoes, severe thunderstorms, and flash floods as well as improve the accuracy of hurricane landfall predictions.

This request level also supports the budget and program recommendations contained in the report to the Secretary of Commerce entitled *"An Assessment of*

TABLE 2.1 METEOROLOGICAL OPERATIONS AND SUPPORTING RESEARCH COSTS*, BY AGENCY

(Thousands of Dollars)

AGENCY	Operations			% of FY99	Supporting Research			% of FY99	Total			% of FY98	% of FY99
	FY98	FY99	%CHG	TOTAL	FY98	FY99	%CHG	TOTAL	FY98	FY99	%CHG	TOTAL	TOTAL
Agriculture	12553	12600	0.4	0.6	15591	15500	-0.6	4.0	28144	28100	-0.2	1.2	1.1
Commerce/NOAA(Subtot)	1095964	1285339	17.3	58.7	78569	70768	-9.9	18.1	1174533	1356107	15.5	49.7	52.6
NWS	644696	652688	1.2	29.8	23172	18111	-21.8	4.6	667868	670799	0.4	28.3	26.0
NESDIS	434637	615128	41.5	28.1	9740	9800	0.6	2.5	444377	624928	40.6	18.8	24.2
OAR	2700	3000	11.1	0.1	44763	41963	-6.3	10.8	47463	44963	-5.3	2.0	1.7
NOS	8250	8250	0.0	0.4	0	0	0.0	0.0	8250	8250	0.0	0.3	0.3
NOAA Corps	5681	6273	10.4	0.3	894	894	0.0	0.2	6575	7167	9.0	0.3	0.3
Defense(Subtot)	442151	438228	-0.9	20.0	79349.2	87013.2	9.7	22.3	521500.2	525241.2	0.7	22.1	20.4
Air Force	266932	265905	-0.4	12.1	41239	40063	-2.9	10.3	308171	305968	-0.7	13.1	11.9
DMSP**	41034	35415	-13.7	1.6	12425	20432	64.4	5.2	53459	55847	4.5	2.3	2.2
Navy	108240	109879	1.5	5.0	11985	12284	2.5	3.1	120225	122163	1.6	5.1	4.7
Army	25945	27029	4.2	1.2	13700.2	14234.2	3.9	3.6	39645.2	41263.2	4.1	1.7	1.6
Interior/BLM	800	800	0.0	0.0	0	0	0.0	0.0	800	800	0.0	0.0	0.0
Transportation/CG	6000	6000	0.0	0.3	0	0	0.0	0.0	6000	6000	0.0	0.3	0.2
Transportation/FAA	412277.5	442648.2	7.4	20.2	13839.7	13954.8	0.8	3.6	426117.2	456603	7.2	18.0	17.7
EPA	0	0	0.0	0.0	5700	5700	0.0	1.5	5700	5700	0.0	0.2	0.2
NASA	3790	2963	-21.8	0.1	194200	197095	1.5	50.5	197990	200058	1.0	8.4	7.8
NRC	109	110	0.9	0.0	0	0	0.0	0.0	109	110	0.9	0.0	0.0
TOTAL	1973644.5	2188688.2	10.9	100.0	387248.9	390031	4.0	100.0	2360893.4	2578719.2	9.2	100.0	100.0
% of FY TOTAL	83.6%	84.9%			16.4%	15.1%			100.0%	100.0%			

*The FY 1998 funding reflects Congressionally appropriated funds; the FY 1999 funding reflects the amount requested in the President's FY 1999 budget submission to Congress.

**DMSP is the Defense Meteorological Satellite Program that supports all DOD Components and other government agencies. It is primarily funded and managed by the Air Force.

the Fiscal Requirements to Operate the Modernized National Weather Service" by Retired Air Force General John Kelly, Jr.

Detailed Program Changes

The FY 1999 net increase of \$44.2 million in the OR&F account includes:

- ▶ An increase of \$28.3 million to provide for the mandatory pay related cost increases, associated staffing costs, and non-labor requirements to maintain modernized weather service operations;
- ▶ An increase of \$3.4 million to continue the replacement of the upper air radiosonde network;
- ▶ An increase of \$4.2 million to initiate the national implementation of the Advanced Hydrologic Prediction System (AHPS) in the Pacific Northwest and the Upper Midwest;
- ▶ A decrease of \$0.2 million for data buoy and C-MAN operations;
- ▶ A decrease of \$1.0 million to reflect the completion of one-time activities as mandated by Congress during FY 1998 including: installation of NOAA Weather Radio transmitters in Kentucky and South Indiana (\$0.5 million), and product enhancement activities under the Susquehanna River Basin Flood System (\$0.5 million);
- ▶ A decrease of \$1.2 million to operate and maintain the NWS network of 123 NEXRAD units;
- ▶ An increase of \$1.8 million to operate and maintain the NWS network of 314 ASOS units;
- ▶ An increase of \$12.2 million to begin the operation and maintenance phase of the AWIPS program; and
- ▶ A decrease of \$3.4 million to reflect the discontinuation of lease payments on the Cray C-90 computer system (Class VII).

The FY 1999 net decrease of \$45.6 million for the procurement, acquisition, and construction account includes:

- ▶ An increase of \$2.8 million to support the NEXRAD product improvement initiative and continue acquisition closeout activities;

- ▶ A decrease of \$0.6 million for ASOS product improvement efforts to develop and test new sensor capabilities;
- ▶ A decrease of \$49.2 million to reflect the AWIPS planned acquisition profile and completion of the acquisition program; and
- ▶ An increase of \$4.9 million to provide the final payment toward the Cray J-916 systems buy-out, begin the lease with option to purchase for the Class VIII supercomputer, and begin the replacement of obsolete interactive computer workstations.

Environmental Satellite, Data, and Information

Services. Proposed funding for FY 1999 includes a \$107.7 million increase in the Polar-Orbiting Satellite Program and a \$74.1 million increase in the Geostationary Satellite Program. These changes allow for continuation of procurements to provide the spacecraft and instruments, launch services, and ground systems necessary to assure continuity of environmental satellite coverage. The FY 1999 budget request will maintain a system of polar-orbiting satellites that obtains global data and a system of geostationary satellites that provides near-continuous observations of the Earth's western hemisphere. Funding is included for NOAA's share of the converged NOAA and Department of Defense (DOD) polar-orbiting system that will replace the current NOAA series and the DOD Defense Meteorological Satellite Program (DMSP) in the year 2007.

A total of \$4.0 million is requested to continue the Ocean Remote Sensing Program which began in FY 1995. During the next several years, NOAA will acquire data from foreign and other non-NOAA satellites that will provide measurement of ocean currents, surface winds and waves, subsurface temperature and salinity profiles, ice thickness and flows, and other marine factors.

An increase of \$1.1 million is also requested to maintain basic mission services, which includes maintaining and operating satellite ground facilities, providing for satellite-derived products, and conducting research to improve the use of satellite data.

No budgetary changes are requested for implementation of the NOAA Virtual Data System (NVDS) or for the operation of the three NOAA data centers and environmental data management modernization programs.

DEPARTMENT OF DEFENSE (DOD)

The DOD total budget request for FY 1999 is \$525.2 million. This total represents a 0.7 percent increase in the funding level from FY 1998. Specific highlights for each of the military departments are described below:

United States Air Force

United States Air Force (USAF) resources for meteorological support fall under four categories: general operations, general supporting research, DMSP operations, and DMSP and National Polar-orbiting Operational Environmental Satellite System (NPOESS) supporting research. The Air Force request (including DMSP) for FY 1999 is \$361.8 million.

General Operations. The operations portion of the FY 1999 budget request is \$265.9 million and represents a large portion of the environmental support to the DOD. These funds will pay for weather and space environmental support to the USAF (both active duty and reserve components), the United States Army, nine unified commands, and other agencies as directed by the Chief of Staff of the Air Force. Over 3,400 people conduct these activities at over 200 worldwide locations. These people include active duty military, Air Force reservists, Air National Guard weather flight personnel, weather communications and computer specialists, and civilians. General operations fund the salaries of these people providing weather support, and the day-to-day operations and maintenance costs for the support they provide.

General Supporting Research. The FY 1999 budget request for Air Force supporting research is \$40 million. The Air Force continues development of the Cloud Depiction and Forecast System II (CDFS II) and the Global Theater Weather Analysis and Prediction System (GTWAPS), and research and development will begin on the Tactical Weather Radar (TWR). CDFS II will expand the computer processing capability of the current CDFS at the Air Force Weather Agency (AFWA) and will build a high resolution, worldwide cloud database which will ingest

and exploit all weather satellite and sensor data received at AFWA. GTWAPS will provide AFWA and the DOD a theater modeling capability to support the warfighters. A variety of other research efforts will investigate the electrodynamics of the Sun and Earth's magnetosphere, ionospheric dynamics, mesoscale meteorology, visible and infrared properties of the environment, and cloud parameterization and prediction.

DMSP Operations. Though funding for DMSP comes from the Air Force, this system is the major source of space-borne meteorological data for the military services and other high-priority DOD programs. Environmental data from DMSP sensors is also distributed to the NWS, National Environmental Satellite, Data, and Information Service (NESDIS), the Navy's Fleet Numerical Meteorology and Oceanography Center (FNMOC) and the Naval Oceanographic Office (NAVOCEANO), and AFWA according to the Shared Processing Program agreement.

The operations portion of the FY 1999 budget request is \$35.4 million. The major portion of this funding is for on-orbit operations, tactical terminal maintenance, and long-haul communications. These funds also pay operations costs for one dedicated command and control facility. DMSP funds for 201 military and civilian personnel associated with the operation of, and to a much smaller extent, the procurement of the DMSP system.

DMSP and NPOESS Supporting Research. The FY 1999 budget for DMSP R&D is \$20.4 million. The funds will be used for launch vehicle integration; system integration and testing; and mission sensor calibration, validation, and algorithm development efforts. The FY 1999 DOD R&D budget for NPOESS is \$64.7 million. FY 1999 funds will be used for system architecture studies and independent risk reduction and technology development efforts, and to begin critical sensor and algorithm development. NPOESS is scheduled to be available in 2007 as a backup to the final launch of the NOAA polar-orbiting satellites and DMSP satellites. This system will exploit advanced hardware and software technologies to produce a more reliable, longer-lived spacecraft with greater mission capability.

United States Navy

The United States Navy FY 1999 budget request for meteorological programs is \$122.2 million. The request includes \$109.9 million for operational programs and \$12.3 million for supporting research.

Operations Support. Operational support for the Navy and Marine Corps includes the day-to-day provision of meteorological and oceanographic (METOC) products and services. Naval METOC support continues to evolve with the shift in US military operational focus to expeditionary forces support. As Naval operations in the littoral increase, Navy and Marine Corps METOC support is being focused on providing on-scene capabilities for personnel that directly furnish environmental data to sensors and weapons planning and employment systems.

In addition to aviation and marine METOC support, the Navy provides a variety of unique services on demand, such as electro-optical and acoustic propagation models and products, METOC-sensitive tactical decision aids, and global sea ice analyses and forecasts. The primary program direction continues to be improvements in data collection and processing capabilities for on-scene METOC support in the littoral zones.

Systems Acquisition. Major systems undergoing procurement or upgrades include:

- Naval Integrated Tactical Environmental System (NITES)--a collection of five METOC subsystems:
 - ▶ NITES I – Tactical Environmental Support System (TESS/NC)
 - ▶ NITES II - Joint TESS Remote Workstation (J-TRWS) and Joint METOC Segment (JMS)
 - ▶ NITES III - METOC Integrated Data Display System (MIDDS)
 - ▶ NITES IV - Interim Mobile Oceanography Support System (I-MOSS)
 - ▶ NITES V - Allied Environmental Support System (AESS)
- Primary Oceanographic Prediction System (POPS) at FLENUMMETOCEN
- USMC Meteorological Mobile Facility (Replacement) (METMF(R))

Research and Development (R&D). This area is not generally system specific; instead, Navy R&D

efforts typically have applications to one or more meteorological, oceanographic, or tactical system(s). Navy's tabulation of these data includes R&D funding for exploratory research, demonstration, validation, engineering, and manufacturing development.

Initiatives of the Navy and Marine Corps, under sponsorship of the Oceanographer of the Navy, transition projects from exploratory development to operational Naval systems. Such efforts include advances in the Navy's numerical METOC forecasting capability, expansion in communications and data compression techniques, further development and improvement of models to better predict METOC parameters in littoral regions, and an improved understanding of the impact these parameters have on sensor, weapon system, and platform performance.

United States Army

The United States Army is requesting \$27 million for operational support and \$14.2 million in research and development in FY 1999. Operational support increases about \$1 million over the FY 1998 expenditures. Operational manning stays about the same with some minor decreases from smaller artillery meteorological crews supporting the Meteorological Measuring System (MMS). Funding for research and development increases to support continued development of new weather systems such as the Integrated Meteorological System (IMETS).

In FY 1998, the Meteorological Hydrogen Generator (MHG) program was completed at a cost of \$2 million, and the MMS was modified to use Global Positioning System (GPS) radiosondes at a cost of \$900,000. There are no new expenses in FY 1999 associated with the MHG. The IMETS continued fielding of Block II systems in FY 1998 and will build additional systems in FY 1999. However, based on prior year cuts in the program, IMETS still remains short of the procurement objective of 32 systems for the Corps, Divisions, and Armored Cavalry Regiments (ACR). An unfunded request for \$6.2 million in FY 1999 has been submitted in an attempt to fill the current funding gap.

To provide operational support for research, development, test, and evaluation, Army Materiel Command funding for the Test and Evaluation Command (TECOM) Meteorological (MET) Teams in FY 1998 was \$6.4 million at 10 ranges and sites. This included atmospheric data collection and analysis. In

addition in FY 1998, TECOM funded \$450,000 to provide MET modeling for Dugway Proving Ground (DPG) to support simulation and test support for range surety and DOD chemical/ biological defense programs. In FY 1999, funding increases slightly to \$6.6 million and supports partnerships with National Center for Atmospheric Research (NCAR) to help sustain TECOM leadership in MET instrumentation and MET data displays.

Basic meteorological research dollars for the Army Research Laboratory's Battlefield Environment Division at Adelphi, Maryland, stay nearly constant at \$3.5 million. Applied research associated with weather exploitation and artillery meteorology at White Sands Missile Range levels off after a decrease in FY 1997 to nearly \$5.5 million in FY 1998 and 1999. ARL is focusing its funding on applied research efforts which can make a fast transition to battlefield systems. Weather effects and tactical profilers have been high payoff areas for ARL. At the Army Research Office, only a small increase occurs from FY 1998 to 1999, but the source of some program funding changes. The Augmentation Awards for Science, Engineering, and Research Training (AASERT) and the Defense University Research Instrumentation Program (DURIP) funds had been drawn from the same sources. DOD took action to discontinue the AASERT program, making more funds available for DURIP initiatives in stable boundary layer processes.

DEPARTMENT OF THE INTERIOR (DOI)

The DOI funding request for FY 1999 is \$800,000. This figure is for meteorological operations and support of the Bureau of Land Management (BLM) remote sensing requirements for Remote Automatic Weather Station (RAWS) and Lightning Detection Programs. Normal operations and maintenance of the restructured RAWS program is approximately \$600,000 beginning this year. (This includes personnel, vehicles, per diem, normal procurement, and facilities).

The BLM optimization effort in RAWS will continue in 1999. To date, the number of stations has been reduced by 15 percent. Continued optimization will take place over the next few years. Subsequent cost savings in operations costs will be used to replace aging equipment and upgrade sensor packages. Proposed changes in Lightning Detection operations will further reduce the out-year expenditures in this

program. Coordination between DOI agencies and the USDA Forest Service regarding combined meteorological requirements for the National Wildfire support functions is ongoing. Interagency RAWS replacement coordination will continue to maximize National Fire Danger Rating System (NFDRS) sampling points and minimize the total number of instrument systems required in the West.

DEPARTMENT OF TRANSPORTATION (DOT)

The meteorological programs for the Federal Aviation Administration and the United States Coast Guard for FY 1998 and FY 1999 are described below.

Federal Aviation Administration (FAA)

The total FAA request for aviation weather in FY 1999 is \$456.6 million for both operations and supporting research; the FAA funding for FY 1998 for aviation weather was \$426.1 million. The increase in the budget is principally in operations which will rise from the appropriated \$412.3 million to the requested \$442.7 million. Funding for supporting research in FY 1999 will increase slightly to almost \$14 million.

The FAA has taken a leadership role with regard to aviation weather. The FAA is setting policy, requirements, and standards for the observation and dissemination of aviation weather data, products, information, and short-range automated warnings and forecasts. FAA's aviation weather programs are directed at improving the timeliness and accuracy of weather information provided to the aviation customer--when and where he or she needs it. The FAA also supports research to improve the observation, dissemination, and forecasting of aviation weather. The end users of the resulting products include pilots, dispatchers, and air traffic controllers.

In FY 1999, system acquisitions increase by 22.2 percent to \$124.8 million. Acquisition programs with significant increases are the Operational and Supportability Implementation System (OASIS), the Integrated Terminal Weather System (ITWS), Wind Shear Processor, ASOS Weather Display System, NEXRAD Product Improvement, the Terminal Doppler Weather Radar (TDWR), and the Aeronautical Data Link. Decreases are associated with the completion or near completion of a specific program. (Section 3 contains descriptions of these programs.)

Individual system acquisition and operational programs with changes greater than \$2 million are listed below:

<u>Program</u>	<u>Change (\$ Millions)</u>
<u>Systems Acquisition:</u>	
Automated Surface Observing System	- 17.8
Weather and Radar Processor	- 2.4
Terminal Doppler Weather Radar	2.0
Integrated Terminal Weather System	3.3
Wind Shear Processor	11.0
ASOS Weather Display System	2.1
Operational and Supportability Implementation System (OASIS)	21.6
Aeronautical Data Link	5.2
<u>Operations Support:</u>	
Flight Service Stations Operations	4.7
Aviation Weather Directorate	2.9

The FY 1999 funding request for operational support increases by \$4.8 million (1.6 percent) to \$311.4 million. The change reflects modest increases for leased communications, contract weather observations, certain maintenance functions, and Flight Service Station operations.

Supporting research funding increases from \$13.9 million in FY 1998 to \$14 million in FY 1999. The number of personnel expected to be engaged in FAA's aviation weather program is nearly level at 3,431.

United States Coast Guard (USCG)

All of USCG's funding for meteorological programs is for operations support. For FY 1999, the requested funding level is \$6 million. (The Coast Guard does not have a specific program and budget for meteorology--all meteorological activities are accomplished as part of general operations.) The Coast Guard's activities include the collection and dissemination of meteorological and iceberg warning information for the benefit of the marine community. The Coast Guard also collects coastal and marine observations from its shore stations and cutters, and transmits these observations daily to the Navy's Fleet Numerical Meteorology and Oceanography Center and NOAA's National Weather Service. These observations are used by both the Navy and NOAA in generating weather forecasts. The Coast Guard also disseminates a variety of weather forecast products and

warnings to the marine community via radio transmissions. Coast Guard shore stations often serve as sites for NWS automated coastal weather stations, and the National Data Buoy Center provides logistics support in deploying and maintaining NOAA offshore weather buoys. The International Ice Patrol conducts iceberg surveillance operations and provides warnings to mariners on the presence of icebergs in the North Atlantic shipping lanes.

ENVIRONMENTAL PROTECTION AGENCY (EPA)

All of the EPA's funding of meteorological programs is for supporting research. The anticipated funding level in FY 1999 for directed meteorological research is \$5.7 million which is approximately the same as the FY 1998 funding level. To promote excellence in environmental science and engineering, the EPA has established a new national fellowship program and substantially increased its support for investigator-initiated research grants. The increase in funding for grants (with reliance on quality science and peer review) and for graduate fellowships (to support the education and careers of future scientists) will provide for a more balanced, long-term capital investment in improved environmental research and development.

The funding for the grants program will remain at \$100 million in FY 1999. The augmented grants program will fund research in areas, including ecological assessment, air quality, environmental fate and treatment of toxic and hazardous wastes, and exploratory research. The portion of these grants that will be awarded for meteorological research during FY 1999 cannot be foreseen, but it is probable that the grant awards will increase the base amount of \$5.7 million listed above for directed meteorological research.

The EPA is continuing its development and validation of air quality dispersion models for air pollutants on all temporal and spatial scales as mandated by the Clean Air Act, as amended. Research will focus on indoor, urban, mesoscale, regional, and multimedia models which will be used to develop air pollution control strategies, and human and ecosystem exposure assessments. There will be increased emphasis placed on meteorological research into regional and urban formation and transport of ozone and particulate pollution in support of the proposed revisions to the National Ambient Air Quality Standards. Increased efficiency of computation and

interpretation of results is being made possible by means of high performance computing and scientific visualization techniques.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

Nearly all of NASA's funding in meteorology is for supporting research. The requested funding for supporting research in FY 1999 is \$197.1 million, which is virtually unchanged from the FY 1998 funding level. These funding levels are composed of the estimated meteorology share of the supporting research and analysis programs as well as Earth Observing System (EOS) and Earth Probe instruments, EOS science and EOS Data and Information Systems (EOSDIS). The FY 1999 level reflects nearly a 16 percent increase in the EOS and a 4 percent decrease in the EOSDIS funding from the corresponding FY 1998 levels. The Earth Probes line for FY 1999 is nearly 29 percent lower than the FY 1998 level. This line reflects reductions due to the launch of the TRMM satellite in November 1997. This reduction is offset by a slight increase in funding for the Earth System Science Pathfinders (ESSP) program. An increase of

nearly 12 percent is requested for the research and analysis programs as we approach launch activities in the EOS program. NASA also funds a \$26.25 million program of weather-related research for aviation safety.

NUCLEAR REGULATORY COMMISSION (NRC)

The NRC requested funding is for meteorological operations. The FY 1999 request for \$110,000 is essentially unchanged from the FY 1998 request.

The meteorological support program in the United States Nuclear Regulatory Commission is focused primarily on obtaining and analyzing meteorological data and information to be utilized in atmospheric transport and dispersion models used in dose projections, plume pathway characterizations, and concentration estimates related to the safe operation of nuclear facilities and the protection of public health and safety and the environment. Obtaining current, accurate and relevant meteorological information on a real-time basis for use during emergencies is the primary consideration. The NRC budget in this area reflects this priority.

AGENCY FUNDING BY BUDGET CATEGORY

Table 2.2 depicts how the agencies plan to obligate their funds for meteorological operations broken down by "budget category." The two major categories are "Operations Support" and "Systems Acquisition." To a large degree, these categories correspond to non-hardware costs (Operations Support) and hardware costs (Systems Acquisition). For agency convenience in identifying small components that do not fit into these two major categories, a third category is added called "Special Programs." Programs that provide

support to several government agencies such as the Air Force's DMSP are listed on a separate line.

Table 3.3 describes how the agencies plan to obligate their funds for meteorological supporting research according to budget categories. The agencies' supporting research budgets are subdivided along similar lines--Research and Development (non-hardware), Systems Development (hardware), and Special Programs (for those items that do not easily fit into the two major categories).

AGENCY FUNDING BY SERVICE CATEGORY

Table 2.4 summarizes how the agencies plan to obligate operational funds for basic and specialized meteorological services; Table 2.5 is a similar breakout for supporting research funds. Table 2.4 reveals that "basic" services require approximately

56.7 percent of the total operational costs while aviation services require about 38 percent. The remaining 5.3 percent is distributed among the other specialized services. The definitions of specialized and basic services are described below.

TABLE 2.2 AGENCY OPERATIONAL COSTS, BY BUDGET CATEGORY

(Thousands of Dollars)

AGENCY	Operations Support		Systems Acquisition		Special Programs		Total			% of FY99 TOTAL
	FY98	FY99	FY98	FY99	FY98	FY99	FY98	FY99	%CHG	
Agriculture	12553	12600	0	0	0	0	12553	12600	0.4	0.6
Commerce/NOAA(Subtot)	556666	594777	518618	667600	20680	22962	1095964	1285339	17.3	58.7
NWS	444160	484069	185713	152843	14823	15776	644696	652688	1.2	29.8
NESDIS	99075	96685	332905	514757	2657	3686	434637	615128	41.5	28.1
OAR	0	0	0	0	2700	3000	2700	3000	11.1	0.1
NOS	7750	7750	0	0	500	500	8250	8250	0.0	0.4
NOAA Corps	5681	6273	0	0	0	0	5681	6273	10.4	0.3
Defense(Subtot)	402436	400852	39626	37262	89	114	442151	438228	-0.9	20.0
Air Force	245676	247324	21256	18581	0	0	266932	265905	-0.4	12.1
DMSP*	27756	22973	13278	12442	0	0	41034	35415	-13.7	1.6
Navy	107528	109145	712	734	0	0	108240	109879	1.5	5.0
Army	21476	21410	4380	5505	89	114	25945	27029	4.2	1.2
Interior/BLM	600	640	200	160	0	0	800	800	0.0	0.0
Transportation/CG	6000	6000	0	0	0	0	6000	6000	0.0	0.3
Transportation/FAA	306600	311367	102126.5	124760.2	3551	6521	412277.5	442648.2	7.4	20.2
EPA					----- Not Applicable -----					
NASA	2460	2848	1330	115	0	0	3790	2963	-21.8	0.1
NRC	109	110	0	0	0	0	109	110	0.9	0.0
TOTAL	1287424	1329194	661900.5	829897.2	24320	29597	1973644.5	2188688.2	10.9	100.0
% of FY TOTAL	65.2%	60.7%	33.5%	37.9%	1.2%	1.4%	100.0%	100.0%		

*DMSP is the Defense Meteorological Satellite Program that supports all DOD Components and other government agencies. It is primarily funded and managed by the Air Force.

TABLE 2.3 AGENCY SUPPORTING RESEARCH COSTS, BY BUDGET CATEGORY

(Thousands of Dollars)

AGENCY	Research & Development		Systems Development		Special Programs		Total			% of FY99 TOTAL
	FY98	FY99	FY98	FY99	FY98	FY99	FY98	FY99	%CHG	
Agriculture	15591	15500	0	0	0	0	15591	15500	-0.6	4.0
Commerce/NOAA(Subtot)	55855	57390	13670	8134	9044	5244	78569	70768	-9.9	18.1
NWS	11372	11847	11800	6264	0	0	23172	18111	-21.8	4.6
NESDIS	9740	9800	0	0	0	0	9740	9800	0.6	2.5
OAR	34743	35743	1870	1870	8150	4350	44763	41963	-6.3	10.8
NOS	0	0	0	0	0	0	0	0	0.0	0.0
NOAA Corps	0	0	0	0	894	894	894	894	0.0	0.2
Defense(Subtot)	76448	84122	2513.2	2491.2	388	400	79349.2	87013.2	9.7	22.3
Air Force	41239	40063	0	0	0	0	41239	40063	-2.9	10.3
DMSP*	12425	20432	0	0	0	0	12425	20432	64.4	5.2
Navy	11985	12284	0	0	0	0	11985	12284	2.5	3.1
Army	10799	11343	2513.2	2491.2	388	400	13700.2	14234.2	3.9	3.6
Interior/BLM					----- Not Applicable -----					
Transportation/CG					----- Not Applicable -----					
Transportation/FAA	13839.7	13954.8	0	0	0	0	13839.7	13954.8	0.8	3.6
EPA	5700	5700	0	0	0	0	5700	5700	0.0	1.5
NASA	116110	119825	51840	51020	26250	26250	194200	197095	1.5	50.5
NRC					----- Not Applicable -----					
TOTAL	283543.7	296491.8	68023.2	61645.2	35682	31894	387248.9	390031	0.7	100.0
% of FY TOTAL	73.2%	76.0%	17.6%	15.8%	9.2%	8.2%	100.0%	100.0%		

*DMSP is the Defense Meteorological Satellite Program that supports all DOD Components and other government agencies. It is primarily funded and managed by the Air Force.

TABLE 2.4 AGENCY OPERATIONAL COSTS, BY SERVICE

(Thousands of Dollars)

AGENCY	Basic Meteorology		Aviation		Marine		Agriculture & Forestry		General Military		Other		Total	
	FY98	FY99	FY98	FY99	FY98	FY99	FY98	FY99	FY98	FY99	FY98	FY99	FY98	FY99
Agriculture	0	0	0	0	0	0	12553	12600	0	0	0	0	12553	12600
Commerce/NOAA(Subtot)	1024737	1213220	41277	41869	27250	27250	0	0	0	0	2700	3000	1095964	1285339
NWS	590100	598092	35596	35596	19000	19000	0	0	0	0	0	0	644696	652688
NESDIS	434637	615128	0	0	0	0	0	0	0	0	0	0	434637	615128
OAR	0	0	0	0	0	0	0	0	0	0	2700	3000	2700	3000
NOS	0	0	0	0	8250	8250	0	0	0	0	0	0	8250	8250
NOAA Corps	0	0	5681	6273	0	0	0	0	0	0	0	0	5681	6273
Defense(Subtot)	18726	19009	299100	298561	31346	31821	0	0	86279	82024	6700	6813	442151	438228
Air Force	0	0	266932	265905	0	0	0	0	0	0	0	0	266932	265905
DMSP*	0	0	0	0	0	0	0	0	41034	35415	0	0	41034	35415
Navy	18726	19009	32147	32634	31346	31821	0	0	20295	20602	5726	5813	108240	109879
Army	0	0	21	22	0	0	0	0	24950	26007	974	1000	25945	27029
Interior/BLM	0	0	0	0	0	0	800	800	0	0	0	0	800	800
Transportation/CG	0	0	0	0	6000	6000	0	0	0	0	0	0	6000	6000
Transportation/FAA	0	0	412277.5	442648.2	0	0	0	0	0	0	0	0	412277.5	442648.2
EPA							----- Not Applicable -----							
NASA	0	0	0	0	0	0	0	0	0	0	3790	2963	3790	2963
NRC	109	110	0	0	0	0	0	0	0	0	0	0	109	110
TOTAL	1043572	1232339	752654.5	783078.2	64596	65071	13353	13400	86279	82024	13190	12776	1973644.5	2188688.2
% of FY TOTAL	52.9%	56.3%	38.1%	35.8%	3.3%	3.0%	0.7%	0.6%	4.4%	3.7%	0.7%	0.6%	100.0%	100.0%

*DMSP is the Defense Meteorological Satellite Program that supports all DOD Components and other government agencies. It is primarily funded and managed by the Air Force.

TABLE 2.5 AGENCY SUPPORTING RESEARCH COSTS, BY SERVICE

(Thousands of Dollars)

AGENCY	Basic Meteorology		Aviation		Marine		Agriculture & Forestry		General Military		Other		Total	
	FY98	FY99	FY98	FY99	FY98	FY99	FY98	FY99	FY98	FY99	FY98	FY99	FY98	FY99
Agriculture	0	0	0	0	0	0	15591	15500	0	0	0	0	15591	15500
Commerce/NOAA(Subtot)	76944	69143	1625	1625	0	0	0	0	0	0	0	0	78569	70768
NWS	23172	18111	0	0	0	0	0	0	0	0	0	0	23172	18111
NESDIS	9740	9800	0	0	0	0	0	0	0	0	0	0	9740	9800
OAR	43138	40338	1625	1625	0	0	0	0	0	0	0	0	44763	41963
NOS	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NOAA Corps	894	894	0	0	0	0	0	0	0	0	0	0	894	894
Defense(Subtot)	4613	4929	41240.2	40064.2	11985	12284	0	0	21411	29636	100	100	79349.2	87013.2
Air Force	0	0	41239	40063	0	0	0	0	0	0	0	0	41239	40063
DMSP*	0	0	0	0	0	0	0	0	12425	20432	0	0	12425	20432
Navy	0	0	0	0	11985	12284	0	0	0	0	0	0	11985	12284
Army	4613	4929	1.2	1.2	0	0	0	0	8986	9204	100	100	13700.2	14234.2
Interior/BLM							----- Not Applicable -----							
Transportation/CG							----- Not Applicable -----							
Transportation/FAA	0	0	13839.7	13954.8	0	0	0	0	0	0	0	0	13839.7	13954.8
EPA	0	0	0	0	0	0	0	0	0	0	5700	5700	5700	5700
NASA	0	0	26250	26250	0	0	0	0	0	0	167950	170845	194200	197095
NRC							----- Not Applicable -----							
TOTAL	81557	74072	82954.9	81894	11985	12284	15591	15500	21411	29636	173750	176645	387248.9	390031
% of FY TOTAL	21.1%	19.0%	21.4%	21.0%	3.1%	3.1%	4.0%	4.0%	5.5%	7.6%	44.9%	45.3%	100.0%	100.0%

*DMSP is the Defense Meteorological Satellite Program that supports all DOD Components and other government agencies. It is primarily funded and managed by the Air Force.

Basic Services

Basic services provide products that meet the common needs of all users and include the products needed by the general public in their everyday activities and for the protection of lives and property. "Basic" services include the programs and activities that do not fall under one of the specialized services.

Specialized Meteorological Services

Aviation Services. Those services and facilities established to meet the requirements of general, commercial, and military aviation.

Marine Services. Those services and facilities established to meet the requirements of the DOC, DOD, and DOT on the high seas, on coastal and inland waters, and for boating activities in coastal and inland waters. The civil programs which are directly related to services solely for marine uses and military programs supporting fleet, amphibious, and sea-borne units (including carrier-based aviation and fleet missile systems) are included.

Agriculture and Forestry Services. Those services and facilities established to meet the requirements of the agricultural industries and federal, state, and local agencies charged with the protection and maintenance of the Nation's forests.

General Military Services. Those services and facilities established to meet the requirements of military user commands and their component elements. Programs and services which are part of basic, aviation, marine, or other specialized services are not included.

Other Specialized Services. Those services and facilities established to meet meteorological requirements that cannot be classified under one of the preceding categories; such as, space operations, urban air pollution, global climate change, and water management.

PERSONNEL ENGAGED IN METEOROLOGICAL OPERATIONS

Table 2.6 depicts agency staff resources in meteorological operations. The total agency staff resources requested for FY 1999 is 14,992. This

total represents a decrease of 1.6 percent from FY 1998.

INTERAGENCY FUND TRANSFERS

Table 2.7 summarizes the reimbursement of funds from one agency to another during FY 1998. Agencies routinely enter into reimbursable agreements when they determine that one agency can provide the service more efficiently and effectively than the other. While specific amounts may vary from year-to-year, the pattern shown is essentially stable and reflects a significant level of interagency cooperation.

Department of Commerce. The NWS will reimburse DOT \$2.5 million for Alaska housing utilities and technological advances. NASA will receive \$60,000 for stratospheric studies and a total of \$417,699 million for satellite acquisition and launches.

Department of Defense. The Air Force will reimburse DOC a total of \$1.052 million for COMET participation (\$195,000), OFCM support (\$140,000), Share Processing Network (\$152,000), and supporting research (\$565,000). The Navy will reimburse DOC \$100,000 for climatological analysis and forecasting. The Army reimbursements to DOC include \$529,000

to maintain precipitation reporting stations and \$35,000 for basic supporting research at NOAA's Environmental Technology Laboratory. The Army will also reimburse the National Center for Atmospheric Research (NCAR) \$12,000 for basic supporting research support. Finally, the United States Geological Survey will be reimbursed \$545,000 for operations and maintenance of hydrologic and precipitation reporting stations.

Department of Transportation. The FAA will reimburse NOAA almost \$16.0 million in FY 1998 for improvement of WSR-88D and costs associated with automated observing systems. Additionally, NOAA will receive \$17.5 million for operational support associated with the WSR-88D and ASOS maintenance, the Center Weather Service Units at all Air Route Traffic Control Centers, the World Area Forecast System, for meteorology instructors at the FAA, and for studies and OFCM support

The FAA will reimburse the NOAA and USAF a total of \$6.3 million for supporting research. The USAF will receive \$1.4 million, and NOAA will receive \$4.9 million for various aeronautical hazards mitigation work.

National Aeronautics and Space Administration (NASA). The Air Force will receive reimbursement of \$1.3 million for observations and forecasts. NOAA will receive \$15,000 for an upper air analysis and study, and the National Data Buoy Center will receive reimbursements of \$100,000 for the operation of two data buoys.

Environmental Protection Agency (EPA). NOAA's Air Resources Laboratory (ARL) will be reimbursed \$5 million for development, evaluation, and application of air quality dispersion models, and for providing meteorological expertise and guidance for EPA policy development activities.

Department of Energy (DOE). The NOAA/OAR will be reimbursed \$1.6 million for the Air Resources Laboratory's Special Operations and Research Division located at the Nevada Nuclear Test Site.

Nuclear Regulatory Commission (NRC). The NRC will reimburse DOE \$35,000 for technical assistance.

TABLE 2.6 PERSONNEL ENGAGED IN METEOROLOGICAL OPERATIONS
(Units are Full Time Equivalent Staff Years)*

<u>AGENCY</u>	<u>FY 1998</u>	<u>FY 1999</u>	<u>%CHG</u>	<u>% of FY 1999 TOTAL</u>
Agriculture	102	104	2.0	0.7
Commerce/NOAA	5,876	5,876	0.0	39.2
Reimbursed**	200	200	0	1.3
Defense(Subtotal)	5,532	5,285	-4.5	35.3
Air Force	3,424	3,398	-0.7	22.7
DMSP	245	65	-73.5	0.4
Navy	1,563	1,527	-2.3	10.2
Army	300	295	-1.7	2.0
Interior/BLM	8	6	-25.0	0.0
Reimbursed**	4	4	0.0	0.0
Transportation/CG	85	85	0.0	0.6
Transportation/FAA	3,426	3,431	0.0	22.9
EPA	0	0	0.0	0.0
NASA	0	0	0.0	0.0
NRC	1	1	0.0	0.0
TOTAL	15,234	14,992	-1.6	100.0

* Numbers of personnel are rounded to nearest whole number.

** "Reimbursed" are personnel funded by other agencies.

TABLE 2.7 INTERAGENCY FUND TRANSFERS FOR METEOROLOGICAL OPERATIONS AND SUPPORTING RESEARCH

<u>Agency Funds Transferred from:</u>	<u>Agency Funds Transferred to:</u>	<u>FY 1998 Funds (\$K)</u>	
		<u>Operations</u>	<u>Supporting Research</u>
Commerce/NOAA	DOT/USCG	2.5	
	NASA Studies	60	
	NASA (Procurement)	417,699	
Defense/Air Force	DOC	487	565
Defense/Navy	DOC/NOAA/NCDC	100	
Defense/Army	DOC/NOAA/NWS	529	
	DOC/NOAA/ETL		35
	DOI/USGS	545	
	NSF/NCAR		12
Transportation/FAA	DOC/NOAA	17,512	4,900
	DOC/NOAA (Procurement)	15,950	
	DOD/USAF		1,400
NASA	DOD/USAF	1,333	
	DOC/NOAA/NDBC	100	
	DOC/NOAA		15
EPA	DOC/NOAA/ARL		5,013
DOE	DOC/NOAA/OAR	1,600	
NRC	DOE/ORNL	35	

FACILITIES/LOCATIONS FOR TAKING METEOROLOGICAL OBSERVATIONS

Table 2.8 indicates the number of facilities or platforms at which the federal agencies carry out (or supervise) the various types of weather observations.

TABLE 2.8 FACILITIES/LOCATIONS for TAKING METEOROLOGICAL OBSERVATIONS

<u>TYPE OF OBSERVATION/AGENCY</u>	<u>No. of Locations (FY 1998)</u>	<u>TYPE OF OBSERVATION/AGENCY</u>	<u>No. of Locations (FY 1998)</u>
<u>Surface, land</u>		<u>Upper air, rocket</u>	
Commerce (all types)	841	NASA	2
Air Force (U.S. & Overseas)	130	Navy	1
Navy (U.S. & Overseas)	43	Army (U.S. & Overseas)	2
Army (U.S. & Overseas)	14	<u>Doppler weather radar (WSR-88D) sites</u>	
Marine Corps (U.S. & Overseas)	13	Commerce (NWS)	123
Transportation (Flight Service Stn)	61	Air Force (U.S. & Overseas)	29
Transportation (Lim Aviation Wx Rptg Stn)	114	Army (U.S. & Overseas)	2
Transportation (Contract Wx Observing Stn)	124	Transportation	12
Transportation (Auto Wx Observing Stn)	175	<u>Doppler weather radar (Not WSR-88D) sites</u>	
Transportation (Auto Sfc Obs Sys, fielded)	318	Air Force (Transportable)	4
Transportation (USCG Coastal)	100	<u>Off-site WSR-88D Processors (PUPs)</u>	
Interior	470	Commerce (NWS)	63
Agriculture	1080	Air Force	140
NASA	3	Navy	32
<u>Surface, marine</u>		Army	4
Commerce (SEAS-equipped ships)	140	Marine Corps	8
Commerce (Coastal-Marine Autom Network)	65	Transportation	25
Commerce (NOAA/NOS/PORTS)	6	<u>Airport terminal Doppler weather radars</u>	
Commerce (Buoys--moored)	64	Transportation (Commissioned)	3
Commerce (Buoys--drifting)	21	Army (not airfield--Test Range)	1
Commerce (Buoys--large navigation)	10	<u>Conventional radar (non-Doppler) sites</u>	
Commerce (Water-level gauges)	189	Commerce (NWS)	31
Navy (Ships with met personnel)	29	Commerce (at FAA sites)	27
Navy (Ships without met personnel)	325	Air Force, Fixed (U.S. & Overseas)	7
Transportation (USCG Ships)	70	Air Force, Remote Displays	2
NASA	2	Air Force, Mobile Units	3
<u>Upper air, balloon</u>		Army (Overseas)	1
Commerce (U.S.)	86	Navy, Fixed (U.S. & Overseas)	6
Commerce (Foreign, cooperative)	22	Navy, Remote displays/RADIDS	6
Air Force, Fixed (U.S. & Overseas)	12	Marine Corps, Mobile units	15
Air Force, Mobile	15	<u>Weather reconnaissance (No. of aircraft)</u>	
Army, Fixed (U.S. & Overseas)	14	Commerce (NOAA)	3
Army, Mobile	51	Air Force Reserve Command (AFRC)	10
Navy, Fixed (U.S. & Overseas)	11	<u>Geostationary meteorological satellites (No. operating)</u>	
Navy, Mobile	47	Commerce (planned config of 2)	2
Navy, Ships	29	Army (U.S. & Overseas)	1
Marine Corps, Mobile	14	<u>Polar meteorological satellites (No. operating)</u>	
NASA (U.S.)	2	Commerce (planned config of 2)	2
<u>Atmospheric Profilers</u>		Air Force	4
Army	7	Army (U.S. & Overseas)	1