

Audit

Report



MANAGEMENT AND OVERSIGHT OF THE
DOD WEATHER PROGRAM

Report No. D-2001-018

December 14, 2000

Office of the Inspector General
Department of Defense

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Acronyms

ASD(C ³ I)	Assistant Secretary of Defense (Command, Control, Communications, and Intelligence)
DMSP	Defense Meteorological Satellite Program
VSAT	Very Small Aperture Terminal



INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
400 ARMY NAVY DRIVE
ARLINGTON, VIRGINIA 22202-2884

December 14, 2000

MEMORANDUM FOR ASSISTANT SECRETARY OF DEFENSE (COMMAND,
CONTROL, COMMUNICATIONS, AND
INTELLIGENCE)
ASSISTANT SECRETARY OF THE AIR FORCE
(FINANCIAL MANAGEMENT AND COMPTROLLER)
NAVAL INSPECTOR GENERAL
AUDITOR GENERAL, DEPARTMENT OF THE ARMY

SUBJECT: Audit Report on the Management and Oversight of the DoD Weather
Program (Report No. D-2001-018)

We are providing this audit report for review and comment. It is one in a series about DoD meteorological and oceanographic support services. Subsequent reports will discuss the DoD meteorological and oceanographic infrastructure and the effectiveness of meteorological and oceanographic services and support provided by the Military Departments to DoD and other governmental agencies. We considered management comments on a draft of this report in preparing the final report.

DoD Directive 7650.3 requires that all recommendations be resolved promptly. As a result of management comments, we revised Recommendation 1.a., revised and renumbered Recommendation 1.d.1., now Recommendation 1.d., and deleted Recommendation 1.d.2. We request that the Assistant Secretary of Defense (Command, Control, Communications, and Intelligence) provide additional comments on the final report to Recommendation 1.a. and also provide comments on Recommendation 1.d. We added Recommendation 3 to the Army Deputy Chief of Staff for Intelligence and Air Force Deputy Chief of Staff for Air and Space Operations and Recommendation 4 to the Oceanographer of the Navy. We request that the Army Deputy Chief of Staff for Intelligence and the Air Force Deputy Chief of Staff for Air and Space Operations provide comments on the final report to Recommendation 3. We also request that the Oceanographer of the Navy provide comments on the final report to Recommendation 4. We request all comments by February 12, 2001.

We appreciate the courtesies extended to the audit staff. Questions on the audit should be directed to Ms. Evelyn R. Klemstine at (703) 604-9172 (DSN 664-9172) (eklemstine@dodig.osd.mil) or Mr. Gary R. Padgett at (703) 604-9632 (DSN 664-9632) (gpadgett@dodig.osd.mil). See Appendix B for the report distribution. The audit team members are listed inside the back cover.

A handwritten signature in cursive script, reading "Robert J. Lieberman".

Robert J. Lieberman
Assistant Inspector General
for Auditing

Office of the Inspector General, DoD

Report No. D-2001-018
(Project No. D2000LG-0102)

December 14, 2000

Management and Oversight of the DoD Weather Program

Executive Summary

Introduction. This report is the first in a series on management of the DoD weather program. Subsequent reports will discuss the DoD meteorological and oceanographic infrastructure and the effectiveness of meteorological and oceanographic services and support provided by the Military Departments to DoD and other governmental agencies. For FY 2000, the DoD weather budget was approximately \$475.7 million for operations and supporting research and development.

Background. The three components of the DoD weather program are meteorology, oceanography, and space weather. The DoD Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance Architecture Framework contributes to building interoperable and cost-effective military systems by ensuring that the architecture descriptions developed by the DoD Components are synchronized.

The Assistant Secretary of Defense (Command, Control, Communications, and Intelligence) (ASD[C³I]) is responsible for overseeing the development and execution of space-related activities, to include space weather. The Chairman of the Joint Chiefs of Staff is responsible for defining common communication standards that ensure interoperability of meteorological, oceanographic, and space weather data transmissions between the Military Departments. The Army Deputy Chief of Staff for Intelligence is responsible for establishing meteorological policy covering surface and upper air observations in direct support of Army artillery systems. The Oceanographer of the Navy is responsible for providing oceanographic services and support to DoD and for providing meteorological and oceanographic services and support to Navy and Marine Corps operations. The Air Force Director of Weather is responsible for providing space weather services and support to DoD and meteorological services and support to Army and Air Force operations.

Objectives. The overall objective of this self-initiated series of audits was to evaluate DoD meteorological and oceanographic services and support to determine whether the Military Departments are providing the most cost-effective and nonduplicative meteorological and oceanographic services and support to DoD and other governmental agencies. Specifically, this audit focused on evaluating DoD management and oversight of meteorological, oceanographic, and space weather services and support provided by the Military Departments. We also evaluated the management control program as it related to the audit objectives.

Results. An integrated DoD weather architecture using the overall DoD Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance Architecture Framework methodology was lacking. Under current DoD Directives, no Principal Staff Assistant is responsible for overall management of the DoD weather program. These conditions are material management control weaknesses. As a result, DoD did not adequately coordinate satellite and communication requirements to ensure all user requirements were met. We believe that the function relates closely to the core ASD(C³I) responsibilities, which are focused on the production, analysis, and dissemination of information. See Appendix A for details on our review of the management control program.

Summary of Recommendations. We recommend ASD(C³I) oversee the development of a DoD weather architecture; propose changes to DoD Directive 5137.1, "Assistant Secretary of Defense for Command, Control, Communications, and Intelligence," February 12, 1992; serve as the proponent for the DoD weather program; and develop specific policy that assigns roles and responsibilities for meteorological, oceanographic, and space weather programs. We recommend the Oceanographer of the Navy and Air Force Director of Weather evaluate the Navy requirement to obtain snow and ice data through cloud-covered areas; evaluate sensor requirements and develop solutions that meet user needs on current and future environmental satellites; and evaluate Air Force high-speed, two-way weather communication systems to ensure interoperability with Navy operations afloat. We recommend the Army Deputy Chief of Staff for Intelligence, the Air Force Deputy Chief of Staff for Air and Space Operations, and the Oceanographer of the Navy update existing Service guidance to require the coordination of meteorological, oceanographic, and space weather requirements across all Military Departments.

Management Comments. ASD(C³I) concurred with the recommendation to serve as the proponent for the DoD weather program. However, ASD(C³I) nonconcurred with the recommendation to develop a DoD weather architecture, stating that they are not responsible for developing functional requirements needed to develop an operational-level weather architecture. ASD(C³I) also nonconcurred with the recommendation to develop policy and guidance that addresses the integration of meteorological, oceanographic, and space weather programs within DoD to meet interoperability requirements, stating that such policy and guidance already exists. Also, ASD(C³I) disagreed that the lack of a cognizant DoD organization responsible for the DoD weather program was a material management control weakness.

The Assistant Secretary of the Navy (Installation and Environment) concurred with the recommendations to evaluate the Navy requirement to obtain sea ice and snow data through cloud-covered areas and in adverse weather conditions and to evaluate Air Force high-speed, two-way weather communication systems to ensure interoperability with Navy operations afloat. However, the Assistant Secretary of the Navy (Installation and Environment) nonconcurred with the recommendation to validate and fund the need for the special sensor microwave imager to be a primary sensor on current and future weather satellites, stating that modifying current requirements to make the special sensor microwave imager a primary sensor could cause out-of-sequence launches that ultimately lead to gaps in meteorological and

oceanographic satellite coverage. In addition, the Assistant Secretary of the Navy (Installation and Environment) stated that the National Polar-Orbiting Operational Environmental Satellite System Program Office is adequately addressing the requirement by designating the conical microwave imager sounder as a key performance parameter on future satellites. The Deputy Chief of Staff (Air and Space Operations) concurred with the recommendations to evaluate the Navy requirement to obtain sea ice and snow data through cloud-covered areas and in adverse weather conditions and to evaluate Air Force high-speed, two-way weather communication systems to ensure interoperability with Navy operations afloat. However, the Deputy Chief of Staff (Air and Space Operations) nonconcurred with the recommendation to validate and fund the need for the special sensor microwave imager to be the primary sensor on current and future weather satellites, stating the Air Force is not responsible for validating and funding Navy requirements for space-based weather sensing systems.

Additional unsolicited management comments were received. A discussion of management comments is in the Finding section of the report and the complete text is in the Management Comments section.

Audit Response. ASD(C³I) comments are generally responsive; however, a few issues remain unresolved. ASD(C³I) acknowledged oversight responsibility for a DoD weather architecture, but not for developing operational-level architectures. As a result, we revised the recommendation and request that ASD(C³I) provide additional comments on it. Although ASD(C³I) identified general guidance addressing integration and interoperability of information technology systems, the guidance does not assign specific roles and responsibilities for meteorological, oceanographic, and space weather systems. We request that ASD(C³I) provide additional comments to the final report on whether specific guidance assigning roles and responsibilities for meteorological, oceanographic, and space weather programs will be developed. In addition, we request that ASD(C³I) reconsider their position on the materiality of the management control weakness identified in this report, taking into consideration the definitions of materiality prescribed for the DoD Management Control Program.

We added a recommendation to the Army Deputy Chief of Staff for Intelligence, the Air Force Deputy Chief of Staff for Air and Space Operations, and the Oceanographer of the Navy to update existing Service guidance to require the coordination of meteorological, oceanographic, and space weather requirements across all Military Departments. We request the Army Deputy Chief of Staff for Intelligence, the Air Force Deputy Chief of Staff for Air and Space Operations, and the Oceanographer of the Navy provide additional comments to the final report as to whether existing meteorological, oceanographic, and space weather guidance will be updated.

We request management provide comments to the final report by February 12, 2001.

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Background

Weather refers to the entire range of environmental events extending from the bottom of the ocean to space.¹ The three components of the DoD weather program are meteorology, oceanography, and space weather. Meteorology is the study of the affects of atmospheric events and of the atmosphere on the Earth's oceans and surface, to include weather forecasting. Oceanography is the study of the influences on surface and underwater operations caused by the ocean's chemistry, geophysics, and physical characteristics (to include salinity and temperature). Space weather is the study of the region beginning at the lower boundary of the Earth's ionosphere (approximately 50 kilometers) and extending outward. Specifically, space weather incorporates disturbances in the ionosphere which interfere with spacecraft and ground-based communications, solar flares and their effects on defense systems, and changes in atmospheric density which impact accurate predictions of satellite and space debris from orbit. For FY 2000, the DoD weather budget² was approximately \$475.7 million for operations and supporting research and development.

Office of the Secretary of Defense Responsibilities. DoD Directive 5137.1, "Assistant Secretary of Defense for Command, Control, Communications, and Intelligence," February 12, 1992, assigns responsibility for establishing policy and providing direction to DoD Components on matters related to command, control, communications, and intelligence-related space systems. DoD Directive 3100.10, "Space Policy," July 9, 1999, establishes policy and assigns roles and responsibilities for space-related activities³ within DoD. DoD Directive 3100.10 states that ASD(C³I) is responsible for overseeing the development and execution of space-related architectures, acquisition, and technology programs. Space-related activities include all aspects of a comprehensive command, control, communications, intelligence, surveillance, and reconnaissance architecture that integrates airborne, land, sea, and space assets. Further, DoD Directive 3100.10 requires a national security space architecture that includes communications, ground, and space segments to enhance support to military operations and other national security objectives.

Joint Chiefs of Staff Responsibilities and Doctrine. Chairman of the Joint Chiefs of Staff Instruction 3810.01A, "Meteorological and Oceanographic Operations," February 25, 1998, states that the Chairman of the Joint Chiefs of Staff is responsible for defining common communication standards that ensure interoperability of meteorological, oceanographic, and space weather data transmissions between Military Departments. The Army Chief of Staff is

¹Although Joint Publication 3-59, "Joint Doctrine, Tactics, Techniques, and Procedures for Meteorological and Oceanographic Operations," March 23, 1999, uses the terms meteorology and oceanography [METOC], throughout this report the term weather is used to define the entire range of environmental events extending from the bottom of the ocean to space.

²Source: Office of the Federal Coordinator for Meteorology, "The Federal Plan for Meteorological Services and Supporting Research," June 2000.

³Officials from the Office of the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence stated that space-related activities include space weather and space-based environmental monitoring.

responsible for surface and upper air observations in direct support of Army artillery systems and forward units not supported by the Air Force. The Chief of Naval Operations is responsible for providing oceanographic services and support to DoD and for providing meteorological and oceanographic services and support to Navy and Marine Corps operations. The Air Force Chief of Staff is responsible for providing space weather services and support to DoD and meteorological support to Army and Air Force operations.

Joint Publication 3-59, "Joint Doctrine, Tactics, Techniques, and Procedures for Meteorological and Oceanographic Operations," March 23, 1999, establishes joint doctrine and procedures for planning and executing meteorological, oceanographic, and space weather services and support throughout a range of military operations. Joint Publication 3-59 states that Military Departments must maintain a state of immediate responsiveness to joint operations by:

- maintaining communication equipment interoperability,⁴
- planning and maintaining standardized and interoperable equipment, and
- identifying training techniques that allow for a seamless transition to joint operations.

Also, Joint Publication 3-59 supports a "one theater, one forecast" concept and identifies meteorological, oceanographic, and space weather services and support as a principal readiness issue.

Military Department Responsibilities. The Military Departments provide a variety of weather services and support including:

- daily forecasts for meteorological, oceanographic, and space weather for operations;
- briefings for aviation, land operations, and oceanographic missions;
- predictions of severe weather;
- input to sensor and weapon systems;
- data for warfighting decision-making tools;
- computations for ballistic missile system and special mission support; and
- collection and dissemination of environmental data.

⁴DoD Directive 4630.5, "Compatibility, Interoperability, and Integration of Command, Control, Communications, and Intelligence Systems," November 12, 1992, defines interoperability as the ability of systems, units, or forces to provide services to and accept services from other systems, units, or forces, and to use the services so exchanged to enable them to operate effectively together. Interoperability is achieved between systems when information or services are exchanged directly and satisfactorily between the system and users.

Public Law 253, "National Security Act of 1947," chapter 343, July 26, 1947, assigns the Air Force responsibility for providing meteorological services to the Army. The Army is responsible for providing meteorological ballistics data. The Navy and Air Force are the primary providers of meteorological, oceanographic, and space weather to DoD and U.S. national programs. In addition, the Navy and Air Force also provide meteorological, oceanographic, and space weather to other governmental agencies and international partners.

Army. The Army Chief of Staff, specifically, the Deputy Chief of Staff for Intelligence, is responsible for establishing meteorological support policy. The Deputy Chief of Staff for Operations and Plans is responsible for determining meteorological support for artillery units and providing upper air observations to forward units not supported by the Air Force. Also, the Deputy Chief of Staff for Operations and Plans is responsible for identifying and approving meteorological requirements related to data collection and forecasting; however, the Air Force Director of Weather determines how those requirements can best be met. Pursuant to the implementation of the National Security Act of 1947, inter-Service agreements require the Air Force to provide personnel and resources to meet most of the Army's weather information needs. The Army is required to provide meteorological support equipment while the Air Force is responsible for providing meteorological communication support, observations, and forecasting ability.

Navy. The Chief of Naval Operations, specifically, the Oceanographer of the Navy, is the resource and program sponsor for Navy weather activities. The Navy weather program consists of five closely related disciplines: astrometry, hydrography, meteorology, oceanography, and precise-time.⁵ Chief of Naval Operations Instruction 3140.54A, "Submission of Meteorological and Oceanographic, Astrometry, and Precise-Time and Time Interval Requirements," November 5, 1993, requires the Oceanographer of the Navy to screen and review astrometry, geospatial information and services, meteorology, oceanography, and precise-time requirements. The ocean and atmosphere affects all aspects of Naval warfare. Accurate sonar prediction in the coastal areas of the world are not possible without knowledge of depth and bottom type; changes in depth, ocean temperature, and salinity; or the weather conditions at and above the sea surface. Similarly, accurate missile and aircraft detection ranges cannot be adequately determined without knowledge of sea surface temperature and winds, knowledge of nearby topography, and the temperature and moisture profile of the atmosphere. The Naval meteorological and oceanographic community is a forward-deployed force that operates in similar environments during peacetime and wartime.

The Oceanographer of the Navy is the resource sponsor for the Marine Corps; however, the Marine Corps is responsible for observing, collecting, and analyzing meteorological data to provide forecasts that support operations at fixed shore sites and forward operating bases worldwide. The Marine Corps uses Navy and Air Force analytical data, models, and model output to perform

⁵Precise-time supports DoD requirements for electronic communication, navigation, and weapon systems.

meteorological and oceanographic analysis and forecasting. The Navy is responsible for budgeting, planning, and programming Marine Corps satellite and communication requirements.

Air Force. The Air Force Chief of Staff, specifically, the Director of Weather, is responsible for Air Force weather resources and operations. In addition, the Director of Weather is responsible for coordinating with the Army operational meteorological support policies related to, or potentially impacting, the Army. The Air Force provides meteorological and space weather services and support for Army and Air Force operations. The Air Force provides information, products, and services that support air, land, and space operations. The Air Force observes, analyzes, forecasts, and disseminates climatological, meteorological, and space weather information. The Air Force Space Command is the lead Service Component for managing and supporting the Defense Meteorological Satellite Program (DMSP). The DMSP constellation of satellites is a group of DoD-owned operational weather satellites that provides the primary source of meteorological, oceanographic, and space weather data to DoD users worldwide. DMSP satellites collect, store, and communicate data used to develop various meteorological, oceanographic, and space weather products to fixed and tactical ground stations. The Air Force Weather Agency provides DMSP satellite data and meteorological information to DoD, national programs, and other governmental agencies and international partners. The Air Force meteorological community is a forward-deployed force that is able to rely on operational weather squadrons for support.

Objectives

This report is one in a series that evaluates management of the DoD weather program. Subsequent reports will discuss the DoD meteorological and oceanographic infrastructure and effectiveness of meteorological and oceanographic services and support provided by the Military Departments to themselves and other governmental agencies.

The overall objective of this self-initiated series of audits was to evaluate DoD meteorological and oceanographic services and support to determine whether the Military Departments are providing the most cost-effective and nonduplicative meteorological and oceanographic services and support to DoD and other governmental agencies. Specifically, this audit focused on evaluating DoD management and oversight of meteorological, oceanographic, and space weather services and support provided by the Military Departments. We also evaluated the management control program as it related to identifying, coordinating, validating, and revalidating meteorological, oceanographic, and space weather satellite and communication requirements. See Appendix A for a discussion of the audit scope and methodology, management control program, and prior coverage.

Weather Services and Support

An integrated DoD weather program using the overall "DoD Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance Architecture Framework," version 2.0, December 18, 1997 (DoD Architecture Framework) methodology was lacking. Although DoD Directive 5137.1 assigns ASD(C³I) responsibility for command, control, communications, and intelligence-related space systems, no Directive assigns responsibility for coordination and oversight of meteorological and oceanographic services and support to any Office of the Secretary of Defense Principal Staff Assistant. In addition, DoD did not develop specific policy and guidance that assigns roles and responsibilities for meteorological, oceanographic, and space weather programs to meet interoperability and mission requirements⁶ effectively and efficiently. Also, the Military Departments' guidance for identifying, coordinating, and validating meteorological, oceanographic, and space weather service and support requirements did not require coordination across all Military Departments. As a result, DoD did not always coordinate satellite and communication requirements to ensure all user requirements were met.

DoD Weather Architecture

An integrated DoD weather program was not implemented using the overall DoD Architecture Framework methodology.

Post-Desert Storm Studies. Operation Desert Storm identified a lack of interoperable meteorological, oceanographic, and space weather communications capabilities. The Joint Staff tasked the Defense Information Systems Agency and the Services to identify requirements for the interoperable flow of meteorological, oceanographic, and space weather information in support of joint operations, make recommendations, and initiate actions to improve interoperability of weather support during joint operations.

May 1993 Study. "The Joint Meteorological and Oceanographic Interoperability Team's Process Modeling Findings and Recommendations on Joint Interoperability of Meteorological and Oceanographic Support to Joint Operations," May 25, 1993, identified the existing meteorological, oceanographic, and space weather architecture did not meet the needs of the warfighter because the communication systems were Service-unique and not interoperable, the meteorological, oceanographic, and space weather forces were not trained as they actually fought, and meteorological, oceanographic, and space weather information was not usable among all Services.

⁶To include satellite and communications, data collection, forecasting models, and equipment acquisition.

May 1995 Study. "Joint Meteorological and Oceanographic Interoperability Team Functional Process Improvement AS-IS Modeling Report on Joint Meteorological and Oceanographic Operations," May 1995, evaluated meteorological, oceanographic, and space weather processes, information requirements, and resources necessary to aid in the development of an interoperable communications architecture. The May 1995 study also identified that DoD needs to fully integrate a long-term joint meteorological, oceanographic, and space weather communications architecture with the DoD communications architecture.

July 1995 Study. "The Joint Meteorological and Oceanographic Interoperability Team Functional Process Improvement TO-BE Modeling Report on Joint Meteorological and Oceanographic Operations," July 1995, identified meteorological, oceanographic, and space weather information flow requirements necessary for the communications community to develop a communications architecture that adequately met the Services' requirements. The purpose of the architecture was to support joint operations during the 2005-2010 timeframe. In addition, the July 1995 study concluded that a lead Service was necessary for the overall transition to interoperable information systems and an interoperable communications architecture.

The post-Operation Desert Storm studies identified that timely and reliable communications, in addition to interoperable meteorological, oceanographic, and space weather information systems, are critical to every facet of military operations. As a result of the post-Operation Desert Storm studies, the Defense Information Systems Agency initiated a communications architecture and the Services initiated joint weather architecture to improve interoperability during operations. However, as of November 2000, these architectures had not been completed.

DoD Architecture Framework. Public Law 103-62, "The Government Performance and Results Act of 1993," section 306, and the Clinger-Cohen Act of 1996, Public Law 104-106, section 5113 (40 U.S.C. 1413) codify the efficiency, interoperability, and leveraging goals pursued by the Military Departments, Unified Commands, and other DoD Components. In October 1995, the Deputy Secretary of Defense directed a DoD-wide effort to define and develop a better means and process for ensuring that command, control, communications, computers, and intelligence capabilities meet warfighter requirements. ASD(C³I) established the Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance Architecture Working Group to develop the DoD Architecture Framework. The DoD Architecture Framework is intended to ensure that architecture descriptions developed by the Military Departments, Unified Commands, and other DoD Components are interrelated between and among each organization.

The DoD Architecture Framework consists of three perspectives: operational, system, and technical architecture views. An operational architecture view describes the activities and tasks, operational elements, and information flows required to accomplish and support a military operation. A system architecture view describes systems and interconnections providing for, or supporting, warfighting functions. A technical architecture view is the minimal set of rules governing the arrangement, interaction, and interdependence of system parts or

elements, whose purpose is to ensure that a system satisfies a specified set of requirements. An architecture framework contributes to building interoperable and cost-effective military systems.

Management of the DoD Architecture Framework. In January 1997, the DoD Architecture Coordination Council⁷ was established to ensure the interoperability and cost effectiveness of military systems by establishing comprehensive DoD architecture guidance. The DoD Architecture Framework implements the methodology for developing and reviewing architectures. In a March 31, 2000, Deputy Secretary of Defense memorandum, "DoD Chief Information Officer Executive Board," the DoD Architecture Coordination Council was designated as the senior council for oversight of all DoD architectures. As of November 2000, based on the architectures initiated by the Defense Information Systems Agency and the Services, the Services were in the process of developing a joint meteorological, oceanographic, and space weather architecture that promotes interoperability. However, an integrated DoD weather program architecture did not exist because DoD did not have a proponent or advocate for integrating meteorology, oceanography, and space weather.

Weather Program Management and Oversight

Although DoD Directive 5137.1 assigns the responsibility for command, control, communications, and intelligence-related space systems to ASD(C³I), no Directive assigns responsibility for coordination and oversight of meteorological and oceanographic services and support to any Office of the Secretary of Defense Principal Staff Assistant. In addition, DoD did not develop overall policy and guidance that addresses the integration of meteorological, oceanographic, and space weather programs to meet interoperability and mission requirements effectively and efficiently. Also, the Military Departments' guidance for identifying, coordinating, and validating meteorological, oceanographic, and space weather services and support did not require coordination across all Military Departments.

Past Initiatives. On April 3, 1992, the Joint Staff tasked the Military Departments and the Defense Information Systems Agency to form a joint working group to improve interoperability of military weather services and support for joint operations. The Joint Interoperability of Military Weather Support Working Group identified shortfalls in joint weather planning during Operation Desert Storm. The Joint Interoperability of Military Weather Support Working Group identified 11 interoperability problem areas. As a result, on January 13, 1993, the Oceanographer of the Navy and the Air Force Director of Weather signed a memorandum of agreement, "Navy-Air Force Cooperation Implementation Action Memorandum," to evaluate potential areas of

⁷The DoD Architecture Coordination Council, which comprises many organizations within DoD and is cochaired by the Under Secretary of Defense for Acquisition, Technology, and Logistics; ASD (C³I); and the Director, Joint Chiefs of Staff for Command, Control, Communications, and Computer Systems, is the senior council for oversight of the DoD Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance Architecture Framework.

cooperation between the Navy and Air Force for weather services and support. The Navy-Air Force agreement provides a framework for a long-term cooperative effort with the goal of identifying ways in which the Navy and Air Force can provide weather support with greater efficiency and address weather interoperability issues.

The Navy-Air Force agreement identifies 19 initiatives, to include standardizing weather databases and algorithms, expanding communication capacity using a shared processing network, and standardizing Military Department dial-in access capability to improve interoperability of weather support services. Of the 19 initiatives, 16 were accepted for implementation, 2 were rejected, and 1 was returned for further investigation. As of November 2000, only 5 of the 16 accepted initiatives were complete. Initiatives remaining open include the implementation of joint theater forecast consistency (one theater, one forecast), consolidation of computer flight planning requirements, increased coordination of research and development, and reduction of duplicate base aviation weather support at operational facilities. Without a cognizant organization and implementing policy and guidance to provide management and oversight for DoD weather, increasing interoperability of weather services and support between the Navy and Air Force, reducing duplicative weather services and support, and providing effective and efficient weather services and support is limited.

DoD Policy and Guidance. ASD(C³I) has management and oversight responsibilities for space-related activities to include space weather; however, neither that official nor any other Principal Staff Assistant had overall management and oversight responsibilities for meteorology and oceanography. As a result, DoD did not develop specific policy and guidance that assigns roles and responsibilities for meteorological, oceanographic, and space weather programs to meet interoperability and mission requirements effectively and efficiently.

Management and Oversight of the DoD Space Program. DoD Directive 5137.1 assigns ASD(C³I) responsibility for command, control, communications, and intelligence-related space systems and DoD Directive 3100.10 assigns ASD(C³I) responsibility for oversight and management of the DoD space program to include space weather. In March 1999, the National Security Space Senior Steering Group approved a Space Weather Architecture Study. As a result, in June 2000, the National Security Space Senior Steering Group approved a transition plan to implement the study's recommendations. As of November 2000, the Office of ASD(C³I) was in the process of developing a National Security Space Architecture⁸ that includes DoD space weather. However, the development of that architecture was not coordinated with the DoD Architecture Coordination Council.

Management and Oversight of the DoD Meteorological and Oceanographic Program. DoD policy that assigned responsibility for managing and overseeing meteorological and oceanographic services and

⁸The National Security Space Architecture was developed with interagency assistance from DoD, the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration, and other U.S. Government agencies.

support provided by the Military Departments did not exist. We interviewed officials from the Office of ASD(C³I) and the Office of the Director, Defense Research and Engineering, to determine which office within DoD had responsibility for meteorological and oceanographic services and support. Officials from the Office of ASD(C³I) stated that, although DoD Directive 3100.10 requires their office to provide management and oversight of space-related matters, meteorological and oceanographic services and support were not addressed. Officials from the Office of the Director, Defense Research and Engineering, stated that their only responsibility related to DoD weather was meteorological, oceanographic, and space environment research. Neither office was able to identify a cognizant organization responsible for overall management of meteorological and oceanographic services and support within DoD. We believe that this function relates closely to the core responsibilities of the ASD(C³I), which are focused on the production, analysis, and dissemination of information.

Military Department Policy and Guidance. Although the Military Departments have developed policy and guidance for identifying, coordinating, and validating meteorological, oceanographic, and space weather requirements, that guidance does not require the coordination of meteorological, oceanographic, and space weather requirements across all Military Departments to support interoperability and avoid duplication of weather services and support.

Meteorological Services and Support. Chief of Naval Operations Instruction 5450.165D, "Mission and Function of Commander, Naval Meteorology and Oceanography Command," August 8, 1995, requires the Navy to provide meteorological services and support to DoD and joint operations. In addition, Air Force Policy Directive 15-1, "Atmospheric and Space Environmental Support," October 13, 1993, requires the Air Force to provide accurate and timely atmospheric forecasts that support DoD missions. DoD and joint commanders use real-time, global meteorological services and support provided by the Navy and Air Force to enhance the warfighter effectiveness. Air Force Joint Instruction 15-157, "Weather Support for the U.S. Army," July 31, 1996 (also referred to as Army Regulation 115-10), assigns responsibilities and establishes procedures for the Air Force to integrate the Army meteorological mission into the Air Force overall weather mission. Air Force Joint Instruction 15-157 also establishes procedures for identifying, coordinating, and validating Army and Air Force meteorological requirements at the Major Command levels.

Oceanographic Services and Support. Secretary of the Navy Instruction 5430.79B, "Naval Oceanography Policy, Relationships, and Responsibilities," July 14, 1986, requires the Navy to provide oceanographic information⁹ for DoD missions. Real-time, tailored oceanographic information is used by joint and Naval Expeditionary and Special Operations Forces to perform global ocean front and sea-surface temperature analysis. In addition,

⁹Oceanographic information includes knowledge of the atmosphere, the oceans, the ocean floors, and the coastal and seabed areas.

Chief of Naval Operations Instruction 3140.54A establishes procedures for identifying, coordinating, and validating requirements for new or modified meteorological and oceanographic equipment within the Navy.

Space Weather Services and Support. DoD Directive 3100.10 requires ASD(C³) to provide operational space force capabilities necessary to conduct space support and integrate mission areas into an operational space force structure that is interoperable and meets the needs of Unified Commanders, intelligence users, and the Military Departments. Air Force Policy Directive 15-1 requires the Air Force to provide uninterrupted space weather advisories, observations, and warnings to support DoD missions. The Air Force Space Command provides space observations and forecasts that support ballistic missile warnings, communications, intelligence, navigation, and weather for U.S. Space Command and the North American Aerospace Defense Command operational plans and missions. Air Force Joint Instruction 15-157 also establishes procedures for identifying, coordinating, and validating Army and Air Force space weather requirements at the Major Command level.

Each of the Military Departments has developed policy and guidance for identifying, coordinating, and validating meteorological, oceanographic, and space weather services and support within their respective organization. However, the guidance does not require the coordination of meteorological, oceanographic, and space weather requirements across all Military Departments to support interoperability and avoid duplication of weather services. A cognizant and accountable Principal Staff Assistant to the Secretary of Defense is necessary to provide overall guidance to avoid duplication and ensure weather services are executed in an efficient manner.

Meeting Weather Support Requirements

The Military Departments did not always coordinate satellite and communication requirements to ensure DoD user requirements were met. The Air Force did not have satellite support to meet Navy requirements for snow and ice data through cloud-covered areas and in adverse weather conditions. The Navy and Air Force did not adequately coordinate the need for the special sensor microwave imager¹⁰ to be a primary sensor on DMSP satellites. The Air Force weather communication equipment was not interoperable with Navy operations afloat.

Kosovo After-Action Report. The Joint Chiefs of Staff issued a report to Congress, "The Kosovo/Operation Allied Force After-Action Report" (the report), January 31, 2000, that evaluated the effects of weather on intelligence, surveillance, reconnaissance, and air attack operations during Operation Allied Force.¹¹ The report states that air operations during Operation Allied Force

¹⁰The special sensor microwave imager is a passive microwave radiometer used to detect cloud water, ice edges, rain rates, and sea surface wind speeds.

¹¹Operation Allied Force began on March 24, 1999, when U.S. military forces, acting with our North American Treaty Organization allies, commenced air strikes against the Former Republic of Yugoslavia to bring an end to Serbian atrocities in Kosovo.

were hampered by poor weather conditions that allowed unimpeded air strikes only 24 of 78 days. In addition, adverse weather perpetuated the condition by limiting the ability of the Allied Force to find and identify targets more than 70 percent of the time because at least 50 percent of the sky was obscured by cloud cover. The allied forces experienced unfavorable weather conditions that increased the risk for aircrews and aircraft and complicated the ability to effectively collect collateral damage and target information. The report stresses the importance of having accurate and timely weather forecasting capabilities, and using those capabilities to enhance weather forecasts.

The report also emphasizes a need for an all-weather, high-fidelity sensor capable of cloud penetration to enable search capabilities for target detection and tracking. Although the Air Force provided meteorological support during Operation Allied Force, the Air Force meteorological team did not consider cloud penetration a viable weather support requirement. As a result, cloud penetration technology used by the Navy was not used for operational planning and execution purposes during Operation Allied Force.

Weather Satellite Support. The Air Force did not have satellite support to meet Navy requirements for snow and ice data through cloud-covered areas and in adverse weather conditions. The Navy identified the need for high-resolution sea-ice and snow data in a "Memorandum Joint Chiefs of Staff 154-86," August 1, 1986, that addresses all defense environmental satellite requirements. High-resolution sea ice data is critical to determine ice depth and thickness for surface and subsurface operations in the Antarctic, Arctic, and northern Atlantic and Pacific Oceans. In addition, high-resolution snow data is necessary for determining the difference between cloud-covered and snow-covered areas. The Navy submitted the requirement for high-resolution sea ice and snow data to the Air Force Space Command for inclusion in the DMSP system operational requirements document. Although DMSP sensors are capable of obtaining sea ice and snow data, the data did not meet the parameters established by the Navy. Therefore, DMSP satellites did not meet Navy needs for high-resolution sea ice and snow data because the sensors were unable to penetrate cloud-covered areas. In 1995, the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration, and the Canadian Space Agency signed an International Memorandum of Agreement that allowed the National Ice Center, in Suitland, Maryland, to receive high-resolution sea ice data needed to meet its requirements.

The 1995 International Memorandum of Agreement allowed the National Ice Center to receive synthetic aperture radar data from a Canadian government satellite for approximately \$500,000 a year. The satellite, Radar Satellite-1, is equipped with a powerful microwave instrument that receives and transmits a signal to "see" through clouds, darkness, haze, and smoke. The synthetic aperture radar technology enabled the Navy to meet ongoing global, regional, and tactical scale operations. Synthetic aperture radar is used by commanders because it is able to obtain high-resolution images in all weather conditions. Synthetic aperture radar also enhanced Navy ability to detect sea ice motion and surface features more clearly.

DoD, the National Aeronautics and Space Administration, and the National Oceanic and Atmospheric Administration provided a booster to the Canadian Space Agency to launch Radar Satellite-1 in November 1995. As a result, the Canadian government provided synthetic aperture radar to DoD at a reduced cost. However, the Canadian satellite is scheduled to reach its life expectancy in November 2000.¹² Although the Canadian Space Agency has a replacement satellite, Radar Satellite-2, they do not have the capability or resources to launch the satellite. Therefore, the Canadian Space Agency contracted an U.S. commercial company to launch Radar Satellite-2. If Canada launches Radar Satellite-2 without U.S. Government support, the cost of synthetic aperture radar data will increase from approximately \$500,000 to approximately \$16 million annually. As of November 2000, the Navy and Air Force had not determined an alternative solution to meet the Navy's high-resolution need for sea ice and snow data.

Satellite Requirement Coordination. The Navy and Air Force did not adequately coordinate the need for the special sensor microwave imager to be a primary sensor on DMSP satellites. The "DMSP System Operational Requirements Document," December 26, 1990, identifies the operational linescan system¹³ as the only primary sensor on DMSP satellites and the special sensor microwave imager as a secondary sensor rather than a primary sensor. Therefore, replacement DMSP satellites are launched when the operational linescan system fails, not when the special sensor microwave imager fails.

The special sensor microwave imager is critical for Army operations in determining surface soil moisture content and to the Fleet Numerical Meteorology and Oceanography Center¹⁴ for running the Navy Operational Global Atmospheric Prediction System.¹⁵ In 1993, the Navy Operational Global Atmospheric Prediction System became the single DoD global numerical weather prediction model and as a result, the special sensor microwave imager became a critical mission sensor for DoD modeling and weather operations. Officials from the Navy stated they had requested an update to the DMSP System Operational Requirements Document to include the special sensor microwave imager as a primary sensor. Although officials from the Air Force confirmed that the Navy made the request, neither the Navy or Air Force were able to provide documentation that supports a request to update the DMSP System Operational Requirements Document had been made. Officials from the Air Force also stated that the Navy was given the opportunity to fund the requirement to make the special sensor microwave imager equivalent to the

¹²Generally, the life expectancy of a satellite is 5 years; however, the status of the satellite is continuously monitored and the life expectancy updated. As of November 2000, the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration, and the Canadian Space Agency signed an extension to the 1995 International Memorandum of Agreement based on life expectancy updates that continues the agreement for 5 years, the life of Radar Satellite-1, or until the launch of Radar Satellite-2, whichever occurs first.

¹³The operational linescan system is a two-channel radiometer that is used for visible and infrared cloud cover detection and produces fine and smoothed data imagery.

¹⁴The Fleet Numerical Meteorology and Oceanography Center is designated the official global model producer for DoD.

¹⁵The Navy Operational Global Prediction System is the back-up global forecasting model for the National Weather Service and the only DoD global model.

operational linescan system for determining the need to launch replacement DMSP satellites when the primary sensor fails. However, officials from the Navy stated they were unaware of an Air Force request to provide additional funding. As a result, the Navy did not program additional funds to support elevating the special sensor microwave imager from a secondary sensor to a primary sensor.

Products produced by the operational linescan system and the special sensor microwave imager are critical to the warfighter. Therefore, not identifying and funding the special sensor microwave imager as a primary sensor could potentially impact the ability of the Navy to perform its mission. In addition, the Navy Operational Global Atmospheric Prediction System could significantly degrade its mission capability if a special sensor microwave imager failed.

Weather Communication Support. The Air Force weather communication equipment was not interoperable with Navy operations afloat. Based on shortfalls identified in an Air Force study, "XENA - Air Force Weather Communication Vision" (XENA study), September 30, 1996, the Air Force migrated from using terrestrial-based communication lines as their primary method of communication to using satellite and terrestrial-based communications. The XENA study identifies the need for a worldwide, high-speed, two-way communication system to support cost-effective data transmissions because meteorological and oceanographic data is highly perishable. In addition, the XENA study provides a comprehensive and detailed description of existing weather systems, establishes a baseline for a detailed communications architecture, and identifies communication shortcomings.

During calendar years 1996 through 1998, the Defense Information Systems Agency was unable to meet the Air Force need for a high-speed, two-way communication system. As a result, the Defense Information Systems Agency granted a waiver¹⁶ in May 1998 for the Air Force to sign a lease with Hughes Corporation for use of a very small aperture terminal (VSAT). VSAT allows the warfighter to receive high-speed, high-resolution weather data. VSAT is a commercial two-way communication system designed to improve weather support to the warfighter when deployed or in garrison by providing weather data to operational weather systems. The weather data allows forecasters to integrate strategic, center-developed, ground-based and space-based observational data with centrally produced forecast products to generate tailored, mission-specific weather support to DoD.

VSAT is a viable solution to Army and Air Force needs for an in-garrison high-speed, common-user communication system; it is not practical for Navy operations afloat. In February 1995, the Navy conducted tests aboard the USS LaSalle¹⁷ to determine whether the Navy could use VSAT afloat and

¹⁶Officials from the Air Force Weather Agency stated that in November 2000, the Defense Information Systems Agency began the transition process of using Hughes Global Services to provide satellite communication support. However, the Air Force has continued to use the same VSAT equipment and services.

¹⁷The USS LaSalle is one of two command ships that provides accommodations and communications for fleet commanders. The USS LaSalle serves as the flagship for the Commander, Sixth Fleet.

ashore. The Navy tested VSAT because of the need for a more efficient mode of data exchange with their regional meteorology and oceanography centers and to establish interoperability with the Army and Air Force. The tests revealed that VSAT was not a viable communication system afloat because the communication path was interrupted when the ship shifted only a few tenths of a degree, resulting in erroneous and incomplete data. Officials from the Combat Air Force Command and Control System Program Office stated that VSAT was designed to provide information to fixed locations. Separate, Service-unique weather communication systems do not promote interoperability, therefore, the potential exists for degraded meteorological, oceanographic, and space weather support to the warfighter.

Future Requirements

The United States operates unique civil and military polar-orbiting environmental satellite systems that collect, process, and distribute remotely sensed meteorological, oceanographic, and space weather data. In May 1995, DoD, the National Aeronautics and Space Administration, and the National Oceanic and Atmospheric Administration began to consolidate¹⁸ separate civilian and military polar-orbiting environmental satellite systems into a single constellation: the National Polar-Orbiting Operational Environmental Satellite System. The Federal agencies have developed a plan for identifying, documenting, and validating initial requirements for the new satellites. The goal of the convergence program is to reduce the cost of acquiring and operating polar-orbiting operational environmental satellites while continuing to satisfy U.S. operational civil and national security requirements. The creation of the National Polar-Orbiting Operational Environmental Satellite System requires a cognizant DoD organization to provide guidance, policy, and oversight for DoD meteorological, oceanographic, and space weather programs to ensure that DoD requirements are met in the national satellite system.

Management Comments on the Finding

Joint Staff. Although not required to respond, the Joint Staff concurred with the audit report provided the following comment was incorporated into the report.

We agree there are some functional areas that may benefit from Office of the Secretary of Defense oversight and closer programmatic cooperation among the Services. However, in developing a DoD weather architecture that integrates the DoD weather program, it is important to consider and protect Service-specific needs consistent with the Services' responsibilities under Title 10, United States Code.

In addition, the Joint Staff stated that their role was accurately identified when conducting meteorological and oceanographic operations.

¹⁸Mandated by Presidential Decision Directive, National Science and Technology Council - 2, May 5, 1994.

Recommendations, Management Comments, and Audit Response

Revised, Renumbered, Deleted, and Added Recommendations. As a result of management comments, we revised draft Recommendation 1.a. to clarify the intent of our recommendation for ASD(C³I) to provide oversight for the development of an integrated DoD weather architecture. We also revised and renumbered Recommendation 1.d.1., now Recommendation 1.d., to clarify the intent of our recommendation for ASD(C³I) to develop specific policy and guidance that assigns roles and responsibilities for meteorological, oceanographic, and space weather programs. We deleted Recommendation 1.d.2. to acknowledge that existing DoD guidance addresses the requirements coordination process. We added Recommendation 3 to the Army Deputy Chief of Staff for Intelligence and Air Force Deputy Chief of Staff for Air and Space Operations to update existing Service guidance to require the coordination of meteorological, oceanographic, and space weather requirements across all Military Departments. We also added Recommendation 4 to the Oceanographer of the Navy to update existing Service guidance to require the coordination of meteorological, oceanographic, and space weather requirements across all Military Departments.

1. We recommend the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence:

a. Oversee the development of a DoD weather architecture using the DoD Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance Architecture Framework methodology.

ASD(C³I) Comments. ASD(C³I) nonconcurred, stating that it is not responsible for developing functional requirements that are used to develop operational-level architectures. ASD(C³I) stated they are responsible for developing enterprise-level architectures and providing policy, procedures, and oversight for information technology architectures. In addition, ASD(C³I) stated that they were responsible for validating and conducting cross-architecture analysis among and between Service and agency weather architectures to ensure interoperability of DoD information technology systems. ASD(C³I) also stated that, because the meteorological, oceanographic, and space weather function has not been designated as a joint mission area, it is unclear as to whether a DoD-level architecture is necessary. Weather is actually embedded in all or most of the joint mission areas.

Audit Response. We consider ASD(C³I) comments partially responsive to the intent of the recommendation. Although ASD(C³I) stated that the Services are responsible for developing functional-level architectures, the Clinger-Cohen Act of 1996, Public Law 104-106, section 5125 (40 U.S.C. 1413) states that the Chief Information Officer is responsible for developing, maintaining, and facilitating the implementation of sound and integrated information technology architectures. In addition, a March 31, 2000, memorandum from the Deputy Secretary of Defense, "DoD Chief Information Officer Executive Board," established the DoD Chief Information Officer Executive Board to advise the DoD Chief Information Officer on matters relating to the implementation of the

Clinger-Cohen Act of 1996. The DoD Chief Information Officer Executive Board is responsible for ensuring the collaborative development of information technology architectures as specified in the Clinger-Cohen Act of 1996 and for ensuring that processes are in place to enforce the architecture's standardized use, management, and control. We realize ASD(C³I) is ultimately responsible for information technology architectures; however, providing oversight for the development of a weather architecture using the existing joint Service-level weather architecture will ensure an integrated DoD weather architecture is developed and implemented. The fact that meteorological, oceanographic, and space weather is not a joint mission area does not mean an architecture for the weather functional area is unnecessary. Architectures are most necessary when related systems are built by diverse communities. The intent of the original recommendation was for ASD(C³I) to ensure an overall DoD weather architecture was developed using the DoD Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance Architecture Framework methodology; therefore, we revised Recommendation 1.a. to clarify our intent. We request that ASD(C³I) provide additional comments on Recommendation 1.a. in response to the final report.

b. Propose changes to DoD Directive 5137.1, "Assistant Secretary of Defense for Command, Control, Communications, and Intelligence," February 12, 1992, to include meteorology and oceanography as part of the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence responsibilities.

ASD(C³I) Comments. ASD(C³I) concurred, stating that proposed changes to DoD Directive 5137.1 would be made to reflect the added responsibility of serving as the proponent and advocate for the DoD weather program to include meteorology, oceanography, and space weather.

c. Serve as the DoD proponent and advocate for integrating the DoD weather program to include meteorology, oceanography, and space weather.

ASD(C³I) Comments. ASD(C³I) concurred, stating that they accept responsibility for becoming the proponent and advocate for the DoD weather program to include meteorology, oceanography, and space weather.

d. Develop specific policy and guidance that assigns roles and responsibilities for meteorological, oceanographic, and space weather programs within DoD to meet interoperability requirements effectively and efficiently.

ASD(C³I) Comments. ASD(C³I) nonconcurred, stating that DoD Directive 4630.5, "Compatibility, Interoperability, and Integration of Command, Control, Communications, and Intelligence Systems," November 12, 1992, and DoD Instruction 4630.8, "Procedures for Compatibility, Interoperability, and Integration of Command, Control, Communications, and Intelligence Systems," November 18, 1992, provide general policy and guidance that addresses integration and interoperability of DoD information technology. In addition, ASD(C³I) stated that it is not

necessary to develop specific policy and guidance to address meteorological, oceanographic, and space weather requirements related to information technology.

Audit Response. We consider ASD(C³I) comments partially responsive to the intent of Recommendation 1.d.1. ASD(C³I) identified general guidance that pertains to the integration and interoperability of information technology systems; however, that guidance does not provide specific roles and responsibilities for meteorological, oceanographic, and space weather systems. Specific meteorological, oceanographic, and space weather guidance is necessary to attain interoperability between the Military Departments. The need for specific meteorological, oceanographic, and space weather guidance is supported by post-Operation Desert Storm studies that identified interoperability and communication shortfalls within DoD. We realize guidance addressing roles and responsibilities for space weather exist; however, there continues to be a need for overall guidance that assigns roles and responsibilities for overall DoD weather program. The intent of the original recommendation was to promote the integration and interoperability of meteorological, oceanographic, and space weather information systems between the Military Departments by assigning specific roles and responsibilities for the DoD weather program; therefore, we revised Recommendation 1.d.1., now Recommendation 1.d., to clarify our intent. We request that ASD(C³I) provide comments on Recommendation 1.d. in response to the final report.

2. We recommend the Oceanographer of the Navy and Air Force Director of Weather:

a. Evaluate the Navy requirement to obtain sea ice and snow data through cloud-covered areas and in adverse weather conditions and develop alternative solutions to meet the requirement.

Navy Comments. The Office of the Assistant Secretary of the Navy (Installation and Environment), in coordination with the Oceanographer of the Navy, concurred, stating that there is a need to continually evaluate the requirement for high-resolution, all-weather sea ice and snow data. The Navy stated they will work with the Air Force, the National Polar-Orbiting Operational Environmental Satellite System Program Office, and other agencies to develop solutions that meet their requirements.

Air Force Comments. The Deputy Chief of Staff (Air and Space Operations), in coordination with the Air Force Director of Weather, concurred, stating that because of multi-level involvement in requirements such as the Navy requirement for sea ice and snow data in cloud-covered areas and in adverse weather conditions, the Navy should update its sea ice and snow data requirements to ensure they are evaluated and included in the National Polar-Orbiting Operational Environmental Satellite System integrated operational requirements document. The Air Force stated that once the requirements are evaluated, they will either be placed in the active portion of the integrated operational requirements document or retained in the pre-planned product improvement section of the integrated operational requirements document depending on funding, priority, and technological capability.

b. Validate and fund the need for the special sensor microwave imager to be a primary sensor on current and future weather satellites.

Navy Comments. The Office of the Assistant Secretary of the Navy (Installation and Environment), in coordination with the Oceanographer of the Navy, nonconcurrent, stating that modifying current requirements to make the special sensor microwave imager a primary sensor could cause out-of-sequence launches that ultimately lead to gaps in meteorological, oceanographic satellite coverage. The Navy also stated that the National Polar-Orbiting Operational Environmental Satellite System Program Office is adequately addressing this requirement by designating the conical microwave imager sounder as a key performance parameter on future satellites, thereby making it a primary sensor.

Air Force Comments. The Deputy Chief of Staff (Air and Space Operations), in coordination with the Air Force Director of Weather, nonconcurrent, stating that the Air Force is not responsible for validating and funding Navy requirements for space-based weather sensing systems. The Air Force stated that the special sensor microwave imager is unique to DMSP. The Air Force also stated that the Navy requirement is not for the special sensor microwave imager to be a primary sensor, but rather for the required measure of performance it provides. The Air Force stated that making the presumption that the special sensor microwave imager is the only solution capable of meeting the Navy's requirement could put the primary mission of DMSP at risk.

Audit Response. Although the Navy and Air Force nonconcurrent, their comments are responsive to the intent of the recommendation. The Air Force recognizes the importance of the special sensor microwave imager for the Navy's global weather prediction models; however, launching one of the remaining DMSP satellites because of a special sensor microwave imager failure could put the mission of DMSP at risk. The Air Force stated that National Oceanic and Atmospheric Administration Polar-Orbiting Operational Environmental Satellites are expected to bridge the gap between DMSP satellites and the launch of National Polar-Orbiting Operational Environmental Satellite Systems satellites. The Navy stated that the data produced by the special sensor microwave imager is being adequately addressed in the Presidentially directed National Polar-Orbiting Operational Environmental Satellite System program. In addition, the National Polar-Orbiting Operational Environmental Satellite System cost and operational benefits requirements analysis states that the sea ice and wind threshold requirements for the Navy will be met on the National Polar-Orbiting Operational Environmental Satellite System with the conical microwave imager sounder. Officials from the National Polar-Orbiting Operational Environmental Satellite System Program Office stated that the conical microwave imager sounder will meet sea ice, snow, and other requirements identified by the Services. In addition, the conical microwave imager sounder received its "fixed position" on the National Polar-Orbiting Operational Environmental Satellite System satellites.

c. Evaluate Air Force high-speed, two-way weather communication systems to ensure interoperability with Navy operations afloat.

Navy Comments. The Office of the Assistant Secretary of the Navy (Installation and Environment), in coordination with the Oceanographer of the Navy, concurred, stating that although a need for interoperability between the Navy and Air Force exists, the Oceanographer of the Navy will continue to pursue communication capabilities through the Defense Information Systems Agency and established DoD procedures because these processes are designed to ensure interoperability.

Air Force Comments. The Deputy Chief of Staff (Air and Space Operations), in coordination with the Air Force Director of Weather, concurred, stating that the Air Force would assist the Navy if the Navy integrates tracking systems for VSAT on its ships. The Air Force also stated that the Navy should procure the necessary hardware and software for fixed locations and operations at sea or for any other Service-unique operational requirement if it chooses to use VSAT. However, the Air Force stated that there is no need for the Navy to use VSAT because of available existing communication methods that ensure the Navy is capable of receiving Air Force weather data during operations afloat.

3. We recommend the Army Deputy Chief of Staff for Intelligence and the Air Force Deputy Chief of Staff for Air and Space Operations update Air Force Joint Instruction 15-157, "Weather Support for the U.S. Army," July 31, 1996, to require that the Army and Air Force coordinate meteorological, oceanographic, and space weather requirements across all Military Departments to promote interoperability and avoid duplication of weather services and support.

4. We recommend the Oceanographer of the Navy update Secretary of the Navy Instruction 5430.79B, "Naval Oceanography Policy, Relationships, and Responsibilities," July 14, 1986, and Chief of Naval Operations Instruction 5450.165D, "Mission and Function of Commander, Naval Meteorology and Oceanography Command," August 8, 1995, to require that the Navy coordinate meteorological, oceanographic, and space weather requirements across all Military Departments to promote interoperability and avoid duplication of weather services.

Appendix A. Audit Process

Scope

This report is one in a series that evaluates the effectiveness of DoD meteorological and oceanographic services and support provided by the Military Departments to themselves and other governmental agencies.

We reviewed and evaluated whether DoD, Joint Staff, and Military Department directives, instructions, policies, regulations, and memorandums implemented from July 1947 to March 2000 were adequate for coordinating satellite and communication requirements for meteorological, oceanographic, and space weather services and support across the Military Departments. We reviewed the DoD Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance Architecture Framework, the Kosovo/Operation Allied Force After-Action Report, and the Navy-Air Force agreement. We reviewed the processes used by the Military Departments for identifying needs and generating requirements based on the identified mission needs. In addition, we reviewed interagency and inter-Service agreements to determine whether meteorological and oceanographic services and support were duplicative.

DoD-wide Corporate Level Government Performance and Results Act Goals. In response to the Government Performance and Results Act, the Secretary of Defense annually establishes DoD-wide corporate level goals, subordinate performance goals, and performance measures. This report pertains to the achievement of the following goal and subordinate performance goals:

FY 2000 DoD Corporate Level Goal 2: Prepare now for an uncertain future by pursuing a focused modernization effort that maintains U.S. qualitative superiority in key warfighting capabilities. Transform the force by exploiting the revolution in Military Affairs, and reengineer the Department to achieve a 21st century infrastructure. **(00-DoD-2)**

FY 2000 Subordinate Performance Goal 2.2: Transform U.S. military forces for the future. **(00-DoD-2.2)**

FY 2000 Subordinate Performance Measure 2.2.3: Joint Experiments. **(00-DoD-2.2.3)**

General Accounting Office High-Risk Area. The General Accounting Office has identified several high-risk areas in the DoD. This report provides coverage of the Information Management and Technology and Infrastructure high-risk areas.

Methodology

We identified and analyzed policies and guidance used by the Military Departments to identify, document, and validate requirements for communication and satellite systems used to support meteorological and oceanographic services and support by:

- conducting interviews with officials from the Offices of the ASD(C³I); the Director, Defense Research and Engineering; the Joint Staff; and the Army Deputy Chief of Staff for Intelligence. We also visited the White Sands Missile Range, the Naval Meteorological and Oceanographic Command, the Fleet Numerical Meteorology and Oceanography Center, the Naval Oceanographic Office, the Naval Ice Center, the Air Force Weather Agency, the Air Force Space Command, the Air Force Space and Missile Center, and the Combat Air Force Command and Control System Program Office.
- evaluating the process used by the Military Departments to identify, develop, document, and coordinate meteorological, oceanographic, and space weather communication and satellite requirements within the Military Departments.
- researching management and oversight responsibilities for meteorological, oceanographic, and space weather within DoD.
- reviewing whether the Military Departments revalidated meteorological, oceanographic, and space weather requirements.
- examining the methods used by management to monitor and determine the adequacy of DoD meteorological, oceanographic, and space weather services and support.

Audit Type, Dates, and Standards. We performed this program audit from February through July 2000 in accordance with auditing standards issued by the Comptroller General of the United States, as implemented by the Inspector General, DoD. Accordingly, we included tests of management controls considered necessary. We did not use computer-processed data to perform this audit.

Contacts During the Audit. We visited or contacted individuals and organizations within DoD. Further details are available on request.

Management Control Program Review

DoD Directive 5010.38, "Management Control Program," August 26, 1996, requires DoD organizations to implement a comprehensive system of management controls that provides reasonable assurance programs are operating as intended and to evaluate the adequacy of the controls.

Scope of Review of the Management Control Program. We reviewed the adequacy of management controls at the Office of the Secretary of Defense with respect to coordinating meteorological, oceanographic, and space weather satellite and communication requirements. Specifically, we reviewed the accuracy and reliability of the process to identify, coordinate, validate, and revalidate satellite and communication requirements that support DoD meteorological, oceanographic, and space weather services and support. In addition, we reviewed management's self-evaluation applicable to meteorological, oceanographic, and space weather services and support.

Adequacy of Management Controls. We identified material management control weaknesses within DoD. DoD did not establish a cognizant organization that was responsible for management and oversight of meteorological, oceanographic, and space weather requirements to include the development of a DoD weather architecture. Without a responsible cognizant DoD organization and DoD weather architecture to ensure deficiencies impacting mission accomplishment are eliminated, DoD may not adequately accomplish its mission of providing meteorological, oceanographic, and space weather services and support to the warfighter. Recommendation 1.a. and Recommendation 1.c., if implemented, will ensure the process to develop communication and satellite requirements that support meteorological, oceanographic, and space weather services is met. A copy of this report will be sent to the senior official in charge of management controls in the Office of the Secretary of Defense.

Although ASD(C³I), in commenting on the draft report, disagreed that the condition of not having a cognizant DoD organization needed to be reported as a material control weakness, ASD(C³I) concurred and will implement the recommendation to correct the condition and become the proponent for the DoD weather program. However, we continue to believe that the lack of a DoD weather architecture is material. The Joint Interoperability Meteorological and Oceanographic Interoperability Team, formed as a result of Operation Desert Storm, identified meteorological, oceanographic, and space weather interoperability and communication problems in the May 1995 study. In addition, the 1993 Navy-Air Force agreement, also established as a result of interoperability issues identified during Operation Desert Storm, identified 16 interoperability initiatives, of which 11 accepted initiatives remain unresolved as of November 2000. DoD Instruction 5010.40, "Management Control Program Procedures," August 28, 1996, defines control weaknesses as material when the weakness impairs fulfillment of essential missions or operations. We request management to comment on whether this weakness will be reported in the annual assurance letter for FY 2001, if it remains uncorrected.

Adequacy of Management's Self Evaluation. DoD did not identify meteorology, oceanography, and space weather services and support as an assessable unit, related to program oversight and requirements coordination within DoD. This occurred because DoD did not designate a cognizant organization for the execution of DoD meteorological and oceanographic programs. Therefore, DoD did not identify or report the material management control weakness identified by the audit.

Prior Coverage

No prior coverage has been conducted on meteorological and oceanographic support services during the last 5 years.

Appendix B. Report Distribution

Office of the Secretary of Defense

Under Secretary of Defense for Acquisition, Technology, and Logistics

Director, Defense Research and Engineering

Under Secretary of Defense (Policy)

Under Secretary of Defense (Comptroller/Chief Financial Officer)

Deputy Chief Financial Officer

Deputy Comptroller (Program/Budget)

Director, Administration and Management

Under Secretary of Defense (Personnel and Readiness)

Assistant Secretary of Defense for Command, Control, Communications, and Intelligence

Joint Staff

Director, Joint Staff

Department of the Army

Auditor General, Department of the Army

Deputy Chief of Staff for Intelligence

Department of the Navy

Naval Inspector General

Auditor General, Department of the Navy

Oceanographer of the Navy

Commander, Naval Meteorology and Oceanography Command

Commander, Fleet Numerical Meteorology and Oceanography Center

Commander, Naval Oceanographic Office

Commander, Naval Ice Center

Department of the Air Force

Assistant Secretary of the Air Force (Financial Management and Comptroller)

Auditor General, Department of the Air Force

Director of Weather

Commander, Air Force Weather Agency

Commander, Air Force Space Command

Commander, Space and Missile Center

Commander, Combat Air Force Command and Control System Program Office

Other Defense Organizations

Director, Defense Information Systems Agency
Inspector General, National Imagery and Mapping Agency
Inspector General, National Reconnaissance Office
Comptroller, Defense Advanced Research Project Agency

Non-Defense Federal Organizations

Office of Management and Budget

Congressional Committees and Subcommittees, Chairman and Ranking Minority Member

Senate Committee on Appropriations
Senate Subcommittee on Defense, Committee on Appropriations
Senate Committee on Armed Services
Senate Committee on Governmental Affairs
House Committee on Appropriations
House Subcommittee on Defense, Committee on Appropriations
House Committee on Armed Services
House Committee on Government Reform
House Subcommittee on Government Management, Information, and Technology,
Committee on Government Reform
House Subcommittee on National Security, Veterans Affairs, and International
Relations, Committee on Government Reform

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Assistant Secretary of Defense (Command, Control, Communications, and Intelligence Comments)



COMMAND, CONTROL,
COMMUNICATIONS, AND
INTELLIGENCE

ASSISTANT SECRETARY OF DEFENSE
6000 DEFENSE PENTAGON
WASHINGTON, DC 20301-6000



NOV 13 2000

MEMORANDUM FOR ASSISTANT INSPECTOR GENERAL FOR AUDITING
OFFICE OF THE INSPECTOR GENERAL, DEPARTMENT OF
DEFENSE

SUBJECT: Audit Report on Management and Oversight of the DoD Weather Program (Project
No. D2000LG-0102) – ACTION MEMORANDUM

In reply to your August 31, 2000 memo, this is our response. Our comments on the
subject draft report are attached.

In recommendation 1, you propose that we create a DoD weather architecture, add
meteorology and oceanography to our responsibilities, serve as proponent and advocate for
integrating the DoD weather program, and develop weather policy and guidance. It is not the
responsibility of OASD(C3I) to actually develop such functional requirements architectures
which lead to operational architectural views. This is a Joint Staff and Service responsibility. It
is our job to develop enterprise-level architectures, e.g., Global Information Grid, and provide
oversight, policy and procedures for Information Technology and National Security Space
architectures. It is already within our responsibilities to oversee space-based environmental
monitoring programs. There is no compelling evidence to indicate that DoD should develop
specific interoperability and integration policy and guidance for this particular functional area –
existing policy and guidance already cover it. We do see some merit in becoming the DoD
proponent and advocate for terrestrial-based environmental programs as part of our information
superiority charter.

You propose in recommendation 2 that the Navy and Air Force evaluate and develop
alternative solutions to the sea ice and snow data requirement, validate and fund a microwave
sensor as primary on current and future weather satellites, and evaluate USAF high-speed, two-
way communications to ensure interoperability with Navy ops afloat. Although you direct
recommendation 2 at the Oceanographer of the Navy and the Air Force Director of Weather, we
have the following comment. Detailed DoD guidance for requirements generation, validation,
and funding already exists. It has been a long-standing DoD policy for each Service to fund their
unique requirements with respect to weather satellites and communications. It is appropriate to
recommend joint evaluations of solutions to such requirements, but unnecessary to mandate
validation and funding other than by following existing guidance.

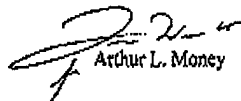
Furthermore, we do not agree with your assessment that a DoD material management
control weakness exists necessitating a cognizant DoD weather oversight organization. It is
inconsistent with current DoD reform initiatives and guidance to create an OSD-level
management organization for programs other than Acquisition Category I. The Services have



established sufficient management controls and measurable units for these operational and program management functions.

In general, we found this report to contain a number of factual errors. We provide specific report comments addressing these errors in the third attachment.

If you have any questions regarding our comments, my action officer for this initiative is Col Michael Jamilkowski, ODASD(C3ISR&S)/Space Systems Directorate, 703-607-0739, or e-mail: jamilkom@osd.pentagon.mil.



Arthur L. Money

Attachments:
As stated

cc:
JS/I-38
CNO/N096
HQ USAF/XO
DAMI-POB

ASD(C3I) Comments on DoD IG Recommendations
Draft DoD IG Audit Report
"Management and Oversight of the DoD Weather Program," p. 13
Project No. D2000LG-0102:

Recommendation 1a: "We recommend the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence develop a DoD weather architecture using the DoD Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance Architecture Framework methodology."

Comment: Non-concur

Rationale/Remarks: ASD(C3I) is not responsible for development of functional requirements and operational architectures. This responsibility resides with the Joint Staff and the Joint Requirements Oversight Council (JROC) under CJCSI 3170.01, and the Services under Title 10, United States Code. It is our job to develop enterprise-level architectures, e.g., Global Information Grid (GIG), and provide oversight, policy and procedures for Information Technology and National Security System architectures.

ASD(C3I) is the developer and proponent for the Global Information Grid (GIG) which outlines DoD "Enterprise"-level policy and guidance. ASD(C3I) will validate and conduct cross-architecture analysis among and between Service and agency weather and other related architectures to ensure interoperability between and among DoD Information Technology (IT) and National Security Systems (NSSs).

It is not clear that the "METOC" functional area requires a separate DoD-level architecture. Weather is not designated as a Joint Mission Area (JMA) as defined by the Joint Staff. Weather is actually embedded in all or most of the JMAs.

Recommendation 1b: "We recommend the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence propose changes to DoD Directive 5137.1 to include meteorology and oceanography as part of the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence responsibilities."

Comment: Concur w/comment

Rationale/Remarks: The recommendation does not specify exactly which aspects of meteorology and oceanography to include in a proposed change to DoDD 5137.1 as part of ASD(C3I) responsibilities. We recommend changing this recommendation to read: "We recommend the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence propose changes to DoD Directive 5137.1 to include serving as the DoD proponent and advocate for integrating the DoD weather program to include meteorology, oceanography, and space weather as part of the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence responsibilities."

ASD(C3I) Comments on DoD IG Recommendations
Draft DoD IG Audit Report
"Management and Oversight of the DoD Weather Program," p. 13
Project No. D2000LG-0102:

Recommendation 1c: "We recommend the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence serve as the DoD proponent and advocate for integrating the DoD weather program to include meteorology, oceanography, and space weather."

Comment: Concur w/comment

Rationale/Remarks: It is appropriate for ASD(C3I) to be the proponent and advocate for integrating the DoD weather program -- ASD(C3I) already has this responsibility for DoD space-based environmental monitoring programs such as DMSP, NPOESS and space weather. However, this should not interfere with nor overlap existing CICS, CINC, JFC and Service weather operations and requirements oversight and management functions. Furthermore, with our recommended change to DoD IG Recommendation 1b (see above), DOD IG Recommendations 1b and 1c should be merged.

Recommendation 1d(1): "We recommend the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence develop policy and guidance that addresses the integration of meteorological, oceanographic, and space weather programs within DoD to meet interoperability requirements effectively and efficiently."

Comment: Non-concur

Rationale/Remarks: General DoD policy and guidance already exist addressing interoperability and integration requirements for DoD Information Technology (IT) and National Security Space (NSS) programs (ref: DoDI 4630.5 and DoDI 4630.8). There is no compelling case or evidence for creating additional specific policy and guidance regarding interoperability and integration requirements for meteorological, oceanographic, and space weather programs.

Recommendation 1d(2): "We recommend the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence develop policy and guidance that identifies, coordinates, and validates meteorological, oceanographic, and space weather service and support requirements among the Military Departments."

Comment: Non-concur

Rationale/Remarks: DoD policy and guidance already exist for requirements identification, coordination and validation (see CJCSI 3170.01A, Requirements Generation System, 10 Aug 99). Again, there is no compelling case or evidence for creating additional specific policy and guidance regarding requirements identification, coordination and validation for meteorological, oceanographic, and space weather services and support. Furthermore, requirements direction and oversight should always belong to the Joint Staff and not the OSD staff.

ASD(C3I) Comments on Material Management Control Assessment
Appendix A to Draft DoD IG Audit Report
"Management and Oversight of the DoD Weather Program"
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Management Control Program Review, page 17:

Page 22

Adequacy of Management Controls: "We identified material management control weaknesses within DoD. DoD did not establish a cognizant organization that was responsible for management and oversight of meteorological, oceanographic, and space weather requirements."

Comment: Non-concur

Rationale/Remarks: The two cases cited by the DoD IG (Navy snow & ice requirements and lack of communications equipment interoperability) in the body of the report were weak, inaccurate, and inadequate to demonstrate any prevailing weakness. Policy, guidance and processes already exist that cover meteorological, oceanographic, and space weather requirements -- the DoD IG has not made a sufficient case for establishing specific DoD oversight for the meteorology and oceanography functional area.

Adequacy of Management's Self Evaluation: "DoD did not identify meteorology, oceanography, and space weather services and support as an assessable unit, related to program oversight and requirements coordination within DoD."

Comment: Non-concur

Rationale/Remarks: The Services have established management controls and assessable units for METOC operational and program management functions. This is consistent with the 1997 Defense Reform Initiatives, which directed that management functions be delegated to levels below OSD to the extent possible, especially for Acquisition Category III programs. Establishing a cognizant organization at the OSD level for the execution of DoD METOC programs runs counter to these reform initiatives.

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ASD(C3I) Specific (Factual-Correction) Comments on Draft DoD IG Audit Report
"Management and Oversight of the DoD Weather Program"
Project No. D2000LG-0102

Cover Page

Project Title: "Management and Oversight of the DoD Weather Program"

- Change to "Management and Oversight of the DoD Meteorology, Oceanography, and Space Weather Program."
Rationale: Accuracy. The term "Weather" alone is insufficient to describe all the environmental domains under consideration and may cause confusion. We recommend defining and using the acronym "METOC" throughout the document to follow JCS and DoD definitions. (References: JCS Pub 3-59, and DoD Dictionary).

Executive Summary

Introduction, page i, last line:

- Change "\$664.4M" to "\$475.7."
Rationale: Accuracy. The \$664.4 million figure was the requested FY00 budget, published by OFCM in June 1999, before the actual FY00 funding level was set. (POC: Mr. Blaine Tsugawa, Office of the Federal Coordinator for Meteorology (OFCM), 301-427-2002).

Background, page i:

- Paragraph 1, line 1. Change: "Weather refers to the entire range of environmental events extending from the bottom of the ocean to space. The three components of the DoD weather program are meteorology, oceanography, and space weather." to "The DoD meteorology and oceanography program includes observing, analyzing, forecasting, tailoring, and disseminating products and services for the whole range of atmospheric and oceanographic phenomena from the bottom of the earth's oceans up to the space environment (space weather). These domains are collectively referred to as the METOC program."
Rationale: Accuracy. Weather does not encompass phenomena below the ocean surface. This definition is consistent with the DoD and JCS definitions.

- Paragraph 2, line 6-8. Change to read: "The Army Deputy Chief of Staff for Intelligence (DCSINT) is responsible for meteorological policy that provides for Army Artillery to take surface and upper air observations in direct support of Army artillery systems in accordance with FM 6-15."
Rationale: Accuracy.

Results, page ii, lines 3-5:

- Delete the sentence: "As a result, the Military Departments did not adequately coordinate satellite and communication requirements to ensure all user requirements were met."
Rationale: Unsubstantiated conclusion. The cited requirements were developed, coordinated, and assessed in accordance with DoD 5000-series directives, CJCSI 3170.01A, and agreements between the Services. Fiscal constraints always exist precluding all user requirements from

Revised

Revised,
Pages 1-2

Revised

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being met. All key performance parameters have been met for existing systems and are continuing to be addressed in future systems.

Summary of Recommendations, page ii:

- We provide individual comments on each part of recommendation #1 in attachment 1.

Main Body

Background

- Page 1, paragraph 1, line 1. See "Weather" definition recommendation and rationale above.
- Page 1, footnote 1. Delete.
Rationale: See "Weather/METOC" definition recommendation for the Executive Summary/Background above.
- Page 1, paragraph 1, line 3. Change: "Meteorology is the study of atmospheric events and of the atmosphere of the Earth's oceans and surface, to include weather forecasting." to read: "Meteorology is the study of atmospheric events and of the atmosphere over the Earth's oceans and land surface, to include weather forecasting."
Rationale: Accuracy. Clarifies that the atmosphere is above the Earth's ocean and land surfaces. Revised
- Page 1, paragraph 1, last line: Change "...was approximately \$664.4 million for research and development and operations." to "...was approximately \$475.7 million for oceanographic, meteorological and space weather operations, and supporting research and development".
Rationale: Accuracy and clarity. Reflects actual FY2000 DoD METOC budget. Revised
- Page 1, "Office of the Secretary of Defense Responsibilities" paragraph, lines 11-14. Change: "Further, DoD Directive 3100.10 requires a national security space architecture, that includes communications, ground, and space segments, to enhance support to military operations and other national security objectives." to "Further, DoD Directive 3100.10, states that an integrated national security space architecture shall be developed to the maximum extent feasible."
Rationale: Accuracy -- more exact quote from DoD Directive 3100.10, paragraph 4.6.2.
- Pages 1-2, "Joint Chiefs of Staff Responsibilities and Doctrine" paragraph, lines 6-8. Change to read: "The Chief of Staff, U.S. Army is responsible for surface and upper air observations in direct support of Army artillery systems, and in areas forward of division main command posts, not covered by the Air Force, as described in the National Security Act of 1947 and Army-Air Force directives and agreements."
Rationale: Completeness -- matches responsibilities stated in CJCSI 3810.01A. Revised
- Page 3, "Military Department Responsibilities", paragraph 1, line 3. Change to read: "The Army is responsible for surface and upper air observations in direct support of Army artillery systems, and in areas forward of division main command posts, not covered by the Revised

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Air Force, as described in the National Security Act of 1947 and Army-Air Force directives and agreements."

Rationale: Completeness. The Army has other surface observing responsibilities besides those in support of artillery.

Revised

- Page 3, paragraph 1, lines 4-6. Change to: "The Navy and Air Force are the primary providers of meteorological, oceanographic, and space weather information to DoD and national programs. They are also additional providers and collaborators with other governmental agencies and international partners."

Rationale: Accuracy and clarity. The Navy and Air Force are not the primary providers for "other governmental agencies and international partners" who use the National Weather Service, their own national METOC services, or commercial services.

Revised

- Page 4, "Air Force" paragraph, lines 5-6. Change to read: "The Air Force provides meteorological and space weather services and support to AF and Army operations."

Rationale: Air Force supports Army operations as required by the 1947 National Security Act.

- Page 4, "Air Force" paragraph, line 11. Change: "The DMSP constellation of satellites is a group of DoD-owned operational weather satellites that provides the primary source of meteorological, oceanographic, and space weather data to DoD users worldwide." to: "The DMSP constellation of satellites is a group of DoD-owned operational weather satellites that provides a primary source of meteorological, oceanographic, and space weather data to DoD users worldwide."

Rationale: Accuracy. DMSP is but one of many important sources of METOC data. Other sources include: geostationary weather satellites, science and R&D satellites, other nations' satellites, and a worldwide network of surface, upper air, and solar observing systems.

Revised

- Page 4, "Air Force" paragraph, line 14. Change: "DMSP satellite sensors collect, store, and communicate data used to develop various meteorological, oceanographic, and space weather products to ground stations." to read "DMSP satellites collect, store, and communicate to ground stations data used to develop various meteorological, oceanographic, and space weather products."

Rationale: Accuracy. The satellite system (not the sensors) stores and communicates data.

Revised

- Page 4, "Air Force" paragraph, line 16. Change: "... to ground stations." to: "... to fixed and tactical ground stations."

Rationale: Completeness of requirement. Capabilities must support receipt of data in both fixed- base and changing tactical locations.

Weather Services and Support

- Page 5, Paragraph 1, sentence 1. Comment: We do not understand the purpose of this statement. It may be true as it stands, but does not appear to be relevant. The statement implies that an "integrated DoD weather program" should have been implemented and that the DoD C4ISR Architecture Framework contains the implementing guidance. We are not aware of any directive that mandates this.

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- Page 5, paragraph 1. Add in paragraph body: "DoD Directive 3100.10 assigns ASD(C3I) responsibility to develop, coordinate, and oversee the implementation of policies and oversee the development and execution of architectures, acquisition, and technology programs for space and space-related activities, which includes space-based environmental monitoring."
Rationale: Completeness and accuracy. Although ASD(C3I) is not assigned responsibility for meteorological and oceanographic services and support, we do oversee space-based environmental monitoring programs and activities. These programs are the ACAT 1 pieces of the overall "DoD Weather Program."
- Page 5, paragraph 1, last sentence, plus bullets 1 and 2: Comment. We disagree that that DoD did not develop policy and guidance for the functions described in the two bullets listed. General DoD policy and guidance already exist addressing interoperability and integration requirements for DoD Information Technology (IT) and National Security Space (NSS) programs (ref: DoDD 4630.5 and DoDI 4630.8). There is no compelling case or evidence for creating additional specific policy and guidance regarding interoperability and integration requirements for meteorological, oceanographic, and space weather programs. Additionally, DoD policy and guidance already exist for requirements identification, coordination and validation (see CJCSI 3170.01A, Requirements Generation System, 10 Aug 99). Again, there is no compelling case or evidence for creating additional specific policy and guidance regarding requirements identification, coordination and validation for meteorological, oceanographic, and space weather services and support. Furthermore, requirements direction and oversight should always belong to the Joint Staff and not the OSD staff.
- Page 5, paragraph 2: Comment. This paragraph is unsubstantiated. The DoD IG cites two weak, isolated and inaccurate cases to develop this generalization. The DoD and interagency partners use very rigorous processes for weather satellite requirements generation, coordination and validation (ref: CJCSI 3170.01A, Requirements Generation System, 10 Aug 99, and DOC-DoD-NASA MOA, NPOESS, May 1995, Appendix 2).

Revised

DoD Weather Architecture

- Page 5, paragraph, line 3: Change "... 1995" to "... 1996".
Rationale: Accuracy.
- Page 6, "Management of the DoD Architecture Framework" paragraph, line 11. Add: "The Office of the National Security Space Architect (NSSA) completed a Space Weather Architecture Study approved by the National Security Space Senior Steering Group (NSS SSG) in March 1999. In June 2000 the NSS SSG approved a transition plan to implement the study recommendations."
Rationale: Completeness and accuracy. In order to provide a comprehensive assessment and overview of DoD architectures covering the areas of meteorology, oceanography, and space weather, the Space Weather Architecture Study and Transition Plan must be included.

Revised,
Page 6
Page 7

Weather Program Management and Oversight

- Page 6, paragraph 1, last sentence, plus bullets 1 and 2: Comment. We again disagree that the DoD did not develop policy and guidance for the functions described in the two bullets listed.

Revised,
Page 7

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General DoD policy and guidance already exist addressing interoperability and integration requirements for DoD Information Technology (IT) and National Security Space (NSS) programs (ref: DoDD 4630.5 and DoDI 4630.8). There is no compelling case or evidence for creating additional specific policy and guidance regarding interoperability and integration requirements for meteorological, oceanographic, and space weather programs. Additionally, DoD policy and guidance already exist for requirements identification, coordination and validation (see CJCSI 3170.01A, Requirements Generation System, 10 Aug 99). Again, there is no compelling case or evidence for creating additional specific policy and guidance regarding requirements identification, coordination and validation for meteorological, oceanographic, and space weather services and support. Furthermore, requirements direction and oversight should always belong to the Joint Staff and not the OSD staff.

Revised,
Page 8

- Page 7, paragraph 2, line 1. Change: "The Navy-Air Force agreement identifies 19 initiatives" to "... 16 initiatives".
Rationale: Accuracy. "19" was the number of areas originally proposed, but the NAVAF agreement documented only 16 initiatives for action.

DoD Policy and Guidance

Revised,
Page 8

- Page 7, last sentence in section. Comment: Again, we disagree that that DoD did not develop policy and guidance for the DoD weather program that integrates meteorological, oceanographic, and space weather programs to meet interoperability and mission requirements effectively and efficiently. General DoD policy and guidance already exist addressing interoperability and integration requirements for DoD Information Technology (IT) and National Security Space (NSS) programs (ref: DoDD 4630.5 and DoDI 4630.8). There is no compelling case or evidence for creating additional specific policy and guidance regarding interoperability and integration requirements for meteorological, oceanographic, and space weather programs. Such added bureaucratic management for the METOC program, which makes up a small fraction of a percent of the DoD budget, is unwarranted.

Management and Oversight of DoD Space Program

Revised,
Page 8

- Page 7, 2nd sentence in section. Change: "As of July 2000, the Office of ASD(C3I) was in the process of developing a National Security Space Architecture⁸ that includes DoD space weather." to: "The Office of the National Security Space Architect (NSSA) completed a Space Weather Architecture Study⁸ approved by the National Security Space Senior Steering Group (NSS SSG) in March 1999. In June 2000 the NSS SSG (ASD/C3I, J-8, and DDCI/CM) approved a transition plan to implement the study recommendations."
Rationale: Accuracy. The NSSA developed the architecture with interagency assistance and the National Security Space Senior Steering Group (ASD/C3I, J-8, and DDCI/CM) approved the architecture in 1999 and the transition plan in 2000.

Page 8

- Page 7, last sentence in section. Delete.
Rationale: There is no requirement to coordinate the space weather architecture through the DoD Architecture Coordination Council (ACC). The joint USD(A&T)-ASD/C3I-JS/J-6 memorandum forming this council is only a discretionary document with respect to directives in the Defense Acquisition Deskbook. This joint memo is the only guidance so far for the ACC.

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Also, the ACC has not yet determined their role with respect to the NSSA and its architectures. Furthermore, as a general routine practice, the ONSSA employs the DoD C4ISR Architecture Framework, version 2.0, methodology.

- Page 7, footnote 8. Change entire footnote to read: "The National Security Space Architect developed a space weather architecture with interagency assistance from many USG agencies including the National Oceanic and Atmospheric Administration, the National Science Foundation, and the National Aeronautics and Space Administration."
Rationale: Accuracy. The NSSA, not ASD/C3I, developed the space weather architecture, which was approved by the NSS SSG in 1999. Several agencies participated in the space weather architecture development beyond NASA and NOAA (their names are also corrected here), most notably the National Science Foundation. The National Security Space Architecture includes several component architectures, one of which is space weather. The overall architecture is still in development, but the space weather architecture has been completed. Furthermore, ASD/C3I, the Joint Staff J-8, and the Deputy Director of Central Intelligence for Community Management jointly guide the NSSA's efforts.

Revised,
Page 8

Management and Oversight of the DoD Meteorological and Oceanographic Program

- Paragraph 1, pages 7-8. Comment: Although the DoD IG could not identify a cognizant organization responsible for meteorological and oceanographic services and support within the OSD staff, they failed to recognize the fact that the Joint Staff has general responsibilities for operations and requirements under which meteorology, oceanography and space weather fall.

Pages 8-9

Military Department Policy and Guidance

- Pages 8-9, all paragraphs. General Comment: For this section it is unclear if you are referring to DoD/OSD policy and guidance over the Military Departments, the Military Department's own policy and guidance, or both. We recommend that you make this clear.
- Page 8, paragraph 1, line 4. Change: "...there is no policy or guidance to support interoperability and avoid duplication..." to "...there is no Service policy or guidance to avoid duplication..."
Rationale: Accuracy. Although no policy or guidance on interoperability may exist at the Service level, general DoD policy and guidance already exist addressing interoperability and integration requirements for DoD Information Technology (IT) and National Security Space (NSS) programs (refs: DoDD 4630.5 and DoDI 4630.8). Again, there is no compelling case or evidence for creating additional specific policy and guidance regarding interoperability and integration requirements for meteorological, oceanographic, and space weather programs.
- Page 9, paragraph 1, last sentence. Change: "...and validating Air Force space weather requirements..." to "...and validating Air Force and Army space weather requirements...."
Rationale: Accuracy. AFJI (Air Force Joint Instruction) 15-157, a.k.a., Army Regulation 115-10, covers the process for the Army to identify its requirements.

Revised,
Pages 9-10

Revised,
Page 9

Revised,
Page 10

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Page 10

- Page 9, paragraph 2, sentence 2. Comment: We disagree -- guidance on interoperability is provided in applicable DoD and CJCS instructions. Even without their own internal, specific guidance, the Services must still follow DoD and CJCS guidance.

Meeting Weather Support Requirements

- Paragraph 1, all sentences. Comment: All these statements are either unsubstantiated or hollow allegations. See further comments below.

Kosovo After-Action Report

Page 11

- Page 9, last sentence. Change: "... to enhance weather forecasts." To read: "... to enhance intelligence and combat operations."
Rationale: Accuracy and eliminate redundancy. As it stands, the sentence states that "it is important to have valuable weather forecasting capabilities to use to enhance weather forecasts." This is redundant and was probably intended to convey that "it is important to have valuable weather forecasting capabilities to use to enhance intelligence and combat operations."

Pages 10-11

- Pages 9 and 10, entire section. Comment: Cloud penetration for target detection and tracking is an ISR (Intelligence, Surveillance, and Reconnaissance) mission, as defined by both the Services and the JCS, not a METOC mission. One implies from reading the report that cloud-penetrating weather sensors should be used to detect and track targets. We learn from the Operation Allied Force After Action Report (Unclas) that several US systems provided target detection and tracking through cloudy and adverse weather conditions (Joint STARS, U-2s, ATARS, and P-3C Orion synthetic aperture radar (SAR)). USN, USAF, and USMC weather personnel provided full weather support to these and the other platforms. The Navy's cloud penetration technology (RadarSat-1?) should not nor cannot be used for target identification and tracking.

Weather Satellite Support

Revised,
Page 11

- Page 10, first paragraph in section, line 5. Change: "...discusses all DMSP satellite requirements." to: "...discusses all environmental satellite requirements."
Rationale: Accuracy. MICS 154-86 documents military requirements for all operational environmental satellites in general, not just for DMSP. We believe that the DoD IG incorrectly implies that the Navy's ice and snow data requirement should have been met by DMSP.

Revised,
Page 11

- Page 10, first paragraph in section, last sentence. Change to read: "The National Ice Center (NIC), in Suitland, Maryland obtained the high-resolution sea ice data via an International Memorandum of Agreement (IMOU) between the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), and the Canadian Space Agency."
Rationale: More accurately reflects the arrangement used to obtain the sea ice data. The Special Sensor Microwave Imager (SSM/I) did not meet the NIC requirements completely. The prospect of an active microwave capability led NASA and NOAA to work with the Canadian Space Agency (CSA) for the launch of Radar Satellite-1 (RADARSAT-1). NASA, NOAA and CSA signed an IMOU. NASA agreed to launch RADARSAT-1 in return for a portion of the

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Attachment 3

ASD(C3I) Specific (Factual-Correction) Comments on Draft DoD IG Audit Report
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data from each orbit for the USG. The NIC gets high-resolution sea ice data under this IMOU but does not itself have any agreements with CSA.

- Page 10, second paragraph in section, sentences 1-2. Change to read: "The NIC receives SAR data from a Canadian government satellite under the IMOU between NASA, NOAA, and the Canadian Space Agency. The Navy pays \$240,000 per year in processing fees directly to supporting ground stations. The RADARSAT-1 is equipped with a powerful microwave instrument ..."

Page 11

Rationale: The additional text corrects and accurately defines the relationship for receipt of high-resolution sea ice data by the NIC from RADARSAT-1.

- Page 10, third paragraph in section, sentence 1. Change: "...National Aeronautical and Space Administration, and the National Oceanic and Atmospheric Agency..." to read: "National Aeronautics and Space Administration, and the National Oceanic and Atmospheric Administration...."

Revised,
Page 11

Rationale: Accuracy - corrects names of these agencies.

- Page 10, third paragraph in section, sentences 4-6. Change to read: "The RADARSAT-2 program is intended to be a commercial program. Due to a number of factors, NASA will not provide the launch for this satellite. The Canadian Space Agency contracted a U.S. commercial company to launch this satellite. No agreement is expected to provide the U.S. government preferential access to RADARSAT-2 data. At current use rates, commercial rates for RADARSAT-2 data could increase from \$500,000 to approximately \$16 million annually."

Revised,
Page 12

Rationale: Better defines the status and outlook for RADARSAT-2.

- Page 10, third paragraph in section. Add to end of paragraph: "As of November 2000, Canada and the U.S. signed a RADARSAT IMOU extension. Canada and the U.S. agreed to continue the current arrangement for 5 years or until end of life of RADARSAT-1 or until launch and checkout of RADARSAT 2, whichever comes sooner."

Revised,
Page 12

Rationale: New and relevant additional information.

- Page 10, Weather Satellite Support, all paragraphs. General comment: The Navy's use of Canadian RadarSat-1 data to meet sea ice requirements via an agreement is consistent with DoD guidance and intent documented in DoDD 3100.10 - leveraging national and/or international capabilities to save on costs. The U.S. launch of a similar capability would likely have cost hundreds of millions of dollars.

Pages 11-12

Satellite Requirement Coordination

- Page 11, paragraph 2, sentence 1. Change to read: "The special sensor microwave imager (SSM/I) or a successor sensor is critical... to run the Navy Operational Global Atmospheric Prediction System (NOGAPS)¹⁴, and for the Army to determine surface soil moisture content."

Revised,
Page 12

Rationale: In addition to Navy requirements for microwave data, there is a critical US Army requirement for Soil Moisture data, a KPP, which is obtained via the SSM/I sensor on DMSP satellites. In the future, NPOESS will replace and enhance this capability via the Conical Microwave Imager Sounder (CMIS).

Final Report
Reference

ASD(C3I) Specific (Factual-Correction) Comments on Draft DoD IG Audit Report
"Management and Oversight of the DoD Weather Program"
Project No. D2000LG-0102

Page 12

- Page 11, paragraph 2, sentence 2. Change: "In 1993, the Navy Operational Global Atmospheric Prediction System became the single DoD global model..." to read: "In 1996, the NOGAPS became the single DoD-run global numerical weather prediction (NWP) model...."
Rationale: Accuracy. The NOGAPS did not reach full operational capability until 1996. Also, because of other global modeling and applications operated by the Air Force Weather Agency, it is erroneous to state that NOGAPS is the "single DoD global model".

Weather Communication Support

Page 13

- Page 11, sentence 1: Comment. The fact that VSAT, as used at fixed sites, does not work afloat is not the real interoperability issue here, i.e., the DoD IG focus on equipment is not the issue. Availability of the same data to the Navy through their communication channels as that sent over VSAT to Air Force and Army weather support personnel is the important interoperability aspect and that was accomplished. Planning, programming, budgeting, and implementing the hardware end of the data stream is the responsibility of the requiring Service.

Revised,
Page 13

- Page 12, paragraph 3, lines 1-2. Change to read: "VSAT is a viable solution to Army and Air Force needs for an *in-garrison* high-speed,...."
Rationale: VSAT is meeting in-garrison communications needs of Army weather teams, but will not support Army tactical communications needs until Tactical-VSAT terminals are approved for operation at a Classified level in conjunction with the Army Integrated Meteorological System (IMETS).

Pages 13-14

- Page 12, last sentence in section. Comment: The DoD IG concern expressed here is unfounded because the interoperability is already in place. The Navy need not use VSAT at all but rather can use existing communications channels.

Future Requirements

Revised,
Page 14

- Page 13, first paragraph, first sentence. Change: "The United States operates separate civil and military polar-orbiting environmental satellite systems..." to "The United States jointly operates civil and military polar-orbiting environmental satellite systems...."
Rationale: Accuracy. The DMSP and NOAA POES satellites are not operated separately. In 1998, all DMSP and POES satellite operations were merged at the NOAA control facility in Suitland, Maryland.

Revised,
Page 14

- Page 13, first paragraph, line 3. Change: "In May 1998..." to "In 1995...."
Rationale: Accuracy. The President directed formation of the NPOESS program in 1994. We deem 1995 to be the beginning of consolidation with the signing of the triagency MOA.

Revised,
Page 14

- Page 13, first paragraph, line 8. Change: "The Federal agencies are in the process of developing a plan to identify, document, and validate requirements for the new satellites." to: "The Federal agencies have identified, documented, and validated the initial requirements for the new satellites."
Rationale: Accuracy. The NPOESS requirements process was established in 1995. IORD I was published in 1996 following NPOESS Joint Agencies Requirements Council (JARC) (for the civil side of the program) and JROC approval (for the Defense side of the program). The

**ASD(C3I) Specific (Factual-Correction) Comments on Draft DoD IG Audit Report
"Management and Oversight of the DoD Weather Program"
Project No. D2000LG-0102**

NPOESS requirements process has been rigorous, with multi-Service participation throughout, including placing Navy, Air Force, and Army personnel in the Integrated Program Office and through participation in the Senior User Advisory Group (SUAG). The DoD acquisition and JCS requirements processes, based on DoD directives, have provided the mechanism to identify and vet all Service requirements and validate these requirements through the JROC.

- General comment: OASD(C3I) already oversees most aspects of NPOESS. Requirements oversight and management should remain with the Joint Staff.

Recommendations

- Addressed in a separate attachment (Attachment 1).

Appendix A

- Addressed in a separate attachment (Attachment 2).

CONCURRENCE OR NON-CONCURRENCE ON RECOMMENDATION 1.

1 DoD IG Recommendation 1a.

a. Army non-concurs.

b. The Joint Staff (JS) under the role described in CJCSI 3810.01A, Enclosure B has operational responsibilities, but it does not direct The JS to develop a long-range architecture. Until The JS agrees to expand its role to develop such a METOC architecture, a Service-lead group should be chartered with equal Army, Navy, Air Force, Marine Corps and Joint participation as stakeholders. An Inter-Service Agreement can ensure Services have a firm commitment to develop programs to follow the architecture

c. A METOC Architecture should have the clear, long-range objective of developing interoperable software, hardware, and information sharing processes in a Joint Task Force environment. A JTF Commander-designated Joint METOC Officer will be directing component command METOC resources and must have interoperable hardware, software, and communications.

d. Once chartered, the new multi-Service group can develop METOC Architecture using the C4ISR Architecture Framework (systems view, operational view, and technical view). Although all four Services and the Joint Staff are stakeholders (reference the NSSA architecture approach) in common solution, but they must still move above Service rivalries, and have incorporated safeguards to ensure they make a firm commitment to follow the architecture once it is developed. The METOC Architecture should set a long range (2010-2025) objective capability beyond the POM years and provide a "target" for which each Service builds its weather programs, using the Joint Mapping Tool Kit, Defense Information Infrastructure (DII) Common Operating Environment (COE), Joint Technical Architecture (JTA), and other Defense Information Systems Agency/Joint Interoperability Engineering Office (DISA/JIEO) or JS technical guidance. The JTA is limited to providing guidance on the protocols and technical interface specifications for interoperability of communications systems in a Joint Task Force environment and does not provide an architecture

e. The Office of the Deputy Undersecretary of Defense (Science and Technology) (ODUSD(S&T)) has a clear role to guide the Services' METOC Research & Development (R&D) to help meet a METOC architecture objective capability.

f. The METOC Architecture should also consider national capabilities. National Polar-orbiting Operational Environmental Satellite System (NPOESS) and National Weather Service numerical forecast model play a part in the objective capabilities and should be part of the architecture.

Revised

Final Report
Reference

2. DoD IG Recommendation 1b.

- a. Army non-concurs because The JS already has this responsibility
- b. Army also recommends the Navy and AF Weather/METOC Officers on The JS be increased in rank and refocused to work full time the METOC activities and responsibilities as established in existing JS guidance. Rank of both METOC officers should be increased to the O-6 level, and both officers should work in a single office. The O-5 level Action Officers (AOs) currently have limited capability to achieve their stated mission because of additional non-METOC work load. Senior leaders are currently tasking O-5 level AO to work higher priority actions. Previous METOC officers on The JS in late 1980s -1990 had O-6 level officers, who more effectively managed METOC operations and wartime planning from a single office

3. DoD IG Recommendation 1c.

- a. Army concurs with comment.
- b. Army recommends that The JS, CINCs, Component Commanders and Services should retain their oversight and management functions. ASD(C3I) should be an advocate and proponent for improving and integrating weather into the DoD processes.

4. DoD IG Recommendation 1d(1).

- a. Army concurs with the recommendation
- b. Any new policy and guidance should not duplicate or change existing DoD processes in acquisition and management of METOC programs, which are being followed by the Army and other Services.

5. DoD IG Recommendation 1d(2).

- a. Army non-concurs.
- b. Although Army agrees that there is a need for coordinating Service requirements and leveraging other Service solutions, this recommendation encroaches on the Service's Title 10 charter to man, train and equip the force. Army already has existing procedures to internally determine requirements. Training and Doctrine Command has the mission to develop doctrine, training, or materiel solutions to meet these requirements. Deputy Chief of Staff, Operations and Plans prioritizes weather priorities within the Army Planning, Programming, Budgeting and Execution System.

Revised and
renumbered
as Recom-
mendation
1.d.

Deleted

Army Recommended Changes to Draft Audit Report
(Project No. D2000LG-0102). August 31, 2000

GENERAL.

1. Lack of interoperability of Service METOC hardware and software in a Joint Task Force (JTF) environment and inadequate communications into, within, and out of the area of operations are major barriers to successful accomplishment of the Services' "man, train, and equip" roles in support of the Unified Combatant Commands. Additional overarching and binding guidance is needed to help the Services synchronize programs in the long term. Two other areas need to be recognized.

a. The Joint Staff appears to be inadequately manned to provide needed leadership and oversight to integrate METOC into Joint long range plans such as Joint Vision 2020, and other Joint Doctrine, where METOC should be shown as interacting with other Joint functional areas. Two O-6 level staff positions, one from the AF and Navy, both dedicated to METOC-only operations appear to be needed. Since DESERT STORM (DS) the Joint Staff METOC leadership has been gradually reduced to one officer, who has to work other areas in addition to METOC issues. A symptom of this problem is that the METOC officer has not been able to adequately manage the actions required to follow up the Joint Staff request to Defense Information Systems Agency Joint Interoperability Engineering Office (DISA/JIEO) in the early 1990s to provide the communications to meet requirements identified in the Joint Uniform Lessons Learned from DS. Interoperable communications between all component Commanders METOC forces is still an issue. Before DS, an O-6 lead Joint Staff group worked METOC issues. After DS it was reduced to two full-time METOC officers at O-5 level. Today it is one O-5 with additional duties.

b. The Joint Architecture to be developed under the Audit Report Recommendation 1a needs to be expanded to include the other applicable national weather programs in a similar way to how the National Security Space Architect (NSSA) developed the Space Weather Architecture for 2010-2025 and Transition Plan from 2000-2010. Without adequate planning and integration of key national METOC sources, the observing from surface, upper air, satellite, lightning, and radar are not fully coordinated with development of Service and national numerical weather prediction models. The NSSA Space Weather architecture showed a 70% improvement in Space Weather support by just better planning and integration of observing sensors with prediction model development.

Enclosure 1

Final Report
Reference

SPECIFIC RECOMMENDED CHANGES.

Revised

1. Executive Summary, Background, Second Paragraph, Line 6-8.
Change to read: The Army Deputy Chief of Staff for Intelligence (DCSINT) is responsible for meteorological policy that provides for Army Artillery to take surface and upper air observations in direct support of Army artillery systems in accordance with FM 6-15.
RATIONALE: Correctness. The Army's DCSINT is not directly responsible for ensuring surface and upper air observations are taken as stated in the Draft Audit Report. The DCSINT is responsible for establishing overall Army weather support policies and ensuring all weather requirements are stated through standard TRADOC requirements determination processes. This includes ensuring the Army meets its requirements to provide meteorological ballistic data in support of Army artillery systems. The U.S. Army Field Artillery School trains soldiers to take observations and develops systems to meet the operational capabilities described in FMs 5-16 and 34-81.

Revised

2. Page 1, Background, Paragraph 1, line 14-15.
Change to read: ...was approximately \$664.4 million for oceanographic, meteorological and space weather operations, and supporting research and development.
RATIONALE: Clarity

Revised,
Pages 1-2

3. Page 1, Joint Chiefs of Staff Responsibilities and Doctrine, Paragraph 1, line 6-8.
Change to read: The Chief of Staff, U.S. Army is responsible for surface and upper air observations in direct support of Army artillery systems, and in areas forward of division main command posts, not covered by the Air Force, as described in the National Security Act of 1947 and Army-Air Force directives and agreements.
RATIONALE: Completeness...the Army has other surface and upper air responsibilities besides those in support of artillery. The new description matches CJCSI 3810.01A stated responsibilities.

Revised

4. Page 3, Military Department Responsibilities, Paragraph 1, line 3.
Change to read: The Army is responsible for surface and upper air observations in direct support of Army artillery systems, and in areas forward of division main command posts, not covered by the Air Force, as described in the National Security Act of 1947 and Army-Air Force directives and agreements.

RATIONALE: Completeness...the Army has other surface observing responsibilities besides those in support of artillery.

Revised

5. Page 4, Air Force Paragraph, line 5-6
Change to read: The Air Force provides meteorological and space weather services and support to AF and Army operations.

RATIONALE: Air Force supports Army operations as required by the National Security Act of 1947.

6. Page 4, Air Force Paragraph, line 16.

Change from "... to ground stations" to: ... fixed and tactical ground stations.

RATIONALE. Completeness of requirement. Capabilities must support receipt of data in both fixed base and changing tactical locations. Receipt "*on the move*" affects the AF design of equipment to be small, light weight, and easy to set up after daily moves.

7. Page 11, Satellite Requirement Coordination, Paragraph 2, line 1-3.

Change to read: The special sensor microwave imager (SSM/I) or successor sensors is critical to run the Navy Operational Global Atmospheric Prediction Systems, and for the Army to determine surface soil moisture content.

RATIONALE: The National Polar-orbiting Operational Environmental Satellite System (NPOESS) will not fly an SSM/I as the Defense Meteorological System (DMSP) does on Block 2 and 3 satellites. NPOESS will fly a Conical Microwave Imaging System (CMIS) to achieve requirements to get Soil Moisture as a Key Performance Parameter. Army needs SSM/I and CMIS for the soil moisture information. Soil moisture information is used to support armored vehicles in off-road mobility assessment and for use in Intelligence Preparation of the Battlefield (IPB). In IPB, soil moisture affects the Threat forces ability to maneuver and changes the avenues of approach of Threat forces.

8. Page 12, Weather Communications Support, Paragraph 3, line 1-2.

Change to read: "... VSAT is a viable solution to Army and Air Force needs for an in-garrison high-speed,...."

RATIONALE: VSAT is meeting in-garrison communications needs of Army weather teams, but will not support Army tactical communications needs until Tactical-VSAT terminals are approved for operation at a SECRET level in conjunction with the Army Integrated Meteorological System (IMETS).

Revised

Revised,
Page 12

Revised,
Page 13

Department of the Navy Comments



DEPARTMENT OF THE NAVY
THE ASSISTANT SECRETARY OF THE NAVY
(INSTALLATIONS AND ENVIRONMENT)
1600 NAVY PENTAGON
WASHINGTON, D.C. 20350-1000

NOV 6 2000

FIRST ENDORSEMENT on Chief of Naval Operations (N096) ltr of
23 Oct 00

From: Assistant Secretary of the Navy (Installations and
Environment)
To: Inspector General, Department of Defense

Subj: SUBSTANTIVE REVIEW OF THE DRAFT AUDIT REPORT ON MANAGEMENT
AND OVERSIGHT OF THE DEPARTMENT OF DEFENSE WEATHER PROGRAM
(PROJECT D2000LG-0102)

Ref: (a) DoD Inspector General Draft Audit Report on the
Management and Oversight of the DoD Weather Program
(Project No. D2000LG-0102) of 31 Aug 00

Encl: (1) CNO(N096) letter of 20 Oct 00
(2) CNO(N096) Recommended Changes and Comments Regarding
Draft Audit Report (Project No. D2000LG-0102)

1. Forwarded, recommending approval.

Elsie L. Mansell

Elsie L. Mansell
Deputy Assistant Secretary of the Navy



DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
2000 NAVY PENTAGON
WASHINGTON, D.C. 20350-2000

IN REPLY REFER TO

5410
Ser N096/ OUS70977
23 OCT 00

From: Chief of Naval Operations (N096)
To: Inspector General, Department of Defense
Via: Assistant Secretary of the Navy (Installation and Environment)

Subj: SUBSTANTIVE REVIEW OF THE DRAFT AUDIT REPORT ON MANAGEMENT AND OVERSIGHT OF THE DEPARTMENT OF DEFENSE WEATHER PROGRAM (PROJECT D2000LG-0102)

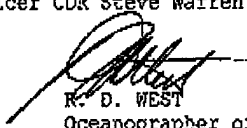
Ref: (a) DoD Inspector General Draft Audit Report on the Management and Oversight of the DoD Weather Program (Project No. D2000LG-0102) of 31 Aug 00

Encl: (1) CNO(N096) Recommended Changes and Comments Regarding Draft Audit Report (Project No. D2000LG-0102)

1. Reference (a) provides an adept representation of current issues associated with DoD Weather Program management and oversight. Clearly, continued emphasis on coordination and cooperation between the Navy and Air Force Weather Programs is needed, particularly in areas such as interoperability and support requirements. Although oversight of this joint coordination by the Assistant Secretary of Defense for Command, Control, Communications and Intelligence (ASDC3I) is recommended in reference (a), I am convinced that adequate oversight can be achieved by simply having the Oceanographer of the Navy (CNO (N096)) and the Air Force Director of Weather (XOW) personally brief ASDC3I in annual presentations, focusing on our overall investments, partnerships, and progress. Any additional, more comprehensive layer of oversight runs contrary to efforts by the Deputy Secretary of Defense to devolve Office of the Secretary of Defense and Defense Agency functions to the Services rather than to accrue them.

2. I believe the existing Navy/Air Force (NAVAF) Cooperation process within the DoD Weather Program can serve as the foundation for oversight.

3. Specific comments regarding reference (a) are included in enclosure (1). If you have questions, please contact me at (202) 762-1020 or my action officer CDR Steve Warren at (202) 762-0261.


R. D. WEST
Oceanographer of the Navy

Subj: SUBSTANTIVE REVIEW OF THE DRAFT AUDIT REPORT ON MANAGEMENT
AND OVERSIGHT OF THE DEPARTMENT OF DEFENSE WEATHER PROGRAM
(PROJECT D2000LG-0102)

Copy to:
NAVIG
COMNAVMETOCCOM

CNO (N096) Recommended Changes and Comments Regarding Draft Audit Report (Project No. D2000LG-0102)

1. The following comments are provided regarding recommendations on pages 13 and 14 of the draft audit report:

Pages 15-19

a. Recommendation 1: We concur, as amplified below, that a form of oversight by ASDC3I may be beneficial.

Comments: While some form of oversight may be beneficial, we do not recommend introducing another layer of active oversight. We believe a simple annual reporting to ASDC3I can provide a healthy third party review of both how Service weather programs are working together and how well they are being tailored for interoperability with DoD C3I systems. As stated in the cover letter, we believe the existing NAVAF mechanism can be developed to support this need.

In 1992, CNO (N096) and XOW signed a Memorandum of Agreement to evaluate potential areas of cooperation between the Navy and Air Force for meteorological operations. The NAVAF organization consists of an executive committee, a steering committee and working groups. Enhancement at the Executive Committee level, composed of the Flag Officers, Senior Executive Service members and Deputies from XOW and CNO (N096), can create this oversight mechanism. The efforts of these groups will result in periodic reports addressing progress made with the key issues raised by the DoDIG. In turn, the steering group and a working group can focus on acquisition issues of concern.

b. Recommendation 2: In general, we do not concur with the perceived theme of this recommendation for the Oceanographer of the Navy and Air Force Director of Weather to evaluate, validate and fund requirements.

Comments: Mechanisms governing this process are already in place in the form of the Requirements Generation System (Chairman Joint Chiefs of Staff Instruction 3170.01A) and associated guidance. This process facilitates joint potential and development of requirements through the validation process and additionally sets requirements for the analysis of alternatives in determining solutions to stated requirements. This requirements system is the governing mechanism to utilize in evaluating and validating requirements for supporting the DoD Weather Program. In support of our comments to Recommendation 1, however, a review of significant requirements could be highlighted as part of the annual report to ASDC3I.

Enclosure (1)

(1) Recommendation 2a: We concur, with comments, to this recommendation.

Comments: We concur with the need to evaluate the requirements for high-resolution, all-weather sea ice and snow data. Without U.S. government preferential access to RADARSAT-2 or other satellite-based Synthetic Aperture Radar (SAR) source, the ability to satisfy our requirements for this type of data is severely limited. We will continue to work with the Air Force, the NPOESS program office, and other agencies in developing strategies to meet our requirements.

(2) Recommendation 2b: We do not concur with this recommendation.

Comments: This recommendation to modify current requirements to make either the SSM/I or SSMIS a primary sensor, could cause launch phasing sequence perturbations that could ultimately cause gaps in Meteorology and Oceanography (METOC) satellite coverage. We believe this issue has been adequately addressed within the NPOESS program where the Conical-scan Microwave Imager Sounder (CMIS) is being designed to fulfill a Key Performance Parameter, thereby making it a primary sensor. The development, review and tracking of satellite requirements of this type are closely coordinated by the Air Force and Navy communities, especially during the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Integrated Operational Requirements Document (IORD) review, which is currently underway.

(3) Recommendation 2c: We concur, with comments, to this recommendation.

Comments: Although a need exists for interoperability between Navy and Air Force weather communications, CNO (N096) will continue to maximize acquisition of communications capabilities through established DoD routes and guidance (e.g. Defense Information Systems Agency). Use of this standard process, will help ensure acquired communications capabilities are interoperable with joint communications and systems upon delivery.

2. The following additional comments are provided to address points within the report:

a. Reference: Page 10, Paragraph 1 (Weather Satellite Support), Sentence B

Comment: Change the last sentence to read "The National Ice Center, in Suitland, Maryland was able to obtain the high-resolution sea ice data via an International Memorandum of Agreement (IMOU) between the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), and the Canadian Space Agency."

Rationale: The recommended change reflects the arrangement used to obtain the sea ice data. The Special Sensor Microwave Imager (SSM/I) did not meet the National Ice Center requirements and the promise of the capability of active microwave led NASA and NOAA to work with the Canadian Space Agency for the launch of Radar Satellite-1 (RADARSAT-1). NASA, NOAA and the Canadian Space Agency signed an IMOU. NASA agreed to launch RADARSAT-1. In return for this launch, the United States government received a percentage of the data from each orbit. The National Ice Center receives the high-resolution sea ice data under this IMOU. The National Ice Center does not have any agreements with the Canadian Space Agency.

b. Reference: Page 10, Paragraph 2, Sentences 1 and 2

Comment: Change sentences to read "The National Ice Center receives SAR data from a Canadian government satellite under the IMOU between NASA, NOAA, and the Canadian Space Agency. The Navy pays \$240,000 per year in processing fees directly to supporting ground stations. The RADARSAT-1 is equipped with a powerful microwave instrument"

Rationale: The additional text defines the relationship for receipt of high-resolution sea ice data by the National Ice Center from RADARSAT-1.

c. Reference: Page 10, Paragraph 3, Sentences 4 through 6

Comment: Change sentences to read "The RADARSAT-2 program is intended to be a commercial program. Due to a number of factors, NASA will not be providing the launch for this satellite. The Canadian Space Agency has contracted a U.S. commercial company to launch this satellite. No agreement is expected to provide the U.S. government preferential access to RADARSAT-2 data. At current use rates commercial rates for RADARSAT-2 data could increase from \$500,000 to approximately \$16 million annually."

Page 11

Revised

Page 11

Pages 11-12

Revised

Pages 12-13

Rationale: The recommended changes define the status and intentions for RADARSAT-2.

d. Reference: Page 11, Paragraphs 1 through 3 (Satellite Requirement Coordination)

Comment/Rationale: The Navy and Air Force have maintained a strong cooperative relationship through the Integrated Program Office (IPO), a joint office of DoD, NOAA, and NASA for the National Polar-orbiting Operational Environmental Satellite (NPOESS). Funding levels and guidance have been the limiting factors. Budgets and scope of the NPOESS program have been overseen by the Office of the Secretary of Defense (OSD). An OSD reassessment of the program could provide an opportunity to effectively address "Objective" versus just "Threshold" capabilities, enabling better definitions of winds, stratification, and other features that affect targeting, weapon and sensor range and platform detectability. However, offsets within existing programs are not palatable.

The CNO (N096) and XOW are members of the NPOESS Senior Users Advisory Group (SUAG). CNO (N096) is currently chairman of this group reviewing requirements and recommending solutions to the DJCS-level council. The CNO (N096) and XOW staffs also represent DoD interests on the Joint Agency Review Group (JARG), along with representatives from their respective subordinate commands, which proposes the requirements for the IORD.

The Air Force and Navy also utilize additional meetings to have constructive dialogues about METOC user field terminals, high-mobility unit data access (including naval afloat METOC data access) and other issues that come up in the main requirements forums.

e. Reference: Page 17, Paragraph 3 (Adequacy of Management Controls)

Comment/Rationale: Rather than creating an additional layer of oversight, the identified material management control weaknesses can be addressed via the existing NAVAF Cooperation mechanism as discussed in our comments to Recommendation 1 in paragraph 1.2. above.

Page 22

Department of the Air Force Comments



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE
WASHINGTON DC

20 OCT 2000

MEMORANDUM FOR ASSISTANT INSPECTOR GENERAL FOR AUDITING
OFFICE OF THE INSPECTOR GENERAL
DEPARTMENT OF DEFENSE

FROM: HQ USAF/XO
1630 Air Force Pentagon
Washington, DC 20330-1630

SUBJECT: Audit Report on the Management and Oversight of the DoD Weather
Program (Project No D2000LG-0102)

This is in reply to your memorandum requesting Air Force comments on subject report. Our specific comments on recommendations, the Management Control Program Review, and general comments on the report are attached. We note with interest that in portions of the report the DoD IG has a detailed and thorough understanding of US Navy requirements and seeks to require Air Force solutions to these requirements that have already been addressed in the DoD acquisition process. We stand ready to help make future reports in this audit exhibit a more balanced approach.

DoD IG Recommendation 1 proposes ASD(C3I) oversight and management of the DoD weather program, the development of weather policy and guidance by ASD(C3I), the creation of a DoD weather architecture, and ASD(C3I) management of the acquisition process for weather systems. The recommendation to create a separate weather architecture could create a stovepipe that runs the risk of not being interoperable with other Command, Control, Communications, Computing, Intelligence, Surveillance, and Reconnaissance (C4ISR) components or DoD functions. OSD oversight of meteorology, oceanography, and space weather runs contrary to the 1997 Defense Reform Initiative to push operational management tasks to the lowest appropriate level. We fundamentally disagree with the underlying assumption that existing guidance and established roles and responsibilities are insufficient to provide effective and efficient meteorological and oceanographic services to DoD and other users. We propose using existing processes to continue cooperation between the Services, to find joint solutions to common problems, and to improve the efficiency, effectiveness, and interoperability of environmental support provided to DoD.

DoD IG Recommendation 2 calls for evaluation of the requirement for sea ice and snow data through clouds, validating and funding a sensor on Defense Meteorological Satellite Program (DMSP) and future weather satellites, and evaluating Air Force high-speed, two-way weather communications to ensure interoperability with Navy ops afloat. This recommendation appears to bypass the DoD requirements definition and capability acquisition process. In effect, it is resurrecting a set of ice and snow requirements that

have been repeatedly reviewed through Service and Joint processes and have repeatedly been deferred due to funding constraints and technological incompatibility issues. We believe other data sources are available by leveraging national and international capabilities. We will gladly participate in another effort to apply existing satellite-tracking technology to provide ships with the capability to obtain and use fine-scale Air Force meteorological products via satellite.

Beyond the specific recommendations of this draft report, the report did not recognize Air Force efforts to leverage commercial and academic capabilities to provide fine-scale, timely, accurate, and relevant weather products to DoD customers. By applying an established, open community, fine-scale forecasting model to meet customer needs, the Air Force avoided significant costs and is well positioned to take advantage of continuing scientific and computational advances.

Air Force does not agree with the audit report assertion that a material management control weakness exists within DoD and that a cognizant DoD weather organization is necessary. Creation of a DoD organization to manage Acquisition Category III programs runs contrary to the 1997 Defense Reform Initiative which sought to relieve the OSD staff of responsibility for operational and program management functions and from the day-to-day management of subordinate activities. The Air Force has established management controls and assessable units for these operational and program management functions.

Questions may be directed to my action officer for this report, Lt Col Charlie Kennedy, AF/XOW, (703) 696-4936, or email: charles.kennedy@pentagon.af.mil.


 ROBERT H. FOGLESONG, Lt Gen, USAF
 Deputy Chief of Staff
 Air and Space Operations

Attachments:

1. Comments on Recommendations
2. Comments on Management Control
3. Comments on Draft Audit Report

cc:

SAF/FM	SAF/LLR
SAF/PA	SAF/AG
SAF/IGI	SAF/SX
AFMC/FMPM	AFSPC/FM
ACC/FMFP	OPNAV 096

**Specific Comments on Recommendations
DoD IG Draft Report
on Management and Oversight of the
DoD Weather Program
(Project No. D2000LG-0102)**

DoD IG Recommendation 1.a. We recommend the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence develop a DoD weather architecture using the DoD Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance Architecture Framework methodology.

Revised

COMMENT: Non-concur.

RATIONALE: This recommendation runs counter to the 1997 Defense Reform Initiative (DRI) to relieve the OSD staff of responsibility for operational and program management functions and from day-to-day management of subordinate activities. Additionally, CJCSI 3810.01A details responsibilities of the Chairman of the JCS, Joint Force Commanders, and the Services on common communications, data standards, and interoperability of meteorology, oceanography, and space weather (METOC) services and support. Extensive architectural guidance already exists in the Joint Technical Architecture (reference DoD Joint Technical Architecture, Version 4.0 Draft 1, 14 April 2000, C4ISR Domain Annex, paragraph C4ISR 1.3 Domain Description) and the Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) Architecture Framework. Given these responsibilities, we recommend that the Joint Staff oversee a Service-level group chartered to bring together all of the Services and Joint stakeholders to collectively define enduring pathways for development. This avoids duplicating these responsibilities within OSD and follows DRI guidance. This development must follow the existing DoD overarching architectural guidance to avoid creation of a METOC "stovepipe" that could distance METOC support from the warfighter user.

DoD IG Recommendation 1.b. We recommend the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence propose changes to DoD Directive 5137.1 to include meteorology and oceanography as part of the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence responsibilities.

COMMENT: Non-concur.

RATIONALE: The Joint Staff already performs this function and this recommendation runs counter to the 1997 Defense Reform Initiative.

CJCSI 3810.01A, Meteorological and Oceanographic Operations, 25 Feb 98, establishes policy and assigns responsibilities for conducting meteorological and oceanographic (METOC) operations at unified commands and other joint activities. The instruction applies to the Services, unified commands, Joint Staff, and other joint activities. Enclosure B of the instruction, Responsibilities for Meteorological and Oceanographic Operations, states that the Chairman of the Joint Chiefs of Staff (CJCS) defines common communications and data standards for the transmission and receipt of

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METOC information between the Services to ensure interoperability. The CJCS also coordinates with the Services, USSOCOM, and US Governmental agencies to fulfill shortfalls in METOC capabilities and to meet requirements of the supported and supporting CINCs. Additionally, the CJCS, where appropriate, reviews operation plans to ensure adequacy, coordination, and interoperability of METOC resources and activities.

CJCSI 3810.01A also states that CINCs ensure that interoperable communications requirements for METOC information flow are clearly stated in an operations order or other appropriate theater document and that interoperable resources are employed to support the transmission and receipt of METOC information and tactical decision aids. Joint Force Commanders ensure all supporting METOC force elements are capable of exchanging information directly and freely with each other in a timely manner to ensure consistency and accuracy of information across the operational spectrum.

CJCSI 3810.01A also lists responsibilities of the Services and Service Components. Service Components coordinate and, as directed by Service agreements or regulations, participate in the funding and procurement of METOC equipment for the collection, processing, receipt, storage, and transmission of METOC data. The Services provide, operate, and maintain the METOC assets, tactical equipment, and capabilities organic to their own organizations. Where feasible, the Services assist other Services in accomplishing METOC functions, to include coordination of research and development efforts to avoid duplication and to ensure commonality in the development of METOC capabilities.

Furthermore, creating a separate "weather program office" within ASD(C3I) would be creating a separate DoD office to manage an ACAT III program. Creation of a separate office to manage an ACAT III program would be an unnecessary increase in management overhead and runs counter to the 1997 Defense Reform Initiative guidance to relieve the OSD staff of responsibility for operational and program management functions and from day-to-day management of subordinate activities. Current DoD processes of Requirements Generation (CJCS MOP 77), Acquisition Management (DoD Directive 5000.1 and DoD 5000.2-R), and Planning, Programming, and Budgeting (DoD Directive 7045.14) are adequate to fund and control each Military Department's contribution to the total DoD weather program.

DoD IG Recommendation 1.c. We recommend the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence serve as the DoD proponent and advocate for integrating the DoD weather program to include meteorology, oceanography, and space weather.

COMMENT: Concur, with comment.

RATIONALE: We agree that ASD(C3I) should be a proponent and advocate for integrating the DoD weather program. However, the CJCS, CINCs, Joint Force Commanders and Services should retain their oversight and management functions.

DoD IG Recommendation 1.d.(1). We recommend the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence develop policy and guidance that addresses

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Revised and
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as Recommendation
1.d.

the integration of meteorological, oceanographic, and space weather programs within DoD to meet interoperability requirements effectively and efficiently.

COMMENT: Concur, with comment.

RATIONALE: This is consistent with the 1997 Defense Reform Initiative intent that OSD provides policy and guidance to the Department components. However, operational, program management, and day-to-day management of the meteorological, oceanographic, and space weather programs should remain with the CJCS, CINCS, Joint Force Commanders, Services, and Service Components. Services should continue their coordinating activities and participation in Office of Federal Coordinator for Meteorological Services and Supporting Research activities. DoD guidance is necessary to focus cooperation but existing guidance and processes should not be duplicated. Additionally, the well-established DoD processes of Requirements Generation, Acquisition Management, and Planning, Programming, and Budgeting are adequate to fund and control each Military Department's contribution to the total DoD weather program.

DoDD 4630.5 Paragraph 5.3 states the CJCS shall, IAW DoDD 5000.1 and DoD 5000.2-R, establish procedures for the development, coordination, review, and validation of compatibility, interoperability, and integration requirements for C3I systems.

DoD IG Recommendation 1.d.(2). We recommend the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence develop policy and guidance that identifies, coordinates, and validates meteorological, oceanographic, and space weather service and support requirements among the Military Departments.

COMMENT: Non-concur. Policy and guidance already exist that govern the Requirements Generation, Acquisition Management, and Planning, Programming, and Budgeting processes the Military Departments must follow.

RATIONALE: DoDD 5000.1, Defense Acquisition, 15 Mar 96, states the policies and principles for all DoD acquisition programs and identifies the Department's key acquisition officials and forums. This Directive and DoD 5000.2-R provide mandatory policies and procedures except when statutory requirements override them (Federal Acquisition Regulations and Defense Federal Acquisition Regulation Supplements also apply). This directive merges the Requirements Generation System, the Acquisition Management System, and the Planning, Programming, and Budgeting System (PPBS). DoDD 5000.1 and DoD 5000.2-R establish ACAT levels and either the USD(A&T) as Acquisition Executive or Component Acquisition Executive depending upon the type of program (Acquisition Category, or ACAT, level). The Joint Requirements Oversight Council (for programs such as the Defense Meteorological Satellite Program [DMSP] or the National Polar-orbiting Operational Environmental Satellite System [NPOESS]) is chaired by the VCJCS and conducts requirements analysis, validates mission needs and key performance parameters, and develops recommended joint priorities for those needs IAW Title 10 U.S.C. The JROC validates the C4I certification of mission needs and operational requirements documents for conformance with Joint C4 policy and doctrine, architectural integrity, and interoperability standards. For lower level programs (ACAT III), the same types of functions are performed at the Service level. DoD 5000.2-R states "This regulation shall not be supplemented by any DoD Component. Department officials shall keep the issuance of any directives, Regulations, policy memoranda, or regulations necessary to

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implement the mandatory procedures contained herein to a minimum." Also, DoD 5000.2-R states "ACAT III programs are defined as those acquisition programs that do not meet the criteria for an ACAT I, and ACAT IA, or and ACAT II. The Milestone Decision Authority (MDA) is designated by the Component Acquisition Executive (CAE) and shall be at the lowest appropriate level." DoDD 4630.5 paragraph 5.1 says the heads of the DoD components shall ensure that the provisions of Section 4 (Policy) are followed during the requirements validation process, acquisition, deployment, and operation of systems and forces.

DoD IG Recommendation 2.a. We recommend the Oceanographer of the Navy and Air Force Director of Weather evaluate the Navy requirement to obtain sea ice and snow data through cloud-covered areas and in adverse weather conditions and develop alternative solutions to meet the requirement.

COMMENT: Concur, with comment.

RATIONALE: Evaluating requirements is within the purview of each Military Department using the established DoD requirements generation process. The Air Force Director of Weather accepts the Navy's requirements at face value, evaluating them only in terms of identifying potential solutions. However, the Air Force, Navy, and other DoD users should develop environmental satellite requirements and then use the well-documented acquisition process, following DoDD 5000.1, DoD 5000.2-R, and documented agreements to develop and fund solutions. We suggest the recommendation be changed to read "We recommend the Oceanographer of the Navy and the Air Force Director of Weather evaluate the Navy requirement to obtain sea ice and snow data through cloud-covered areas and in adverse weather conditions and seek alternative solutions to meet the requirement." We also recommend that the Navy update their requirements for sea ice and snow data through the NPOESS Integrated Operational Requirements Document (IORD) IA and the approved Joint Agency Requirements Group (JARG) and Joint Agency Requirements Council (JARC).

The Navy and Air Force have a solid history of satellite meteorology and oceanography (METOC) program cooperation with the DMSP and have made phenomenal strides to improve that relationship even further within the construct of the convergence of DMSP and NOAA's Polar-orbiting Operational Environmental Satellite (POES) programs. The converged program, known as NPOESS, is managed through the Integrated Program Office (IPO), a joint office of DoD, NOAA, and NASA. This joint office includes Navy, Air Force, and Army METOC user liaisons among its community cadre.

The Navy and Air Force coordinate extensively on development of the IORD that is at the core of NPOESS METOC user requirements. Through reviews, discussions, and other forums, the Navy and Air Force, along with other users, define the requirements for the converged system.

The Oceanographer of the Navy (N096) and the Air Force Director of Weather (XOW) are members of the NPOESS Senior Users Advisory Group (SUAG). The Oceanographer of the Navy is currently chairman of this group that reviews service needs and advises the System Program Director on user needs. The N096 and XOW staffs, along with representatives from their respective subordinate commands, also represent DoD interests on the JARG, which proposes the requirements for the IORD. Because of this multi-level involvement in the requirements and definition process, issues such as Navy requirements to obtain sea ice and snow data through cloud-covered areas and in

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adverse weather conditions are currently being evaluated as part of the IORD update. These issues are addressed and placed into the IORD, and depending on funding level, technical capability, and priority, will either be placed in the active portion of the IORD or retained in the Pre-Planned Product Improvement (P3I) section of the document. Alternate solutions will be part of the developer's trade space evaluation process.

These efforts to pull together all unique community requirements, utilize common instruments and common platforms, and define them precisely for contractor trade space, has forged strong, constructive relationships within the METOC community, both within and outside of DoD. The Air Force, as executive agent for military weather satellite user requirements, coordinates extensively every step along the way with all users. Army requirements (e.g., soil moisture, freshwater currents, etc.), Navy requirements (e.g., sea ice concentration and extent, sea surface wind speed and direction, etc.), and other user requirements are addressed, in accordance with budget priorities, as needed to ensure space assets are providing the correct data in time for effective use.

The Air Force and Navy also use constructive dialogues about METOC user field terminals, high-mobility unit data access (including naval afloat METOC data access) and other issues arising in the main requirements forums. Throughout these processes, all groups continue to work together diligently to define current/future requirements in order to effectively support DoD warfighting capabilities.

DoD IG Recommendation 2.b. We recommend the Oceanographer of the Navy and Air Force Director of Weather validate and fund the need for the special sensor microwave imager to be a primary sensor on current and future weather satellites.

COMMENT: Non-Concur.

RATIONALE: It is not within the purview of the Air Force Director of Weather to validate Navy requirements nor to fund for space-based weather sensing systems. Per DoDD 5000.1, Defense Acquisition, 15 Mar 99, paragraph 5.2.3, and IAW Title 10 U.S.C., "The Joint Requirements Oversight Council (JROC), chaired by the VCJCS, conducts requirements analyses, validates mission needs and key performance parameters, and develops recommended joint priorities for those needs."

The DMSP is an ACAT IC program in acquisition Phase III (Production, Fielding/Deployment, and Operational Support. Note: production of DMSP is complete) and the Special Sensor Microwave/Imager (SSM/I) is unique to the DMSP. The NPOESS is a Presidentially-directed convergence of the Department of Commerce (DoC) National Oceanic and Atmospheric Administration's POES program and DMSP. In addition, NASA will offer new remote sensing and spacecraft technologies to the NPOESS program. NPOESS will begin to replace DMSP in 2008. The NPOESS Memorandum of Agreement (MOA) between DoC, DoD, and NASA, signed by the heads of the respective agencies, establishes OMB Circular A-109, DoDD 5000.1, and DoD 5000.2-R as the basis of the NPOESS acquisition process and the DoD component acquisition executive will be the NPOESS Source Selection Authority.

We believe the Navy requirement is not for the SSM/I to be a primary sensor, rather it is for the required measure of performance (accuracy, refresh rate, etc.). Making a decision to establish SSM/I

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as a primary sensor (the failure of which precipitates a launch) for DMSP without a review by the JROC bypasses and ignores the acquisition process and presupposes the results of the JROC, makes the a priori assumption that the only solution to the requirement is two active SSM/I sensors on DMSP satellites, locks in the SSM/I solution, and puts the primary mission of DMSP at risk. DoD 5000.2-R Mandatory Procedures for MDAPs and MAIS Acquisition Programs, 11 May 99, Paragraph 2.3 states "avoid early commitments to system-specific solutions, including those that inhibit future insertion of new technology and commercial or non-developmental technology."

In 1976, Assistant Secretaries of the Army, Navy, and Air Force entered into an MOA acknowledging that requirements for special strategic mission data shall receive first priority when satellite support is allocated or when replenishment launches are scheduled. The current schedule is mission driven and changing to a more sensor-based priority could prematurely exhaust the remaining inventory of DMSP spacecraft as we transition to the NPOESS schedule. However, the 1976 MOA between the Services also allows any Service to fund the procurement and launch of additional satellites subject to the requirement that such procurement or launch must not impact the required collection of special strategic mission data. All DMSP satellites expected to keep the system operational to satisfy the special strategic mission through 2008 have been purchased. In the past, satellites which could not support the special strategic mission, but had functional SSM/I sensors, were kept active to support the Navy's requirement.

NPOESS is in Phase I of the acquisition process. Establishing the requirements that are driving the Navy's need for SSM/I in DMSP as key performance parameters in NPOESS should be proposed by the Navy through the JARG and JARC, in accordance with the well-documented DoD acquisition process through the JROC and existing agreements on NPOESS.

We suggest the following alternative recommendation: "We recommend the Oceanographer of the Navy and the Air Force Director of Weather identify and resolve program issues, determine program status, and seek solutions to user needs for information from current and future environmental satellites in accordance with DoD Directives, Component directives, and existing Memoranda of Agreements."

DoD IG Recommendation 2.c. We recommend the Oceanographer of the Navy and Air Force Director of Weather evaluate Air Force high-speed, two-way weather communications systems to ensure interoperability with Navy operations afloat.

COMMENT: Concur, with comment.

RATIONALE: As the DoD IG report points out, the Navy already conducted a test of a system similar to the Very Small Aperture Terminal (VSAT) system on Navy ships. It was no surprise that a system designed for fixed sites needs a tracking capability to enable reliable communications. Clearly, the Navy has developed the technical solution for tracking satellites—this is well documented. If the Navy chooses to equip its ships with such a system, the Air Force will assist the Commander, Naval Meteorology and Oceanography Command, to integrate tracking systems with the Air Force VSAT capability. Additionally, the Air Force procured for the Navy the Meteorological Assistant (METASSI) satellite system and the NATO Automated Meteorological Information System (NAMIS) satellite system in the European theater to facilitate joint as well as NATO METOC communications. This was not documented in the audit report. Four NAMIS

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systems are in use by the Navy today at shore-based activities and the Air Force is helping the Navy acquire another NAMIS system.

As a normal part of doing business, the Navy and Air Force Weather evaluate methods of providing Navy operations afloat access to high-speed communication links. However, according to OPNAV Instruction 2370.3A, Environmental Telecommunications Support, 30 Oct 87, paragraph 4.b states "The Commander, Naval Telecommunications Command (COMNAVTELCOM), is responsible for providing the necessary telecommunications systems to carry out COMNAVOCEANCOM missions." Furthermore, in paragraph 4.b.(1).c., Commander, Naval Meteorology and Oceanography Command, will "acquire and operate, for the Navy, communications equipment and circuits necessary to deliver available environmental data to, and receive required data from, the AWN." OPNAV Instruction 2800.3, Navy Data Communications Program, 6 Oct 88, is the governing Navy instruction with regard to data communications requirements of decision and mission support information systems. It implements the Navy Data Communications Control Architecture (NDCCA). The NDCCA describes the architecture and summarizes the architectural segments needed as a baseline for enhancing the transfer of decision and mission support data between afloat and shore-based information systems and information system users.

The Air Force supports the evaluation of its high-speed, two-way weather communications systems. If the Navy chooses to use the system, we recommend the Navy procure the necessary commercial and government off-the-shelf hardware and software for their fixed sites and ships and any additional ground and satellite segments to support operations at sea or for any other Service-unique operational area.

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**Specific Comments on Management Control
DoD IG Draft Report
on Management and Oversight of the
DoD Weather Program
(Project No. D2000LG-0102)**

The Air Force does not agree with the assertion that a Material Management Control Weakness exists within DoD. The draft report exhibits faulty reasoning to claim that DoD requires a cognizant organization within DoD for management and oversight of meteorology, oceanography, and space weather support requirements. According to the DoD IG, this is driven by the lack of identified meteorology, oceanography, and space weather support assessable units within DoD. The 1997 Defense Reform Initiative states the Office of the Secretary of Defense (OSD) should focus on corporate-level tasks and operational management tasks should be pushed to the lowest appropriate level. The report further states that OSD staff should be relieved of responsibility for program management functions and from day-to-day management of subordinate activities. Because the DoD meteorology, oceanography, and space weather (METOC) program constitutes an ACAT III program (with the exception of DMSP/NPOESS) and because requirements generation is part of the program management function, it would be inappropriate for OSD to assume management control. Control should remain at the Service level.

Based on Air Force Weather Agency (AFWA) discussions with the DoD IG concerning management controls, the Air Force forwarded the final version of AFWA 65-2, "Management Controls," to the DoD IG. Specifically, the four assessable units identified in this directive are Comptroller function, Strategic Center function, Acquisition function, and System Sustainment function. By definition, the Acquisition function is responsible for two aspects: (1) user representative during the entire acquisition of AFMC-managed acquisition programs and (2) total responsibility for command supported initiatives. As user representative, AFWA represents all operating commands during the entire lifecycle of the Air Force Weather Weapon System and its segments. During Phase 0 of the lifecycle, AFWA is responsible for requirements generation and transfers them to AFMC at Milestone I. Command supported initiatives include those activities within the strategic center that involve the entire aspect of acquisition. This amounts to a little over \$20M of activity. This assessable unit is involved with the entire spectrum of weather system requirements for all warfighter applications. Further, the AFWA Strategic Center is involved in weather production and weather requirements for the global warfighter. As defined by AFWA Mission Directive 5201, the AFWA Strategic Center function provides mission-tailored weather products 24-hours per day to meet the requirements of the National Command Authorities, DoD, unified commands, combat forces of the Air Force and Army, and National Programs controlled by the Secretary of the Air Force, and implements modeling and simulation programs in support of DoD objectives. Clearly these assessable units do cover meteorology and space weather support.

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**Specific Comments on Draft Audit Report
DoD IG Draft Report
On Management and Oversight of the
DoD Weather Program
(Project No. D2000LG-0102)**

Project Title

- Change to "Management and Oversight of the DoD Meteorology, Oceanography, and Space Weather Program." Rationale: Accuracy. The DoD Dictionary defines "meteorological" and "oceanographic" as terms

"...used to convey all meteorological (weather) and oceanographic (physical oceanography) factors as provided by Service components. These factors include the whole range of atmospheric and oceanographic phenomena from the sub-bottom of the earth's oceans up to the space environment (space weather). Also called METOC."

We are concerned that the Audit Report will cause confusion by defining this full range of environmental events (weather, physical oceanography, and space weather) as "weather." Recommend defining and using the term METOC throughout the document to follow JCS and DoD definitions. (References: JCS Pub 3-59, and DoD Dictionary at <http://www.dtic.mil/doctrine/jel/doddict/data/m/03932.html>)

Executive Summary

Introduction (page i)

- Last line in section: Contact the Office of the Federal Coordinator for Meteorology (OFCM) to confirm (Mr. Blaine Tsugawa, 301-427-2002) and change "\$664.4M" to "\$475.7." Rationale: Accuracy. The FY2000 DoD METOC budget is approximately \$475.7 million rather than the \$664.4 million quoted. The \$664.4 million figure was the requested FY2000 budget, published by OFCM in June 1999 before the actual FY2000 funding level was established.

Background (page i)

- Paragraph 1, line 1: Change "Weather refers to the entire range of environmental events extending from the bottom of the ocean to space. The three components of the DoD weather program are meteorology, oceanography, and space weather." to "The DoD meteorology and oceanography program includes observing, analyzing, forecasting, tailoring, and disseminating products and services for the whole range of atmospheric and oceanographic phenomena from the sub-bottom of the earth's oceans up to the space environment (space weather). It is also collectively referred to as the METOC program." Rationale: Accuracy. Weather does not exist below the ocean surface. This definition matches the DoD and JCS definition.

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Results (page ii)

- **Comment:** We disagree with the assessment that the Military Departments did not adequately coordinate satellite and communication requirements to ensure all user requirements were met. Requirements were developed, coordinated, and assessed in accordance with DoD 5000-series directives and agreements between the Services. Fiscal constraints meant that not all user requirements could be met. All key performance parameters have been met for existing systems and have been, and are continuing to be, addressed in future systems.

Summary of Recommendations (page ii)

- **Comment:** Detailed information is provided in subsequent sections of this attachment.

Main Body of Audit Report

Background

- Page 1, paragraph 1, line 1: See above for recommendation on definition of "weather."
- Page 1, footnote 1: Delete. Rationale: See above recommendation on "weather" and "METOC."
- Page 1, paragraph 1, line 3: Change "Meteorology is the study of atmospheric events and of the atmosphere of the Earth's oceans and surface, to include weather forecasting." to read "Meteorology is the study of atmospheric events and of the atmosphere over the Earth's oceans and land surface, to include weather forecasting." Rationale: Accuracy. Clarifies that the atmosphere is above the Earth's ocean and land surfaces.
- Page 1, paragraph 1, last line: Change "\$664.4 million" to "\$475.7 million". Rationale: Accuracy. Reflects the actual FY2000 DoD METOC budget.
- Page 1, footnote 2: Delete the footnote or clarify in the text that the \$664.4 million figure was the requested FY2000 DoD METOC budget. Rationale: Accuracy. See above.
- Page 3, paragraph 1, line 4: Change "The Navy and Air Force are the primary providers of meteorological, oceanographic, and space weather information to DoD, national programs, other governmental agencies, and international partners." to "The Navy and Air Force are the primary providers of meteorological, oceanographic, and space weather information to DoD and national programs. They are also additional providers and collaborators with other governmental agencies and international partners." Rationale: Accuracy. The Navy and Air Force are not the primary providers for "other governmental agencies and international partners" who use the National Weather Service, their own national METOC services, or commercial providers.
- Page 4, "Air Force" paragraph, line 11: Change "The DMSP constellation of satellites is a group of DoD-owned operational weather satellites that provides the primary source of meteorological, oceanographic, and space weather data to DoD

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users worldwide." to "The DMSP constellation of satellites is a group of DoD-owned operational weather satellites that provides a primary source of meteorological, oceanographic, and space weather data to DoD users worldwide." Rationale: Accuracy. DMSP is one of many significant sources of METOC data—other sources include geostationary environmental satellites, collaborations with science satellites, other nations' satellites, and an extensive, worldwide network of surface, upper air, and solar observing sites.

Revised

- Page 4, "Air Force" paragraph, line 14: Change "DMSP satellite sensors collect, store, and communicate data used to develop various meteorological, oceanographic, and space weather products to ground stations." to read "DMSP satellites collect, store, and communicate to ground stations data used to develop various meteorological, oceanographic, and space weather products." Rationale: Accuracy. The sensors do not store and communicate data but rather the entire satellite system.

Weather Services and Support

Revised

- Page 5, paragraph 1, bullet 1: Comment. We disagree that interoperability and mission requirements have not been met effectively. The interoperability argument is centered on one system and the inability of Navy ships to receive a direct broadcast from it. However, the data sent over this system are available through existing communications systems to the Navy afloat. The data, not the communications system, are the crux of interoperability. Therefore this argument is unsupported. Also, no evidence of a failure to meet mission requirements has been documented in this report.
- Page 5, paragraph 1, bullet 2: Comment. We disagree that there is a lack of policy and guidance for identifying, developing, documenting, and coordinating METOC services and support. Current DoD 5000-series directives and CJCS instructions provide adequate guidance on these processes as well as interoperability.
- Page 5, paragraph 2: Comment. We disagree. The satellite requirements in question have been vetted through both Service and DoD requirements and acquisition processes and deferred due to cost. DMSP management and funding responsibilities were clearly delineated and agreed to in the 1976 *Memorandum of Agreement on the Joint Service Management and Operation of the Defense Meteorological Satellite Program (DMSP)*. The communication requirement in question is an unsupported argument as described above.

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DoD Weather Architecture

- Page 5, "DoD Architecture Framework" paragraph, line 3: Change "Information Technology Management Reform Act of 1995" to "Information Technology Management Reform Act of 1996". Rationale: Accuracy. Corrects date to match Library of Congress records (source: Thomas Web Site).

Revised,
Page 6

Weather Program Management and Oversight

- Page 7, paragraph 2, line 1: Change "The Navy-Air Force agreement identifies 19 initiatives" to "The Navy-Air Force agreement identifies 16 initiatives". Rationale: Accuracy. Although 19 areas were proposed, the NAVAF agreement accepted 16

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initiatives for action. Because the Services were working on 16 initiatives vice 19, it is misleading to say only 5 of 19 were completed.

Page 8

DoD Policy and Guidance

- Page 7, last sentence in section: Comment. We disagree. No evidence has been presented that mission requirements have not been met effectively. We question the need for additional bureaucracy to manage a METOC program comprising 0.17% of the FY2000 defense budget. In addition, with the DMSP transition to an ACAT 1C program, it reverts to Service responsibility for management vice OSD management. We have seen no evidence to suggest that a reversal of this acquisition program decision is appropriate.

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Management and Oversight of DoD Space Program

- Page 7, 2nd sentence in section: Comment. This sentence is correct as written, assuming the report is referring to the entire National Security Space Architecture, of which space weather is only one component. However, based on the content of footnote 8 referring to agencies who participated in development of the space weather architecture, it appears the report is referring to the space weather architecture component itself. If this is the case, change this sentence to read "The National Security Space Architect (NSSA), under the guidance of ASD/C3I, the Joint Staff J-8, and the Deputy Director of Central Intelligence for Community Management, developed a space weather architecture which was approved in 1999." Rationale: Accuracy. The NSSA developed the architecture with interagency assistance and the National Security Space Senior Steering Group (ASD/C3I, J-8, and DDCI/CM) approved it in 1999.

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- Page 7, last sentence in section: Delete. Rationale: There is no requirement to coordinate the space weather architecture through the DoD Architecture Coordination Council (ACC). The joint memorandum (JSD(A&T), ASD/C3I, and J-6) forming this council appears only in the "Discretionary Documents" portion of the DoD library of directives in the Defense Acquisition Deskbook. Based on our conversations with OSD, the only guidance for the ACC is the joint memo and the ACC has not internally determined their role with respect to the NSSA and its architectures.

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- Page 7, footnote 8: Change entire footnote to read "The National Security Space Architect developed its space weather architecture with interagency assistance from many agencies including the National Oceanic and Atmospheric Administration, the National Science Foundation, and the National Aeronautics and Space Administration." Rationale: Accuracy. The NSSA (not ASD/C3I, although ASD/C3I, the Joint Staff J-8, and the Deputy Director of Central Intelligence for Community Management jointly guide the Architect's efforts) developed the space weather architecture and it was approved in 1999. Several agencies participated in the space weather architecture development beyond NASA and NOAA (their names are also corrected here), most notably the National Science Foundation. The National Security Space Architecture includes several component architectures, one

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of which is space weather. The overall architecture is still in development, but the space weather architecture is finished.

Military Department Policy and Guidance

- Page 9, paragraph 1, last sentence: Change "...and validating Air Force space weather requirements..." to "...and validating Air Force and Army space weather requirements..." Rationale: Accuracy. AFJI 15-157 is also Army Regulation 115-10 and includes the process for the Army to identify its requirements.
- Page 9, paragraph 2, 2nd sentence: Comment. We disagree because guidance on interoperability is provided by the applicable CJCS instructions and the lack of specific mention in Service guidance does not provide relief from CJCS requirements.

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Meeting Weather Support Requirements

- First paragraph in section: Comment. We disagree. See following sections for details.

Kosovo After-Action Report

- Pages 9 and 10, entire section: Comment. Cloud penetration for target detection and tracking is not a MITOC mission but rather an intelligence mission, as defined by both the Services and the JCS. The DoD IG report appears to be implying that weather sensors which can penetrate clouds should be used to detect and track targets. According to the Operation Allied Force After Action Report (declassified), Joint STARS, U-2s, and ATARS (Marine Corps system) provided target detection and tracking in cloudy and adverse weather conditions. Additionally, the P-3C Orion made its synthetic aperture radar (SAR) debut in Kosovo operations. Air Force, Navy, and Marine Corps weather support personnel provided full weather support to these targeting platforms. We do not believe the Navy's cloud penetration technology (we assume this means RadarSat-1, a Canadian satellite) should or could be used for target identification and tracking.

Pages 11-12

Weather Satellite Support

- Page 10, first paragraph in section, line 5: Change "...discusses all DMSP satellite requirements." to "...discusses all environmental satellite requirements." Rationale: Accuracy. MICS 154-86 documents requirements for operational environmental satellites in general, not just DMSP. Although it does discuss DMSP requirements, the Navy's ice and snow data requirement does not necessarily have to be met by DMSP as implied by the DoD IG report.
- Page 10, paragraph 4, line 1: Change "...National Aeronautical and Space Administration, and the National Oceanic and Atmospheric Agency..." to read "National Aeronautics and Space Administration, and the National Oceanic and Atmospheric Administration..." Rationale: Accuracy. Correct agency names.
- General comment: The Navy found a very cost-effective way to meet requirements through agreements to obtain RadarSat-1 data from the Canadians. In consonance with DoD guidance and intent (DoDD 3100.10, paragraph 4.13), leveraging national

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and international capabilities to save money is highly desirable—at \$500K per year for five years, the Navy received the data they required for \$2.5 million. The cost of the US launching a similar capability would likely have been in the hundreds of millions of dollars.

- General comment: MJCS 154-86 also references the Navy Remote Ocean-Sensing System (N-ROSS) satellite, which included technology intended to meet Navy sea ice requirements. MJCS 154-86 requirements for icebergs and leads include resolution down to 100 meters for center use and 15 meters for tactical use. We believe the only technology capable of meeting these requirements was synthetic aperture radar (SAR). N-ROSS did not include SAR and therefore could not meet their full requirements. Finally, the Navy cancelled the entire program due to cost.
- General comment: The 1976 DMSP Management and Operations MOA states that the special strategic mission of DMSP took priority over all others, conflicting sensors would not be permitted, and that a maximum of two satellites would be required at any given time. The MOA also clearly states the Services will fund for Service-unique requirements and/or additional spacecraft beyond the two required. The Navy considered such action through its N-ROSS program but found it too costly.
- General comment: The DMSP SORD, 1990, was created after the system existed in order to bring it into line with other acquisition and system management programs. The system already existed as a result of special strategic program requirements. The SORD documented existing capability and then set requirements for the Block 5D-3 spacecraft (first full-up block 5D-3 satellite is to be launched in January 2001). Sea ice data is not a key performance parameter for DMSP. The DMSP SORD is now frozen because the program is past Milestone III.
- General comment: The National Polar-orbiting Operational Environmental Satellite System (NPOESS) Cost and Operational Benefits Requirements Analysis (COBRA) based on Integrated Operational Requirements Document (IORD) I indicates Navy sea ice threshold requirements will be met. The Navy is now revising requirements for IORD IA which will appear to require a SAR solution. However, sea ice is not a Key Performance Parameter (KPP) and no new KPPs are expected without a significant change in the funding profile.
- Overall Comments: We agree that the Air Force did not have satellite support to meet Navy requirements for snow and ice data through cloud-covered areas and in adverse weather conditions. However, we are disturbed by the clear implication that the Air Force should have met these requirements, disregarding the stated mission of DMSP, disregarding the Joint Service DMSP MOA, and ignoring fiscal constraints that the acquisition community, including the Navy, found to be prohibitive. DoD policy and guidance is to leverage national and international assets wherever possible (see DoD Directive 3100.10, paragraph 4.13). The IG's report implies that the Navy's acquisition of RadarSat-1 data from Canada was somehow a sub-optimal solution. The approximately \$2.5 million paid for this data over the last five years is very cost effective compared to the expense of developing, procuring, launching, managing, and maintaining a similar US-only system. The IG report states the Navy will have to pay approximately \$16 million per year for RadarSat-2 data assuming it is launched without US support. Over five years, this is still significantly cheaper

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than a US-only system and apparently ignores the possibility of leveraging other national systems.

The President directed DoD and DoC to converge DMSP and the National Oceanic and Atmospheric Administration's Polar Orbiting Environmental Satellite (POES) system into the National Polar-orbiting Operational Environmental Satellite System (NPOESS). The Navy participated fully throughout the requirements definition phase and development thus far. In fact, the first IORD I has been written by the Joint Agency Requirements Group, approved by the DoD's Joint Requirements Oversight Council (JROC) and the NPOESS Joint Agency Requirements Council, and the triagency NPOESS Executive Committee. The team of experts conducting the Cost and Operational Benefits Requirements Analysis determined that NPOESS will meet the Navy's threshold sea ice data requirements. Additionally, sea ice data is not a key performance parameter in the NPOESS program.

General Comment: The Navy, Air Force, and Joint acquisition systems have examined the stated sea ice requirements and deferred acquisition of a US system capable of meeting these requirements because of its cost, not because the Air Force chose to ignore Navy requirements. Navy acquisition of RadarSat-1 data saved the Nation considerable investment and we recommend the Navy pursue and fund similar alternative solutions in the future since the current NPOESS is not expected to meet Navy objective requirements.

Satellite Requirement Coordination

- Page 11, paragraph 2, line 3: Change "In 1993, the Navy Operational Global Atmospheric Prediction System became the single DoD global model..." to read "In 1996, the Navy Operational Global Atmospheric Prediction System became the single DoD-run global numerical weather prediction (NWP) model..." Rationale: Accuracy. Although agreed upon in 1993, the Navy did not implement the necessary global NWP support for AFGWC until 1996 and the Air Force incurred significant additional costs to maintain a global modeling capability during this delay. In addition, the Navy Operational Global Atmospheric Prediction System (NOGAPS) is not the "single DoD global model" because of the global cloud modeling and other global applications operated at AFWA. It is the only DoD-run global numerical weather prediction model.
- General comment: The DMSP Operational Lincscan System (OLS) provides very high resolution (0.55 kilometer (km)) visual sea ice imagery in cloud free or nearly cloud free conditions. The Navy sea ice cover resolution requirement stated in the DMSP SORD is 2.5 km for special operations and 10 km otherwise. The DMSP OLS easily meets these requirements except for a tactical requirement of 100-meter resolution to detect small icebergs. The SSM/I sensor provides sea ice age data at an effective resolution of 25 km, meeting Navy requirements for ice age horizontal resolution of 25 km, again except for an iceberg requirement of 10 km. The SSM/I also provides some ice edge information through clouds and as well as sea surface wind speeds needed for the Navy's global and regional weather prediction models.

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The Air Force recognizes the importance of the SSM/I sensor and in fact kept SSM/I active on DMSP satellite F-11 after shutting off the OLS, thus providing additional SSM/I data for the period from May 1996 to August 2000. Although F-11 was shut down entirely at the end of August 2000 due to poor spacecraft health, an additional DMSP satellite is scheduled for launch in mid-January 2001. The concept of operations for the DMSP constellation following the scheduled launch of F-16 in January 2001 includes collection of microwave data from sensors on all four operating satellites.

- General comment: A SORD update was not done because DMSP was well past Milestone III and a SORD update was not appropriate. Also, AFSPC would have to rewrite the entire SORD to meet the new requirements documentation standards then in force.
- General comment: We cannot substantiate the statement in the DoD IG report that the Navy would have to program funds to make SSM/I a primary sensor. Because AFSPC appears not to have pursued the primary sensor issue as an option (recommending operational Employment Plan changes instead), it seems unlikely they would have sought funding from the Navy. In any case, per the 1976 DMSP management and operations memorandum of agreement (MOA), the Navy should have anticipated the need and had sufficient time to fund any service-specific requirements.
- General comment: As previously stated, we don't dispute the importance of SSM/I data for global weather prediction modeling. Our research indicates that both the Navy's global (NOGAPS) and regional (Coupled Ocean Atmosphere Prediction System - COAMPS) models ingest SSM/I data for ocean wind speeds. However, the two newest NOAA Polar-orbiting Operational Environmental Satellites (POES) include the Advanced Microwave Sounding Unit (AMSU), similar in ocean wind speed capabilities to SSM/I. NOAA-15 was launched in May 1998 and NOAA-16 was launched on 21 Sep 00 and was expected to become operational on 2 Oct 00. Although AMSU ocean wind speed products are not routinely available at this time, NOAA is developing them. Three additional NOAA POES satellites will provide the NOAA bridge to NPOESS and each will carry the AMSU sensor suite.
- General comment: Other satellites also provide ocean wind speed data but have been primarily research platforms. Through collaboration with NASA and others, these data may also be available operationally as a secondary mission in a way similar to that used for space weather data from research satellites.
- Overall comment: We believe making SSM/I a primary sensor is unnecessary. The Air Force has already demonstrated its understanding of the importance of SSM/I data through its management of the DMSP constellation (F-11 kept running for SSM/I data while the primary sensor was turned off). The Air Force has provided data from at least two satellites since December 1990, continues to provide microwave data from three satellites now, and a fourth will be added in early 2001. DMSP satellite production has ended, the systems are stored, and restarting the production line could be very costly. Launching a DMSP satellite early solely to meet SSM/I needs (based on primary sensor status) may create a gap between the last available DMSP satellite and the new NPOESS satellites, not just degrading but eliminating a full DMSP data stream. Such an early launch decision would be

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difficult to make if required. Additionally, after the DMSP F-16 launch scheduled for January 2001, there will be no boosters available to launch DMSP until the Evolved Expendable Launch Vehicle (EELV) is fielded in Fiscal Year 2003. An early launch decision would have to compare the National Programs to the ocean wind speed, ice, and snow requirements. Finding alternative solutions to SSM/T data, such as AMSU data from NOAA POES and/or leveraging research satellites, seems the more cost-effective course of action while significantly reducing the possibility of a gap in coverage before NPOESS is launched.

Weather Communication Support

- Page 11, first sentence in section: Comment. We agree that VSAT, as used at fixed sites, does not work afloat due to ship motion. However, we believe the DoD IG report's focus on equipment neglects the availability to the Navy through their communication channels of the same information sent over VSAT to Air Force and Army weather support personnel. We believe the availability of the information is the crux of interoperability rather than the ability of a given piece of hardware to work in all environments.
- General comment: Current VSAT transponders do not cover all ocean areas. VSAT is not a final solution but rather a temporary bridge until the common user communications through DISA can meet weather communication needs. VSAT was also a fix to a Y2K problem, increased available bandwidth, and provided annual cost savings of nearly \$1 million over the land-based systems it replaced.
- General comment: The Air Force in Europe provided Meteorological Assistant (METASSI) terminals and satellite systems to the Navy to provide data connectivity to Navy and Marine Corps shore-based activities. The Air Force also subsequently provided four NATO Automated Meteorological Information Systems (NAMIS - a follow-on to METASSI since METASSI was not Y2K compliant) to the Navy in Europe and is working on procuring an additional system for them. The Air Force has made considerable effort and expended its own funds to maintain interoperability with the Navy. However, developing and fielding afloat-capable systems will require additional time and Navy expense. We stand ready to help provide ships afloat with fine-scale Air Force meteorological products.
- Page 12, last sentence in section: Comment. The DoD IG report expresses concern that the Navy might have to expend additional funds to acquire an interface to achieve interoperability between their DISA communications and VSAT. This interoperability already exists. There is no need to use VSAT or have direct interoperability with it afloat because Air Force weather data are already available through existing communications channels.

Future Requirements (page 13)

- First sentence: Change "The United States operates separate civil and military polar-orbiting environmental satellite systems..." to "The United States operates polar-orbiting environmental satellite systems..." Rationale: Accuracy. The DMSP and NOAA POES satellites are not operated separately. In 1998, all satellite operations were merged at the NOAA control facility in Suitland, Maryland.

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Page 13

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Page 14
Revised

Final Report
Reference

Revised,
Page 14
Revised,
Page 14

- **Line 3:** Change "In May 1998..." to "In 1995..." Rationale: Accuracy. The President directed formation of the NPOESS program in 1994 and the program can be considered to have begun in 1995 with the signing of the triagency MOA.
- **Line 8:** Change "The Federal agencies are in the process of developing a plan to identify, document, and validate requirements for the new satellites." to "The Federal agencies have identified, documented, and validated the initial requirements for the new satellites." Rationale: Accuracy. The NPOESS requirements process was established in 1995. IORD I was published in 1996 following JROC approval for the DoD side of the program. The NPOESS requirements process has been rigorous, with Navy participation throughout, including placing personnel in the Integrated Program Office and through participation in the Senior User Advisory Group (SUAG). The DoD acquisition process, based on DoD directives, has provided the mechanism to identify and vet all Service requirements and validate requirements through the JROC.
- **General comment:** We see no reason that the creation of NPOESS requires "a cognizant DoD organization to provide guidance, policy, and oversight for DoD meteorological, oceanographic, and space weather programs to ensure that DoD requirements are met in the national satellite system." One voice has communicated the official DoD requirements to the NPOESS program—the Vice Chairman of the Joint Chiefs of Staff (VCJCS), with the backing of the full DoD requirements process and a set of requirements validated by the JROC. An oversight function in ASD/CISR would add only an additional layer of bureaucracy through which to coordinate requirements.

Recommendations

- Addressed in a separate attachment.

Appendix A

- Addressed in a separate attachment.

Joint Staff Comments



THE JOINT STAFF
WASHINGTON, DC


Reply ZIP Code:
20318-0300

DJSM-898-00
30 October 2000

MEMORANDUM FOR THE INSPECTOR GENERAL, DEPARTMENT OF
DEFENSE

Subject: Audit Report on the Management and Oversight of the DOD Weather
Program

1. Thank you for the opportunity to comment on your draft report¹ concerning the DOD weather program. You have accurately noted the Joint Staff role in meteorological and oceanographic operations by referencing joint doctrine and instructions (Joint Publication 3-59 and CJCS Instruction 3810.01A) describing this key activity. We concur subject to the incorporation of the comment below.
2. We agree there are some functional areas that may benefit from OSD oversight and closer programmatic cooperation among the Services. However, in developing a DOD weather architecture that integrates the DOD weather program, it is important to consider and protect Service-specific needs consistent with the Services' responsibilities under title 10, United States Code.
3. Look forward to assisting you in the future. The Joint Staff point of contact is Lt Col Burnett, J-38/ROD, 703-695-0581.


GARRY R. TREXLER
Major General, USAF
Vice Director, Joint Staff

Reference:

1 DOD/IG memorandum, 31 August 2000, "Audit Report on the Management and Oversight of the DoD Weather Program (Project No. D2000LG-0102)"

Audit Team Members

The Readiness and Logistics Support Directorate, Office of the Assistant Inspector General for Auditing, DoD, prepared this report. Personnel of the Office of the Inspector General, DoD, who contributed to the report are listed below.

Shelton R. Young
Raymond D. Kidd
Evelyn R. Klemstine
Gary R. Padgett
Raymond L. Hopkins
Arthur J. Maurer
Michael J. Barnes
Sean J. Keaney
Mary R. Hoover
Woodrow W. Mack
Nadine F. Ramjohn

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OAIG-AUD (ATTN: AFTS Audit Suggestions)
Inspector General, Department of Defense
400 Army Navy Drive (Room 801)
Arlington, VA 22202-2884

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