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NATIONAL GEOSTATIONARY OPERATIONAL ENVIRONMENTAL SATELLITE DATA COLLECTION SYSTEM OPERATIONS PLAN

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CHANGE AND REVIEW LOG

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FOREWORD

The remote areas of the nation and the world produce many of the precious natural resources that we must develop for use, protect from pestilence, store and use effectively. Modern technology has offered us many ways to monitor the atmosphere, the earth*s water from rain and its runoff, the forest growth and susceptibility to fire, the stresses of the earth*s crust, the oceans* surface and mixed layers, the parameters affecting agricultural production, and the quality of air and water. The methods and procedures for such data collection have varied greatly due to the specialized sensors and the analysis systems employed by the different data gatherers.

The advent of the Geostationary Operational Environmental Satellites (GOES) and the on-board transponder in the early 1970s opened a vast new capability to acquire the needed data in real or near-real time. Many of the Federal Agencies started their own systems for collecting and telemetering their data for their own use. In the recent decade and a half, the Federal Agencies have come together to improve the tools and the system for better collection, and to modernize the storage and dissemination of all the data to all the users who desired them. This Data Collection System (DCS) has become the conduit through which remotely sensed data, the life-blood of the Agencies* operations, must pass. Data from all the Agencies were integrated and analyzed to map and forecast the cresting flood levels during the 1993 Mid-West floods. This contributed to billions of dollars in damages being averted through flood control measures.

As the demand for remotely sensed data has increased, certain segments of the system have been threatened with saturation. The Federal Agencies as users, and the National Environmental Satellite, Data, and Information Service (NESDIS) as the system operator, have been improving the capabilities of the GOES DCS. Under the joint charter of the Interagency Advisory Committee on Water Data (IACWD) and the Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR), the Satellite Telemetry Interagency Working Group (STIWG) was formed as a coordinating arena for cross-cutting interagency requirements and capabilities. The STIWG has developed this first National GOES DCS Operations Plan to document the joint use programs for collecting and sharing data sensed and collected remotely.

Signatures of the undersigned document the approval of this plan by the participating agencies.

_____

Julian M. Wright
Federal Coordinator for Meteorology

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_____

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NATIONAL GEOSTATIONARY OPERATIONAL ENVIRONMENTAL SATELLITE DATA COLLECTION SYSTEM OPERATIONS PLAN

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CHAPTER 1

INTRODUCTION

1.1 Background. The Satellite Telemetry Interagency Working Group (STIWG) has commissioned the preparation of this National Geostationary Operational Environmental Satellite Data Collection System (GOES DCS) Operations Plan, hereafter referred to as the Plan. The STIWG is chartered jointly by the Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR) and the Interagency Advisory Committee on Water Data (IACWD). The STIWG reports to the Committee for Basic Services (CBS) and the Hydrology Subcommittee, respectively, as shown in Figure E-1. The STIWG had its origin in the unchartered Satellite Data Collection System Interagency Working Group (SDCSIWG). The membership of the STIWG is presented in Table 5-1. Organizational relationships are shown in Appendix E.

Several Federal, state, and local agencies are responsible for monitoring the environment and Earth*s resources. To assist these agencies in meeting their environmental responsibilities, the National Aeronautics and Space Administration (NASA) developed experimental Earth orbiting satellites to serve as two-way communication links between a central receiving station and globally distributed measurement sites. Large-scale operational demonstrations of the communication links began in the late 1960s (Ref Flanders and Schiesl, 1972). The National Oceanic and Atmospheric Administration (NOAA) included a DCS in its National Geostationary Operational Environmental Satellite, beginning in 1974. Although the GOES DCS was intended to be for the exclusive use of NOAA, other Federal agencies obtained permission to utilize the system.

The responsibility for maintaining GOES DCS in full operation at all times rests with NOAA*s National Environmental Satellite, Data, and Information Service (NESDIS).

1.2 History. The technical successes of NASA and NOAA in developing and orbiting satellite telemetry systems for collection of global environmental data enabled a number of Federal agencies to make use of such systems. A working group of major agencies, the Satellite Data Collection System Interagency Working Group (SDCSIWG), was formed in 1976 to formulate a plan for a National GOES DCS. The SDCSIWG was composed of the Army Corps of Engineers (COE), the U.S. Geological Survey (USGS), NOAA, the U.S. Environmental Protection Agency (EPA), the U.S. Department of Energy (DOE), the U.S. Department of Agriculture (USDA), and NASA.

The SDCSIWG served as a focal point for the various GOES DCS user agencies to NESDIS. In addition to its coordination function, the SDCSIWG also arranged for cooperative funding for specific surveys and research projects, and identified issues related to the GOES DCS. The issues identified by the SDCSIWG reflected the need for a continuous, operational data collection system. The work of the SDCSIWG lead to the issuance of a Presidential Directive (PD), in November 1979, giving NOAA a mandate to operate the GOES DCS to satisfy national requirements.

The SDCSIWG completed a draft plan for satellite data relay in May 1980; but the plan was never formalized by the member agencies or forwarded to the Office of Management and Budget (OMB). In 1983, NESDIS published a document (Ref NOAA/NESDIS, 1983) describing the GOES DCS and identifying requirements of the GOES DCS user agencies.

From 1980 to 1984, the SDCSIWG held regular meetings with NESDIS to formulate a national plan, and to reach agreement on interagency funding for expansion of the DCS to the full capabilities of the GOES spacecraft. Neither of these objectives was attained. Nevertheless, demand for use of the GOES DCS by the various Federal agencies increased by about 20 percent annually.

To anticipate the impact of increasing demand for use of the GOES DCS, the SDCSIWG commissioned the preparation of two important studies. The first study (Ref U.S. Army, January 1984) defined further user requirements and

associated costs for optional upgrades of the DCS ground system. The second study (Ref U.S. Army, October 1984) identified critical elements in the GOES DCS relative to projected system saturation. It proved useful for NESDIS to extend existing ground system capabilities at that time to accommodate over 7,000 Data Collection Platforms (DCPs).

In March 1985 and July 1986, NESDIS asked user agencies for proposed enhancements to the upgraded DCS and advised the user agencies that they might be required to fund the enhancements. At this time, NESDIS assigned the name "DCS Automatic Processing System (DAPS)" to the upgraded ground system.

In June 1985, the ICMSSR and the IACWD chartered the STIWG to continue in a capacity similar to that of the SDCSIWG. The ICMSSR and IACWD derived their authority from OMB Circulars A-62 and A-67, respectively. Circular A-67 has since been supplanted by M-92-01 (10 December 1991).

During 1986 and 1987, the STIWG worked to obtain agreements from the Federal user agencies concerning DAPS enhancements and how to pay for them. This effort resulted in the decision to purchase additional demodulators to operate additional GOES DCS channels. Funding for the additional demodulators was to be in proportion to the number of DCPs assigned to each of the user agencies, with only agencies having 4 percent or more of the DCP assignments taking part. STIWG also agreed to fund an interim Domestic Satellite (Domsat) broadcast communications link until a NOAA satellite broadcast called NOAAPORT becomes operational.

In 1989, the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) and Office of Water Data Coordination (OWDC) determined the need for a Federal Plan to ensure the effective use of the GOES DCS, and accordingly sanctioned the STIWG to prepare a draft of such Plan. This document builds on the framework and expands the scope of that draft Plan.

1.3 Scope. The Plan addresses a wide range of topics to serve both users and operators of the GOES DCS, e.g., the DCS architecture, operational procedures, types of data collected, agency missions, funding, responsibilities, system enhancements, program growth, and interagency coordination. The information (and sources for further information) will satisfy the needs of both program managers and engineers. Discussions of problems and requirements of the system are incorporated where appropriate, including procedures to resolve agency disagreements. Ongoing and planned system enhancements are addressed. The Plan also recognizes the growing number of non-Federal and non-U.S. user agencies, and the utilization of satellites other than GOES, e.g., METEOSAT.

The Plan is a process developed over several years by a variety of government agencies working toward a common goal. Figure 1-1 illustrates the Plan process. The numbers in parentheses indicate the chapters of this Plan in which appropriate discussion can be found. The process begins with an examination of user agency requirements and GOES DCS capabilities. Identified additional system requirements are addressed by needed enhancements, which in turn define a more responsive current system. Interagency policy, coordination, and funding interface with both the current and planned systems.

Figure 1-1. National GOES DCS Operations Plan Process

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CHAPTER 2

SYSTEM DESCRIPTION

2.1 Introduction. The GOES DCS is a system for collecting and transmitting environmental data from remote platforms via government-owned and -operated geostationary satellites. Users are composed of many Federal, State, and local agencies required to monitor environmental and earth resources for a variety of purposes. These purposes include reservoir management, river forecasting, meteorological analysis/forecasting, and other highly variable phenomena where observations must be collected frequently and quickly.

This chapter describes the NOAA/NESDIS GOES DCS system, including its evolution, current capabilities, and additional requirements system plans and their effectiveness in meeting the increasing number of user requirements represented by the deployment of more than 12,000 DCPs from Africa westward to eastern Australia. User-agency requirements for DCS data increased by about 20 percent/year in the mid-1980s. In the 1990s, requirements are expected to continue to increase by 5 percent/year. Monitoring and control of the DCS by NESDIS, in coordination with STIWG, is designed to effectively and fairly identify and evaluate new requirements. Prototype and operational enhancements to meet these requirements will be funded by a coordinated set of STIWG users and NESDIS, as agreed upon by the members of STIWG and NESDIS.

2.2 GOES System Overview. The United States operates the GOES, which, since November 1979, has included an integrated system of Earth-based and space-based environmental sensors that provide nearly continual observational information. The entire system is shown in Figure 2-1. The GOES system, operated and controlled by NESDIS, operates from geostationary orbit and consists of several observing subsystems, including visible and infrared imagers, sounders, and the DCS. The DCS functions as a communications relay system using 400 MHz of the spacecraft transponder for the multiplexing and transmission of DCS environmental data from remotely located, in-situ DCPs at or near the Earth*s surface and within the radio transmission view of the receiving GOES, as shown in Figure 2-2. The DCP UHF-uplink transmission is converted by the GOES transponder to an S-band downlink received at the Wallops Command and Data Acquisition (CDA) site from which the data are passed to the Wallops DAPS. The DCS data are relayed to users via Domsat, NWS Telecommunications Gateway, or direct from DAPS via dial-in telephone lines providing 300, 1200, 2400, and 9600 bits per second (bps) selective data access. Independent users can procure their own Direct Readout Ground Station (DRGS) and receive DCS data directly from GOES. The user in this case bears all costs of receipt and processing for use. There are presently 17 DRGS users, who in turn support 65 sub-users. The elements of the DCS are discussed in more detail in later sections. Agencies using their own DRGS are required to adhere to the channel assignments and schedules coordinated for the GOES DCS by NESDIS. Operators of DRGS are encouraged to notify the NESDIS operators in order to receive notification of operational schedules and changes. There are no formal agreements between DRGS users and NESDIS, other than the normal Memorandum of Agreement (MOA).

Figure 2-1. GOES DCS Current System

Figure 2-2. GOES Satellite Coverage Map

Two operational GOES spacecraft normally are located over the Equator, at 75EW and 135EW. These spacecraft have a radio view of most of the Earth from 0E longitude westward to 150EE, and between 77ES to 77EN, as shown in Figure 2-2. (Coverage is restricted to lower latitudes when moving east or west from the receiving satellite*s sub-point longitude.) The National Weather Service (NWS) has requested that a third GOES spacecraft be positioned at 105EW (mid-way between the two operational satellites). These spacecraft are complemented by non-U.S. geosynchronous satellites with compatible DCS capability provided by Europe (Meteorological Satellite [METEOSAT]) and Japan (Geosynchronous Meteorological Satellite [GMS]) and located over the equator at 0EW, and 140EE, respectively. The compatibility between the U.S. and non-U.S. DCS systems is restricted to 33 channels having 3 kHz bandwidth (channel separation). These channels are designated "international." DCPs assigned to the international channels are usually mobile platforms, except in special circumstances such as the Tropical Ocean Global Atmosphere (TOGA) experiment.

2.3 GOES DCS Data Collection Platforms. The GOES DCS is a communication system that supports user agencies which require DCP and have executed an MOA with NESDIS. Organizations, agents, or persons who receive DCS data but do not have an MOA are considered secondary users. The DCS MOA implies compliance with the Data Collection Platform Certification Specifications and the User Interface Manual (UIM) Version 1.1 (September 1990). The DCP Certification Specifications issued by NESDIS are standards that provide for compatibility with the GOES spacecraft and reduce the possibility of DCP interference with the rest of the GOES system. The GOES receives UHF (401.7010 to 402.0985 MHz) transmissions from DCPs at 100 bps for relay via the GOES transponder, which converts the signal to S-band (1694.5 MHz) for downlink to the Wallops CDA site. Each spacecraft has a transponder bandwidth of 400 kHz dedicated to DCS with the capacity to relay 200 (1.5-kHz bandwidth) domestic channels and 33 (3-kHz bandwidth) international channels.

The current DCS uplink operates at 100 bps and can handle at least 25,320 messages from DCP sites each hour based on 30-second messages (120 messages per hour per channel over 200 domestic channels equals 24,000 messages per hour, plus 40 messages per hour over 33 international channels equals 1320). With technological advances being made in timing devices, transmission windows of 15 to 30 seconds may become standard in the future. Shortened windows and higher data rates permit two to four times the number of messages from a given number of DCPs and allow more efficient utilization of the available 400-kHz transponder bandwidth. The DAPS, which became operational in October 1989, is designed to support 100,000 DCPs. Each of the 12,000 DCPs in the current system is uniquely identified by at least one code address in its 100-bps data stream to the GOES transponder. The three types of DCPs supported by the GOES DCS are:

- Self timed (S)—transmits data on a periodic basis at prescribed times. Planned data rates on these platforms are 100, 300 or 1200 bps.

- Random Reporting (R)—transmits randomly with the capability to adjust its reporting rate as specified conditions are sensed.

  The Dual (D) type DCP is a self-timed (S) unit that operates from a mobile vehicle, but uses international channels only. The Dual DCP does not routinely transmit on a regular basis as does the S-Type DCP. D-type DCPs are assigned to both GOES East and West.

- Interrogate (I)—transmits data in response to a specific command signal generated at the Wallops CDA. The S-band signal is uplinked from Wallops to the GOES where it is converted to UHF and downlinked to the addressed DCP. (See Figure 2-1.)

To satisfy special program requirements, some DCPs are assigned two platform addresses: primary and secondary. These DCPs operate in either S and I or R and I modes, depending on program requirements.

2.4 GOES Transponder. In general, two GOES spacecraft support the DCS. The satellite transponder provides the RF transfer link between the DCP UHF transmitter and the S-band downlink to the Wallops CDA. The DCS is allocated 401.7 to 402 MHz (domestic) and 402 to 402.1 MHz (international) of the GOES transponder bandwidth, which is the bandwidth

limit available for subsequent DCP data rate upgrades in the current GOES series. (The subsequent GOES I-M series is expected to have an equivalent transponder bandwidth.) The transponder bandwidth is subdivided, via frequency division multiplexing, into 200 domestic channels with 1.5-kHz separation (channel numbers 1 to 200) and 33 international channels with 3.0-kHz separation (channel numbers 202-266, even only). Of the current 200 domestic channels, 130 are in use, leaving 70 channels available for data rate upgrades and new users.

2.4.1. Data Rate Upgrade. To increase the system capacity and provide for more efficient use of allocated bandwidth, an upgrade in data transmission rates is planned for initial implementation in 1997. See Section 2.7 for details.

2.5 DCS Automatic Processing System. Downlinked GOES DCP data are acquired by the Wallops CDA site. The DCP data are then demodulated by the 13 Data Acquisition and Monitoring Subsystems (DAMS). Each DAMS contains 10 demodulators. Each demodulator can be tuned to any of the 233 DCS channels downlinked from the satellites to demodulate and quality check the DCP messages, and multiplex these data for ingest into the DAPS computers. The DAPS computers prepare messages for the user interface by performing the following specific functions:

- Storage in the DCS Data Base Management System (DBMS) for 100,000 Platform Description Tables (PDTs), 5000 User Description Tables (UDTs), and 5000 MOA records.
- Ingest data simultaneously from up to 233 channels (33-3 kHz channels).
- Output a complete set of DCP message data via Domsat direct broadcast. Provide for retransmission of selected Domsat data in response to user requests.
- Output DCP message data via NWS Telecommunications Gateway (different format than Domsat and dial-in data).
- Support the Telephone User Dial-up service. Allow DCS users to access data via ten 300/1200/2400/9600-bps dial-up circuits.
- Maintain all DCP message data in accessible storage for up to 72 hours (72-hour limit on storage is becoming a deficiency for a significant number of research and development users).
- Ingest DCP data from up to twenty-seven 100-bps, ten 120-bps, and twenty 30-bps DAMS units.
- Monitor the quality of all DCS/DCP message data ingested, DCS demodulator status, and communication circuits.
- Monitor the arrival of self-timed and interrogated DCP messages as per data stored in the central PDT data base.
- Automatically control two interrogate modulators and two test transmitters.

2.6 GOES DCS Users. Users can receive DCP data via four basic routes (See Figure 2-1):

- Direct readout of the DCS data obtained from the GOES spacecraft using a DRGS. This is an independent configuration with the user responsible for the antenna, hardware, software, processing costs, and performance.

- Data from GOES via DAPS to Domsat. Provides selective access to all DCP data and a retransmission capability to the user. The user is fully responsible for the local Domsat readout capability -- the Domsat Receive-Only Terminal (DROT), which may cost $15,000 to $20,000. NESDIS contracts for Domsat uplink and transmission channels. User support is coordinated by the STIWG.

- Data from GOES via DAPS to NWS Telecommunications Gateway. Data available in limited or restricted capacity, and only through special arrangements with NWS.

- Stored DCP data from the DAPS via dial-in telephone. Provides selective access to all DCP data. Ten phone lines provide dial-in asynchronous service at 300/1200/2400/9600-bps access to the DAPS. The user assumes phone line expenses and interface costs with DAPS.

Table 2-1 shows the ranking of GOES DCS information receipt methods tabulated from the “1992 STIWG User Questionnaire” responses.

Table 2-1. GOES DCS Information Receipt Method Utilized

Method	Percent*
Dial In	40
DRGS	21
DROT	15
NWS	12
Other	12

* Percent of users responding to questionnaire

Methods reported in the "other" category includes receipt through other agency offices, VHF radio, and direct dial-in from the DCP. A discussion of the STIWG questionnaires and the method used to prepare figures from the data are presented in Section 3.2.

2.7 GOES DCS Enhancements. In the 1980s, as use of the system increased, a number of enhancements were proposed for the DCS. The National Center for Atmospheric Research (NCAR) drafted an RFP in 1987 and selected a contractor to investigate the feasibility of higher DCS data rates (300 to 1200 bps). NESDIS and STIWG have initiated the procurement of high-data-rate modulators and test transmitter prototypes, operational 300-bps and 1200-bps high-data-rate demodulators, and a 300/1200-bps test transmitter. The project contains options for additional demodulator purchases and will establish the certification standards for industry to develop high-data-rate DCPs. To illustrate the anticipated increase in system capability: a typical assignment of one-minute time slots reporting every three hours at 100 bps results in a maximum of 180 DCPs per channel. At 300 bps, three times the number of DCPs can be assigned to the same channel, e.g., 540. Overall, it is estimated that the system capacity will increase by approximately 200 percent.

Initially, NESDIS will allocate forty 300-bps, 1.5-kHz channels (20 in the East and 20 in the West), and ten 1200-bps, 3.0-kHz channels for the high-data-rate conversion (five in the East and five in the West. Note: one 1200-bps channel, 3.0 kHz is equivalent in bandwidth to two 1200-bps, 1.5 kHz). Additional bandwidth will become available as the conversion to 300/1200 bps progresses.

The upgrades and enhancements planned through 1998 are listed in Table 2-2 and highlighted in Figure 2-3. Initial expansion of the DCS by additional 100-bps demodulators allowed the DCS to acquire the capacity necessary to operate for five years after completion of the DAPS in 1989. To the extent that budget pressures and competing priorities allow, NESDIS and the STIWG are working together to support the long-range needs and goals established by the users. Other enhancements that have been recommended are discussed in Chapter 7 and are as follows:

- **!** Higher data rates (*60* additional channels) and additional demodulators
  - 300/1200 bps DCPs
  - 300/1200 bps demodulators.

- **!** DCS data dissemination via NOAAPORT is an element of the Advanced Weather Interactive Processing System (AWIPS) Communications Network (ACN). Initial Operational Capability (IOC) is expected in 1998.

- **!** Implementation of a dial-in capability to an Internet file server that will receive selected DCS data from the DAPS. This capability is primarily for scientific users.

Table 2-2. GOES DCS Upgrades and Enhancement Milestones

1ST INCREMENTAL UPGRADE: 1998

• 300 bps DCP Capability - IOC
  - 10 channels GOES E, 5400 DCP's
  - 10 channels GOES W, 5400 DCP's
  - 20-300 bps Demodulators

• 1200 bps DCP Capability
  - 5 channels GOES E (3 dedicated, 2 shared)
  - 5 channels GOES W (3 dedicated, 2 shared)
  - 10 1200 bps Demodulators

• 30-day DAPS data storage

• Data Dissemination to Users via NOAAPORT (possibly in conjunction with DOMSAT - plans not firm)

PLANNED SYSTEM: 2000

• Higher Env. Data Rate
  - Upgrade DCP's, channels, demodulators
  - (300, 1200 bps)

• Dissemination via Internet

Figure 2-3. GOES DCS Planned System (1998)

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CHAPTER 3

MISSION REQUIREMENT FOR REMOTE TELEMETRY OF ENVIRONMENTAL DATA

3.1 General Requirements. One of the many capabilities of the GOES is the near-real-time relay of environmental data from remotely located DCPs through the GOES DCS. The GOES DCS currently supports Federal agencies, state functions, academic institutions, private industry, and numerous international efforts. Over 12,000 DCPs are currently operated by both U.S. and international users. Figure 3-1 is an overview of DCP assignments contained in the March 1993 NOAA/NESDIS DAPS report (Ref NOAA/NESDIS, 1993).

Figure 3-1. Overview of GOES DCS Users (March 1993)

The GOES DCS affords effective data collection at a cost far less than users would encounter using their own independent systems. In addition, the GOES DCS operating agency, NOAA, is able to use data collected by other organizations to enhance its operations. A 1985 U.S. Department of Commerce/NOAA/NWS memo (Ref DOC/NOAA/NWS, 1985) stated, in part:

> Although the NWS is one of the smaller operators on the GOES DCS (5 percent), we are definitely the biggest user, since we use over 90 percent of the data coming through the system ... (data) networks not only provide necessary data for our forecasting and warning needs, but also are cost-effective to the taxpayer when interagency duplication is avoided.

3.2 Overview of User Requirements. The STIWG circulated a questionnaire among GOES DCS current and potential users in February 1993 to obtain a sampling of opinions for inclusion in this Plan. A series of nine questions relative to GOES DCS communications, data applications, and future plans were posed to users. Most questions included a menu of specific responses, as well as an "other" category that facilitated inclusion of comments. Users were also asked to rank their responses by numerical order of importance. For example, question 4 included 10 possible responses for users to indicate why they needed remote telemetry data. If the "river forecast" choice was the most important to their activity, a "1" would be placed in the space before that category. The prominence of other menu choices could also be entered. Tabulations of the significant categories for each menu choice yielded the data discussed in this Plan. Although the number of returned questionnaires reflected approximately one-half of the current NOAA/NESDIS user file, the responses to many of the questions revealed a sufficiently broad cross section of agency view. These opinions are included in the following sections.

3.2.1 Applications of GOES DCS Data. A series of nine specific application categories and one general category were included in the questionnaire. Table 3-1 is a summary of user applications for GOES DCS data. Values shown are a percentage of users rating the categories as the first, second, or third most importance choice.

Items in the "other" category include ocean wave data collection, hardware testing, sea level analysis/forecasting, tsunami warnings, soil moisture monitoring, fisheries management, tide prediction, and dam safety.

3.2.2 Reasons for Using the GOES DCS. A ranking of factors that lead agencies to use the GOES DCS rather than other data collection systems, such as telephone, VHF radio, etc. was requested. Table 3-2 is a summary of the responses.

Reasons reported in the "other" category included field work effectiveness, data quality, U.S. owned, and access to remote geographic areas.

3.2.3 Use of the Domestic Satellite Distribution System. Currently only a few primary users (26 percent) of the DCS system received data via Domsat. Many secondary users are believed to be receiving data from primary Domsat users. Data distributed by primary users was not addressed by this questionnaire.

Table 3-1. Application of GOES DCS Data

Application Category	Percent*
Meteorological Analysis and Forecasting	19
River Forecast	19
Reservoir Management	16
Other	14
Water Quality Monitoring	9
Improved Data Collection Station Operations	8
Fire Potential	6
Navigation	4
Irrigation Control	3
Seismic	2

* Percent of users selecting the category as being of first, second, or third choice of importance.

Table 3-2. Reasons Users Decided to Use the GOES DCS

Reason	Percent*
Real-Time Response	25
Coverage	22
Availability	15
Reliability	14
Cost	12
Capability	10
Other	2

* Percent of users selecting the category as being a first, second, or third choice of importance.

3.2.4 Plans For DCS Use. Users were asked to provide the number of specific DCPs for which their agency has received an assignment from NESDIS to use the GOES DCS, as well as estimates of DCP use through 1998. Six columns were provided to enable six entries corresponding to a specific type of DCP. If the DCP has only a self-timed capability, it was reported in the "S" column. The self-timed capability generally results in a data transmission on a three- or four-hour cycle and a channel assigned by NESDIS. DCPs with only a random capability were reported in the "R" column. The random reporting capability results in transmission on a secondary channel assigned by NESDIS. The random transmissions are not scheduled, but are controlled by changes in the data. The most common type of DCP, "S/R", is one that can be programmed to transmit self-timed and random. Interrogate ("I") platforms transmit after receiving a command signal. Platforms that are self-timed, or random, and can be interrogated are of the "S/I", or "R/I" category.

Tabulations of all DCP types by years were not considered valid since responses from only about one-half of all users were available. The trend of DCP use from those reporting organizations is displayed by Table 3-3. S/R and S/I DCP types are included in the S category. Users did not include a requirement for the R/I type DCP.

Table 3-3. Trend of DCP Assignments (1993–1998)

DCP Type	Calendar Year Trend (1993 to 1998)
S	Increase of about 26 percent
R	Increase of about 17 percent
I	Increase of about 50 percent[1]

[1] Only a few DCPs are assigned as "I", thus the apparent increased value is not significant.

The complete list of current GOES DCS DCP assignments from the March 1993 DAPS report (Ref NOAA/NESDIS, 1993) is presented in Table 3-4, and may be used as the basis for projecting the DCP assignment totals exhibited in Table 3-3.

Table 3-4. GOES DCS DCP Assignments by Organization (March 1993)

Organization	Self-Timed	Interrogated	Random Reporting	Dual Channel (International/ Domestic)
DOI	3620	0	288	0
DOD	2403	0	40	0
DOC	801	0	185	412
USDA	379	0	0	0
DOE	78	0	0	0
NSF	0	0	66	0
NASA	16	0	0	0
TVA	89	0	2	0
State Govt	575	0	2	0
Academic	132	0	40	0
Industry	29	0	27	0
Non-U.S.	2166	6	7	63
TOTALS	**10,288**	**6**	**657**	**475**

3.3 Specific Organization Requirements and Activities. This section presents an overview of organizations using the GOES DCS. Information from the STIWG February 1993 Questionnaire, although incomplete, was used as background for this section.

3.3.1 Department of the Interior (DOI). DOI currently has 3908 DCP assignments.

3.3.1.1 Bureau of Reclamation (Reclamation). The initial and primary use of hydrological and meteorological data collected via GOES by Reclamation is for the real-time operation and forecasting for the management of the Bureau*s multipurpose reservoir systems. This includes functions related to flood control, irrigation releases, power generation, recreation, fish and wildlife management, and water quality. Other uses developed include water conservation and irrigation scheduling, hydrologic and structural parameter monitoring related to dam safety, and research projects associated with the development of wind and solar energy resources. Reclamation currently operates approximately 400 DCPs and collects near-real-time data through a NOAA GOES DRGS in Boise, Idaho.

3.3.1.2 U.S. Geological Survey (USGS).

A. Water Resources Division (WRD). The WRD collects stream stage, water quality, and other hydrologic data for other Federal, state and local agencies through various cooperative arrangements. These agencies require real-time data for forecasting, management of dams, irrigation, and regulatory missions. The USGS operates most of the data collection stations and DCPs, with other agencies generally acquiring data through direct telephone access to the DCPs, from GOES through their own readout stations, or directly from the NESDIS. The USGS collects hydrometeorological data from approximately 4000 DCPs, via the GOES DCS to two DRGS and nine Domsat readout stations. Many of the DCPs operated by the USGS are owned by other Federal agencies. The data collected include surface water levels for river, lake, and reservoir stages; quantity of precipitation; and various quality characteristics of surface-water such as temperature, dissolved oxygen, conductivity and pH. The real-time data acquired are entered into computers residing in the USGS local office responsible for the operation of the DCPs. Data are verified and edited on these computers as a part of the local office*s report processing procedures. The USGS considers real-time data received through GOES DCS to be provisional unedited data subject to revision and not available for general release. The USGS does not consider data transmitted in real-time to be an end product; however, such data, if appropriately decoded, edited, interpreted, and quality-controlled, can provide an opportunity to improve data-collection operations, the quality of hydrologic information, timeliness of data availability, and the ability of water forecast and management agencies to better accomplish their mission. Specific information on the availability of near-real-time data can be obtained from local USGS offices responsible for the operation of the DCPs.

B. Geologic Division. The Geologic Division collects data to monitor earthquake and volcanic hazards. The division operates sites in the western United States, primarily California, and monitors sites in other areas. Data from over 100 DCPs are received through a Domsat system and a DRGS at the USGS in Menlo Park, California. Most field sites transmit data on crustal deformation from instruments that continuously monitor strain, tilt, displacement, magnetics, and related parameters. Additional sites are being added to telemeter data from seismic event recorders for locating earthquakes and monitoring of instrument operations. Real-time data received from DCPs on a 10-minute transmission interval are processed by computers to issue automated alerts to cognizant scientists in an effort to enhance public safety. The data are also archived for subsequent processing, display, and analysis to foster a comprehensive understanding of the ongoing geologic process.

3.3.1.3 Bureau of Land Management (BLM). The BLM is responsible for the balanced management of the public lands and resources and their various assessments so that they are considered in an alliance that will best serve the needs of the American people. Management is based on the principles of multiple-use and sustained yield, a combination of uses that takes into account the long-term needs of future generations for renewable and non-renewable resources. These resources include recreation, range, timber, minerals, watershed, fish and wildlife, wilderness and natural, scenic, scientific and cultural values.

The Remote Automatic Weather Station (RAWS) Program is one of the primary data gathering tools for meeting the Bureau*s overall mission. The primary data recovery method for the RAWS Program is the GOES DCS. Originally designed for fire management (initial attack, fire planning, and prescribed fire), the RAWS and the valuable data it collects is used in all resource management activities identified in the Bureau*s mission statement. The use of RAWS has evolved into the Bureau-wide Remote Environmental Monitoring System (REMS) Program. The RAWS/REMS data are used in real-time, historic, and synoptic applications.

Currently, most RAWS/REMS units are collecting data hourly and transmitting that data via the DCS every hour or every three hours depending on the station classification and primary end user needs. Typical sensors include the following: precipitation, wind speed, wind direction, air temperature, fuel temperature, relative humidity, barometric pressure, wind speed, and direct peak gusts. Specialized sensors include soil temperature, soil moisture, visibility, cloud heights, thunderstorm sensors, water quality (temperature, dissolved oxygen, pH, salinity, and conductivity), stage, solar radiation, and gamma radiation. The RAWS/REMS platforms can and will accept a wide variety of sensors that lend themselves to increased diversification. The Bureau currently operates more than 300 RAWS/REMS in the western United States and Alaska. The Bureau is currently retrieving and routing data from more than 800 interagency RAWS/REMS platforms via the GOES DCS. The data from all interagency RAWS/REMS that are recovered at the National Interagency Fire Center (NIFC) are routed to the Western

Region Climate Center (WRCC) in Reno, Nevada, for permanent storage. WRCC, in cooperation with the BLM and U.S. Forest Service, has provided these data to a much larger user community outside the immediate interagency user group.

3.3.1.4 National Park Service (NPS). NPS employs nearly 50 DCPs for data collection at numerous national parks, monuments and recreation areas from Maine to Hawaii for a variety of operational and research needs. The NPS monitors air quality in several national parks and monuments. GOES DCPs are used to collect these data. The Service has contracted research to develop and test models to assess long-range transport of anthropogenic pollutants including sulfur dioxide. The NPS is also monitoring atmospheric deposition at a number of locations to determine the effects on park ecosystems and historic structures.

3.3.1.5 Bureau of Indian Affairs (BIA). The BIA operates approximately 25 DCPs on numerous Indian reservations in the western states. Data are integrated into the fire weather collection of the NIFC, as well as being used for specific investigations such as the evaluation of potentially irrigable Indian Trust lands in the Southwest. Some of the BIA platforms can be interrogated by line-of-sight radio transmissions and land line communication.

3.3.1.6 Fish and Wildlife Service (FWS). The FWS is currently operating about 30 DCPs at remote wildlife refuges located from Alaska to Georgia. These data are collected for fire weather prediction and resource management, as well as being available for site-specific studies.

3.3.2 Department of Defense. The DOD currently has 2443 DCP assignments.

3.3.2.1 U.S. Army (USA). The civil works mission of the Army Corps of Engineers (Corps) is to construct and manage water projects for flood control, navigation, and other purposes authorized by Congress. The Corps* charter as a principal water resources development agency for the nation places broad responsibilities on the Corps to manage limited water resources for best overall public interest. As such, the Corps is responsible for the judicious operation of these projects.

Real-time data such as river stage, precipitation, and temperature are needed to judiciously operate projects for their authorized purposes. GOES provides a reliable, real-time, and cost-effective means of retrieving these data from remote sites. The data are subsequently used for analysis, forecasting, and reservoir control decision-making, and managing Corps water projects. The Corps has the majority of DOD-assigned DCPs. The U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) and the Corps* Environmental Topographic Laboratories employ a few DCPs to support investigative studies.

3.3.2.2 U.S. Navy (USN). USN GOES DCS activities are minor, and include research-related applications at the David Taylor Research Center and the U.S. Naval Post Graduate School.

3.3.2.3 U.S. Air Force (USAF). USAF Weather Service personnel currently operate 12 DCPs.

3.3.3 Department of Commerce (DOC). The GOES system is mainly used in connection with meteorological analysis and forecasting efforts by the NWS, with some applications made at the National Ocean Service (NOS) and research efforts of the Office of Oceanic and Atmospheric Research (OAR).

3.3.3.1 National Weather Service (NWS). The NWS has the principal responsibility for the plans and operations of the basic weather services and certain applied services. The primary mission of the NWS is to help ensure the safety and welfare of the general public with respect to the effects of weather and to further the conduct of governmental and commercial activities that are affected by weather. In support of this mission, the NWS uses the GOES DCS to collect real-time data from remote meteorological, hydrologic, and oceanographic stations. The rapid collection of these data is essential in determining the status of the atmosphere, the rivers, and the oceans.

The NWS provides around-the-clock weather and flood warning and forecast services to the public for the protection of life and property and to meet the needs of all segments of the economy.

Data collected by the NWS through the GOES DCS include wind speed and direction, wind gust, air temperature, dew point, barometric pressure, amount of precipitation, water temperature, water level, and maintenance parameters. In support of Marine Weather Services, the NWS operates the National Data Buoy Center (NDBC). NDBC provides real-time operations, data acquisition and data processing, and distribution of meteorological/oceanographic data from sea and coastal buoys and ground stations. In addition to collecting many of the sensor data identified above, NDBC also collects wave data, solar radiation, transmissivity, salinity, and conductivity data.

NWS GOES DCS data are transmitted anywhere from once each hour to once every six hours through the Wallops Station CDA and into the NWS Telecommunications Gateway. Data from over 5500 DCPs are decoded, quality controlled, and reformatted into formats such as the Standard Hydrometeorological Exchange Format (SHEF), either by the Office of Hydrology or the NDBC. These data are then forwarded to NWS offices throughout the country.

3.3.3.2 National Ocean Service (NOS). The majority of GOES DCS assignments within the NOS are associated with two measurement programs. The Shipboard Environmental (Data) Acquisition Program (SEAS) was developed by the NOS to improve marine forecasts and services. The success of the SEAS program relies on the participation of Volunteer Observing Ships (VOS) worldwide. Currently, 130 ships are active in the VOS program; they collect shipboard meteorological observations and subsurface ocean temperature data. The data are relayed, via GOES and the Wallops ground station, to the National Centers for Environmental Prediction (NCEP) for use in weather forecasting models and experimental climate prediction activities. The subsurface ocean data are also routed to many other users including the U.S. Navy, the National Marine Fisheries Service, and research scientists in other organizations.

The National Water Level Observation Network (NWLON) is operated by the NOS to monitor water levels in U.S. coastal waters and the Great Lakes for the purpose of observing and predicting the tides. The NWLON consists of 189 permanent monitoring stations. Similar monitoring and telemetry equipment have also been deployed at 27 measurement locations in support of the Global Sea Level Monitoring Program. For the two programs 125 locations currently use automated GOES monitoring, reporting systems. In addition to the primary measurement (water level), many of the platforms have additional sensors that monitor oceanographic and meteorological parameters. As resources permit, and through cooperative activities with the NWS, all stations will eventually be equipped to monitor additional environmental parameters. Data acquired at the field sites are relayed through the GOES system to NOS*s Ocean and Lake Levels Division computer system in Silver Spring, Maryland. The data and derived products are used as references for marine boundary determinations and nautical charts, by research scientists in studies of long-term sea level change, by the NWS for tsunami and storm surge warnings, and by researchers at many universities and private facilities.

3.3.4 U.S. Department of Agriculture (USDA). The Forest Service, USDA, provides leadership in the management, protection, and use of the Nation*s forests and rangelands. The agency operates under the concept of multiple use, providing sustained yields of renewable resources such as water, foliage, wildlife, wood, and recreation. The Forest Service is committed to the preservation of wilderness, bio-diversity, and landscape beauty, as well as the protection of the basic resources of soil, water, and air quality in its management of these lands.

The Forest Service manages 154 national forests and 19 national grasslands comprising more than 191 million acres in 41 states and Puerto Rico. The mission of the Forest Service is to provide a continuing flow of natural resources to help meet the needs of the international community and to manage all resources of the national forests and national grasslands so that the products and benefits will best serve the local and national needs of the people.

The Forest Service collects and processes meteorological data from more than 400 RAWS to assist in the monitoring and control of forest fires and prescribed burnings and resource management decision making. The RAWS collect precipitation (tipping bucket or weighing gauge), wind direction, wind speed and direct peak gusts, air temperature, relative humidity, fuel temperature, fuel moisture, and barometric pressure data. Data telemetry from the RAWS is collected and downlinked via

the GOES DCS. The data are received by the BLM system at the NIFC. These data are sent to the Forest Service*s Weather Information Management System located at the USDA National Computer Center in Kansas City, Missouri.

The RAWS data have been used primarily in support of fire management activities such as pre-suppression planning, budgeting, allocating fire fighting resources, and providing public information. The Forest Service has committed to the ecosystem management approach, and these RAWS data will be better integrated into all resource management decision making.

3.3.5 U.S. Department of Energy (DOE). DOE applications of the GOES DCS data are minimal. About 80 DCPs are operated by DOE laboratories in connection with diffusion/dispersion studies, meteorological analysis, forecasting, and other environmental efforts.

3.3.6 National Science Foundation (NSF). The National Center for Atmospheric Research (NCAR), under the University Corporation for Atmospheric Research (UCAR), is responsible for the development and operation of several research and development projects that utilize DCPs. Typical installations collect surface meteorological observations in remote locations using solar-powered sensors. Deployments are usually for only a few months. Sixty-eight DCPs are currently assigned to NSF. Many of these systems are used in joint efforts such as TOGA, with DOC organizations.

3.3.7 National Aeronautics and Space Administration (NASA). NASA has minimal applications of the GOES DCS, and those efforts are mainly for meteorological operations. A total of 16 DCPs are assigned to the Goddard and the Johnson Space Flight Centers.

3.3.8 Tennessee Valley Authority (TVA). TVA is a minor user of the GOES DCS. Precipitation and river level information is collected in connection with management of river and reservoir levels. In addition, water temperatures are monitored prior to and after entering TVA coal-fired generating plants to ensure compliance with EPA standards. Ninety-one DCPs are currently assigned to TVA.

3.3.9 State Governments. Hawaii, Texas, Alaska, California, Colorado, Washington, and several U.S. cities use GOES DCS data for reservoir management, water quality management, river forecasting activities, forest fire management, etc.

3.3.10 Academia. Eleven academic institutions currently use the GOES DCS, mainly for meteorological monitoring, seismic and sea level analysis and forecasting, tsunami warnings, and other related research.

3.3.11 Industry. Fifteen private-sector companies use GOES DCS information for hardware testing, water quality monitoring, and other development activities.

3.3.12 International. International users currently comprise about 20 percent of the NESDIS DCP assignments. These are used for nearly all applications identified for other users, with predominant use in meteorological and hydrological activities.

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CHAPTER 4

GENERAL POLICIES AND PROCEDURES

4.1 NOAA/NESDIS Policies and Procedures. NESDIS manages and operates civilian U.S. operational Earth-observing satellite systems. The satellite systems include both polar-orbiting and geostationary satellites. NESDIS policy regarding the GOES DCS stems in part from international agreements that specify the radio frequencies used by the system, and restrict use of the system to the relay of environmental data. Environmental data are defined quite broadly to include observations and measurements of physical, chemical, or biological properties of oceans, rivers, lakes, solid earth and/or atmosphere (including space). Furthermore, it is NESDIS policy that data acquired through the GOES DCS are considered to be in the public domain. Under special conditions, some exceptions to the public domain ruling can be made.

The formal rules and regulations pertaining to NESDIS policy regarding the GOES DCS have been printed in the *15 Code of Federal Regulations Part 911* (last revision 28 January 1986). Agreement between NESDIS, the GOES DCS operator, and each GOES DCS user is specified in an individual MOA in which users accept the NESDIS policies stated above. There are separate MOAs for domestic and international users, and for manufacturers of DCS equipment. All users of the GOES DCS must agree to comply with NESDIS procedures, as specified in their formal Operating Agreement. MOAs are renewed periodically via letter of agreement or new MOA. Users must have a Federal, state or local government sponsor to use the DCS.

The GOES DCS operates within uplink and downlink frequency bands specified by the Frequency Assignment Subcommittee/Interdepartmental Radio Advisory Committee and the Federal Communications Commission. Although NESDIS has been given authority, as the GOES DCS operator, to make frequency assignments, it remains the responsibility of each user to obtain permission from local (national) authorities to transmit.

All DCPs intended for use with the GOES DCS must first be approved by NESDIS. Up-to-date listings of approved DCPs (vendors and models) and DRGS manufacturers are maintained by NESDIS. Unlike the DCPs, there is no requirement for prior approval of DRGS.

4.1.1 Blocking Procedure. NESDIS requires that all interfering DCPs be deactivated by the user within 24 hours of notification. Exceptions are made, only if required, by the remoteness of the DCP location or because of weather conditions.

When operational, the message blocking system operates from the NOAA Science Center (NSC) in Camp Springs, Maryland. The purpose of message blocking is to render useless those data transmitted by a specific malfunctioning DCP. NESDIS has incorporated this feature to allow users to correct their malfunctioning DCPs, e.g., those transmitting in the wrong time slots, without interfering with other platforms. The potential for DCPs to interrupt one another is extremely high.

Hardware elements used in the message blocking system were provided by members of the STIWG and NESDIS. The system consists of two antennas, two DCPs, a PC, modem, and associated cables. The two antennas and DCPs enable simultaneous and nearly simultaneous blocking transmissions on each spacecraft. A separate antenna was installed for GOES-East (odd-numbered channels) and for GOES-West (even-numbered channels). A single antenna cannot cover both spacecraft.

Blocking is achieved when the DCP at the NSC transmits the message preamble of the malfunctioning DCP slightly ahead of the scheduled reporting period. Also, the message preamble from the NSC DCP is slightly longer than that from the malfunctioning DCP. The data message from the malfunctioning DCP is garbled.

The existence of the message blocking system and its sponsorship by the STIWG and the GOES DCS operator attest to both the need for the system and the agencies* willingness to control the quality of data transmissions and to guard against non-compliant users. This willingness of the user community to extend such authority to the system operator reflects the intent of the STIWG membership.

4.1.2 Quality Control. NESDIS provides each new user with official DCS information and procedures, including the GOES *DCS User Interface Manual*. The manual defines user interface requirements, communications protocols, and systems for data distribution. NESDIS also maintains a real-time data quality control program, and regularly issues system performance reports.

NESDIS has implemented procedures for long-range technical planning and the orderly evolution of the GOES DCS to provide a more timely acquisition of telemetered measurements and improve the distribution of environmental parameters. NESDIS performs limited engineering studies and tests related to the GOES DCS. The agency monitors provide quality assurance control to monitor data transmission errors, channel interference, and platform operations. NESDIS is in the process of improving customer service by allowing a border system interface on DCS activities. NESDIS investigates new technologies and services that are designed to increase the quality and service of the GOES DCS. The expertise NESDIS has shown in the past and will continue to provide in the future relies extensively on the guidance of the STIWG, the technical, developmental, and acquisition support of NASA, and industry for DCS research and production.

4.1.3 General. It is the defined mission and the primary policy of NESDIS to operate the GOES DCS with priority assignments in the following descending order: disaster warning, operational, experimental. Priorities are assigned by NESDIS to the agencies and/or users at the time of application for DCP channels. When DCP errors or malfunctions are detected by the DAPS, NESDIS contacts the agency or user and requests corrective action. NESDIS provides the agencies and/or users with timely information about DCS activities and operations at the Technical Working Group (TWG) meetings, by mail, and by the *DAPS-News* service. Information pertaining to enhancements for improving customer service and new implementations for the DCS are provided to the TWG in a timely manner. *DAPS-News* is an active information file that users access by dialing in. Document updates, modifications to the *User Interface Manual* and User Operations documents, are distributed by NESDIS to the user community for comment and opinion. Information on the DCS status, GOES spacecraft health and safety, and platform operations are made available to the users as quickly as possible. Messages can be sent to the DCS operators at Wallops at Internet address: cdadaps@wcda.wff.nasa.gov; or to the DCS coordinator or program manager at Internet address: mperkins@nesdis.noaa.gov.

4.2 Other Policies and Procedures

4.2.1 Introduction. GOES DCS is an interdependent and synergistic system, reflecting the diverse needs of its operating agency and its user community. Federal agencies in the user community are usually active members of the STIWG.

4.2.2 STIWG. All Federal agencies may participate in the STIWG, and are eligible for voting membership (one vote per agency). The only requirement for STIWG membership is that the Federal agency use satellite telemetry. NESDIS is a non-voting member of the STIWG, and NOAA members may not serve as STIWG Chair. All STIWG decisions must be unanimous with respect to members who are parties to the decisions or are significantly affected by the decisions.

The STIWG provides funding for improved efficiencies and system enhancements to the GOES DCS, resources for which are derived from the STIWG member/user agencies. Because resource assessments are determined within the STIWG (see Chapter 6), it is prudent for users to be active STIWG members. International agencies are not eligible for membership in the STIWG.

In addition to fostering interagency cooperation and developing and maintaining national GOES DCS plans, the STIWG also funds GOES DCS-related research and provides all of the shared funding required for the Domsat data dissemination link. The Domsat link is paid for through STIWG agency assessments.

4.2.3 The Technical Working Group (TWG). All user agencies qualify for representation in the TWG. Meetings of the TWG, like those of the STIWG, are scheduled twice yearly. The GOES DCS operator, NESDIS, serves as permanent chair of the TWG. The purposes of the TWG are to exchange technical experiences and problems, and to address technical issues via highly focused ad hoc study groups.

4.3 Non-Federal Users. Non-Federal users include state and local government agencies, contractors working for Federal agencies, and universities. Non-Federal users may own and operate DCPs or may simply use data from the DCPs of another agency. Non-Federal agencies are not eligible for voting membership in the STIWG, but may be represented by a sponsoring U.S. Federal agency qualified for full STIWG membership. The sponsoring agency serves as ombudsman for the non-Federal user, and is responsible for all assessments levied by the STIWG.

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CHAPTER 5

INTERAGENCY COORDINATION

5.1 Role of STIWG and TWG

5.1.1 STIWG. The STIWG is an interagency working group, established to coordinate user requirements for satellite telemetry relating to hydrologic, meteorological, oceanic, and other environmental data. The STIWG is jointly sponsored by the OWDC and OFCM. The STIWG reports directly to the ICMSSR*s Committee for Basic Services (CBS) and IACWD*s Hydrology Subcommittee (HS) (see Figure E-1). The STIWG originated as a specific action taken to assure the effective use of the GOES DCS. The membership of STIWG is presented in Table 5-1. It is anticipated that NASA, DOE, and NSF will be added soon.

5.1.2 TWG. The TWG was established to provide a technical forum for users and operators of the GOES DCS. Its membership is drawn from all of the major U.S. and non-U.S. users of the GOES DCS. NESDIS initiated the technical forum in 1972, and continues to assume the responsibility for organizing and conducting TWG meetings. The TWG has been very successful in identifying technical problems, exchanging information, and formulating solutions and improved working procedures.

5.2 Memorandum of Agreement, NESDIS and User Agencies. The operator of the GOES DCS, NESDIS, and each agency and/or user are bound in their agreement to work together by the MOA. There are formal MOAs for every primary user, without exception.

The MOA is completed during the final steps of the application approval process. The MOA identifies the user*s program name, purpose of the program, agency name, country if appropriate, and points of agency contact. The MOA clearly specifies the responsibilities of NESDIS and those of the applicant. Either party to the MOA may request amendments throughout the life of the agreement.

The MOAs are prepared and signed by NESDIS and then forwarded to the applicant for acceptance. Upon receipt of the signed MOA, NESDIS continues the application process by providing DCP identification addresses, assigning appropriate time slots, and generating the assignment letter. A summary of the procedures for potential users to follow in applying for use of the GOES DCS are presented in Appendix F.

Table 5-1. STIWG Membership

ICMSSR/CBS and IACWD/HS
STIWG

Agency
Department of Interior Bureau of Land Management
Department of Interior U.S. Geological Survey
Department of Interior Bureau of Reclamation
Department of Commerce National Weather Service
Department of Commerce Environmental Research Lab
Department of Commerce National Ocean Service
Department of Defense USA Corps of Engineers
Department of Defense USAF Air Weather Service
Department of State Office of Advanced Technology
U.S. Environmental Protection Agency
Tennessee Valley Authority
U.S. Department of Agriculture Forest Service

5.3 Coordination of Enhancements and Research Studies

5.3.1 Enhancements. Enhancements to the GOES DCS are coordinated and implemented as outlined in Figure 1-1. Requests for enhancement of the GOES DCS, which originate within the user community, are presented at the TWG and/or STIWG meeting. Requests approved by the TWG and/or STIWG are reviewed by the NESDIS Office of Satellite Data Processing and Distribution (OSDPD) to determine the operational impacts. The NESDIS Office of Systems Development then undertakes an initial review of the requested enhancement to assess any physical impacts on the DCS hardware and software operations. The results of the two initial reviews and NESDIS*s recommendation are presented to the STIWG. The STIWG must approve all enhancements and, if required, the funding must be made available.

Approved requests and available funding, if required, are scheduled for implementation. Standard reporting procedures (progress reports, financial updates, schedule impacts, modifications and changes, and regularly scheduled meetings) are used by NESDIS to provide the STIWG and the user community with detailed information on the status of each task until the enhancements are fully implemented on the operational system. Documents associated with the new enhancements are distributed and the *User Interface Manual* and User Operations credentials are appropriately updated.

5.3.2 Research Studies. Research and development activities relating to the GOES DCS are sponsored either by NASA, by private industry, or by the STIWG. The NASA Operational Satellite Improvement Program and Supporting Research and Technology program have made and continue to make significant technological improvements to the GOES DCS.

NESDIS is responsible for submitting research and development requests for system improvements to NASA. NESDIS requests of NASA are based upon user identified short- and long-term needs. Communications are open for NASA and private industry to inform NESDIS, the STIWG and TWG, and all users of promising technology.

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CHAPTER 6

FUNDING

6.1 Agency/User Responsibilities. The funding responsibilities of each agency include costs of DCPs, environmental sensors, calibration, installation and maintenance, and all tests required to establish conformity with the GOES DCS performance specifications. Also, it is considered the responsibility of the agency/user to fund all costs for applying and receiving authority from the appropriate governmental organization to transmit on appropriate frequencies designated by the GOES DCS operator within the 401.7 to 402.1 MHz uplink band.

Agencies/users are responsible for the costs of data dissemination from Wallops Station (Virginia), including communications equipment and terminals, unless an alternative method for data dissemination is used. Funding of an alternative method, such as use of a DRGS, is entirely the responsibility of the agency/user.

The GOES DCS is considered a government-operated environmental data communications system. Under present U.S. Federal regulations, all users of the GOES DCS must agree to allow all Federal agencies free and open use of the data transmitted over the system.

6.2 NESDIS Responsibilities. The GOES DCS is operated and funded entirely by the U.S. system. Operations are controlled and performed by NESDIS. The GOES DCS was developed jointly by NESDIS and NASA and is based on experiments conducted with the NASA Advanced Technology Satellite.

All aspects of the operation of GOES DCS, from receipt of transmissions from the DCPs to processing and dissemination of data, are funded by NESDIS. The GOES satellites, which house the communications relay system, are also funded by NESDIS. METEOSAT carries 33-3 kHz channels in a communications relay system similar to that of the GOES.

Enhancements and upgrades of the GOES DCS are funded by the agencies. Enhancements and upgrades are defined to include improvements in data collection (uplink) and data dissemination. For example, agencies have funded upgrades of the demodulators located at Wallops CDA, and contracted for studies of ground system saturation.

The funding responsibilities of NESDIS are subject to the availability of annual appropriations.

6.3 Procedures. STIWG member agencies have developed and successfully implemented an effective funding agreement. The agreement has two features: (1) all funding plans must be agreed to unanimously and (2) the basis for determining each agency*s funding assessment is open to negotiation within the STIWG.

In instances where agencies generally benefit equally from a proposed study or system improvement, they each pay equal shares. If the benefits of an enhancement are not equal among the STIWG agencies, then funding shares may be collected only from the agencies receiving the greatest benefit. In some instances, the most equitable procedure for funding an enhancement would be to base the shares on the percentage of active DCPs in use by each agency. Circumstances might also occur where the number of DCPs from which data are used would serve as a more equitable basis for apportionment of funding than the number of DCPs in use. If an activity is proposed for funding that benefits only specific agencies, then only those agencies are assessed.

Secondary benefits from proposed enhancements may also be considered. For example, if some agencies were to use DCPs with higher data rates, it might free additional channels for use by other agencies that have existing (lower) data rate DCPs.

The OFCM serves as treasurer of the STIWG, with full authority for collection and expenditure of funds allocated by the agencies for the GOES DCS. The treasurer has explicit authority to maintain custody of funds received from the STIWG agencies. Treasurer reports are made at each of the STIWG meetings.

CHAPTER 7

DCS AUTOMATIC PROCESSING SYSTEM (DAPS) ENHANCEMENTS

7.1 Additional Demodulators. Rapid growth during the late 1970s and early 1980s in the number of active DCPs dictated the need for increased capacity in the DCS ground system. Studies sponsored by the SDCSIWG quantified the requirement for additional 100-bps demodulators and led to changes in DAPS hardware and software. The new DAPS architecture was established via a competitive process managed by NESDIS. It is worthwhile to note that funding for the studies, based upon the required unanimous approval of STIWG members, came from the Departments of Defense, Interior, and Commerce in equal amounts. The additional demodulators were paid for by members of the STIWG on the basis of their percentage share in the total number of DCPs in use. Agencies having fewer than four percent of the DCPs made no contribution to the purchase of demodulators. The numbers of DCPs assigned to each STIWG member was obtained from NESDIS.

7.2 Domsat Rebroadcast. The STIWG reached agreement with NESDIS, in 1988, to use Domsat as a high-speed data link between the GOES DCS at Wallops Station, Virginia, and the various user facilities. Funding for the implementation of the Domsat link and for its operation through 1998 is provided by the STIWG. Major users (those having more than 4 percent of the DCP assignments) pay in proportion to their number of assigned DCPs; NOAA agencies do not contribute, as they have an alternate capability; and no funds are provided by Canadian agencies, as they are outside the Domsat dissemination footprint.

Agencies acquired their own Domsat receive facilities, DROTs, as a separate action, totally independent of the STIWG. All of the GOES DCS data are broadcast via the Domsat link.

The Domsat dissemination footprint is limited essentially to the continental United States. Thus, the rebroadcast is not available at receive sites south of the Rio Grande, in Alaska, or in Hawaii. Users of the GOES DCS who wish to acquire transmission directly from the GOES DCS may use a DRGS to capture the GOES S-band (1694.5 MHz) downlink.

7.3 Higher Transmission Rate. Several of the GOES DCS agencies/users would like to acquire DCPs with a higher data-rate capacity than the nominal 100 bps. Increasing the data transmission capability will provide several extraordinary benefits, such as extended message length (greater than 500 characters), more frequent transmissions, and increased channel efficiency. Figure 7-1 reveals the most common reasons cited for faster transmissions (300/1200 baud) in the 1993 survey. The graph represents information obtained from 92 questionnaires. An explanation of the STIWG questionnaires and the method used to prepare the figures is presented in Section 3.2. Extended message lengths and more frequent transmissions were the most important features to users.

DCPs approved by NESDIS and operating at 300 and 1200 bps are not expected to be available to the users until mid-summer 1997, or later.

Figure 7-1. Reasons Users Desire 300/1200 Baud GOES DCP Transmission Capability (All Users)

7.4 DCS on NOAAPORT. NOAAPORT is the planned communications element of the NWS*s Advanced Weather Interactive Processing System for the 1990s (AWIPS-90), which is presently under contract. Initial operating capability is planned for January 1996. Within two years of AWIPS IOC, a Ku-band frequency distribution capability for the DCS at 56 kbps will be available. A detailed data plan for DCS data on NOAAPORT may be completed in FY-98. The plan may include both Domsat and NOAAPORT simultaneous utilization with a phasing up to sole utilization of NOAAPORT in the out years.

The presently planned DCS data flow to NOAAPORT is from the Wallops DAPS direct to the AWIPS Network Control Facility, and then to NOAAPORT along with other AWIPS data.

Agencies using NOAAPORT will be required to procure the antenna, hardware, and software to do the processing necessary to identify appropriate message headers and acquire the desired DCS information. Studies are on-going to determine if the receivers of the DCS data will be able to use the same antenna as for Domsat.

7.5 Internet. The Internet is an international conglomeration of interconnected computer networks that use Transmission Control Protocol/Internet Protocol (TCP/IP) to effect high-speed data communications. The Internet connects thousands of academic and government research computers in the United States and throughout the world. In the United States, the "backbone" of the Internet is funded by the Federal government (Ref Bulletin of the AMS, March 1993).

The Internet has been recommended as a DCS enhancement by members of the academic and research community. The initial assessment of a DCS enhancement will be to provide scientists with a subset of the complete DCS data set. The STIWG has emphasized that the projected Internet service is not to be construed as a substitute for the Domsat primary data reception, nor as an operational backup.

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APPENDIX A

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APPENDIX B

ABBREVIATIONS

-A-

ACN	AWIPS Communications Network
AFOS	Automation of Field Operations and Services
ALDS	Automated Lightning Detection System
AMS	American Meteorological Society
ATS	Advanced Technology Satellite
AWIPS	Advanced Weather Interactive Processing System

-B-

BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
bps	bits per second
BuMines	Bureau of Mines

-C-

CBS	Committee for Basic Services
CDA	Command and Data Acquisition
COE	U.S. Army Corps of Engineers
COES	Committee for Operational Environmental Satellites
CRREL	U.S. Army Cold Regions Research and Engineering Laboratory

-D-

D	Dual (domestic and international) channel DCP
DAMS	Data Acquisition and Monitoring System
DAPS	DCS Automatic Processing System
DBMS	Data Base Management System
DCDB	Data Collection and Direct Broadcast
DCP	Data Collection Platform
DCS	Data Collection System
DMSP	Defense Meteorological Satellite Program
DOC	Department of Commerce
DOD	Department of Defense
DOE	U.S. Department of Energy
DOI	Department of the Interior
Domsat	Domestic Satellite
DOS	U.S. Department of State
DOT	U.S. Department of Transportation
DRGS	Direct Readout Ground Station

DROT	Domsat Receive-Only Terminal

-E-

EPA	Environmental Protection Agency

-F-

FS	Forest Service
FWS	Fish and Wildlife Service
FY	Fiscal Year

-G-

GMS	Geosynchronous Meteorological Satellite
GOES	Geostationary Operational Environmental Satellite
GTS	Geostationary Technology Satellite

-H-

HAZMAT	hazardous material
HRPT	High-Resolution Picture Transmission
HS	Hydrology Subcommittee
Hz	Hertz or cycles per second

-I-

I	Interrogatable DCP
IA	Interagency
IAMS	Initial Attack Management System
IACWD	Interagency Advisory Committee on Water Data
ICMSSR	Interdepartmental Committee for Meteorological Services and Supporting Research
IOC	Initial Operational Capability

-K-

kbps	kilobits/bytes per second
kHz	kilohertz

-L-

Landsat	Land Satellite

-M-

MAROB	Marine Observation
METEOSAT	Meteorological Satellite

MHz	megahertz
MOA	Memorandum of Agreement

-N-

NASA	National Aeronautics and Space Administration
NCAR	National Center for Atmospheric Research
NCEP	National Centers for Environmental Prediction
NDBC	National Data Buoy Center
NESDIS	National Environmental Satellite, Data, and Information Service
NICC	National Interagency Coordinating Center
NIFC	National Interagency Fire Center
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NPS	National Park Service
NSC	NOAA Science Center
NSF	National Science Foundation
NWLON	National Water Level Observation Network
NWS	National Weather Service

-O-

OAR	Office of Oceanic and Atmospheric Research
OFCM	Office of the Federal Coordinator for Meteorological Services and Supporting Research
OMB	Office of Management and Budget
OSDPD	Office of Satellite Data Processing and Distribution
OWDC	Office of Water Data Coordination

-P-

PD	Presidential Directive
PDT	Platform Description Tables
POES	Polar Orbiting Environmental Satellite

-R-

R	Random reporting DCP
RAWS	Remote Automatic Weather Station
REMS	Remote Environmental Monitoring System
RF	Radio Frequency
RFP	Request for Proposal
R/I	Random reporting and Interrogatable DCP
Reclamation	Bureau of Reclamation

-S-

S	Self-timed DCP
SDCSIWG	Satellite Data Collection System Interagency Working Group
SEAS	Shipboard Environmental (Data) Acquisition Program
SHEF	Standard Hydrometeorological Exchange Format
S/I	Self-timed and Interrogatable DCP

S/R	Self-timed and Random reporting DCP
STIWG	Satellite Telemetry Interagency Working Group

-T-

TCP/IP	Transmission Control Protocol/Internet Protocol
TVA	Tennessee Valley Authority
TWG	Technical Working Group

-U-

UCAR	University Corporation for Atmospheric Research
UDT	User Description Table
UHF	Ultra High Frequency
UIM	User Interface Manual
USA	United States Army
USAF	United States Air Force
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
USN	United States Navy

-V-

VHF	Very High Frequency
VOS	Volunteer Observing Ships

-W-

WWB	World Weather Building
WRCC	Western Regional Climate Center
WRD	Water Resources Division

APPENDIX C

GLOSSARY

-B-

Bandwidth. A range of consecutive wavelengths or frequencies.

Baud. A unit of speed in data transmission (one bit per second for binary signals).

Byte. Adjacent binary bits that are operated on as a unit.

-C-

Channel. A specific frequency band for transmitting and receiving electromagnetic signals.

Conductance. The ability of a material to conduct an electric charge.

-D-

Demodulator. An electronic device that removes a signal from its carrier wave.

Downlink. Communication downward on a link between a satellite and ground station.

-F-

Footprint. The region beneath a satellite imaged by a satellite sensor or illuminated by a satellite antenna.

-G-

Geostationary. An Earth-orbiting satellite in equatorial plane and traveling at Earth*s speed of rotation. Earth appears motionless beneath the satellite.

-M-

Multiplex. To simultaneously send more than one signal on a single channel or frequency.

-N-

NOAAPORT. Point-to-multipoint broadcast service available with the initial deployment of AWIPS.

-P-

pH. Negative logarithm of the hydrogen ion concentration. Measure of acidity or alkalinity of a solution.

Protocols. Procedure for interaction through a communications facility.

-T-

Transponder. A radio receiver-transmitter activated for transmission by reception of a specific signal.

-U-

Uplink. Communication upward on a link between a ground site and satellite.

APPENDIX D

AGENCY PROGRAM PROJECTIONS

D.1 Summary of Agency Projections. This Appendix contains available agency program projections. When agency summaries were not available, information contained in February 1993 STIWG GOES DCS questionnaires was used.

Although a good cross-section of GOES DCS questionnaires was received by the STIWG, it was not possible to tabulate the total current and 1994-1998 projected GOES DCS DCP assignments for all agencies. Estimated projections, therefore, were made for most agencies using the following procedure:

- Current agency 1993 GOES DCP assignments were taken from the March 1993 DAPS report.
- DCP assignment annual increase/decrease trends for the period 1994-1998 were determined from the GOES DCS STIWG questionnaires.
- Questionnaire trend factors were applied to the March 1993 GOES DCS DCP assignments to derive annual projections for the period 1994-1998.

D.1.1 Department of the Interior (DOI). Table D-1 is a summary of the DCS projected use derived from the STIWG questionnaires.

Table D-1. DOI Plans for DCS Use

	Calendar Years					
DCP Type	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
S	3920	3982	4235	4452	3873	4054
R	288	361	389	389	389	389
I	-	-	-	-	-	-

D.1.1.1 Bureau of Land Management (BLM). The BLM has expanded the use of RAWS/REMS platforms to include a large array of environmental sensors in various monitoring programs. Typical applications are in monitoring soil characteristics, hydrology, hazardous material (HAZMAT), and air quality. Increased use of the RAWS/REMS data in ecosystems management activities on public lands will potentially require some increased future requirements in DCS resources.

D.1.1.2 United States Geologic Survey.

A. Water Resources Division. WRD data telemetry is operated at approximately 4000 data-collection stations to assist water forecast and management agencies. The number of DCPs operated by WRD has been growing by 200 to 300 units per year for the last 10 years. This growth rate is expected to decrease through 1998 due to

projected decreases in the Federal budget. WRD operates DCPs on a reimbursable basis for other agencies, and therefore DCP growth is dependent on those agencies* needs and budgets.

The USGS has completed the process of replacing its DRGS with Domsat DROTs and is also upgrading its computer and telecommunications networks. DROTs are located in Pennsylvania, South Carolina, Ohio, Arkansas, Oklahoma, Colorado, Nevada, Washington, Florida, and California. DROTs are purchased and serviced using a USGS contract with a commercial vendor. By 1998, the number of DROTs is expected to reach 16. By mid-1994, the number of DRGSs will drop from six to two. One of the DRGS will be operated in San Juan, Puerto Rico, where Domsat is not available, and the second will be operated in Tacoma, Washington, as a backup to the DROT.

B. Geologic Division. The Geologic Division collects geophysical data for real-time monitoring of earthquakes and volcanoes. The program currently operates between 100 and 150 DCPs located primarily in the western United States. Data are collected in Menlo Park, California, via a Domsat receive site and a DRGS. Domsat is the main operational system, with DRGS used as backup. Over the next five years, the program should increase the number of active DCPs by 10 to 20 percent. Use of high-transmission-rate (1200 baud) DCPs would provide more interest in using the system for some types of seismic data and other instrumentation. These projections are based on optimistic guesses for the future.

D.1.2 Department of Defense (DOD). Table D-2 is a summary of plans for DOD DCS use projected from the trend derived the STIWG user questionnaires.

Table D-2. DOD Plans for DCS Use

	Calendar Years					
DCP Type	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
S	2403	2259	2306	2357	2355	2379
R	40	38	36	33	31	29
I	-	-	-	-	-	-

D.1.3 Department of Commerce (DOC). Table D-3 is a summary of plans for DOC DCS use based on projected trend derived from the STIWG questionnaires and information furnished by NOAA/NWS and NOS.

Table D-3. DOC/NWS Plans for DCS Use

Calendar Years						
DCP Type	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
S	801	841	985	1049	1153	1210
R	185	185	185	185	185	185
I	-	-	-	-	-	-
D	412	412	412	412	412	412

D.1.3.1 National Weather Service. The NWS/NDBC network of environmental data platforms is expected to more than double in the next six years. NDBC currently operates a network of approximately 140 moored buoys and land stations, not only for the NWS, but also for the Joint Typhoon Warning Center in the western Pacific Ocean and various reimbursable programs for such agencies as NASA, COE, and NOS. NDBC is also providing DCPs for NOAA*s Wind Profiler Demonstration Project and plans to expand up to 30 sites. NWS is proposing a National Marine Observation (MAROB) Network. The goal of MAROB is to establish an observing network, integrated with NEXRAD and GOES-Next, to support coastal, offshore, and hurricane services more effectively in the modernized era.

D.1.3.2 National Ocean Service. Table D-4 is additional information concerning DOC/NOAA/NOS DCS use. DCPs listed are included in totals shown in Table D-3. The decrease in the SEAS/VOS use of Dual International (D) assignments is due to an increasing number of volunteer ships converting to data telemetry via INMARSAT C.

The growth in the NWLON Program through 1996 reflects the continuing installation of GOES-reporting hardware at the remaining field sites. In 1997 and 1998, it is expected that high-data-rate systems will begin to be deployed. The additional message length will make GOES telemetry feasible for other monitoring programs, so the growth shown is not strictly for the NWLON Program.

Table D-4. DOC/NOAA/NOS Plans for DCS Use

	Calendar Years					
DCP Type	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
	SEAS/VOS Program					
S	3	3	3	3	3	3
R	82	82	82	82	82	82
I	--	--	--	--	--	--
D	386	386	386	347	312	281
	NWLON Program					
S	184	200	225	225	250	250
R	2	2	3	3	4	4
I	--	--	--	--	--	--
D	--	--	--	--	--	--

D.1.4 USDA Forest Service. Table D-5 is the projected USDA Forest Service DCS plans through 1998. They reflect a gradual yearly increase in the installation of RAWS. No major yearly increases are anticipated.

Table D-5. USDA Plans for DCS Use

Calendar Years						
DCP Type	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
S	364	380	405	430	450	480
R	-	-	-	-	-	-
I	-	-	-	-	-	-

D.1.5 Department of Energy. Table D-6 is a summary of plans for DOE DCS use projected from the trend derived from the STIWG questionnaires.

Table D-6. DOE Plans for DCS Use

Calendar Years						
DCP Type	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
S	78	89	89	89	89	89
R	-	-	-	-	-	-
I	-	-	-	-	-	-

D.1.6 International.

Canada. Table D-7 is a summary of Canadian plans for DCS use projected from the trend derived from the STIWG user questionnaires.

Table D-7. Canadian Plans for DCS Use

Calendar Years						
DCP Type	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
S	1385	1496	1524	1551	1593	1662
R	5	5	5	5	5	5
I	6	6	6	7	8	9
D	6	6	6	6	6	6

Mexico. Table D-8 is a tabulation of plans for DCS use submitted to the STIWG from the government of Mexico.

Table D-8. Mexican Plans for DCS Use

Calendar Years						
DCP Type	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**
S	700	800	900	1200	1300	2000
R	-	-	-	-	-	-
I	-	-	-	-	-	-

APPENDIX E

TERMS OF REFERENCE FOR SATELLITE TELEMETRY INTERAGENCY WORKING GROUP

E.1 Sponsorship. The Satellite Telemetry Interagency Working Group (STIWG) is jointly sponsored by the Interdepartmental Committee for Meteorological Services and Supporting Research (ICMSSR) and the Interagency Advisory Committee on Water Data (IACWD). STIWG will report directly to the Committee for Basic Services (CBS) of ICMSSR and the Hydrology Subcommittee of IACWD.

E.2 Purpose.

a. The STIWG shall be responsible for advising the CBS and the Hydrology Subcommittee on matters concerning satellite telemetry user requirements as they relate to hydrologic, meteorological, oceanic, and other environmental data; shall promote current information exchange including the sharing of data, research and development results, and other technical information among agencies; and will undertake projects at the direction of either CBS or the Hydrology Subcommittee.

b. The STIWG will coordinate these activities with the Committee on Operational Environmental Satellites, which operates under ICMSSR, to facilitate the integration of satellite telemetry user requirements with the design and operation of satellites and ground systems.

E.3 Membership.

a. Federal agencies may participate in STIWG when matters of concern to them are involved. Each Federal agency using satellite telemetry will be eligible for membership on the STIWG and will be entitled to one official voting representative and additional observers as desired. Each agency having membership on STIWG will maintain a current listing of its representative and alternate(s) on file with the Office of the Federal Coordinator for Meteorological Services and Supporting Research (OFCM) and, through the Hydrology Subcommittee, the Office of Water Data Coordination (OWDC).

b. The Chairperson and Secretary of the STIWG shall be determined by common consent of official agency representatives. Both the Chairperson and Secretary shall rotate annually among the member agencies.

c. The National Environmental Satellite Data and Information Service (NESDIS) will be represented on the STIWG as the Satellite Data Collection System*s Manager and Operator.

E.4 Procedures.

a. Meetings shall be quarterly or at the call of the Chairperson upon the request of one or more members to carry out a specific task. Normally, notification of meetings and an agenda will be distributed to members of the Group, the CBS, and the Hydrology Subcommittee in advance of the meetings.

b. All decisions shall be on the basis of unanimous agreement by the members whose agencies are parties to the decision or subsequent action. When interagency agreement is not reached on significant questions, the matter will be referred to the CBS or the Hydrology Subcommittee, as appropriate, for resolution.

c. The official agency representative will act as the agency spokesperson in matters of concern to STIWG.

d. Coordination will be effected at meetings, by correspondence, or by documented telephone calls.

e. The STIWG may establish internal procedures for conduct of business; however, the establishment of additional groups must have prior approval of the CBS and Hydrology Subcommittee.

E.5 Reports.

a. STIWG shall prepare reports and publications needed to fulfill the purposes of the Working Group and others as requested by CBS and the Hydrology Subcommittee.

b. STIWG shall submit to the Executive Secretary of the CBS and the Chairperson of the Hydrology Subcommittee by October 1 of each year, a status report that contains:

- Accomplishments of the past fiscal year;
- Activities planned for the forthcoming fiscal year; and
- A brief discussion of problems encountered and of other matters of interest.

c. Minutes of STIWG meetings shall be provided to all agency representatives, the Executive Secretary of CBS, and the Chairman of the Hydrology Subcommittee for distribution, as appropriate.

d. Chairperson of the STIWG shall report current activities (1) at the Hydrology Subcommittee meetings and (2) at CBS meetings, as appropriate.

e. STIWG will keep OFCM and OWDC informed of significant accomplishments and activities by providing information copies of correspondence, reports and other documents.

E.6 Termination. The Hydrology Subcommittee and CBS shall annually review STIWG activities and provide to IACWD and ICMSSR a recommendation on STIWG continuance. The STIWG shall remain in existence until terminated by joint action of ICMSSR and IACWD.

S/ Alonzo Smith Jr. Date: 7/10/85
Executive Secretary, ICMSSR

S/ Edgar Imhoff Date: 7/9/85
Acting Executive Secretary, IACWD

E.7 STIWG Parent Committee Organization. Figure E-1 illustrates the STIWG Parent Committee Organization.

Figure E-1. STIWG Parent Committee Organization

APPENDIX F

SUMMARY OF GOES DCS APPLICATION AND OPERATIONS PROCEDURES

The procedures to be followed by potential users are illustrated in Figure F-1. Numbers within the figure refer to sections in the Plan.

Figure F-1. User Application (A) and Operations (B) Procedures

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