



# **Cooperative Observer Program**

## **Product Improvement**

### **Implementation Plan**

[addendum I]

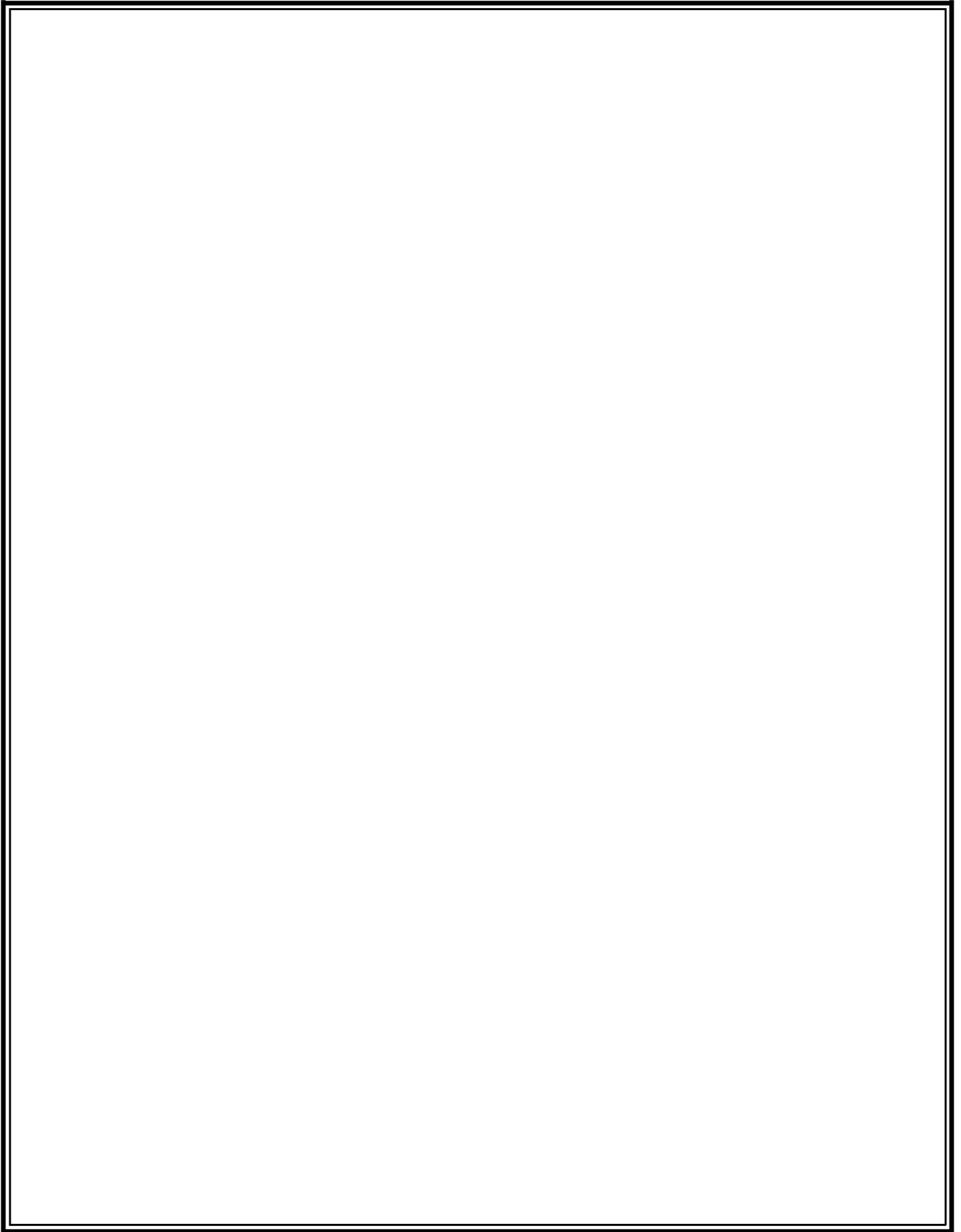
**For**

## **Fischer & Porter Sensor Upgrade**

**April 30, 2004** (as of 04/12/04)

U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
National Weather Service/Office of Operational Systems  
Field Systems Operations Center/Observing Systems Branch





# TABLE OF CONTENTS

	<u>Page</u>
Executive Summary.....	iii
List of Organizational Codes.....	v
Acronyms.....	vii
CHAPTER 1: INTRODUCTION.....	1
1.1 Description of Technology Improvement Schedule For Implementation.....	1
1.2 Purpose.....	1
1.3 Scope.....	1
1.4 Applicable Documents.....	2
CHAPTER 2: TEST AND EVALUATION ACTIVITIES .....	5
2.1 Pre-Contract Acceptance Test Activities (CAT).....	10
2.2 CAT Activities .....	11
2.3 Pre-Operational Readiness Evaluation Activities.....	11
2.4 Operational readiness evaluation Activities.....	14
CHAPTER 3: PRE-OPERATIONAL IMPLEMENTATION (OI) ACTIVITIES.....	17
3.1 Pre-OI Planning/Decision Activities.....	17
3.2 Pre-OI Logistic Support Activities.....	19
3.3 Pre-OI Configuration Management Activities.....	20
3.4 Pre-OI Operational Support Activities.....	20
CHAPTER 4: OPERATIONAL IMPLEMENTATION (OI) ACTIVITIES.....	23
4.1 Implementation Management Activities.....	23
4.2 Acquisition Activities.....	24
4.3 Installation Activities.....	25
4.4 OI Monitoring & Coordination Activities.....	25
CHAPTER 5: POST-OPERATIONAL IMPLEMENTATION (OI) ACTIVITIES.....	27
APPENDICES	
Appendix I: FPU Operational Readiness Evaluation Check List.....	I-1
Appendix II: FPU Operational Implementation Plan Check Lists.....	II-1
Appendix III: FPU Installation Sequence Strategy Lists.....	III-1
Appendix IV: FPU Operational Readiness Evaluation /Data Continuity Test Sites .....	IV-1
Appendix V: FPU Photos.....	V-1



# EXECUTIVE SUMMARY

As part of its continuing review and evaluation of National Weather Service operations and plans, the Office of Climate, Water, and Weather Services, Observing Services Division has planned for the modernization of the Cooperative Observer Network.

The Cooperative Observer Network is a nationwide weather and climate monitoring network consisting of volunteer citizens and institutions observing and reporting weather information on a scheduled basis. The cooperative Observer Network remains a vital component of the National Weather Service's data collection function. The network observes and reports temperature, precipitation, snowfall, and other weather events across the United States.

The network was initially established to serve agricultural needs, however, data applications have expanded. Data from the network are used in many ways, ranging from drought management to weather risk management. Because of its stability over time the network serves to monitor climate variations on a number of scales ranging from local to national. Despite its increasing importance to the nation, over the past decade the Cooperative Observer Network has been weakened by a combination of organizational and budgetary factors. In response to the National Research Council's Panel on Climate Record, the National Weather Service has embarked on an initiative to modernize the Cooperative Observing Network. An imperative of the Cooperative Observer Network Modernization is to rescue the at risk Fischer & Porter rain gauge network. Phase I of the Cooperative Observer Network Modernization calls for the rescue of approximately 2500 Fischer & Porter rain gauges operating with 1950's vintage equipment. The aging tape punch block mechanisms internal to the Fischer & Porter rain gauge account for nearly eighty percent of the annual Fischer & Porter rain gauge maintenance costs. In addition, paper tape punch readers used to transcribe and archive Fischer & Porter collected data have been identified as a high risk for failure, due to the loss of commercial logistic support.

The Observing Services Division in collaboration with the Office of Science & Technology and Office of Operational Systems has developed a solution to this problem. The solution calls for replacement of tape punch blocks with commercial electronic data loggers. Use of commercial-off-the-shelf technology will expedite the rescue process, mitigate the risk of losing data, while laying the foundation for the full Cooperative Observer Network Modernization.

This plan is written from the time perspective of imminent operational implementation. It assumes all necessary activities prior to operational implementation are, or *will have been* completed and that operational implementation activities are about to begin. The plan identifies two main activities: acquisition, and integration. The acquisition activities focus on compliance with NWS functional requirements as stated in the acquisition specification. The integration activities focus on meeting and exceeding NWS operational requirements for systemic delivery of products and services to the end user.

The importance of climate data gathered by the Cooperative Observer Network has increased since the incidents of September 11, 2001. The National Weather Service has an opportunity to build a modernized system that can play in integral role in the nation's weather and climate information networks. The Cooperative Observer Network needs to continue to play a vital role in an integrated National Weather System envisioned for the twenty-first century. This plan describe the activities necessary for successful implementation of the Fischer & Porter Upgrade.



## List of Organizational Codes

<u>Code</u>	<u>NWS Organization</u>
CCx2	National Logistics Support Center
OPS11	Engineering & Acquisition Branch
OPS12	Maintenance Branch
OPS13	Configuration Branch
OPS14	Logistics Branch
OPS22	Observing Systems Branch
OPS23	Software Branch
OPS24	Test & Evaluation Branch
OPS31	Operations Support & Performance Monitoring Branch
OS7	Observing Services Division
OST1	Programs & Plans Division



# ACRONYMS

AWIPS	Advanced Weather Interactive Processing System
CMIS	Configuration Management Information System
CO	Contracting Officer
COOP	Cooperative Observer Program
COTR	Contracting Officer Technical Representative
CSSA	Cooperative Station Service Accountability
DAPM	Data Acquisition Program Manager
EMRS	Engineering Management Reporting System
ET	Electronics Technician
F&P	Fischer & Porter (Precipitation Gauge)
FAT	First Article Test
CAT	Contract Acceptance Test
DCOM	Display Communications Unit
FCA	Functional Configuration Audit
FET	Field Engineering Test
FPU	Fischer-Porter Upgrade
FY	Fiscal Year
GMA	Gauge Modification Assembly
MIC	Meteorologist-In-Charge
MIRS	Management Information Reporting System
MTBF	Mean Time Between Failure
NCDC	National Climatic Data Center
NDS	NWS Policy (and Procedures) Directives
NLSC	National Logistics Support Center
NRC	National Reconditioning Center
NSN	National Stock Number
NWS	National Weather Service
OI	Operational Implementation
OIP	Operational Implementation Plan
OPR	Office of Primary Responsibility
ORE	Operational Readiness Evaluation
PC	Personal Computer
PCA	Physical Configuration Audit
PD	Policy Directives
PD	Procedure Directives
PPI	Planned Product Improvement
PPL	Provisioning Parts List
RMA	Reliability, Maintainability, Availability
RAM	Random Access Memory
RC	Request for Change
RCPM	Regional COOP Manager

REL NOTE	Release Note
RFP	Regional Focal Point
Protocol	Internet Protocol
TTR	Test Trouble Report
WSOM	Weather Service Operations Manual
WFO	Weather Forecast Office

# **1. INTRODUCTION**

## **1.1 Description of Technology Improvement Scheduled For Implementation**

The technological improvement described in this plan consists of an upgrade to the Fischer and Porter/Belfort Precipitation Gauge. The upgrade consists of a Gauge Modification Assembly (GMA) for each gauge and a Key Reader for use at the Weather Forecast Office (WFO). The GMA is a replacement for the current paper tape recorder in the Precipitation Gauge. It will sense, acquire, and record the precipitation accumulation data in internal memory and onto a removable data key. The GMA will be installed in all government-owned Fischer & Porter (F&P) precipitation gauges. The Key reader is a device which reads data from the data key and provides this data to a Personal Computer (PC) through a parallel port interface. The Key Reader will be installed at each WFO and used to transfer data from the data key to a PC data file at the WFO for transmission to the National Climatic Data Center (NCDC). These components, the GMA, data key, and the Key Reader will be collectively referred to throughout this document as the Fischer-Porter Upgrade (FPU).

## **1.2 Purpose**

The purpose of this document is to fully describe the activities necessary for operational implementation of the FPU. This plan describes the schedules and organizational responsibilities required for a smooth transition into operations. Two distinct groups of activities are described: 1) Acquisition related activities which include factory and contract acceptance testing, and; 2) Integration related activities which include an operational readiness evaluation, installation, and operational and maintenance support activities.

## **1.3 Scope**

The FPU will be implemented at all COOP locations equipped with a Fischer & Porter (F&P) Gauge (current number is 2500), and all 121 WFOs where a Key Reader or other similar support device is needed. The full implementation will occur over several year period. The first stage involves the procurement of 309 FPUs; with deployment at approximately 265 F&P locations, approximately 40 held as spares, and the remaining 2-4 used for training and testing. Follow-on modified FPUs will be deployed at the remaining F&P locations and their supporting WFOs. The first batch of FPUs will be referred at FPU version I (FPU-I), and the follow-on FPUs as FPU version II (FPU-II). Although both the FPU-I and FPU-II conform to the above system description and function alike, their form and fit, may differ. The FPU-I is distinguished by the large component enclosure and absence of remote communications and display components, whereas the FPU-II is intended to be less obtrusive in appearance and may contain a remote

communications and display component at some locations. See Appendix IV for photos of the FPU-I system components. The size, shape, and configuration of the FPU-II has not yet been determined. The overall implementation process described in this plan applies to both FPU-I and FPU-II. However, this plan is specifically tailored to the FPU-I. A separate plan is dedicated to FPU-II.

This plan describes the full extent of implementation activities: the pre-implementation acquisition-related testing, and integration-related operational readiness evaluation activities (described in Chapter 2); the pre-operational implementation, integration-related, activities (described in Chapter 3); the operational implementation, integration-related activities (described in Chapter 4); and the post-operational implementation, integration-related activities (described in Chapter 5). It identifies any unique additions, exceptions, or limitations imposed on NWS operations by introduction of the new equipment into the integrated system. For example, unlike some other observing system improvements, the new Fischer-Porter gauge improvement *does* require user/operator training because of new electronic processing and data handling procedures, and *does* require completion of a follow-on Data Continuity Study because the measuring mechanism has been altered. In comparison to the follow-on full modernization, this plan features abbreviated procedures and a compressed schedule for completion.

Figure 1 depicts the overall process leading to full deployment of the FPU. This process will be described in the following chapters of this document.

## **1.4 Schedule and Responsibilities**

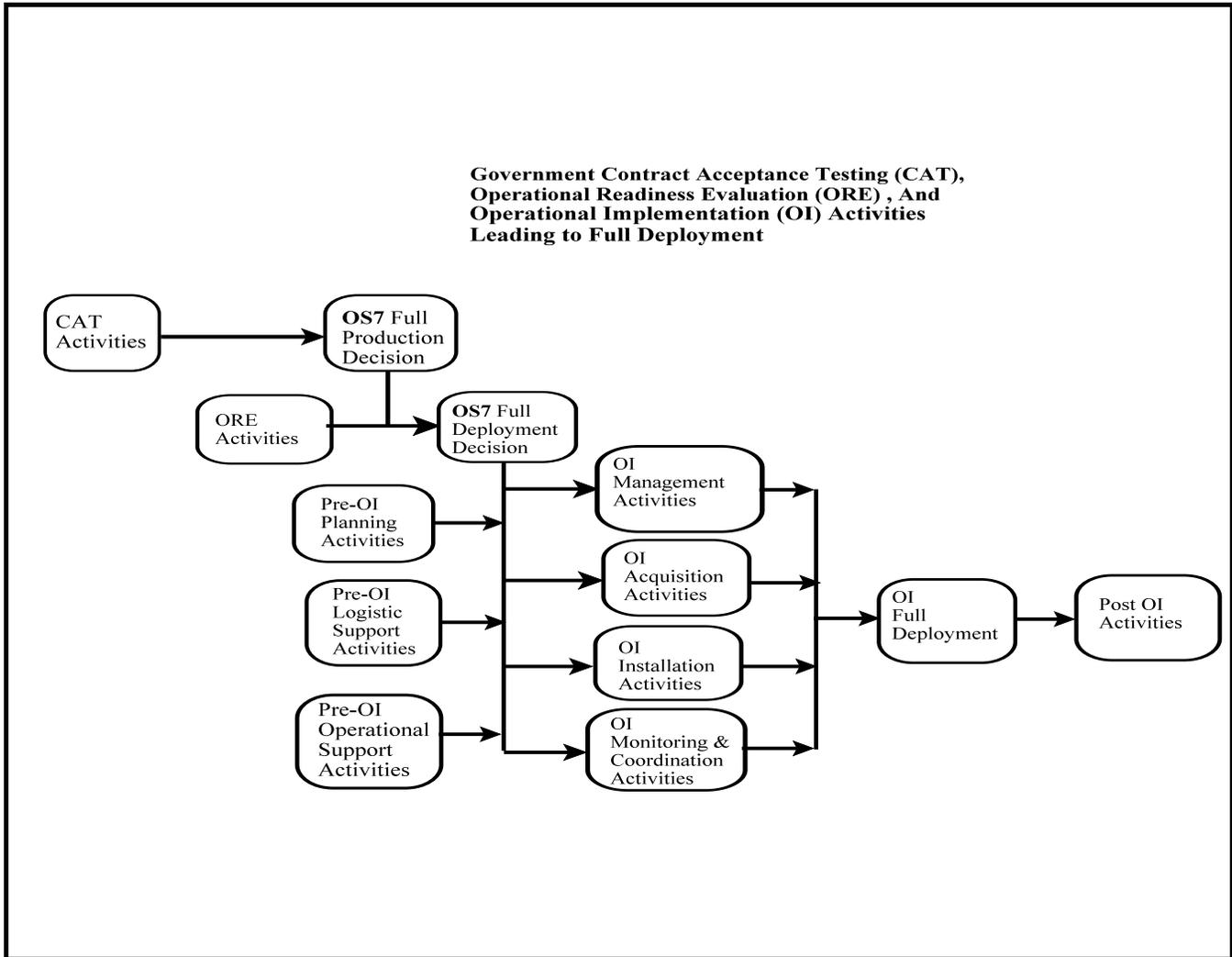
Operational implementation of the FPU is expected to begin in Spring, 2004 and conclude in Fall, 2004. Primary national headquarters responsibility for implementation resides with the Observing Systems Branch (OPS22). Primary national headquarters responsibility for COOP direction and operation resides with the Observing Services Division (OS7). Primary regional responsibility for both implementation and operations resides with the Regional Cooperative Program Manager. Primary local field responsibility for installation, maintenance, and operation resides with the MIC. The MIC may assign responsibility to staff as appropriate. The DAPM/HMT staff at the WFO. are designated as primarily responsible for installation and maintenance of the FPU. El Tech staff are available and may be asked to assist in trouble shooting the most difficult maintenance problems, but are not required to sacrifice other assigned duties to perform this function.

## **1.5 Applicable Documents**

As applicable, the following documents should be referenced for further guidance and serve as a part of this plan:

- FPU Mod Note prepared by OS7 and issued by OPS12.
- Operational Readiness Evaluation Plan (and Certification) Produced by OS7
- Initial issue, installation, maintenance, and operational directives prepared and issued by OS7

These documents may be found on the Surface Observation Program Web page:  
[www.nws.noaa.gov/ops2/Surface/index.htm](http://www.nws.noaa.gov/ops2/Surface/index.htm). Click on “Implementation.”



**Figure 1. Overall Operational Implementation Process**



## 2.0 TEST AND EVALUATION ACTIVITIES

This chapter gives a brief overview of the test activities leading to operational readiness certification, and ultimately to the Operational Implementation (OI) activities.

The pre-implementation acquisition test activities consist of a Contractor conducted, Government witnessed Factory Acceptance Test (FAT), a Government conducted Contract Acceptance Test (CAT). The pre-implementation integration evaluation consists of a government conducted operational readiness evaluation. These activities are the transition between development activities and OI activities. The sections in this chapter describe the test/evaluation -related activities, are given in general serial order of completion, and identify the offices(s) primarily responsible for their accomplishment.

Acquisition test, and integration evaluation plans and their criteria for success are written by those conducting the test/evaluation and submitted in advance to the Observing Services Division (OS7), for approval. The testing and evaluation are conducted serially and at the conclusion of each, a formal certification is prepared and submitted to the Observing Services Division (OS7), for ratification and approval to move forward with the implementation activities. The primary focus of FAT and CAT activities is to verify and validate FPU performance according to contract specifications. This includes, but not limited to, Reliability, Maintainability, Availability (RMA), Mean Time Between Failure (MTBF), accuracy, resolution, and other engineering measures of performance. These tests are conducted in the laboratory and/or field environment at a defined number of sites.

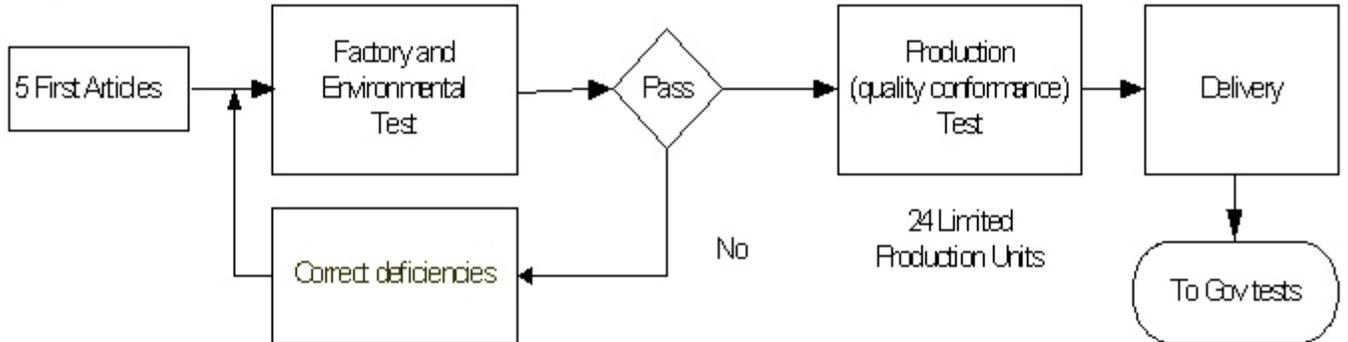
The contractor FAT and the government CAT activities are necessary conditions for the first of two Key Decision points. The first Key Decision point is a full or series of partial production decisions, usually made as a result of successful completion of the FAT and CAT. This is a program office (OS7) decision based on the formal test report and recommendation of a Test Review Board.

The operational readiness evaluation is a necessary condition to the second of two Key Decision points. The second Key Decision point is a full, or series of partial deployment decisions. This decision is made by the program manager and is based on successful completion of the operational readiness evaluation. A Test Review Board also provides technical review and advice for this decision.

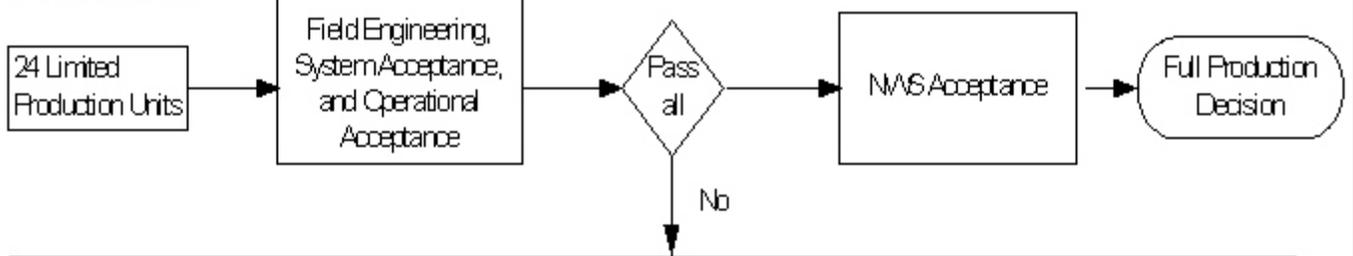
In contrast to the FAT and CAT, the primary focus of the operational readiness evaluation is to verify and certify the end-to-end operational system integrated with the FPU performs as expected. This includes, but is not limited to timely, accurate, and complete delivery of meteorologically representative, and user-ready information from the data provider, through the intermediate data handlers and processors, to the end users. This evaluation, in contrast to the

previous tests, is conducted in a field environment at an expanded number of climatologically diverse and operationally distinct locations. Extended evaluation is conducted to ensure end-to-end operational processes, procedures, products and services are not adversely affected by the change. Together, these testing and evaluation activities are necessary to determine if the product improvement is ready for the follow-on operational implementation. The schematic representation of the tests and evaluations are given in Figures 2 and 3 respectively. A general description of acquisition -related testing activities is provided in section A and B below; similarly a general description of system integration - related evaluation activities is given in section C below. More specific information on acquisition - related testing activities is provided in sections 2.1 and 2.2; similarly more specific information on integration - related evaluation activities is provided in sections 2.3 and 2.4.

**Contract Tests**

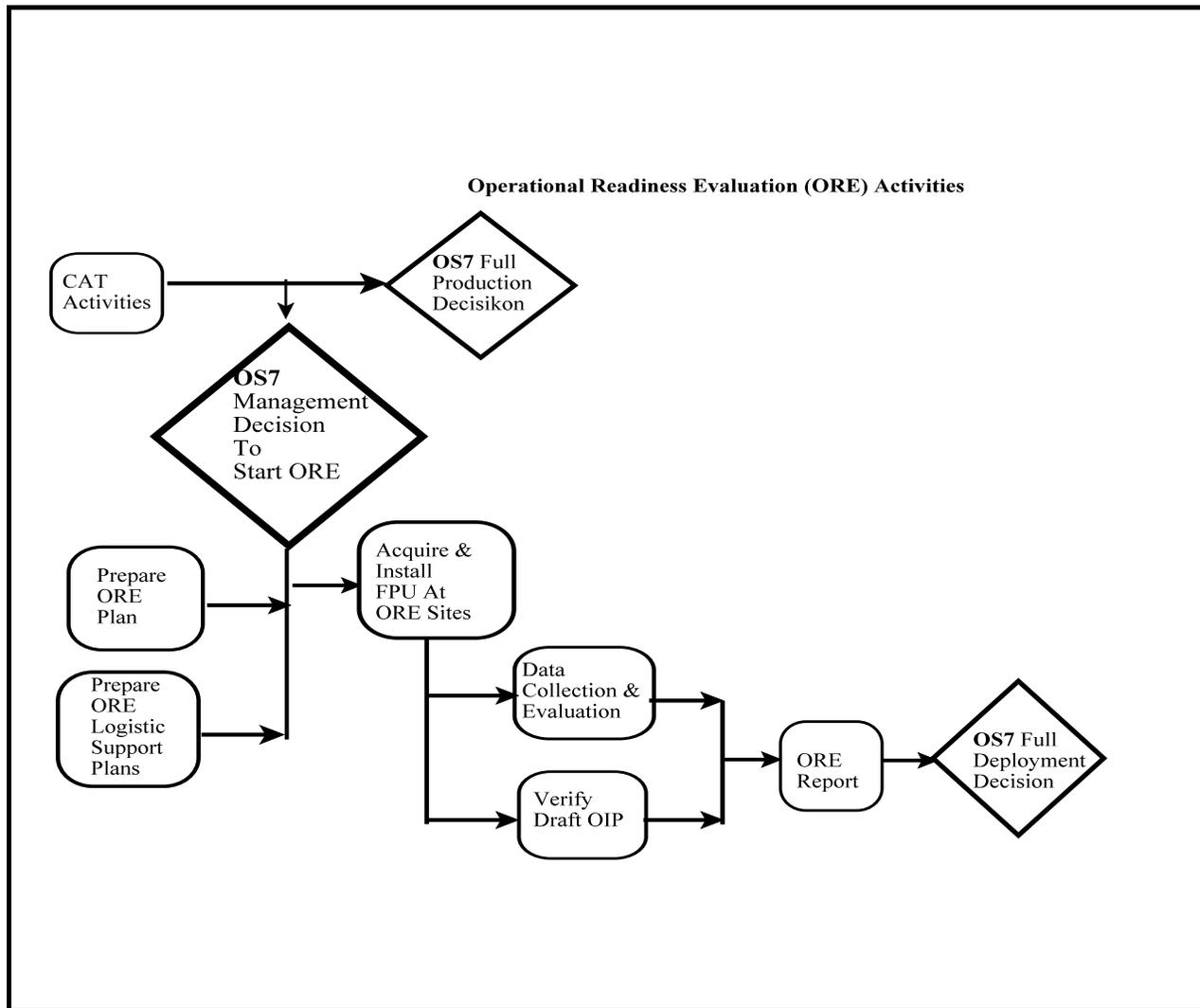


**Government Tests**



Further action at direction of Program Manager. Minor problems may not delay full production decision; severe issues will require formal engineering change(s) and a funded contract modification to change (and retest) the product baseline.

**Figure 2: FAT & CAT Activities**



**Figure 3: Operational readiness evaluation Activities**

**A. First Article Test (FAT)**

The FPU vendor (Coastal Environmental Systems) will conduct a contractor First Article Test (FAT) to demonstrate the limited production GMA units meet contractually specified requirements. Testing will be conducted at the vendor's facilities in accordance with government-approved test plans and procedures and will be witnessed by the Contracting Officer's Technical representative (COTR). Failing units are subject to rejection by the government. FAT activities consist primarily of contract specified, contractual conformance testing and will be managed and witnessed by the COTR and other Government witnesses. The FAT will verify all mechanical and performance requirements identified in the contract. Once satisfactorily completed, the contractually submitted test report shall satisfy all implementation documentation requirements for this activity. OPS11 will prepare the FAT plan and manage its execution. The plan will include all activities and deliverables for successful completion of the FAT. The FAT must be successfully completed before the CAT begins. OPS11 certified successful FAT completion on July 30, 2002. For further details, see FAT report prepared by OPS11.

**B. Contract Acceptance Test (CAT)**

After delivery, limited production units will undergo a Contract Acceptance Test (CAT) conducted by the NWS Engineering and Acquisition Branch (W/OPS11) to ensure their readiness for government operational readiness evaluation. Any problems discovered during field engineering testing will be resolved by an approved engineering change process. Upon successful conclusion of the CAT, OPS11 will formally certify to OS7 the FPU is fully compliant with contract terms and specifications, and is ready for operational readiness evaluation.

**C. Operational readiness evaluation**

Following CAT acceptance notification, OS7 will make the management decision whether or not to begin limited operational production. The results of the operational readiness evaluation will be used by OS7 to make decisions whether or not to begin deployment, installation, and implementation. OS7 will prepare the operational readiness evaluation plan, coordinate, and manage all activities for conducting the operational readiness evaluation. These activities will culminate in a formal or informal operational readiness evaluation acceptance notification and certification by OS7 to begin operational implementation.

## 2.1 Pre-Contract Acceptance Test (CAT) Activities

This section describes those activities which must be completed prior to the CAT. This description identifies the office responsible for completion of each activity. These pre-CAT activities include:

- A. **Prepare Request For Change (RC):** Not applicable
- B. **Prepare CAT Plan:** OPS11 will prepare and distribute the CAT plan prior to start of the CAT. This plan will include all activities and deliverables for successful completion of the CAT and a draft outline of the CAT report. A test team will have been formed to support all test activities.
- C. **CAT Locations and Dates:** CAT locations, schedules, and procedures are determined and managed by OPS11.

Selection of CAT locations will have been made by OPS11 prior to start of the CAT. The test dates will have been determined prior to the start of the CAT. The CAT will have been conducted at the following locations:

Sterling Research & Development (SRDC) and selected other COOP sites determined by OPS11 and coordination with OS7 and the Regional Cooperative Program Manager (RCPM).

- D. **Acquisition of CAT Units:** Upon successful completion of the FAT, OPS11 in coordination with OS7 will have initiated procurement of the CAT FPU components and delivery of these components to the designated CAT locations. OPS11 will have ensured delivery of the necessary test equipment, as identified by OPS11, to the designated CAT locations.
- E. **CAT Logistic Support:** Will be provided by OPS11.
- F. **Prepare & Provide FPU Installation Instructions:** A draft set of FPU Installation Instructions will be produced by OPS11 and provided to installation technicians prior to start of the CAT. A copy of the FPU installation instructions may be found on the Surface Observation Program Web page: [www.nws.noaa.gov/ops2/Surface/index.htm](http://www.nws.noaa.gov/ops2/Surface/index.htm). Click on Implementation button for pull down menu. These installation instructions will be provided by OPS11 to OS7 as the core input for OS7 preparation of the FPU Mod Note issued by OPS12.
- G. **Install FPU Units at CAT Sites:** Installation and maintenance of CAT equipment will be coordinated by OPS11.

## 2.2 CAT Activities

This section describes those activities which must be completed during or before operational readiness evaluation and before the end of the CAT. This description identifies the office(s) responsible for completion of each activity. These CAT activities include:

- A. **Verify Start of CAT:** OPS11 will report the start of the CAT to OPS22 and OS7.
- B. **Data Collection and Analysis:** All relevant data will have been collected, compiled, and checked for quality and completeness in accordance with the CAT plan. All Test Trouble Reports (TTRs) will have been reviewed and reconciled as a necessary pre-condition for successful completion of the CAT. This process is conducted and managed by OPS11.
- C. **Verify Completion of the CAT:** When the CAT is completed, OPS11 will have informed test members on the results. If the test identifies serious flaws, additional CATs will be conducted. When the test was declared successful, the next phase of testing can commence.
- D. **CAT Report:** A preliminary test report will have been prepared and issued for review by OPS11 as the CAT nears completion. This includes an assessment of all outstanding Test Trouble Reports (TTRs) and a recommendation whether to proceed the follow-on operational readiness evaluation. The preliminary CAT report will also be used by OS7 to make a management decision on full scale production and acquisition. If the final CAT report recommendation is to proceed with operational readiness evaluation, OPS11 will provide written notification to OS7 of satisfactory completion of the CAT with a recommendation to begin operational readiness evaluation testing. OPS11 will complete and deliver the final CAT report to OS7 for a decision prior to the start of the operational readiness evaluation.

## 2.3 Pre-operational readiness evaluation Activities

This section describes the purpose of the operational readiness evaluation and those activities which must be completed before the start of the operational readiness evaluation. This description identifies the office responsible for completion of each activity. The purpose of the operational readiness evaluation is to verify operational performance of the FPU and its integration into the COOP network at a representative number of COOP sites under operational field conditions. In effect, this is a “dry-run” for the full implementation for the remaining sites. The following activities must be completed prior to start of the operational readiness evaluation:

- A. **RC for operational readiness evaluation:** Not Applicable

- B. Operational readiness evaluation Management Decision:** Upon completion and delivery of the final CAT report, OS7 will have made a formal documented decision whether to proceed with the operational readiness evaluation. This management decision will have been based on recommendation to proceed in the final CAT report provided by OPS11. If the decision is to proceed with the operational readiness evaluation, OS7 will have notified OPS11 to procure the planned quantity of equipment components necessary for the operational readiness evaluation. Under special circumstances, the decision to proceed with the Operational readiness evaluation could be made based on the preliminary CAT report provided no major changes are expected in the final CAT.
- C. Prepare operational readiness evaluation plan:** OS7 will have prepared and distributed the operational readiness evaluation plan prior to start of the operational readiness evaluation. This plan identifies the operational readiness evaluation locations, schedules, responsibilities, procedures, metrics, and evaluation criteria, and deliverables (data, reports, evaluations, and recommendations) for successful completion of the operational readiness evaluation.
- 1. Operational readiness evaluation Locations and Schedule:** The operational readiness evaluation locations will have been determined by OS7 in coordination with the NWS Regional COOP Managers (RCPMs). The sites selected for the operational readiness evaluation were chosen to ensure a representative sample of operational locations are evaluated. The criteria for selection include: site system configuration, site communications interfaces, and diversity of climatic regimes. Selection of operational readiness evaluation locations will be made prior to start of the operational readiness evaluation. The test dates were determined by OS7 prior to the start of the operational readiness evaluation. The sites selected for the operational readiness evaluation are identified in Appendix IV. See the operational readiness evaluation plan for further details.
  - 2. Schedules:** OS7 will have determined all schedules for the operational readiness evaluation. This includes schedules for delivery and installation of FPU components, start, duration, and end dates for the operational readiness evaluation, and report preparation period. These schedules will have been documented in the operational readiness evaluation plan.
  - 3. Purpose and Scope:** The primary purpose of the operational readiness evaluation is to determine if the FPU performance and operational availability meet objective standards as described in the evaluation criteria. A secondary purpose is to uncover and fix any latent defects in the FPU before OI.
  - 4. Responsibilities:** Those offices or individuals tasked with specific roles (lead

and/or support), functions, and activities for conducting the operational readiness evaluation will have been identified by OS7 and documented in the operational readiness evaluation plan.

5. **Procedures:** The specific activities and contingencies (if needed) to be performed during the operational readiness evaluation will have been described by OS7 and documented in the operational readiness evaluation plan.
  6. **Metrics:** The data to be collected, tabulated, and evaluated will have been described by OS7 and documented in the operational readiness evaluation plan. These data will form the basis for any reports, conclusions and recommendations.
  7. **Evaluation criteria:** The specific performance measures and their pass/fail standards and rules for evaluation will have been established by OS7 prior to start of the operational readiness evaluation and documented in the operational readiness evaluation plan.
  8. **Deliverables:** The content and format of operational readiness evaluation reports, evaluations and recommendations will have been established by OS7 prior to the start of the operational readiness evaluation and documented in the operational readiness evaluation plan.
  9. **ORE Activities:** A brief list of FPU operational readiness evaluation activities is contained in Appendix I.
- D. Operational readiness evaluation Logistic Support Plans:** OS7 in coordination with OPS12 will have ensured the FPU Mod Note is prepared and available, and the Provisioning Parts List (PPL) is implemented in the Integrated Logistic Support ( ILS) system by the start of the operational readiness evaluation. Whole system spares will be used.
- E. Operational readiness evaluation Maintenance Coordination Support:** OPS11 will have coordinated plans for installation and maintenance of the operational readiness evaluation Modification Kits with the NWS regions, and the NWS REP responsible for each operational readiness evaluation site prior to start of the operational readiness evaluation.
- F. Operational readiness evaluation Documentation Support:** All necessary documentation will be delivered to the NWS regions and the test sites prior to start of the operational readiness evaluation. Documentation includes: FPU Installation Mod Note prepared by OS7 and issued by OPS12; operational readiness evaluation plan produced by OS7; “Observer Instructions for FPU” produced by OS7; “WFO Instructions for Data Key

Exchange” produced by OS7; and “COOP Station Visitation Guide for FPU Stations” produced by OS7.

## 2.4 Operational readiness evaluation Activities

This section describes the activities which must be completed during and before the end of the operational readiness evaluation. This description identifies the office responsible for completion of each activity. These activities include:

- A. **Acquisition of operational readiness evaluation Units:** Upon notification from OS7 to proceed with the operational readiness evaluation, OPS11 (acting as the COTR) will have initiated contract action to acquire the planned operational readiness evaluation equipment and coordinate the delivery of the equipment in accordance with the Integrated Logistic Support (ILS) plan (See Section 3.1.1)
- B. **Verify Start of operational readiness evaluation:** OS7 will have informed the test team of the times, places, and procedures for the operational readiness evaluation. This will have been done through ongoing coordination and formal issuance of the operational readiness evaluation plan.
- C. **Data Collection and Analysis:** All necessary data will have been collected, compiled and checked for quality and completeness in accordance with the operational readiness evaluation plan. This process will be managed by OS7.
- D. **Verify Draft Operational Implementation Plan (OIP):** A key element of the operational readiness evaluation is the verification of the implementation procedures in the draft OIP. In effect, the operational readiness evaluation is a “dry-run” for the operational implementation. OS7 will have ensured the draft OIP procedures were followed during FPU component installation and checkout at the operational readiness evaluation locations. OS7 will have ensured all noted discrepancies are rectified and inform OPS22 of any necessary modifications which need to be included in the final OIP.
- E. **Verify Completion of Operational readiness evaluation:** If the operational readiness evaluation was completed successfully, OS7 will have informed the test team that full implementation of the FPU can commence. If the test had a significant failure, this may have inhibited full implementation until the problem is resolved. A new operational readiness evaluation will be conducted following corrective action.
- F. **Operational readiness evaluation Report:** A preliminary operational readiness evaluation report will have been prepared and issued by OS7 for management review as the operational readiness evaluation nears completion. This includes an assessment of all outstanding TTRs and a recommendation whether to proceed with the follow-on full scale

OI. OS7 will have completed the final operational readiness evaluation report prior to start of the OI, or as soon after the start as possible.



### 3.0 PRE-OPERATIONAL IMPLEMENTATION (OI) ACTIVITIES

This chapter gives a brief overview of the activities which immediately precede and lead to OI activities. These pre-implementation activities are the transition between the operational readiness evaluation activities and OI activities. The sections in this chapter describe the pre-implementation activities necessary to initiate the follow-on implementation activities and identify the office(s) responsible for their accomplishment. These activities are planning/decision activities, logistic support activities, configuration management, and operational support activities. They are accomplished in parallel and are completed by the start of the OI which occurs when the new FPU is installed and operationally activated at the first site following completion of the operational readiness evaluation. The following activities should be accomplished before the start of the OI.

#### 3.1 Planning/Decision Activities

This section describes those plans and associated decisions which must be completed before OI. This description identifies the office responsible for completion of each plan or related decision. This is a dynamic process with variations from the norm. These planning/decision activities include:

- A. **Integrated Logistic Support (ILS) Planning:** Not applicable because of whole unit spares concept for FPU.
- B. **Depot Spares Modeling:** Expected Mean time Between Failure (MTBF), Reliability, Maintainability, Availability (RMA), system Expected Life Cycle (ELC), and number of Line Replaceable Units (LRUs) are among the variables used by OPS14 to run a depot spares model needed to operationally support the FPU. This number will be provided to OS7 prior to full scale production management decision.
- C. **RC for OI:** Not Applicable
- D. **Full Scale Production and Acquisition Management Decision:** OS7 will notify OPS11 (acting as the COTR) whether to proceed with the operational procurement. This notification will customarily be made upon receipt of the final CAT report and recommendation to proceed with the OI *and management concurrence with the final report and recommendation*. If the final CAT report does *not* support proceeding with the OI, OS7 will suspend procurement activity until the critical issue(s) cited in the report are satisfactorily resolved. The actual procurement may occur in batches and staggered delivery dates which coincide with the planned deployment schedule.

- E. Full Scale OI Deployment Decision:** OS7 will have made the management decision to begin full scale operational implementation (deployment and installation) of the FPU. This decision will typically be made upon receipt of the final operational readiness evaluation report and recommendation to proceed with the OI, *and management concurrence with the final operational readiness evaluation report*. If the final operational readiness evaluation report does not support proceeding with the OI, OS7 will suspend deployment and installation activities until critical issue(s) cited in the report are satisfactorily resolved. The actual deployment and installation may occur in batches to coincide with the procurement schedule. The criteria for batch composition include, among others, political exigencies, operational continuity risks, and maintenance costs. *In the case of the FPU, there is only one procurement batch consisting of 309 FPUs. Only approximately 265 sites are available for operational implementation. The remainder are used for spares, testing, and training.*
- F. Prepare OI Plan:** OPS22 will have developed and coordinated the execution of the OIP for the FPU. The OIP defines all activities for successful completion of the FPU OI. This document fulfills that objective.
- G. Identify OI Installation Locations:** OPS22 will coordinate with the RCPMs to initially identify candidate FPU locations. OS7 will coordinate the final selection of FPU locations in the weekly regional initial issue group with the RCPMs four weeks prior to scheduled initial issue, and coordinate this selection with OPS12 two weeks prior to scheduled initial issue.
- H. Develop OI Strategy:** A key element of the OI plan is the implementation strategy. Since not all FPU kits will be initially available to all technicians, a distribution and installation strategy is needed to ensure a smooth implementation. Distribution will be accomplished via initial issue by OPS12. Installation will be accomplished by the DAPM/HMT or other WFO staff as designated by the MIC. OPS22 will establish the initial issue strategy and the installation sequence strategy for the FPU kits. The basic elements of these strategies are described below.
- 1. Initial Issue Strategy:** . The FPU-I will be implemented at approximately 265 sites. This includes 15 sites in the operational readiness evaluation and approximately 250 other operational sites. These sites are tentatively identified in Appendix III as priority # 1 sites. The uncertainty in identifying the FPU implementation sites far in advance stems from the ever-changing composition of the pool of F&P sites from which FPU sites are drawn. To minimize the uncertainty, the RCPMs will identify the next imminent weekly group of FPU implementation sites within their region four weeks in advance of initial issue for that group (see below for details). Initial issue will rotate among the regions on a weekly basis at the rate of 10-15 sites per week. This process will take 17-25 weeks to complete. Initial issue will commence upon OS7 certification of

successful completion of the FPU operational readiness evaluation, OPS2 formal issuance of the FPU Implementation Plan, and OPS22 direction to OPS12 to begin the operational implementation initial issue process. At that time OPS12 will direct NLSC to begin sending FPUs to designated WFO(s) each week within the 10-15 FPU/week initial issue constraint, in accordance with the sequence strategy described next in this plan. Each week the initial issue will rotate from one region to another in the following order: Eastern, Central, Southern, Western, Alaska, Pacific. When a region has received all designated FPUs, it will be dropped from the initial issue rotation. OPS12 will initial- issue FPU-I installation kits to the responsible WFOs in accordance with the installation sequence described below.

2. **Installation Sequence Strategy:** The first group of FPU sites to be implemented are the 15 sites included in the operational readiness evaluation. These sites are declared operational upon successful conclusion of the operational readiness evaluation process. The remaining group of approximately 250 sites will be initial issued by OPS12 at the rate of 10-15 FPUs per week. The RCPMs will determine the composition of FPU sites in the regional weekly initial issue and installation sequence. The initial issue sequence determination will be based on the following priority: 1) WFOs which have FPU locations participating in the New England High Resolution Temperature Project (Eastern Region only); 2) WFOs with FPU locations designated as collocated with Climate Reference Network (CRN) sites; 3) WFOs whose FPU locations most urgently need the FPU installed based on maintenance costs, and/or operational considerations. *To minimize storage and scheduling difficulties at the WFOs with multiple FPUs, only one FPU should be scheduled for initial issue to a WFO in a given week. The WFO should install the FPU before the next scheduled delivery.* The weekly initial issue and installation schedule in each region is left to the RCPMs, however, as the weekly initial issue rotation returns to their region they must coordinate their selected weekly FPU initial issue group with OS7 and OPS22 four weeks prior to the scheduled weekly initial issue. Throughout the implementation, OS7 will provide OPS12 two weeks notice which sites are included in the next regional weekly initial issue group. This will allow sufficient time for last minute adjustments. OPS22 will monitor initial issue and installation progress, and make minor adjustments to this sequence as needed.

### 3.2 Logistic Support Activities

This section describes logistic activities which must be completed before the start of the OI. This description identifies the office responsible for completion of each activity. These activities include:

- A. **Procurement:** Full production and procurement of the FPU and delivery to NLSC will be managed by OPS11. This function includes serving as COTR. Upon notification of the full production contract award approval by OS7, OPS11 coordinated the issuance of the production contract with the Contracting Officer (CO). A production rate and procurement schedule was established by OPS11 at time of contract award.
- B. **Logistic Support Strategy:** All procured full production FPUs will be entered into the supply channel through the NLSC. OPS14 will establish a national stock number for the FPU kit. The OS7 prepared, OPS12 issued FPU Mod Note will inform field technicians how to order repair parts for this kit.
- C. **Installation and Maintenance Coordination:** OS7 will coordinate with the RCPMs and respective WFOs all activities for installation and maintenance of operational FPUs at designated locations in consonance with the planned OI installation sequence. These activities include designating and scheduling staff for installation and check-out of the FPU, ensuring all FPU and support equipment are available, ensuring all necessary maintenance documentation is provided and ensuring all necessary maintenance training is completed.

### 3.3 PRE-OI Configuration Management Activities

This section describes the Configuration Management (CM) activities for the FPU during the pre- and post-OI period. The CM activities assure that the system performs as required and that future changes and modifications will be compatible with the implemented systems. The CM activities apply to a complete system. **Because the FPU is only one component in a larger suite of COOP sensors and equipment, it does not meet the threshold degree of complexity and therefore the CM activities are not applicable.**

### 3.4 Pre-OI Operational Support Activities

This section describes those documentation, training, user notification, and validation activities which must be completed before the start of the OI. This section identifies the office(s) responsible for completion of each activity. These activities include:

- A. **Documentation:** The following documentation will be provided to the implementation and operational personnel at the responsible WFO prior to OI of a given site:
  1. Engineering FPU Mod Note will be prepared by OS7 and provided to WFO technicians by OPS12 for installation and follow-on maintenance activities. This will occur prior to the start of scheduled OI of the first full production FPU.

2. Operational Release Notes - Not applicable
  3. Any update to Weather Service Operations Manual (WSOM) Chapters or its replacement Policy & Procedure Directives will be provided by the appropriate Weather Service Headquarters Office to the WFOs prior to Operational Implementation. OS7 will coordinate production and distribution of the updates. OPS22 will monitor and ensure timely compliance.
- B. Training:** All training for responsible operators and maintenance personnel will be completed prior to Operational Implementation. This will include production and delivery of all training materials, completion of training sessions, and documentation/certification of completion of training. The OPS11 COTR will obtain all maintenance training materials from the contractor and provide them to the appropriate agency office responsible for providing formal maintenance training (i.e., the NWS Training Center in Kansas City (NWSTC)). The NWSTC will compile the supplied training materials into a training course curriculum and training modules and conduct periodic training classes. Supplementary distant learning modules will be developed by the NWSTC and provided to the WFO. All observer training materials will be provided by OS7 to the responsible WFO for instructing the Cooperative Observers in their area of responsibility in the use of the FPU equipment. The WFO will provide local observer training in operation and simple maintenance of the FPU equipment. The following materials will be provided to the WFO:
1. Maintenance training materials will be provided by NWSTC.
  2. Observer training materials will be provided by OS7.
- C. Pre-Implementation User Notification:** User notification is needed because of a fundamental change in the measuring method. A dynamic spring balance arm mechanism will be replaced by a static spring - load cell configuration. Although the measured output is unchanged, users still need to understand the different method used to obtain the output. Prior to initial operation implementation, OS7 will prepare and disseminate a user notification explaining the differences in the FPU particularly the measurement differences. This notification will be disseminated to NCDC for inclusion in their monthly publications and postings on their Web page(s), and also to the WFOs for their public relations efforts.
- D. Verify completion of all Pre-OI Activities:** The preceding activities must be completed before commencement of the OI activities. The OPS22 Implementation Manager will ensure all prerequisite activities are verified as completed. Furthermore, OPS22 will inform the implementation team of the schedules, responsibilities, and procedures for the OI. This will be done through ongoing coordination and formal issuance of the OIP.



## 4.0 OPERATIONAL IMPLEMENTATION (OI) ACTIVITIES

This chapter gives a comprehensive description of the OI activities. The sections in this chapter describe the implementation activities necessary to initiate operational activation of the product improvement and identify the office(s) responsible. These activities include: Implementation Management Activities; Acquisition Activities; Installation Activities; and Implementation Activities. They are accomplished in parallel during the OI activity phase.

### 4.1 Implementation Management Activities

This section describes those activities to initiate, monitor, coordinate, and manage change during the implementation process. The main aspects of implementation management are initiation, oversight, and monitoring. Initiation responsibilities are described in subsection A (below). Oversight responsibilities and the office(s) responsible for carrying out the oversight are described in subsection B (below), and check list monitoring and documentation responsibilities are described in subsection C (below).

- A. **Implementation Management Decision:** Upon successful completion of the FPU operational readiness evaluation, a report will be written by OS7 and sent to the designated Test Review Board (TRB) for consideration whether to proceed with a full, or a series of partial implementations. OS7 will designate the composition of the TRB. The TRB recommendation will be provided to the OS7 program manager who will make the management decision whether to proceed with operational deployment and implementation. Specific sites for deployment will be identified and coordinated with OPS22.
  
- B. **Oversight Responsibility:** OPS22 has overall responsibility for managing and coordinating the OI activities. These responsibilities include ensuring the implementation is executed according to plan and coordinating any necessary adjustments with other key participants. This includes coordination with: OPS11 for managing the successful completion of all prerequisite testing (FAT, CAT) prior to OI; OS7 for managing the successful completion of all prerequisite operational readiness evaluation activities prior to OI, and preparation of documentation and directives for installation, ongoing maintenance, and operation; OPS11 for monitoring acquisition and delivery of MOD KITS and other necessary material for implementation to NLSC; OPS14 for managing the logistics supply, repair; OPS12 for issuing the FPU Mod Note and managing the initial issuance of FPU MOD KITS and other materials, and the installation and maintenance activities; and the NWS RCPMs for managing and coordinating all implementation activities and schedules within their respective regions.

The RCPMs have a unique responsibility to fine tune and manage the implementation sequence within the region, and coordinate with the local WFO to resolve implementation issues and ensure a successful implementation. The RCPMs will compile and forward 30-

day implementation status reports to OPS22 via e-mail. These status reports will include the newly completed Checklist, Part B and the 30-day Evaluation Reports from the WFO. The status reports will only be forwarded to OPS22 when the problems noted by the WFO either cannot be resolved at the regional level or have national impact.

- C. **Check List:** A key component of the oversight responsibility is monitoring the status and progress of the implementation. A two part check list has been developed to assist in this activity. The purpose of the check list is to ensure all essential activities described are completed as scheduled. The check list follows the general organization of this plan. See Appendix II for FPU Operational Implementation Check Lists.

**Part A:** This part is completed once by OPS22. It applies to all locations subject to OI. It is completed prior to the beginning of the OI process for the first full production FPU .

**Part B:** This part is initially completed by the responsible WFO for each site which is implemented. The Meteorologist-In-Charge (MIC) at each WFO is responsible for ensuring this check list is completed and sent forward in a timely manner (within 5 working days after completion of the 30-day evaluation period). This includes annotating the check list with the completion dates (mm/dd/yy) of those items for which the WFO is designated as the Office of Primary Responsibility (OPR), and attaching a narrative 30-day Evaluation Report which describes any problems encountered and any solutions found or recommended. Both the check list and narrative will be retained on site for six months. A copy will be forwarded via e-mail to the RFP upon completion only when the problems either cannot be resolved at the local level or have regional or national implications. The RFP will compile these check lists and narratives into a monthly e-mail status report to OPS22 only when the problems noted by the WFO either cannot be resolved regionally or have national implications.

## 4.2 Acquisition Activities

Acquisition oversight responsibilities are shared by OPS11 and OPS14. OPS11 will insure the contracted FPU parts and components are delivered to NLSC. OPS14 will insure these parts and components are put into kits, stocked at NLSC, and issued to WFOs upon registration.

- A. **Verify Start of OI:** OPS22 will verify the start date of the OI.
- B. **Monitor & Validate Delivery:** As the COTR, OPS11 will monitor and ensure timely delivery of all planned production units to the NLSC. Any discrepancies or delays in scheduled delivery of the FPU to NLSC will be reported by NLSC to OPS11 in a timely

manner (within 5 working days after discrepancy is discovered). OPS11 will monitor quality assurance on units being delivered to the NLSC throughout the production cycle, report any discrepancies, and provide remediation recommendations to the CO.

- C. **Stock Kits at NLSC:** The new FPU and associated parts needed for installation will be stocked as a kit at NLSC. A National Stock Number (NSN) will be established by the Logistics Branch (OPS14) for this kit. This kit will be initial issued by OPS12 to the appropriate WFO for each scheduled installed site during the operational implementation phase. OPS14 will manage all logistic support for the implementation of the new Cooperative Observer Program FPU . NLSC will manage inventory of all necessary supplies, spares, and modification kits, and filling orders from field technicians for dissemination of FPU spares kits.
- D. **Requisition Kits from NLSC:** The first kit will be initial issued by OPS12 to each appropriate WFO from the stock at NLSC. For all subsequent kits, the NWS REP will requisition the appropriate FPU spares as needed. **Note: For the FPU only whole system spares are available. Ordering spares and returning equipment to the National Reconditioning Center should be done in accordance with published guidance from OS7.**

### 4.3 Installation Activities

- A. **Downloading of Archive:** Not applicable.
- B. **Installation & Checkout:** Field technicians will perform installation and checkout of the FPU in accordance with the Installation FPU Mod Note. Generally this process will take about two hours or less. Key activities include: 1) Prepare the existing gauge for change out; 2) Install load cell assembly; 3) Mount solar panel; 4) Set date and time and set up GMA; 6) Calibrate Load Cell; 7) Check out GMA function, and; 8) Verify Data Key Operation.

### 4.4 OI Monitoring & Coordination Activities

- A. **Installation Notification:** Upon successful completion of installation and checkout, the NWS REP will prepare and submit a new WS Form B-44 to NCDC, and update the EMRS and the CSSA in accordance with FPU Mod Note and notify, via E-Mail, the responsible WFO, the RFP, and the AOMC of this occurrence. This action should be completed within 5 working days after successful installation and checkout.
- B. **Initiate Maintenance Monitoring and Confirm Operations:**

1. **Maintenance Monitoring:** Upon commencement of operational implementation, the WFO will begin routine maintenance monitoring.
  2. **30-Day Evaluation Report:** The WFO will also conduct a close 30 consecutive day meteorological monitoring and evaluation of the data from the newly implemented site to ensure the data are complete, consistent with expected local conditions or independently confirmed as representative of unique meso-scale phenomena, and the system is operating normally. All discrepancies will be noted and reported to the RCPM in a timely manner. Upon the conclusion of the 30-day monitoring period, the WFO will complete and forward to the RFP a narrative report on the results of the monitoring and evaluation along with any recommendations. The report shall include the identification of the location evaluated, the dates of the evaluation, the office and person conducting the evaluation and the narrative. The narrative shall include a description of any discrepancies found which relate in any way to the implemented change, and any solutions which act on the discrepancy. Both the check list and evaluation report will be retained on site for six months. A copy of the report and narrative will be forwarded via e-mail to the RCPM within 5 working days after completion of the 30-day monitoring period only when the problems either cannot be resolved at the local level or have regional or national implications.
  3. The RCPM will closely monitor the status of the installation, checkout and OI. The RCPM will conduct periodic teleconferences with the field to assess installation, maintenance, and meteorological performance. When necessary, they will initiate timely corrective actions which are beyond the capability of the local WFO. They will also collect and compile the 30-day implementation reports from the WFOs and forward them in monthly status reports to the OPS22 Implementation Manager via e-mail only when the problems either cannot be resolved at the regional level or have national implications. OPS22 will coordinate with the designated OPRs to ensure the remaining items are completed.
- C. **Installation Status Reporting and Coordination:** OPS22, assisted by OS7, will monitor the installation and implementation status of every site from information contained in various data bases (e.g., EMRS, CSSA, CMIS, MIRS), and monthly reports provided by the RFPs, OS7 will assist OPS22 to prepare weekly implementation status reports from these data. These reports will be provided through the COOP Implementation List Server: (Cooperative Observer Program\_Implementation@infolist.nws.noaa.gov). Anyone wishing to join this list server should submit their request to [david.mannarano@noaa.gov](mailto:david.mannarano@noaa.gov). OPS22 will use these reports to provide weekly staff note updates for mid- and upper-level management on the status of the implementation, and initiate remedial coordination actions to resolve any difficulties and keep the implementation on schedule. OS7 will assist OPS22 to ensure that drafts, updates, data bases, and other documents related to the formal

Implementation Plan which are too large for the list server will be announced on the list server and posted on the Surface Observing Program Web Site:  
**<http://www.nws.noaa.gov/ops2/Surface/index.htm>**.

**D. Post-Implementation User Notification:** Not Applicable



## 5.0 POST OI ACTIVITIES

The completion of the OI at each location marks the transition to post implementation activities. This chapter gives a comprehensive description of the post-OI activities. The sections in this chapter describe the post-implementation activities necessary to integrate the new FPU into routine ongoing operations, and identify the office(s) responsible. These activities include: Operational Quality Control; Documentation; Disposition of Old Equipment; and Climate Continuity Study, as applicable. They begin immediately upon operational activation and are accomplished in parallel.

- A. Operational Quality Control:** The responsible WFO will continue normal monitoring of the operation of the newly installed FPU beyond the initial 30-day close monitoring period. This will ensure proper ongoing operation of both the installed unit and the entire system. The WFO will perform maintenance on system components for which they are responsible. Any FPU parts returned to National Reconditioning Center (NRC) which are still under warranty will be reported by NRC (OPS16) to the FPU COTR, OPS11.
- B. Documentation:** Five operations are necessary to ensure proper documentation of changes to Cooperative Observer Program. They are:
- 1) Data entry into the EMRS;
  - 2) Submission of WS Form B-44 to NCDC
  - 3) Data entry into the CMIS,
  - 4) Data entry into the MIRS,
  - 5) Data entry into the CSSA.

The EMRS update is performed by the EI Tech for their share of the maintenance as appropriate. OPS12 will monitor the EMRS update status. The CMIS will upload data from EMRS. OPS13 will ensure this action is accomplished. The WS Form B-44 will be completed and sent the NCDC by the NWS REP in accordance with OS7 procedures in NWSI\_\_**(NEED INPUT FROM OS7 HERE)**\_\_\_\_\_. The CSSA will be updated by the NWS REP in accordance with OS7 procedures in NWSI\_\_**(NEED INPUT FROM OS7 HERE)**\_\_\_\_\_. The MIRS will be automatically update information from EMRS (through CMIS) and CSSA. OPS22 will ensure the MIRS staff manage the MIRS database to produce timely and accurate reports, charts, and other information for tracking the status of the FPU.

- C. Disposal of Old Equipment:** After the installation has been completed, package and ship the old F&P gauge parts to the National Reconditioning Center in accordance with established NWS disposal policy and specific instructions in the FPU Mod Note.
- D. Climate Continuity Study:** The FPU modification changes the way the gauge measures catch. A 1-2 year Climate Data Continuity Study will therefore be conducted by OS7 at selected sites to document any systemic differences from the old configuration and for

generation of a transfer function for use by NCDC for normalization of data from the F&P and FPU gauges. OS7 will prepare a Climate Continuity Study Plan and manage the execution of this plan