ORDER

6470.33A

CONTROL OF POWER, SPACE, AND ENVIRONMENTAL INTERFACES AT EN ROUTE AIR TRAFFIC CONTROL FACILITIES

September 30, 2005

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

Distribution: A-W(UA/ND/SD/BZ/CA/RS/OS/OP/NI/SR)-2; A-Z(CB/CX)-2; A-X(AF)-3; A-FAF-0(STD)

Initiated by: En Route and Oceanic Services

RECORD OF CHANGES

DIRECTIVE NO. **6470.33A**

CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL	CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL

FOREWARD

This order establishes and provides policy, process, and requirements for managing interfaces between en route facilities and National Airspace System (NAS) systems. The En Route and Oceanic Services and En Route Facilities Planning and Modernization Group manage changes introduced into en route operational facilities. Significant effort is expended implementing new NAS systems into en route facilities. Similar effort is given to modernize, improve, and sustain those facilities. These efforts require standard processes and configurations for maximum efficiency.

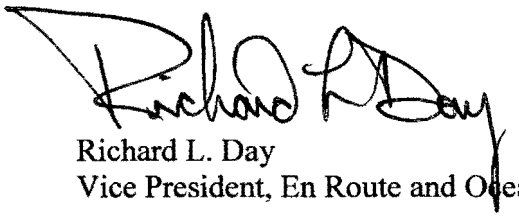

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TABLE OF CONTENTS

CHAPTER 1. GENERAL

1. PURPOSE. This order establishes and provides policy, process, and requirements for managing interfaces between en route facilities and National Airspace System (NAS) subsystems. The order also provides an authorization process required of subsystem programs to obtain approval to modify en route facility interfaces. It provides direction regarding the implementation and facility management for Air Route Traffic Control Center (ARTCC), and combined Center Radar Approach Control (CERAP) programs and promotes standardization for the benefit of all stakeholders.

2. DISTRIBUTION. This order is distributed in Washington headquarters to Group level in System Operations, Operations Planning, Technical Operations, En Route and Oceanic Services, and Finance; to appropriate levels in the Technical Operations Service Areas; and to all Technical Operations field offices with a standard distribution.

3. CANCELLATION. This order replaces FAA Order 6470.33, Control of Space at Air Route Traffic Control Centers, dated January 28, 1982. FAA Order 6650.9, Requirements for Area Control Facility (ACF) Under the Floor Cabling, dated October 8, 1991, and FAA Order 6950.15B, ARTCC Critical Load Circuits and Configuration, dated April 10, 1986, are cancelled.

4. EFFECTIVE DATE. This order is effective upon signature.

5. EXPLANATION OF CHANGES. This order updates and consolidates FAA Orders 6470.33, 6650.9, and 6950.15B as follows:

a. Revises Title.

b. Incorporates, modifies, and expands the policy formerly included in FAA Order 6650.9 and simplifies the policy and content of FAA Order 6950.15B.

6. BACKGROUND. The policy and procedures provided in this order are necessary instruments for effective facility management and primary tools in near term and future planning. Facility change resulting from the introduction of new subsystems, operating procedures, facility support system changes and facility modernization generates the need for new or updated Facility Power Panel Schedule (FPPS) data, baseline drawings, and as-built drawings. These products generate planning documents such as facility end state drawings and transition plans.

a. Cooperation, adherence to standards and procedures, and well-organized planning result in the most efficient use of NAS program resources. Additional benefits include reduced implementation costs and a degree of assurance that subsystems will operate within the predicted reliability, maintainability, and availability (RMA) needed without interference from or to other NAS subsystems.

b. The similarities of ARTCC facilities achieved through configuration management and standardization provide financial and program benefits during the facility lifecycle. Financial

benefits include reduced costs needed to prepare one standard design instead of multiple designs and savings from the ability to let national designs and construction contracts for multiple facilities.

7. DEFINITIONS. Several primary definitions that may be unfamiliar or may clarify their usage within this order are included below:

a. **Facility Interface Requirements/Control Document (FIR/CD).** The FIR/CD specifies the requirements for an interface between a given facility and a given subsystem. Acquisition offices responsible for the implementation of new subsystems or modification of existing subsystems into the en route facility are responsible for preparing an FIR/CD. The FIR/CD provides all necessary information required for space and power National Airspace System (NAS) Change Proposals (NCP), HVAC (heating, ventilation and air conditioning) characteristics, and other physical interfaces required for the operational interface and integration of the proposed NAS subsystem to an en route facility. The FIR/CD is developed in phases in accordance with the procedures outlined in paragraph 9, FAA-STD-025, Appendix 1.

b. **Facility Power Panel Schedule (FPPS).** The FPPS is a standardized national database designed to serve as a central management repository of electrical power panel data for FAA facilities power panel configurations.

c. **Critical Bus.** The ARTCC critical bus is the facility conditioned power bus that supports critical and essential air traffic control services.

d. **Essential Bus.** The ARTCC essential bus is the facility power bus that supports facility environmental systems with large motor load demands such as blowers, HVAC and chillers. Normally, sensitive electronic equipment is not connected to this bus.

e. **Building Service Bus.** The ARTCC building service bus is the facility power bus that supports other building power requirements such as lighting and non-motor loads. Sensitive electronic equipment may be connected to this bus, provided the effects of load shedding and possible undesired power loss are considered.

f. **Key Site.** A key site is a facility used for proof of concept assessment or initial deployment validation of a subsystem. Key sites utilize the test bus for initial power-up testing and a "power integrity test".

g. **E-Complex.** The E-Complex is the Technical Operations and Air Traffic operations support area to the ARTCC Air Traffic Control function and is identified in the Standard End State Drawing, STD-D-ARTCC-ES-07, First Floor Plan, Part 3.

h. **Controlled Space.** Controlled space is a physical area of a facility that is subject to a planning process that reserves and restricts use to specific functions or organizations. Controlled space within en route facilities includes ATC operational areas (designated boundaries), equipment areas in support of the NAS, electronic equipment rooms (including automation and communication equipment rooms), critical and essential power generation and distribution equipment rooms, and all areas constructed with raised access flooring.

(1) **End State Space**. The controlled space at the completion of a predetermined period of modernization identified in the End State Drawings in the target year specified.

(2) **Temporary Space.** Temporary space is controlled space available for limited-time use within a modernization period with a different End State space designation. Temporary space is generally used as subsystem transition space.

(3) **Administrative Space.** A physical area of a facility used by management and support staff, e.g., offices, cafeteria, restrooms, janitorial, storage, conferences rooms, classrooms, training rooms, etc., and other facility common areas. Administrative space management is a function of the Facilities Configuration National Planning Team (FCNPT) administered through the efforts of En Route and Oceanic Services, Facilities Planning and Modernization.

(4) **Operational Space.** Operational space is a physical area of the ARTCC where control of air traffic and associated ATC support activities occur. This includes the ATC room, E-Complex area, and other areas directly supporting the air traffic control not included in the administrative space. These areas are managed through the End State NCP process with primary needs and requirements determined by local facility operational characteristics. Space within the Service Operations Center (SOC) subset of the E-Complex is extremely limited. Use of space for replacement or new SOC equipment to support NAS Programs requires space and power NCPs prior to deployment.

(5) **Equipment Space.** Equipment space is a physical area designated for critical equipment (ATC computers, display generators, communications equipment, weather equipment, etc.) that supports air traffic operations. This is the area required for environmental conditioning and electrical power distribution equipment. Equipment space is generally not identified as administrative or operational space, is usually equipped with raised access flooring, has specific environmental characteristic requirements, and appropriate power sources needed for NAS equipment.

(6) **Support Space.** Support space is a physical area required for plant operation that includes areas for chillers, boilers, air handlers, motor control centers, fire protection equipment, etc., and associated facility storage. Plant operations also include facility environmental and electrical power conditioning and distribution and fire protection.

(7) **Site Plot/Grounds.** Site Plot/Grounds are physical areas designated for non-building elements of the facility property. These areas include driveways, parking lots, antenna farms, underground storage tanks, cooling towers and pump house, storage buildings, external security, loading docks, staging areas, utility transformers, etc.

(8) **Permanent External Buildings.** Permanent external buildings are characterized as those having permanent type construction such as basements or full concrete foundations, and are used to perform end state functions. Permanent exterior buildings include power service buildings, childcare facilities, NADIN buildings, security guard buildings, etc.

(9) **Temporary External Buildings.** Temporary external buildings have provisional construction such as trailers, modular buildings, etc., and are erected to satisfy temporary short-

term needs such as temporary administrative space, contractor trailers, temporary medical facilities, etc.

CHAPTER 2. POLICY

8. APPLICABILITY.

a. **Scope.** The requirements and direction of this order apply to all NAS subsystems integrated into an ARTCC en route facility, including NAS subsystems that have reached the requirements development stages on the effective date of this order. The order also applies to all new NAS subsystems, including subsystems advanced under any development process (normal or accelerated variations) or subsystems being substantially modified.

b. **Implementation.** This order provides the procedures an acquisition office must initiate to implement a project and defines the processes for managing the change elements associated with the subsystem-to-facility interfaces. Under extreme and unusual circumstances, i.e., a need for rapid deployment, the acquisition office may initially be granted a temporary exemption to this order to accomplish its task. However, the acquisition office must comply with all requirements in this order prior to permanent connection to any critical power source.

c. **Processes.** NAS programs must incorporate the requirements and processes of this order into subsystem implementation plans and documentation. The information provided through the processes defined in this order assist the service areas in establishing and maintaining facility power and space configuration management.

9. FACILITY SPACE INTERFACES.

a. **General Policy.** This order establishes a process for management of space in en route air traffic control facilities. All space within the perimeter of an ARTCC is managed through the joint efforts of the En Route and Oceanic Services, Facilities Planning and Modernization, and the appropriate facility managers. Space available in most ARTCC areas is assigned nationally on a first come, first serve basis, and obtained through the NCP processes. Administrative space is controlled as a designated area. When space within the ARTCC facilities or grounds is inadequate or unavailable, refer to FAA Order 4420.4, Space Acquisition, for further guidance.

b. **Change Process.** FAA Order 4420.4, Space Acquisition, defines controlled spaces and functional areas, method of initial change documentation, and assigns responsibility for management of the space control process. Changes must be formally coordinated, approved, authorized, and implemented via the specific NCP and FIR/CD requirements and processes defined within this order. Proposals for the changes to ARTCC configuration items (CI's) or functions must be submitted to the appropriate CCB for approval of En Route and Oceanic Services and Technical Operations for approval in accordance with the procedures of FAA Order 1800.66, Configuration Management Policy. In the event of a dispute regarding the need for a space or power NCP, the Power Systems and Facilities (PS&F) and the En Route and Oceanic Services (EOS) CCBs, as appropriate, must make the final determination.

c. **Controlled Space.** Controlled space must be used exclusively for the intended functions. No other permanent activity or equipment is permitted without prior approval of En

Route and Oceanic Services, En Route Facilities Planning and Modernization. Space identified as temporary space, but used for extended periods is considered controlled space, and must fall under the processes and procedures defined in this order. Equipment installed in equipment areas must adhere to the following space requirements:

(1) Working spaces about electrical equipment must conform to the requirements of the National Electrical Code (NEC) and FAA's Human Factors Design Standard, HF-STD-001.

(2) Equipment must not be placed within three feet of an electrical power panel, air handling unit or fire detection/control equipment. Electrical power panels with Solid State Static Automatic Transfer Switches require a clearance of four feet.

(3) ATC console floor plans must be configured to support and not interfere with future operational configurations as depicted in the facility end state drawings.

(4) A minimum of 42 inches clear space in front of each equipment rack is required. Five feet of clear space is preferred to the rear of each equipment rack, but based on space availability and maintenance requirements of the system – it may be reduced to a minimum of three feet. Clear space of adjacent equipment racks may overlap.

(5) Equipment is placed in the allocated space in a manner consistent with facility lighting, and ingress and egress paths.

(6) Eighteen inches of clear space is required adjacent to and within the perimeter of each allocated equipment area boundary. The resulting space will provide access ways through the equipment rooms and may be used for maintenance access.

(7) Equipment placement must not diminish the existing level of facility fire protection.

(8) Equipment installation must not affect the existing facility cabling, unless the facility and ANI agree to changes during the site survey.

d. **Temporary Space Interface Requirements.** The deployment of a new subsystem may require temporary office, administrative, and/or contractor/FAA workspace. This space must be identified by the subsystem's acquisition office and assigned through coordination with the affected facility. Space occupied longer than two years is considered a permanent allocation and must be identified on the space NCP. During the equipment deployment process:

(1) Equipment deliveries must be coordinated such that internal and external space is identified in advance and made available to accept deliveries at an established time.

(2) Predefined and approved staging areas must be used.

(3) Subsystem installation contractors may be assigned space, as available, within the facility or in external trailers.

10. SUBSYSTEM–FACILITY POWER INTERFACE. The subsystem-facility power interface guidance provided in this order must be used by the responsible organizations in

establishing ARTCC electrical power configuration and interface requirements for NAS subsystems. Procedures and practices identified within this order must be accomplished prior to, and for the purpose of, establishing site power configurations and databases and defining facility preparation or construction activities. Before subsystem deployment, all required actions and documentation identified must be completed with acceptable results.

a. **Power Interface Requirements Definition.** En Route Facilities Planning and Modernization recommends that subsystem equipment supporting ATC operations be powered by a critical power source. The approval for critical power connectivity is determined by the subsystem function, that is, the subsystem provides an Air Traffic Control critical or essential service. Generally, the subsystem must be directly involved in the control of air traffic or aid in the quality or efficiency of the control of air traffic, and may be negatively affected by poor electrical power quality. ATC advisory and information services such as weather programs meet the requirements of this approval definition.

(1) All ATC or administrative subsystems that are not assigned critical or essential service status and require high-availability power to prevent long boot-up times due to momentary power loss conditions, should consider the advantages of critical power. This configuration is more desirable than use of numerous Uninterruptible Power Supplies and associated battery systems that might be considered an alternative fix. However, NAS Change Proposals will be required for implementation.

(2) The subsystem must be identified in the appropriate section of FAA Order 6950.2 for critical power connectivity authorization and appropriate power quality testing. NCP approvals must be completed to verify the subsystem's suitability for critical power connectivity. All changes requesting the use of critical power are to be coordinated through En Route and Oceanic Services, En Route Facilities Planning and Modernization. En Route Facilities Planning and Modernization will determine the impact of the change as defined by FAA Order 6950.2 and FAA-G-2100.

b. **Power NCP Need Criteria.** National power NCPs are necessary for subsystem critical power connectivity authorizations. They are also necessary for:

(1) Changes in source voltage and number of phases used by the subsystem.

(2) Modifications to the subsystem resulting in power characteristic changes (power consumption, power factor, current harmonic distortion, and in-rush current).

(3) Subsystem modifications resulting in the need for additional branch circuits or rearrangement of existing branch circuits to subsystem equipment.

(4) Program office upgrades or other subsystem component level changes.

c. **Power NCP Content.** National power NCPs must contain the following information:

(1) Source voltage and number of phases required for each branch circuit.

(2) Power characteristics: Power consumption, power factor, current harmonic distortion, in-rush current.

(3) A request to list the subsystem in FAA Order 6950.2 with the results of the FAA performed or authenticated test results or test methodology used to ensure compliance.

(4) A description of planned per site power testing preceding site implementation.

(5) Identification of the need for a power transfer switch, and the type (mechanical, or fast transfer Solid State Static Automatic Transfer Switch, (SSSATS)) to be used.

> **Note:** If the equipment is 100 percent redundant and has dual power supplies fed from different power panels, there would not be a need for "fast" power transfer. Generally, if power transfer to an alternative power source is required to be less than 150 ms, power must be provided via a SSSATS. The subsystem acquisition program will be required to fund the switch. If no power transfer timing requirements are provided, it will be assumed that a minimum power transfer time of 150 ms is sufficient for the subsystem.

(6) Single line power wiring diagram identifying need for branch circuits and need for power panels with different primary power sources. The diagram must show which equipment is grouped on branch circuits and to which power panel groups the circuits are connected.

(7) Identification of the panelboard(s) planned to supply the subsystem electrical power. Identification of specific circuit breaker positions within the panelboard(s) is optional. This recommendation must make use of the Virtual ARTCC Power Panel Database via FPPS whenever possible. If an appropriate power panel is not available, the subsystem acquisition office will be responsible for the installation cost of providing new panel(s).

(8) A short circuit coordination study, if requested by Technical Operations, NAS Power Services Office (during any pre-NCP contacts or discussions), or by comment during the NCP process. Technical guidance is provided in FAA Order 6950.27, "Short Circuit Analysis and Protective Device Coordination Study".

d. **Exceptions.** National power NCPs are not required for the following situations:

(1) A subsystem change that results in a power characteristic change involving less than 200 V-A variation (not to exceed power panel rated capacity) from a previously approved subsystem configuration. This includes technical refreshers for outdated equipment.

(2) The installation of additional equipment as part of a previously approved scalable subsystem. Regional power panel updates use the identification number of the original power NCP for the subsystem as CCB authorization.

11. SUBSYSTEM-FACILITY POWER COMPONENT REQUIREMENTS. A Memorandum of Agreement between ATO-E and ATO-W defines the responsibility of ATO-E as managing power configurations on the load side of the facility power panels, with the facility power panels being a point of common interest with ATO-W.

a. **Power Wiring.** Power wiring must adhere to the requirements of the NEC and Specification FAA-C-1217, Electrical Work, Interior. When conflicts occur between FAA-C-1217 and the NEC, FAA-C-1217 must govern.

b. **Power Cabling.** Alternating Current power cabling must be segregated from signal/control cable and is to be the lowest tier of cabling under an ARTCC access floor. Power wiring must be shielded by use of metallic raceway (e.g. wireway, rigid conduit, flexible metal conduit, etc.) or by any other method permitted by the NEC. A 1-inch standoff from the concrete floor should be used in the installation of power cable raceway to allow air circulation and avoid water contact.

c. **Power Cable Routing.** Power cables are routed from the facility power panels to the subsystem equipment. Close proximity between power and signal cables is undesirable and it is recommended that parallel runs of power and signal cables be separated by 24 inches. When the vertical planes of power and signal cable intersect, the desirable intersecting angle is 90 degrees. It is realized that adherence to this separation recommendation is not always possible. It is the responsibility of the implementing program to verify that any signal degradation caused by close proximity to power cables is acceptable to the operation of any subsystem affected.

d. **Power Receptacles.** For connection to loads, power wiring may be terminated in either junction boxes or at receptacles. Only locking receptacles must be used under access flooring for critical and essential power. The receptacles should be chosen such that physically unique types are used for the various power services. Notice that the use of straight blade receptacles for building service power under access flooring is permitted for non-ATC circuits.

e. **Isolated Ground Receptacles.** Isolated ground receptacles are not supported by the facility electrical system and should not be used.

f. **Rack Power Receptacles.** Where permitted by the NEC, it is permissible to power equipment from a relocatable power tap (i.e. power strip) connected to critical power. If the power strip uses straight blade receptacles, access to them must be restricted by the equipment's cabinet or some other means to ensure that unauthorized equipment or other loads are not connected to critical power. Obvious identification that the receptacle is a critical power source must be provided. Permanent labeling in 1/4-inch letters is preferred but a facility coordinated, color-coded faceplate is permissible. Non-critical power receptacles are normally provided in racks for powering of test equipment and tools.

g. **Power Panels.** Power panels are to be selected as early as possible and as consistently as possible for all ARTCC facilities. Power panel identification (FPPS assignment) should be made in the initial power NCP for the subsystem.

h. **Grounding.** Grounding of data cables and equipment must comply with FAA-C-1217, FAA-STD-019, and the NEC. FAA grounding requirements often exceed those of the NEC.

Installations must comply with FAA-C-1217 and FAA-STD-019 when the requirements exceed the NEC requirements.

12. POWER TESTING REQUIREMENTS. Power characteristic values must be measured and recorded prior to subsystem deployment. Acquisition offices and the William J. Hughes Technical Center (WJHTC), ATO-E En Route Field Support must comply with the processes and procedures of this order. Power characteristic values are measured and recorded to assess compliance of the subsystem with FAA Order 6950.2. The following documents provide the key test parameters required to satisfy NCP and Order requirements. Where FAA Order 6950.2 is silent on power parameter requirements, there must be compliance with Specification FAA-G-2100, Electronic Equipment, and General Requirements. In all cases, programs must comply with the NEC, and as applicable, FAA-C-1217.

a. **Power Panel Balance.** The multiple phase current load required by the subsystem equipment must be analyzed to ensure that the subsystem power source does not become overloaded or unbalanced due to application of the subsystem load. Refer to FAA-G-2100 for acceptable limits.

b. **Inrush Current.** Peak inrush current of subsystem electronic equipment must not exceed the applicable limits specified in FAA-G-2100.

c. **Power Factor.** FAA Order 6950.2 specifies that the power factor at the service entrance must be within 0.8 lagging to 1.0 leading or, if more stringent, as required by the local utility contract. Power factors of ARTCC electronic hardware must meet the limits specified for $200 \leq KVA \leq 1500$ source generators as defined in FAA-G-2100 as measured at the branch feeder. For testing performed at facilities other than ARTCCs, use the limits applicable to the source generator. Power factor at all other locations must be considered with regard to energy conservation and performance of power sources and power conditioners.

d. **Total Harmonic Distortion (THD).** Facility Environmental Support Unit (ESU) personnel must conduct a Current THD test when equipment is added or removed from a critical power panel. Values must be measured by, and the current THD of the power system must be within, the requirements of FAA Order 6950.2. If the current THD exceeds the required curve for a specific load, an evaluation/analysis must be performed to ensure no adverse impacts to the equipment operation or power distribution system. Current THD must not exceed those provided in FAA Order 6950.2, Appendix 2, Current Distortion.

e. **FPPS Database.** Following the approval of the Power NCP, the facility power panel databases must be updated to indicate the changes introduced by the new or modified subsystem. ATO-E, En Route Facilities Planning and Modernization must update the FPPS Standard ARTCC Database. Authorized regional personnel, per their regular practice, must update the site FPPS databases. A procedural flow diagram of the FPPS process is provided in Figure 1, including portions of the NCP process, virtual panel reservation system, and final documentation.

13. SUBSYSTEM-FACILITY DATA COMPONENT REQUIREMENTS.

a. **Information Technology Areas.** The ARTCC Control Wing basement, Automation Wing basement and the NAS Communications, Navigation, Surveillance, and Weather equipment areas in the Administration Wing basement must be considered Information Technology areas and are subject to the wiring practices for such areas as defined in the NEC. The Operational areas in the Control Wing first floor and Automation Wing first floor are also considered Information Technology areas. Due to the large numbers of operational personnel, under floor wiring in those areas must be plenum rated if the cable is not installed in a raceway, (e.g. conduit, including flexible conduit).

b. **Service Operations Centers (SOCs).** Equipment installed within the service operations center may be connected to the critical power bus if the equipment supports critical or essential air traffic services. All other equipment should connect to the building service bus.

c. **Grounding.** Power interface cables and equipment must comply with FAA-C-1217, FAA-STD-019, and the NEC. Installations must comply with FAA-C-1217 and FAA-STD-019 when the FAA requirements exceed NEC requirements.

d. **Signal Cabling.** Signal or control cabling for new subsystems must be installed in cable trays. When planned in an orderly manner and installed properly, cable trays ensure full access to under floor cables because the cable trays are located in areas designated as non-equipment or aisle areas. Where available, a facility cable tray plan will permit vendors to review the exact path for their cables and not be concerned with interfering with under the floor fire detection systems and other obstructions.

e. **Cable Tray Hardware.** Selected cable tray hardware must be compliant with the NEC, FAA-C-1217, and FAA-STD-019. The cable tray system must permit tray elevation changes and accommodate access to vertical risers. Cable tray standard widths of 6, 12, or 18 inches are acceptable.

f. **Cable Tray Fill.** Cables may be placed in cable trays without being tied down or secured. This permits easier removal of old cables and installation of new cables. It is permissible to bundle cables of the same source and destination. Cable trays must be sized to accommodate the planned cable volume plus 25 percent.

g. **Under Floor Cable Tray Routing.** Cable run areas are typically located behind the equipment racks or consoles, along aisles, and in other areas where space has not been allocated to subsystems. Generally, cable trays should be centered under the 24" x 24" floor panels. It is acceptable, and may be necessary, to provide a double (side by side) cable tray run to accommodate large numbers of cables.

14. SUBSYSTEM-FACILITY ENVIRONMENTAL INTERFACE REQUIREMENTS. The environmental impacts and concerns of new subsystems must be addressed in accordance with FAA Order 1050.1, Policies and Procedures for Considering Environmental Impacts, and the National Environmental Policy Act of 1969 (NEPA).

a. New subsystems must comply with the energy and water conservation mandates of 42 USC 8252-8261, National Energy Conservation Policy Act of 1978, Executive Order 12902, Energy Efficiency and Water Conservation at Federal Facilities, and Order 1053.1, Energy and Water Management Program for FAA Buildings and Facilities.

b. New subsystems must use the existing under floor cooling ventilation and environmental cooling at all locations. If new subsystem requirements for under floor cooling air exceed the available cooling capacity, the subsystem office must be responsible to fund engineering and installation of upgrades to the cooling system.

c. New subsystem equipment must comply with seismic design guidelines developed by the National Earthquake Hazards Reduction Program (NEHRP) and contained in NEHRP recommended "Provisions for Seismic Regulations for New Buildings and Other Structures", Federal Emergency Management Agency (FEMA) Document 302 or with the seismic code applicable to the site installation, whichever is more stringent. In addition, FEMA Document 74, "Reducing the Risks of Nonstructural Earthquake Damage", will be used as a practical guideline for installation of nonstructural components.

d. The subsystem interfaces with the facility through physical attachment to the structural floor or access flooring. The subsystem must introduce a dead load of no more than 125 pounds per square foot.

e. **Exceptions.** Signature authority over any action deemed appropriate is granted the ARTCC manager or CCB secretariat after a catastrophic failure due to environmental or man-made conditions. However, after this action, NCP coordination as determined by the Power Systems and Facilities (PS&F) and the En Route and Oceanic Services (EOS) CCB, Facilities Planning and Modernization is required.

15. REMOVAL OF OBSOLETE INTERFACES. When equipment is replaced by new equipment, a disposal plan for the obsolete equipment and a removal/restoration plan for the former space must be originated by the subsystem acquisition office. The Removal/Restoration Plan must identify the restoration funding source, schedule, and responsibilities. The replaced systems have obsolete facility interfaces that require removal and a programmed effort to restore the areas to safe and usable conditions.

a. **Acquisition Offices.** Acquisition offices providing the new subsystem are responsible for removal of obsolete equipment and restorations of vacated areas, and will submit a removal/restoration plan to the En Route and Oceanic Services, En Route Facilities Planning and Modernization for approval.

b. **Removal/Restoration Plans.**

(1) Removal/Restoration Plans address the removal of obsolete/excess equipment and cables, as well as actions needed to return the vacated area to a safe condition. All unused electrical circuits and associated raceways must be removed from the circuit end outlet to the power source. Vacated areas resulting from the equipment removal process must be restored to a condition that is compliant with Occupational Safety and Health Administration Safety standards and aesthetically equivalent to the immediate adjacent areas. Equipment removal and site restoration activities must be conducted in a manner that will not affect air traffic operations, impede access to critical areas, disturb lighting and must control dust, noise and excess traffic into critical areas.

CHAPTER 3. PROCEDURES

16. GENERAL PROCESSES AND PROCEDURES.

a. **New Subsystems.** Acquisition offices must enter into an FIR/CD development process with the initiation of a Facilities Interface Working Group (FIWG). The completed FIR/CD will provide sufficient information to develop space and power NCPs. The space NCPs are processed through the EF CCB, while the power NCPs are processed through both EF and PS&F CCBs. The FIR/CD is processed through the NAS CCB. NCPs must be developed in accordance with FAA Order 1800.66, National Airspace System Configuration Management, and are mandatory for the deployment of new subsystems. ATO-E Program Operations has a Domain Engineering Review Group (DERG) that provides the input vehicle for new requirements analysis. As a pre-screen, FIWG must coordinate new requirements through the DERG.

b. **Existing Subsystems.** Modifications to existing subsystems require an update to an existing FIR/CD or a revision of current documentation, and submission of appropriate NCPs.

17. OVERVIEW OF THE FIR/CD AND ASSOCIATED PROCESSES.

a. **Initial Phase.** All acquisition offices that desire space or power connectivity for proposed subsystems within the en route environment must forward a memo to En Route and Oceanic Services, En Route Planning and Modernization specifying the known need and intent. The memo must be submitted during subsystem conceptual phases or during the development of the initial Facility Interface Requirements/Control Document as defined by FAA-STD-025.

(1) **Facilities Interface Working Group (FIWG).** The acquisition office must initiate a FIWG to develop and submit an initial FIR/CD to En Route and Oceanic Services, Facilities Planning and Modernization. The FIR/CD will be considered interim until the final iteration is completed and an NCP is processed through the NAS CCB. As a member of the FIWG, En Route and Oceanic Services, Facilities Planning and Modernization will assist in developing and coordinating the final FIR/CD. Acquisition offices must provide copies of all FIR/CD iterations to En Route and Oceanic Services, Facilities Planning and Modernization for facility integration, transition, and end state planning.

(2) **Key Site Selection.** En Route and Oceanic Services, Facilities Planning and Modernization will assist the NAS acquisition office, through the FIWG, in the selection of a Key Site. Acquisition offices desiring the use of a Key Site must coordinate with En Route and Oceanic Services, Facilities Planning and Modernization for approval of a selected facility and target location, development of initial use plans, and facility interfaces. Only facilities with an active test bus adequate to meet the normal power requirements of the proposed subsystem are considered as key site candidates. The selected Key Site must not conflict with the national transition plan.

(3) **Initial FIR/CD.** The initial FIR/CD will contain minimal information. The information provided will be expanded during the subsystem development period. En Route and Oceanic Services, Facilities Planning and Modernization will use the initial FIR/CD as the preliminary planning document for site preparation activities, national transition, and end state planning.

b. **Mid-Maturity Phase.** Following the initial phase, the acquisition office must provide primary and intermediate updates to the FIR/CD to reflect the latest knowledge of the proposed system and initiate the Removal/ Restoration Plan and initiate the Power Requirements Determination.

(1) **FIR/CD**. The FIR/CD must be amended to include:

(a) Refined space requirement, i.e., operational, equipment room, transition, storage and maintenance space requirements at all locations within the facility.

(b) Critical and non-critical power panel requirements, with indications of voltages, breaker size or load, and number of pole positions required.

(c) Power panel reliability and diversity needs.

(d) Physical cooling requirements.

(e) Floor loading values.

(f) Anticipated noise generation levels.

(g) If known, the acquisition office must advise En Route and Oceanic Services, Facilities Planning and Modernization of any cable length/proximity dependencies that pinpoint the need for specific subsystem locations within the facility and drive the final end state drawing locations and changes.

(h) Responsible organizations must perform subsystem power quality testing in accordance with the processes and procedures outlined under Power Interface Testing Procedures of this order. This information is necessary for the completion of the appropriate power NCPs required prior to deployment.

(2) **Removal and Restoration Plan.** The Removal/Restoration plan should be initiated during the program's Mid-Maturity Phase. The Removal/Restoration Plan must be approved prior to the In-Service-Decision (ISD) and must be coordinated with all affected facilities and En Route and Oceanic Services, Facilities Planning and Modernization.

(3) **Power Requirements Determination.** The subsystem acquisition office will develop the subsystem electrical power requirements and negotiate an agreement with En Route and Oceanic Services, Facilities Planning and Modernization and Technical Operations, as required, regarding the facility power source and power panels. To assure that power sourcing will satisfy the subsystem's RMA requirements, acquisition offices must contact En Route and Oceanic Services, Facilities Planning and Modernization to discuss and determine the best means

of powering the subsystem prior to finalizing the power source configurations and developing the NCP for submission. To minimize the impact of a Critical Power Center (CPC) or

(4) **Distribution Panel.** Distribution Panel (DP) failure on air traffic activities, acquisition offices must develop an analysis of a branch circuit configuration scheme such that the loss of power to a CPC or DP would have the least possible impact on air traffic control capability.

(a) Like equipment within a subsystem must be distributed among facility CPCs and DPs on the critical bus to avoid total loss of a subsystem.

(b) Equipment at adjacent ATC operational sectors must be connected to a different power center distribution panel to avoid simultaneous loss of adjacent sectors in the event of a CPC/DP failure.

(c) A subsystem whose operation is dependent on the operation of another subsystem must be powered by the same critical power center to reduce the number of possible power failure points.

(d) Redundant capability subsystems or subsystems with redundant power supplies that power multiple redundant subsystems must be connected to different power centers and distribution panels. Similarly, power supply loads must be distributed among power sources to achieve optimum power configuration beyond the AC power demarcation.

(5) **NAS Power Change Proposal Development.** The NAS subsystem acquisition office is responsible for requesting authorization for the critical power connectivity of the subsystem via an NCP. In order to develop the NCP the following should be considered:

(a) Basic power sourcing configuration to satisfy the subsystem RMA requirements.

(b) Facility power redundancy configuration to support subsystem redundancy configuration requirements.

(c) Minimum power transfer time requirements of the subsystem.

(d) Subsystem redundancy configuration.

(e) Identification of any special power transfer requirements.

(f) Effect of subsystem dual power supplies, if applicable.

(g) Consequences of the subsystem going off-line.

(h) Re-boot time and impact to service.

(i) Electrical power test data or test methodology employed to ensure compliance with the requirements of FAA Order 6950.2.

(j) A recommendation of the specific power panels to be used which may include power panels and circuit breakers for all specific ARTCCs and the virtual facility database. The NCP must contain, at a minimum, the power panel recommendation for the virtual facility FPPS power panel database.

(k) Upon agreement of the planned subsystem configuration, En Route Operations and Oceanic Services, En Route Facilities Planning and Modernization will update the FPPS virtual facility database by marking the approved power source circuit breakers as "RESERVED FOR [subsystem]". These breaker positions will be made available to the subsystem and the CCB for use or reference in the Configuration Control Decision (CCD).

(6) **NAS Space Change Proposals.** A space NCP must be initiated during this phase. In order to develop the space NCP the following should be considered:

(a) Proposed location and proximity to other required equipment interfaces.

(b) Equipment orientation.

(c) Dimensional limits.

(d) Access requirements.

(e) Security.

(f) Total space required, including storage and work area requirements.

(g) Environmental requirements.

c. **Deployment Phase.** Activities will be required prior to and following the subsystem deployment.

(1) **Pre-Deployment.**

(a) The acquisition office must:

1. Prepare the final FIR/CD and power and space NCPs to support the proposed subsystem for completion and final approval prior to subsystem deployment.

2. Provide En Route and Oceanic Services, En Route Facilities Planning and Modernization with information relating to any necessary equipment relocation requirements or any other site preparation requirements essential to the subsystem installation.

(b) En Route and Oceanic Services, Facilities Planning and Modernization must:

1. Develop rough order of magnitude financial estimates for facility modifications required to successfully install the subsystem.

2. Determine the organization(s) responsible for funding the required facility modifications.

3. Analyze the proposed facility interface requirements of the subsystem and the target installation areas.

4. Analyze the proposed subsystem for conformance to the facility interface and other facility standards.

5. Identify and recommend power panels and space for the acquisition office NCPs.

(c) Technical Operations must prepare the facility for the introduction of the new subsystem equipment.

(2) **Post-Deployment.**

(a) The acquisition offices must:

1. Remove and dispose of obsolete equipment, electrical circuits, cables, etc., resulting from the subsystem's installation in accordance with the subsystem's specific Removal and Restoration Plan.

2. Restore the area vacated by obsolete equipment to a safe and aesthetic condition in accordance with the Removal and Restoration Plan.

(b) En Route and Oceanic Services, En Route Facilities Planning and Modernization must:

1. Place the equipment footprint in the national transition plan and the proposed end state drawing.

2. Update the FPPS virtual power panel database.

(c) Technical Operations and the Field Engineering Services must update facility baseline drawings and facility FPPS databases.

18. POWER INTERFACE TEST PROCEDURES.

a. This section provides the test procedures and responsibilities associated with the introduction of new or modified subsystems requiring the utilization of Air Route Traffic Control Center power system interfaces. The use of these test procedures ensures that facility and NAS subsystem configurations are implemented appropriately with their assigned missions.

b. Meeting the respective minimum standards listed in paragraph 12 provides acceptable assurance of subsystem power characteristics. The specified testing process supports the development of the FIR/CDs, defined in FAA-STD-025 and the FPPS base lining efforts defined in other documents.

The tests determine compliance with applicable sections of FAA Order 6950.2 for any portion of subsystem equipment scheduled for installation within an ARTCC. These tests provide assessments of the effects of the subsystem on the ARTCC critical power source to ensure that there are no negative impacts to the power system or other subsystems sharing the power source.

c. Subsystem acquisition offices have the overall responsibility for all testing defined in this order except baseline testing. First site or "key site" critical bus testing is a responsibility of the subsystem acquisition office, but requires the assistance and cooperation of facility personnel. Facility personnel will conduct or oversee facility critical bus testing. Baseline testing is the responsibility of facility personnel.

(1) Facility testing is a critical event as operational equipment connected to critical power panels may be affected in the testing process. All facility testing must be performed in accordance with the procedures defined in paragraph 18.f, Facility Power Quality Measurement Procedures.

(2) Organizations with testing responsibility will ensure that testing is fully documented as required by 1800.66 and submitted to the PF&S CCB and subsystem acquisition offices. Associated baseline data will be added to the FPPS.

d. **Specific Test Processes.**

(1) **Initial Testing.** The subsystem acquisition office must perform initial subsystem power quality acceptability testing in a facility other than an ARTCC or field facility (WJHTC or a contractor facility are acceptable locations). Testing must be completed in accordance with the subsystem contract requirements.

(a) Initial testing is completed with the subsystem configured to replicate the proposed final ARTCC configuration. Each equipment point of connection to a branch circuit in the test setup must be composed of electrical equipment identical to the proposed equipment and the configuration must replicate the proposed final installation configuration. If the equipment test setup cannot be constructed identical to the proposed final configuration, then the power quality testing must be performed on each individual piece of electronics equipment.

(b) Test results obtained using electronic equipment configurations with makes or models that differ from proposed deployment equipment are not acceptable. Perform power quality tests for Power Balance, Inrush Current, Power Factor (PF) and Total Harmonic Distortion (THD) in accordance with the current version of FAA-G-2100 at the time of subsystem contract award. Power quality measurements are taken at the panelboard, branch circuit level.

(c) Test results are used for the subsystem power NCP. Adequate data should also be made available at this time for collection and incorporation into the Facility IRD and space NCPs. Exceptions resulting from failed tests may require a future CCD or other remedial action.

(2) **Remedial Testing.** Remedial testing is power quality testing used to determine the acceptability of the subsystem on the facility ARTCC Critical/Essential Power System (ACEPS) after subsystem modifications to correct failed initial test results.

If corrective action is not accomplished prior to scheduled delivery to an ARTCC, the PS&F CCB may issue a configuration control decision (CCD) specifying the requirement for hardware modifications or last resort remedial testing.

(a) The subsystem acquisition office determines the feasibility of subsystem equipment engineering changes to provide acceptable power quality characteristics. If the engineering changes required to meet power quality standards are deemed impractical or cost prohibitive, last resort remedial testing may be authorized by the CCB, with prior approval of Power System Division, Technical Operations, NAS Power Services Office, and En Route and Oceanic Services, Facilities Planning and Modernization.

(b) Remedial testing may be performed at the subsystem's first deployment site only if an adequate facility test bus is available. If it is determined that the subsystem affects the power system in such a manner that any facility power quality measurement is driven beyond the accepted tolerances, evaluation, re-engineering, and re-testing are required. Follow-up testing with acceptable results is required prior to transfer of the subsystem to the critical bus.

(3) **Subsystem Modifications**. When components of a subsystem are replaced with newer models or with equipment that has been previously tested, remedial testing processes will apply. See paragraph 10.d. of this Order for exceptions.

(4) **Power-Up Testing.**

(a) Power-up testing is on-site testing performed by the subsystem acquisition office on a facility non-critical bus to assure that the equipment has not suffered damage during shipping or installation.

(b) Prior to connection of a new subsystem to the ARTCC facility critical bus, the subsystem program office shall perform power-up testing to assure that the equipment has not undergone any damage during shipping or installation. Power-up testing must be performed with the subsystem connected to the facility test bus or a non-critical bus. The subsystem must be powered on and allowed to reach normal operating temperatures and conditions. Observe the subsystem for abnormal physical conditions, system error, or failure indications, etc. Successful power-up testing is achieved when the subsystem reaches normal operating temperatures and is observed as normal and stable.

(5) **Baseline Testing.** Baseline testing is facility power quality testing of the operating subsystem installed on the facility critical bus. Facility personnel are responsible for baseline testing in conjunction with key or first site testing.

(a) Baseline testing is performed at each site to assure that the effects of new equipment are as predicted at each ARTCC, to establish and maintain site-specific power quality baselines, and to populate or revise the FPPS database. Current baseline data will allow modeling data assessments and predictions for new installations.

(b) Facility or En Route and Oceanic Services, En Route Field Support personnel perform the baseline testing of all critical power panels interfacing with the new subsystem.

During the installation process at each site, facility personnel perform and record before (not necessary if current data is available) and after baseline critical panel test data.

(c) Before and after-testing is a form of baseline power quality testing performed on each ARTCC critical bus prior to and after new equipment installations to evaluate the affect of the subsystem on the bus. After-testing results indicate the bus power quality change that has occurred within the power subsystem and results in a new facility baseline. Facility or Technical Operations personnel usually conduct these tests with the assistance from the acquisition office or William J. Hughes Technical Center, En Route and Oceanic Services, En Route Field Support. At follow-on sites in deployment waterfalls, Facility or Technical Operations personnel complete after-testing and facility baseline updates.

(d) The cumulative after-testing of the subsystem equipment located at each ARTCC represents the fully integrated system baseline interface with the critical bus. Baseline testing is most effective when facility and acquisition office personnel coordinate and cooperate in the installation process.

e. **Facility Power Quality Measurement Procedures.** A progressive comparison of power quality characteristics will be used to determine the subsystem's effect on the facility power system. The following processes must be used to measure the subsystem power quality values and assess standards compliance.

(1) **First or Key Site Power Quality Reference Baseline (Test Bus).** Test the condition of the existing test bus power system at the unloaded power panel to determine the power quality reference baseline. Take pre-subsystem measurements of the Power Panel Balance, PF, and THD. Valid no-load power quality data for the existing test bus power configuration may be used for the power quality reference baseline. The resulting no-load measurements for the Power Panel Balance, PF and THD must be documented.

(2) **First or Key Site Incremental Power Quality Change (Test Bus).** At the first or key site, test the subsystem incrementally as each equipment part of the subsystem is powered to the test bus. The final test increment is at normal operating conditions, providing the total load distribution baseline. This information is used in a final evaluation to determine if the subsystem can be safely connected to the critical bus. This test bus procedure is necessary only for key or first site testing to assure that prior acceptability tests will be replicated on a facility ACEPS system.

(a) Connect subsystem equipment to the test panel. Activate the equipment, one breaker at a time and observe the steady-state voltage, current, watts and volt-amperes, Power Balance, PF and THD (Voltage and Current) using the test instruments, for each incremental change.

(b) When the final breaker is closed, measure and record the above data as the total incremental change for the test bus. Perform the same process on additional panels (if available). Document the resulting test bus measurements for the Power Balance, PF, and THD.

(c) Satisfactory results signify that the equipment is acceptable for connection to a critical power bus.

(3) **Initial Power Quality Baseline - Test Procedure (Critical Bus, All Sites).**

(a) Perform this test at all subsystem deployment sites on all critical power panels populated with new circuits.

(b) Acquisition offices must include this procedure in the facility integration schedule for each site. The procedure is similar to the test bus procedure stated above and may be eliminated if valid before-testing or baseline testing values are on record and available for comparison.

(c) With all new equipment breakers in the "OFF" position, measure the phase values for Power Balance, PF, and THD (voltage and current) at the source input of each power panel. Record the data for reference.

(4) **Incremental Power Quality Change (After) Measurements (Critical Bus).** Perform this test at all subsystem deployment sites on all critical power panels populated with new circuits. The test will culminate in a revised facilities power panel baseline. Acquisition offices must include this procedure in the facility integration schedule for each site. The procedure is similar to the test bus procedure stated above.

(a) Physically connect the equipment to be tested to the critical panel circuit breakers with all new breakers in the "OFF" position and assure that the power quality measurement equipment is connected and functioning.

(b) Using the test equipment, observe the steady-state voltage, current, watts and volt-amps, Power Balance, PF, and THD (voltage and current) as each new breaker is activated. If any test value indicates an out of tolerance condition, then immediately terminate the test and initiate corrective action. Once the final breaker is switched on and all equipment is integrated onto each power panel, record the final power quality characteristics, Power Balance, PF, and THD as the new baseline measurements.

(c) The power interface testing responsibility of the subsystem acquisition office ends with satisfactory subsystem power quality testing at the key or first site. Subsystem acquisition office personnel will perform only the power-up testing at all subsequent sites prior to any connection to facility critical power panels. Ensuing subsystems will be connected to the critical bus with the assumption that the subsystem power quality characteristics are acceptable, based on key or first site testing.

(5) **Results Documentation.** Test bus and critical bus test measurements must be documented for each new subsystem power panel configuration. Branch circuit information, including power quality, is recorded in the FPPS database upon completion of the test procedures.

CHAPTER 4. RESPONSIBILITIES

19. RESPONSIBILITIES.

a. **En Route and Oceanic Services, Director of En Route Program Operations.** The Director of the En Route Program Operations has the overall responsibility for facilities planning and modernization.

b. **Acquisition Office(s).** The acquisition office is responsible for the preparation of NAS Change Proposals; for identification of required en route facility space, critical power connectivity and development of FIR/CDs for new subsystems. The acquisition office is also responsible for obtaining any additional authorizations required for prototype space and power use considerations.

c. **En Route and Oceanic Services, En Route Facilities Planning and Modernization.** The En Route and Oceanic Services, Facilities Planning and Modernization Group manages the modernization and configuration of all en route facilities with specific responsibilities for the ARTCCs, and CERAPs, and is the Office of Primary Responsibility (OPR) for this Order. Facilities Planning and Modernization performs future planning and configuration management for en route facilities on a national basis. Future planning includes establishment of standard end state designs and functions for en route facilities. Configuration management responsibility includes management of en route facilities configuration items, including facility space and power in the current, transitional, and end state. Facilities Planning and Modernization, in coordination with Area Operations Directors and facilities is responsible for facility configuration audits.

d. **Technical Operations.** Technical Operations is responsible for construction services, site adaptation, and project management that provides for timely readiness necessary to accommodate new subsystems at en route facilities. The Technical Operations Implementation Centers are also responsible for preparation of the annual baseline drawings for each ARTCC.

e. **En Route Facilities and Building Systems Team.** The En Route Facilities and Building Systems Team is responsible for en route facilities strategic planning, national level en route facilities configuration management planning and national level transition planning.

f. **Technical Operations, NAS Power Services Office.** The NAS Power Services Office is responsible for the management, modernization and sustainment of facility electrical power systems. This responsibility is shared with the En Route Facility Planning and Modernization Group, ATO-E, and the demarcation of that responsibility is at the individual power circuit breaker panels. NAS Power Services Office reviews en route power NCPs and FIR/CDs as must-evaluators. When in the role of an acquisition organization, this Office is considered to be a development acquisition office and must comply with this Order as such.

g. **Headquarters Configuration Control Board.** The Power Systems & Facilities (PS&F) Configuration Control Board (CCB) is responsible for NCP distribution and comment resolution among the appropriate functional organizations, for all power systems changes. The En Route and Oceanic Services (EOS) CCB performs this function for all space and power connectivity changes, as described in the respective CCB charter and operating procedures.

h. **En Route and Oceanic Services, En Route Field Support.** En Route and Oceanic Services, En Route Field Support at the William J. Hughes Technical Center is responsible for the overall testing of new en route subsystems, including initial power quality tests, and key (or first site) site testing.

i. **Regions.** Regions are responsible for submitting baseline drawings for each facility. Regions prepare case files and NCP depicting the baseline documentation for each en route facility and submit them to the PS&F CCB for configuration control action.

j. **Facility Managers.** The ARTCC Facility Manager responsibilities include supporting the day-to-day activities associated with the implementation and integration of new subsystems, as well as the ongoing configuration management of their facilities and adherence to national standards. Facility Managers are responsible for assuring that the FPPS databases are current.

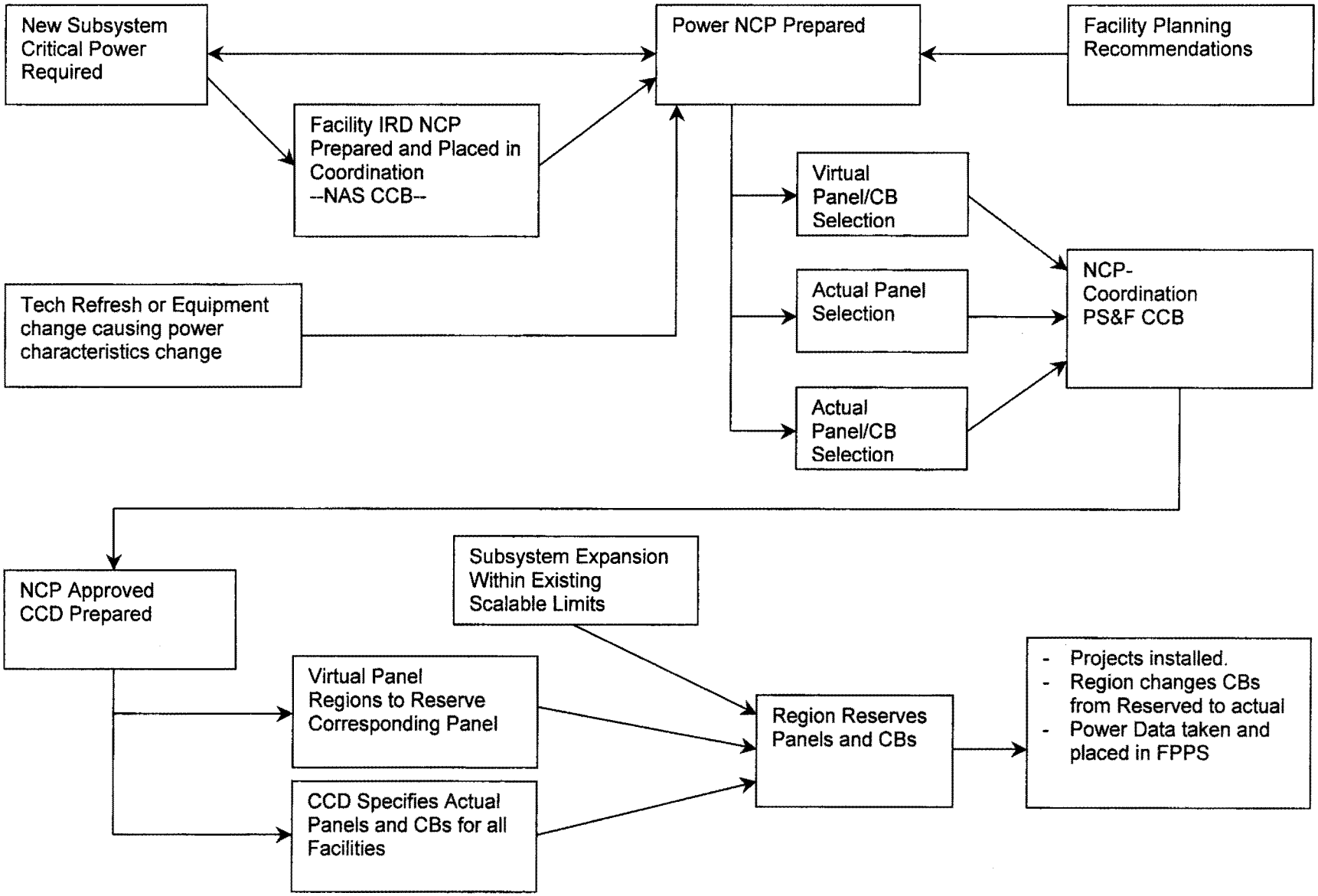

Figure 1: FPPS Procedural Flow Chart

APPENDIX 1 - ABBREVIATIONS AND ACRONYMS

ACEPS	ARTCC Critical Essential Power System
ACM	NAS Configuration Management and Evaluation
AFZ	Resource Management Staff
ANI	NAS Implementation Program
AOS	Operational Support Program
AOP	NAS Operations Program
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
ATO	Air Traffic Organization
CCB	Configuration Control Board
CCD	Configuration Control Decision
CERAP	CEnter Radar APproach control facility
CI	Configuration Item
CM	Configuration Management
CNS	Communications Navigation and Surveillance
CPC	Critical Power Center
DP	Distribution Panel
EFaBS	En Route Facilities and Building Systems Product Team
FCNPT	Facilities Configuration National Planning Team
FEMA	Federal Emergency Management Agency
FIR/CD	Facility-type Interface Requirements Control Document
FIWG	Facility Interface Working Group
FPPS	Facility Power Panel System
HVAC	Heating, Ventilation and Air Conditioning
ISD	In-Service Decision
MCI	Master Configuration Index
NADIN	National Airspace Data Interchange Network
NAS	National Airspace System
NCP	NAS Change Proposal
NEC	National Electrical Code
NEHRP	National Earthquake Hazards Reduction Program
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
OPI	Office of Primary Interest
PF	Power Factor
PS&F	Power Systems and Facilities
PSL	Program Support Library

PT	Product Team
RMA	Reliability, Maintainability and Availability
SOC	Service Operations Center
SSSATS	Solid State Static Automatic Transfer Switch
THD	Total Harmonic Distortion
V-A	Volt-Amp

APPENDIX 2 - RELATED PUBLICATIONS

FAA Orders

Order 1050.1	Policies and Procedures for Considering Environmental Impacts
Order 1053.1	Energy and Water Management Program for FAA Buildings and Facilities
Order 1800.66	National Airspace System Configuration Management
Order 4420.4	Space Acquisition
Order 6030.20	Electrical Power Policy
Order 6950.2	Electrical Power Policy Implementation at National Airspace System Facilities
Order 6950.27	Short Circuit Analysis and Protective Device Coordination Study

ACM Standard Procedures

The National Configuration Management Standard Procedure Document for Conducting Formal Configuration Audits of Operational Facilities, distributed 10/12/1999.

Configuration Management of Critical Power Connections and Panel Breaker Assignments, distributed 5/1/2002.

FAA Standards

FAA-STD-002	Engineering Drawing Preparation & Support
FAA-STD-019	Lightning Protection, Grounding, Bonding and Shielding Requirements for Facilities
FAA-STD-025	Preparation of Interface Documentation
FAA-STD-058	Standard Practice - Facility Configuration Management
HF-STD-001	Human Factors Design Standard

FAA Specifications

FAA-G-2100	Electronic Equipment, General Requirements
FAA-C-1217	Electrical Work, Interior

Other

NAS MCI, NAS-MD-001	NAS Master Configuration Index, MCI Database
MIL-HDBK-61	Configuration Management Guidance
EIA 649	National Consensus Standard for Configuration Management
NEC	National Electrical Code
Executive Order 12902	National Energy Conservation Policy Act of 1978
42 USC 8252-8261	The National Environmental Policy Act of 1969 (NEPA)