



Working to Perfect the Flow of Energy

PJM Manual 10:

Pre-Scheduling Operations

Revision: 18

Effective Date: August 10, 2005

Prepared by

System Operation Division



PJM Manual 10: Pre-Scheduling Operations

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Approval

Approval Date: 08/09/05
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Generation

Revision History

Revision 18 (08/10/05)

- Added new Section 6 on Winter Net Capability Test Exemption.

Revision 17 (07/29/05)

- Attachment A: Replaced old Reserve Objective Tables (Winter 2002 – 2003) with hyperlinks to current and previous PJM Operating Reserve Objective Summaries.

Revision 16 (12/24/03)

- Revised Attachment A: PJM Operating Reserve Objective Summary. Updated Exhibits A5 and A6, Winter 2002 - 2003.
- Updated Exhibit 1 PJM Manuals List

Revision 15 (10/01/03)

- *Section 4: Regulation Requirements* – Updated Exhibit 6 on Limit Relationship for Regulation. Also updated definition of energy dispatch range of a unit under regulation to be consistent with definitions in other PJM manuals.
- ATTACHMENT B: Replace attachment B (a copy of the Markets Database Dictionary) with a hyperlink to the Markets Database Dictionary.

Revision 14 (06/25/03)

- *Section 2: Outage Reporting – Rules & Regulations* – **Deleted:** “At least three days prior to the Operating Day during which the Planned Outage is to begin, the PJM Member submits a MW Outage Generator ticket through eDART for PJM to confirm the Planned Outage request.
- *Section 2: Outage Reporting – Maintenance General Information* – **Deleted:** “If approved, PJM acknowledges the Maintenance Outage request via eDART tool.

Revision 13 (06/01/03)

- Revised Attachment A: PJM Operating Reserve Objective Summary. Updated Exhibits A1 and A2, Summer 2003.
- Changed references to PJM Interconnection, L.L.C. to PJM.
- Changed department name “Real Time Market Operations” to “Forward Market Operations.”
- Renamed Exhibits I.1 through C.3 to Exhibit 1 through Exhibit 17.
- Reformatted to new PJM formatting standard.
- Renumbered pages to consecutive numbering.

Revision 12 (03/01/03)

- Revised Attachment A: PJM Operating Reserve Objective Summary. Updated Exhibits A7 and A8, Spring 2003.

Revision 11 (12/01/02)

- Revised Section 2: Outage Reporting
- Incorporated the procedures that PJM follows to ensure and monitor Black Start Service.

Revision 10 (11/01/02)

- Revised Attachment A: PJM Operating Reserve Objective Summary. Updated Exhibits A5 and A6, Winter 2002 - 2003.

Revision 09 (10/01/02)

- Revised Attachment A: PJM Operating Reserve Objective Summary. Updated Exhibits A3 and A4, Fall 2002.

Revision 08 (06/01/02)

- Revised Attachment A: PJM Operating Reserve Objective Summary. Updated Exhibits A1 and A2, Summer 2002.

Revision 07 (03/01/02)

- Revised Attachment A: PJM Operating Reserve Objective Summary. Updated Exhibits A7 and A8, Spring 2002.
- Revision 06 (11/01/01)
- Revised Attachment A: PJM Operating Reserve Objective Summary. Updated Exhibits A5 and A6, Winter 2001 - 2002.

Revision 05 (10/01/01)

- Revised Attachment A: PJM Operating Reserve Objective Summary. Updated Exhibits A3 and A4, Fall 2001.

Revision 04 (06/01/01)

- Revised to reflect PJM eDART tool implementation.
- Removed Attachment A: Definitions & Abbreviations. Attachment A is being developed into a new PJM Manual for **Definitions & Abbreviations (M-35)**. Also, removed Attachment B: PJM Generating Unit Event Request. Renamed Attachment C, D and E to be A, B and C, respectively. Revised new Attachment A: PJM Operating Reserve Objective Summary.

Revision 03 (06/01/00)

- Revised to reflect the Multi-Settlement Process implementation.

Revision 02 (04/01/00)

- Attachment D: Unit Commitment Database

Removed reference to Maximum Scheduled Generation in section *Unit Commitment – Scheduling Data (Cost Capped)* for Steam Unit and Schedule Data #7 Schedule Operating Data.

Removed reference to Maximum Scheduled Generation in section *Unit Commitment – Scheduling Data (Cost Capped)* CT Unit and Schedule Data #5 Unit & Schedule Operating Data.

Removed reference to Maximum Scheduled Generation in section *Unit Commitment – Scheduling Data (Cost Capped)* Diesel Unit Data #5 Schedule Operating Data. Revision 01 (09/22/97)

- Attachment C: PJM Operating Reserve Objective Summary
- Added Operating Reserve Objectives for October 1, 1997 to October 31, 1997 and November 1, 1997 to February 28, 1998.

Revision 01 (07/21/97)

- Section 1: Pre-Scheduling Overview

Changed “Market Participant” to “PJM Member” in Exhibit 2.

- Section 5: Maintaining Market Information

Changed “company data (name, long name, short name, gross/net ID)” to “company data (name, long name, short name, gross/net switch)” in Thermal Resource Design Data under Resource Scheduling Database.

- Attachment B: PJM Generating Unit Event Request
- Added unit choices “CT, CC” and company choices “PEP, AE, DPL JO” to PJM Steam Generating Unit Event Request form.
- Attachment D: Unit Commitment Database
- Exhibit B.2: Steam Unit and Schedule Data (Cost Capped)
- Changed “Price in dollars to release a PJM RTO scheduled unit if the unit is not synchronized.” to “Price/cost in dollars to release a PJM RTO scheduled unit if the unit has begun the start-up sequence and is not synchronized. Note: for cost-based-units, this fee is defaulted to the Hot Start Cost.” in Unit Cancellation Fee Data.
- Changed “2. Available (marginal)” to “2. Available (marginal) (Bid into market)” in Schedule Operating Data.
- Deleted “Scheduled to run for Company (R)” from Schedule Operating Data.
- Deleted “Scheduled to run for PJM (P)” from Schedule Operating Data.

Revision 00 (05/01/97)

- Attachment C: PJM Operating Reserve Objective Summary

Replaced Operating Reserve Objectives for March 1, 1997 to May 31, 1997 with Objectives for June 1, 1997 to September 30, 1997.

- Section 2: Outage Reporting
- Maintenance Outage Extension

The request for a Maintenance Outage Extension must be submitted ~~at least 48 hours~~ before the original end date.

- Changed references to PJM Interconnection Association to PJM Interconnection, L.L.C.

- Changed references to PJM to PJM where appropriate.
- Changed references to PJM to PJM RTO where appropriate.
- Changed references to PJM IA to PJM.
- Changed references to IA to PJM.
- Changed references to Mid-Atlantic Market to PJM Interchange Energy Market.
- Changed references to Mid-Atlantic Market Operations Agreement to Operating Agreement of PJM Interconnection, L.L.C.
- Changed references to pool to control area.
- Changed references to parties to PJM Members.
- Changed references to External Market Participant to Non-Metered PJM Member.
- Changed references to Internal Market Participant to Metered PJM Member.

Revision 00 (03/13/97)

- This revision is a draft of the PJM Manual for ***Pre-Scheduling Operations***.

Introduction

Welcome to the PJM Manual for **Pre-Scheduling Operations** of the PJM Manuals. In this Introduction, you will find the following information:

- What you can expect from the PJM Manuals in general (see “*About PJM Manuals*”).
- What you can expect from this PJM Manual (see “*About This Manual*”).
- How to use this manual (see “*Using This Manual*”).

About PJM Manuals

The PJM Manuals are the instructions, rules, procedures, and guidelines established by PJM for the operation, planning, and accounting requirements of the PJM RTO and the PJM Energy Market. Exhibit 1 lists the PJM Manuals.

Transmission	M01: Control Center Requirements	M02: Transmission Service Requests	M03: Transmission Operations
	M04: PJM OASIS Operation	M05: Power System Application Data	M06: Financial Transmission Rights
PJM Energy Market	M09: PJM eSchedules	M10: Pre-Scheduling Operations	M11: Scheduling Operations
	M12: Dispatching Operations	M13: Emergency Operations	M15: Cost Development Guidelines
	M36: System Restoration Manual		
Generation and Transmission Interconnection	M14A: Generation and Transmission Interconnection Process Overview	M14B: Generation and Transmission Interconnection Planning	M14C: Generation and Transmission Interconnection Facility Construction
	M14D: Generator Operational Requirements	M14E: Merchant Transmission Specific Requirements	M16: eDART Operations
Reserve	M17: Capacity Obligations	M19: Load Data Systems	M20: PJM Reserve Requirements
	M21: Rules and Procedures for Determination of Generating Capability	M22: Generator Resource Performance Indices	M23: eGADS User Manual
	M24: PJM eCapacity	M25b: eFuel 2.0 – User Manual	
Accounting & Billing	M27: Open Access Transmission Tariff Accounting	M28: Operating Agreement Accounting	M29: Billing
PJM	M33: Administrative Services for PJM Interconnection Agreement	M35: Definitions and Acronyms	

Exhibit 1: List of PJM Manuals

About This Manual

The PJM Manual for ***Pre-Scheduling Operations*** is the first manual within the PJM Interchange Energy Market series. This manual focuses on PJM and PJM Member pre-scheduling activities that set the stage for the scheduling and dispatching phases of the PJM RTO operation.

The PJM Manual for ***Pre-Scheduling Operations*** consists of five sections. The sections are as follows:

- Section 1: Pre-Scheduling Overview
- Section 2: Outage Reporting
- Section 3: Reserve Objectives
- Section 4: Regulation Requirements
- Section 5: Maintaining Market Information

Intended Audience

The intended audiences for the PJM Manual for ***Pre-Scheduling Operations*** are:

- ☞ PJM operations staff
- ☞ PJM audit staff
- ☞ Local Control Center (LCC) operations support staff
- ☞ Transmission Providers
- ☞ PJM Members

References

The References to other documents that provide background or additional detail directly related to the PJM Manual for ***Pre-Scheduling Operations*** are:

- ☞ FERC Order No. 888
- ☞ FERC Order No. 889
- ☞ Operating Agreement of PJM Interconnection, L.L.C.

- ☞ NERC Operating Guide
- ☞ PJM eDART User Guide

Using This Manual

We believe that explaining concepts is just as important as presenting the procedures. Therefore, we start each section with an overview. Then, we present details and procedures. This philosophy is reflected in the way we organize the material in this manual. The following paragraphs provide an orientation to the manual's structure.

What You Will Find In This Manual

- ☞ A table of contents
- ☞ This introduction
- ☞ Sections containing the specific guidelines, requirements, or procedures including PJM actions and PJM Member actions
- ☞ Attachments that include additional supporting documents, forms, or tables in this PJM Manual

Section 1: Pre-Scheduling Overview

Welcome to the *Pre-scheduling Overview* section of the PJM Manual for **Pre-Scheduling Operations**. In this section you will find the following information:

- A description of the scope and purpose of pre-scheduling (see “*Scope & Purpose of Pre-Scheduling*”).
- A description of PJM pre-scheduling responsibilities (see “*PJM Responsibilities*”).
- A description of PJM Members’ pre-scheduling responsibilities (see “*PJM Member Responsibilities*”).

Scope & Purpose of Pre-Scheduling

Operation of the PJM RTO involves many activities by different operating and technical personnel. These activities take place in parallel on a continuous basis, 24 hours a day and are grouped into three overlapping time frames:

- ☞ pre-scheduling operations
- ☞ scheduling operations
- ☞ dispatching

In this PJM Manual for **Pre-Scheduling Operations** we focus mainly on the activities that take place before the PJM Energy Market opens each day. Exhibit 2 depicts the Pre-scheduling activities in the form of a timeline. The reference point for the timeline is the “Operating Day”, recognizing that every new day becomes an Operating Day. This timeline-type of description is used throughout this PJM Manual and the other PJM Manuals for **Scheduling Operations and Dispatching Operations**.

PJM Energy Market bidding is described in the PJM Manual for **Scheduling Operations**.

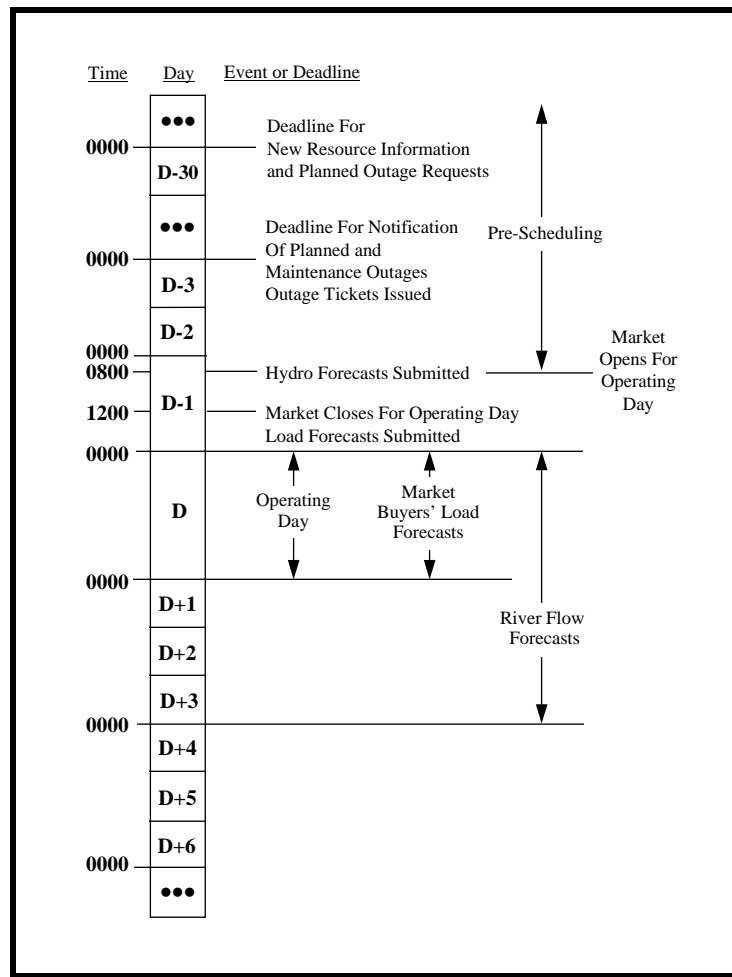


Exhibit 2: Pre-Scheduling, Scheduling, and Dispatching Timeline

The following notation is used in the timeline:

- D represents the Operating Day
- D-30 represents 30 days before the Operating Day
- D+6 represents 6 days after the Operating Day

In this manual we make no special distinction between the terms “price” and “cost”. PJM Members submit their bids according to either actual cost or offer price as designated by PJM for each generation resource. For specific information as to the use of price and cost, refer to [Markets Database Dictionary](#).

PJM Responsibilities

PJM responsibilities to support pre-scheduling are to:

- maintain data and information relating to generation and transmission facilities in the PJM RTO, as may be necessary or appropriate to conduct the scheduling and dispatch of the PJM Energy Market and PJM RTO
- maintain data and information relating to generation and transmission facilities external to the PJM RTO, as may be necessary or appropriate to conduct the scheduling and dispatch of the PJM Energy Market and PJM RTO with respect to Non-Metered PJM Members
- process and respond to requests for Capacity Resource outages
- maintain and update tables that establish the PJM Operating Reserve objectives
- perform seasonal operating studies to assess the forecasted adequacy of generating reserves and of the transmission system

PJM Member Responsibilities

Exhibit 3 shows the general structure of the PJM Energy Market according to participation.

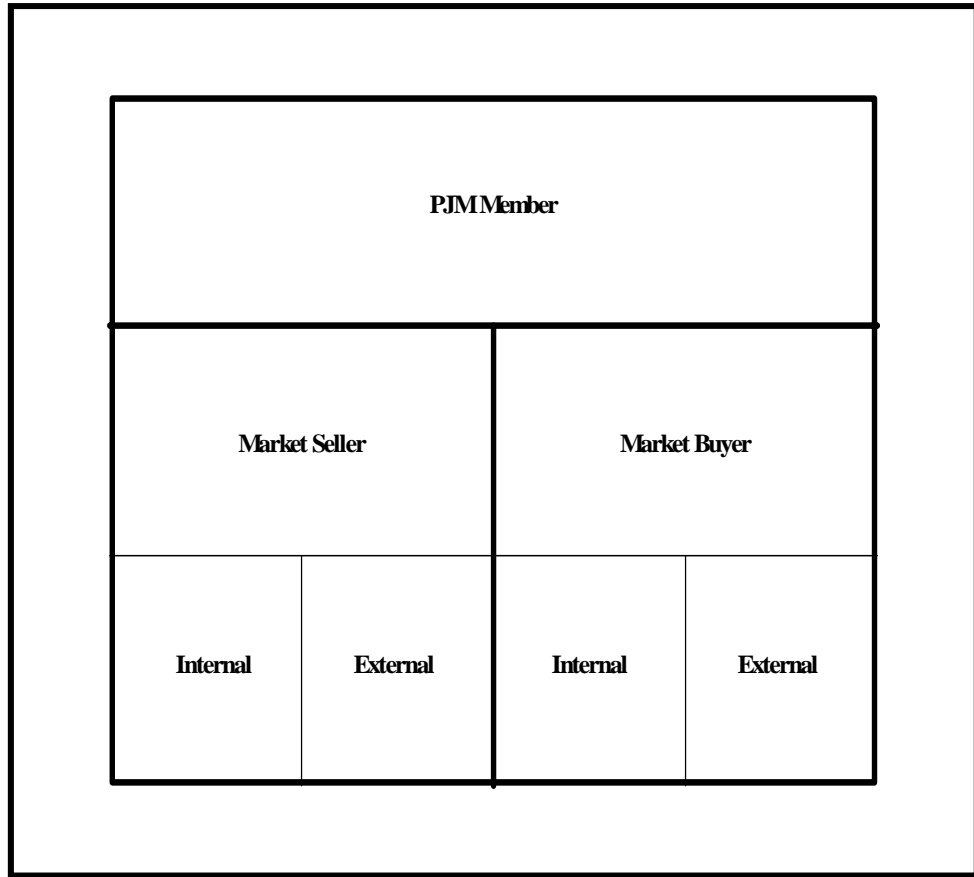


Exhibit 3: PJM Energy Market Structure

PJM Member pre-scheduling responsibilities are to:

- report to PJM all bilateral transactions that extend beyond the next Operating Day

The Market Seller pre-scheduling responsibilities are to:

- furnish to PJM the information specified in the Offer Data for new Capacity Resources
- furnish to PJM start-up and no-load fees for each Resource as specified by Section 1.9.7 of Schedule 1 to the Operating Agreement of PJM Interconnection, L.L.C.

- request approval from PJM for Capacity Resource outages and report outages for non-designated, Non-capacity Resources

Section 2: Outage Reporting

Welcome to the *Outage Reporting* section of the PJM Manual for **Pre-Scheduling Operations**. In this section you will find the following information:

What you can expect from the Outage Reporting section in general (see “*Outage Reporting Overview*”).

- A description of Planned Outages (see “*Planned Outages*”).
- A description of Maintenance Outages (see “*Maintenance Outages*”).
- A description of Unplanned Outages (see “*Unplanned Outages*”).

Outage Reporting Overview

PJM is responsible for coordinating and approving requests for outages of generation and transmission facilities, as necessary, for the reliable operation of the PJM RTO. PJM maintains records of outages and outage requests for these facilities. In this PJM Manual we only consider those outages that are associated with generation. See the PJM Manual for **Transmission Operations** for the treatment of transmission facility outages.

Generation outages fall into the following three categories:

- planned
- maintenance
- unplanned

The general procedure begins with the PJM Members requesting outages via the eDART tool. PJM may either accept or reject a specific outage request.

It is important to emphasize that PJM does not “schedule” when outages should take place. PJM only accepts/rejects the requests for outages. PJM only rejects outage requests when they affect the reliability of the PJM RTO. It is the responsibility of each PJM Member to determine its own best schedule of outages. Outage requests are honored by PJM on a first come-first serve basis.

Planned Outages

Planned Outages are scheduled by the PJM Members well in advance and are of a predetermined duration. Turbine and boiler overhauls or inspections, testing, and nuclear re-fuelings are typical Planned Outages. Characteristically, Planned Outages usually occur during those seasons of the year when the peak demand on the power system is lowest. Planned Outages have flexible start dates, have a predetermined duration, last for several weeks, and occur only once or twice a year.

Request Procedure

Refer to the Pre-scheduling Timeline shown in Exhibit 2 as we describe the process for a Planned Outage request.

- In order to be classified as a Planned Outage, the PJM Member submits the initial outage request to PJM through eDART no later than 30 days prior to the Operating Day in which the Planned Outage is to begin.
- Upon receipt of the initial Planned Outage request, PJM executes the validation process and immediately notifies the PJM Member if the Planned Outage request is denied.
- In the event that the initial Planned Outage request is denied, the PJM Member re-evaluates its Planned Outage schedule and submits a new outage request. This process is repeated until the PJM Member submits an outage request that is acceptable.
- PJM maintains a record of the approved forecasted planned outage requests so that the validation process is kept up to date.

Rules & Regulations

There are rules and regulations that exist regarding planned outages, including:

- PJM may withdraw its approval for a Planned Outage by notifying the PJM Member owning or controlling the Capacity Resource in advance of the planned commencement of the outage, in accordance with deadlines for such notice as specified by PJM. Currently the deadline is at least 24 hours in advance. Approval for a Planned Outage is withdrawn only as necessary to ensure the adequacy of reserves or the reliability of the PJM RTO in connection with anticipated implementation or avoidance of emergency procedures.
- A PJM Member is not expected to submit offers for the sale of energy or other services or to satisfy delivery obligations from all or part of a Capacity Resource undergoing an approved Planned Outage.

Planned Outage Extension

A Planned Outage Extension is the extension of a Planned Outage beyond its originally estimated completion date; such date being established at the start of these outages. A Planned Outage extension starts at the same time the Planned Outage ends.

A Planned Outage Extension may be used in those instances when the original scope of work requires more time to complete than originally scheduled. The outage extension is not used for those instances when unexpected problems or delays are encountered to render the Capacity Resource in question, out of service past the expected date of the Planned Outage.

The request for a Planned Outage Extension must be submitted via eDART at least 48 hours before the end date of the outage.

Planned Outage Restrictions for Black Start Units

A Black Start Unit is defined as a generating unit that can start without the assistance of an off-site source of power. Critical black start units are those receiving compensation for providing black start through the PJM Black Start Service as maintained by PJM.

In order to ensure adequate black start capability is available in case of a system restoration, no more than one unit at a black start plant with multiple black start units may be on planned maintenance at any one time (excluding outages on common plant equipment which may make all units unavailable).

In addition, concurrent planned outages at multiple black start plants within a zone may be restricted based on Transmission Owner requirements for black start availability. These restrictions have been predefined, approved by PJM and will be incorporated into the eDART tool.

A Generation Owner may substitute another black start unit (currently not designated as critical) at a plant (on the same voltage level) for a black start unit that is on a planned outage to allow a concurrent planned outage of another critical black start unit at a plant to begin. This substituted unit must have a valid black start test within the last 13 months to be considered as an eligible substitution.

Maintenance Outages

A Maintenance Outage is an outage that may be deferred beyond the next weekend but requires that the Capacity Resource be removed from service before the next Planned Outage. Characteristically, these Maintenance Outages may occur throughout the year, have flexible start dates, are much shorter than Planned Outages, and have a predetermined duration established at the start of the outage. The duration of a Maintenance Outage is generally unlimited except during the PJM Peak Period Maintenance Season, which is defined as those weeks containing the 24th through 36th Wednesday of the calendar year. Each such week shall begin on a Monday, and approved Maintenance Outages will be limited to a maximum duration of 9 consecutive days, 5 weekdays plus the included weekends. The definition of Weekend and Weekday Periods are shown in Exhibit 4.

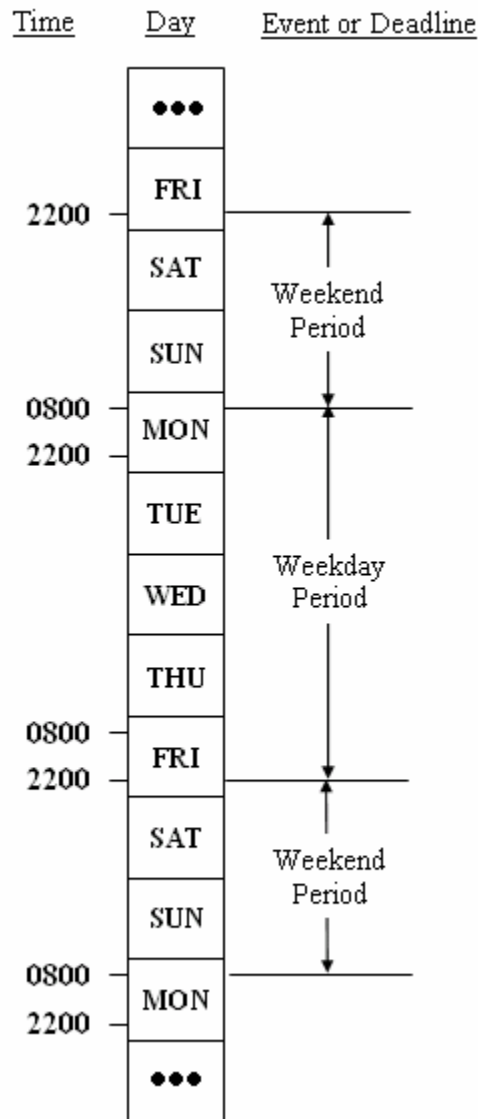


Exhibit 4: Maintenance Outage Timeline

However, if a Maintenance Outage request is submitted for a generator, and an extended outage poses potential reliability concerns, then the outage duration can be limited to 9 days, same as during the Peak Period Maintenance Season.

Examples of reliability concerns include:

- The unit is a critical blackstart unit and another blackstart unit in the area is already on Planned Outage.
- The unit is critical for scheduled transmission work.
- There is a reserve shortage in the area.

In the event that a generating unit has already been on a maintenance outage for an extended period of time when it is determined by PJM to be needed for reliability, the generation owner will be given seven days to make the unit available. The generation owner must make every effort to make the unit available in that timeframe.

Maintenance General Information

The Weekend Period is defined from Friday at 2200 to Monday at 0800. Therefore, during the week, an outage is considered a Maintenance Outage if, at the time of the request to the PJM dispatcher, the Capacity Resource can carry load at its present capacity beyond the next Monday morning at 0800. If the release of a Capacity Resource is requested during the weekend, the outage is considered a Maintenance Outage if, at the time of the request to the PJM dispatcher, the Capacity Resource can carry load at its present capacity beyond Monday morning, 0800 of the following weekend.

Three examples are given, as follows:

1. If an outage request is submitted to PJM and it can be postponed, it is the responsibility of the PJM dispatcher to decide, as directed by the PJM RTO conditions, whether the outage should be postponed. If the PJM dispatcher decides that the outage should be postponed beyond the next weekend and the Capacity Resource fails before 0800 on Monday, the outage is considered an Unplanned Outage.
2. If the PJM dispatcher decides that the outage should be postponed beyond the next weekend and the Capacity Resource fails beyond that weekend, but before the scheduled start time of the outage, the outage is considered a Unplanned Outage; provided, that the component which failed is the component which would have been repaired as specified in the original request. The outage request must be properly documented to explain this situation. This allows internal PJM calculations to consider the fact that the PJM dispatcher requested deferral of the event.
3. If the PJM dispatcher decides that the outage should not be postponed, but the outage is postponed by the PJM Member and the Capacity Resource fails, the outage is considered an Unplanned Outage.

If approved, PJM acknowledges the Maintenance Outage request via the eDART tool.

Rules & Regulations

A PJM Member is not expected to submit offers for the sale of energy or other services, or to satisfy delivery obligations, from a part of the Capacity Resource undergoing an approved full or partial Maintenance Outage.

Maintenance Outage Extension

A Maintenance Outage Extension is an extension of a Maintenance Outage beyond its originally estimated completion date; such date being established at the start of these outages. A Maintenance Outage Extension starts at the same time the Maintenance Outage ends.

A Maintenance Outage Extension may be used in those instances when the original scope of work requires more time to complete than originally scheduled. The outage extension is not used for those instances when unexpected problems or delays are encountered to render the Capacity Resource in question, out of service past the expected date of the Maintenance Outage.

The request for a Maintenance Outage Extension must be submitted before the original end date.

Unplanned Outages

Market Sellers that own or control a Capacity Resource whether or not PJM RTO-Scheduled are expected to:

- Advise PJM of a Capacity Resource Unplanned Outage suffered or anticipated to be suffered by the resource as promptly as possible.
- Provide PJM with the expected date and time that the Capacity Resource will be made available.
- Make and submit to PJM a record of the events and circumstances giving rise to the Unplanned Outage.

PJM acknowledges the Unplanned Outage request and records the outage request via eDART tool.

Section 3: Reserve Objectives

Welcome to the *Reserve Objectives* section of the PJM Manual for **Pre-Scheduling Operations**. In this section you will find the following information:

- A description of each type of Reserve (see “*Reserve Definitions*”).
- How Reserve Objectives are determined (see “*Objective Determination*”).
- A description of the PJM Seasonal Reserve Objectives (see “*PJM Seasonal Reserves*”).

Reserve Definition

Reserve represents the generating capability that is “standing by” ready for service in the event that something happens on the power system, such as the loss of a large generator. The PJM RTO operates on a First Contingency Basis and complies with NERC’s reserve criteria. The severity of the event determines how quickly the reserves have to be picked up. Exhibit 5 illustrates how PJM classifies the different types of reserve.

Operating Reserve (T ≤ 30 Minutes)		Reserve Beyond 30 Minutes
Primary Reserve (T ≤ 10 Minutes)		Secondary Reserve (10 Min. ≤ 30 Minutes)
Spinning Reserve (Synchronized)	Quick-Start Reserve (Off-Line)	
T = Time Interval Following PJM Request		

Exhibit 5: Graphic Representation of Reserves

Operating Reserve

Operating Reserve is reserve capability (generating capability and/or equivalent generating capability scheduled to operate in excess of the forecast hourly integrated PJM RTO load) that can be converted fully into energy within 30 minutes from the request of the PJM dispatcher.

Based on the time required to effect the reserve energy incremental contribution, Operating Reserve is subdivided into Primary Reserve and Secondary Reserve.

A. Primary Reserve

Primary Reserve is reserve capability that can be converted fully into energy within 10 minutes of the request from the PJM dispatcher.

Based on the operating status of the facility that is providing the reserve capability, Primary Reserve is subdivided into Spinning Reserve and Quick-Start Reserve.

B. Spinning Reserve

Spinning Reserve is reserve capability that can be converted fully into energy within 10 minutes from the request of the PJM dispatcher, and must be provided by equipment electrically synchronized to the system. Included as Spinning Reserve are:

1. the increase in the output energy level of a synchronized generator which can be attained within 10 minutes;
2. the load of a pumped hydro unit currently synchronized in the pumping mode and capable of being shut down within 10 minutes (provided that the PJM dispatcher had determined that the loss of the generating capability which the pumping would provide would not seriously affect future PJM RTO reliability); and
3. the maximum output energy level that could be attained within 10 minutes on a unit operating as a synchronous condenser, provided that:
 - (a) it has been determined that the loss of voltage control that would occur by reversing the synchronous condenser to generating mode would not seriously affect future PJM RTO reliability; and
 - (b) the interruption of the unit's synchronization is not required during transfer to the generating mode.

C. Quick-Start Reserve

Quick-Start Reserve is reserve capability that can be fully converted into energy within 10 minutes from the request of the PJM dispatcher and is provided by equipment not electrically synchronized to the system. Included as Quick-Start Reserve is the maximum output energy level of a unit which in the opinion of the Local Control Center dispatchers can be attained within 10 minutes from the PJM dispatcher's request to initiate the starting sequence. The units that generally qualify in this category are currently shutdown run-of-river hydro, pumped hydro, industrial combustion turbines, jet engine/expander turbines, combined cycle, and diesels.

D. Secondary Reserve

Secondary Reserve is reserve capability that can be fully converted into energy within a 10-to-30 minute interval following the request of the PJM dispatcher. Equipment providing Secondary Reserve need not be electrically synchronized to the system.

Objective Determination

In the daily operation of the PJM RTO, the objective is to operate generating capability and/or equivalent generating capability as required to carry the load reliably and economically by providing reasonable protection against instantaneous load variations in excess of the hourly integrated values, load forecasting error, and loss of system capability due to generation equipment failure or malfunction and by providing reasonable capability for frequency regulation and area protection. The amount of reserve capability necessary to obtain this objective is established and reviewed periodically by PJM.

Reserve objectives are lower-limit reliability objectives. Spinning, Quick-Start and Secondary Reserve have a priority sequence based on the level of reliability which each provides. Spinning Reserve, being the most reliable, can also qualify for an objective which requires Quick-Start or Secondary Reserve. Likewise, Quick-Start Reserve can also qualify for an objective which requires Secondary Reserve. Since the system is to be operated in the most economical manner while satisfying each reserve objective, economics dictate the extent to which more reliable reserve excesses can be applied to subordinate reserve categories.

Capacity backed purchases from external systems do not qualify as PJM RTO reserve but may permit the attaining of reserve on participant-owned equipment. Non-capacity backed purchases cannot permit the attaining of reserve on participant-owned equipment.

Operating & Primary Reserve Objectives

The Operating and Primary Reserve objectives are calculated probabilistically. They differ due to their somewhat different treatment of the following factors:

- generator mix
- load level
- time of day
- day of week
- season of year
- load forecast uncertainty
- probability of equipment unplanned outage
- probability of equipment return
- probability of equipment failure to start
- exposure time interval (over which the interaction of these various factors is evaluated)

Spinning Reserve Requirement

The Spinning Reserve Requirement is determined at the discretion of PJM after careful review to ensure appropriate system reliability. The Spinning Reserve Requirement equals the largest PJM contingency which may be loss of generation within the PJM RTO, loss of a transmission path with a neighboring control area, or loss of a non-capacity backed purchase from a neighboring control area.

E. PJM Seasonal Reserves

PJM Seasonal Reserve Objectives are published periodically in a table format, as illustrated in Attachment A.

F. Operating Reserve Objectives

A table of Operating Reserve objectives is calculated seasonally for various peak load levels and eight weekly periods. Reserve levels are probabilistically determined based on the season's historical load forecasting error and expected generation mix (including typical Planned and Unplanned Outages).

G. Primary Reserve Objective

An acceptable range of the Primary Reserve objective is probabilistically determined based on the season's typical generation mix, ignoring Unplanned Outages, load forecasting error, and the other Operating Reserve objective contributing factors.

The current value for this objective is 1700 MW and subject to change with significant changes in the PJM RTO's generation mix.

H. Spinning Reserve Requirement Allocation Percentages

Spinning Reserve Requirement Allocation Percentages are based on the past year's average contribution of each LSE to the PJM RTO's weekly peak loads during the season being studied.

Section 4: Regulation Requirements

Welcome to the *Regulation Requirements* section of the PJM Manual for **Pre-Scheduling Operations**. In this section, you will find the following information:

- A description of Regulation (see “*PJM Regulation Service*”).
- A description of Regulating Unit Availability (see “*Regulating Unit Availability*”).
- A description of Regulating Units (see “*Regulating Unit Characteristics*”).

PJM Regulation Service

The FERC Order 888 requires that the transmission providers within the PJM RTO provide the Ancillary Services for Regulation and frequency response. Since PJM is operating the PJM RTO, the Regulation and frequency response Ancillary Service is being coordinated by PJM.

NERC requires that the PJM RTO maintain regulating capability in order to match short-term deviations in system load. Regulation refers to the control action that is performed to correct for load changes that may cause the power system to operate above or below 60 Hz. To correct for these deviations from 60 Hz, PJM assigns the load changes to its faster responding generating units, called regulating units. By assigning regulation, PJM is better able to control the performance of the power system. Regulation is also referred to as regulation action or regulation response.

Regulation for the PJM RTO is supplied by Regulation Class from generators that are located within the metered electrical boundaries of the PJM RTO. Regulation is scheduled in the following ways:

- Self-Scheduled Resources
- PJM RTO Regulation Market
- Bilateral Transactions

The amount of regulation capability that the PJM RTO is required to maintain and PJM Regulation Market process is discussed in the PJM Manual for **Scheduling Operations**.

Regulating Unit Eligibility

Regulating units have the following characteristics:

- have Automatic Generation Control (AGC) capability
- be located within PJM Control Area metered electrical boundaries
- have their outputs metered to the PJM OI
- be controlled by a Local Control Center or Market Operations Center
- meet the 75% (or applicable) regulation quality standard as described in the PJM Manual for **Dispatching Operations**

Regulating Unit Characteristics

The Capacity Resources assigned to meet the PJM Regulation Requirement must be capable of responding to the AR signal within five minutes and must increase or decrease their outputs at the Ramping Capability rates that are specified in the Offer Data that is submitted to the PJM OI.

A unit capable of automatic energy dispatch that is also providing Regulation reduces its energy dispatch range by the regulation assigned to the unit. This redefines the energy dispatch range of that unit. The unit's assigned regulation subtracted from its regulation maximum forms the upper limit of the new dispatch range, while the unit's regulation minimum plus its assigned regulation forms the lower limit of the new dispatch range. Exhibit 6 illustrates the limit relationship.

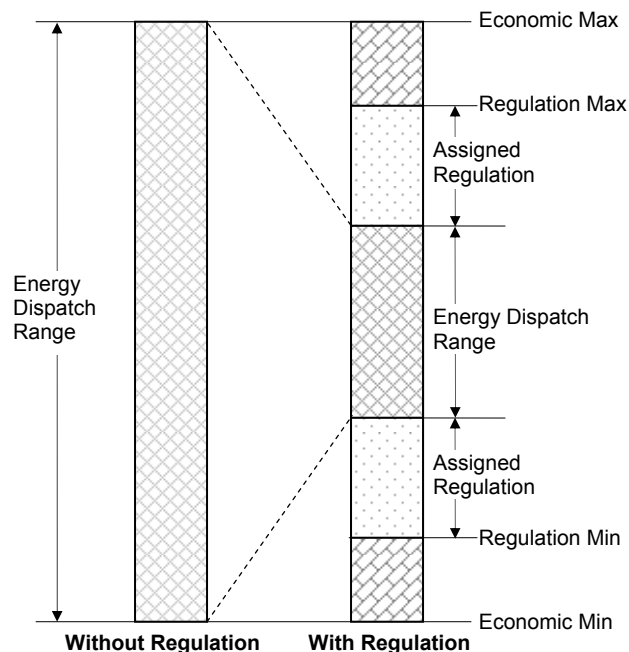


Exhibit 6: Limit Relationship for Regulation

Section 5: Maintaining Market Information

Welcome to the *Maintaining Market Information* section of the PJM Manual for **Pre-Scheduling Operations**. In this section, you will find the following information:

- A description of the Markets database (see “*Markets Database*”).
- A description of the Market Sellers’ inputs (see “*Market Seller Inputs*”).
- A description of Bilateral Transaction inputs (see “*Bilateral Transaction Inputs*”).

Markets Database

One of the principal purposes of the pre-scheduling activities is to establish and maintain a current database to be used for PJM scheduling and dispatching. This database is referred to as the Markets Database and contains the following information which is described in detail in [Markets Database Dictionary](#).

- Generation Resource Data - Design data from Designated and non-Designated Capacity Resources for PJM Members
- Demand Data - Design data from Metered and Non-Metered PJM Members
- Design data required for coordinated Hydro Scheduling
- The Markets Database contains the information relating to the market for energy, generating capacity, and regulation.
- Thermal Resource Design Data
- Thermal Resource design data must be supplied to PJM 30 days prior to submitting bid information. It is used to create the appropriate records within the Unit Commitment Database. The following type of information is submitted:
 - company data (name, long name, short name, gross/net switch)
 - plant data (number, long name, short name)
 - steam unit data (number, short name, NERC ID, gross/net switch, telemetry ID, bus ID)
 - steam schedule data (schedule ID, long name, short name, marginal switch, dispatch lambda number)
 - CT/diesel unit data (number, name, NERC ID, telemetry ID, bus ID)
 - CT/diesel schedule data (schedule ID, long name, short name, CT bank ID)
 - weather point data (point ID, name) (if necessary)

- miscellaneous unit data (number, name, telemetry ID, bus ID)
- bus data (ID number, name, penalty factor ID)
- PJM fuel data (code, name) (for cost information only)

Hydro Resource Design Data

The following information must be available if hydro resources are to be turned over for scheduling by PJM. It is used in the Hydro Calculator and/or Unit Commitment.

I. Run-of-River Plant Information

The following information is submitted for run-of-river plants:

- plant/unit capacity curves
- per unit installed capacity
- per unit discharge curve in terms of Mcfs
- max/min plant elevations
- operating restrictions
- average unit efficiency
- unit loading patterns
- storage-to-elevation tables
- tables for ice conditions
- spill gate capacity
- spill curves
- forebay-to-tailrace efficiency curve during spill conditions
- unit capability
- gate settings and cost ratios
- river flow information
- black start capability
- hourly capacity and energy values
- condensing information
- regulation information

J. Pumped Storage Plant Information

The following information is submitted for pumped storage plants:

- plant capacity vs. elevation chart
- unit hours vs. pond elevation tables
- per unit installed capacity
- load per unit
- per unit discharge curve in terms of Mcfs
- max/min plant elevations
- operating restrictions
- unit loading patterns
- storage-to-elevation tables
- unit capability
- gate settings and cost ratios
- black start capability
- hourly capacity and energy levels
- condensing information
- regulation information

Market Seller Inputs

Design data for new generation resources are required by PJM at least 30 days prior to commercial operation. This information is submitted by the PJM Member to PJM via facsimile. Attachment B shows the format and content of the information that is submitted to PJM.

The PJM Manual for ***Scheduling Operations*** describes the PJM Member bidding information that is required by 1200 hours when the PJM Energy Market closes.

Bilateral Transaction Inputs

PJM Members are expected to keep PJM informed of all Bilateral Transactions that involve the use of generation or transmission facilities in the PJM RTO. Each PJM Member involved in a Bilateral Transaction covering a period greater than the following Operating Day furnishes the required information to PJM. The PJM Manual for **Scheduling Operations** describes the required Bilateral Transaction data that must be submitted and the rules pertaining to Bilateral Transactions.

Section 6: Winter Net Capability Test Exemption

Welcome to the *Winter Net Capability Test Exemption* section of the PJM Manual for **Generator Operational Requirements**. In this section you will find the following information:

- Description of the Winter Net Capability Test Exemption Program

PJM Net Capability Verification Tests

PJM requires both summer and winter net capability verification tests for every capacity resource to demonstrate their maximum net capabilities during the specified summer and winter verification windows. The summer verification window is defined as the first day of June through the last day of August, while the winter verification window is defined as the first day of December through the last day of February.

If the claimed summer or winter net capabilities are not demonstrated during these verification windows, a reduction or derating covering the deficiency shall be coded retroactive to June 1 or December 1 for summer and winter verification windows, respectively.

Generation owners are responsible for complying with these requirements at their own expense.

Detailed guidelines for performing and reporting summer and winter net capability verification tests can be found in PJM Manual M-21 on [Rules and Procedures For Determination of Generating Capability](#).

Winter Net Capability Test Exemption Program

The Winter Net Capability Test Exemption program has been implemented as an alternative to the PJM winter net capability verification requirement for participating generation owners, who may nominate their units to be scheduled as-needed by PJM, or be granted an exemption, for their full load tests.

This program was implemented in order to provide an opportunity for participating generation owners to reduce their financial risks of testing, while ensuring that tests to verify unit capabilities to meet winter peaks are still performed on an as-needed basis.

Pre-Scheduling Details

The Winter Net Capability Test Exemption program will occur on an annual basis, from the first day of December through the first two weeks of February. This allows the opportunity for a participating generation owner to schedule a test, at their own expense, within the last two weeks of the winter verification window, if for any reason they are not tested or granted an exemption within the program.

Selection Criteria

The following selection criteria are applicable for units participating in the annual winter net capability test exemption program.

1. Maximum of 12 units or 1000 MW per participating generation owner.
2. Only units that have submitted successful summer tests for the same year will be eligible.
3. Winter capacity must be greater than or equal to summer capacity rating unless an exception is granted based on unit winter physical design limitations.

PJM Member Actions:

1. 30 days prior to the winter verification window, companies will forward a list of nominated units, in accordance with the stated selection criteria, to the PJM Generation Department, for participation in the winter net capability test exemption program.
2. The list of nominated units must include the claimed summer and winter net capability for each unit, as well as the minimum run-time and start-up times, including any applicable notification times, for scheduling the tests.

PJM Actions:

1. PJM will confirm acceptance of the list of units participating in the winter net capability test exemption program by December 1.

Scheduling Details

PJM will schedule participating units as-required based on economics.

1. Unit must be bid in with a start-up time less than or equal to 16 hours Monday through Friday unless PJM has requested CT's to be staffed over the weekend.

2. Units will be dispatched using cost based schedules during the second pass of the market (reliability run).
3. If the unit is self-scheduled by the owner, or is scheduled during the first pass of the market, and is requested to run at full load, the actual operation results will be used.

Scheduling Exceptions

1. If a participating unit is scheduled on by PJM and the unit is taken over by the owner prior to completion of the test, the unit will be removed from the exemption program for the year, and the owner will be responsible for scheduling the test for the remainder of the winter verification window.
2. Participating units may be unavailable during the course of the program for only two weeks (ten business days) maximum. Units that are unavailable during the program for more than two weeks will be removed from the exemption program for the year, and the owner will be responsible for scheduling the test for the remainder of the winter verification window.
3. Only two start failures per unit are permissible during the course of the program. A unit that fails to start for the third time during the program will be removed from the exemption program for the year, and the owner will be responsible for scheduling the test for the remainder of the winter verification window.
4. If a capability deficiency is uncovered during this verification (unit fails to demonstrate reported capability), a reduction covering the deficiency shall be coded retroactive to December 1, consistent with current PJM policy (please refer to PJM Manual M-21, Appendix A for additional details)
5. If a unit is not economically scheduled by PJM over the winter period by the second week of February, the unit will be granted an exemption to the winter test for that period based on the results of the unit's previous winter test.

Accounting Assumptions

1. Units installed after July 9, 1996 are required to supply a cost schedule for capacity testing.
2. Units which are scheduled by PJM as part of the program, and remain under PJM dispatch control during the test, will be eligible for recovery of their cost based schedule through PJM operating reserve credit provisions of the PJM OATT.

3. Failure of a test at the end of the winter verification window will have capacity accounting implications. If a unit fails on the last day of the test exemption program, February 14, the generation owner will have 2 weeks remaining to re-test within the winter verification window.

Completion of the Program

The Winter Net Capability Test Exemption program will be concluded on February 14, two weeks from the end of the winter verification window.

PJM Actions:

1. PJM Generation Department will notify Generation owners of the conclusion of the winter net capability test exemption program and will provide confirmation of which units were successfully tested during the programs, which were removed from the program, and which units will be granted exemptions from testing during that winter verification window.

PJM Member Actions:

1. Participating Generation owners must submit net capability verification reports for all tests conducted within the test exemption program to the PJM Capacity Adequacy Planning Department by March 31, in a manner consistent with current PJM policy (please refer to Manual M-21 for more details).
2. Net capability verification reports must also be submitted for units that were granted exemptions from testing in the program. The values reported for exempted units must be the values from the previous winter test results, along with an accompanying explanation that the unit was granted an exemption during the net capability verification program.

Attachment A: PJM Operating Reserve Objective Summary

The current PJM Operating Reserve Objective Summary may be reviewed by clicking on the following link:

- [Current PJM Operating Reserve Objective Summary](#)

The PJM Operating Reserve Objectives for the last 3 seasons may be also be reviewed by clicking on the following link:

- [Previous PJM Operating Reserve Objective Summaries](#)

Attachment B: Unit Commitment New Unit Requirements

	DATE SUBMITTED: _____ DATE DUE: _____ DATE COMPLETED: _____	
UNIT COMMITMENT NEW UNIT REQUIREMENTS COMPANY DATA		
UC ITEM #	DESCRIPTION	VALUE
2000	Company Number (CC) 2 numeric characters long CC = Company identifier	_____
2001	Long Company Name 24 Characters long	_____
2002	Short Company Name 4 Characters long	_____
PLANT DATA		
UC ITEM #	DESCRIPTION	VALUE
2029	Plant Number (CCPP) 4 numeric characters long CC = Company identifier PP = Plant Number Example: 7005	_____
2006	Long Plant Name 16 characters long Example: England	_____
2007	Short Plant Name 4 characters long Example: Engl	_____

Exhibit 7: Unit Commitment New Unit Requirements - Page 1

UNIT COMMITMENT NEW UNIT REQUIREMENTS		
UNIT DATA		
UC ITEM #	DESCRIPTION	VALUE
2008 STM 2014 CT	CCPPTTUU Identifier 8 numeric characters CC = Company identifier PP = Plant number TT = Type of unit (e.g., 01 is a steam unit, 21 is an industrial CT, 22-26 are aircraft type CTs) UU = Number of unit Example: 70050101	—
2010 STM 2016 CT	Short Unit Name 4 characters Example: 1 for England 1	—
1302 STM 2017 CT	MWMON PTID 4 numeric characters Example: 0899 Bus Name England 138	—
STM only	Calculates by Dispatch Lambda (Yes or No?) 1 character Example: Yes for England 1	
2037 STM only	Dispatch Lambda Gross/Net Switch (Yes or No?) 1 character Example: No for England 1	
2038 CT only	CT Bank ID Number 2 numeric characters Example: 00 for Vineland CT	—
2026 CT only	Co. Weather Pointer 8 numeric characters Ex. 70007201 for Vineland CT	—

Exhibit 8: Unit Commitment New Unit Requirements - Page 2

UNIT COMMITMENT NEW UNIT REQUIREMENTS SCHEDULE DATA		
UC ITEM #	DESCRIPTION	VALUE
2013 STM 2020 CT	CCPPTTUUSS Identifier 10 numeric characters CC = Company identifier PP = Plant number TT = Type of unit UU = Number of unit SS = Schedule number	_____
2011 STM 2018 CT	Long Schedule Name 16 characters long Example: COAL for England 1	_____
2012 STM 2019 CT	Short Schedule Name 8 characters long Example: Coal for England 1	_____
2032 STM Only	Dispatch Lambda Identifier 6 numeric characters Example: 222401 for England 1	_____
<p style="text-align: center;">Existing Schedule ID copy from (CCPPTTUUSS) _____ This will initialize all data items with those found in the existing schedule. This option may only be implemented at the time of the creation of the schedule.</p>		

Exhibit 9: Unit Commitment New Unit Requirements - Page 3