A. Introduction

1. Title: Verification and Data Reporting of Generator Gross and Net Real Power Capability

2. Number: MOD – 024 – RFC – 01

3. Purpose: To establish Reliability*First* requirements for verification and data reporting of generator gross and net Real Power capability to support NERC Reliability Standard MOD-024.

4. Applicability:
4.1 Generator Operator of any size unit that is connected either to the Bulk Electric System, subtransmission or distribution system (not including units behind an end-use customer meter)
4.2 Resource Planner

5. (Proposed) Effective Date: Upon Board Approval

B. Requirements

R1 Generator Operators shall apply the following periodicity for generator seasonal (Summer and Winter) Real Power capability verification for each unit operated:

R1.1 Units whose generator maximum nameplate Rating is greater than or equal to 85 MVA shall verify their seasonal capabilities annually.

R1.2 Units whose average capacity factor over the last three years is greater than five percent shall verify their seasonal capabilities annually.

R1.3 All other units shall verify their seasonal capabilities at least every five years.

R1.4 If Sister Units exist at a site:

R1.4.1 At least 20 percent of all Sister Units shall verify their seasonal capabilities annually with all units being verified over a five year period,

R1.4.2 If fewer than five units are deemed Sister Units, a minimum of one unit shall verify seasonal capabilities each year.

R1.4.3 If the resulting verification data shows a difference in gross Real Power capability between any two Sister Units that exceeds three percent of the remaining Sister Units, those units will no longer be considered or treated as Sister Units until the time that their capabilities match again as demonstrated by official verifications.

R2 Each Generator Operator shall record the Real Power requirements of auxiliary loads during the verifications required by R3.

R2.1 Generator Operators shall provide a simplified key one-line diagram (see FAQ for an example) showing all sources of auxiliary real power. This diagram shall include Generator Step-Up (GSU), auxiliary, station service and standby (start-up) transformers. The key one-line diagram shall show Real Power flows assuming the following plant operating conditions:

- Normal electrical plant configuration
- Normal full load equipment operation of all units
- Normal fuel handling in operation
- Normal ash removal systems in operation
- Normal environmental systems in operation.

R2.2 Generator Operators shall include Real Power consumption for Common Service Load (for example, coal-handling or lighting) that shall be prorated among the appropriate units in the plant and will represent the consumption normally experienced during the high-load period of the day.

R2.3 If metering does not exist to measure station service load, only the net Real Power shall be reported

R3 Each Generator Operator shall verify the summer gross and net Real Power capability by tracking for the specified period of time. Verification of winter gross and net Real Power capability shall be accomplished by (1) tracking for the specified period of time or (2) adjusting the summer verification.

R3.1 Summer verification shall be accomplished by recording data for the specified continuous hours of normal operation during the Summer Peak Period. If winter verification is accomplished by recording data for the specified continuous hours of normal operation, the verification shall be performed during the Winter Peak Period. (See FAQ for the desired format of the recording record – temporary note for posting purposes.)

R3.1.1 Verifications of nuclear or fossil fired steam units shall be run for four continuous hours

R3.1.2 Verifications of combined-cycle units shall be run for two continuous hours

R3.1.3 Verifications of hydro and pumped storage plants shall be run for one hour, shall be based on operational data or test results taken at any time during the year and shall take into account forecasted reservoir levels or water flow conditions. Verification shall be run with all units in the hydro plant running. Results shall then be prorated for each unit. The same operational data or test can be used for reporting both summer and winter capability verifications.

R3.1.4 Verifications of all other units shall be run for one hour

R3.2 The gross and net Real Power capability will be determined with the generator in automatic voltage control mode controlling to the voltage schedule supplied by the Transmission Operator.

R3.3 When a known permanent (nine months or longer) change occurs in the gross and net Real Power capability rating of a unit, and is indicated by operating data or verification results, it shall be reported to the Resource Planner and Planning Coordinator within 60 calendar days following the change.

R3.4 The gross and net Real Power capability rating of a unit shall not be reduced to reflect unplanned deratings or temporary capability restrictions provided that it is the intention of the owner to restore the original capability. The time of this restoration may depend on availability of parts and scheduling of the outage required for repairs. If the owner does not intend to restore the original capability within nine months, the reduced gross and net Real Power capability value will become effective.

R4 Each Generator Operator shall perform normalization to median ambient conditions of the recorded data in R3, before reporting the gross and net Real Power capability

R4.1 Each Generator Operator shall document an ambient conditions normalization methodology to adjust the recorded Real Power capability readings from the operational tracking or test

R4.1.1 Each Generator Operator shall make its ambient conditions normalization methodology available for inspection and technical review by those Resource Planners and Planning Coordinators that have responsibility in the area in which the associated Generators are located, within 15 business days of the receipt of a request.

R4.1.2 If a Resource Planner or Planning Coordinator provides written comments on the Generator Operator's ambient conditions normalization methodology, the Generator Operator shall provide a written response to that commenting entity within 45 calendar days of receipt of those comments. The response shall indicate whether a change will be made to the ambient conditions normalization methodology and, if no change will be made, the reason why.

R4.2 Local ambient conditions shall reflect the fifty percent probability of occurrence (the median) of local temperature, humidity and cooling water temperature conditions at the time of the Resource Planner's seasonal peak load, measured at or near the generator's location. Ambient weather conditions shall be determined as the median value of the most recent 15 years of local weather records. These ambient conditions may be used for up to five years before recalculating new

ambient conditions. When local weather records are not available, the values shall be estimated from the best data available.

R4.2.1 The Resource Planner shall supply each Generator Operator the current and previous 15 years of annual summer and winter peak load dates and times within six months of the end of Seasonal Peak Period

R4.2.2 Generator Operators shall determine the local ambient conditions for each generator on the dates and times of the Resource Planner's annual summer and winter peak loads supplied as required by R4.2.1

R4.2.3 Generator Operators shall calculate the median of the local ambient summer and winter conditions as required by R4.2.2. The seasonal medians shall be then known as the local ambient summer and winter conditions

R4.2.4 Generator Operators shall then adjust the recorded Real Power capability readings from operational tracking or test using the ambient conditions normalization methodology. The normalized real power capability readings shall become the seasonal verified real gross and net power for that generator

R5 If all or any part of a unit's capability cannot be sustained for 12 hours of continuous operation, that unit shall be known as an intermittent or limited energy unit. A Wind Generating Station will be considered to be an intermittent energy unit. The entire Wind Generating Station should be considered as a whole. Hydro units or pumped storage units shall not be considered intermittent energy units. To determine the intermittent or limited energy unit's capability, the Generator Operator shall perform the following calculation in lieu of the verification procedure listed in R3:

Step A Sum all of the "hourly net outputs" for each of the Summer Peak Period Hours of each day during the Summer Peak Period in the year that is three years prior to the current year.

Step B Then, for each of the same Summer Peak Period Hours, sum the net Maximum Capability values.

Step C The quotient of the summed summer peak hour net outputs (Step A) divided by the summed Summer Peak Period Hour net Maximum Capability (Step B) times 100 will yield a single year capacity factor for that year.

Step D If there is no or incomplete operating data for one or more of the summers (immature Intermittent capacity resource) then the single year capacity factor for each of those years is assigned the value of the Class Average Capacity Factor. For Wind Generating Stations use a Class Average Capacity Factor of 20 percent.

Step E Repeating steps (A) through (D) above for each of the two intervening years (current year minus 2, and current year minus 1) will generate two more single year capacity factors, one for each of those years.

Step F The Capacity Factor to be used in the current year is the mean (arithmetic average) of the three single year capacity factors calculated in steps (C) and (D) above.

Step G The current Capability Value is then calculated by multiplying this Capacity Factor from (F) above by the current net Maximum Capacity of the intermittent capacity resource.

Step H Repeat steps A through G for the Winter Peak Period.

R6 The Generator Operator shall report the following data, following verification, in accordance with the schedule provided by the requesting Resource Planner and Planning Coordinator :

R6.1 Seasonal gross and net Real Power generating capabilities.

R6.2 Real Power requirements of auxiliary loads.

R6.3 Method of verification, including date and conditions.

C. Measures

M1

M2

M3

M4

D. Compliance

1. Compliance Monitoring Process

1.1 Compliance Monitoring Responsibility
Reliability*First* Corporation

1.1.1

1.1.2

1.2 Compliance Monitoring Period and Reset Time Frame

Compliance Monitoring Period – Daily

Reset period - One calendar month

1.3 Data Retention

The documented methodology and daily plans must be held for the current calendar year plus previous calendar year

1.4 Additional Compliance Information

None

2. Violation Severity Levels

2.1 **Lower:** There shall be a lower violation if the following condition exists:

2.1.1

2.2 **Moderate:** There shall be a moderate violation if the following condition exists:

2.2.1

2.3 **High:** There shall be a high violation if the following condition exists:

2.3.1

2.4 **Severe:** There shall be a severe violation if any of the following conditions exists:

2.4.1

E. Definitions

The following are definitions of terms used in this Standard:

Capacity Factor (expressed as a percent) - Is net actual energy generation (MW-hours) divided by the period (hours) multiplied by the net max capacity rating (MW)

Seasonal Peak Period – For the summer season, the Seasonal Peak Period extends from the first day of June to the last day of August. For the winter peak season, the Seasonal Peak Period extends from the first day of December to the last day of February.

Peak Period Hours – The four summer hours ending at 3 PM, 4 PM, 5 PM and 6 PM. The four winter hours ending 8 AM, 9 AM, 7 PM and 8 PM.

Sister Units - Units can be considered sisters in regard to that equipment or system if it can be demonstrated that the units, equipment, or systems have identical designs, identical major components, identical significant control system settings and similar verified capabilities.

Station Service Transformer – A transformer that supplies power from a station high voltage bus to the station auxiliaries and also to the unit auxiliaries during unit startup and shutdown or when the unit auxiliaries transformer is not available, or both (generating stations electric power system) (ANSI C57.116-1989)

Unit Auxiliaries Transformer – A transformer intended primarily to supply all or a portion of the unit auxiliaries (generating stations electric power system)

Wind Generating Station - a collection of wind turbines at a single site electrically connected together and injecting energy into the grid at one point, sometimes known as a "Wind Farm".

The following definitions were extracted from the August 2, 2006 NERC Glossary of Terms:

Rating - The operational limits of a transmission system element under a set of specified conditions.

Real Power - The portion of electricity that supplies energy to the load.

F. IntraRegional Differences

None

G. Notes

None

Version History

Version	Date	Action	Change Tracking
MOD-024-RFC-01 1st Draft	09/12/07 Through 10/11/07	Posted for 1st Comment Period	