

## Ancillary Services Manual

March 2007

#### NYISO ANCILLARY SERVICES MANUAL

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#### Disclaimer

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#### 3.2 Supplier Qualification

A VSS Supplier's Resource must be a Generator or a Synchronous Condenser. Suppliers of VSS must provide a Resource that has an Automatic Voltage Regulator (AVR) and has successfully performed a Reactive Power (MVAr) capability test in accordance with the NYISO Procedures described below. VSS suppliers must be able to produce or absorb Reactive Power within the Resource's tested reactive capability range and be able to maintain a specific voltage level under both steady-state and post-contingency operating conditions subject to the limitations of the Resource's tested reactive capability.

In order to qualify to receive payments as a VSS Supplier the candidate Supplier, including previously disqualified VSS Suppliers that must re-qualify, must complete a VSS Qualification Form. That form is provided as <u>Attachment A</u> of this manual. The Qualification Form must include a statement of intent to provide Voltage Support Services and attach documentation that the synchronous generator or synchronous condenser has an automatic voltage regulator (AVR). This documentation shall include the voltage regulator block diagram and associated data, the manufacturer's model number and specifications, and a generator reactive capability data sheet ("D-curve").

The candidate VSS Supplier must complete and return the Voltage Support Service Suppliers Qualification Form, a copy of which is provided in Attachment A of this document, and supporting data to:

Manager, Auxiliary Market Operations New York Independent System Operator, Inc. 10 Krey Boulevard Rensselaer, NY 12144

The original application form must be completed by a representative of the Supplier and signed by a Vice-President (or equivalent) of the corporation.

### 3.3 Responsibilities for Service

The NYISO directs the Supplier's Resources to operate within their tested reactive capability limits. The scheduling of VSS is the responsibility of the NYISO.

- NYISO The NYISO coordinates the NYS Power System voltages throughout the NYCA.
- Transmission Owners Transmission Owners are responsible for the local control of the Reactive Power resources that are connected to their network.
- Suppliers Suppliers are expected to operate their Resources within demonstrated reactive
  capability limits. VSS suppliers are also expected to maintain a specific voltage level, as
  directed by the NYISO and the Transmission Owner System Operator, under both steadystate and post-contingency operating conditions subject to the limitations of the Resource's
  tested reactive capability.

• the Resource provides VSS for 30 consecutive days without any compliance failures. No payments for VSS or LOC are made to the Supplier during this period.

#### 3.5.3 Failure to Maintain Automatic Voltage Regulator in Service

a) A Resource will be disqualified as a supplier of voltage support after it fails to maintain the automatic voltage regulator in operation and fails to commence timely repairs following a failure of the automatic voltage regulator within a 30day period.

#### Reinstatement of Payments

The Supplier will not receive Voltage Support Service payments for the disqualified Resource until the Supplier complies with the following conditions:

- the Supplier provides documentation to the NYISO of the completion of the repairs,
- the Supplier's Resource successfully performs a Reactive Power (MVAr) capability test, and
- the Resource provides Voltage Support Service for 30 consecutive days without any compliance failures. No payments for Voltage Support Service or LOC are made to the Supplier during this period.

#### 3.6 Reactive Power Capability Testing or Demonstration

The purpose of the Reactive Power capability testing or demonstration is to establish a uniform procedure of determining, confirming, and documenting the Reactive Power capability of VSS Suppliers for real-time system voltage control. VSS suppliers must have a functioning automatic voltage regulator (AVR). The procedures set forth below provide the NYISO with accurate and timely information on the Reactive Power capability of the VSS Suppliers. The demonstration also provides confirmation that the supplier's AVR is in proper working condition and that the supplier is able to automatically adjust its reactive power production or consumption to properly control voltage.

Each year resources that participate in VSS must be tested to demonstrate both Lagging and Leading Reactive Power capability or must provide data collected during actual operation to demonstrate both Lagging and Leading Reactive Power capability. In all cases, the Supplier's AVR must be enabled and providing automatic voltage control during the demonstration period. Tests may take the form of demonstration of Reactive Power capability based upon actual generator output data or tests conducted pursuant to the procedures set forth in this Manual. Tests must be coordinated with the NYISO and the Transmission Owner (TO) in whose service territory the unit is located. Test data reports must be submitted electronically by the VSS Supplier within <a href="five(5)ten(10)">five(5)ten(10)</a> business days of the test to the NYISO for review and acceptance. The demonstrated performance of the Lagging Reactive Power capability tests is the basis for compensation to Suppliers of VSS.

(TO) within sixty (60) days of the end of the capability period. This allows sufficient time for the NYISO to assemble the data with due consideration to Generator owner reporting requirements.

#### 3.6.5 Allowance for Out-of-period Reactive Capability Testing

There are three (3) conditions where NYISO will provisionally accept testing for Voltage Support Service when that test is not conducted within the specified Summer Capability Period:

- 1. A new resource entering commercial operation, or
- 2. An existing provider's resource returning to service from an extended forced outage, or
- 3. An existing resource becoming eligible to qualify as a VSS supplier.

#### Initial Qualification of New Resource

For a new resource entering commercial service and requesting qualification as a Voltage Support Service supplier, the resource must complete the annual test requirements within thirty (30) days of entering service, and forward the completed test report, in electronic form, to NYISO within ten (10) five (5) business days of the completion of that test. The resource shall also provide, in writing, the required documentation of the resource's reactive capability and automatic voltage regulator.

#### Existing Resource returning from Extended Forced Outage

An existing supplier's resource returning to service following an extended forced outage must complete the annual test requirements within thirty (30) days of returning to service, and forward the completed test report, in electronic form, to NYISO within ten (10) five (5) business days of the completion of that test.

#### Existing Resource becoming eligible as a VSS Supplier

If, as the result of equipment upgrades or changes in qualification requirements, an existing supplier's resource becomes eligible, the Supplier must complete the annual test requirements within thirty (30) days of the effective date of the change in qualification requirement or equipment upgrade, and forward the completed test report, in electronic form, to NYISO within ten (10) five (5) business days of the completion of that test.

#### Follow-up Testing Requirement

For any of the above conditions, the following conditions and requirements apply:

The NYISO will accept the demonstrated lagging MVAr capability as the basis for compensation on a provisional basis until the beginning of the next Summer Capability Period.

To continue qualification to receive VSS payments the resource is required to perform a complete annual test within thirty (30) days of the start of the Summer

Capability Period, and forward the completed test report, in electronic form, to NYISO within ten (10) five (5) business days of the completion of that test. This "in period" test will also qualify the resource for continued participation in the VSS in the next compensation year.

#### 3.7 Voltage Support

The following procedures apply to VSS.

#### 3.7.1 Request for Voltage Support Service

The NYISO may request corrective actions from voltage support facilities that are already in service and available. The procedures for Real-Time voltage control are covered in the NYISO <u>Emergency Operations</u> and <u>Transmission & Dispatching Operations</u> Manuals.

#### 3.7.2 Voltage Support Availability

#### Supplier Actions:

The supplier is obligated to provide timely notification of any operational restrictions that may limit the voltage support capability.

The supplier must perform the following:

- 1) The Automatic Voltage Regulator (AVR) shall be maintained in service in automatic voltage regulation mode at all times, unless instructed otherwise by the NYISO or the Transmission Owner System Operator.
- 2) Provide immediate notification to the NYISO through the Transmission Owner System Operator whenever the AVR, or any other equipment necessary for maintaining the resource's demonstrated Reactive Power capability (including, but not limited to, auxiliary cooling systems, exciters, etc.) is forced out of service or derated, and provided notice as required by the <u>NYISO Outage</u> <u>Scheduling Manual</u> prior to removal from service for scheduled maintenance.
- Notify the NYISO and Transmission Owner System Operator of the estimated time for completion of necessary AVR (or other) repairs, or scheduled maintenance.
- 4) Notify the NYISO and Transmission Owner System Operator when maintenance is complete and the resource's voltage support capability is fully restored.

# Attachment A – VSS Qualification Request Form

## **Voltage Support Services**

## **Qualifications Request Form**

below have an	Automatic Vo	ltage Regulator	(AVR <del>).</del> ), incl	uding voltage i	resource(s) liste	d
	ssociated data, etive capability			and specificat	ions, and a	
	-					
documenting t		e(s) listed below	w have successi		pability Test Report Reactive Power	
The resource(s) listed be direction of the NYISO with NYISO voltage and	and agree to c	omply with al				d
Resource	Type (Generator or Synchronous Condenser)	Location	NYISO ICAP Contract	NYISO MIS PTID	Generator MW Capability	
Market Participant Inform	ation:					
Officer's	Signature				Date	
New York ISO Approval:						
Approved	by				Date	
Manager, Market O	Grid Account perations	ing and Settle	ments Auxiliar	y	Date	

## **Revision History Page**

Revision	Date	Changes
<u>3.8</u>	<b>TBD</b>	Section 3.2
		Second paragraph – added "Attachment A".
		Section 3.6  Section 3.6  Section 3.6
		<ul> <li>Second paragraph—corrected "Test data reports must be submitted electronically by the VSS Supplier within ten (10) business days"—</li> </ul>
		originally stated five (5) business days.
		Attachment A
		<ul> <li>Updated first bullet – added "including voltage regulatordata sheet ("D-</li> </ul>
		curve").
		Attachment B
		Section B-1 – Restored missing "Reason for Limit" column.
		Section B-2 and B-3 – Removed "Part 1" from figure titles.
3.7	3/8/07	Administrative change
		<ul> <li>Removed 10 Krey Blvd address for Manager, AMO, and replaced with 3890</li> </ul>
		Carman Road address.
		Section 3.6
		Clarify that functioning AVR is required during
3.6	12/8/06	Deleted Attachment B – AGC Functional Requirements
		There were no references to the Attachment in version 3.5 of the manual
		Inserted New Attachment A – VSS Qualifications Request Form  Inserted Qualification Request Form from TR 103 (TR 103 can be retired)
		<ul> <li>Inserted Qualification Request Form from TB 103 (TB 103 can be retired).</li> <li>Subsequent Attachments have been relabeled.</li> </ul>
		Inserted New Section 1.3
		<ul> <li>Inserted new section 1.3 "Payments and Charges for Ancillary Services" (from</li> </ul>
		TB 121, TB 121 should be incorporated in the Accounting & Billing Manual
		before being retired) sections following 1.3 have been renumbered.
		Inserted New Section 3.2
		<ul> <li>Inserted new section 3.2 Supplier Qualifications (from TB 091 and TB 103) sections following 3.2 have been renumbered.</li> </ul>
		Modified Section 3.6
		Changes to this section are in accordance with RT SCHD 2, Sect 1.1.
		• Changed title of heading to "Reactive Power Capability Demonstration"
		<ul> <li>Second paragraph – inserted language on providing data during actual</li> </ul>
		operation.
		Section 3.6 (old section 3.5) – Incorporated TB 091 (TB 091 can be retired)
		Modified Section 3.6.1
		<ul> <li>Changed title of heading to "Frequency and Timing"</li> <li>First paragraph – inserted language stating each calendar year resources</li> </ul>
		providing VSS must demonstrate both lagging and leading reactive capability.
		Modified Section 3.6.2
		• First paragraph – inserted language on how measurements should be taken and how tests must be performed.
		Modified Section 3.6.4
		<ul> <li>Changed title of heading to "Reporting Requirements"</li> </ul>
		<ul> <li>Replaced demonstration with "tests and/or demonstrations."</li> </ul>
		• Section 3.6.4 (old section 3.5.4) – Incorporated TB 126 (TB 126 must also be
		incorporated in ICAP manual then can be retired)

## Attachment B – Generator MVAr Capability Test

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1	NYISO	Voltag	e Supp	ort Anc	illary S	ervice	Annua	al Read	ctive C	apabi	lity Te	est Re	port		
3	Genera	tor Owner	(enter owr	nor namel			NOTE: F	eportina e	entity sho	uld compl	lete all fie	elds		-	
4			(enter gene				highlight	ed in yello	w on this	sheet, an	d <u>all</u> appi	ropriate			
5			(enter uni	-						st data sh					
6			(enter ID					i on the te: into this s		neets will a sheet	automatic	cally			
7	Generator ICAP/DM	NC Rating	enter DMN0	C MW-rating)			(Rev. 8/3		annina y	Shoon					
8	LAGGING MVAR MAXIMUM	CADADILITY	TECT												
9	Test Date:	CAPADILIT	(enter mn	/dd/mnn/											
-	Start Time		(enter h												
11	End Time		(enter l												_
13	Life Time		tenter i											_	
14		NO	OTE: Cells	shaded light	green are	automatica	lly popula	ted from t	he test da	ata sheets					
15							Gen. T	erminal			In-plant	Auxiliarg	Reason		
16		Gross Gene	rator Output	Net Output	to system		¥ol	tage	Tap Po	sitions	Station S	ervice Loa	1 For		
17		Gross	Gross	Net	Net	Hydrogen	Gen	Auxiliary	GSU	Auziliary	MV	MVAR	Limit	ш	
18		Real Power	Reacitve Power	Real Power	Reactive Power	Pressure	Terminal	Bus		Bus					<u> </u>
20		MW	MVAr	MV	MVAr	(PSIA)									
21	HP or CT (Unit/Part 1)						0.0	0.0	0.0	0.0	0.0	0.0			
22	THE OF CT (CHIEF GIVE)						0.0	0.0	0.0	0.0	0.0	0.0		= 1	
23	LP or ST (Unit/Part 2)						0.0	0.0	0.0	0.0	0.0	0.0			
24															<u> </u>
25 26	LEADING MVAR MAXIMUM (	CAPABILITY	TEST												
27	Test Date:		(enter mm	/dd/yyyy)											
28	Start Time		(enter h	nh.mm)											
29	End Time		(enter h	nh.mm)											
30															
31		NO	OTE: Cells	shaded light	green are	automatica			he test da	ata sheets				_	<u> </u>
32		C	rator Output	Net Output				erminal tage	T D-	ositions		Auxiliary ervice Loa	Reason d For	-	<u> </u>
				Net Output Net	to system Net		Gen	Auziliare	GSU	Auziliaru	MV	MYAR	H	Н	
3 <b>4</b> 35		Gross Real	Gross Reacitve	Real	Net Reactive	Hydrogen Pressure	Terminal	Bus	usu	Bus	Me	MTAR	Limit	Н	
36		Power	Power	Power	Power										
37		MW	MVAr	MV	MVAr	(PSIA)								-	<u> </u>
38	HP or CT (Unit/Part 1)						0.0	0.0	0.0	0.0	0.0	0.0		_	
40	LP or ST (Unit/Part 2)						0.0	0.0	0.0	0.0	0.0	0.0		7 1	
41	Er or or (orner urtz)						0.0	0.0	0.0	0.0	0.0	0.0			
42								D / D1/		FARMIC				_	
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51	NYISO SHIFT SUPERVISOR:						TRANSM	SSION PR	OVIDER D	SPATCHE	R:				
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Figure B-1: NYISO Voltage Support Ancillary Service Annual Reactive Capability Test Report

	A	В	C	D	E	F	G	Н	1	J	K	L	M	N
1				Laggin	q Test Da	ta Record	ing Form	- Part 1						
2														
3		Use this section to report test results						Gen. To	erminal			In-plant	Auxiliary	
4		for the high pressure turbine-	Gross Gene	Gross Generator Output		Net Output to system		Volt	tage	Tap Po	sitions	Station Service Load		
5		generator set of a cross-compound	Gross	Gross	Net	Net	Hydrogen	Gen	Auxiliary	GSU	Auxiliary	MV	MVAR	
6		unit, or the combustion turbine-	Real	Reacitve	Real	Reactive	Pressure	Terminal	Bus		Bus			
7		generator set of a combined-cycle	Power	Power	Power	Power								
8	Reading	Time	MW	MVAr	MV	MVAr	(PSIA)							
9	1													
10	2													
11	3													
12	4													
13	5													
14	6													
15	7													
	- '													
16	8													
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18	10													
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22														
		Calculated Average value												
23		for hour												
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				Those colle	ara autom	atically calcu	ulated and re	scult nonu	lated in the	test ren	ort sheet.			
25				THESE CEIIS	are automi		nateu anu i t							
										tootrop				
26				Data to be s	supplied at	5-minute inte	rvals for du	ration of te	est hour.	tootrop				
26 27				Data to be s	supplied at		rvals for du	ration of te	est hour.	restrop				
25 26 27 28 29		Use Part 2 only for LP-shaft	of cross-co	Data to be s Values nee	supplied at d only be s	5-minute inte upplied at be	ervals for du ginning and	ration of te end of tes	est hour. t hour.			as genera	ntor in Part	1.
26 27 28 29		Use Part 2 only for LP-shaft	of cross-co	Data to be s Values nee mpound or s	supplied at a d only be su steam turbii	5-minute inte upplied at be ne portion of	ervals for du ginning and combined-c	ration of to end of tes cycle unit v	est hour. t hour.			as genera	ntor in Part	1.
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26 27 28 29 30 31		Use Part 2 only for LP-shaft  Use this section to report test results for the low pressure ruthine-		Data to be s Values nee mpound or s	supplied at a donly be substeam turbing Test Da	5-minute inte upplied at be ne portion of	ervals for du ginning and combined-c	ration of to end of tes cycle unit v - Part 2 Gen. Te	est hour. t hour. vhen teste	ed at the s		in-plant		1.
26 27 28 29 30 31 32 33 34		Use this section to report test results		Data to be s Values nee mpound or s Laggin	supplied at a donly be substantial donly be substantial donly be substantial donly by the substa	5-minute inte upplied at be ne portion of ta Record t to system	ervals for du ginning and combined-c	ration of to end of tes cycle unit v - Part 2 Gen. Te	est hour. t hour. vhen teste erminal	ed at the s	ame time	in-plant	Auxiliary	1.
26 27 28 29 30 31 32 33 34 35		Use this section to report test results for the low pressure ruthing-generator set of a cross-compound unit, or the HFSG steam turbing-	Gross Gene Gross Real	Data to be s Values nee mpound or s Laggin rator Output Gross Reacitve	supplied at a donly be so steam turbing Test Da  Net Outpu  Net Real	5-minute inte upplied at be ne portion of ta Record t to system Net Reactive	ervals for du ginning and combined-d ing Form	ration of to end of tes cycle unit v - Part 2 Gen. To Vol	est hour. t hour. when teste erminal tage	ed at the s	ame time	In-plant Station Se	Auziliary ervice Load	1.
26 27 28 29 30 31 32 33 34 35 36		Use this section to report test results for the low pressure turbine-generator set of a cross-compound unit, or the HRSG steam turbine-generator set of a combined-ouble	Gross Gene Gross Real Power	Data to be s Values nee mpound or s Laggin rator Output Gross Reacitve Power	supplied at a donly be so steam turbing Test Da  Net Outpu  Net Real  Power	5-minute inte upplied at be ne portion of ta Record t to system Net Reactive Power	ervals for du ginning and combined-o ing Form Hydrogen Pressure	ration of te end of tes cycle unit v - Part 2 Gen. To Volt	est hour. t hour. vhen teste erminal tage Auxiliarg	ed at the s	eame time	In-plant Station Se	Auziliary ervice Load	1.
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26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42	Reading 1 2 3 4 4 5 5 6 6	Use this section to report test results for the low pressure turbine-generator set of a cross-compound unit, or the HRSG steam turbine-generator set of a combined-ouble	Gross Gene Gross Real Power	Data to be s Values nee mpound or s Laggin rator Output Gross Reacitve Power	supplied at a donly be so steam turbing Test Da  Net Outpu  Net Real  Power	5-minute inte upplied at be ne portion of ta Record t to system Net Reactive Power	ervals for du ginning and combined-o ing Form Hydrogen Pressure	ration of te end of tes cycle unit v - Part 2 Gen. To Volt	est hour. t hour. vhen teste erminal tage Auxiliarg	ed at the s	eame time	In-plant Station Se	Auziliary ervice Load	1.
26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43	Reading 1 2 3 4 5 5 6 6	Use this section to report test results for the low pressure turbine-generator set of a cross-compound unit, or the HRSG steam turbine-generator set of a combined-ouble	Gross Gene Gross Real Power	Data to be s Values nee mpound or s Laggin rator Output Gross Reacitve Power	supplied at a donly be so steam turbing Test Da  Net Outpu  Net Real  Power	5-minute inte upplied at be ne portion of ta Record t to system Net Reactive Power	ervals for du ginning and combined-o ing Form Hydrogen Pressure	ration of te end of tes cycle unit v - Part 2 Gen. To Vol	est hour. t hour. vhen teste erminal tage Auxiliarg	ed at the s	eame time	In-plant Station Se	Auziliary ervice Load	1.
26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44	Reading 1 2 3 4 4 5 6 6 7 7	Use this section to report test results for the low pressure turbine-generator set of a cross-compound unit, or the HRSG steam turbine-generator set of a combined-ouble	Gross Gene Gross Real Power	Data to be s Values nee mpound or s Laggin rator Output Gross Reacitve Power	supplied at a donly be so steam turbing Test Da  Net Outpu  Net Real  Power	5-minute inte upplied at be ne portion of ta Record t to system Net Reactive Power	ervals for du ginning and combined-o ing Form Hydrogen Pressure	ration of te end of tes cycle unit v - Part 2 Gen. To Vol	est hour. t hour. vhen teste erminal tage Auxiliarg	ed at the s	eame time	In-plant Station Se	Auziliary ervice Load	1.
26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45	Reading 1 2 3 4 4 5 6 6 7 7 8 8	Use this section to report test results for the low pressure turbine-generator set of a cross-compound unit, or the HRSG steam turbine-generator set of a combined-ouble	Gross Gene Gross Real Power	Data to be s Values nee mpound or s Laggin rator Output Gross Reacitve Power	supplied at a donly be so steam turbing Test Da  Net Outpu  Net Real  Power	5-minute inte upplied at be ne portion of ta Record t to system Net Reactive Power	ervals for du ginning and combined-o ing Form Hydrogen Pressure	ration of te end of tes cycle unit v - Part 2 Gen. To Vol	est hour. t hour. vhen teste erminal tage Auxiliarg	ed at the s	eame time	In-plant Station Se	Auziliary ervice Load	1.
26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46	1 2 3 4 5 6 7 8	Use this section to report test results for the low pressure turbine-generator set of a cross-compound unit, or the HRSG steam turbine-generator set of a combined-ouble	Gross Gene Gross Real Power	Data to be s Values nee mpound or s Laggin rator Output Gross Reacitve Power	supplied at a donly be so steam turbing Test Da  Net Outpu  Net Real  Power	5-minute inte upplied at be ne portion of ta Record t to system Net Reactive Power	ervals for du ginning and combined-o ing Form Hydrogen Pressure	ration of te end of tes cycle unit v - Part 2 Gen. To Vol	est hour. t hour. vhen teste erminal tage Auxiliarg	ed at the s	eame time	In-plant Station Se	Auziliary ervice Load	1.
26 27 28 29 30 31 33 33 33 33 33 33 33 40 41 42 43 44 45 46 47	Reading 1 2 3 4 5 6 6 7 7 8 9 9 10	Use this section to report test results for the low pressure turbine-generator set of a cross-compound unit, or the HRSG steam turbine-generator set of a combined-ouble	Gross Gene Gross Real Power	Data to be s Values nee mpound or s Laggin rator Output Gross Reacitve Power	supplied at a donly be so steam turbing Test Da  Net Outpu  Net Real  Power	5-minute inte upplied at be ne portion of ta Record t to system Net Reactive Power	ervals for du ginning and combined-o ing Form Hydrogen Pressure	ration of te end of tes cycle unit v - Part 2 Gen. To Vol	est hour. t hour. vhen teste erminal tage Auxiliarg	ed at the s	eame time	In-plant Station Se	Auziliary ervice Load	1.
26 27 28 29 30 30 31 32 33 33 33 34 35 36 37 38 39 40 41 42 43 44 45 44 45 47 48	1 2 3 4 5 6 7 8	Use this section to report test results for the low pressure turbine-generator set of a cross-compound unit, or the HRSG steam turbine-generator set of a combined-ouble	Gross Gene Gross Real Power	Data to be s Values nee mpound or s Laggin rator Output Gross Reacitve Power	supplied at a donly be so steam turbing Test Da  Net Outpu  Net Real  Power	5-minute inte upplied at be ne portion of ta Record t to system Net Reactive Power	ervals for du ginning and combined-o ing Form Hydrogen Pressure	ration of te end of tes cycle unit v - Part 2 Gen. To Vol	est hour. t hour. vhen teste erminal tage Auxiliarg	ed at the s	eame time	In-plant Station Se	Auziliary ervice Load	1.
26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45	1 2 3 4 5 6 7 8	Use this section to report test results for the low pressure turbine-generator set of a cross-compound unit, or the HRSG steam turbine-generator set of a combined-ouble	Gross Gene Gross Real Power	Data to be s Values nee mpound or s Laggin rator Output Gross Reacitve Power	supplied at a donly be so steam turbing Test Da  Net Outpu  Net Real  Power	5-minute inte upplied at be ne portion of ta Record t to system Net Reactive Power	ervals for du ginning and combined-o ing Form Hydrogen Pressure	ration of te end of tes cycle unit v - Part 2 Gen. To Vol	est hour. t hour. vhen teste erminal tage Auxiliarg	ed at the s	eame time	In-plant Station Se	Auziliary ervice Load	1.
266 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49	1 2 3 4 5 6 7 8 9	Use this section to report test results for the low pressure turbine-generator set of a cross-compound unit, or the HRSG steam turbine-generator set of a combined-ouble	Gross Gene Gross Real Power	Data to be s Values nee mpound or s Laggin rator Output Gross Reacitve Power	supplied at a donly be so steam turbing Test Da  Net Outpu  Net Real  Power	5-minute inte upplied at be ne portion of ta Record t to system Net Reactive Power	ervals for du ginning and combined-o ing Form Hydrogen Pressure	ration of te end of tes cycle unit v - Part 2 Gen. To Vol	est hour. t hour. vhen teste erminal tage Auxiliarg	ed at the s	eame time	In-plant Station Se	Auziliary ervice Load	1.
26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48	1 2 3 4 5 6 7 8 9 10	Use this section to report test results for the low pressure turbine-generator set of a cross-compound unit, or the HRSG steam turbine-generator set of a combined-ouble	Gross Gene Gross Real Power	Data to be s Values nee mpound or s Laggin rator Output Gross Reacitve Power	supplied at a donly be so steam turbing Test Da  Net Outpu  Net Real  Power	5-minute inte upplied at be ne portion of ta Record t to system Net Reactive Power	ervals for du ginning and combined-o ing Form Hydrogen Pressure	ration of te end of tes cycle unit v - Part 2 Gen. To Vol	est hour. t hour. vhen teste erminal tage Auxiliarg	ed at the s	eame time	In-plant Station Se	Auziliary ervice Load	1.
26 27 28 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50	1 2 3 4 5 6 7 8 9 10	Use this section to report test results for the low pressure turbine-generator set of a cross-compound unit, or the HRSG steam turbine-generator set of a combined-ouble	Gross Gene Gross Real Power	Data to be s Values nee mpound or s Laggin rator Output Gross Reacitve Power	supplied at a donly be so steam turbing Test Da  Net Outpu  Net Real  Power	5-minute inte upplied at be ne portion of ta Record t to system Net Reactive Power	ervals for du ginning and combined-o ing Form Hydrogen Pressure	ration of te end of tes cycle unit v - Part 2 Gen. To Vol	est hour. t hour. vhen teste erminal tage Auxiliarg	ed at the s	eame time	In-plant Station Se	Auziliary ervice Load	1.
226 227 228 330 331 332 333 343 335 336 337 338 339 440 441 442 443 444 445 446 447 448 449 450 550 551	1 2 3 4 5 6 7 8 9 10	Lise this section to report test results for the low pressure turbine- generator set of a cross-compound unit, or the HPSGs steam turbine- generator set of a combined-oucle Time  Calculated Average value	Gross Gene Gross Real Power	Data to be s Values nee mpound or s Laggin rator Output Gross Reacitve Power	supplied at a donly be so steam turbing Test Da  Net Outpu  Net Real  Power	5-minute inte upplied at be ne portion of ta Record t to system Net Reactive Power	ervals for du ginning and combined-o ing Form Hydrogen Pressure	ration of te end of tes cycle unit v - Part 2 Gen. To Vol	est hour. t hour. vhen teste erminal tage Auxiliarg	ed at the s	eame time	In-plant Station Se	Auziliary ervice Load	1.
226 227 228 229 230 331 332 333 334 335 336 337 338 339 440 441 442 443 444 445 446 447 448 449 550 551	1 2 3 4 5 6 7 8 9 100 111 12	Lise this section to report test results for the low pressure rubbine-generator set of a cross-compound unit, or the HISGS steam rubbine-generator set of a combined-oucle.  Time	Gross Gene Gross Real Power MW	Data to be s Values nee mpound or s Laggin rator Output Gross Reacitive Power MYAr	supplied at a donly be so steam turbing Test Da  Net Outpu  Net Real  Power	5-minute inte upplied at be ne portion of ta Record t to system Net Reactive Power	ervals for du ginning and combined-o ing Form Hydrogen Pressure	ration of te end of tes cycle unit v - Part 2 Gen. To Vol	est hour. t hour. vhen teste erminal tage Auxiliarg	ed at the s	eame time	In-plant Station Se	Auziliary ervice Load	1.

Figure B-2: Lagging Test Data Recording Form—Part I

	A	В	С	D	E	F	G	Н	I	J	К	L	М	N
1						ta Record								
2														
3		Use this section to report test results							erminal				Auxiliary	
4		for the high pressure turbine-		rator Output	Net Output to system				tage		sitions	Station Service Load		
5		generator set of a cross-compound	Gross	Gross	Net	Net	Hydrogen	Gen	Auxiliary	GSU	Auxiliary	MV	MVAR	
6 7		unit, or the combustion turbine-	Real Power	Reacitve <b>Power</b>	Real Power	Reactive Power	Pressure	Terminal	Bus		Bus			
8	Reading	generator set of a combined-cycle Time	MW	MVAr	MV	MVAr	(PSIA)							
9	rieaulily	Time	1*IW	PITAL	101 W	PITAL	(F3IA)							
_	- '													
10														
11	3													
12	4													
13	5													
14	6													
15	7													
16	8													
17	9													
18	10													
19	11													
20	12													
21	13													
22		Calculated Average value												
		Calculated Average value												
23 24		for hour												
25				Those cells	are autom	atically calc	ulated and re	eult nonu	lated in the	a tast ran	ort choot			
26						5-minute inte				e test rep	JI L SHEEL			
27						upplied at be								
28				T did to ii to		pp.iod di 20	giiiiiiig aire	0114 01 100	Liiouii					
29		Use Part 2 only for LP-shaft	of cross-co	mpound or	steam turbii	ne portion of	combined-c	ycle unit v	when teste	ed at the s	ame time	as genera	tor in Part	1.
30				Leadin	ig Test Da	ta Record	ing Form	- Part 2						
31														
32		Use this section to report test results							erminal				Auxiliary	
33 34		for the low pressure turbine-		rator Output		t to system		¥ol Gen	tage	Tap Po GSU	sitions	Station Se	MYAR	
35		generator set of a cross-compound unit, or the HRSG steam turbine-	Gross Real	Gross Reacitve	Net Real	Net Reactive	Hydrogen Pressure	Gen Terminal	Auxiliary Bus	G50	Auxiliary Bus	MA	MTAR	
36		generator set of a combined-cycle	Power	Power	Power	Power	liessuie	remina	Dus		l Dus			
37	Reading	Time	MW	MVAr	MV	MVAr	(PSIA)							
38	1													
39	2													
40	3													
41	4													
42	5													
43	6													
44	7													
45	8													
46	9													
47	10													
48	11													
49	12													
50	13													
51														
		Calculated Average value												
52		for hour												
F2		test_report / lag_test_data	\	/										
4 4														

Figure B-3: Leading Test Data Recording Form—Part I