GENERATOR INTERCONNECTION FACILITY STUDY

FOR BRIDGEWATER HYDRO POWER HOUSE REPLACEMENT

BURKE COUNTY NC

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Generator Interconnection Facility Study Results

INTRODUCTION

[redacted] ("Customer") has proposed to install additional generation in the electric transmission control area owned and operated by Duke Energy Corporation ("Duke"). The Customer's requested interconnection point is at Duke's Bridgewater Hydro 100 kV Switching Station located in Burke County, NC. The Customer's proposed facility shall replace the existing Bridgewater Hydro Generators with new machines with an ultimate generating capacity of 31.5 MW. This represents a net increase of 7.5 MW.

The requested in service date is 3-1-10.

At the request of the Customer, Duke performed and delivered to the Customer a Generation Interconnection Study ("GI Study"). This GI Study, dated 5-2-07 summarized all thermal, short circuit, stability, and Reactive Capability constraints resulting from the interconnection of the Customer's proposed generating facility. This Facility Study quantifies the work scope and cost associated with addressing both the Customer Interconnection and the required Network Modifications to address the identified constraints.

The interconnection of the Customer requires modification of existing Interconnection Facilities and certain other Network Modifications. For the purposes of this Facility Study the Interconnection Facilities are defined as those facilities linking the Customer's generation to the Bridgewater Hydro 100 kV Switching Station main busses. It shall consist of facilities owned and operated by both Duke and the Customer. The Interconnection Point ("IP") shall be defined as the location where ownership changes between the Customer and Duke. The IP shall be located at the terminal pad of the high side bushing of the Generator Step Up Transformer ("GSU"). Appendix A provides a representative schematic of the 100 kV portion of the substation and indicates more precisely the location of the IP. Responsibilities for the development, construction, and maintenance of the Interconnection Facilities are addressed later in this document.

BASELINE ASSUMPTIONS

Duke's Facilities are based on application of industry standard equipment. As such the total capability may accommodate energy flows greater than the requested increase of 7.5 MW's in the Generation Interconnection Request. In the event the Customer decides to interconnect an additional increment of capacity, a new Generation Interconnection Request will be required to evaluate the impacts. Any constraints that may result will be identified as part of the new study request.

The following assumptions have been used to establish the project scope and cost estimate for the identified facilities.

1. Facility Study is premised on Duke providing turnkey design and installation of all Transmission Owner's Interconnection Facilities associated with a 100 kV interconnection of the Customer.

2. The Interconnection Voltage will be at a nominal voltage of 100 kV.

3. The area identified as the interconnection substation yard shall be kept free of materials and equipment associated with the power island. This shall include but not be limited to fire protection piping, water and sewer lines, duct bank systems, fuel supply lines, structures and other electrical equipment. Only exception to this shall be any piping and catch basins which may be required to effectively accommodate storm water run off. Location of any subsurface drain lines or catch basins shall be mutually agreed upon between Duke and the customer.

4. Customer shall address the stability issues as identified in the GI Study by installing Out of Step Relay Protection on their generators.

5. Duke will design, construct, own and operate all of Duke's Interconnection Facilities. Duke's Interconnection Facilities are defined as the Bridgewater Hydro Substation. The Customer's interconnection facilities are the two 6.6-100 kV Generator Step-Up (GSU) transformers and bus lines connecting the power house to the interconnection yard which contains the GSUs. A one line representation of the Bridgewater Hydro 100 kV Substation is provided in Appendix A for clarity.

6. The Interconnection point shall be the high side bushing of the 6.6-100kv transformers.

7. Any required outages necessary to support construction of Duke Interconnection Facilities and/or Network Modifications must occur during a spring or fall time frame. If an outage of sufficient duration cannot be obtained to support any of the required construction activity, temporary facilities may have to be constructed to maintain integrity of grid. No provisions have been made for temporary work in the estimates provided herein.

8. The protection schemes installed by Duke at its Interconnection Facility are intended to protect Duke's Network from the Customer's Facilities.

9. Electrical protection schemes for the bus line interconnecting the plant to the Bridgewater substation shall be the responsibility of the Customer. The bus-line protection scheme must include separate primary and secondary schemes whose operation shall be coordinated with the Bridgewater Substation's protection schemes.

10. Any required communications and control circuits between Duke's facilities and the Customer's Facility shall be the responsibility of the Customer.

11. All relay settings for the breakers at Duke's Facility will be the responsibility of Duke.

12. Duke maintains all rights for the commission testing of any substation facility that it owns. Duke reserves the right to inspect and witness commission testing of any switchyard and transmission line facility constructed on behalf of the Customer for the purpose of interconnecting to Duke's transmission grid.

13. Metering responsibilities shall be in accordance with Section 7.1 of Duke's Open Access Transmission Tariff ("Tariff"). Specific Meter requirements are defined on Page 10 - 13 of this Study. Auxiliary power requirements for the Customer Facility must be metered. The Customer is allowed to self supply when generating however when generation is not on line it must be properly accounted for and billed.

14. All telemetry circuits that provide the generation plant operational and billing data to Duke's System Operations Center (SOC) will be the responsibility of the Customer.

15. All estimates prepared for this Facility Study are considered to be good faith estimates represented in present day dollars as of the date of the Study. The estimates are further premised on being able to perform work during normal business hours with minimum overtime or weekend work. The Customer will be responsible for all actual costs.

16. The Customer's financial responsibilities for Duke's regulated facilities will be determined in accordance with the Duke's Tariff in effect at the time of design and construction.

17. All schedules provided herein are provided as a guideline for planning purposes. Detailed work planning will not begin on any facilities until the appropriate Large Generator Interconnection Agreement ("LGIA") has been executed, appropriate monies tendered, and credit securities provided.

18. Upon receipt of the Customer's notice to proceed, Duke will develop appropriate work plans and initiate certain design and procurement activities. The Customer will be responsible for all costs incurred by Duke associated with those efforts. Should the Customer reconsider its decision to proceed or determine it must suspend the project for some period of time will not relieve the Customer of financial responsibility for costs or obligations incurred by Duke in support of the Customer's project?

DUKE INTERCONNECTION FACILITIES

COST ESTIMATES

Interconnection Substation Estimate

As per the requirements of the tariff, the following good faith estimate is provided. This estimate assumes no temporary facilities will be required to support construction efforts.

Ref #	Impacted Facility	Date Required	Estimated Cost
1	Bridgewater Substation	3-1-10	$ 510,817
2	Relocation of Marion B&W 100KV Line	12-31-08	$ 538,987
5	Relocation of Bridgewater B&W 100KV Line	11-16-07	$ 687,886
6	Relocation of James 44KV Line	10-31-08	$ 340,725
7	**Total**		$ 2,078,415

I. WORK SCOPE DESCRIPTION FOR INTERCONNECTION FACILITIES

To facilitate the relocation of the power house changes must be made to the existing substation structure along with the relocation of multiple lines.

The Bridgewater Hydro Powerhouse will be relocated to facilitate the Linville Dam Stability Improvement Project. The substation will remain in the existing location but modifications will be needed to allow room for reinforcement to the dam, and to accommodate the Customer's interconnection 6.6kV underground bus lines. The new bus line from the relocated facility will be in trench way to the existing substation. The underground 6.6kv bus line will stub up between the two GSUs. The interconnection point will be the high side bushing of the GSU transformer. All facilities including the GSU transformers and associated 6.6kv bus is the responsibility of the Customer and recognized as the Customer's Interconnection Facilities. Duke's Interconnection Substation requires station service power and is assumed to be provided from Customer generating facility plant auxiliary system.

1. Scope Associated with Bridgewater Switching Station

A. Overall Description

Work will require the removal of twenty four lattice steel columns and associated structure on the North West side of the existing substation. These structures currently support the 6.6kV bus to the old power house location. Equipment including two generator breakers, one bus tie breaker, two low tension breakers and station service transformers will be removed.

The Bridgewater 100 kV Substation utilizes a double bus, single breaker scheme. Refer to Appendix A for the proposed electrical one line of the substation.

The substation structure shall be a lattice steel design with all power circuit breakers and switches fully rated for ultimate load and fault current levels to which the substation might be exposed. Disconnects installed on the Customer bus line terminal position shall be 3000 amperes.

Provisions for metering all energy transported across the Interconnection Point shall be incorporated in Duke's Interconnection Facilities at Bridgewater 100 kV Substation. Additional metering may be required in the future at the Customer's Facility to measure energy consumed off of the grid when no Customer generation is on line. Provisions will be provided for future metering at the customer facility

The line terminal currently proposed for the interconnection of the Customer will enter Bridgewater Substation with an underground three phase lines. The underground will terminate at a point between the GSU transformers. A bus structure will be provided to support the connection to the lowside bushing of the GSUs. The Interconnection Point in this scenario shall be terminal pad of the GSU high side bushing at Bridgewater Hydro Substation. This location is illustrated on the One-line diagram found in Appendix A.

A disconnect switch at the Bridgewater Substation shall be installed and controlled by Duke which will physically and visibly isolate the Duke System from the Customer.

Duke reserves the right to lock the switch in the open position:

- If it is necessary for the protection of maintenance personnel when working on de-energized circuits.
- If Customer or Duke equipment presents a hazardous condition.
- If Customer or Duke equipment interferes with the operation of the Duke System.
- If the Duke System interferes with the operation of Customer.

B. Relay, Controls and Communication

The protective relays, controls, and communications equipment will be installed in a prefabricated building that will be shipped from the manufacturer to the Bridgewater Hydro substation and set into place. Below is a description of the relays to be utilized.

(a) Each 100KV line terminal, the Bridgewater White, Bridgewater Black, Marion White and Marion Black lines will consist of (1) SEL-311C and (1) SEL-311B relay.
(b) Breaker failure will be provided from the SEL-311B relay for each line. The SEL-311B relay will also provide voltage controlled reclosing/close function.
(c) Each 100KV line terminal will have an external Control Switch for manually tripping/closing the breakers on the panel with each lines relays.
(d) Bank 1 and Bank 2 transformers will have transformer differential relaying which will be provided by the customer.

(e) The 100KV Bank 1 and 2 High Tension Breakers, will have a SEL-351S relays. Over Current protection and Breaker Failure will be provided from these relays.
(f) Bank 3 100 / 44KV High Tension Breaker will have a SEL-351S relay. Over Current protection, Breaker Failure and reclosing will be provided from this relay.
(g) Bank 3 100 / 44KV Transformer will have a SEL-387 relay. Transformer Differential and Over Current protection will be provided from this relay.
(h) The 44KV James line will have a SEL-351S and a SEL-551 relay. Primary over current protection and reclosing will be provided from the SEL-351S relay. The SEL-551 will provide secondary over current protection.
(i) The 100KV Bus Differential relays will be three (3) single phase GE type PVD's.
(j) The SCADA system, station annunciation and communications will be provided with a SEL-2032 Communications Processor connected to a telephone line through a modem.
(k) The control power for the electrical equipment will be a 130 volt, 60 cells, flooded lead acid battery bank.

All DC power, control, and CT cables to be 1000V shielded. All AC power cables to be 2000V shielded.

2. Bridgewater 100kV Lines Scope

This project consists of relocating approximately 800' of the Bridgewater Bl & Wh 100KV Lines. The relocation involves the removal of one existing 1CWL tower and the installation of two self supporting steel poles. New 556 kcmil ACSR conductor shall be used in the relocated spans for phase conductors. The line will be shielded with 2- 3/8" EHS OHGW. A new R/W corridor must be defined and rights granted.

3.Marion 100kV Lines Scope

This project consists of relocating approximately 1000' of the Marion Bl & Wh 100KV Lines. The relocation involves the removal of two 1CWL towers and the installation of one 1BWL tower and one self supporting steel pole. New 556 kcmil ACSR conductor shall be used in the relocated spans for phase conductors. The line will be shielded with 2 – 3/8" EHS OHGW. A new R/W corridor must be defined on Duke Energy property.

4.James 44kV Lines Scope

This project consists of relocating approximately 1000' of the James 44KV line. The relocation involves the removal of the first four wood pole structures and installation of three new concrete pole structures and one self supporting steel pole. New 336 kcmil ACSR conductors shall be used in the relocated spans for phase conductors. The line will be shielded with 1 - 3/8" EHS OHGW. A new R/W corridor must be defined on Duke Energy property.

SCHEDULE FOR INTERCONNECTION FACILITIES

Appendix B provides definition of critical milestones necessary to support the requested in service date. In accordance with Duke's tariff, failure to adhere to the prescribed milestones may result in loss of queue position and suspension of the project. Should that event occur, the Customer will remain liable for all costs incurred to date plus any additional cost which might have to be incurred to return impacted facilities to a reasonable condition and service.

A more detailed work plan and project schedule will be developed once an authorization to proceed is received. This authorization shall take the form of an executed LGIA backed with an appropriate security equal in amount to the commitments Duke must make to take the project forward.

NOTE: No provisions have been made for the construction of any temporary facilities that might have to be constructed should outages not be granted.

CONNECTION REQUIREMENTS

A. General

General requirements as defined in IEEE 1109-1990 "IEEE Guide for the Interconnection of User-owned Substations to Electric Utilities" shall apply to this facility. This Facility Study document is intended to provide a basic scope definition of facilities on which Duke has based its facility study and cost estimates. It shall serve as the basis for the facilities that Duke proposes to design, build, and operate in connection with interconnection of Customer generation in the Burke County NC area. Should there be differences between this document and IEEE 1190, this document shall take precedence.

All Facilities installed by Customer and connected to Duke's Network shall comply with Facility Connection Requirements dated December 6, 2001. This document shall supplement those requirements where necessary.

B. Short Circuit Withstand Capability

Duke assumes no responsibility for appropriately sizing the short circuit withstand capability of any equipment installed on the Customer's Side of the Interconnection Interface. DUKE will provide upon request the maximum available short circuit current based on its current models. The Customer however must realize that significant numbers of new generation requests are constantly being received all of which will add to the available short circuit current. The Customer will need to exercise extreme care in appropriately sizing its equipment while providing for reasonable margin for future increases in available short circuit current. Duke bears no responsibility in the sizing decision. Available short circuit currents on Duke's system can be in excess of 80 kA depending upon location and voltage.

C. Equipment Ratings

Prior to finalizing specification of equipment necessary to interconnect to the power grid, the Customer shall consult with Duke to establish the required ratings necessary to reliably interconnect and provide the expected Voltage and Var support as defined in the Interconnection and Operating Agreement. Specific parameters shall include but are not limited to available transformer taps and short circuit withstand capabilities.

D. Insulation Requirements

Duke's standard requirements for equipment installed on the 100 kV system shall meet the following minimum Basic Impulse Insulation Levels (BIL).

	BIL (kV)
Open Air	**550**
Transformer Winding	**550**

E. Metering

THIS STUDY CURRENTLY ASSUMES THAT ALL METERING OF THE GENERATION OUTPUT WILL BE PROVIDED BY CUSTOMER.

This section is intended to provide a high level overview of some of the metering that shall be required by Duke's System Operating Center for both monitoring and billing purposes. All plant output shall be tracked on a unit basis and shall be compensated relative to the point of interconnection. Adequate metering must be in place to determine each unit's performance relative to voltage support and how well it produces against the predefined schedule. For these applications revenue class metering is routinely required. In addition appropriate metering to measure power consumption by the plant auxiliary systems when the plant is not running shall be necessary. In the event Duke determines that redundant metering is required, such metering will be done at a point mutually agreeable to all both parties.

All metered data shall be provided to Duke's SOC. (Data from the substation will go to the TCC). In addition, all meters shall be equipped with suitable communication ports to allow for direct dial in via a phone line for downloading of data. This function shall be performed by Duke's Automated Metering System (AMS). Customer shall be responsible for providing all required phone circuits to allow for dial-up access.

All meters shall be installed and maintained by Customer. Duke reserves the right to witness meter calibration and testing.

Customer shall provide Duke all pertinent meter data prior to backfeed of the Power Island. This will include, but is not limited to, meter type/style, calibration test results, copies of all algorithms required for meter operation, Serial Numbers of meters for establishment of unique addresses in support of AMS, phone number for access thereof, and factory test data for all instrument transformers associated with energy measurements.

ALL METERING SYSTEMS SHALL BE THOROUGHLY TESTED FOR FUNTIONALITY PRIOR TO START OF FUNCTIONAL TESTING OF ANY GENERATOR. DUKE RESERVES THE RIGHT TO WITNESS ALL TESTING ON SITE. TESTING WILL NOT BE DEEMED COMPLETE UNTIL

TELEMETERED DATA FLOW BACK TO THE SYSTEM OPERATING CENTER IS VERIFIED AS BEING COMPLETE AND ACCURATE.

A high level description of minimum meter data can be found in the table on page 14

1. Metering Equipment Requirements

A solid state meter shall be used to measure the real and reactive power interchange between the Duke System and the Facility. Three-element, three-phase, four-wire meters shall be utilized on wye connected power systems. Two-element, three-phase, three-wire meters shall be utilized on delta connected power systems.

The metering devices must be fully compatible (approved meter type and communication media) with Duke System's remote metering and data acquisition system.

2. Meter Accuracy

Meters shall be calibrated to 100% registration with a maximum deviation of +/- 0.5% accuracy at unity power factor for both full load and light load. These meters shall be calibrated to100% registration with a maximum deviation of +/- 1.0-% accuracy for 0.5 power factor at full load. Metering accuracy limits are stated in the following table.

MAXIMUM DEVIATION OF METER REGISTRATION			
Watt-hour Function			**Var-hour Function**
Full Load	Power Factor	Light Load	Power Factor
+/- 0.5 %	+/- 1.0 %	+/- 0.5 %	+/- 1.0 %

Notes:
- Watt-hour functions should be tested in both directions of energy flow (In and Out) (If applicable).
- Var-hour functions should be tested in both directions of energy flow (In and Out).
- When compensating for transformer or line loss, utilize stated limits above or 5% of desired compensation, whichever is greater.
- The meter shall be tested with compensation applied to obtain a true test of the installation.

Test Points	***Volts***	***Amps***	***Power Factor***
Full Load	120	5	1.0
Power Factor	120	5	0.5
Light Load	120	0.5	1.0

3. Instrument Transformers

Potential devices and current transformers shall be 0.3% metering accuracy class for both magnitude and phase angle over the burden range of the installed metering circuit. Instrument transformer correction factors may be applied to the meter to adjust the meter for inaccuracies associated with the secondary burdens in the current transformer and voltage transformer circuits. All instrument transformers shall comply with ANSI/IEEE Standard C57.13.

4. Loss Compensation

If the metering is not located at the Connection Point, then power transformer and/or line loss compensation shall be required. Duke approved power transformer and/or line loss compensation values shall be applied to the meter to properly compensate for the losses in the power transformer and/or line.

5. Standard Configuration

The meter's load profile recorder shall be configured with the channel assignments as follows:

Channel	*Description*
1	kWh Delivered
2	KVARH Delivered
3	KVARH Received
4	Available for optional data per *Transmission Provider's* request. For Example: • kWh Delivered (Pulse Input from Check Meter) • kWh Received

6. Access to Metering Data

If access to the meter is required, proper security measures must be taken to ensure the integrity of the meter is not compromised. If data pulses are required from the revenue meter, then the appropriate interface box with associated equipment must be installed to properly protect the revenue meter. If an additional meter is requested, good utility practices must be adhered to when terminating the connections in the meter circuit to ensure the integrity of the revenue-accuracy metering circuit is intact.

7. Station Service Power

Metering requirements for the plant auxiliary power will be determined on a case-by-case basis. Service to the plant auxiliary is considered to be a form of Retail Service and subject to various requirements as defined by the rate schedule selected for the particular service provided.

8. Check Meters

Duke shall have the right to install, at its own expense, suitable metering equipment at any other Metering Point for the purpose of checking the meters installed by the Customer. Customer shall be responsible for providing terminations of the current and voltage circuits to a test block specifically for the check meter.

9. Meter Enclosure

For metering equipment that might be located in Customer's Facility, a suitable enclosure for mounting the Duke's required meter equipment, which may include the check meter, shall be provided. All necessary terminations inside this enclosure, including, but not limited to, CT & VT circuits at a test block, telephone or other communications requirements shall be included. There shall be separate enclosures for Customer's and Duke's metering equipment.

10. Meter Operations

a) Calibration of Metering Facilities

Metering facilities shall be tested and calibrated if necessary every two years. More frequent test intervals may be negotiated. All interested parties or their representatives may witness the calibration tests. Calibration records shall be made available to all interested parties. The accuracy of the standard utilized for calibration purposes shall be traceable to the National Institute of Standards and Technology, (NIST).

b) Meter Verification / Audit

Customer will allow Duke access, upon reasonable notice, to its facilities for the purpose of verifying and inspecting the metering either at installation or as part of a periodic audit or testing. Customer must provide any requested meter configuration information (i.e. program constants, instrument transformer tap settings, compensation calculation parameters, etc.), relevant to their equipment, requested as part of an audit.

c) Meter Configuration Changes

Changes to the metering configuration (i.e. program constants, instrument transformer tap settings, compensation calculation parameters, etc.) will be communicated to Duke's meter engineering at least 30 days in advance. Changes due to equipment failures must be communicated to Duke's meter engineering within one business day after the failure is identified. In all cases, Duke's master station operator shall be notified immediately before and after any metering work is performed so that the meter device may be interrogated before and after the work. Any configuration changes shall be communicated at this time as well.

	DATA Use	Operation Functions						Billing & Generator Imbalance Calculations				
	Data Source	For SOC/TCC Needs From Revenue Class Meter or Transducer Compensated to Interconnection Point						From Revenue Class Metering Devices For ET & Retail Billing				
AREA or DEVICE TO BE METERED		MW		MVARS				MW-Hours	MVAR-Hours			
		Instantaneous	Hourly Integrated	Instantaneous		Hourly Integrated		Hourly Integrated	Instantaneous		Hourly Integrated	
				Del.	Rec.	Del.	Rec.		Del.	Rec.	Del.	Rec.
Unit 1		X	X	X	X	X	X	X			X	X
Unit 2		X	X	X	X	X	X	X			X	X
Aux "1" Total Usage With or Without generation on		X	X	N/A	X	N/A	X					
Aux 1 Total use with no Generation On Line				N/A	N/A	N/A	N/A	X				
Aux "X" Total Usage With or Without generation on		X	X	N/A	X		X					
Aux "X" Total use with no Generation On Line				N/A	N/A	N/A	N/A	X				

NOTES: Everything based on High Side of GSU or Aux Transformers

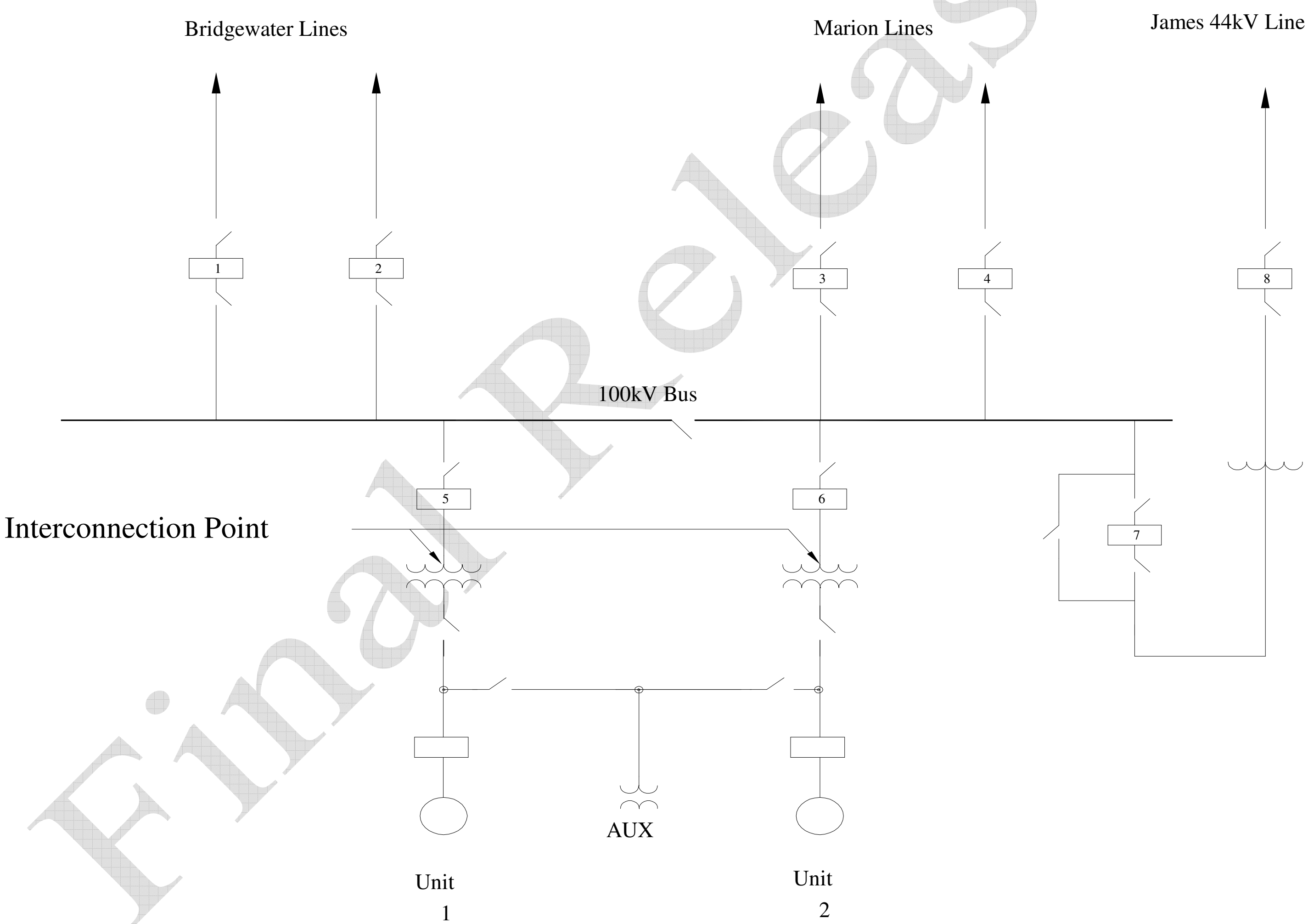
Net Plant comes from software totalization through AMS (for Generation Imbalance Calc

Rec. is defined as VARS received by Duke from Generator (Generator Operating at Lagging PF)

Del. Is defined as VARS consumed by generator off the system (Generator Operating at Leading PF)

Appendix A

Proposed One Line for Interconnection at Bridgewater Hydro 100 kV Substation Proposed Electrical One Line



Appendix B

Interconnection Facilities Milestone Schedule Requirements
Note activities with * are associated with moving transmission line tower

Facility and Major Activity / Milestone	Duration	Months Prior to COD For Start of Activity
Authorization To Proceed		38+
* Preliminary Engineering & Spec Development	1	36
*Order of Long Lead Time Items	1	36
* Tower Relocation	1	35
Preliminary Engineering & Scope	2	17
Detailed Engineering	2	10
Construction	3	5
Internal Acceptance Testing of Direct Assign Facilities	1	3
Backfeed Facility (Direct Assign In-service Date)	1	2
Merchant Facility Functional Testing	1	2
COD		0