Submission of the Following: AJD-1

1	□ Appendix 3 Attachments A-C (Fully completed) https://opsportal.spp.org/documents/studies/Appendix%203%20and%20Attachments%20A_B_C.pdf * Note: Check Item #2 Attachment A as replacement and Item #6 for replacement deposit
2	□ As built Substation One-line diagram with asset characteristics/specifications showing the POI, transmission lead(s), main project transformer (s), collector system cable(s), generator step-up transformer(s), and generating unit(s)
3	□ Diagram showing the facility site layout, which would include the site locations of the turbines/inverters.
4	□ Geographical map of existing Point of Interconnection and location of Generating Facility. Map should contain approximate location or surrounding area or address.
5	□ Initial Study Deposit of $60,000 per request. In advance of study, SPP will provide scope, timeline for completion and invoice customer for costs exceeding initial deposit.
6	□ Transmission Line Parameters (Rating A/B/C and R,X B, length)
7	□ PSS/E v33.10 generator Generic or User written dynamic models (this includes .dyr, .lib, .sav, .idv, .dll and .seq files)
8	□ Collector system impedance data and rating (renewables only)
9	□ Collector System Impedance spreadsheet that corresponds to the Collector Feeder Cable Layout (renewables only)
10	□ Generator/inverter Manufacturer technical data specifications
11	□ Existing facility GIA or If request predates queue need attestation at XXX and supporting documentation
12	□ Tie line data characteristics (layout between POI and GSU to the generator facility)
13	□ IRS W-9 https://www.irs.gov/pub/irs-pdf/fw9.pdf
14	□ SPP Study Deposit Refund and Disposition Form https://opsportal.spp.org/documents/studies/SPP%20Study%20Deposit%20Refund%20Form.pdf
	Site Control: Requirements found at: https://opsportal.spp.org/documents/studies/SPP%20Site%20Control%20Criteria.pdf
15	□ Site Control Documents (Lease Agreements)
16	□ Site Control Attestation https://opsportal.spp.org/documents/studies/AttestationStatementForSiteControl.pdf
	***Note: when providing items please label beginning with item number, for ex: 1.Appendix 3**

Attachment B to Appendix 3

ASSUMPTIONS USED IN CONDUCTING THE DEFINITIVE INTERCONNECTION SYSTEM IMPACT STUDY

The Definitive Interconnection System Impact Study will be based upon the information set forth in the Interconnection Requests and results of applicable prior studies, subject to any modifications in accordance with Section 4.4 of the GIP.

GENERATING FACILITY DATA FOR THE DEFINITIVE INTERCONNECTION SYSTEM IMPACT STUDY

Interconnection Facilities Tie Line Information

Nominal Voltage (kV)	**161**
Line length (miles)	**0.40**
Summer Line Rating (MVA)	**442**
Winter Line Rating (MVA)	**527**
Positive Sequence Resistance R1(in p.u.*)	**0.00003**
Positive Sequence Reactance X1(in p.u.*)	**0.00035**
Positive Sequence Susceptance B1(in p.u.*)	**0.001**
Zero Sequence Resistance R0(in p.u.*)	**0.000336**
Zero Sequence Reactance X0(in p.u.*)	**0.001445**

Zero Sequence Susceptance B0 (in p.u.*)	**0.00016**
Positive Sequence Shunt G1 (in p.u.*)	**0.0**
Positive Sequence Shunt B1 (in p.u.*)	**0.0**
Zero Sequence Shunt G0 (in p.u.*)	**0.0**
Zero Sequence Shunt B0 (in p.u.*)	**0.0**

*On 100-MVA Base

Main Substation Transformer

(for a single generator or the step-up from collector system to POI voltage)

Number of transformers ____

RATINGS	Self-Cooled	Maximum Nameplate	
Capacity (kVA)			
MVA Base	_____MVA		
Maximum Nameplate Ratings		_____/_____MVA	
	Generator Side	System Side	Tertiary

Voltage Ratio			
	Primary	Secondary	
Nominal Voltage			
Winding Connections (Delta or Wye)			
Tapped Winding			
	Low Voltage	High Voltage	Tertiary Voltage
Winding Connections (Delta or Wye)			
IMPEDANCE	Primary-Secondary	Primary-Tertiary	Secondary-Tertiary
Positive Z1 (on self-cooled kVA rating)			
Zero Z0 (on self-cooled kVA rating)			
	Fixed Taps Available	Present Taps Available	
TAP SETTING			
Tap Ratio Range			
Number of Taps			
No Load Loss	_____ W		
Exciting I:	_____ p.u.		

Static Reactive Compensation Device

Voltage (kV)	
Total Size (MVAR)	
Step Size (MVAR)	Number of Steps

Equivalent Collector System

Equivalent Collector System for each modeled medium voltage feeder line
Collector system voltage = _____kV
R = _____per unit on 100 MVA Base and collector kV base (positive sequence)
X = _____per unit on 100 MVA Base and collector kV base (positive sequence)
B = _____per unit on 100 MVA Base and collector kV base (positive sequence)

Generator Step-up Transformer

Number of transformers __1__

RATINGS	Self-Cooled	Maximum Nameplate	
Capacity (kVA)	24,000	40,000	
MVA Base	__24___MVA		
Maximum Nameplate Ratings		___32___/__40___MVA	
	Generator Side	System Side	Tertiary
Voltage Ratio	/110/N.A. kV	161/650/150 kV	
	Primary (Unit 13)	Secondary	Primary (Unit 4)
Nominal Voltage	13.8 kV	161 kV	13.8 kV
Winding Connections (Delta or Wye)	Delta	Wye	Delta
Tapped Winding	No	Yes	No
	Low Voltage	High Voltage	Tertiary Voltage
Winding Connections (Delta or Wye)	Same as above	Same as above	Same of above
IMPEDANCE	Primary-Secondary	Primary-Primary	Secondary-Tertiary
Positive Z1 (on self-cooled kVA rating)	10%	20%	

Zero Z0 (on self-cooled kVA rating)			
	Fixed Taps Available	Present Taps Available	
TAP SETTING	+/-0		
Tap Ratio Range	+/- 2.5% per step		
Number of Taps	5		
No Load Loss	__25,000____W		
Exciting I:	____ p.u.		

Unit Ratings

Number of generating units	**2**
Inverter manufacturer, model name, number and version	**N/A**
Nameplate kVA rating	**16,966**
Voltage	**13.8 KV**
Terminal Voltage	**+/-5%**
Generator type (e.g. Type III – DFIG or Type IV – Inverter)	**SYNCRONOUS**
Fuel Type	**NATUARAL GAS/ JET FUEL**
Prime Mover Type	**COMBUSTION TURBINE**
Power Factor (Lead/Lag)	**0.8 LAG**
Connection (e.g. Wye)	**WYE**
Max Turbine Power Output Capability (Summer MW/Winter MW)	
Frequency, Hertz	**60**
Stator Amperes at Rated kVA	**12**

COMBINED TURBINE-GENERATOR-EXCITER INERTIA DATA

Inertia Constant, H = 5.24 kW sec/kVA

REACTANCE DATA (PER UNIT-RATED KVA)

Subtransient (first cycle) Positive Sequence Resistance R1*	
Subtransient (first cycle) Positive Sequence Reactance X1*	
Subtransient (first cycle) Negative Sequence Resistance R2*	
Subtransient (first cycle) Negative Sequence Reactance X2*	
Subtransient (first cycle) Zero Sequence Resistance R0*	
Subtransient (first cycle) Zero Sequence Reactance X0*	
Stationary (after 50ms) Positive Sequence Resistance R1*	
Stationary (after 50ms) Positive Sequence Reactance X1*	
Stationary (after 50ms) Negative Sequence Resistance R2*	
Stationary (after 50ms) Negative Sequence Reactance X2*	
Stationary (after 50ms) Zero Sequence Resistance R0*	
Stationary (after 50ms) Zero Sequence Reactance X0*	
Voltage Controlled Current Source (VCCS) curve	

*In p.u. nameplate kVA based

	Direct Axis	Quadrature Axis
Synchronous – saturated	Xdv: 2.000	Xqv: 1.934
Synchronous – unsaturated	Xdi: 2.273	Xqi: 2.197
Transient – saturated	X'dv: 0.342	X'qv: 1.934
Transient – unsaturated	X'di: 0.388	X'qi: 2.197
Subtransient – saturated	X"dv: 0.259	X"qv: 0.418
Subtransient – unsaturated	X"di: 0.259	X"qi: 0.216
Negative Sequence – saturated	X2v: 0.338	
Negative Sequence – unsaturated	X2i: 0.338	
Zero Sequence – saturated	X0v: 0.139	
Zero Sequence – unsaturated	X0i: 0.158	
Leakage Reactance	Xlm: 0.190	

FIELD TIME CONSTANT DATA (SEC)

Open Circuit	T'_{do}	3.173	T'_{qo}	
Three-Phase Short Circuit Transient	T'_{d3}		T'_{q}	
Line to Line Short Circuit Transient	T'_{d2}			
Line to Neutral Short Circuit Transient	T'_{d1}			
Short Circuit Subtransient	T''_{d}	0.035	T''_{q}	0.022
Open Circuit Subtransient	T''_{do}	0.046	T''_{qo}	0.029

ARMATURE WINDING RESISTANCE DATA (PER UNIT)

Positive	R_1	_0.0056
Negative	R_2	__0.0047
Zero	R_0	_0.0018

CURVES

Provide Saturation, Vee, Reactive Capability, Capacity Temperature Correction curves. Designate normal and emergency Hydrogen Pressure operating range for multiple curves.

See "Riverton replacement generator curves.pdf".

EXCITATION SYSTEM DATA

Identify appropriate IEEE model block diagram of excitation system and power system stabilizer (PSS) for computer representation in power system stability simulations and the corresponding excitation system and PSS constants for use in the model.

See folder "Excitation System".

GOVERNOR SYSTEM DATA

Identify appropriate IEEE model block diagram of governor system for computer representation in power system stability simulations and the corresponding governor system constants for use in the model.

See "mw03800a_1_1.pdf".

ENERGY STORAGE RESOURCES

Device manufacturer: _____

Technology (Li-ion, Lead Acid, Flow Battery, Pumped Hydro, Flywheel, etc.)_____

Check one of the following:

_____ Stand-alone
_____ Co-located with another Generating Facility (co-located means at the same POI)

Maximum Energy Output Rating (MWh) _____ at Maximum Power Output (MW) _____

Maximum Contractual Power Output (MW) _____

Charging Parameters

Check one of the following:

_____ Yes, the energy storage resource will take energy from the Transmission System when operating in charging mode. The maximum rate of charge capability of the Generating Facility will be _____ MW. The maximum rate of charge to be utilized (requested maximum) will be_____MW.

Charging Power Factor _____ lag _____ lead at rated output

_____ No, the energy storage resource will never take energy from the Transmission System when operating in charging mode, by either Self-Dispatch or at the direction of SPP. The monitoring and control equipment that will be used to ensure that the Generating Facility never takes energy from the Transmission System when operating in charging mode is described as follows:

_____
_____
_____

Inverter-Based Resource Data

Phase-Locked Loop ("PLL") controller parameters for inverter-based resources:

- PLL Proportional Gain K_p _____
- PLL Integral Gain K_i _____
- PLL Frequency Limits ω_l _____ (rad/sec) and ω_h _____ (rad/sec)

The above data applies to a generic structure of the PLL (also commonly known as a synchronous reference frame PLL) and that the actual PLL structure within an Original Equipment Manufacturer's (OEM) device may differ from this generic structure. Should a difference exist, the parameter values of the PLL shall be provided such that the most recent equivalently parameterized generic industry model shows the same trend as the performance shown by actual OEM equipment.

Plant Load

Load MW _____ ____
Load MVAR_____
Specify Load Bus Voltage _____kV

Mutual Coupling Impedance

Mutual coupling impedance and 'B' factors for mutually coupled transmission lines

Electromagnetic Transient (EMT) Models:

See SPP Electromagnetic Transient (EMT) Model Requirements Document