ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

1407 W. North Temple, Suite 320
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March 19, 2018

VIA ELECTRONIC FILING

Utah Public Service Commission
Heber M. Wells Building, 4th Floor
160 East 300 South
Salt Lake City, UT 84114

Attention: Gary Widerburg
Commission Secretary

RE: Docket No. 17-035-40
Application for Approval of a Significant Energy Resource Decision and Voluntary Request for Approval of Resource Decision

On March 9, 2018, the Utah Division of Public Utilities ("Division") filed an Objection to the Completeness of Rocky Mountain Power's Filing ("Division's Objection") in the above referenced matter. The Utah Public Service Commission issued a Notice of Objection and Briefing Schedule on March 12, 2018, requesting responses by March 19, 2018. Pursuant to the schedule, Rocky Mountain Power hereby submits its Response to the Division's Objection.

Rocky Mountain Power respectfully requests that all formal correspondence and requests for additional information regarding this filing be addressed to the following:

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Sincerely,

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BEFORE THE PUBLIC SERVICE COMMISSION OF UTAH

In the Matter of: **THE APPLICATION OF ROCKY MOUNTAIN POWER FOR APPROVAL OF A SIGNIFICANT ENERGY RESOURCE DECISION AND VOLUNTARY REQUEST FOR APPROVAL OF RESOURCE DECISION**	Docket No. 17-035-40 **ROCKY MOUNTAIN POWER'S RESPONSE IN OPPOSITION TO THE DIVISION OF PUBLIC UTILITIES' OBJECTION TO COMPLETENESS**

I. INTRODUCTION

In accordance with the Notice of Objection and Briefing Schedule ("Notice") issued by the Public Service Commission of Utah ("Commission") on March 12, 2018, Rocky Mountain Power, a division of PacifiCorp ("Rocky Mountain Power" or "the Company") files this Response in Opposition to the Division of Public Utilities' ("DPU") Objection to the Completeness of Rocky Mountain Power's Filing ("DPU's Objection").

Rocky Mountain Power requests approval of its significant energy resource decision to acquire four Wyoming wind resources ("Wind Projects"), and its voluntary resource decision to construct the Aeolus-to-Bridger/Anticline line and network upgrades ("Transmission Projects"). DPU claims that the Company's filing is incomplete, alleging that it does not include a final transmission study, including transient stability analysis, demonstrating the ability to interconnect and integrate the Wind Projects located in eastern Wyoming.[1] But DPU points to no statute or rule that requires the specific transmission study it references, and it ignores (1) the interconnection studies the Company filed, which establish that the Transmission Projects enable the interconnection of all of the Wind Projects; and (2) the preliminary Aeolus West Transmission Path Capability Assessment, completed in October 2017 and included in supplemental direct testimony, that shows that the Transmission Projects provide the transfer capability needed to realize customer benefits.

DPU's Objection violates the Commission's clear direction in its Order Granting Motion to Vacate Remaining Schedule and Amended Scheduling Order ("Scheduling Order"). The Commission reserved all arguments on the merits, and advised parties to file an objection "only if they believe that RMP has failed to submit the information required under rule and statute to support its Application."[2] This is consistent with the Commission's rationale in rejecting a previous challenge to the Company's filing, concluding that the application "should be granted or denied on the merits, not by a procedural motion[.]"[3] Because the Company's application is legally sufficient, the Commission should reject DPU's Objection and permit adjudication on the merits.

[1] DPU's Objection at 2.
[2] Order Granting Motion to Vacate Remaining Schedule and Amended Scheduling Order at 2, n. 1 (Feb. 13, 2018).
[3] Order Denying Motion to Stay at 3 (Nov. 7, 2017).

II. DISCUSSION

A. The Company's filing provides all information required by statute and rule.

Applications for approval of significant energy resource decisions and voluntary energy resource decisions must include all information required by the Energy Resource Procurement Act ("Act") and Commission rule.[4] The Company's application is supported by multiple rounds of Company testimony and exhibits. To demonstrate completeness, the Company's second supplemental filing in February 2018 includes an index specifying the location of all information required by the Act and Commission rule.[5]

DPU does not cite any specific provision of law that it claims the Company's filing failed to meet. Assuming DPU relies on Utah Admin. Code R746-440-1, which requires the applicant to describe the projects and their purpose, provide estimated costs (with supporting models and analysis), and provide sufficient information to allow verification of the models,[6] the Company has satisfied these requirements. Company witness Rick Vail's second supplemental testimony includes the interconnection studies for the Wind Projects, which rely on power flow studies to demonstrate that the Company can interconnect the Wind Projects.[7] The interconnection studies detail the facilities and estimated costs required for interconnection, and collectively support the interconnection of at least 1,510 MW of new wind resources in eastern Wyoming.

In addition, Mr. Vail's supplemental direct testimony provided an exhibit outlining the numerous technical studies performed to date on the Transmission Projects, a description of the

[4] Utah Code Ann. §§ 54-17-302, 54-17-402.
[5] *See* Attachment A to the Company's cover letter accompanying its February 16, 2018, second supplemental direct filing.
[6] Utah Admin. Code R746-440-1(1)(a), (c), (d), and (f). The Wind Projects are subject to the filing requirements in Utah Admin. Code R746-430-2(a)-(i), which enumerate the information required for significant resource approvals.
[7] Exhibits RMP___(RAV-2SS), RMP___(RAV-3SS), RMP___(RAV-4SS), and RMP___(RAV-5SS); Second Supplemental Direct Testimony of Rick. A. Vail lines 100-103 and 131-139. The interconnection studies include three System Impact Studies and one Facilities Study.

additional studies to be performed, and a schedule for the additional studies.[8] Mr. Vail's supplemental direct testimony also included the preliminary Aeolus West Transmission Path Capability Assessment, completed in October 2017, which includes detailed studies evaluating a wide range of operating conditions, including power flow and stability analyses.[9] The Company is updating this assessment to reflect the Wind Projects' specific design and location, and a preliminary, updated assessment is now available, which the Company provided to DPU in discovery on March 2, 2018.[10] The preliminary updated assessment is attached as Exhibit 1. The Company anticipates completing the dynamic stability analysis referenced in the preliminary updated assessment by March 30, 2018. At that time, the Company will provide the study results to parties through updated discovery responses. The Company's final round of testimony will also include the updated study results.

B. DPU's vague objection improperly seeks to litigate the merits of the Company's application and is facially deficient.

Despite this evidence, DPU claims that the Company's application is incomplete because the Company "has not provided complete, updated transmission analysis."[11] Specifically, DPU asserts that the Company "did not provide the transmission study supporting" the conclusion that "the Transmission projects would increase . . . transfer capability" allowing 1,510 MW of incremental wind generation to interconnect in eastern Wyoming.[12] Because the interconnection

[8] *See, e.g.,* Supplemental Direct and Rebuttal Testimony of Rick. A. Vail at 11; Exhibit RMP___(RAV-3SD). The studies listed include: (1) external consultant studies of sub-synchronous resonance, dynamic stability, power flow, and power system computer-aided design ("PSCAD") modeling (completed December 2017); (2) alternative power flow, dynamic stability, and PSCAD modeling of the transmission system impact resulting from the retirement of the Dave Johnston generating plant (completed November 2017); and (3) studies to refine the architecture and size of the Lathan dynamic device (completed January 2018);[8] and (4) WECC path rating studies (completed in 2011).

[9] Exhibit RMP___(RAV-4SD).

[10] The updated assessment was completed after the Company filed its second supplemental direct testimony on February 16, 2018, and therefore was not included as an exhibit to that testimony.

[11] DPU's Objection at 2.

[12] DPU's Objection at 2.

studies do establish interconnection capability up to 1,510 MW, DPU's claim is factually inaccurate. To the extent that DPU's Objection is based on the still-preliminary status of the updated Aeolus West Transmission Path Capability Assessment, DPU implies a filing requirement that does not exist.

In its Scheduling Order, the Commission provided guidance governing completeness objections in footnote 1. DPU's Objection quotes the entire footnote—except the first—and most critical—sentence, which directed parties to file an objection to the Company's application "only if they believe that RMP has failed to submit the information *required under rule and statute* to support its Application."[13] DPU's Objection not only omits the first sentence of the Commission's directive, but it also fails to conform to its requirements.[14] By demanding studies not required by statute or rule, DPU's objection goes to the merits of the application—issues that the Commission indicated should be preserved for the hearing.[15]

C. The Act allows flexibility to approve a resource decision while additional studies are ongoing.

DPU appears to contend that a complete application for approval of a voluntary resource decision requires all transmission studies to be final. This is inconsistent with the practical requirements for construction of large transmission projects, which include ongoing studies at different stages of the planning process. Here, Mr. Vail testifies that the studies for the Transmission Projects will continue into 2019.[16]

In analogous cases, the Commission has concluded that it is unnecessary to delay review of a voluntary resource decision to await supplemental information, especially if doing so risks

[13] Scheduling Order at 2 (emphasis added).
[14] DPU's Objection at 1–2.
[15] Scheduling Order at 2.
[16] Supplemental Direct and Rebuttal Testimony of Rick A. Vail at lines 511–520.

additional costs to customers to implement the decision.[17] For example, when approving the Company's decision to install selective catalytic reduction systems ("SCRs") at the Jim Bridger plant, the Commission explained that if circumstances change, the Act "provides a process for the Company to request Commission review and determination of whether to proceed with implementation of the approved resource decision."[18] The Commission noted that Company has the "burden to respond prudently to new information and changed circumstances or risk the Commission finding that the Company's responsive actions to be imprudent and inconsistent with the public interest."[19] The Commission concluded that the Company should begin implementation of the SCR decision, but must do so "in a manner that preserves its flexibility to respond appropriately" to intervening changes in costs or circumstances.[20]

Similarly, the Commission approved the Company's voluntary request to execute contracts on the final shortlist of a gas request for proposals ("RFP") "assuming the bids, as updated following Commission approval of the Voluntary Request, meet specified price parameters and a market ratio as defined in the Voluntary Request."[21] In that case, the Commission approved the Company's voluntary request even though the application did not identify the specific contracts that would be executed, which were subject to price updating *after* the Commission's approval. Again, the Commission exercised reasonable flexibility to approve a voluntary request even though information would be updated after approval.

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[17] *In the Matter of the Voluntary Request of Rocky Mountain Power for Approval of Resource Decision to Construct Selective Catalytic Reduction Systems on Jim Bridger Units 3 and 4*, Docket No. 12-035-92, Report and Order at 9, 29 (May 10, 2013) ("Bridger SCR Order"). Sierra Club sought a stay of the proceeding to consider the installation of SCRs in Bridger Units 3 and 4, arguing that the Commissions should wait until the U.S. Environmental Protection Agency ("EPA") issued a final Best Available Retrofit Technology ("BART") determination for the plant.
[18] Bridger SCR Order at 29 (citing Utah Code Ann. § 54-17-404).
[19] Bridger SCR Order at 29.
[20] Bridger SCR Order at 29.
[21] *In the Matter of the Voluntary Request of Rocky Mountain Power for Approval of Resource Decision to Acquire Natural Gas Resources*, Docket No. 12-035-102, Report and Order at 2 (Apr. 19, 2013).

The Company is confident that its ongoing transmission studies will continue to confirm the Transmission Projects' benefits, consistent with every study to date. But if ongoing studies reveal that the capability of the Transmission Projects is insufficient to realize the expected customer benefits, the Company will return to the Commission for additional review and guidance. The Commission's approach in the SCR and gas RFP cases demonstrates that the Act is flexible enough to allow for ongoing study and review of a proposed resource decision.

III. CONCLUSION

DPU fails to identify any information required by statute or rule that the Company failed to provide. The Company's application fully conforms to the requirements of the Act and the Commission's rules, as detailed in the Company's testimony and accompanying exhibits. For these reasons, the Company requests that the Commission deny DPU's Objection and review the Company's application for approval of resource decisions on the merits.

Respectfully submitted this 19th of March, 2018.

Respectfully submitted,

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Exhibit 1

PRELIMINARY DRAFT

Aeolus West Transmission Path Transfer Capability Assessment

Updated Study Report
Revision 2.0

February 2018

Prepared by
PacifiCorp – Transmission Planning

Table of Contents

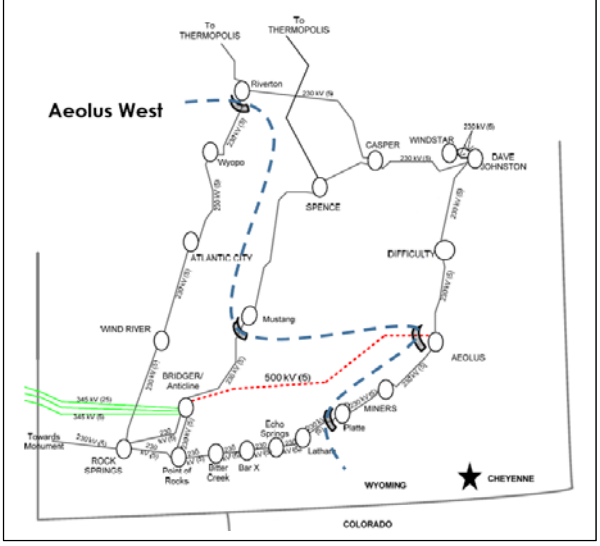
Executive Summary

This assessment was conducted to document the Transfer Capability of the Aeolus West[1] transmission path once the Gateway West – Subsegment D.2[2] (Bridger/Anticline – Aeolus) transmission facilities (D.2 Project) are added to the Wyoming transmission system and assumed resources identified in the PacifiCorp 2017R RFP[3] Shortlist were added.

The Aeolus West transmission path (see Figure 1) is a new path that will be formed by adding the D.2 Project in parallel with the TOT 4A[4] (Path 37) transmission path facilities. The anticipated in-service date for the D.2 Project is November 2020. The D.2 Project is part of PacifiCorp's Energy Vision 2020 which includes the following major transmission facilities:

- Aeolus 500/230 kV substation,
- Shirley Basin – Freezeout 230 kV line loop-in to Aeolus,
- Anticline 500/345 kV substation,
- Aeolus – Anticline 500 kV new line,
- Bridger – Anticline 345 kV new line,
- Shirley Basin – Aeolus 230 kV #1 line rebuild,
- Shirley Basin – Aeolus 230 kV #2 line (16-mile),

Figure 1: Aeolus West Transmission Path



1 The Aeolus West transmission path will include the following major transmission elements: Aeolus* – Anticline 500 kV, Platte* – Latham 230 kV, Mustang* – Bridger 230 kV and Riverton* – Wyopo 230 kV transmission lines. (*meter location)

2 Gateway West – Subsegment D.2 is a key component of the Energy Vision 2020 (EV2020) initiative that was announced by PacifiCorp on April 4, 2017. Other components of the EV2020 initiative include repowering PacifiCorp's existing wind fleet in southeast Wyoming and adding approximately 1,100 MW of new wind generation east of Bridger/Anticline. [Subsequent to the initial announcement, technical studies have demonstrated that as high as 1,510 MW can be integrated east of Bridger/Anticline.]

3 The PacifiCorp 2017R Request for Proposals for renewable resources (2017R RFP) solicited cost-competitive bids for up to 1,270 MW of new or repowered wind energy interconnecting with or delivering to PacifiCorp's Wyoming system with the use of third-party firm transmission service and any additional wind energy located outside of Wyoming capable of delivering energy to PacifiCorp's transmission system that will reduce system costs and provide net benefits for customers.

4 The existing TOT 4A (Path 37) transmission path is comprised of the Riverton* – Wyopo 230 kV, Platte – Standpipe* 230 kV and Spence* – Mustang 230 kV transmission lines. (*meter location)

- Aeolus – Freezeout 230 kV line rebuild,
- Freezeout – Standpipe 230 kV line reconstruction,
- Latham dynamic voltage control device,
- Construct a 230 kV single circuit transmission line to replace 7-miles of the Ben Lomond - Naughton 230 kV #1 circuit, which resides double-circuit lattice towers with the Ben Lomond - Birch Creek 230 kV #2 line, and
- Reconductor the 795 ACSR portion of the Railroad – Croydon 138 kV line with 1222 ACCC high temperature conductor.

The WECC 2021-22 HW power flow base case was utilized for the Aeolus West transfer capability assessment studies. In support of the EV2020 initiative, which calls for the addition of new and repowered wind resources in Wyoming, the base case was modified to achieve the transfer levels evaluated by utilizing PacifiCorp 2017R RFP Shortlist resources, which added 1510 MW east of the Aeolus West "cut plane" and 221 MW in southwest Wyoming. For different Aeolus West transfer levels (heavy and light) and 2400 MW flow across Jim Bridger West, resource levels in eastern Wyoming were varied relative to the Jim Bridger Generation Plant in Central Wyoming and the Emery/Hunter and Huntington generation in Central Utah.

Contingencies that were considered in this analysis include:

- N-1 of D.2 Project facilities
- N-1, N-2 Bridger contingencies
- All Eastern, Central and North Wyoming transmission system contingencies performed as part of the TPL-001-4 annual assessment.

For the preliminary Transfer Capability assessment, simultaneous interaction between the Aeolus West path and the TOT 4B path was evaluated; however, the interactions with other transmission paths (Yellowtail South, Jim Bridger West, TOT 1A and TOT 3) were monitored throughout the study.

Conclusions

Technical studies demonstrated that with the addition of the planned D.2 Project facilities to the Wyoming transmission system, system performance will meet all NERC and WECC performance criteria.

Preliminary power flow studies demonstrate that by utilizing existing and planned southeast Wyoming resources[5], the Aeolus West transmission path can transfer up to 1792 MW under simultaneous transfer conditions with the TOT 4B transmission path, effectively[6] increasing the east to west transfer levels across Wyoming by 914.5 MW. Power flow findings also indicated:

- Dynamic voltage control is necessary at the Latham 230 kV substation to mitigate low voltage conditions resulting from loss of Bridger/Anticline – Aeolus transmission facilities.
- Under certain operating conditions, one Remedial Action Schemes (RAS) will need to be implemented to trip generation following outage of specific transmission facilities.
- The location (and output level) of new and repowered wind resources can influence the transfer capability level across the Aeolus West transmission path, the Aeolus West and TOT 4B nomogram curve and the area under the nomogram curve.

Dynamic stability studies evaluating a wide range of system disturbances are under way and will be presented in a follow-on technical report.

[5] Eastern Wyoming Resources: Existing Wind: 1124 MW, Dave Johnston (net) 717 MW, New Wind – East of the Aeolus West "cut plane": 1510 MW at various locations.

[6] Effective transfers were determined by subtracting the existing TOT 4A path maximum[13] transfer level (960 MW) from the Aeolus West transfer level (1792 MW) and adding the Platte area loads (82.5 MW) that are up-stream of the Aeolus West metering point.

1 Introduction

1.1 Purpose

The purpose of the study is to demonstrate that the interconnected transmission Bulk Electric System (BES) in Wyoming with the D.2 Project added can support the PacifiCorp 2017R RFP Shortlist resources and can be operated reliably during normal and contingency operations throughout the planning horizon. To achieve this purpose, the study will: (1) identify the new Aeolus West transmission path limitations, (2) evaluate the interactions between the Aeolus West and the TOT 4B transmission paths and develop a nomogram that depicts system limitations and (3) identify the need for various Remedial Action Schemes (RAS).

This report summarizes the results of the power flow portion of Aeolus West transfer capability assessment and demonstrates that performance of the BES in Wyoming with the addition of the D.2 Project will meet all NERC and WECC performance criteria.

1.2 Plan of Service

The D.2 Project consists of the following system improvements:

1. A new 500/230 kV Aeolus substation
2. A new 230/500 kV, 1600 MVA transformer at Aeolus
3. Loop-in the Shirley Basin – Freezeout 230 kV line into Aeolus,
4. A new 500/345 kV Anticline substation
5. A new 500/345 kV, 1600 MVA transformer at Anticline
6. A new 137.8-mile 3x1272 ACSR (Bittern), 500 kV line between Aeolus and Anticline substations
7. A new 5.1-mile 3x1272 ACSR (Bittern), 345 kV line between Anticline and Jim Bridger substations
8. A new 50 MVAr reactor at Aeolus 230 kV bus
9. A new 200 MVAr shunt capacitor bank at Aeolus 500 kV bus
10. A new 200 MVAr shunt capacitor bank at Anticline 500 kV bus
11. Rebuild of the Aeolus – Shirley Basin 230 kV #1 line to 2x1557 ACSR/TW (Potomac/TW) conductor
12. A new 2x1557 ACSR/TW (Potomac/TW) Aeolus – Shirley Basin 230 kV #2 line
13. Rebuild of the Aeolus – Freezeout 230 kV lines to 2x1272 ACSR (Bittern) conductor

14. Reconstruction of Freezeout – Standpipe 230 kV lines to 2x1272 ACSR (Bittern) conductor
15. A new dynamic reactive device at Latham 230 kV substation.
16. Construct a 230 kV (2-795 ACSR) transmission line to replace 7-miles of the Ben Lomond - Naughton 230 kV #1 circuit, which resides double-circuit lattice towers with the Ben Lomond - Birch Creek 230 kV #2 line, and
17. Reconductor 2.35 miles of 795 ACSR 138 kV line between Railroad and Croydon with 1222 ACCC high temperature conductor.

1.3 Planned Operating Date

The plan of service for the facilities to be operational is by November 2020.

1.4 Scope

The Aeolus West Transfer Capability assessment assumes the addition of new wind generation facilities as noted in Table 1, which are associated with the PacifiCorp interconnection queue and its 2017R RFP Shortlist resources. While the new technology and model information of the repowered units was used in the steady-state and transient stability analysis (currently underway), no incremental MW output was considered; i.e., each repowered facility was limited to its current Large Generator Interconnection Agreement (LGIA) capacity. The study

Table 1: Generating Resources

Wyoming Thermal Generation	East Wyoming – Existing Wind	New Wyoming Wind
2396 MW • Dave Johnston: 717 MW • Wyodak (PacifiCorp): 268 MW • Jim Bridger (PacifiCorp): 1411 MW	1124 MW (Foote Creek, Rock River, High Plains, Seven Mile Hill, Dunlap, Root Creek, Top of the World, Glenrock, Three Buttes, Chevron)	1731 MW • Eastern Wyoming (Aeolus, Shirley Basin, Windstar): 1270 MW • Northern Wyoming (Bighorn Basin): 240 MW • Southwest Wyoming (Uinta County) : 221 MW See Table 4.

was performed using a 2021-22 heavy winter WECC approved case which was modified to include the D.2 Project facilities and applicable PacifiCorp 2017R RFP Shortlist wind generation transmission facilities. The system model assumed summer line ratings to assess the thermal limitation of the Wyoming system. Load served from Platte is normally represented as an open point between Platte – Whiskey Peak 115 kV. The system configuration with Platte 115 kV normally open is presently the most limiting scenario for the existing TOT 4A/4B nomogram.

2 Study Criteria

While this report is intended to summarize the results of updated power flow studies, for clarity, the study criteria that is used for the evaluation of both power flow and dynamic stability studies will remain in the document.

2.1 Thermal Loading

For system normal conditions described by the P0[7] event, thermal loading on BES transmission lines and transformers is required to be within continuous ratings.

For contingency conditions described by P1-P7 category planning events, thermal loading on transmission lines and transformers should remain within 30-minute emergency ratings.

The thermal ratings of PacifiCorp's BES transmission lines and transformers are based on PacifiCorp's Weak Link Transmission Database and Weak Link Transformer Database as of March 31, 2017.

2.2 Steady State Voltage Range

The steady state voltage ranges at all PacifiCorp BES buses shall be within acceptable limits as established in PacifiCorp's Engineering Handbook section 1B.3 "Planning Standards for Transmission Voltage[8]" as shown below.

[7] Facility outage events that are identified with "P" designations are referenced to the TPL-001-4 NERC standard.

[8] PacifiCorp Engineering Handbook "Planning Standards for Transmission Voltage," April 8, 2013.

Table 2: Voltage Criteria

Operating System Configuration	Normal Conditions (P0)		Contingency Conditions (P1-P7)	
	Vmin (pu)	Vmax (pu)	Vmin (pu)	Vmax (pu)
Looped	0.95	1.06[9]	0.90	1.10
Radial	0.90	1.06[9]	0.85	1.10

Steady state voltage ranges at all applicable BES buses on adjacent systems were screened based on the limits established by WECC regional criterion as follows:

- 95% to 105% of nominal for P0 event (system normal),
- 90% to 110% of nominal for P1-P7 events (contingency).

2.3 Post-Transient Voltage Deviation

Post-contingency steady state voltage deviation at each applicable BES load serving bus (having no intermediate connection) shall not exceed 8% for P1 events.

2.4 Transient Stability Analysis Criteria

All voltages, frequencies and relative rotor angles are required to be stable and damped. Cascading or uncontrolled separation shall not occur and transient voltage response shall be within established limits.

2.5 Transient Voltage Response

Transient stability voltage response criteria are based on WECC Regional Performance Criteria WR1.3 through WR1.5 as follows:

- Transient stability voltage response at the applicable BES buses serving load (having no intermediate connection) shall recover to at least 80% of pre-contingency voltage within 20 seconds of the initiating event for all P1-P7 category events, for each applicable bus serving load.
- For voltage swings following fault clearing and voltage recovery above 80%, voltage dips at each applicable BES bus serving load (having no intermediate buses) shall not dip below 70% of pre-contingency voltage for more than 30 cycles or remain below

[9] In some situations, voltages may go as high as 1.08 pu at non-load buses, contingent upon equipment rating review.

80% of pre-contingency voltage for more than two seconds for all P1-P7 category events.

- For contingencies without a fault (P2-1 category event), voltage dips at each applicable BES bus serving load (having no intermediate buses) shall not dip below 70% of pre-contingency voltage for more than 30 cycles or remain below 80% of pre-contingency voltage for more than two seconds.

The following criteria were used to investigate the potential for cascading and uncontrolled islanding:

- Load interruption due to successive line tripping for thermal violations shall be confined to the immediate impacted areas and shall not propagate to other areas. The highest available emergency rating is used to determine the tripping threshold for lines or transformers when evaluating a scenario that may lead to cascading.
- Voltage deficiencies caused by either the initiating event or successive line tripping shall be confined to the immediate impacted areas, and shall not propagate to other areas.

Positive damping in stability analysis is demonstrated by showing that the amplitude of power angle or voltage magnitude oscillations after a minimum of 10 seconds is less than the initial post-contingency amplitude. Oscillations that do not show positive damping within a 30-second time frame shall be deemed unacceptable.

Stability studies shall be performed for planning events to determine whether the BES meets the performance requirements.

- Single contingencies (P1 category events): No generating unit shall pull out of synchronism (excludes generators being disconnected from the system by fault clearing action or by a special protection system).
- Multiple contingencies (P2-P7 category events): When a generator pulls out of synchronism in the simulations, the resulting apparent impedance swings shall not result in the tripping of any transmission system elements other than the generating unit and its directly connected facilities.
- Power oscillations are evaluated by exhibiting acceptable damping. The absence of positive damping within a 30-second time frame is considered un-damped.

3 Base Case Development

3.1 Base Case Selection

The base case development process involves selecting an approved WECC base case, updating the models to represent existing and planned facilities (D.2 Project transmission and wind generation facilities) and then tuning the cases to maximum transfer conditions on the WECC transmission path(s) being studied. For this study purpose, the published WECC base case that is close to the projects' in-service date of November 2020, which has average load conditions based on 2021 load projection and availability of a stability case, was selected. The WECC approved base case 2021-22 HW (created on August 19, 2016) was selected, which meets these criteria. This study focused on simultaneous transmission path interaction in the Wyoming area between the Aeolus West and the TOT 4B transmission paths; however, other transmission paths such as Yellowtail South (non-WECC path), Jim Bridger West, TOT 1A and TOT 3 (See Appendix A for path definitions) were monitored throughout the study.

The various critical components for this study purpose from selected 2021-22 HW base case are listed below:

Table 3: Wyoming Load, Generation and Platte Normal Open Configuration in Base Case

North Wyoming PAC Load (including Wyodak load of 42 MW)	391 MW
North Wyoming - Western Area Power Administration (WAPA) Load	211 MW
Eastern Wyoming PAC Load (including DJ load of 56 MW)	474 MW
Eastern Wyoming PAC loads on WAPA system	95 MW
Central Wyoming Load (including JB load of 130 MW)	434 MW
Yellowtail South Flow	192 MW
Yellowtail Generation	140/260 MW (Online/Max)
WAPA's Existing Small Generation[10] in North Wyoming	26/50 MW(Online/Max)
WAPA's Existing Small Generation[11] in Eastern Wyoming	484/584 MW(Online/Max)
Wyodak Generation (PacifiCorp/Black Hills)	350/380 MW (Online/Max)

[10] WAPA's small generation in north Wyoming includes; Boysen, BBill, Heart MT, Shoshone, Spring Mtn

[11] WAPA's small generation in eastern Wyoming includes; Alcova, Fremont, Glendo, Guernsy, Kortes, Seminoe, CLR_1, SS_Gen1 AND CPGSTN

Dry Fork Generation (Basin Electric)	420/440 MW (Online/Max)
Gross Laramie River Generation I (WAPA's swing machine)	605 MW(Max)
Gross Laramie River Generation II	590/605 MW(Online/Max)
Gross Dave Johnston (DJ) Generation	700/774 MW(Online/Max)
Total Existing PAC East Wyoming Wind[12] Generation	885.7/1124 MW (Online/Max)
Rapid City DC W Tie	130 W2E (200 MW-bidirectional)
Stegall DC Tie	100 E2W (110 MW-bidirectional)
Sydney DC Tie	196 E2W (200 MW-bidirectional)
TOT 4A	627 MW
TOT 4B	469 MW
Jim Bridger (JB) Generation	2200 MW
Jim Bridger West Flow	2027 MW
TOT 3	1259.1 MW
TOT 1A	195 MW
Platte – Mustang 115 kV Normal Open point	Platte – Normal Open

3.2 Generating Facility Additions

Based on the wind generation resources in PacifiCorp's interconnection queue in combination with projects identified in the PacifiCorp 2017R RFP Shortlist, an updated transmission assessment of the Aeolus West transmission path was performed. Projects with an in-service date beyond 2020 were excluded. In conducting this analysis, the generating resources identified in Table 4 were added to the base case and technical studies identified in Section 4 were performed. While Table 4 provides the general location of each of the PacifiCorp 2017R RFP Shortlist resources, Figure 2 provides an overview of the PacifiCorp's Wyoming transmission system, gives a visual illustration of the location of each of the existing and new generation (noted in red) resources, and identifies location of the Aeolus West and TOT 4B transmission path constraints.

[12] PAC eastern Wyoming wind generation includes; Root Creek, Three Buttes, Top of World, Glenrock, Rolling Hills, Dunlap. Seven Mile Hill, Foote Creek and High Plains wind generation

Table 4: PacifiCorp 2017R RFP Shortlist Generation Resources

Proposed New Wind Facilities	LGI Queue Number	Project Size	Point of Interconnection
Eastern Wyoming (Aeolus/Shirley Basin/Windstar Area)	Q706	250 MW	Aeolus 230 kV
Eastern Wyoming (Aeolus/Shirley Basin/Windstar Area) Southwest Wyoming (Uinta County)	Q707	250 MW	Shirley Basin 230 kV
	Q708	250 MW	Shirley Basin 230 kV
	Q712	520 MW	Windstar 230 kV
	Q715	120 MW	Canyon Compression – Railroad 138 kV line
Southwest Wyoming (Uinta County)	Q810	101 MW	Canyon Compression – Railroad 138 kV line
TOTAL		**1491 MW**	

See Appendix B for detail on new and repowered wind farm modelling assumptions.
UPDATES IN PROGRESS

3.3 Base Case Modification and Tuning

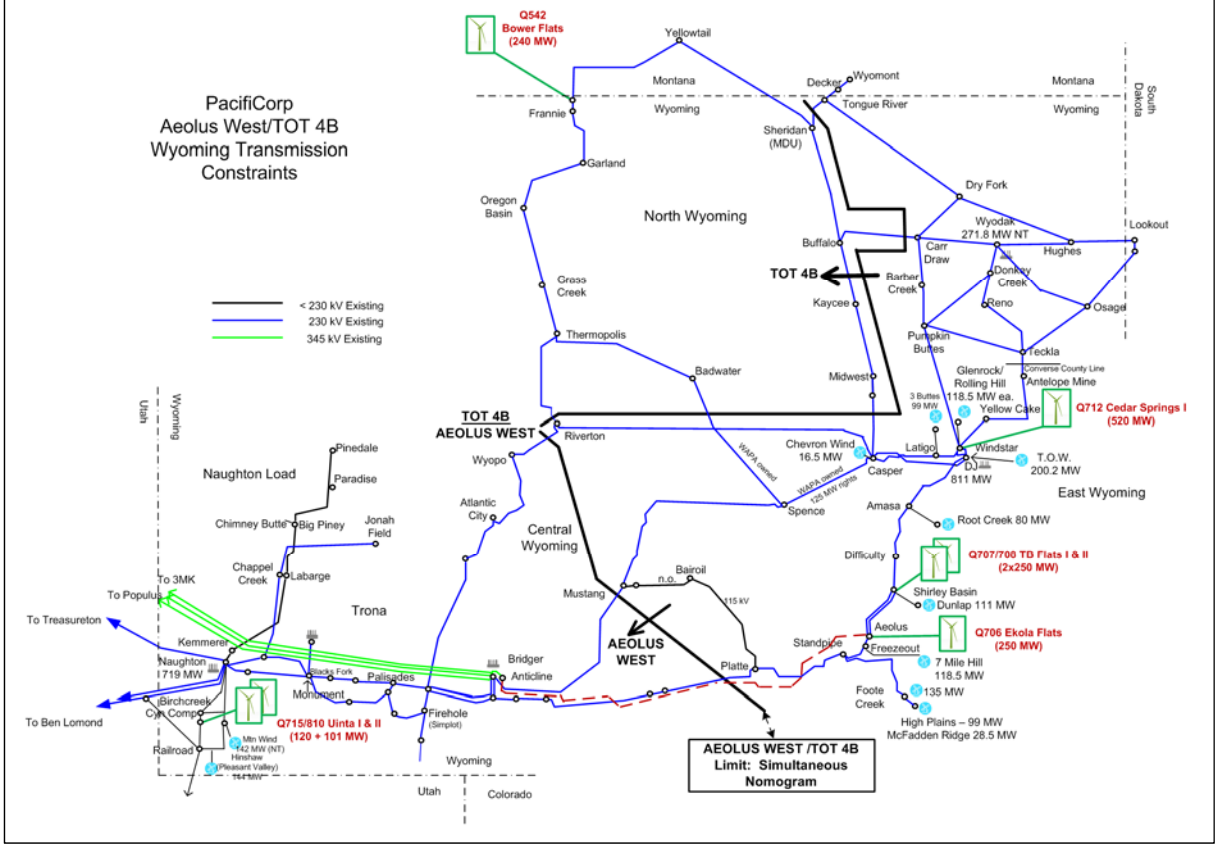
The 2021-22HW base case was modified to reflect the most recent Foote Creek, High Plains, Top of the World and Three Buttes wind generation modeling as per the recent MOD-032 data submitted by each generator owner (GO). Transmission line impedances between Dave Johnston and Standpipe were verified and updated and the transmission line ratings in the 2021-22 heavy winter case were modified to summer ratings, which represent the most conservative thermal limitations. The Platte – Standpipe 230 kV dynamic line rating of 608/666/680 MVA was assumed during the analysis.

The PacifiCorp 2017R RFP Shortlist resources listed in Table 4 were added to the base case and the existing repowered wind farm generator models and collector system data were updated. The Aeolus West path was stressed by maximizing the output on all of the existing and new wind generation facilities. Output for the repowered wind generation facilities was limited to the existing LGI agreement generation levels. The additional generation in southeast Wyoming was re-dispatched with Jim Bridger, central and southern Utah generation. The Jim Bridger generation output was maintained such that Jim Bridger West path flows were held at 2400 MW.

As per the available data obtained for the various wind generation facilities at the time of this study analysis, the base cases were reviewed and adjusted to ensure voltages in the collector

system of wind generation facilities were below 1.05 p.u. and that there was no reactive power loop flow between the main generator step-up transformers GSU's for wind generation facility.

Figure 2
Existing/Proposed Wyoming Generation Resources, and Transmission Constraints



This process involved tuning transformer and generator parameters such that generators were producing appropriate reactive power output. Additionally, within the 230 kV transmission system it was verified that the shunt reactive devices were accurately represented, voltage profiles were normal, reactive power flows were within normal operating ranges and transmission system voltage was maintained to match acceptable PacifiCorp Transmission Voltage Schedules.

4 Path Studies

4.1 Aeolus West vs. TOT 4B

Based on the assumptions outlined above, the study demonstrated that the Aeolus West maximum transfer capability limit is 1792 MW, while meeting all NERC and WECC

performance criteria. While this transfer level is 832 MW above the present TOT 4A (960 MW[13]) path limit for similar conditions, east to west transfers have effectively increased by 914.5 MW due to shifting the Platte area load (82.5 MW) east of the Aeolus West cut plane. The Aeolus West path was stressed by using 3351 MW of total generation resources, which includes thermal (Dave Johnston, 717 MW - net), existing wind (1124 MW), and new wind (1510 MW) resources. The 240 MW of new wind resource in Big Horn Basin was varied with Wyodak generation. It was assumed that only the thermal generation at Dave Johnston (717 MW, new) generating plant in eastern Wyoming would be adjusted to maintain transfers on the Aeolus West transmission path.

The maximum flow limitation of 1792 MW was achieved by utilizing all new and existing wind resources.

Table 1: Aeolus West and TOT 4B Corner Point Cases (See Figure 3)

Case	TOT 4A (MW)	TOT 4B (MW)	Limiting Element	Outage
1	1792	99	Platte- Latham 230 kV line[14]	Anticline – Aeolus 500 kV line outage with RAS
2	1789	251	Platte- Latham 230 kV line[14]	Anticline – Aeolus 500 kV line outage with RAS
3	1346	840	Yellowtail – Sheridan 230 kV line	N-0
			Dave Johnston South Tap – Refinery Tap 115 kV line	Dave Johnston – Casper 230 kV line or Casper – Spence 230 kV line. Casper circuit breaker failure 1H40000 or 1H4001.

See Appendix C for power flow diagrams.

In the study, one remedial action schemes (RAS) were considered for N-1 outages:

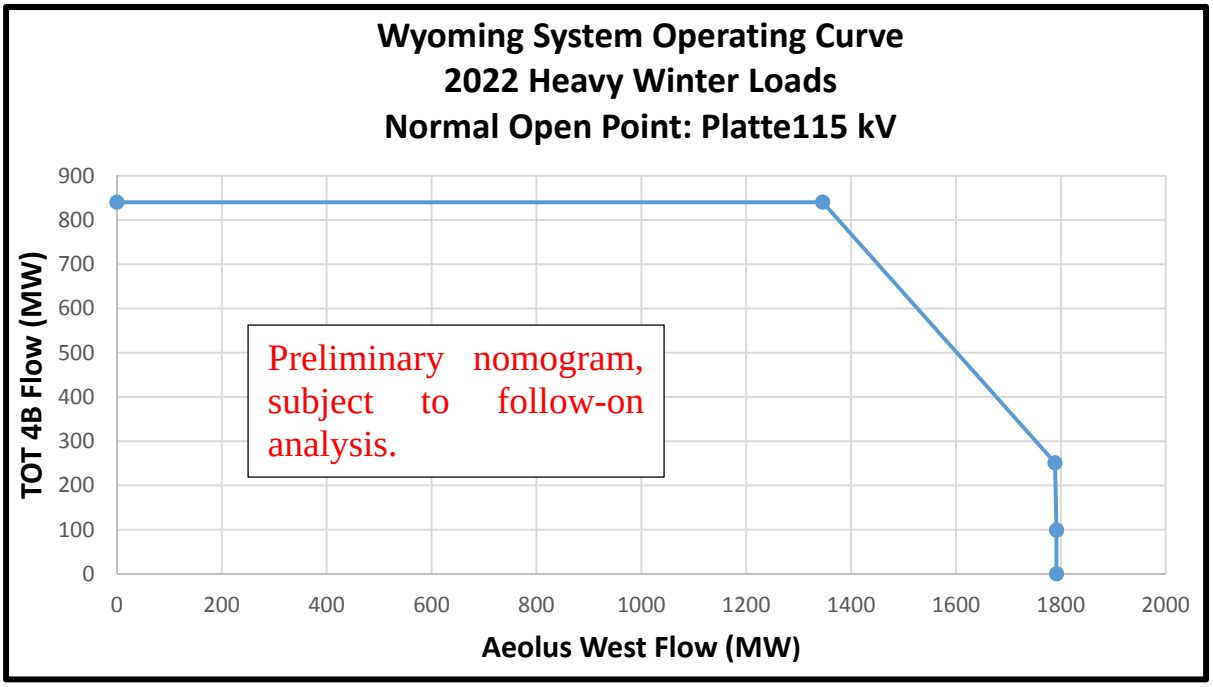
i. Aeolus RAS to trip up to 627.5 MW of wind generation depending on pre-outage flow conditions for any of the new transmission element outages between Aeolus – Jim Bridger.

Figure 3 depicts that the Aeolus West and TOT 4B path interaction is minimized with the addition of the D.2 Project, as indicated by the straight line (implying no path interaction) when

[13] Maximum nomogram point with normal open point at Platte and the dynamic line rating on Platte – Standpipe 230 kV line is utilized

TOT 4B flows are below 250 MW. As the TOT 4B path flows increases above 250 MW the nomogram curve becomes resource limited until TOT 4B flow is 840 MW as compared to present TOT 4A/TOT 4B interaction. However, anytime the emergency dynamic line rating on Platte – Standpipe is lower than 651 MVA[14] the nomogram in Figure 3 might shift to the left. Therefore, a new system operating limit (SOL) value will be identified to represent the real time rating restriction to the path. Additionally, the load at Platte substation can cause a shift in the nomogram; higher load at Platte can shift the curve towards the right and lower load at Platte can shift the curve towards the left, making it more conservative. This is due to the Platte – Latham 230 kV line being the limiting element, as mentioned in Table 5.

Figure 3: Aeolus West Vs TOT 4B Nomogram



4.2 Base Case Development

The 2021-22 HW WECC case was modified to simultaneously stress the Aeolus West and the TOT 4B path flows. The Aeolus West path was stressed using all of eastern Wyoming resource from a total of 3111 MW (existing and future) wind and net coal resource. These resources were re-dispatched with Jim Bridger and Utah Valley resources such that the Jim Bridger West flows were maintained at 2400 MW. No additional resources were imported from WAPA into

[14] The highest loading on the Platte – Standpipe 230 kV line as per power flow analysis based on study assumption.

PACE system to stress the Aeolus West path. The Shiprock, San Juan and Gladstone phase shifters were locked to regulate flow across the TOT 3 path between Colorado and Wyoming.

The TOT 4B path flows were adjusted between a minimum of 100 MW and a maximum of 840 MW. The Montana resources, up to 591 MW, were re-dispatched with WAPA (Dry Fork) to reduce TOT 4B flow or re-dispatched with PAC resources to increase the TOT 4B flow using Crossover, Rimrock and Steam Plant phase shifters in Montana.

4.3 Transient Stability Analysis

Dynamic stability studies evaluating a wide range of system disturbances are under way and will be presented in a follow-on technical report.

5 Sensitivity Analysis

No additional sensitivity analysis were performed as part of this assessment.

6 Study Conclusions

Technical studies demonstrated that with the addition of the planned D.2 Project facilities to the Wyoming transmission system, system performance will meet all NERC and WECC performance criteria.

Updated power flow studies demonstrate that by utilizing existing and planned southeast Wyoming resources[5], the Aeolus West transmission path can transfer up to 1792 MW under simultaneous transfer conditions with the TOT 4B transmission path, effectively[6] increasing the east to west transfer levels across Wyoming by 914.5 MW. Power flow findings also indicated:

- Dynamic voltage control is necessary at the Latham 230 kV substation to mitigate low voltage conditions resulting from loss of Bridger/Anticline – Aeolus transmission facilities.
- Under certain operating conditions, one Remedial Action Schemes (RAS) will need to be implemented to trip generation following outage of specific transmission facilities.
- The location (and output level) of new and repowered wind resources can influence the transfer capability level across the Aeolus West transmission path, the Aeolus West and TOT 4B nomogram curve and the area under the nomogram curve.

Dynamic stability studies evaluating a wide range of system disturbances are under way and will be presented in a follow-on technical report.

Appendix A
Path Definitions

1 Path Definitions

Path definitions are provided in this section, with an asterisk '*' denoting the metering points.

1.1 Path 36: TOT 3 (Location: Border between Northeast Colorado and Southeast Wyoming)

The TOT 3 transmission Path #36 is defined as the sum of flow on the following lines:

- Archer*– Ault 230 kV
- Laramie River*– Ault 345 kV
- Laramie River* – Story 345 kV
- Cheyenne* – Owl Creek 115 kV
- Sidney* – Sterling 115 kV
- Sidney* – Spring Canyon 230 kV
- Cheyenne* – Ault 230 kV

The current path rating is 1680 MW north to south.

1.2 Path 37: TOT 4A (Location: Southwest Wyoming)

The TOT 4A transmission Path #37 is defined as the sum of flow on the following lines:

- Riverton* - Wyopo 230 kV
- Standpipe* - Platte 230kV
- Mustang* - Spence 230 kV

The current path rating is 1025 MW northeast to southwest with Great Divide normal open point.

1.3 New: Aeolus West replaces TOT 4A (Location: Southwest Wyoming)

The new Aeolus West transmission is defined as the sum of flow on the following lines:

- Aeolus* - Anticline 500 kV
- Riverton* - Wyopo 230 kV
- Platte* - Latham 230kV
- Mustang* - Bridger 230 kV

The path rating is 2670 MW East to West based on full Gateway project

1.4 Path 38: TOT 4B (Location: Northwest Wyoming)

The TOT 4B transmission Path #38 is defined as the sum of flows on the following lines:

- Buffalo – CarrDraw* 230 kV
- Tongue River – Sheridan* 230 kV
- Spence* – Thermopolis 230 kV
- Alcova* – Raderville 115 kV
- Casper* – Midwest 230 kV
- Riverton* – Thermopolis 230 kV
- Riverton 230 kV* – Riverton 115 kV transformers
- Subtract PreCorp load at Sheridan (approximately 4 MW in base case)

The current path rating is 880 MW southeast to northwest.

1.5 Path 30: TOT 1A (Location: Northwest Colorado)

The TOT 1A transmission Path #30 is defined as the sum of flows on the following lines:

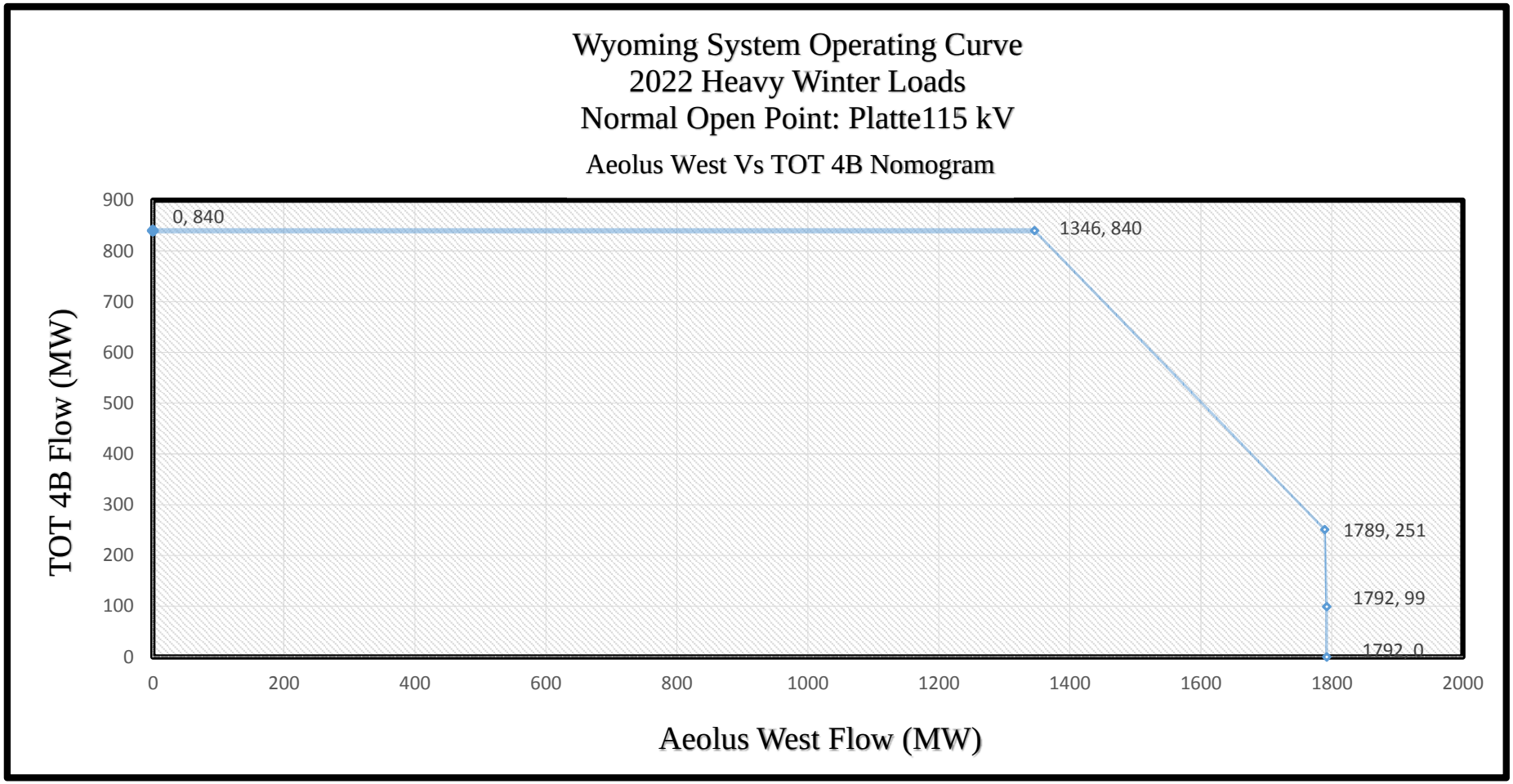
- Craig* - Bonanza 345 kV
- Hayden* - Artesia 138 kV

- Meeker - Rangely 138 kV

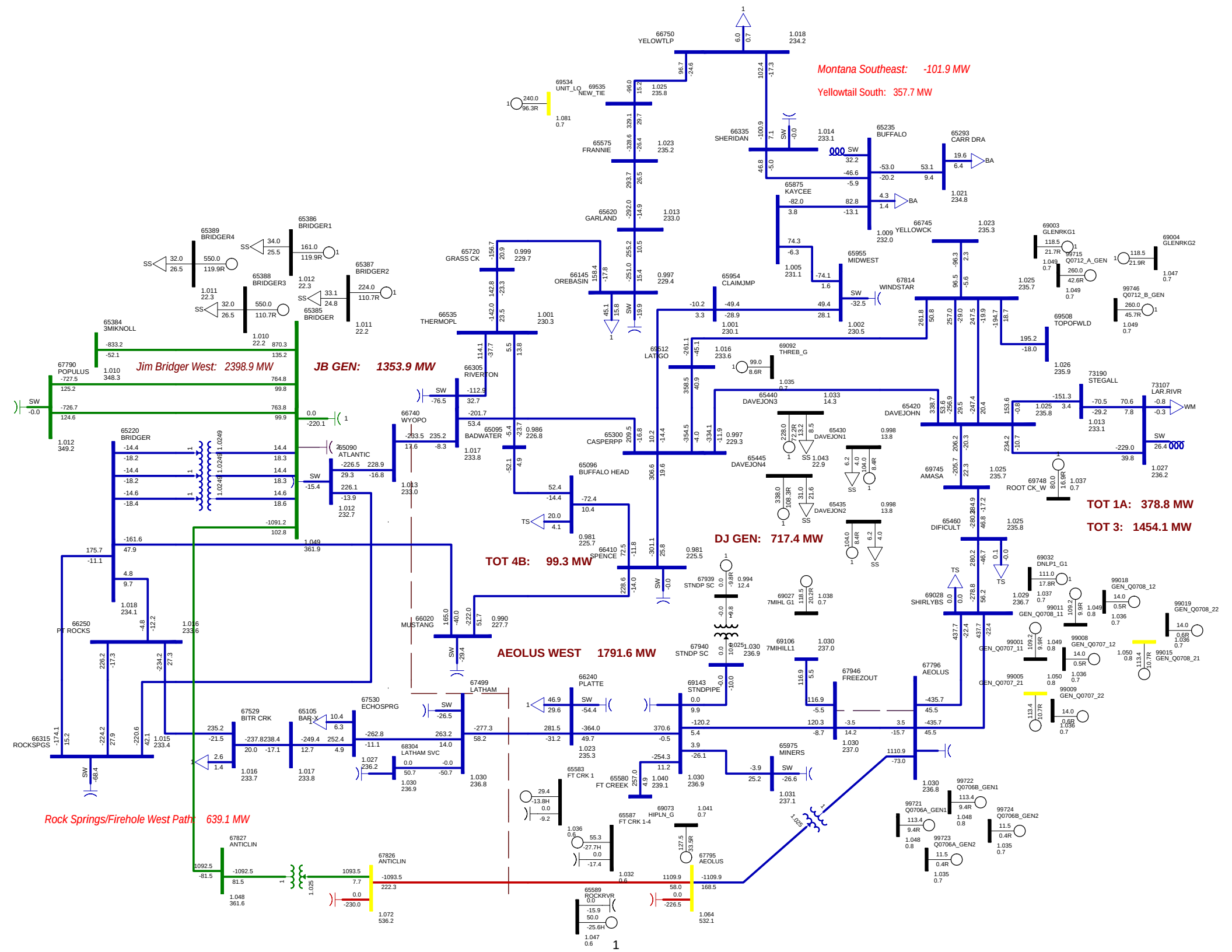
The current path rating is 650 MW east to west.

Appendix C

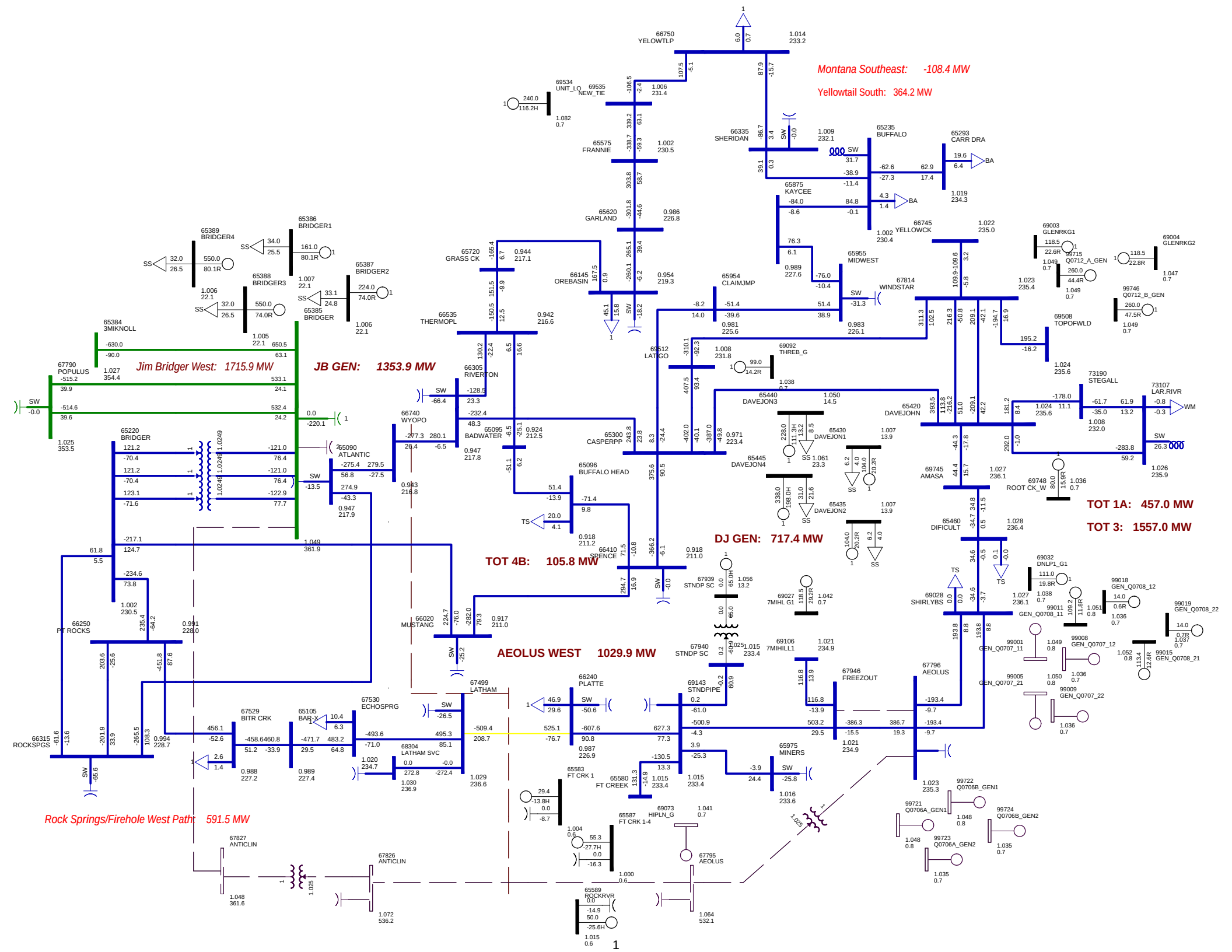
1. Aeolus West Vs TOT 4B Nomogram Plot
2. Power Flow Plots for various nomogram points


Wyoming System Operating Curve
2022 Heavy Winter Loads
Normal Open Point: Platte115 kV
Aeolus West Vs TOT 4B Nomogram
TOT 4B Flow (MW)
900
800
700
600
500
400
300
200
100
0
0, 840
1346, 840
1789, 251
1792, 99
1792, 0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Aeolus West Flow (MW)

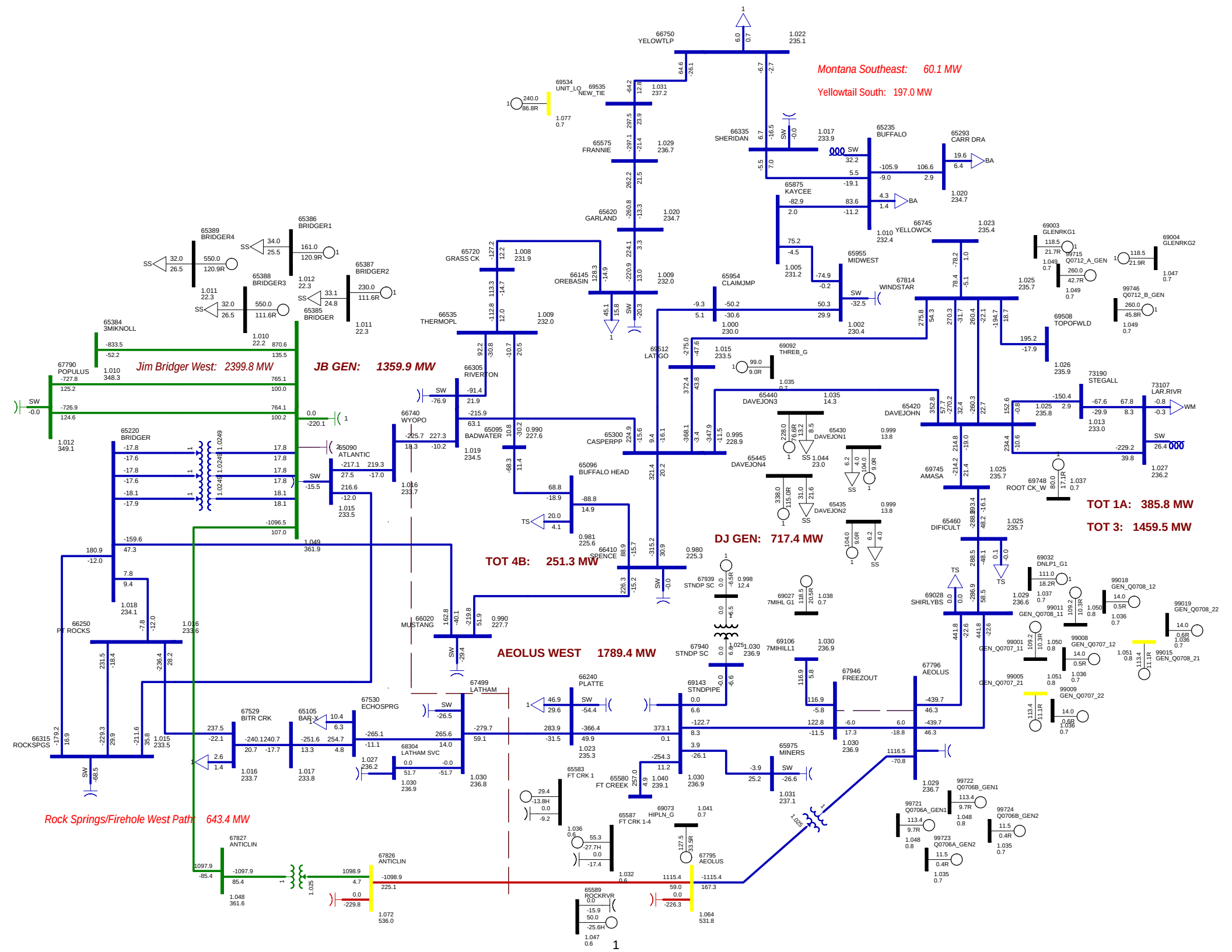
Nomogram Point 1
Aeolus West =1792 MW
TOT 4B = 99 MW
Yellowtail South = 358 MW
TOT 1A = 379 MW
TOT 3 = 1454 MW
Dave Johnston Generation Net = 717 MW Jim
Bridger Generation Net =1354 MW Eastern
Wyoming New Wind = 1270 MW
Eastern Wyoming Existing Wind = 1124 MW


Montana Southeast: -101.9 MW
Yellowtail South: 357.7 MW
Jim Bridger West: 2398.9 MW
JB GEN: 1353.9 MW
TOT 4B: 99.3 MW
DJ GEN: 717.4 MW
AEOLUS WEST 1791.6 MW
TOT 1A: 378.8 MW
TOT 3: 1454.1 MW
Rock Springs/Firehole West Path: 639.1 MW
66750 YELOWTLP
69534 UNIT_LO
69535 NEW_TIE
65575 FRANNIE
65620 GARLAND
66335 SHERIDAN
65235 BUFFALO
65293 CARR DRA
65875 KAYCEE
66745 YELLOWCK
65955 MIDWEST
67814 WINDSTAR
65954 CLAIMJMP
65720 GRASS CK
66145 OREBASIN
66535 THERMOPL
66512 LATIGO
69092 THREB_G
65440 DAVEJON3
65420 DAVEJOHN
65430 DAVEJON1
65445 DAVEJON4
65435 DAVEJON2
65460 DIFICULT
69745 AMASA
69748 ROOT CK_W
73190 STEGALL
73107 LAR.RIVR
69508 TOPOFWLD
69003 GLENRKG1
69004 GLENRKG2
99715 Q0712_A_GEN
99746 Q0712_B_GEN
65389 BRIDGER4
65386 BRIDGER1
65388 BRIDGER3
65387 BRIDGER2
65385 BRIDGER
65384 3MIKNOLL
67790 POPULUS
65220 BRIDGER
65090 ATLANTIC
66740 WYOPO
66305 RIVERTON
65095 BADWATER
65300 CASPERPP
65096 BUFFALO HEAD
66410 SPENCE
66020 MUSTANG
66250 PT ROCKS
66315 ROCKSPGS
67529 BITR CRK
65105 BAR X
67530 ECHOSPRG
67499 LATHAM
68304 LATHAM SVC
66240 PLATTE
69143 STNDPIPE
67939 STNDP SC
67940 STNDP SC
69027 7MIHL G1
69106 7MIHILL1
67946 FREEZOUT
67796 AEOLUS
65975 MINERS
65580 FT CREEK
65583 FT CRK 1
65587 FT CRK 1-4
69073 HIPLN_G
67827 ANTICLIN
67826 ANTICLIN
67795 AEOLUS
65589 ROCKRVR
69028 SHIRLYBS
69032 DNLP1_G1
99011 GEN_Q0708_11
99018 GEN_Q0708_12
99019 GEN_Q0708_22
99001 GEN_Q0707_11
99008 GEN_Q0707_12
99015 GEN_Q0708_21
99005 GEN_Q0707_21
99009 GEN_Q0707_22
99722 Q0706B_GEN1
99724 Q0706B_GEN2
99721 Q0706A_GEN1
99723 Q0706A_GEN2

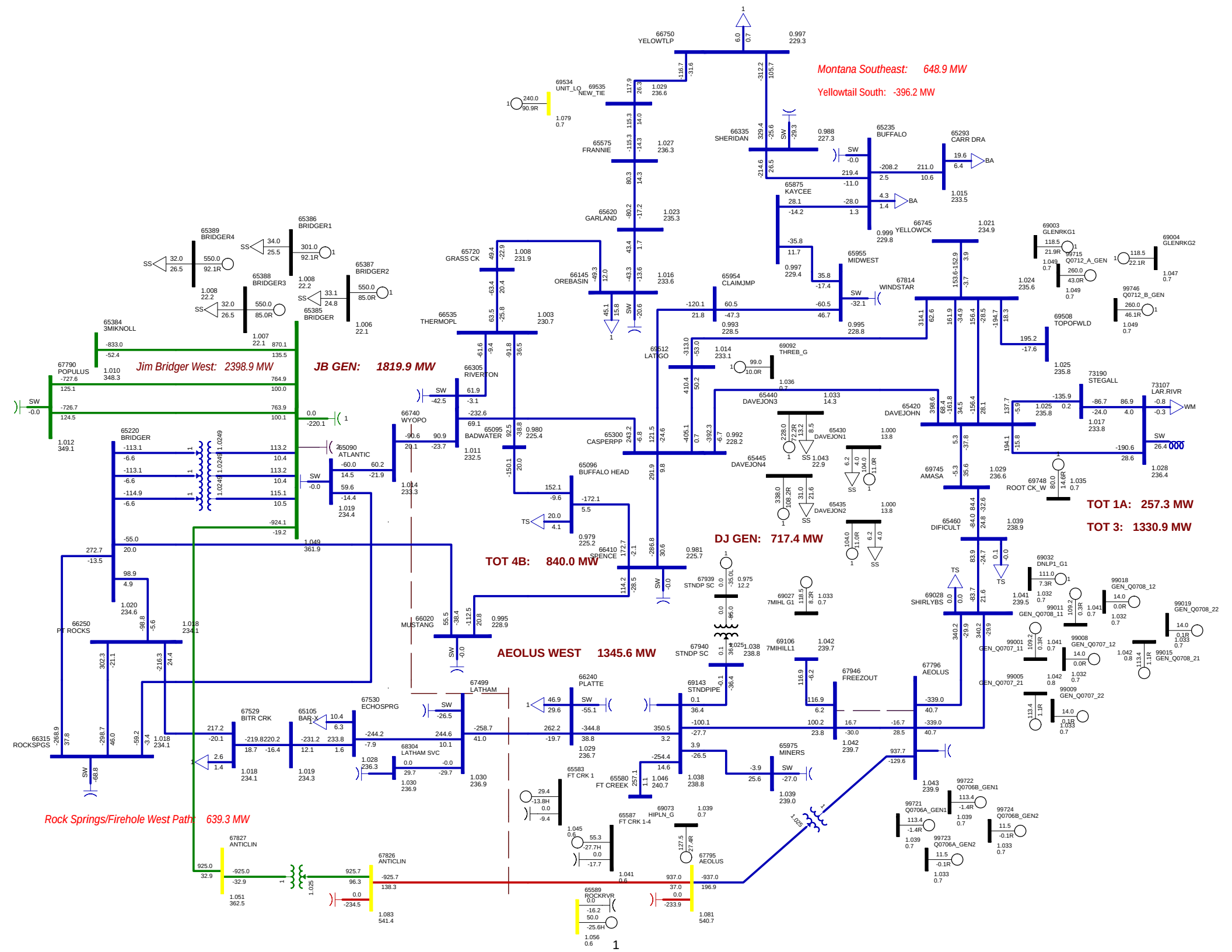
Aeolus-Anticline/Jim Bridger segment outage followed by Aelous RAS to drop 627.5 MW of generation


Montana Southeast: -108.4 MW
Yellowtail South: 364.2 MW
Jim Bridger West: 1715.9 MW
JB GEN: 1353.9 MW
TOT 4B: 105.8 MW
DJ GEN: 717.4 MW
AEOLUS WEST 1029.9 MW
TOT 1A: 457.0 MW
TOT 3: 1557.0 MW
Rock Springs/Firehole West Path: 591.5 MW
66750 YELOWTLP
66335 SHERIDAN
65575 FRANNIE
65620 GARLAND
65720 GRASS CK
66145 OREBASIN
66535 THERMOPL
66512 LATIGO
65954 CLAIMJMP
65955 MIDWEST
65235 BUFFALO
65293 CARR DRA
65875 KAYCEE
66745 YELOWCK
67814 WINDSTAR
65389 BRIDGER4
65386 BRIDGER1
65388 BRIDGER3
65387 BRIDGER2
65385 BRIDGER
65384 3MIKNOLL
67790 POPULUS
65220 BRIDGER
65090 ATLANTIC
66740 WYOPO
66305 RIVERTON
65095 BADWATER
65300 CASPERPP
65096 BUFFALO HEAD
66410 SPENCE
66020 MUSTANG
66250 PT ROCKS
66315 ROCKSPGS
67529 BITR CRK
65105 BAR X
67530 ECHOSPRG
67499 LATHAM
68304 LATHAM SVC
66240 PLATTE
69143 STNDPIPE
67939 STNDP SC
67940 STNDP SC
65583 FT CRK 1
65580 FT CREEK
65587 FT CRK 1-4
69073 HIPLN_G
67827 ANTICLIN
67826 ANTICLIN
65589 ROCKRVR
67795 AEOLUS
65975 MINERS
67946 FREEZOUT
67796 AEOLUS
65440 DAVEJON3
65430 DAVEJON1
65445 DAVEJON4
65435 DAVEJON2
65420 DAVEJOHN
65460 DIFICULT
69745 AMASA
69748 ROOT CK_W
73190 STEGALL
73107 LAR.RIVR
69508 TOPOFWLD
69003 GLENRKG1
69004 GLENRKG2
99715 Q0712_A_GEN
99746 Q0712_B_GEN
69092 THREB_G
69534 UNIT_LO
69535 NEW_TIE
69032 DNLP1_G1
69027 7MIHL G1
69106 7MIHILL1
69028 SHIRLYBS
99018 GEN_Q0708_12
99019 GEN_Q0708_22
99011 GEN_Q0708_11
99008 GEN_Q0707_12
99015 GEN_Q0708_21
99001 GEN_Q0707_11
99005 GEN_Q0707_21
99009 GEN_Q0707_22
99722 Q0706B_GEN1
99724 Q0706B_GEN2
99721 Q0706A_GEN1
99723 Q0706A_GEN2
WM
BA
SS
TS
SW

Nomogram Point 2
Aeolus West = 1789 MW
TOT 4B = 251 MW
Yellowtail South = 197 MW
TOT 1A = 386 MW
TOT 3 = 1460 MW
Dave Johnston Generation Net = 717 MW
JimBridger Generation Net = 1360 MW Eastern
Wyoming New Wind = 1270 MW
Eastern Wyoming Existing Wind = 1124 MW


Montana Southeast: 60.1 MW
Yellowtail South: 197.0 MW
Jim Bridger West: 2399.8 MW
JB GEN: 1359.9 MW
DJ GEN: 717.4 MW
TOT 4B: 251.3 MW
AEOLUS WEST 1789.4 MW
TOT 1A: 385.8 MW
TOT 3: 1459.5 MW
Rock Springs/Firehole West Path 643.4 MW
66750 YELOWTLP
65575 FRANNIE
65620 GARLAND
66335 SHERIDAN
65235 BUFFALO
65293 CARR DRA
65875 KAYCEE
65955 MIDWEST
66745 YELLOWCK
67814 WINDSTAR
65954 CLAIMJMP
66145 OREBASIN
65720 GRASS CK
66535 THERMOPL
66512 LATIGO
65389 BRIDGER4
65386 BRIDGER1
65388 BRIDGER3
65387 BRIDGER2
65385 BRIDGER
65384 3MIKNOLL
67790 POPULUS
65220 BRIDGER
65090 ATLANTIC
66740 WYOPO
66305 RIVERTON
65095 BADWATER
65300 CASPERPP
65096 BUFFALO HEAD
66410 SPENCE
66020 MUSTANG
66250 PT ROCKS
66315 ROCKSPGS
67529 BITR CRK
65105 BAR X
67530 ECHOSPRG
68304 LATHAM SVC
67499 LATHAM
66240 PLATTE
65583 FT CRK 1
65580 FT CREEK
65587 FT CRK 1-4
69073 HIPLN_G
67827 ANTICLIN
67826 ANTICLIN
65589 ROCKRVR
67795 AEOLUS
65975 MINERS
69143 STNDPIPE
67939 STNDP SC
67940 STNDP SC
69106 7MIHILL1
69027 7MIHL G1
67946 FREEZOUT
67796 AEOLUS
65460 DIFICULT
65420 DAVEJOHN
65440 DAVEJON3
65430 DAVEJON1
65445 DAVEJON4
65435 DAVEJON2
69092 THREB_G
69745 AMASA
69748 ROOT CK_W
73190 STEGALL
73107 LAR.RIVR
69508 TOPOFWLD
69003 GLENRKG1
69004 GLENRKG2
99715 Q0712_A_GEN
99746 Q0712_B_GEN
69032 DNLP1_G1
69028 SHIRLYBS
99018 GEN_Q0708_12
99019 GEN_Q0708_22
99011 GEN_Q0708_11
99008 GEN_Q0707_12
99015 GEN_Q0708_21
99001 GEN_Q0707_11
99005 GEN_Q0707_21
99009 GEN_Q0707_22
99722 Q0706B_GEN1
99724 Q0706B_GEN2
99721 Q0706A_GEN1
99723 Q0706A_GEN2
69534 UNIT_LO
69535 NEW_TIE
1

Nomogram Point 3
Aeolus West =1346 MW
TOT 4B = 840 MW
Yellowtail South = -396 MW
TOT 1A = 257 MW
TOT 3 = 1331 MW
Dave Johnston Generation Net = 717 MW
Jim Bridger Generation Net = 1820 MW
Eastern Wyoming New Wind = 1270 MW
Eastern Wyoming Existing Wind = 1124 MW


Montana Southeast: 648.9 MW
Yellowtail South: -396.2 MW
Jim Bridger West: 2398.9 MW
JB GEN: 1819.9 MW
TOT 4B: 840.0 MW
DJ GEN: 717.4 MW
AEOLUS WEST 1345.6 MW
TOT 1A: 257.3 MW
TOT 3: 1330.9 MW
Rock Springs/Firehole West Path 639.3 MW
66750 YELOWTLP
65575 FRANNIE
65620 GARLAND
66335 SHERIDAN
65235 BUFFALO
65293 CARR DRA
65875 KAYCEE
65955 MIDWEST
65954 CLAIMJMP
66145 OREBASIN
65720 GRASS CK
66535 THERMOPL
66305 RIVERTON
65095 BADWATER
66740 WYOPO
65090 ATLANTIC
65300 CASPERPP
65096 BUFFALO HEAD
66410 SPENCE
66512 LATIGO
65440 DAVEJON3
65420 DAVEJOHN
65430 DAVEJON1
65445 DAVEJON4
65435 DAVEJON2
65460 DIFICULT
66745 YELLOWCK
67814 WINDSTAR
69003 GLENRKG1
69004 GLENRKG2
69508 TOPOFWLD
73190 STEGALL
73107 LAR.RIVR
69745 AMASA
69748 ROOT CK_W
65384 3MIKNOLL
67790 POPULUS
65389 BRIDGER4
65386 BRIDGER1
65388 BRIDGER3
65387 BRIDGER2
65385 BRIDGER
65220 BRIDGER
66250 PT ROCKS
66315 ROCKSPGS
67529 BITR CRK
65105 BAR X
67530 ECHOSPRG
67499 LATHAM
68304 LATHAM SVC
66020 MUSTANG
67939 STNDP SC
67940 STNDP SC
66240 PLATTE
69143 STNDPIPE
65583 FT CRK 1
65580 FT CREEK
65587 FT CRK 1-4
69073 HIPLN_G
65975 MINERS
67946 FREEZOUT
67796 AEOLUS
67795 AEOLUS
67827 ANTICLIN
67826 ANTICLIN
65589 ROCKRVR
69534 UNIT_LO
69535 NEW_TIE
69092 THREB_G
69027 7MIHL G1
69106 7MIHILL1
69028 SHIRLYBS
69032 DNLP1_G1
99018 GEN_Q0708_12
99019 GEN_Q0708_22
99011 GEN_Q0708_11
99008 GEN_Q0707_12
99015 GEN_Q0708_21
99001 GEN_Q0707_11
99005 GEN_Q0707_21
99009 GEN_Q0707_22
99722 Q0706B_GEN1
99724 Q0706B_GEN2
99721 Q0706A_GEN1
99723 Q0706A_GEN2
99715 Q0712_A_GEN
99746 Q0712_B_GEN
SW
SS
TS
BA
WM

CERTIFICATE OF SERVICE

Docket No. 17-035-40

I hereby certify that on March 19, 2018, a true and correct copy of the foregoing was served by electronic mail to the following:

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