ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

Community Studies Report

Completed for:
CAEDA (Natrona County International Airport Site)

Load:
3-5 MW

August 22, 2013

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1.0 Description of Request

CAEDA (Natrona County International Airport Site) has requested a Community Study to identify system additions required to provide distribution level electrical service to a proposed new load adjacent to the Natrona County International Airport near Casper, Wyoming. The interconnection is located at 42 deg 53' 38.64" Latitude, -106 deg 27' 16.58" Longitude.

Scenario 1: Customer's requested incremental and total load MW, voltage and schedule is shown in Table 1

	(kV)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Existing Actual			-	-	-	-	-	-	-	-	-	-
Existing Contract												
New	0.48	3	0	0	0	0	0	0	0	0	0	0
Total	-	3	3	3	3	3	3	3	3	3	3	3

Table 1 – Ten Year Load Schedule

Scenario 2: Customer's requested incremental and total load MW, voltage and schedule is shown in Table 2

	(kV)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Existing Actual			-	-	-	-	-	-	-	-	-	-
Existing Contract												
New	0.48	5	0	0	0	0	0	0	0	0	0	0
Total	-	5	5	5	5	5	5	5	5	5	5	5

Table 2 – Ten Year Load Schedule

A qualified representative for Customer has verified that the load forecast in Table 1 is the expected diversified peak demand.

2.0 Scope of the Study Report

This study evaluates Rocky Mountain Power's (Company) system to serve the load shown in Table 1.

2.1 This report assesses the reliability impact of the new facilities on the interconnected transmission systems to ensure compliance with NERC Reliability Standards and applicable regional, sub-regional, and Power Pool criteria and facility connection requirements.
2.2 This report provides a reasonable least cost solution to serve Customer's load.
2.3 This report includes un-scoped, estimated costs[1] to complete any required additions. More accurate estimates will be refined in later phases.
2.4 This report provides a statement about the feasibility of supporting Customer's requested load schedule. Customer shall not assume delivery dates from this report.
2.5 This report will address facilities which must be in service to meet Customer's requested load.
2.6 If applicable, this report will provide information for alternatives to serve Customer's load.

3.0 Definitions

3.1 "Adequate service" is defined as voltage levels identified in Rocky Mountain Power's existing Operability and Reliability Guidelines, filed with the applicable state regulators.
3.2 "N-0" refers to assessing the electrical systems without any outage conditions and all electrical network components in service and operating properly (steady state).
3.3 "N-1" refers to assessing the electrical systems with one component out of service.

4.0 Queue Order

This study is for informational purposes only. It is not treated as an official request and will not be entered into the existing load request queue. If CAEDA or a customer desires to move ahead with an official load request then a new request must be made and a new study will be completed at that time. No capacity has been reserved on the system at this time and other official requests that are received will be given priority in the order that those official requests are received.

[1] Customer's financial responsibility for any required improvements to serve the load is beyond the scope of this report

5.0 Study Assumptions

Specific Assumptions for this queue request:

5.1 This study was completed as a stand-alone, independent load and does not assume any of the other 10 CAEDA sites/loads were added to the system. Each CAEDA site is studied independently with its own load addition only.
5.2 Steady state and contingency conditions were studied as applicable. 2012 recorded loads were used as a basis with a 3.0% annual load growth applied, and applicable higher-priority service requests added to arrive at the base loads on which to add Customer's requested loads,
5.3 Customer will take 0.48-kV delivery from electrical service provider.
5.4 Customer will begin taking service as shown in Table 1 & 2.[2]
5.5 Study was performed with an assumed Customer total load power factor of 0.93. Actual usage below the stated minimum power factor may invalidate the results of the study. Note: Customer may incur financial penalties for actual total load power factor below applicable state tariff.
5.6 The Bar Nunn 115-12.47 kV substation is expected to be in service by December 2015, and 4.2 MVA of load from Casper Sub will be transferred to the Bar Nunn Sub.

6.0 Customer Requirements

6.1.1 For transmission voltage delivery Customer shall provide adequate voltage regulation within their substation facilities to satisfy the Customer's load needs. Transmission system voltage under normal operating conditions may vary up to +6%/- 10%.
6.1.2 Customer's protection devices must coordinate with Rocky Mountain Power's protection devices.
6.1.3 Customer must follow PacifiCorp's "Customer Owned Substation Requirements."[3]
6.1.4 Customer is responsible to secure rights of way and/or permitting and pay associated costs for service extension facilities. This shall be done in coordination with and in a format acceptable to Company.
6.1.5 If Customer installs any on-site or backup generation, a "break-before-make" switch is required to be installed to prevent paralleling Customer's generation to Rocky Mountain Power's system. If Customer desires a "make-before-break", Customer must communicate this request in writing to PacifiCorp. Additional requirements will be required of Customer at their facility.
6.1.6 If Customer wishes to continue with this load request after receiving this report or any Company provided modification to this report, Customer must make this request in writing upon receipt per the terms of the ESA (typically 30 days) unless otherwise

[2] This date is not a guarantee and is subject to project parameters and timely decision making of all parties involved. The service dates will be refined further in future phases of the project.
[3] Available upon request.

agreed to by Customer and Company to initiate the next phase of scoping, estimating and/or detail design. Failure to initiate request will result in Customer's removal from queue.

6.2 Power Quality and Reliability:

6.2.1 It is Customer's responsibility to adequately plan and mitigate any impacts due to outages and sags as a result of being connected to Company's power network.

6.2.2 Customer's three phase loads shall be reasonably balanced among the three phases.[4]

6.2.3 Customer facility shall meet all distortion requirements[5] described in Company's Engineering Handbook.

6.2.4 Customer facility shall meet all induced voltage fluctuation and light flicker requirements[6] described in Company's Engineering Handbook.

6.2.5 Customer must complete, with the help of a qualified engineer, the Power Quality and Reliability questionnaire attached in Appendix prior to Company proceeding to scope the selected option.

[4] Used to maintain voltage balance within conditions described in Company's Engineering Handbook section 1C.3.1 found at http://www.rockymountainpower.net/con/pqs.html
[5] Company's Engineering Handbook section 1C.4.1 found at http://www.rockymountainpower.net/con/pqs.html
[6] Company's Engineering Handbook section 1C.5.1 found at http://www.rockymountainpower.net/con/pqs.html (and IEEE 1453-2011, Appendix F)

7.0 Distribution Study Results and Facility Requirements/Costs (Un-scoped, block estimate)

7.1 Scenario 1: Provide 3 MW, 480Y/277 volt delivery from the Casper 115–12.47 kV substation and 5H210 feeder. ($775,000 Un-Scoped estimate) See appendix Figure 1

- 7.1.1 Install a 3 ph line recloser on the Bar Nunn Feeder at the beginning of the new line feeding west (Bar Nunn substation expected to be in service 2015)
- 7.1.2 Build 4 mile of 795 AAC feeder from Bar Nunn Substation to the Casper Crude to Rail (CCR) site
- 7.1.3 Reconductor 2,300 ft. of 3 phase #2 ACSR with 4/0 AAC on the main circuit to the Customer Site
- 7.1.4 Install two 1,500 kVA padmount transformers
- 7.1.5 Install two risers with 100T fuses
- 7.1.6 Install two 200ft of #2 Al-3ph cables to each transformer
- 7.1.7 Install 3ph gang operated switch near 3480/289302 for normal open point in the loop in circuit 5H210
- 7.1.8 Install 3ph gang operated switch near 3480/220201 for normal open point between circuit 5H210 and the Bar Nunn Feeder.

7.2 Scenario 2: Provide 5 MW, 480Y/277 volt delivery from the Bar Nunn 115–12.47 kV substation and new feeder. ($1,564,000 Un-Scoped estimate) See appendix Figure 2

- 7.2.1 Build a new breaker position in Bar Nunn Substation (Bar Nunn substation expected to be in service 2015)
- 7.2.2 Build 4 mile of 795 AAC feeder from Bar Nunn Substation to the Casper Crude to Rail (CCR) site
- 7.2.3 Reconductor 2,300 ft. of 3phase #2 ACSR with 4/0 AAC on the main circuit to the Customer Site
- 7.2.4 Install two 2,500 kVA padmount transformers
- 7.2.5 Install oil containment system
- 7.2.6 Install two risers with 140T fuses
- 7.2.7 Install two 200ft of #4/0 Al-3ph cables to each transformer
- 7.2.8 Install a new voltage regulator bank near 3480/219000
- 7.2.9 Install a 900 kVAR switched capacitor bank near 3480/219000
- 7.2.10 Install 3ph gang operated switch near 3480/289302 for normal open point in the loop in circuit 5H210
- 7.2.11 Install 3ph gang operated switch south of 3480/220101 for normal open point between circuit 5H210 and the Bar Nunn Feeder.

8.0 Transmission Study Results and Facility Requirements/Costs (Un-scoped, block estimate)

8.1 No Transmission construction required.

8.2 Construction in the new Bar Nunn substation would be required for Scenario 2, to provide 5 MW load, to add a new breaker position and equipment for the feeder to the Casper Crude to Rail site. ($670,000 Un-Scoped estimate, included in 7.2 above)

- 8.2.1 Provide a bus work, new breaker position and equipment for new feeder from the Bar Nunn Substation
- 8.2.2 Provide protection, control, and SCADA for the new breaker position and feeder

9.0 Conclusions

9.1 Load Service Feasibility

It is anticipated Customer's requested load service can be accommodated by the addition of the improvements indicated in Section 7 and/or Section 8 of this report.

9.2 Delivery of Improvements Schedule Evaluation

- 9.2.1 Company estimates it will require approximately 9 months to provide the interconnection and system facilities:
  - 9.2.1.1 After the date Customer provides needed permits and rights of way for the interconnection facilities. Company estimates that the permitting and right of way function completed by Customer may take up to 3 years or more and could be a prerequisite to Company performing detail design.
  - 9.2.1.2 After Customer and Company execute required contracts to allow the project to proceed to design and order long lead material.
  - 9.2.1.3 After Customer has provided necessary infrastructure per state tariff (such as vaults, trenching, conduit etc.)

9.3 Company anticipates Customer's requested schedule for service is feasible. A more accurate evaluation of the schedule will be developed in the next phase and the delivery schedule is subject to timely decision making and progress by all parties and activities.

9.4 It is estimated based on preliminary data that motor(s) operated by Customer will result in acceptable induced voltage fluctuations on the system per the guideline in Company's Engineering Handbook section 1C.5.1. This does not guarantee adherence to the requirements and actual motor characteristics such as "locked rotor" current shall be obtained and provided to Company for detailed assessment. System susceptibility to voltage fluctuation is subject to change and it shall be Customer's responsibility to ensure their facility meets all induced voltage fluctuation and light flicker requirements.

9.5 A motor start voltage fluctuation analysis will need to be performed once customer load had been identified.

10.0 Participation by Affected Systems

N/A

APPENDIX

I. Engineering Services Agreement (ESA) Information Form Loads and Sites

EXHIBIT A

SCOPE OF WORK

The Casper Area Economic Development Alliance (CAEDA) would like studies completed for 11 locations to get an idea of unscoped cost estimates to serve distribution loads in these areas.

Rocky Mountain Power will study distribution load additions of 3 MW and 5 MW at 11 different locations in Natrona County, WY for the customer and provide a system impact study for each location.

Site Name	Latitude	Longitude	T&R	Section
(1) Casper/Natr County Intl. Airport	42°53'38.64"	106°27'16.58"	T34N R80W	S21 SWSW
(2) Bar Nunn	42°56'3.02" N	106°21'31.98" W	T34N R79W	S7 NENE
(3) Robertson Road	42°51'17.35" N	106°25'4.91" W	T33N R80W	S3 NESE
(4) Amoco Road and I-25	42°53'0.30" N	106°20'20.63" W	T34N R79W	S29 NESE
(5) Salt Creek Heights	42°51'42.72" N	106°21'21.31" W	T33N R79W	S5 NWNW
(6) Casper Events Center East	42°52'12.52" N	106°19'17.23" W	T34N R79W	S33 NESE
(7) Casper Substation North	42°52'30.69" N	106°21'45.10" W	T34N R79W	S31 NWNE
(8) New Industrial Area	42°50'38.23" N	106°15'6.57" W	T33N R78W	S7 SENW
(9) Evansville Industrial Park II	42°51'18.55" N	106°15'30.12" W	T33N R78W	S6 NWSW
(10) Cole Creek Industrial Park	42°51'24.66" N	106°12'58.62" W	T33N R78W	S4 NWSW
(11) C-Tran/Bishop	42°55'52.05" N	106°26'34.73" W	T34N R80W	S9 SWNE

II. Maps/sketches

Map 1 -- Natrona County International Airport Site Road Map

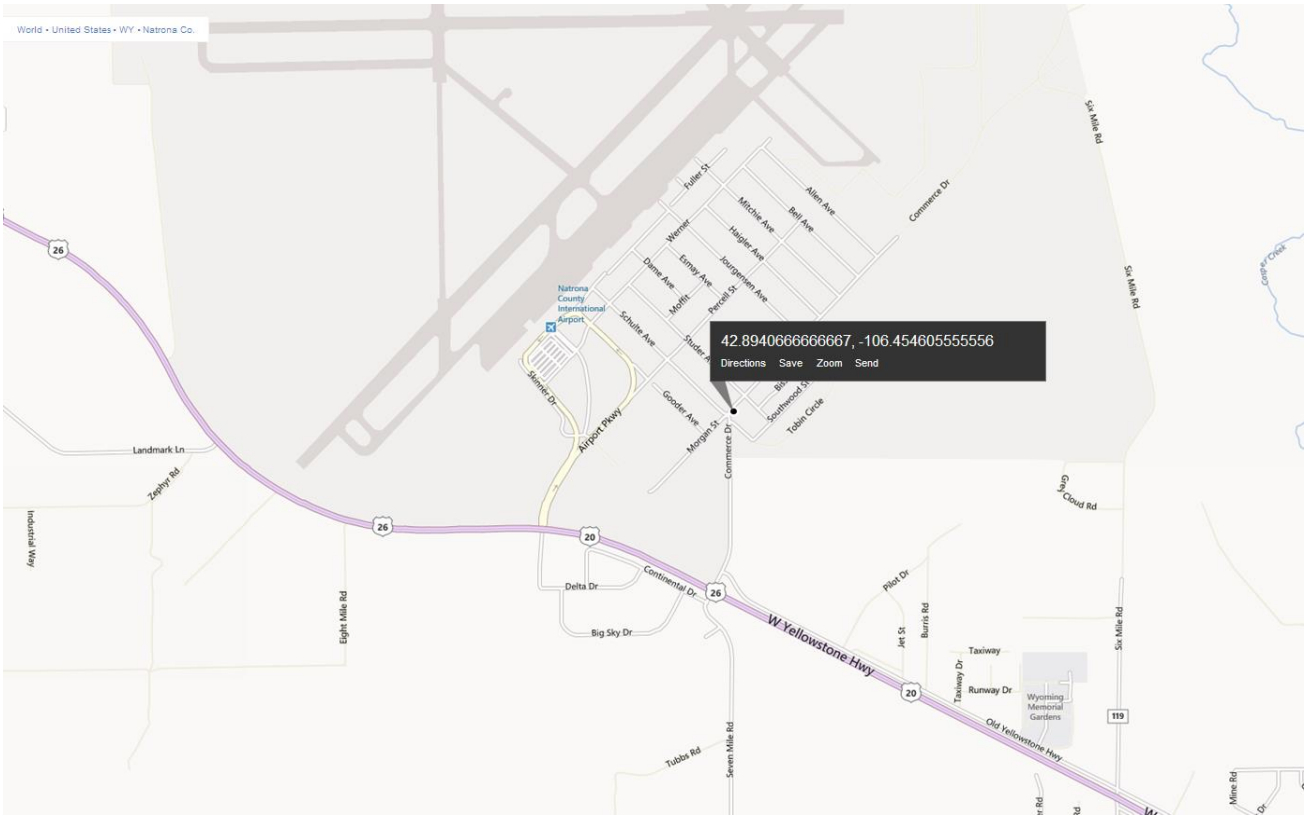
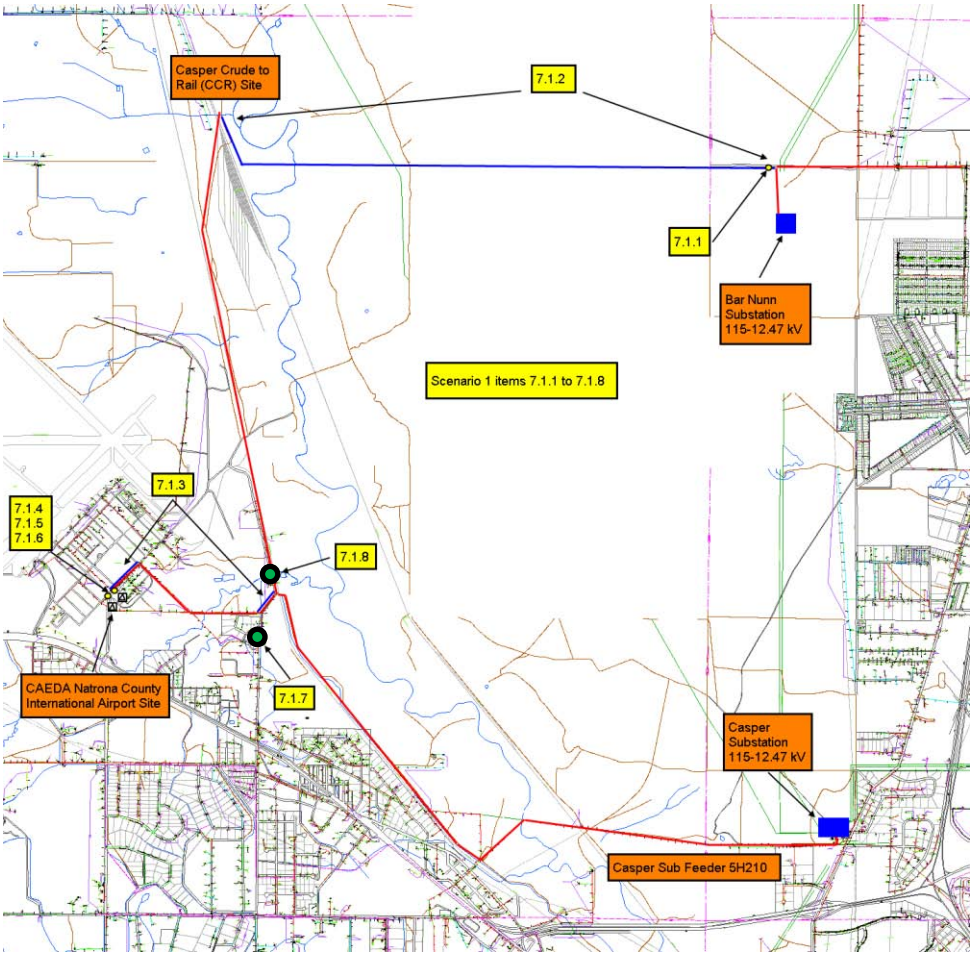


Figure 1 – Service to 3 MW CAEDA Natrona County International Airport site loads from Casper substation and 5H210 feeder



7.1 Scenario 1: Provide 3 MW, 480Y/277 volt delivery from the Casper 115–12.47 kV substation and 5H210 feeder. ($775,000 Un-Scoped estimate) See appendix Figure 1

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- 7.1.5 Install two risers with 100T fuses
- 7.1.6 Install two 200ft of #2 Al-3ph cables to each transformer
- 7.1.7 Install 3ph gang operated switch near 3480/289302 for normal open point in the loop in circuit 5H210
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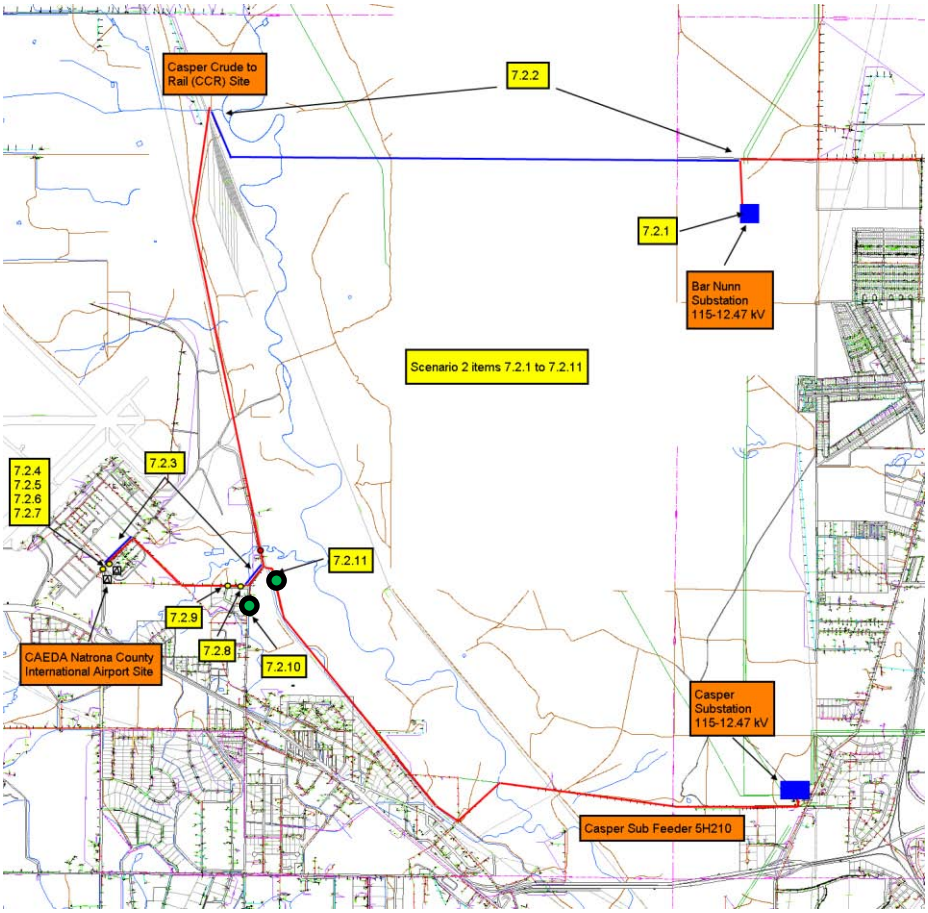
Figure 2 – Service to 5 MW CAEDA Natrona County International Airport site loads from Bar Nunn Substation and new feeder



7.2 Scenario 2: Provide 5 MW, 480Y/277 volt delivery from the Bar Nunn 115–12.47 kV substation and new feeder. ($1,564,000 Un-Scoped estimate) See appendix Figure 2

- 7.2.1 Build a new breaker position in Bar Nunn Substation (Bar Nunn substation expected to be in service 2015)
- 7.2.2 Build 4 mile of 795 AAC feeder from Bar Nunn Substation to the Casper Crude to Rail (CCR) site
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POWER QUALITY AND RELIABILITY QUESTIONNAIRE

The following questions address the reality that events (such as lightning, vehicle accidents, etc.) will happen to disturb the normal flow of power to the facility resulting in voltage sags and spikes and/or interruptions. The best time to address these issues is at the planning/design stage. *An electrical supply system designed to provide higher-than-normal levels of reliability and quality will likely cost more. This added cost is born by Customer and will not prevent all disturbances from occurring. Customers are encouraged to design their end use to be more resilient to disturbances, and usually the cost to do this is less expensive than if the utility designs this resiliency into the electric supply system.*

Availability of Facility: _____

(How many minutes of interrupted power can the facility withstand per year? How long can an interruption last before unacceptable consequences are experienced by the facility?)

Sensitivity to Steady-state Voltage Variations: _____

(Describe how tight the voltage range needs to be for successful operation of this facility. Typical is +/- 5%)

Sensitivity to Voltage Disturbances: _____

(The most common disturbance is voltage sag due to unavoidable and temporary short circuits on nearby lines. These are usually very short, but can sometimes last up to a few seconds. Describe your facility's sensitivity to these events.)

Sensitivity to Voltage Distortion or Other Abnormalities: _____

(Occasionally a facility requires extremely pure power. Please describe any other needs in this regard.)

Electrical Pollution

It is now quite common for facilities to have equipment that can pollute the power if not properly specified or controlled. This includes variable frequency drives (VFDs), large motors without proper starters, induction heaters, and highly fluctuating loads such as welders and other arc producing devices. PacifiCorp has standards governing the pollution such equipment might introduce into its power system so that other customers are not adversely impacted. The following questions address these issues. Please state both size and type.

Highly Fluctuating Load: _____

(Describe any large (>10 kVA or 10 hp) equipment that will suddenly change from one load level to another. This includes motors—both starting and running loads, welders, arc-producers, X-ray machines, wood chippers, etc. If any of these large loads will be changing more often than once per day, state how often it will change.)

Harmonics-producing Load: _____

(Describe any large (>10 kVA or 10 hp) equipment that will produce harmonic distortion. This includes VFDs and rectifiers; also include aggregate loads such as percent of facility load that consists of VFDs if more than 10 %.)

Other Unusual Load or Equipment: _____

(Sometimes equipment works in ways that we don't expect. For example, induction heaters are very different from resistance heaters in that they can cause "notches" or pulsing in the supplied voltage. Any such equipment should be listed here. Also include any special mitigating equipment that will be installed such as a Static VAr Compensator—SVC.)

Power Factor (PF) Correction and Filters: _____

(Sometimes PF correction capacitors are added to a facility with VFDs or other harmonic load. This often leads to failed capacitors and other problems. Please state the size of PF correction capacitors and location if more than 150 kVAr.)

-- Submit Completed Form to RMP Power Quality and Reliability Engineer --