

Response to :

PacifiCorp Small Generation Interconnection Fast Track Study Report

Completed For:

Loyd Fery Hydro Project  
Qualifying Facility for PacificCorp (DSGIQ0169)  
11028 Stayton Rd. SE  
Aumsville, OR

Prepared By:

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Loyd Fery  
Submission  
6-11-08

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Loyd Fery  
Loyd Fery Hydro  
11022 Rainwater Ln. SE  
Aumsville, OR 97325

RE: Loyd Fery Hydro – Response to PacifiCorp DSGIQ0169 Fast Track Study Report

Loyd,

Enclosed is the response to the PacifiCorp Fast Track Study Report. I have gone through the report point by point and made comments/corrections to the PacifiCorp report, as well as made the necessary case for the existing facilities with regards to their requested modifications. The bottom line for your installation is that your relaying should be seen as completely adequate for the safety of the system and the line crews that have to work on any equipment downstream of your facility.

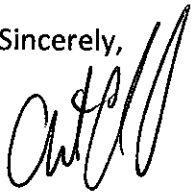
There is some concern regarding the existing metering, PacifiCorp is requesting that you have a meter installed that will allow them to remotely acquire your metering data. While this is not necessary for the operation of your facility to function properly it is a requirement that they have for their new distributed generation customers. Therefore aside from an individual company Engineer waiving this requirement there is no way to bypass this requirement.

A full system schematic is very highly recommended to show exactly how the system is laid out and verify the interconnection of the relays and magnetically relay actuated disconnect.

A couple of other programs to look at would be the PURPA qualifying Facility designation and also the possible inclusion in the Low Impact Hydro Institute's generation program. We can look into this once the interconnection questions have been cleared up.

If you have any additional questions, or would like to go over the information please feel free to contact me at (503) 559-5207 or email [Anthony.schacher@yahoo.com](mailto:Anthony.schacher@yahoo.com).

Sincerely,



Anthony Schacher

Enc. Point by Point Response

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## 1.0 DESCRIPTION OF THE FACILITY

The size of the existing device that was stated in the study was incorrect. PacifiCorp has indicated that it is a Sterling 50kW 208-230/480 V generator. The actual device is a Sterling 35kW 208-230/480 V generator. The location would have adequate flow and head pressure to operate a 50kW device if it were installed however.

## 2.0 APPLICABILITY

This hydro project should meet with the conditions stated in section (1) and with minimum changes to the existing configuration should also meet the requirements of section (2)

## 3.0 FAST TRACK ANALYSIS RESULTS

### Screen 50.2.1.1

Failed, but given the size of the generation source this should be inconsequential when interconnected onto the existing distribution feeder.

### Screen 50.2.1.2

Passed

### Screen 50.2.1.3

N/A – Due to the fact that Mr. Fery is working with an induction generator, there is no need for any type of inverter based electronics to synchronize or add any type of anti-islanding control. The design of the induction generator is such that if there is a loss of AC from the Distribution Provider the entire generation system will shut down.

### Screen 50.2.1.4

Passed

### Screen 50.2.1.5

Passed

### Screen 50.2.1.6

N/A – The generator size is sufficiently small enough that there is no fear of over-voltage occurrences. Once again with the use of an induction generator if there is a loss of potential the entire generation system will shut down.

### Screen 50.2.1.7-8

N/A – The existing generation system is 3-phase

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Screen 50.2.1.9

There is apparently no know transient stability issues on the distribution system that that would be adversely effected by the inclusion of this interconnected generation facility.

Screen 50.2.1.10

Fail – The existing metering does not allow for remote acquisition of the metered data.

There is also concern regarding the relaying equipment that is currently installed at the site. The existing relaying is simple and elegant and should be adequate to meet the requirements for interconnection of an induction generator of this size and nature.

4.0 FAST TRACK ANALYSIS RESULTS CONCLUSION

4.1 METERING REQUIREMENTS

The existing metering does not meet PacifiCorp's requirements for remote data acquisition. Therefore if it is not possible to get a waiver from an authorized company representative the existing metering will for the generation will have to be changed to the updated model.

The existing metering that is in place for the customer served load is adequate and can remain untouched. The metering that has been installed to monitor the output of the generation is what will be required to be replaced. Whether any rewiring will be required is yet to be seen without knowing the exact form and style of meter that is to be used in the PacifiCorp MV-90 data acquisition system. If the new metering fits in the same form and configuration it is possible that the meter may be changed out into the existing meterbase.

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4.2 RELAY REQUIREMENTS

PacifiCorp has requested the installation of a Schweitzer 351A or equivalent with the following parameters:

| <u>Element</u> | <u>Pickup</u> | <u>Time Delay</u> | <u>Purpose</u>                         | <u>Nominal Value</u> |
|----------------|---------------|-------------------|--|----------------------|
| 27P1P          | 65.8 V        | 120 s             | Phase Under Voltage Pickup<br>1        | 69.3 v               |
| 27P2P          | 62.4 V        | 2.0s              | Phase Under Voltage Pickup<br>2        |                      |
| 27PP           | 80.5 V        | 0.1 s             | Phase to Phase Under<br>voltage Pickup | 120.0V               |
| 59P1P          | 72.7 V        | 120 s             | Phase Over Voltage Pickup<br>1         | 69.3 v               |
| 59P2P          | 76.2 V        | 2.0 s             | Phase Over Voltage Pickup<br>2         |                      |
| 59PP           | 180.0 V       | 0.1 s             | Phase to Phase Over<br>voltage Pickup  | 120.0V               |
| 81D1           | 59.5 Hz       | 0.5 s             | Level 1 Under Frequency<br>pickup      | 60.0 Hz              |
| 81D2           | 58.4 Hz       | 0.1 s             | Level 2 Under Frequency<br>Pickup      |                      |
| 81D3           | 60.5 Hz       | 0.5 s             | Level 3 Over Frequency<br>Pickup       |                      |
| 81D4           | 61.6 Hz       | 0.1 s             | Level 4 Over Frequency<br>Pickup       |                      |

Table 1: PacifiCorp Relay settings

The existing relaying is capable of accomplishing the same task as those specified above in Table 1. The setup is much simpler. Instead of having multiple pickups and time delays the existing relaying reaches a threshold point, and if it is ever outside of the predetermined limits the relays will simply disconnect the generation from the distribution circuit.

The current settings are referred to below in Table 2.

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| <u>Element</u> | <u>Pickup</u> | <u>Time Delay</u> | <u>Purpose</u>                      | <u>Nominal Value</u> |
|----------------|---------------|-------------------|-------------------------------------|----------------------|
| 27             | 80 V          | Instant           | Phase to Phase Under voltage Pickup | 120.0V               |
| 27             | 100 V         |                   | Phase to Phase Under Dropout        |                      |
| 59             | 140.0 V       |                   | Phase to Phase Over voltage Pickup  |                      |
| 59             | 160.0 V       | Instant           | Phase to Phase Over voltage Dropout |                      |
| 81             | 59 Hz         | Instant           | Under Frequency Disconnect          | 60.0 Hz              |
| 81             | 60 Hz         | Instant           | Over Frequency Disconnect           |                      |
|                | Energization  | 10 s              | Time Delay Reconnect                |                      |

Table 2: Existing Relay Settings

Additionally, an accessible 3-pole disconnect has been installed at the same location as the metering to enable a Line-crew/Utility operator to completely disconnect the generation from the distribution system in the event of a system disturbance.

As an added safety factor the generation facility operator has incorporated a timed reconnection after electrical service has been restored to the site. This will essentially monitor the distribution system voltage. If the distribution system voltage does not remain stable for 10 seconds the generator will not reconnect.

5.0 COSTS

The displayed costs are within those expected for the type of work that PacifiCorp is referring to.

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SUMMARY

The existing infrastructure and design of the small scale hydro facility located at 11028 Stayton Rd. SE Aumsville, OR 97325 and operated by Loyd Fery is in fine working shape. Some minor metering changes are all that is necessary to meet the requirement laid out by PacifiCorp in their "Fast Track Study Report." The metering may need to be brought up to meet new PacifiCorp remote Data Acquisition standards. The Relaying meets and exceeds the requirements stated in the "Fast Track Study Report" and should be deemed adequate for the new contract period. By using a standard Induction generator as the base of the generation facility, protection has been greatly simplified. If there is a loss of the local distribution system interconnected with the generating facilities the very nature of the generator will shut the system down. All of the other requirements have been met by the use of simple and elegant solid-state industrial grade relays that cover an element by element protection scheme.