

**GENERATOR INTERCONNECTION
FEASIBILITY STUDY**

for integration of the proposed

PROJECT #292

to the

IDAHO POWER COMPANY ELECTRICAL SYSTEM

for the

INTERCONNECTION CUSTOMER

FINAL REPORT

August 27, 2009

1.0 Introduction

The Generation Interconnection Customer has contracted with Idaho Power Company (IPCO) to perform a Generator Interconnection Feasibility Study for the integration of a proposed 1.2 MW Hydro Project (project #292). The location of the project is in Idaho Power's Southern Idaho service territory in Lincoln County, Idaho.

This report documents the basis for and the results of this Feasibility Study for the Generation Interconnection Customer. It describes the proposed project, the study cases used, the impact of associated projects, and results of all work in the areas of concern.

2.0 Summary

The proposed project is a 1.2 MW run of the river hydro project consisting of one 1.2 MW synchronous generator. The proposed Point of Interconnection (POI) for the generating facility with the IPCO system is in Lincoln County, Idaho at an existing POI for another generation project by the same developer.

There are no upgrades that need to be made to IPCO facilities from a feasibility standpoint. Due to the size of the project and the existing generation the only additional equipment needed will be a metering package. The total estimated cost for this project to connect to the IPCO system is **\$25,200**.

This project's Feasibility Study only addresses the ability of the project to interconnect to the system, there are no transmission rights secured for the project until a transmission system request is submitted by the corresponding transmission customer. The required transmission facilities, if any, to support energy transfers will then be determined based on first come first serve basis (queue order).

3.0 Scope of Interconnection Feasibility Study

The Interconnection Feasibility Study was done and prepared in accordance with Idaho Power Company Standard Generator Interconnection Procedures, to provide a preliminary evaluation of the feasibility of the interconnection of the proposed generating project to the Idaho Power system. As listed in the Interconnection Feasibility Study agreement, the Interconnection Feasibility Study report provides the following information:

- preliminary identification of any circuit breaker short circuit capability limits exceeded as a result of the interconnection;
- preliminary identification of any thermal overload or voltage limit violations resulting from the interconnection; and

- preliminary description and non-binding estimated cost of facilities required to interconnect the Small Generating Facility to the Distribution System and to address the identified short circuit and power flow issues.

All other proposed Generation projects prior to this project in the Generator Interconnect queue were considered in this study. A current list of these projects can be found on the Idaho Power web site as follows:

<http://www.oatioasis.com/ipco/index.html>.

4.0 Description of Proposed Generating Project

Project #292 proposes to connect to the IPCO distribution system for an injection of 1.2 MW (maximum project output) using one 1.2 MW synchronous generator.

5.0 Description of Existing Transmission Facilities

The transmission line that serves this area is a 138 kV radial tap. With the addition of this generation project no transmission related problems occur on this tap. Therefore, no improvements need to be made on the immediate transmission system.

6.0 Description of Existing Substation Facilities

The distribution substation that serves this area is located approximately fourteen miles west of the POI. The existing substation transformer is a 138:34.5 kV transformer that has adequate capacity for this project.

The associated feeder breaker at the substation is rated for use at 34.5 kV. This breaker's interrupting capabilities are not exceeded with the added generation.

7.0 Description of Existing Distribution Facilities

The distribution feeder serving this area is grounded wye and operates at 34.5 kV. There is adequate capacity on this feeder to serve this project.

Project #158 will be located near an existing project, also owned by the same developer. This developer proposes to connect the new generation facility to the old generation facility by way of a two to three mile line extension. Due to the location of this facility the POI will be shared with the existing facility. Therefore, an additional generation interconnection protection package will not be required. Along with the two to three miles of line extension the interconnection customer will provide their own transformer.

8.0 Description and Cost Estimate of Required Facility Upgrades

Due to the small amount of generation being added there are no upgrades needed on the IPCO system. Also, due to the existing generation and customer owned distribution no generation interconnection package is required. The only equipment that needs to be installed is the metering equipment for revenue purposes. This includes CTs, VTs, rack, meter, base, hardware and router. The estimated cost for this equipment is **\$25,200**.

Description	Estimated Cost
Metering Equipment (Includes VTs, CTs, Meter, Rack, Hardware and Router)	\$25,200
Total Estimated Cost	\$25,200

9.0 Description of Operating Requirements

There are several operating requirements that must be met. The project will be controlled to operate at unity power factor. The project will also have to meet the voltage schedule provided by Idaho Power. If these requirements cannot be met, further voltage studies will be necessary. Voltage flicker at startup and during operation will be limited to less than 5% as measured at the POI. For this to occur, the starting inrush current cannot exceed 170 Amps at the 4.16 kV voltage level. The project is required to comply with the applicable Voltage and Current Distortion Limits found in IEEE Standard 519-1992 *IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems*.

10.0 Conclusions

The requested interconnection of the Little Wood River Hydro Project to IPCO's system was studied. The results of this study work confirm that the existing IPCO system can handle this project. A metering package is the only equipment installation that needs to occur.

APPENDIX A

A-1.0 Method of Study

The Feasibility Study plan inserts the Project up to the maximum requested injection into the selected Western Electric Coordinating Council (WECC) power flow case and then, using Power World Simulator Version 12, examines the impacts of the new resource on Idaho Power's transmission system (lines, transformers, etc.) within the study area under various operating/outage scenarios. The WECC and Idaho Power reliability criteria and Idaho Power operating procedures were used to determine the acceptability of the configurations considered. The WECC case is a recent case modified to simulate stressed but reasonable pre-contingency energy transfers utilizing the IPC system. For distribution feeder analysis, Idaho Power utilizes Advantica's SynerGEE Software.

A-2.0 Acceptability Criteria

The following acceptability criteria were used in the power flow analysis to determine under which system configuration modifications may be required:

The continuous rating of equipment is assumed to be the normal thermal rating of the equipment. This rating will be as determined by the manufacturer of the equipment or as determined by Idaho Power. Less than or equal to 100% of continuous rating is acceptable.

Idaho Power's Voltage Operating Guidelines were used to determine voltage requirements on the system. This states, in part, that distribution voltages, under normal operating conditions, are to be maintained within plus or minus 5% (0.05 per unit) of nominal everywhere on the feeder. Therefore, voltages greater than or equal to 0.95 pu voltage and less than or equal to 1.05 pu voltage are acceptable.

Voltage flicker during starting or stopping the generator is limited to 5% as measured at the point of interconnection, per Idaho Power's T&D Advisory Information Manual.

Idaho Power's Reliability Criteria for System Planning was used to determine proper transmission system operation.

All customer generation must meet IEEE 519 and ANSI C84.1 Standards.

All other applicable national and Idaho Power standards and prudent utility practices were used to determine the acceptability of the configurations considered.

The stable operation of the system requires an adequate supply of volt-amperes reactive (VARs) to maintain a stable voltage profile under both steady-state and dynamic system conditions. An inadequate supply of VARs will result in voltage decay or even collapse under the worst conditions.

Equipment/line/path ratings used will be those that are in use at the time of the study or that are represented by IPC upgrade projects that are either currently under construction or whose budgets have been approved for construction in the near future. All other potential future ratings are outside the scope of this study. Future transmission changes may, however, affect current facility ratings used in the study.

A-3.0 Grounding Guidance

Idaho Power Company (IPC) requires interconnected transformers to limit their ground fault current to 20 amps at the point of interconnection.

A-4.0 Electrical System Protection Guidance

IPC requires electrical system protection per Requirements for Generation Interconnections found on the Idaho Power Web site, <http://www.idahopower.com/aboutus/business/generationInterconnect/>.

A-5.0 WECC Coordinated Off-Nominal Frequency Load Shedding and Restoration Requirements

IPC requires frequency operational limits to adhere to WECC Under-frequency and Over-frequency Limits per the WECC Coordinated Off-Nominal Frequency Load Shedding and Restoration Requirements available upon request.