GENERATOR INTERCONNECTION
FEASIBILITY STUDY

for integration of the proposed

[redacted]

in

TWIN FALLS COUNTY, IDAHO

to the

IDAHO POWER COMPANY ELECTRICAL SYSTEM

for

[redacted]

the

INTERCONNECTION CUSTOMER

FINAL REPORT

May 4, 2006

1.0 Introduction

[redacted] has contracted with Idaho Power Company (IPC) to perform a Generator Interconnection Feasibility Study for the integration of the proposed 2.6 MW [redacted]. The proposed location of the project is in Idaho Power's southern Idaho service territory in the [redacted] in Twin Falls County. This location is approximately [redacted].

This report documents the basis for and the results of this Feasibility Study for the [redacted] Project. It describes the proposed project, the impact of associated projects and results of all work in the areas of concern.

2.0 Summary

The proposed project is a 2.6 MW hydro project consisting of [redacted] generators. This hydro project will interconnect with the IPC transmission system at about [redacted] in Twin Falls County, Idaho.

This project will be in the Midpoint West transmission system area of impact. In consideration of other proposed generation projects in the queue ahead of this project there is not adequate capacity available on this system to serve this project. A Transmission System Impact Study is necessary to identify the system upgrades required to provide capacity to serve this project.

The transmission line serving this immediate area is Idaho Power's [redacted] 46 kV line. No upgrades are required on this line as a result of this project.

The customer has expressed a desire to build, own, operate and maintain their own substation that will serve only this generation project. At this time, the estimated cost of all known necessary Idaho Power upgrades is $320,000.

120,000 for new line
200,000 gen int. package

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. All other proposed Generation projects prior to this project in the Generator Interconnect queue were considered in this study. This study was performed using the best-known information available as of this date. A current list of these projects can be found on the Idaho Power web site as follows:

Small Generator (<20 MW)
http://www.idahopower.com/aboutus/business/generationInterconnect/generationInterconnect.cfm

Large Generator (≥20 MW)
http://www.oatioasis.com/ipco/index.html.

4.0 Description of Proposed Generating Project

The [redacted] Project proposes to connect to the Idaho Power 46 kV transmission system for an injection of a total of 2.6 MW (maximum project output) using [redacted] generators.

5.0 Description of Transmission Facilities

The transmission line serving this area is Idaho Power's 46 kV [redacted]. This line is a [redacted] 46 kV tap built with 2/0 ACSR conductor, which has a continuous thermal operating rating of 22.8 MVA. No upgrades are required on this line as a result of this project. This project will be in the Midpoint West transmission system area of impact. In consideration of other proposed generation projects in the queue ahead of this project there is not adequate capacity available on this system to serve this project. A Transmission System Impact Study is necessary to identify the system upgrades required to provide capacity to serve this project.

This proposed project will connect to the transmission line described above at [redacted] This will require the construction of a new [redacted] 46 kV transmission line from this intersection to a new substation at the project site. The proposed route for this new transmission line is to follow the existing Idaho Power distribution line along [redacted] to the project. Refer to the map in Appendix B. This assumes that Idaho Power will own and operate the transmission line. If this is not the case an alternative transmission line route will be required. Further details concerning ownership and/or the Transfer of Interconnection Facilities are detailed in the Idaho Power tariff Schedule 72.

6.0 Description of Substation Facilities

The customer has expressed a desire to build, own, operate and maintain their own substation in connection with this project, as they do with their existing [redacted] facility about [redacted] east of this proposed site. This substation will only serve the generation project. The generation step up transformer will be connected grounded wye on the high (transmission) side and delta on the low (generator) side. A generator interconnection and protection package will also be required at this new substation.

The 46 kV breaker at [redacted] is a GE FK 69-2500-5 designed for 1,200 amps continuous load current and has a maximum fault current interrupting rating of 18,000 amps at 46 kV. Initial studies indicate that there is adequate short circuit interrupting capability on this breaker for the addition of this generation project.

7.0 Description of Distribution Facilities

The distribution feeder serving this area is the [redacted] feeder. The distribution facilities serving this site include a single phase line that has been stepped down from 19.9 kV to 7.2 kV and has a mixture of wire sizes including #6-3Strand Steel, #8 Copperweld and #4 ACSR. Without significant upgrades there is not adequate capacity on this feeder to serve this project. This option was not pursued further, since the customer wished to connect to the 46 kV system.

8.0 Description and Cost Estimate of Required Facility Upgrades

The following table lists cost estimates of the directly assignable costs for the upgrades needed to accommodate the proposed project. Note that this estimate does not include the cost of the customer owned substation.

Table 1. Estimated Costs for Required Idaho Power Upgrades

Description	**Cost**
0.85 miles new 46 kV line with distribution underbuild	$120,000
Generator Interconnection Package	$200,000
Total Estimated Cost	$320,000

These cost estimates include direct equipment and installation labor costs, indirect labor costs and overheads. (Tax Gross Up has not been included presuming construction of interconnection facilities will not qualify under IRS rules as a taxable event. Allowance for funds used during construction (AFUDC) has not been included in the cost estimates since it is assumed that IPC will be provided up-front funding by the Project). These are cost estimates only and final charges to the customer will be based on the actual construction costs incurred.

9.0 Description of Operating Requirements

In addition to these upgrades, there are also several operating requirements that must be met. The hydro project will be controlled to operate at unity power factor. If this requirement can not 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 point of interconnection. And 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 [redacted] Project to Idaho Power's system was studied. The results of this study work confirm that, in consideration of other proposed generation projects in the queue ahead of this project, there is not adequate capacity available on

the transmission system to serve this project. A Transmission System Impact Study is necessary to identify the system upgrades required to provide capacity to serve this project. The known required upgrades for the existing transmission and substation systems are listed and cost estimates provided. If the customer chooses to proceed with this project, the Transmission System Impact Study is the next required step in the process.

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 GE's Positive Sequence Load Flow (PSLF) analysis tools or Power World Simulator, examines the impacts of the new resource on Idaho Power's 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 Stoner'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 Proposed Voltage Criteria was used to determine voltage requirements on the system. This states that voltages, under normal operating conditions, are to be maintained within plus or minus 5% (0.05 per unit) of nominal. 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, stopping or operation of 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 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 Idaho Power 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.

APPENDIX B