5. CUSTOMER'S GENERATION

5.1. STANDBY GENERATION:

Customer-installed standby generation equipment is required to comply with all applicable regulations, including the *National Electrical Code* (*NEC*). It shall be interconnected with the Customer's electrical system by way of a break-before-make switch meeting the applicable requirements for voltage and current as contained in the *NEC*. A visible and lockable disconnect switch for the generator that is accessible to BCLP is required unless this requirement is specifically waived by BCLP.

5.2. PARALLEL GENERATION:

Customer-installed generation that is capable of operating in parallel with the electrical system is required to comply with the requirements of this section, in addition to all applicable requirements of the *NEC* and *National Electrical Safety Code*. These instances commonly include co-generation or self-generation.

a. Basic Interconnection Requirements: If BCLP determines that operation of the Customer's generating facility adversely affects the power quality within the general area, then the Customer must disconnect their equipment until the proper adjustments or corrections are made.

b. Metering: The Customer must provide adequate space, access, and equipment for the metering of the facility. Depending on the agreement between the Customer and BCLP, the metering will either be single-direction or bi-directional. Single-direction metering will not provide payment to the Customer for excess power generated on the Customer's site. Power generated or consumed, as well as VARS consumed, will be charged according to the current rate schedule or separate electric service agreement with the Customer.

c. Protective Relaying: The Customer shall solely be responsible for the protection of their equipment. Disturbances including but not limited to lightning, switching surges, voltage sags, line faults, line trips, line reclosures, over-frequency, under-frequency, high voltage, and low voltage all occur within the electrical supply system and the Customer must be prepared to deal with these events. Line reclosures will be done without regard to synchronous checking with the Customer's generator unless special provisions are made with BCLP, at the Customer's expense. As a minimum, the Customer needs to have protection for the following events: over-frequency, under-frequency, over-voltage, under-voltage, ground faults, phase-to-phase faults, reverse current relays for induction machines, and synchronous closing relays. Automatic line reclosing time delays on distribution lines typically range from 0.2 seconds up through 90 seconds. Manual line reclosing will occur after the automatic line reclosing fails to restore electrical service.

d. System Compatibility: The interconnected generation system must not adversely affect the electrical supply system. Excessive voltage flicker and excessive voltage swings on the electrical system are not permitted. Prior to construction, a system compatibility study must be done to ensure that the proposed generator will not adversely affect the system. During the generator compatibility study, if operation of the Customer's generator under normal operating conditions does not raise the voltage of the system at the Point of Delivery more than three percent, with the generator running at full output at unity power factor, then the generator is considered compatible with the system. If voltage swings will be in excess of three percent, then a separate and more extensive study must be done to determine its effects on the distribution system and what action, if any, needs to take place in order to make a compatible tie. These studies must be completed prior to the start of construction. After the generator is constructed, it shall not be operated in such a way as to cause power quality or reliability problems to the system. The generator should limit itself to a three percent voltage shift on the system. Induction machines should be supplied with shunt capacitors to limit their VAR consumption on the system.

e. System Modifications: Any modifications that must be made to BCLP's system to accommodate the proposed generator will be completed at the Customer's expense.

f. Visible Disconnect Switch: A visible and lockable disconnect switch for the generator that is accessible to BCLP is required unless this requirement is specifically waived in writing by BCLP.

g. Code Compliance: The Customer's facility must comply with all applicable sections of the *National Electrical Code*, *National Electrical Safety Code*, and *IEEE 1547, Distributed Resources Interconnected with Electric Power Systems*. Photovoltaic systems must also comply with *NEC Article 690*.

h. Rotating Machine Driven System: This section applies to those systems that use a rotating machine to directly generate AC power. It applies to both synchronous and induction systems. These systems are capable of generating high currents during a fault condition. Lacking any specific information, it is recommended that the Customer use these settings on their protective relaying equipment:

1. Over-frequency: 61 Hertz, 10 cycle time delay.
2. Under-frequency: 59 Hertz, 6 cycle time delay.
3. Over-voltage: 110% of nominal voltage, 1 to 5 second time delay.
4. Under-voltage: 90% of nominal voltage, 1 to 5 second time delay.
5. Ground faults, set to protect the generator.
6. Phase-to-phase faults, set to protect the generator.
7. Reverse current relays for induction machines, to protect motoring of the generator.
8. Synchronous closing relays.

For further information regarding generator protection, please refer to the General Electric "Gold" pamphlet, *Generator Protection GEK–75512A*.

I. Inverter Driven Systems: For systems up through 500 kW where dc-generated power is converted to ac power using an inverter, these systems must comply with *IEEE Std 929, Recommended Practice for Utility Interface of Photovoltaic (PV) Systems, IEEE Std 154, Standard for Interconnecting Distributed Resources and Electrical Power Systems, UL 1741, Underwriters Laboratories Standard for Safety - Static Inverters and Charge Controllers for Use in Photovoltaic Power Systems*, and the *National Electrical Code (ANSI C1)*. The Customer must utilize an automatic non-islanding inverter as defined by the above standards. This includes photovoltaic systems, fuel cells, and dc generators that include an inverter for the final power conversion step.