Exhibit DD

Specific Standards

Yellow Rosebush Energy Center
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Prepared for
Yellow Rosebush Energy Center, LLC

Prepared by

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Acronyms and Abbreviations

AC	alternating current
Applicant	Yellow Rosebush Energy Center, LLC
BPA	Bonneville Power Administration
EFSC	Oregon Energy Facility Siting Council
Facility	Yellow Rosebush Energy Center
gen-tie	generation tie
kV	kilovolt
kV/m	kilovolts per meter
LLC	limited liability company
mA	milliampere
NESC	National Electrical Safety Code
OAR	Oregon Administrative Rules

1.0 Introduction

Yellow Rosebush Energy Center, LLC (Applicant) seeks to develop the Yellow Rosebush Energy Center (Facility), a solar energy generation facility, battery energy storage system, and related or supporting facilities in Wasco and Sherman counties, Oregon. This Exhibit DD was prepared to meet the submittal requirements in Oregon Administrative Rules (OAR) 345-021-0010(1)(dd).

2.0 Specific Standards Applicable to the Facility

> *OAR 345-021-0010(1)(dd) If the proposed facility is a facility for which the Council has adopted specific standards, information about the facility providing evidence to support findings by the Council as required by the following rules:*

The proposed Facility is a solar energy generation and battery storage project; therefore, OAR 345-021-0010(1)(dd)(A), (B), and (D) are not applicable. OAR 345-021-0010(1)(dd)(C) is also not applicable, although the primary and alternate 500-kilovolt (kV) generation-tie (gen-tie) lines do amount to related or supporting facilities to the Facility. As a result, the criteria for (C) are provided below.

3.0 Specific Standards not Applicable to the Facility

3.1 Specific Standards for Transmission Lines – OAR 345-021-0010(1)(dd)(C)

> *OAR 345-021-0010(1)(dd)(C) For any transmission line under Council jurisdiction, OAR 345-024-0090.*

The primary 500-kV gen-tie line to the point of interconnect at the proposed Bonneville Power Administration (BPA) switchyard and the alternate 500-kV gen-tie line to BPA's Buckley Substation do not constitute energy facilities under Oregon Energy Facility Siting Council (EFSC) jurisdiction as defined by Oregon Revised Statutes 469.300(11)(a)(C). However, they do amount to related or supporting facilities to the solar energy Facility that is under EFSC jurisdiction.

> *OAR 345-024-0090 To issue a site certificate for a facility that includes any transmission line under Council jurisdiction, the Council must find that the applicant:*
>
> > *(1) Can design, construct and operate the proposed transmission line so that alternating current electric fields do not exceed 9 kV per meter at one meter above the ground surface in areas accessible to the public;*

Exhibit AA provides modeling results for alternating current electric fields and demonstrates that these electric fields do not exceed 9 kilovolts/meter (kV/m) in areas accessible to the public.

> *(2) Can design, construct and operate the proposed transmission line so that induced currents resulting from the transmission line and related or supporting facilities will be as low as reasonably achievable.*

Exhibit AA provides modeling results for induced currents resulting from the transmission line and related or supporting facilities in areas accessible to the public.

3.1.1 Overview of Induced Current, Induced Voltage, and Nuisance Shock

The flow of electricity in a transmission line can induce a small electric charge, or voltage, in nearby conductive objects. An induced electric charge can flow, or become electric current, when a path to ground is presented. Induced current can be observed as a continuous flow of electricity or, under some circumstances, as a sudden discharge, commonly known as a "nuisance shock." The most common example of a nuisance shock is when a vehicle, which is insulated from grounding by its tires, is parked under a transmission line for sufficient time to build up a charge. A person touching such a charged vehicle could become a conducting path for the current and can feel a momentary shock if the available electrical charge is sufficient, generally above 1 milliampere (mA) (Dalziel and Mansfield 1950).

The amount of current flow, or the magnitude of the nuisance shock, is determined by the level of charge that can be induced and the nature (conductivity or impedance) of the path to ground. Metallic roofs, vehicles, equipment, or wire fences are examples of metallic objects in the vicinity of the Facility in which a small electric charge could be induced. Factors to consider when assessing the potential hazards and mitigation measures for induced voltage include the characteristics of nearby objects, and the degree and nature of grounding of those objects. More conductive materials accumulate greater charge than less conductive materials while large objects, such as a tractor-trailer, will accumulate a greater charge than smaller objects such as a pick-up truck (EPRI 2005). A linear object that is parallel to the transmission line would be more greatly affected than one that is perpendicular to the line. An object passing quickly under the transmission line would be minimally affected compared to a stationary object. A grounded or partially grounded object will accumulate charge that could be discharged as a nuisance shock, while continuous current would occur in a grounded object. The total amount of charge that can be induced in a perfectly nongrounded object is limited by the strength of the magnetic field and the nature of the object; after a time, the field and the induced charge in the object will reach equilibrium (steady-state), and the induced charge would stop building.

Continuous induced current may occur if a metallic object is partially grounded or grounded some distance from the transmission line. Continuous induced current may occur in linear objects that are parallel to the transmission line, such as some fences, railroads, pipelines, irrigation piping, or other transmission or power distribution lines.

3.1.2 Predicted Induced Current

Empirical evidence has yielded a known relationship between short-circuit current and electric field strength for various types and sizes of objects (EPRI 2005). Based on these known relationships, Table DD-1 indicates the maximum current that could be induced in several types of vehicles and agricultural-related pieces of equipment potentially present in the transmission line right-of-way.

Table DD-1. Induced Current Factors

Object	I_{sc}/E (mA/kV/m)	Maximum Induced Current (mA)[1]
Car—L 4.6 m x W 1.78 m x 1.37 m	0.088	0.92
Pickup Truck—L 5.2 m x W 2.0 m x H 1.7m	0.10	1.05
Large Tractor-Trailer—Total Length 15.75 m Trailer: 12.2 m x W 2.4 m x H 3.7 m	0.64	6.72
Combine—L 9.15 m x W 2.3 m x H 3.5 m	0.38	4.0

Source: Table 7.8-2, from EPRI 2005.
I_{sc} = short-circuit current
E = AC electric field
m = meter
[1] Maximum induced current calculated for strongest predicted electric field of 10.5 kV/m, associated with the proposed Facility.

4.0 Conclusion

Induced currents from 500-kV transmission line magnetic fields are typically not a hazard because almost no voltage is involved. A current-carrying conductor will induce a current to flow in another conductor that is parallel to it. Induced currents result from the net AC magnetic field. In the common case of grounded fences, electrical loops can be created in which induced currents can flow. The value of the induced current will depend on the magnetic field strength; the size, shape, and location of the conducting object; and the object-to-ground resistance.

It would be a rare situation for the ideal conditions to occur (a large metallic object which is perfectly insulated from the ground, located in the highest calculated electric field of 4.014 kV/m within the right-of-way, and touched by a perfectly grounded person) where the possibility of a perceived nuisance shock could occur. The calculated electric field (3.796 kV/m for the primary 500-kV gen-tie line and 4.014 kV/m for the alternate 500-kV gen-tie line) will be sufficiently low enough that nuisance shocks should not occur.

The calculated maximum magnetic field (60.93 milligauss [mG] within the right-of-way of the primary 500-kV gen-tie line and 106.5 mG within the right-of-way of the alternate 500-kV gen-tie line) is sufficiently low that induced current in a metallic object should not occur.

5.0 Submittal Requirements and Approval Standards

5.1 Submittal Requirements

Table DD-2. Submittal Requirements Matrix

Requirement	Location
OAR 345-021-0010(1)(dd) If the proposed facility is a facility for which the Council has adopted specific standards, information about the facility providing evidence to support findings by the Council as required by the following rules:	-
(A) For wind energy facilities, OAR 345-024-0010 and -0015.	N/A
(B) For surface facilities related to underground gas storage reservoirs, OAR 345-024-0030, including information required by OAR 345-021-0020.	N/A
(C) For any transmission line under Council jurisdiction, OAR 345-024-0090.	Section 2.0, Section 3.0
(D) For a fossil-fueled power plant or other facility that emits carbon dioxide, OAR 345-024-0500 to 345-024-0720, including the information required by OAR 345-021-0021.	N/A

5.2 Approval Standards

Table DD-3. Approval Standards

Requirement	Location
OAR 345-024-0090 Siting Standards for Transmission Lines	
To issue a site certificate for a facility that includes any transmission line under Council jurisdiction, the Council must find that the applicant:	–
(1) Can design, construct, and operate the proposed transmission line so that alternating current electric fields do not exceed 9 kV per meter at one meter above the ground surface in areas accessible to the public;Table	Exhibit AA
(2) Can design, construct, and operate the proposed transmission line so that induced currents resulting from the transmission line and related or supporting facilities will be as low as reasonably achievable.	Exhibit AA

6.0 References

Dalziel, C.F., and T H. Mansfield. 1950. Effects of Frequency on Perception Currents. AIEE Transactions 69:1162–1168.

EPRI (Electric Power Research Institute). 2005. AC Transmission Line Reference Book: 200 kV and Above. Third edition. EPRI, Palo Alto, CA. 1011974.