APPENDIX D.1

MAXIMUM ASH THICKNESS DEPOSITED AT THE EREF FROM A CASCADE RANGE ERUPTION

Maximum Ash Thickness Deposited at the EREF from a Cascade Range Eruption

The maximum ash thickness that could be deposited at the Eagle Rock Enrichment Facility (EREF) from future Cascade tephra eruptions is less than 8 cm, assuming a hypothetical eruption from the nearest Cascade volcano, a maximum credible eruptive volume and explosivity, and the dispersal of ash directly toward the EREF. Therefore, the maximum ash thickness that could be deposited on building roofs at the EREF from future Cascade tephra eruptions is less than 8 cm.

Potential Roof Loads from a Cascade Range Eruption

Blong (1981, 1984) discusses the effects of ash loading on structures. Snow loading can be used as an analog when making calculations and comparisons. Assume an 8 cm thickness of ash (upper bound; maximum credible ash fall at the site). Assume it has the dry- and wet-ash densities of the Mount St. Helens May 18, 1980 ash, those being 0.5 g/cc dry and 1.25g /cc wet (Shipley and Sarna-Wojcicki, 1983). The load of the ash (8 cm) would range from 4 g/cm^2 (dry) to 10 g/cm^2 (wet).

Determination of Maximum Ash Thickness Deposited at the EREF from a Cascade Range Eruption

The Volcanism Working Group (VWG) (1990; Chapter 5) reviewed published literature, conducted interviews of field researchers in eastern Idaho, and compiled information related to air-fall ash potential at the Idaho National Laboratory (INL), a site immediately west of the proposed Eagle Rock Enrichment Facility. The VWG addressed the 21 most likely sites for ash-fall producing eruptions in the western United States, including all of the Cascade Range volcanoes. The U.S. Geological Survey subsequently published hazard assessments for the five active Cascade volcanoes in Washington, including Mount Adams (Scott, et al., 1995), Mount Baker (Gardner, et al., 1995), Glacier Peak (Waitt, et al., 1995), Mount Rainier (Hoblitt, et al., 1995), Mount St. Helens (Wolfe and Pierson, 1995), and the Medicine Lake volcano in northern California (Donnelly-Nolan, et al., 2007). These investigations provide additional detail on eruption probabilities and the distribution of near-vent volcanic products. However, they do not alter the fundamental conclusions of the VWG (1990), which found that prehistoric Cascade tephra deposits on the Eastern Snake River Plain (ESRP) do not exceed 5 cm in thickness. Apparently, the Cascade volcanoes are sufficiently far from the INL (675 to 790 km) or located such that the prevailing westerly winds aloft did not disperse ash directly toward the INL. It was further concluded that the maximum ash thickness that could be deposited at the INL from future Cascade tephra eruptions is less than 8 cm, assuming a hypothetical eruption from the nearest Cascade volcano, a maximum credible eruptive volume and explosivity, and the dispersal of ash directly toward the INL. Because of the proximity of the EREF to INL, the maximum ash thickness that could be deposited at the EREF from future Cascade tephra eruptions is also estimated to be less than 8 cm.

The supporting technical basis for these conclusions is summarized as follows:

Empirical curves of compacted air-fall ash thickness vs. distance for the largest late Pleistocene and Holocene Cascade eruptions (Miller, 1989, Figure 3; Hoblitt, et al., 1987, Figure 3-1) include the Mazama (Crater Lake, ca. 8,800 years B.P., 40 km^3); Glacier Peak G (ca. 11,000 – 12,000 years B.P.); Mount St. Helens Yn (3,300 – 4,000 years B.P., 3 km^3); and Mount St. Helens May 18, 1980 (uncompacted, 1 km^3) tephras. Assuming the most adverse conditions of closest proximity (a hypothetical major eruption of Newberry Volcano, Oregon, 675 km from the INL), ash dispersed directly toward the EREF, and an eruption magnitude of Mount Mazama

8,800 years B.P. (the largest known eruption from a Cascade volcano), the thickness vs. distance data show that about 6 cm of tephra would be deposited at the EREF.

The observed thicknesses of 13 late Pleistocene and Holocene compacted air-fall tephras at field localities on or near the ESRP range from 0.5 to 5 cm, and most are less than 2 cm thick (Volcanism Working Group, 1990; Table 7). Blong (1984) suggests that the initial uncompacted thicknesses of such tephras may have been up to twice as great. These deposits include tephras from the largest eruptions of Cascade volcanoes listed in item 2 above. The observed thicknesses of compacted Mazama ash (the largest known Cascade eruption) at five localities on or near the ESRP range from 0.5 to 3 cm.

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