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A thermal model for cooling the nEDM ^{3}He services[1] D.P. KENDELLEN, D.G. HAASE, P.R. HUFFMAN, NC State University — The neutron electric dipole moment (nEDM) experiment proposed for the Spallation Neutron Source is a precision test of time reversal symmetry, probing the same physics believed to be responsible for the matter-antimatter imbalance in the universe. In the experiment, polarized neutrons and polarized 3He atoms suspended in a bath of superfluid ^{4}He at 0.35 K precess in a weak magnetic field. When a strong electric field is applied parallel or antiparallel to the B-field, a change in the neutron precession rate signifies a nonzero nEDM. The polarized ^{3}He, which acts as a co-magnetometer, must be replenished every 1000–2000 seconds. Electrical heaters produce heat flows to sweep ^{3}He in and out of the measurement cells. The heat is transferred to a dilution refrigerator through plastic or sintered metal heat exchangers. We have modeled the heat flows needed for ^{3}He transport, to determine the heat load to the refrigerator and to guide the design and placement of the heat exchangers.

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D. G. Haase
NC State University

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