Trip Report for the 27 April-2 May 2008 Lee Nuclear Site Field Audit

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During the Lee Nuclear Site field audit conducted over 27 April-2 May 2008, NRC geologists, seismologists, and geotechnical engineers directly examined outcrops of an erosion-resistant quartzite unit at McKown's Mountain, which is located within the Lee Nuclear Site area, and confirmed that this erosion-resistant unit holds up the topographic ridge that forms McKown's Mountain. The quartzite contains old (i.e., most likely > 251 Ma based on observed field relationships) deformation fabrics, and no geologic field evidence suggests that McKown's Mountain is controlled by Quaternary (26 Ma to present in age) tectonic deformation (i.e., faulting), which would indicate the presence of a potentially capable tectonic structure in the Lee Nuclear Site area near the site location. NRC staff also examined other select bedrock exposures in the Lee Nuclear Site area to assist with understanding the complex tectonic deformation history reflected in rock units at the Lee Nuclear Site location. "Site area" is that area within an 8-km (5-mi) radius of the site, and "site location" is that area within a 1-km (0.6-mi) radius of the site.

NRC staff also directly examined rock units in the excavations for Cherokee Nuclear Station (CNS) Unit 3 (i.e., Lee Nuclear Site Unit 2, currently excavated to top of sound rock and not to foundation grade level bedrock) and CNS Unit 2 (excavated to foundation grade level for the CNS site and located between Lee Nuclear Site Units 1 and 2) to assess orientations, characteristics, and relative ages of tectonic structures (including joints and fractures, shear and breccia zones, minor faults, folds, foliations, and lineations) and lithologic variability at the Lee Nuclear Site location (Figures 1 and 2). In addition, NRC staff examined bedrock outcrops around the periphery of CNS Unit 1 (Lee Nuclear Site Unit 1) where no concrete had been placed during initial construction activities at the CNS site; core of foundation rock unit Zto, a metamorphosed igneous intrusive rock body of possible Neoproterozoic (> 542 Ma) age (Figure 3); and the saprolitic horizon in walls of the original excavations for CNS Units 1, 2, and 3. Based on radiometric age dates reported by the applicant from an undeformed potassium feldspar sample in an igneous vein cutting across one of the shear zones, collected earlier for characterization of the CNS site, shear displacement in the zone occurred more than 219 Ma ago.

NRC staff did not find any geologic field evidence for either capable (i.e., Quaternary) tectonic structures or other potentially detrimental geologic features in the existing open excavations at the locations of CNS Unit 2 and CNS Unit 3 (Lee Nuclear Site Unit 2) during this site audit. Because Lee Nuclear Site Unit 1 is located at the position of former CNS Unit 1 and the original nuclear island excavation for CNS Unit 1 now lies under concrete poured during initial construction activities at the CNS site (Figure 4), NRC staff could not directly examine foundation grade level bedrock in the Lee Nuclear Site Unit 1 excavation.

Figure 1. April-May 2008 Lee Nuclear Site Field Audit: NRC Senior Geologist, Dr. Gerry L. Stirewalt, and the applicant's geologic consultant, Dr. Malcolm Schaeffer, examining rock units and old deformation fabrics in foundation grade level bedrock in the original CNS Unit 2 excavation, which is located between Lee Nuclear Site Units 1 and 2. Dr. Schaeffer was the lead geologist involved with the original geologic mapping of all excavations at the former CNS site in the 1970s.

Figure 2. April-May 2008 Lee Nuclear Site Field Audit: NRC Senior Geologist, Dr. Gerry L. Stirewalt, and the applicant's geologic consultant, Dr. Malcolm Schaeffer, examining a folded igneous vein, an old deformation feature, in foundation grade level bedrock in the original CNS Unit 2 excavation.

Figure 3. April-May 2008 Lee Nuclear Site Field Audit: NRC Senior Geologist, Dr. Gerry L. Stirewalt, examining core from CNS Unit 1 (Lee Nuclear Site Unit 1), including foundation bedrock (darker-colored core in the center and on the right side of the core box) and old concrete (lighter-colored core on the left side of the core box) currently covering the excavation for former CNS Unit 1 (Lee Nuclear Site Unit 1). The contact between the old concrete and bedrock is shown by the color change in the core at the upper left side of the core box. This core was taken during site characterization investigations for the Lee Nuclear Site COL application specifically to penetrate the old concrete and extend into foundation bedrock.

Figure 4. April-May 2008 Lee Nuclear Site Field Audit: View of concrete poured during initial construction activities at CNS Unit 1 (Lee Nuclear Site Unit 1).