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QRCPL

METALLURGICAL EVALUATION OF EDG BASES FROM THE CAROLINA POWER AND LIGHT SHEARON HARRIS NUCLEAR STATION

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Failure Analysis Associates (FaAA) has completed the examination of the two emergency diesel base samples taken from Shearon Harris Nuclear Station.

Procedures outlined in Method 2 of Supplement 1, Revision 1 to the TDI Owners Group Engine Base report were used to evaluate the cast iron samples removed from EDG 1A and 1B respectively. Metallographic procedures, as outlined in ASTM E-3, were used to prepare the specimens for metallurgical evaluation.

Metallographic examination of the base sample removed from EDG S/N 74046, Engine 1A, (Evidence No. PA07596-72, mount I280), did not reveal any evidence of Widmanstatten graphite. The grey cast iron matrix was pearlitic with small regions of ferrite. Photomicrographs of a randomly selected region showing the typical microstructure are provided in Figures 1 and 2.

Metallographic examination of the base sample removed from EDG 74047, Engine 1B, (Evidence No. PA07596-73, mount I281), also did not exhibit any evidence of Widmanstatten graphite. Again, the matrix was pearlitic with small regions of ferrite. Photomicrographs of a typical region are provided in Figures 3 and 4.

The certified chemical and physical properties provided by TDI for each engine base are within the nominal property ranges for ASTM A-48 class 40 grey cast iron. Test results for base S/N 74046 (Base 1A) are provided in a TDI Q.C. memo dated 9/24/80. Results of tests performed on base S/N 74047 (Base 1B) were reported in a TDI Q.C. memo dated 12/15/80. Therefore, both 74046 and 74047 engine bases can be classified as being made from nominal class 40 grey cast iron that does not contain Widmanstatten graphite.

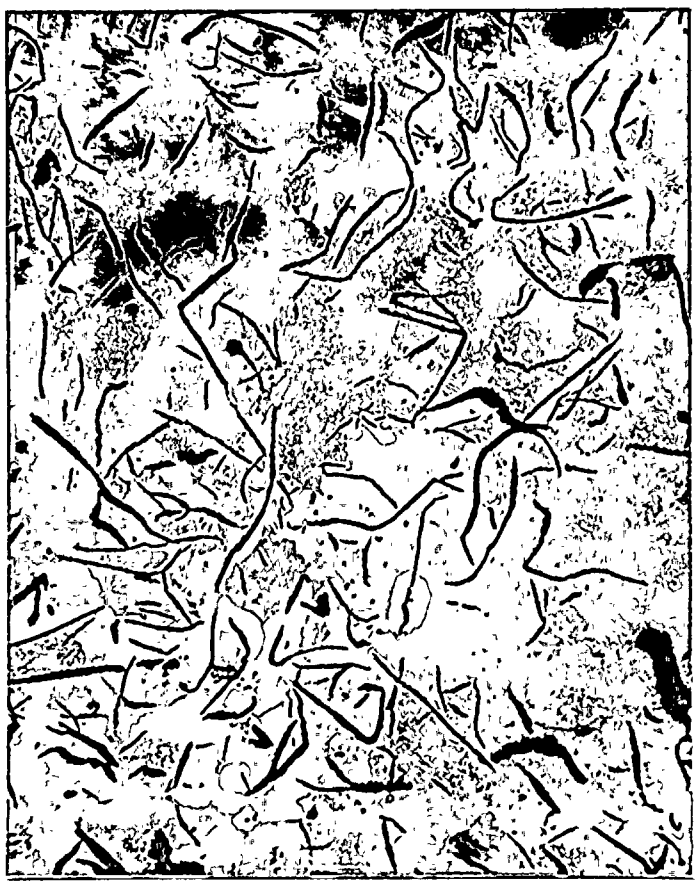

Figure 1. Low magnification photomicrograph of the sample removed from EDG base 1A, S/N 74046, Evidence No. PA07596-72. The black graphite flakes are surrounded by a predominantly pearlitic matrix. No evidence of Widmanstatten graphite is observed.
Magnification: 88.5X
Photo ID No. : PA07596-DW1-2-17-88

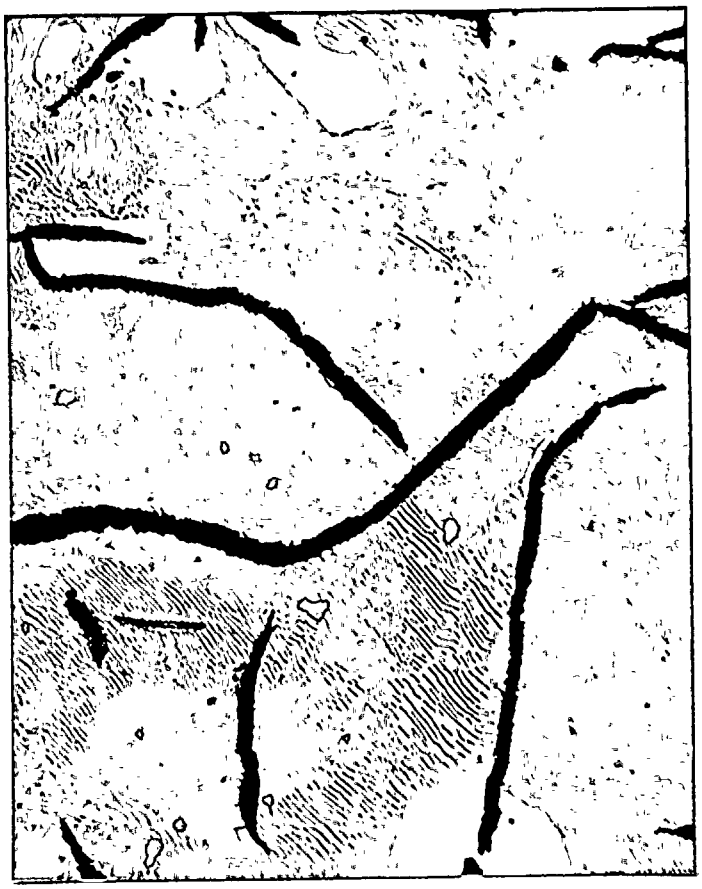

Figure 2. Higher magnification photomicrograph of the base sample removed from EDG 1A. Note the dark gray graphite flakes, the white ferrite phase surrounding portions of several graphite flakes and the pearlitic matrix.
Magnification: 446X
Photo ID No.: PA07596-DW2-2-17-88

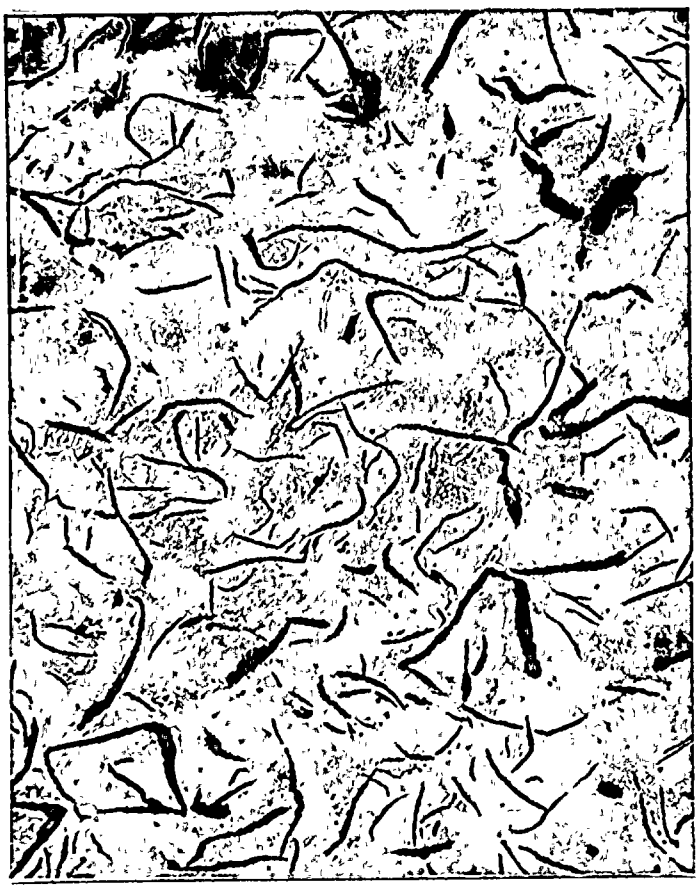

Figure 3. Low magnification photomicrograph of the sample removed from EDG base 1B, S/N 74047, Evidence No. PA07596-73. This typical grey cast iron microstructure consists of the graphite flakes in a predominantly pearlitic matrix. No evidence of Widmanstatten graphite is observed.
Magnification: 88.5X
Photo ID No.: PA07596-DW3-2-17-88

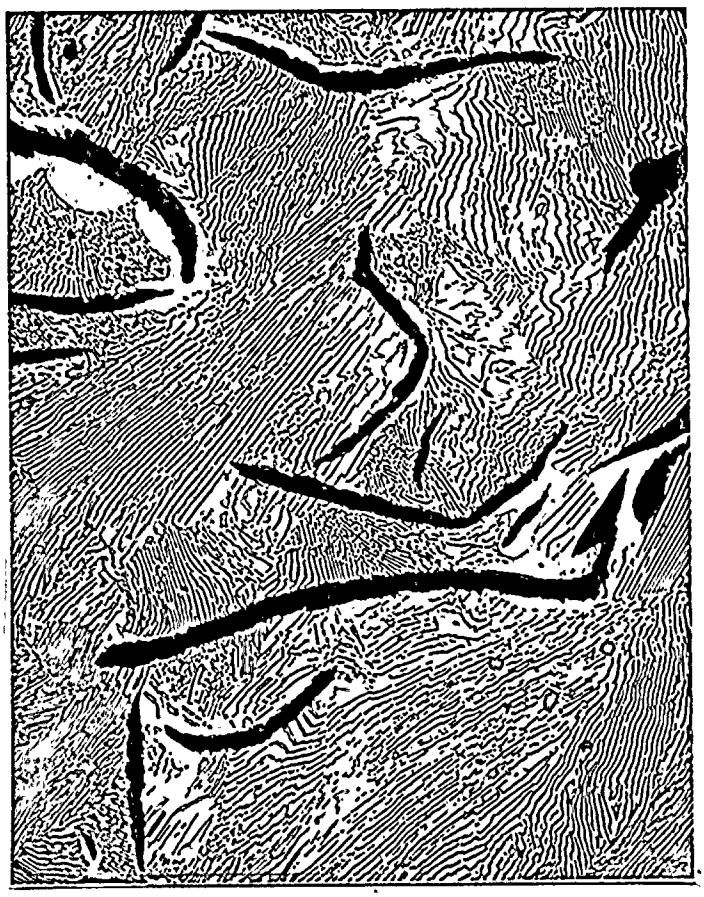

Figure 4. Higher magnification photomicrograph of graphite flakes and predominantly pearlitic matrix of the base sample removed from EDG 1B.
Magnification: 446X
Photo ID No.: PA07596-DW4-2-17-88