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Impact of the Radiating Divertor Approach on Future Tokamaks,* T.W. Petrie, A.W. Leonard, T.C. Luce, *General Atomics*; F. Turco, *Columbia U.*; S.L. Allen, M.E. Fenstermacher, C.T. Holcomb, C.J. Lasnier, *LLNL*; R.A. Moyer, *UCSD*; J.G. Watkins, S*NL* – We report on recent results that apply the deuterium/neon-based radiating divertor approach to three future tokamak concepts: (1) ITER Baseline plasmas, (2) AT high performance plasmas, and (3) H-mode plasmas that are isolated from their divertor targets (Super X-like). Analysis of H-mode plasmas in the ITER Baseline shape, characterized by q_{95}=3.15, I/aB=1.4, β_N=2 in the ITER shape, indicates significant a heat flux reduction (~2.5x) during both ELMing and between ELM periods and a factor of two *increase* in radiated power, almost all of which occurs in the divertor/SOL regions. Radiating divertor applied to AT plasmas (e.g., β_N=3 and H_{89p}=2.4) is shown to reduce heat flux at least 30%, while at the same time maintaining high performance characteristics. We present our most recent results of studies designed to assess the value of increasing parallel connection length ($L_{\|}$) of the outer divertor leg in a radiating divertor environment. Previous experiments have suggested that significant heat flux reduction at the OSP can be possible by increasing $L_{\|}$.

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