Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Understanding tungsten divertor sourcing and SOL transport using multiple poloidally-localized sources in DIII-D ELM-y H-mode discharges[1] EA UNTERBERG, ORNL, D DONOVAN, UT-K, J BARTON, WR WAMPLER, SNL, T ABRAMS, DM THOMAS, T PETRIE, HY GUO, GA, PG STANGEBY, JD ELDER, U.Toronto, D RUDAKOV, UCSD, B GRIERSON, PPPL, B VICTOR, LLNL — Experiments using metal inserts with novel isotopically-enriched tungsten coatings at the outer divertor strike point (OSP) have provided unique insight into the ELM-induced sourcing, main-SOL transport, and core accumulation control mechanisms of W for a range of operating conditions. This experimental approach has used a multi-head, dual-facing collector probe (CP) at the outboard midplane, as well as W-I and core W spectroscopy. Using the CP system, the total amount of W deposited relative to source measurements shows a clear dependence on ELM size, ELM frequency, and strike point location, with large ELMs depositing significantly more W on the CP from the far-SOL source. Additionally, high spatial (˜1mm) and ELM resolved spectroscopic measurements of W sourcing indicate shifts in the peak erosion rate. Furthermore, high performance discharges with rapid ELMs show core W concentrations of ˜few 10^{-5}, and the CP deposition profile indicates W is predominantly transported to the midplane from the OSP rather than from the far-SOL region. The low central W concentration is shown to be due to flattening of the main plasma density profile, presumably by on-axis electron cyclotron heating.

[1]Work supported under USDOE Cooperative Agreement DE-FC02-04ER54698.

Zeke Unterberg
Oak Ridge National Laboratory

Date submitted: 14 Jul 2017 Electronic form version 1.4