THE IMPACT OF OFF-NORMAL SHOTS ON IFE POWER PLANT PERFORMANCE

D. Steiner
Rensselaer Polytechnic Institute

ARIES Project Meeting
UCSD
June 7-8, 2001

PROPOSED APPROACH AND OBJECTIVES OF THIS STUDY

- Develop as complete a list as possible of target and driver preparation and delivery requirements for the ARIES combinations of drivers and targets
- Establish tolerance parameters for these requirements
- Perform statistical analyses to develop probability distributions for various shot outcomes
- Examine the impact of these shot outcomes on the performance of IFE power plant

TO ADDRESS THIS ISSUE, THE OFF-NORMAL WORKING GROUP HAS BEEN ESTABLISHED

Dan Goodin

Debbie Callahan Miller

Ron Miller

John Perkins

Bob Peterson

Dave Petti

John Sethian

Don Steiner

Mark Tillack

Simon Yu

OFF-NORMAL SHOTS WITH REDUCED YIELD

- Due to small variations in target fabrication and driver characteristics and delivery
- Yield output 10 - 90% below normal shot
- Output spectra differ from those of normal shots
- Such shots could be studied using BUCKY/LASNEX codes
- Such shots should not compromise IFE performance but would have to be accommodated for in the chamber wall design

OFF-NORMAL SHOTS WITH ZERO YIELD

- Driver “misses” target and irradiates chamber wall while target strikes chamber wall
- Target is injected but driver does not fire and target strikes chamber wall
- Symmetric driver energy absorped by target without ignition and driver energy appears as target debris kinetic energy
- Asymmetric driver energy absorped by target, accelerating target towards chamber wall
- The first and fourth types of shot appear to present the greatest challenge to IFE performance

OBSERVATIONS

- Establishing tolerance data for target and driver performance is certainly speculative at this point

- However, given the stringent requirements and the goal of ~ 500,000 shots per day, one would expect a non-negligible number of off-normal shots per day

- Of particular concern are target/driver misses and asymmetric zero-yield shots which may damage chamber wall components.

PROPOSED ACTION ITEMS

- Try to get a better handle on the frequency of the various off-normal shots – statistical process control

- Analyze the spectral characteristics of the reduced yield shots and the associated impact on chamber wall design – Bucky/Lasnex codes

- Analyze the impact of the zero yield shots on chamber wall design – Bucky/Lasnex codes