

# **Pantex Plant Special Exposure Cohort - Bounding Uranium Intakes**

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**August 2011**

**Richland, WA**

# Pantex Plant Mission

- Develop and fabricate high explosives
- Assemble finished parts into nuclear weapons
- Conduct surveillance testing and evaluation
- Retrofits and modifications
- Dismantlement of retired weapons

# Uranium Exposure Potential

- Assembly operations involve handling of clean, new depleted uranium components
  - Memorandum to Y-12 dated 1959 explicitly pronounced Pantex's "Commitment to allow no detectable removable contamination into the weapon assembly area."
- Potential for internal exposure from the handling of new uranium parts is low
  - Review of >5,000 Pantex workplace air monitoring results (1960s-1990s), >200,000 contamination swipes (1980s – 2010), and source term information (all years) all support the low exposure potential

# Uranium Exposure Potential<sub>-cont.</sub>

- Higher potential for intake during dismantlement
  - Early Pantex operations focused on assembly
  - Majority of dismantlement work occurred after 1973
- W28 dismantlement operations from 1984-1989 had the highest potential for uranium internal exposure
  - Supported by observed contamination levels, documented interviews, and site expert discussions

# Reasons Why the W-28 Campaign Bounds Uranium Intakes

- W28 series weapons were stockpiled up to 30 years which maximized the potential for age related oxidation
  - Corrosion of uranium is a function of composition, age, temperature, and humidity
- Depleted uranium metal in the W28 was not alloyed or encased (alloying of uranium inhibits corrosion)
- W28 had one of the largest uranium surface areas of all weapons, hence more metal was exposed to corrosive environments
- Disassembly operations far exceeded those conducted in previous years

# Bounding Uranium Intakes<sub>-cont.</sub>

- Approximately 300 uranium urinalyses collected from weapon assembly and disassembly workers at Pantex shortly after the campaign ended
  - Samples can be used to bound the maximum chronic intakes that could have occurred over the 6-year period
- The 95<sup>th</sup> percentile uranium intake value of the distribution of measured urine samples bounds potential intakes for all assembly and disassembly operations at Pantex

# Uranium Intake Plausibility

- The uranium intakes proposed by NIOSH are bounding under plausible circumstances
  - For type S material this results in a daily intake of 135 pCi (~30 U dpm/m<sup>3</sup>)
- *In Vivo* results from the worker population supports that the chronic 95<sup>th</sup> percentile uranium intakes proposed by NIOSH are bounding
- NIOSH airborne levels are consistent with empirically derived values from similar operations involving uranium

# Summary

- NIOSH has developed a scientific, quantitative methodology to bound potential uranium intakes incurred by Pantex assembly and disassembly workers