

# Use of ANSI/ANS 8.10 in H-Canyon ANS 8.10 Panel Discussion

**Tracy Stover** 

Savannah River Nuclear Solutions, LLC ANS Annual Conference June 2018

SRNS-STI-2018-00270

- H-Canyon is a shielded facility for radiochemical separations
- Shielding design reduces the <u>unmitigated</u> consequences of postulated criticality events
- Reduced consequence severity affects the choice of controls and the placement of criticality accident alarm systems





*H Canyon is the only remaining production-scale, shielded radiochemical separations facility in operation in the U.S.* 

### Nuclear Materials Management H Canyon

H Canyon has historically recovered uranium-235 and neptunium-237 from spent nuclear fuel.

Now, H Canyon downblends highly enriched uranium, which can be used in nuclear weapons, into low enriched uranium. Low enriched uranium is used in the Tennessee Valley Authority's commercial power reactors. SRS has shipped more than 330 trailers of low enriched uranium to TVA since March 2003.

Photo: H Canyon

# H-Area



### Warm Canyon with Cell Covers Removed



# **Process Vessel Cell Arrangement (Typical)**



#### **Mixer-Settler**





### **H-Canyon Cross-section**



- Event consequences
- Control scheme
- CAAS Placement



- Event consequences Hot Canyon
  - <u>Unmitigated</u> consequences of a criticality event in the hot canyon is considered moderate to low (less than 100 rem)
  - No personnel will be subject to >12 rad dose which satisfies 8.10-1983 limits of 25 rem
- Event consequences Warm Canyon
  - <u>Unmitigated</u> consequences of a criticality event in the warm canyon is high (greater than 100 rem)
  - Personnel in certain areas of the facility may receive >12
    rad
  - Requires a Criticality Accident Alarm System



- Control scheme
  - Many scenarios are single parameter, multiple control
    - Concentration (e.g. process vessels)
    - Mass (e.g. mixer settlers)
  - Many administrative controls, few engineered controls
  - Loosely tied to facility shielding
    - DOE must approve single parameter control events not mitigated to beyond extremely unlikely
    - Many events are unmitigated at low consequence based on the 12-rad zone analysis



### CAAS Placement

- Placed where a criticality would be a high consequence event
  - Where the 12-Rad zone indicates high dose to worker
- Warm canyon events with high dose occur in
  - Mixer settler banks
  - Evaporator
  - Decanter and Neutralization tank cell
- Normally occupied areas within the 12-rad zone



### **Concluding Remarks**

- Low consequence classification derived from 12-rad zone analysis
- Conservatively meets 25 rem dose limit
- No safety class controls are needed
  - Safety significant and general service only
- 25 rem change to 10 rem would have significant impacts!
  - No measurable health affects conclusively identified below 50 rem exposure.
  - Cost to reperform dose analysis
  - Cost to design, install, and maintain CAAS systems

