



# **Dry Cask Storage Radiation Protection Programs**

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# INTRODUCTION

- ❖ Utilities have extensive experience and programs in place to ensure operations are ALARA, this includes cask loading
- ❖ Cask Loading Dose
- ❖ Continuous Improvement



# ALARA PLAN

- ❖ Cask Loading Activities meet the criteria for additional dose controls including an ALARA plan. Jobs with a total dose of greater than 250mrem
- ❖ These plans will require review by an ALARA committee
- ❖ Extensive planning and a review of controls is included, some examples are included on the next slide



# ALARA Planning and Controls

- ❖ Shielding
- ❖ Remote Monitoring
- ❖ Low Dose Waiting areas
- ❖ Use of Best Qualified Craft/Crew Size
- ❖ Team Integration
- ❖ Tools and Mockups
- ❖ Work Bundling
- ❖ Work Area (Scaffolding)
- ❖ Remote Tooling and/or Robotics



# Radiation Work Permit

- ❖ Total Dose Estimate
- ❖ Alarms for Dose Rate Field and Total Dose
- ❖ Requirements for additional monitors
- ❖ Contamination Controls
- ❖ Post Job Review
- ❖ Requirements for Radiation Protection Coverage
- ❖ High Radiation Area Entry Requirements including a specific High Radiation Area Job Brief
- ❖ Trip Tickets



# Work Management/Planning

- ❖ Starts at 28 weeks prior to activity
- ❖ Multiple reviews at various points, many include Radiation Protection
- ❖ Each job has a specific dose goal and the goals are tracked daily and weekly
- ❖ Goals that are not met either under or over are entered into the Corrective Action Program and review of why the goal was not met is performed



# Radiation Protection

- ❖ Dedicated Radiation Protection Coverage is required during removal of items from the Spent Fuel Pool
- ❖ Additional Monitoring required for any entry into a High Radiation Area
- ❖ RWP/Procedures may impose additional controls or times when Radiation Protection Personnel must be present



# Cask Loading Dose

- ❖ Cask FSAR's include dose estimates based on design basis type fuel, 3-5 years cooling, 60,000-75,000 MWD/MTU
- ❖ These estimates are typically around 2000 mrem total dose for a cask loading
- ❖ A number of cask users are loading casks for between 200-500 mrem total. Some are higher and some are lower



# Cask Dose Rates

- ❖ Cask FSAR's contain estimates of cask dose rates, based on design basis fuel
- ❖ Some sites have site specific cask dose rate estimates
- ❖ Actual Dose Rates measured during loading even on casks with reduced shielding have been found to be lower than the predicted numbers



# Continuous Improvement

- ❖ INPO & Station Goals based on the ALARA principles drive sites to look for every opportunity to improve dose performance
- ❖ Contracts for cask loading services include incentive/penalties for dose performance
- ❖ Continuous Improvement Programs that require 100% participation
- ❖ Cask Vendors and those that provide cask loading services continue to make improvements thus increasing their market share