

# Dry Cask Storage Dose Reduction Successes at Braidwood



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**Braidwood Station**



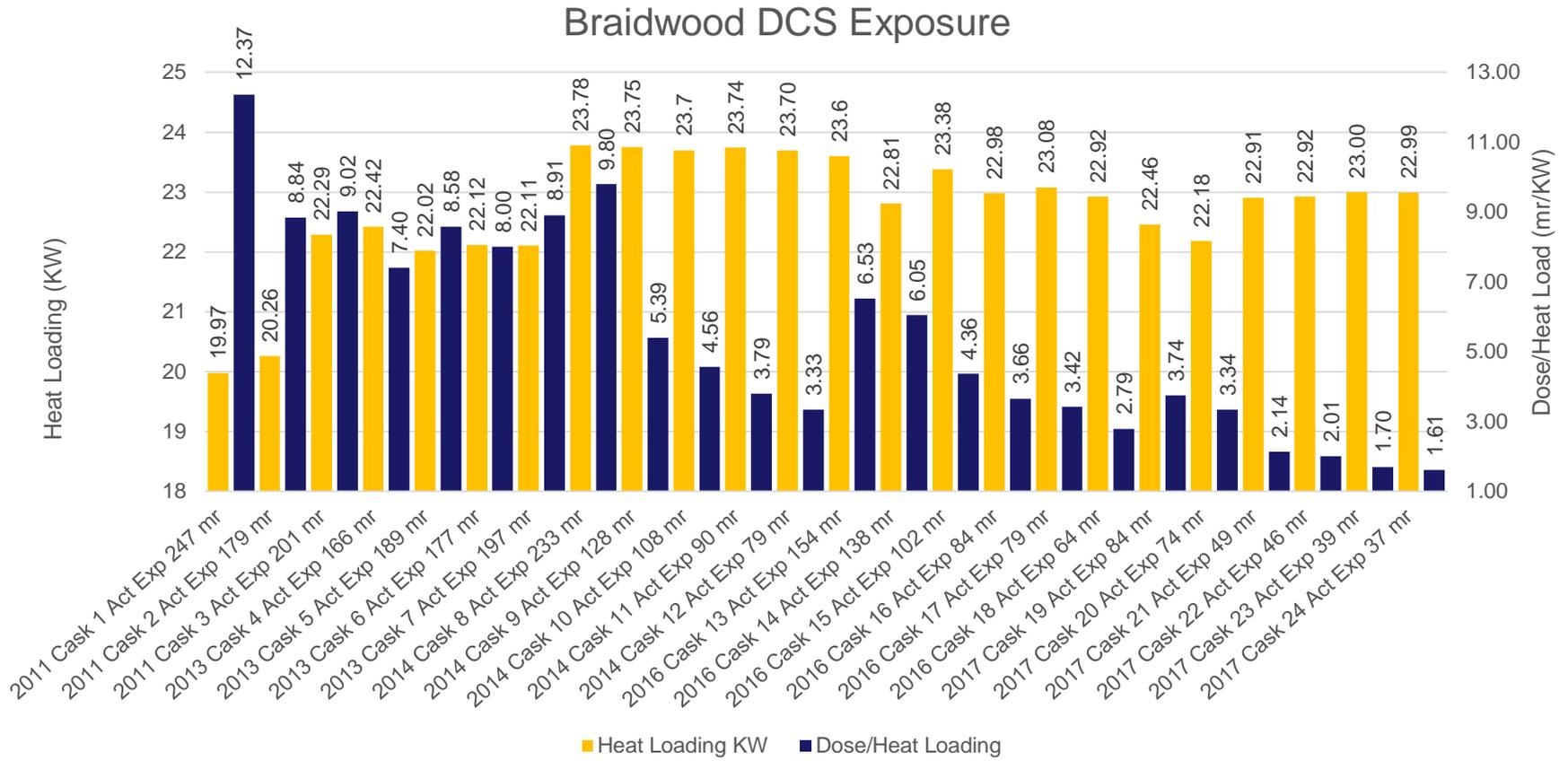
**Exelon** Generation<sup>®</sup>

# Braidwood DCS Exposure

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2011 Braidwood (3 Casks) - Dose Estimate 1.050 Rem / Actual 0.721 Rem  
2013 Braidwood (4 Casks) - Dose Estimate 0.808 Rem / Actual 0.755 Rem  
2014 Braidwood (5 Casks) - Dose Estimate 0.940 Rem / Actual 0.638 Rem  
2016 Braidwood (6 Casks) - Dose Estimate 0.870 Rem / Actual 0.621 Rem  
2017 Braidwood (6 Casks) – Dose Estimate 0.599 Rem / Actual 0.329 Rem

# Braidwood DCS Exposure



# Initial 2011 Exposure Reduction initiatives

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- Cameras were used to monitor remote welding operations and general work area activities.
- LDWA areas were clearly marked with postings and green flashing lights.
- Lead shielding was installed on Dry Pit Hand rail.
- Temporary / Permanent FP skimmer & FPC system were in service prior to start of work and maintained during the duration of the Dry Cask Storage campaign. Dose rates on the refuel bridge were .3 mrem/hr & around the spent fuel pool .2 mrem/hr. Dose rates without Temporary / Permanent FP skimmer & FPC system running were 1.5 mrem/hr on the refuel bridge & around the spent fuel pool .5 mrem/hr.

## 2013 DCS Improvements

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- Neutron Water Shield ring saw a 30% reduction in dose rates around the Hi Trac.
- Specialty Shielding was installed in the Hi Storm Mating Device Gaps during download. (Shielding fabricated by NPO)
- Personnel Shadow Shield Rack.
- Large area dose rate displays.
- Vacuuming the floor of the wet pit after each cask reduced decon time of Hi Trac.
- After completion of each cask a lessons learned critique was performed.

## 2014 DCS Improvements

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- Neutron shielding was installed on Dry Pit Hand rail.
- A stand was made for transfer pump to keep it elevated off the transfer canal floor (reduced contamination when transferring water to the wet pit).
- Tri Nuke 100 was used in wet pit during Dry Cask Storage Activities.
- For supplemental cooling a remote temperature probe was used to monitor annulus temperature.

## 2016 DCS Improvements

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- First time at Braidwood using the unrestrained stack-up configuration. This configuration reduced workers time in the area during download activities and saw 35% reduction in exposure when compared with the 2014 campaign.



Restrained



Unrestrained

## 2016 DCS Improvements

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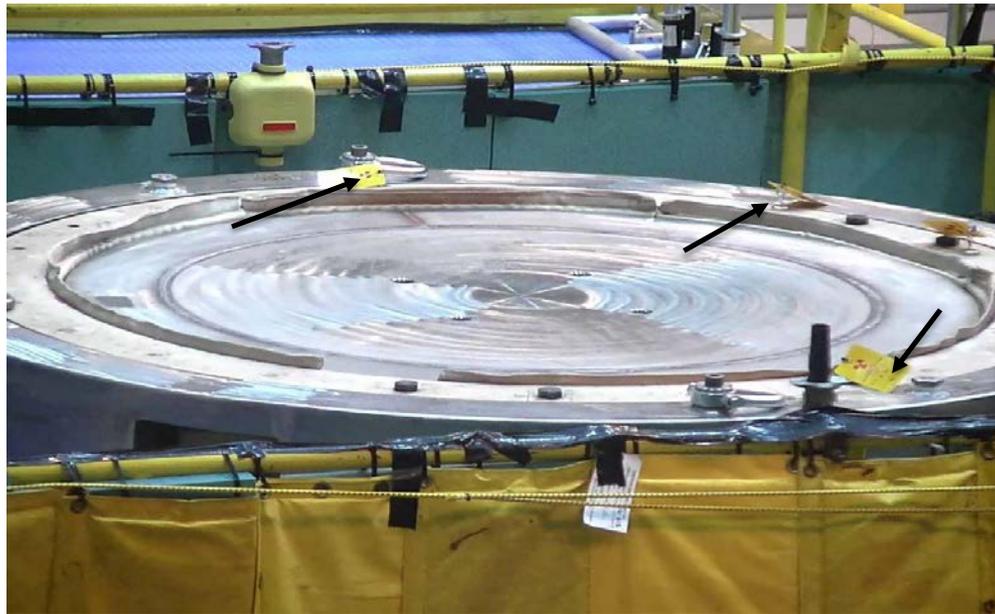
- Radiation Protection Technician designed a new type of shielding to used in the annulus area, which saved 5 to10 mrem per cask.



## 2016 DCS Improvements

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- New Specialty shielding was made to fit in the gaps between the cleats to accommodate using the new unrestraint stack up configuration. (Shielding fabricated by NPO)
- To reduce welders exposure during weld activities Hot Spots around the top of the MPC annular gap were uniquely identified.



## 2016 DCS Improvements

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- The weld machine was installed on top of the MPC in the lowest dose area.
- Decon of the lower area of the Hi Trac was performed prior to annulus / MPC drain down.
- An RP Job guide was created to outline what the daily Dry Cask activities would be, and identify what equipment, RP resources, and surveys would be required to support the activities.

## 2017 DCS Improvements

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- Clear View shielding was used on the portable shield rack which saved approximately 4 mrem for each cask.



## 2017 DCS Improvements

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- Shielding was installed in the sling basket. This reduced dose rates for the worker when accessing the top of the MPC.
- The Hi Trac bottom ledge was taped, this reduced the decon time.



## 2017 DCS Improvements

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- A long-handled pole was used to smear the pool lid, this could be performed from a distance while in a low dose area.
- Wiped down the Spent Fuel Handling Tool frequently during fuel load decreased dose rates on the tool.
- During fuel moves / the fuel handlers rotated crews.
- The new weld machine used by PCI reduced the welding time and lowered the overall welder's exposure, between both welds that saved approximately 2 hrs of welding time.

## 2017 DCS Improvements

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- Teamwork! Everyone was working together as a team reminding / coaching each other about staying dose conscious along with coming up with new ideas to save dose. TEAMWORK all workers were driven to doing their best! It was the challenge to go as low as possible.

