

# Exelon Dresden Nuclear Power Station Dose Reduction through Remote Control



Presented by  
**EXELON**

## Unit 2 and 3 Steam Dryer Storage

- ✓ In 2002 An industry problem was identified with BWR Steam Dryers. Fatigue cracking was seen in some critical areas on the steam dryers and repairs were needed.
- ✓ After multiple repairs and hundreds of Rem of dose was expended, Exelon decided to replace their old steam dryers with new ones.



## Unit 2 and 3 Steam Dryer Storage

- ✓ In 2002, Exelon initiated plans to replace the two steam dryers at Dresden Station.
- ✓ The Team was selected by Project Management to include S&L and NGC to design and Fabricate a remote controlled strong back lifting rig.
- ✓ In 2006 Unit 3 Steam Dryer was remove from the vessel and stored in the dryer separator Pit under 2 feet thick concrete shields.
- ✓ Contact dose rates on the large piece of equipment was as high as 6 rem/hr.



## Unit 2 and 3 Steam Dryer Storage

- ✓ In 2007 the Unit 2 Steam dryer was removed and was stored in the separator pit with the unit 3 Dryer.
- ✓ Once in the pit the unit 3 Dryer would be held in the plant for 1 1/2 years before moving into the long term storage location.
- ✓ The 2 feet thick shielding took the dose rates on the refuel floor from 350 mR at the hand railing to 1 mR. This allowed work to take place on the refuel floor without increasing exposure to the workers over the next year and a half.





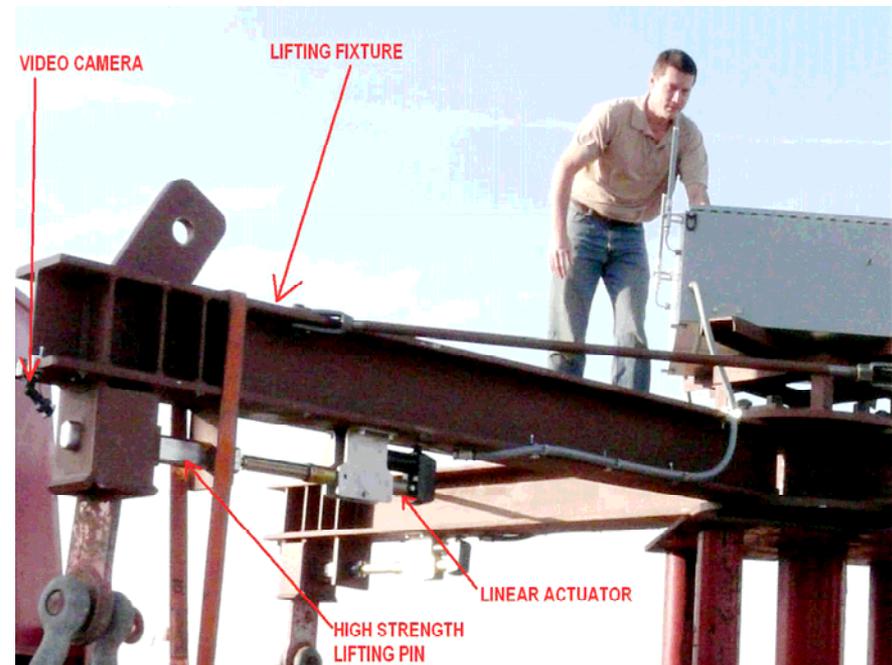
## Unit 2 and 3 Steam Dryer Storage

- ✓ The Project team contracted Northrop Grumman Corp. and Sargent and Lundy to design a remote controlled lifting grapple. Barnhardt Crane & Rigging planned the lift and designed the track to slide the Steam Dryers out of containment.



## Unit 2 and 3 Steam Dryer Storage

- ✓ The design of the Remote grapple had to be completely radio controlled.
- ✓ Have 1500 lbf axial force to drive the load pins into position.
- ✓ Have positive identification of full pin engagement.
- ✓ Pin engagement needed to be verified by redundant Video feeds.
- ✓ Wireless telemetry needed to be operated from up to 300 yard away.



## Unit 2 and 3 Steam Dryer Storage

- ✓ Testing of the lift fixture was performed by Barnhardt Crane in Ottawa IL.
- ✓ In spring of 2008 the remote controlled lifting grapple was completed, tested, and approved for use.



## Unit 2 and 3 Steam Dryer Storage

- ✓ On Saturday Aug 2<sup>nd</sup> the Unit 3 Steam Dryer was moved out of containment and to the on site storage facility. (Mausoleum)
- ✓ On Sunday Aug 3<sup>rd</sup> the Unit 2 Steam Dryer was moved out of containment and to the on site storage facility. (Mausoleum)
- ✓ Both units were successfully moved using remote controls for the slides, the lead shielding monorail and the crane grapple.



## Unit 2 and 3 Steam Dryer Storage

- ✓ The Dryers were transported to the Onsite storage facility (Mausoleum) on a multi-axle transporter called the Godhofer.
- ✓ Shield blocks were used on the front and back of the transporter for dose reduction for drivers.



## Unit 2 and 3 Steam Dryer Storage

- ✓ The total dose to move both Dryers to the onsite Storage Facility was 2.079 Rem
- ✓ Other utilities that have moved a Steam Dryer have incurred as much as 5.7 Rem for one dryer move.
- ✓ The remote latching was estimated to save a total of 4.884 mR of exposure. This did not take into account the addition saving from the remote slide for the dryer and the remote shield wall inside the containment air lock structure.

## Unit 2 and 3 Steam Dryer Storage



ONSITE LONG TERM STORAGE MAUSOLEUM

## Unit 2 and 3 Steam Dryer Storage

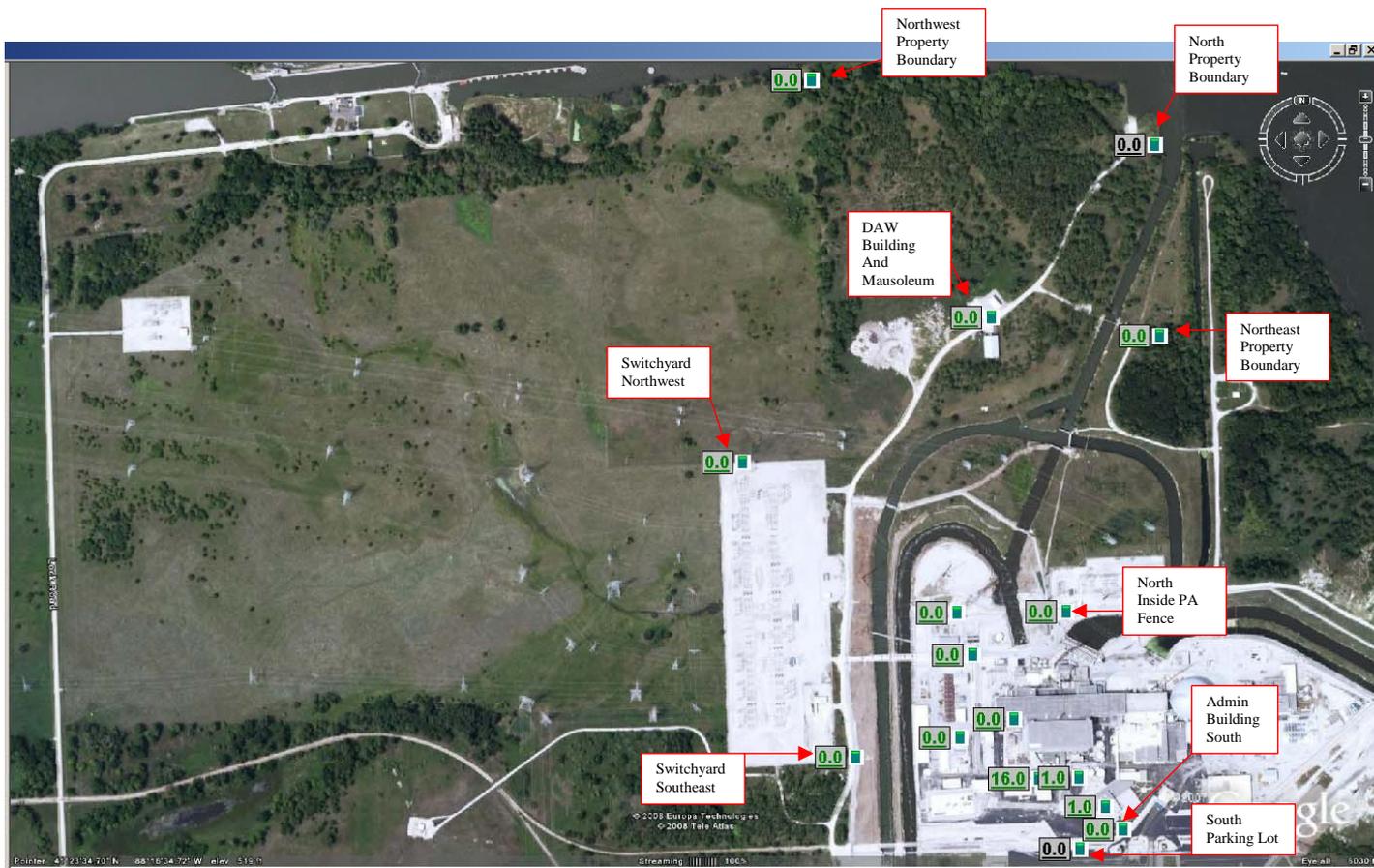
- ✓ This project used 16 remote cameras for monitoring the complete movement of the Dryers from the Reactor building to the on site Storage Facility.
- ✓ There were 16 remote reading electronic dosimeters along the entire route of the Dryer move to give live time dose readings along the route to the mausoleum.

Dryer Move Outside ARM Locations



# Unit 2 and 3 Steam Dryer Storage

## Dryer Move Outside ARM Locations



## Unit 2 and 3 Steam Dryer Storage

- ✓ This highly successful venture integrated many technologies and leveraged team work across multiple disciplines to execute this successful remote operation.
- ✓ This project is considered to be a large success for remote handling operations as a means of reducing personnel exposure and increased worker safety.

## Unit 2 and 3 Steam Dryer Storage

- ✓ We would like to give a special thanks to Mr. Mark Mulhern and Mr. Charles McCarthy of Northrop Grumman Corp. for the remote tooling design. Also Thanks to Sargent and Lundy, and Barnhardt Crane for their hard work and making this project a success.
- ✓ Questions