



# UniTech R3 Nuclear Workshop:

Saving Utilities Time and Money through:  
Critical Path \* Dose Reduction \* PCE Reductions  
at PWR/BWR Sites  
Using InstaCote™ ML-2 for Reactor Cavity Decon

Presented by:

Rick McCormick, Master-Lee Decon Services  
Steven Szymanski, PSEG Salem Rad Pro “Retired”



# Introduction

- \* This presentation details the utilities critical path time and cost reduction for outages at PWR and BWR through critical path, dose, and PCE reductions.
- \* This presentation will provide details of critical path savings, dose, and PCE reduction.
- \* It is intended as a template for applying and removing the InstaCote™ ML-2 to PWR or BWR Reactor Cavities with the understanding that all Reactor Cavities are not all standard in size, configuration, or material makeup.



# How Much Can your Site Save?

## Critical Path Savings

- \* Typical **Rub and Scrub Cavity Decon** is scheduled between **6 to 12 hours** of critical path time depending on the site identified goals, “without a known end result”.
- \* Typical **InstaCote Cavity Decon** is scheduled at **4 – 5 hours** either on critical path or off critical path “with a known end result”. Removal is typically 2 hours off critical path.
- \* How much does a “critical path hour” equate to at your site? **\$50K per hour?**
- \* Do the math! If you only save 2 – 3 hours of critical path time, it pays for itself!

## Dress Out Requirements

- \* Typical Rub and Scrub Cavity Decon – Reassembly crews are required to dress in double PC’s and PAPH’s which can cause heat stress and reduced stay times (decreased efficiency).
- \* Typical post InstaCote ML-2 application – Reassembly crews dress requirements are relaxed due to dramatically lower loose surface contamination levels. No respiratory protection required (increased efficiency).
- \* Reduced radwaste (PC’s, gloves, shoe covers, etc.)

# continued

## **PCE's**

- \* Typical Rub and Scrub Cavity Decon may or may not meet site identified goals and does not address “hot particle removal”.
- \* Typical InstaCote Cavity Decon reduces PCE's and “hot particle” issues (time required for paperwork to write up worker).

## **Dose**

- \* With less time expended on cavity decon and to have a known end result and reduced crew size, overall dose is reduced for decon crew and reassembly crew.
- \* \$\$\$ Savings – multiply that over 5 or 6 outages per unit – a significant savings!



# Agenda

## **Introduction – Time & Cost Reduction through:**

- \* *Critical Path Savings*
- \* *Dose Reduction*
- \* *PCE Reduction*

## **How Much Can Your Site Save?**

- \* *Site Goals – Critical Path, Dose Goals, PCE Reduction Goals while minimizing dress requirements*

## **What is InstaCote™ ML-2?**

### **Purpose of Utilizing InstaCote™ ML-2**

- \* Reduce Loose Surface Contamination through encapsulation (“known end result”)
- \* Reduce dress out and respiratory protection requirements (post application)
- \* Increase productivity and efficiency for reactor disassembly/reassembly

### **Measurements of Success**

- \* Initial contamination levels (typically mRad smearable)
- \* Quicker cavity decon (4 – 5 hours)
- \* Smaller crew size (compared to conventional methods)
- \* Post InstaCote ML-2 application (typically <50kdpm/100cm<sup>2</sup>)
- \* Repeat successes (gets better each outage)

# Agenda continued

## **InstaCote™ ML-2 Equipment**

- \* Portable (fits through personnel airlocks equipment hatch)
- \* Self contained mobile trailers (air compressor and generator on board)

## **Prior to InstaCote™ ML-2 Application**

- \* material, duct tap, and masking gathered before cavity decon begins)

## **Masking the Reactor Cavity**

- \* typically 2 – 3 hours after water is removed by site decon

## **Application Process**

- \* typically 2 – 3 hours depending on size of cavity)

## **InstaCote™ ML-2 Removal**

- \* typically 2 hours at most sites (off critical path)

## **Pre InstaCote™ ML-2 Survey Data**

- \* provided by PSEG Salem (2014 & 2017)

## **Post InstaCote™ ML-2 Survey Data**

- \* provided by PSEG Salem (2014 & 2017)

## **Questions/Discussions**



# What is InstaCote™ ML-2

- \* InstaCote™ ML-2 can be defined as:
  - \* A 2 part pure polyurea coating/elastomer which is derived from the reaction product of a polyisocyanate component (part “A”) and an amine-terminated resin blend (part “B”).
  - \* The reaction of the 2 components yields a urea linkage which formulates into InstaCote™ ML-2.
  - \* Once the formulation occurs, the InstaCote™ ML-2 is dry/tack free in ~30 to ~60 seconds.



# Purpose

The purpose for using the InstaCote™ ML-2 varies depending on a particular plants needs. Some examples are:

- \* Critical Path Savings
- \* Preventing leakage of water from the sandbox or NI covers (PWR) or from the seal plate or covers during reactor cavity flooding and refueling operations.
- \* General Cavity Decontamination
- \* Smaller Crew Size (ALARA)
- \* Reduce PCE's for reactor reassembly/disassembly due to lower contamination levels



# Measurements of Success

- \* Critical Path Savings.
- \* No leakage, or a minimization of leaks, during refueling activities.
- \* Based on 20+ years of historical survey data, RP has reduced PPE and respiratory requirements for reactor disassembly and/or reassembly.
- \* Reduction in Dose and PCE's during reactor cavity decon and head disassembly/reassembly activities.
- \* Reduction in hot particle activity.



# Measurements of Success continued

- \* The personnel exposure limits will be lower due to the fast process of the InstaCote™ ML2 application (dries in <30 seconds), and smaller crew size.
- \* The InstaCote™ ML2 process provides a significantly greater decontamination (DF) of the reactor cavity compared to other methods currently employed at other sites.
- \* InstaCote™ ML2 can be removed off of critical path!



# InstaCote™ ML-2 Equipment

Graco E-30 application proportioner.



Drums of the two part InstaCote™ ML-2.





## InstaCote™ ML-2 Equipment continued



InstaCote™ ML-2 spray gun. The tip of the gun is where the InstaCote™ ML-2 is created.



# InstaCote™ ML-2 Equipment continued

Step-down transformer used to convert house current (480 V 60 amp 3-phase) to power the E-30 application proportioner. Per the ML procedure section 6.1.0 the correct power outlet will be identified and verified available.





# InstaCote™ ML-2 Equipment continued

Operable plant service air of between 90 to 120 psi at 20 scfm (standard cubic feet per minute) will be dedicated to the InstaCote™ ML-2 application equipment.



Note the “Caution” tag hung by Operations Department



# InstaCote™ ML-2 Equipment continued

## Master-Lee Decon Services, Inc. Self Contained Equipment Trailer





# Cavity Preparation

HEPA units are used to minimize the amount of paint fumes and overspray released onto the refuel floor, suction should be just below the edge of the cavity (a minimum of 2 HEPA units is recommended).





# Prior to InstaCote™ ML-2 Application

- \* Provide input to reactor services and scheduling (3 – 6 months out)
- \* Pre-Job Brief
- \* Discuss RWP in detail
- \* ALARA brief
- \* Discuss the use of Human Performance  
Tools (STAR, 2 Minute Drill, Situational Awareness, Etc.)
- \* Discuss goals and expectations
- \* Discuss responsibilities and roles
- \* Emphasize safety and discuss back out criteria



# Masking the Reactor Cavity

Pre-staging material prior to entry into the cavity is very important. Duct tape, razor knives and the masking material in sufficient quantities to accomplish the task in one continuous effort.

Masking material for covering





# Applicator Dress Out

InstaCote ML-2 spray applicator being suited up in a 2 piece air supplied fed hood before the application of the InstaCote™. A one piece bubble suit would also provide cooling from the air fed hood over the whole body and is recommended if available.





# Typical InstaCote Crew Size

- \* MLDS typically utilizes **9 – 10** personnel for InstaCote reactor cavity decon.
- \* MLDS utilizes 4 personnel to mask the cavity & topside support.
- \* MLDS utilizes 2 personnel to spray the cavity.
- \* MLDS utilizes 1 operator to run the equipment.
- \* A minimum of 5 MLDS personnel are top side cavity support to include responsibilities of:
  - Tending the application hose.
  - Tending the communication line.
  - Tending the breathing air lines.
  - Providing real time MDI air sampling for air quality concerns.



# Masking the Reactor Cavity (PWR)

## Reactor Cavity Masked For Coating



Walls and Lower Cavity masked prior to applying InstaCote™ ML-2.

Reactor Head masked prior to applying InstaCote™ ML-2.



# Application Process (PWR)

## InstaCote In Progress





# Application Process (PWR)



HEPA hose  
employed to  
minimize paint  
fumes on the  
floor



# Application Process (BWR)

## FME Cover and Cavity Masked Before Spraying



Walls 6' height masked prior to applying InstaCote™ ML-2.

Reactor Vessel covered for FME purposes prior to applying InstaCote™ ML-2.

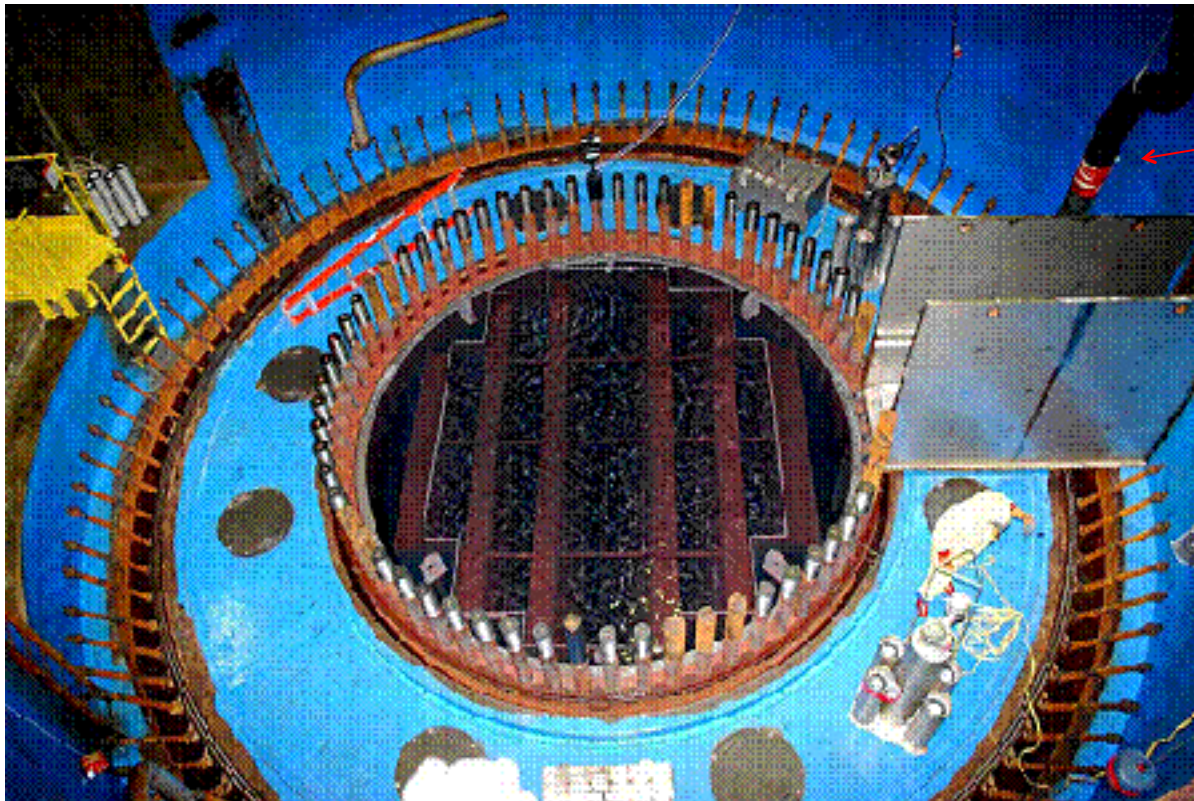


# Application Process (BWR)





# Application Process (BWR) continued



HEPA hose  
employed to  
minimize paint  
fumes on the  
floor



# Completion of PWR Reactor Cavity



InstaCote™ ML-2 applied 6' up the cavity walls and floor including sandbox and NI covers.



# Completion of BWR Reactor Cavity





# InstaCote™ ML-2 Removal

Prior to the InstaCote™ ML-2 removal process, the following materials should be staged on the refuel floor:

- \* Large Radiological trash bags
- \* Duct tape to seal the bags
- \* Razor Knives
- \* Kevlar Gloves



# InstaCote™ ML-2 Removal continued

Wall Removal



Floor Removal



# Initial Survey

[illegible]

# Post InstaCote Application Survey

Salem		Radiological Survey		MAP#	2213019																																																																																				
Location: 52 UNIT 120 RADIUM (UPPER)		Date: 6-29-2014	Time: 0300	Page: 1																																																																																					
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Instrument: <u>E140</u> Scale: <u>1453</u> Instrument: <u>SAC-1</u> Scale: <u>0560</u>																																																																																									
Location: <u>52 UNIT 120 RADIUM (UPPER)</u> Survey Type: <u>General</u>																																																																																									
<table border="1"> <thead> <tr> <th>LOC</th> <th>Area (sqm)</th> <th>LOC</th> <th>Area (sqm)</th> </tr> </thead> <tbody> <tr><td>1</td><td>&lt; 1 K</td><td>1</td><td>&lt; 1 K</td></tr> <tr><td>2</td><td></td><td>2</td><td></td></tr> <tr><td>3</td><td></td><td>3</td><td></td></tr> <tr><td>4</td><td></td><td>4</td><td></td></tr> <tr><td>5</td><td></td><td>5</td><td></td></tr> <tr><td>6</td><td></td><td>6</td><td></td></tr> <tr><td>7</td><td></td><td>7</td><td></td></tr> <tr><td>8</td><td></td><td>8</td><td></td></tr> <tr><td>9</td><td></td><td>9</td><td></td></tr> <tr><td>10</td><td></td><td>10</td><td></td></tr> <tr><td>11</td><td></td><td>11</td><td></td></tr> <tr><td>12</td><td></td><td>12</td><td></td></tr> <tr><td>13</td><td></td><td>13</td><td></td></tr> <tr><td>14</td><td></td><td>14</td><td></td></tr> <tr><td>15</td><td></td><td>15</td><td></td></tr> <tr><td>16</td><td></td><td>16</td><td></td></tr> <tr><td>17</td><td></td><td>17</td><td></td></tr> <tr><td>18</td><td></td><td>18</td><td></td></tr> <tr><td>19</td><td></td><td>19</td><td></td></tr> <tr><td>20</td><td></td><td>20</td><td></td></tr> </tbody> </table>		LOC	Area (sqm)	LOC	Area (sqm)	1	< 1 K	1	< 1 K	2		2		3		3		4		4		5		5		6		6		7		7		8		8		9		9		10		10		11		11		12		12		13		13		14		14		15		15		16		16		17		17		18		18		19		19		20		20					
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Survey Type: <u>General</u> Surveyed By: <u>Robert P. Bonaguidi</u>																																																																																									
Comments: <u>Fast R. Ca. Ca. Down</u> <u>Source for Down Position</u> <u>No Hot Particles</u> <u>R. Long Tunnels - Not</u> <u>Tensioned</u> <u>Spills 15-20 TAKES ON</u> <u>WATER</u> <u>Results &lt; 1 K DPM/100</u>																																																																																									
Signature: <u>Robert P. Bonaguidi</u> Date: <u>6/29/14</u>																																																																																									

# Initial Survey

Solom		Radiological Survey		SCALE	2213019
LOCATION: 52 CTMC 137 BX CAVITY (UPPER)		Date	5/2/17	Time	2:00
Radiation Survey					
r	Instrument	Serial			
r	TPS-1.2	5012-129			
r	Instrument	Serial			
r	TPS-1.2	5012-043			
Contamination Survey					
EN	Instrument	Serial			
EN	LS-2	38411			
A	Instrument	Serial			
A	LS-2300	318712			
Contamination R/r					
LOC	Area	Area/100cm <sup>2</sup>	LOC	Area	Area/100cm <sup>2</sup>
1	282		2	450	
2	450		3	114	
3	114		4	178	
4	178		5	114	
5	114		6	178	
6	178		7	114	
7	114		8	178	
8	178		9	114	
9	114		10	178	
10	178		11	114	
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225	114		226	178	
226	178				

# Post InstaCote™ ML-2 Survey

Salem		Radiological Survey		NAEP #	2215019
Location: 50' DEEP LOWER CAVITY (UPPER)		Date: 5/22/17		Sheet: 1268	BOX: 25
Radiation Survey					
Instrument:	Serial: 211147				
Exposure: A	Scale: N				
Contamination Survey					
Detectors:	Serial: 9275				
Exposure: 3.48 2400	Serial: 312773				
Contamination By					
LOC	Area/100sqd	LOC	Area/100sqd		
1	SPK	11	<1K		
2	1.2K	12			
3	12.5	13			
4	SPK	14			
5	<1K	15			
6		16			
7		17			
8	SPK	18	SPK		
9	SPK	19	SPK		
10		20	SPK		
Survey Type					
A	Contamination	LOC	Area/100sqd		
N	Surface	11	<1K		
X	Other	12			
Surveyed By:					
Print: B. BURDANTE					
Sign: <i>[Signature]</i>					
COMMENTS:					
NO HOT PARTICLES DETECTED					
SMEAR #11 = SPK OFF/PAINT					
SMEAR #22 = SPK = <1K OFF/PAINT					
= 1/2 CAVITY DOWNPOST SURVEY					
SIMILAR SURVEY ONLY AS PER RPS SEE 2215019Q DATED 5/23/17 @C500 FOR DOSE RATES					
Technician Review		Supervisor Review		DATE	
Salem <i>[Signature]</i>		Salem <i>[Signature]</i>		5-22-17	

# Post InstaCote™ ML-2 Removal Survey

<b>Salom</b> <small>Operative Inc.</small>		Radiological Survey		MAP #	2213019																																																																																																																																																																																																
Location: S2 CTMT 120 RECAVITY (UPPER)		Date: 05-27-2017		Time: 14:00																																																																																																																																																																																																	
		BY: EMT Festool		REV: 2.5																																																																																																																																																																																																	
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# ALARA Information

Rwp	Task #	WO #	Time In	Time Out	Org Code	Last Name	First Name	High	Rate	TIME	Max	Net	Dose	
S17-25		96	30290568	5/21/2017 1:14:30 PM	5:25:19 PM	H-RP03	KENNEDY	JOHN	250.00	1,400.00	4.2	4.80	2.20	2
S17-25		96	30290568	5/22/2017 3:04:30 AM	3:23:41 AM	C-DECON	GARCIA	SILVIA	250.00	1,400.00	0.3	0.30	0.00	0
S17-25		96	30290568	5/22/2017 3:04:43 AM	3:23:50 AM	C-DECON	HOOKFIN	VESSIA	250.00	1,400.00	0.3	0.30	0.00	0
S17-25		96	30290568	5/22/2017 3:03:19 AM	3:54:43 AM	C-DECON	STEVENS	TODD	250.00	1,400.00	0.9	1.40	0.00	0
S17-25		96	30290568	5/22/2017 3:03:43 AM	3:55:06 AM	C-DECON	MCCORMICK	WILLIAM	250.00	1,400.00	0.9	1.30	0.00	0
S17-25		96	30290568	5/22/2017 3:03:07 AM	3:55:32 AM	C-DECON	FALLAS	BROC	250.00	1,400.00	0.9	6.60	0.10	0
S17-25		96	30290568	5/22/2017 3:03:10 AM	3:55:39 AM	C-DECON	SCHOCK	JAMES	250.00	1,400.00	0.9	1.40	0.00	0
S17-25		96	30290568	5/22/2017 5:45:16 AM	8:21:32 AM	C-RTECH	TOWNS	EDDIE	250.00	1,400.00	2.6	7.80	1.80	2
S17-25		96	30290568	5/22/2017 5:41:58 AM	8:31:01 AM	C-RTECH	FLEETWOOD	JOYCE	250.00	1,400.00	2.8	6.18	1.30	1
S17-25		96	30290568	5/22/2017 6:54:44 AM	10:22:37 AM	C-DECON	WEDOW	TIMOTHY	250.00	1,400.00	3.5	17.10	9.60	10
S17-25		96	30290568	5/22/2017 6:55:22 AM	10:27:53 AM	C-DECON	SENITTA	STEVEN	250.00	1,400.00	3.5	26.40	10.70	11
S17-25		96	30290568	5/22/2017 5:49:45 AM	10:37:02 AM	C-DECON	HOOKFIN	VESSIA	250.00	1,400.00	4.8	28.20	13.30	13
S17-25		96	30290568	5/22/2017 5:49:14 AM	10:37:24 AM	C-DECON	MCCORMICK	WILLIAM	250.00	1,400.00	4.8	25.80	16.10	16
S17-25		96	30290568	5/22/2017 5:49:20 AM	10:37:47 AM	C-DECON	STEVENS	TODD	250.00	1,400.00	4.8	144.00	17.10	17
S17-25		96	30290568	5/22/2017 5:50:19 AM	10:39:42 AM	C-DECON	GARCIA	SILVIA	250.00	1,400.00	4.8	26.40	17.10	17
S17-25		96	30290568	5/22/2017 5:49:44 AM	10:42:25 AM	C-DECON	SCHOCK	JAMES	250.00	1,400.00	4.9	45.60	16.30	16
S17-25		96	30290568	5/22/2017 5:49:41 AM	10:51:12 AM	C-DECON	FALLAS	BROC	250.00	1,400.00	5.0	102.00	19.80	20
S17-25		96	30290568	5/22/2017 9:33:00 AM	12:11:34 PM	C-RTECH	FLEETWOOD	JOYCE	250.00	1,400.00	2.6	5.57	0.90	1
S17-25		96	30290568	5/22/2017 9:49:22 AM	12:11:51 PM	C-RTECH	TOWNS	EDDIE	250.00	1,400.00	2.4	4.10	0.70	1
S17-25		96	30290568	5/23/2017 10:25:12 AM	11:41:38 AM	C-DECON	CREELY	DENNIS	250.00	1,400.00	1.3	20.60	4.30	4
S17-25		96	30290568	5/23/2017 10:25:09 AM	11:42:05 AM	C-DECON	SCHOCK	JAMES	250.00	1,400.00	1.3	19.60	4.10	4
S17-25		96	30290568	5/23/2017 10:25:12 AM	12:03:58 PM	C-DECON	MCCORMICK	WILLIAM	250.00	1,400.00	1.6	26.80	7.80	8
S17-25		96	30290568	5/23/2017 10:25:15 AM	12:05:13 PM	C-DECON	SENITTA	STEVEN	250.00	1,400.00	1.7	21.90	10.10	10
S17-25		96	30290568	5/23/2017 10:24:50 AM	12:05:25 PM	C-DECON	GARCIA	SILVIA	250.00	1,400.00	1.7	17.10	3.70	4
S17-25		96	30290568	5/23/2017 10:24:59 AM	12:05:39 PM	C-DECON	FALLAS	BROC	250.00	1,400.00	1.7	21.60	8.10	8
S17-25		96	30290568	5/23/2017 10:26:00 AM	12:05:57 PM	C-DECON	GARCIA	RICHARD	250.00	1,400.00	1.7	24.00	6.20	6
S17-25		96	30290568	5/23/2017 10:24:51 AM	12:10:35 PM	C-DECON	HOOKFIN	VESSIA	250.00	1,400.00	1.8	32.80	10.20	10
S17-25		96	30290568	5/23/2017 10:24:38 AM	12:44:21 PM	C-DECON	STEVENS	TODD	250.00	1,400.00	2.3	18.90	13.80	14
S17-25		96	30290568	5/23/2017 10:26:02 AM	12:48:19 PM	C-DECON	WEDOW	TIMOTHY	250.00	1,400.00	2.4	25.60	15.40	15
S17-25		96	10	5/23/2017 1:57:23 PM	4:11:59 PM	S-RTECH	BURDSALL	BRETT	250.00	1,400.00	2.2	9.10	0.60	1
S17-25		96	10	5/24/2017 9:25:10 AM	11:00:27 AM	S-RTECH	SPIESE	STEVEN	300.00	1,400.00	1.6	318.00	35.30	35
S17-25		96	10	5/24/2017 9:24:50 AM	11:02:27 AM	S-RTECH	CLINE	JOSEPH	300.00	1,400.00	1.6	395.00	38.60	39
S17-25		96	10	5/24/2017 11:19:30 AM	1:45:03 PM	H-RPTECH	KNIGHT	JONATHAN	300.00	1,400.00	2.4	19.20	11.30	11
S17-25		96	10	5/24/2017 11:20:18 AM	3:47:50 PM	S-RTECH	BURDSALL	BRETT	300.00	1,400.00	4.5	595.00	54.10	54
														350

**Date:** May 7, 2018 @ 1600  
**Site Name:** Wolf Creek Generating Station  
**Project:** Full Scope Refuel  
**Project Lead:** Jeremy King

**Phone Number(s) at Site:**

- Master-Lee Office, 620-364-8831 x4354, King cell 724-544-6579  
Buchta cell 412-554-6336 (nights)
- Use M-L Email for communications.

**CURRENT PLANT STATUS:** Mode 6

**WORK COMPLETED IN PAST 12 HOURS:** Installed cavity elevator, removed bullet nose, removed cavity ladder. Removed stud hole plugs and guide studs. QC inspected stud holes, SAT. Started installing reactor studs.

**QUALITY/SAFETY/HuP ISSUES:** MLDS did an excellent job with cavity instacote, we were released to work in the cavity in singles after the application. NO PCE's with stud hole plugs or guide stud removal IN SINGLES.

**EQUIPMENT/TOOLING/PERSONNEL ISSUES:** Lost time due to polar crane limit switch troubleshooting issues.

**SCHEDULED WORK FOR NEXT 12 HOURS:** Complete installing studs, mobilize tensioners, tension head,

**Crew Schedule:** 24/7

**EXPECTED TRAVEL OUT DATE:** May 10/11, 2018



# BWR/PWR Plants

## InstaCote™ ML-2 has been used

### **BWR Plants**

Vermont Yankee  
Oyster Creek  
Cooper  
Nine Mile

### **PWR Plants**

ANO 1,2  
Commanche Peak 1,2  
Ginna  
Salem 1,2  
Sequoyah 1,2  
St. Lucie 1,2  
Turkey Point 3,4  
Watts Bar  
Wolf Creek



Questions?  
Discussions