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/100cm2)
* 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.

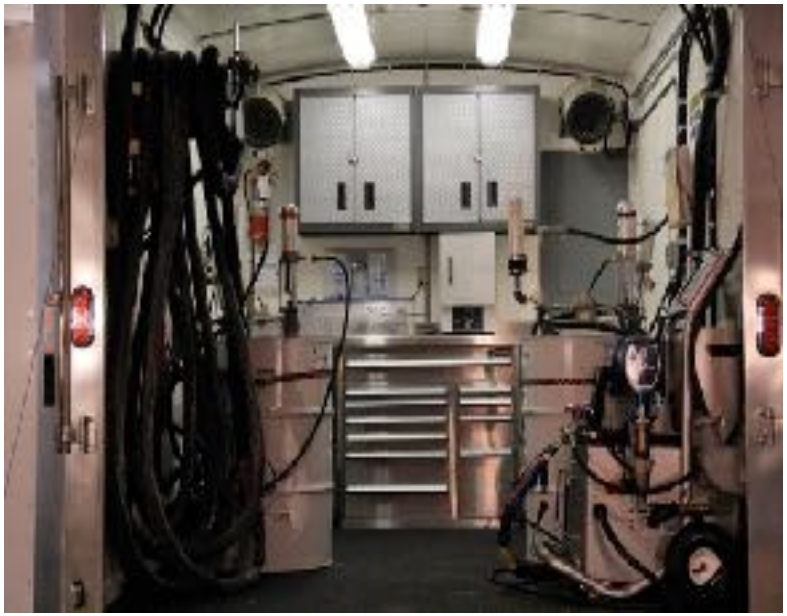
InstaCote™ ML-2 Equipment continued

Operable plant service air of between 90 to 120 psi at 20 scfm (standard cubic feet per minute) will be dedicated to the InstCote™ 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).

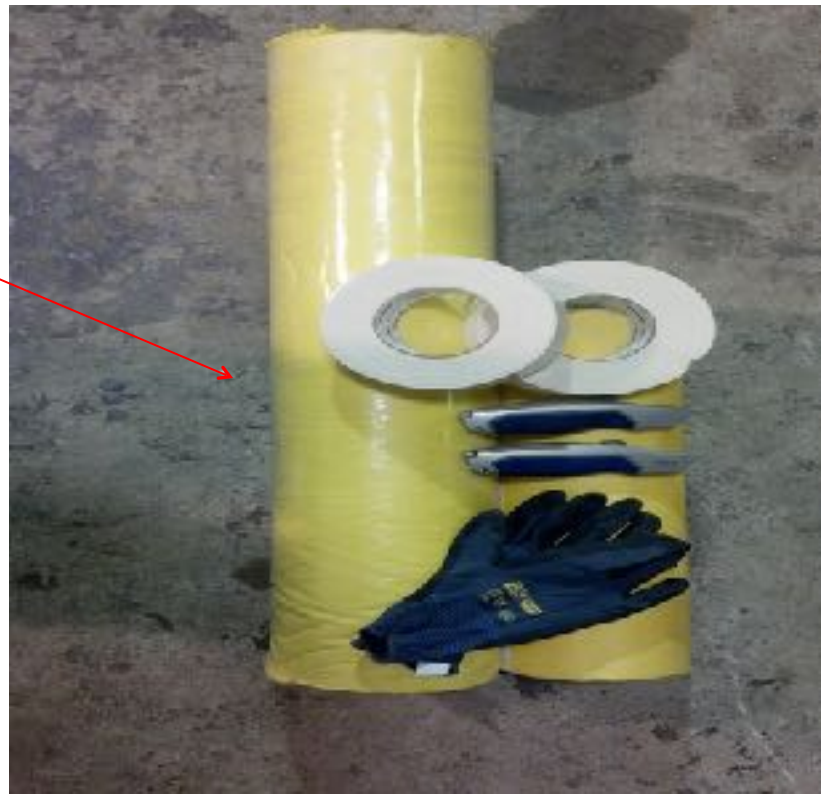
Prior to InstaCote™ ML-2 Application

* 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)

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

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

Application Process (PWR)

Application Process (PWR)

HEPA hose employed to minimize paint fumes on the floor

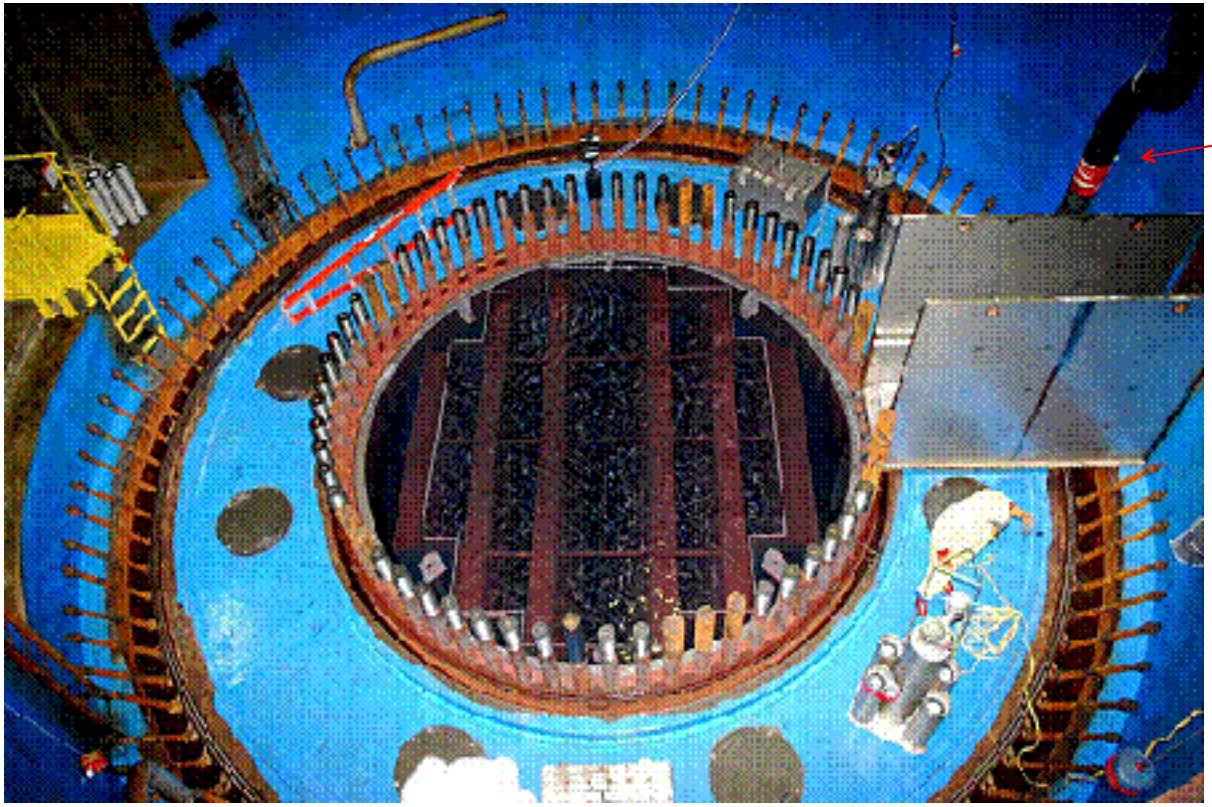
Application Process (BWR)

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:

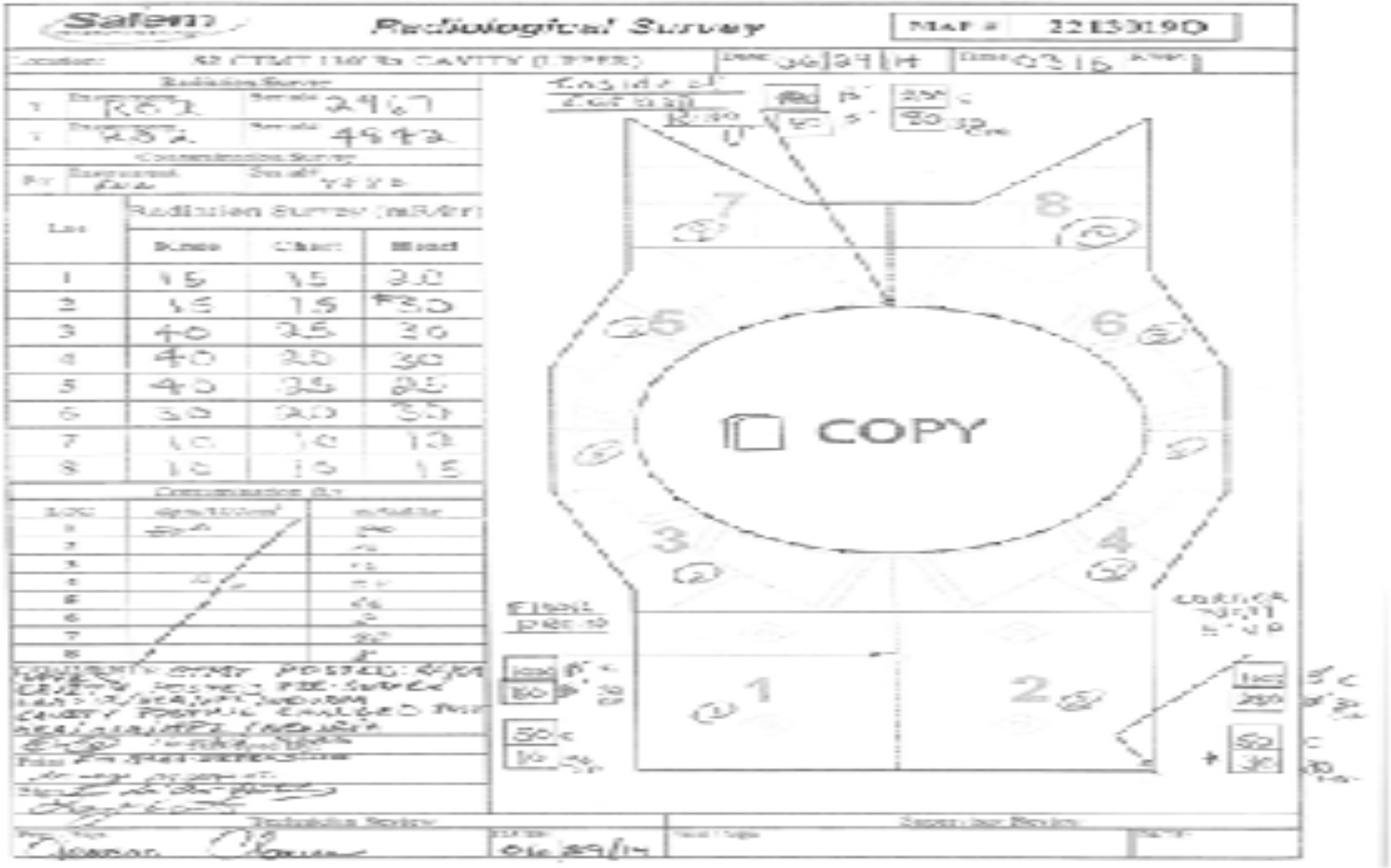
* Large Radiological trash bags
* Duct tape to seal the bags
* Razor Knives
* Kevlar Gloves

InstaCote™ ML-2 Removal continued

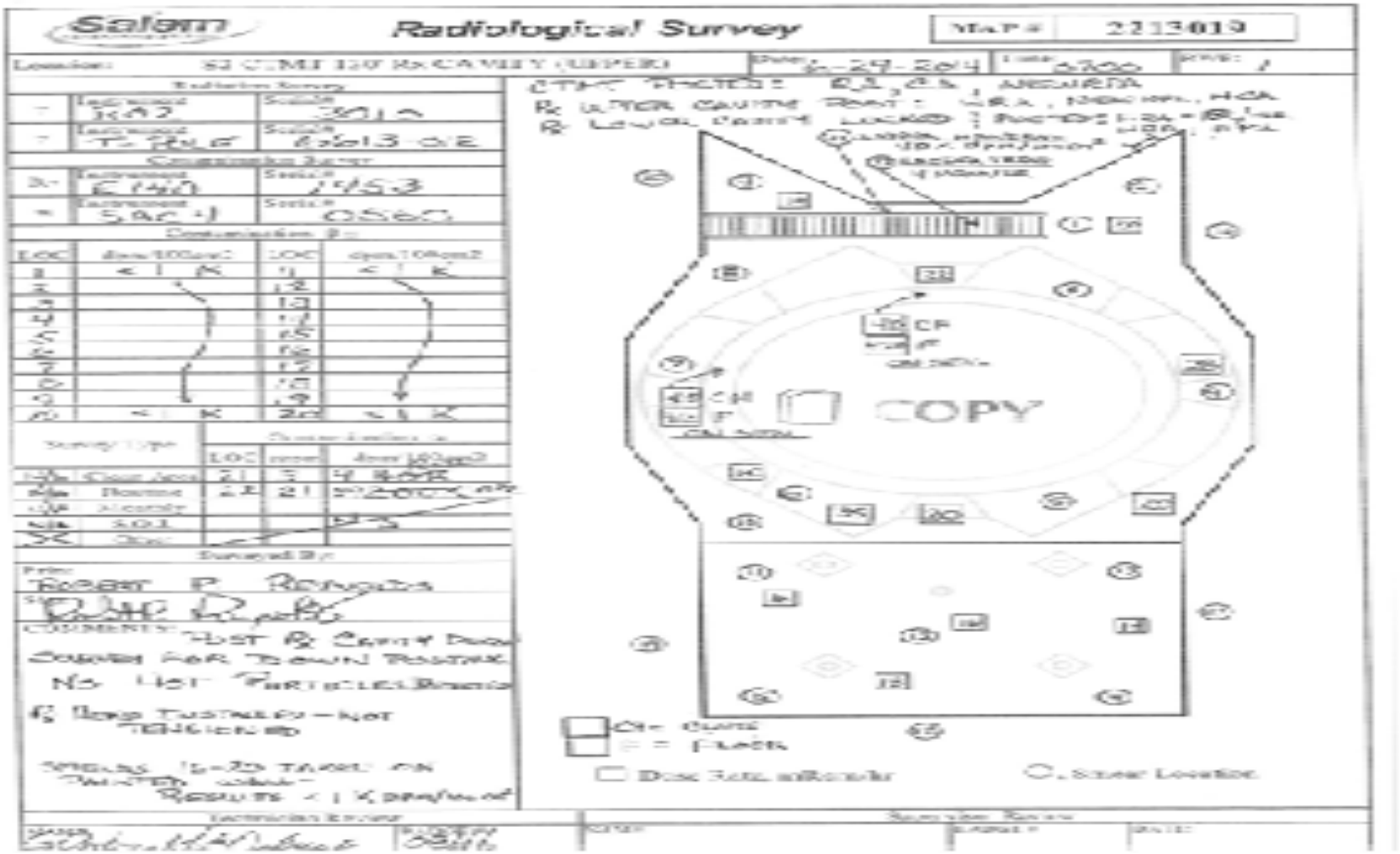
Wall Removal

Floor Removal

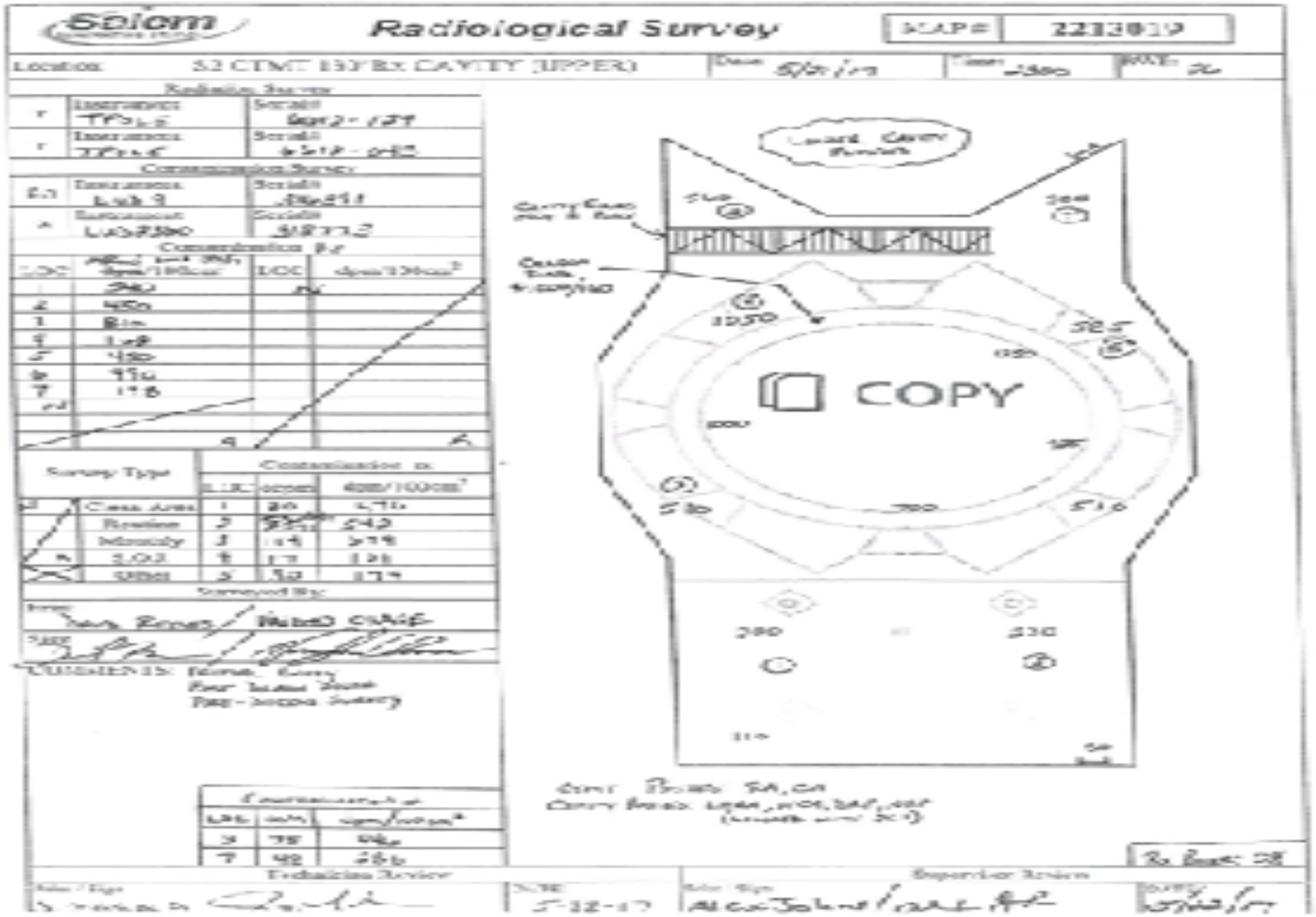
Initial Survey



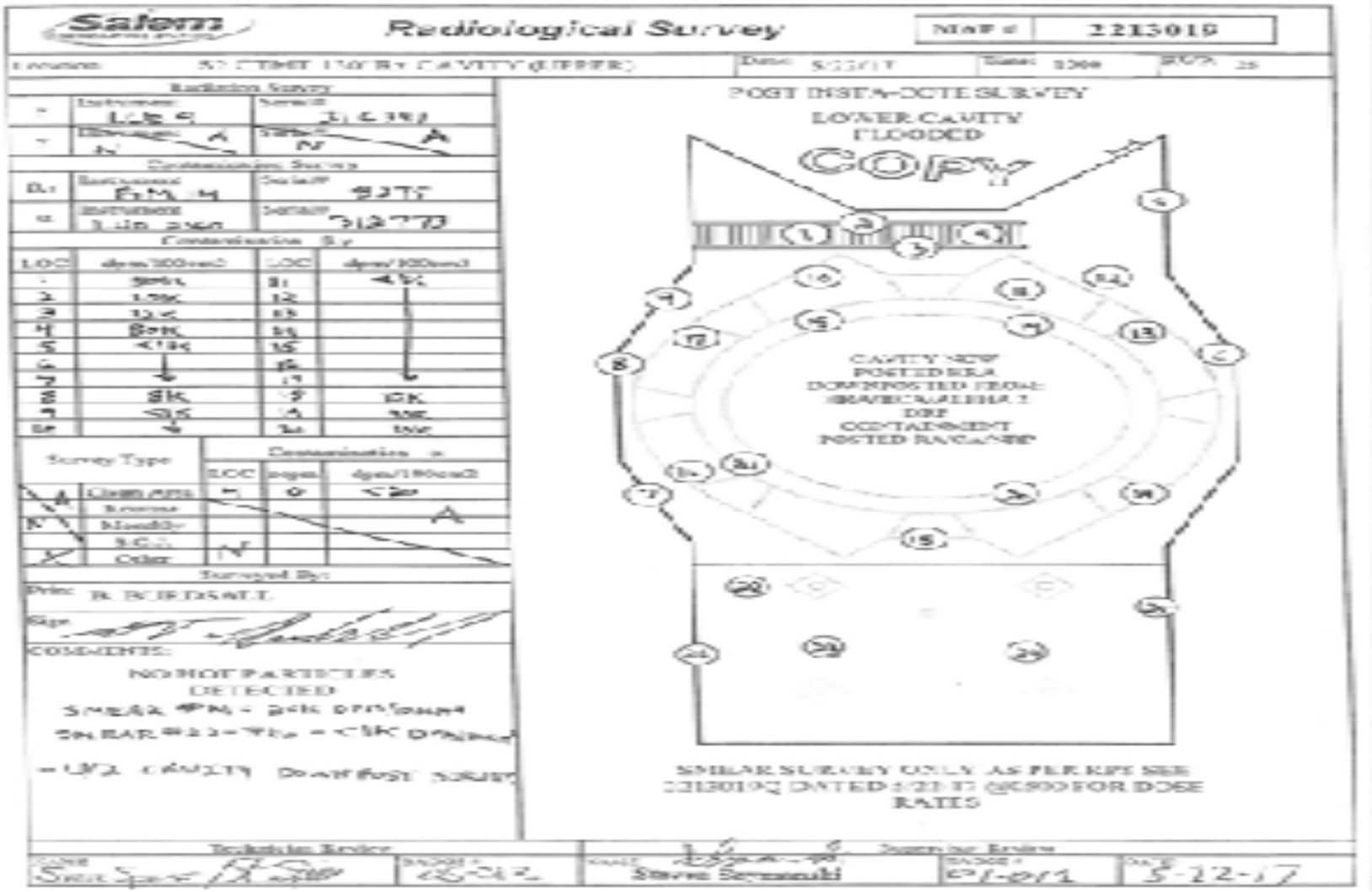
Post InstaCote Application Survey



Initial Survey



Post InstaCote™ ML-2 Survey



Salem

Radiological Survey

MAP # 2213019

POST INSTA-COTE SURVEY

LOWER CAVITY FLOODED

COPY

SMEAR SURVEY ONLY AS PER RPT SEE 2213019 DATED 5/22/17 @ 300 FOR DOSE RATES

Technician Review

Supervisor Review

Steve Sereseuski

5-22-17

Post InstaCote™ ML-2 Removal Survey

Salem Generating Station — Radiological Survey — MAP # 2213019

Location:	S2 CTMT 130' Rx CAVITY (UPPER)
Date:	05-23-2017
Time:	1850
RWP:	S2017-25

Radiation Survey

	Instrument	Serial#
γ	N/A	
γ		N/A

Contamination Survey

	Instrument	Serial#
β-γ	RM-14	8275
α	N/A	N/A

Contamination By

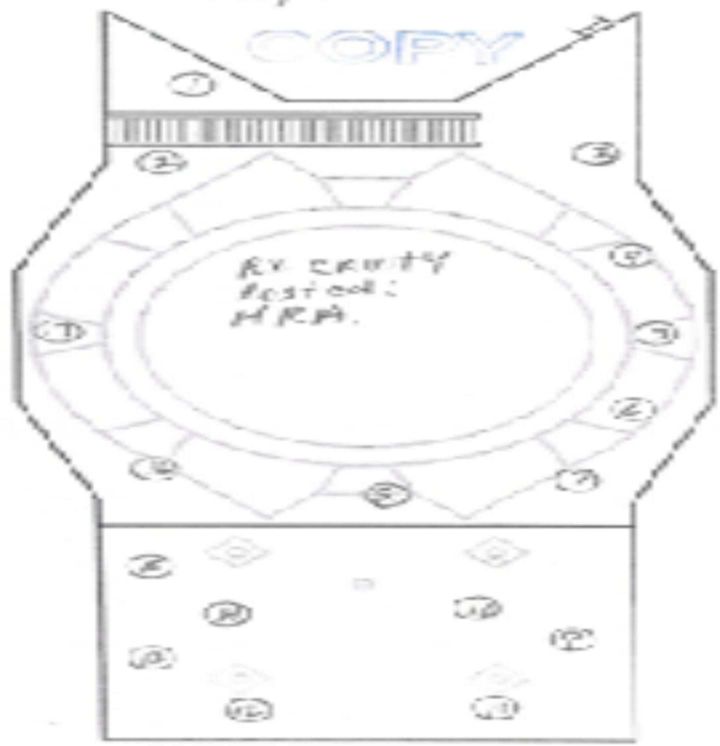
LOC	dpm/100cm²	LOC	dpm/100cm²
1	17000	11	16800
2	17839	12	11800
3	12098	13	5000 wall
4	15599	14	16000
5	100K wall	15	8300
6	16600	16	17900
7	20700	17	12300 wall
8	17150		N/A
9	5460 wall		
10	17805		

Survey Type		LOC	cpm	dpm/100cm²
N/A	Clean Area			N/A
N/A	Routine			
✓	Monthly			
	ECC			
N/A	Other			

Surveyed By: Print: [illegible] Sign: [illegible]

COMMENTS: Post decon survey after InstaCote removed.

START: Posted: RA, CA



Technician Review: [illegible] Date: 5/23/17

Supervisor Review: [illegible] Date: 5-23-17

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