

Station Dose Estimate Process & ALARA Oversight

Martha Wagner



Station Dose Estimate Process

- Dose Estimates are submitted weekly to ALARA Planning by the individual departments.
- Carpenters are leading Palo Verde in their radiological planning efforts.
 - Detailed work plans are generated by their ALARA Advocates that exceed station expectations and ensure radiation exposure is maintained ALARA in the field.
- The Carpenters strive to set higher industry standards in estimating and tracking dose exposure.
 - This is achieved by communicating, updating workers and identifying dose limits within the location(s) where work is to be performed.



Worker Information Sheet *Developed by ALARA Advocate!*

The applicable RP jobsite information is provided to the workers and includes:

- Recent survey maps;
- Area dose exposure;
- Work location;
- Estimated crew size;
- Estimated stay times (with estimated dose exposure); and,
- A brief description of informational notes

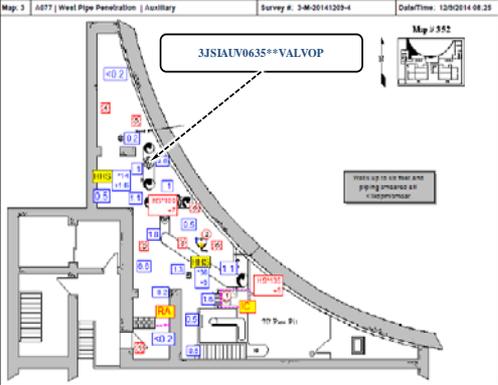
WME:	4474119	EQUIPMENT ID:	3JSIAUV0635**VALVOP	↓ EST ↓	↓ ACT ↓
EST CREW SIZE:	3	EST OF TIME:	2	EST OF DOSE:	2
SURVEY MAP NUMBER:	3-M-20141209-4		WORKSCOPE:	Erect Scaffold	
COMMENT:	77' West Wrap				

Build a Scaffold to support (OPS) They need access to the Stem Indicator Rod (inside White Cover on top of the Actuator) For Testing.

The Scaffold is to support 78ST3X11 'A' ECCS Throttle valve testing (Rubber Ruler)
The deck is typically built from the Steel around the Actuator above the Valve.



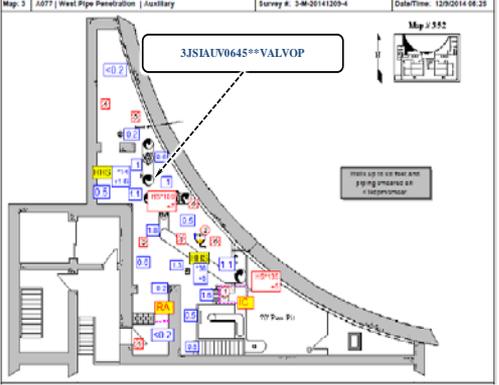
Map: 3	A077 West Pipe Penetration Auxiliary	Survey #: 3-M-20141209-4	Date/Time: 12/09/2014 08:25
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WME:	4474120	EQUIPMENT ID:	3JSIAUV0645**VALVOP	↓ EST ↓	↓ ACT ↓
EST CREW SIZE:	3	EST OF TIME:	2	EST OF DOSE:	3
SURVEY MAP NUMBER:	3-M-20141209-4		WORKSCOPE:	Erect Scaffold	
COMMENT:	77' West Wrap				



Map: 3	A077 West Pipe Penetration Auxiliary	Survey #: 3-M-20141209-4	Date/Time: 12/09/2014 08:25
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DOSE EST UNIT (1) BY WORK WEEK					
Enter WW					
WEEKLY TOTAL: 0 False					
ESTIMATE BY WM UNIT (1)					
WM:	0	EQUIPMENT ID:	0	EST	ACT
EST CREW SIZE:	0	EST OF TIME:	0	EST OF DOSE:	0.0 0.0
SURVEY MAP NUMBER:	0	WORK SCOPE:	0		
COMMENTS:					
WM:	0	EQUIPMENT ID:	0	EST	ACT
EST CREW SIZE:	0	EST OF TIME:	0	EST OF DOSE:	0.0 0.0
SURVEY MAP NUMBER:	0	WORK SCOPE:	0		
COMMENTS:					
WM:	0	EQUIPMENT ID:	0	EST	ACT
EST CREW SIZE:	0	EST OF TIME:	0	EST OF DOSE:	0.0 0.0
SURVEY MAP NUMBER:	0	WORK SCOPE:	0		
COMMENTS:					
WM:	0	EQUIPMENT ID:	0	EST	ACT
EST CREW SIZE:	0	EST OF TIME:	0	EST OF DOSE:	0.0 0.0
SURVEY MAP NUMBER:	0	WORK SCOPE:	0		
COMMENTS:					
WM:	0	EQUIPMENT ID:	0	EST	ACT
EST CREW SIZE:	0	EST OF TIME:	0	EST OF DOSE:	0.0 0.0
SURVEY MAP NUMBER:	0	WORK SCOPE:	0		
COMMENTS:					
WM:	0	EQUIPMENT ID:	0	EST	ACT
EST CREW SIZE:	0	EST OF TIME:	0	EST OF DOSE:	0.0 0.0
SURVEY MAP NUMBER:	0	WORK SCOPE:	0		
COMMENTS:					
WM:	0	EQUIPMENT ID:	0	EST	ACT
EST CREW SIZE:	0	EST OF TIME:	0	EST OF DOSE:	0.0 0.0
SURVEY MAP NUMBER:	0	WORK SCOPE:	0		
COMMENTS:					
WM:	0	EQUIPMENT ID:	0	EST	ACT
EST CREW SIZE:	0	EST OF TIME:	0	EST OF DOSE:	0.0 0.0
SURVEY MAP NUMBER:	0	WORK SCOPE:	0		
COMMENTS:					

Combined Tracking Sheet

All information is provided and tracked by the accumulating tracking sheet, that identifies the total estimated dose exposure by week.

WM:	4474119	EQUIPMENT ID:	3JSIAUV0635**VALVOP	↓ EST ↓	↓ ACT ↓
EST CREW SIZE:	3	EST OF TIME:	1	EST OF DOSE:	2 2
SURVEY MAP NUMBER:	2-M-20141209-4		WORK SCOPE:	Erect Scaffold	
COMMENT:	Job went well...				

Information is self retrieved by the Department ALARA Advocate from radiological survey data published online. This information is transferred to the required “green fields” to provide a detailed dose estimate to ALARA Planning.

The Dose Tracking Sheet is locked from editing as information is automatically updated in document





Palo Verde Nuclear Generating Station
 Online Dose Estimates
 WW 1535 08/24/2015 to 08/30/2015

ALARA Review of Department Online Estimates

Collective Radiation Exposure

Departments	Monday			Tuesday			Wednesday			Thursday			Friday			Saturday			Sunday			Non-Unit Est	Unit Total Weekly Dose			Total Dose
	U1	U2	U3	U1	U2	U3	U1	U2	U3	U1	U2	U3	U1	U2	U3	U1	U2	U3	U1	U2	U3		U1	U2	U3	
Operations	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	1	1	1	1	1	1		5	4	5	14
Electrical Maintenance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
I & C	0	0	0	0	0	0	0	0	8	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	13	13
Mechanical Maintenance	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0		1	2	1	4
Valve Services	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	8
Maintenance Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Outage Maintenance/Fuels	0	0	0	0	0	1	1	0	1	1	0	1	0	0	1	0	0	0	0	0	0		2	0	4	6
FLEX Modifications	0	0	0	0	3	0	0	2	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	7	0	7
Carpenters	0	0	0	0	36	0	0	27	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	63	2	65
Insulators	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	14
Weld	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0		0	0	5	5
Utilities - Coaters	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemistry	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Radiation Protection	0	0	0	1	3	3	2	3	4	1	2	7	1	1	2	0	0	0	0	0	0		5	9	16	30
Engineering Projects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plant Engineering	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Program Engineering	0	0	0	1	0	1	0	2	1	1	0	1	0	0	0	0	0	0	0	0	0	0	2	2	3	7
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	3			66			66			24			8			3			3			0	173			

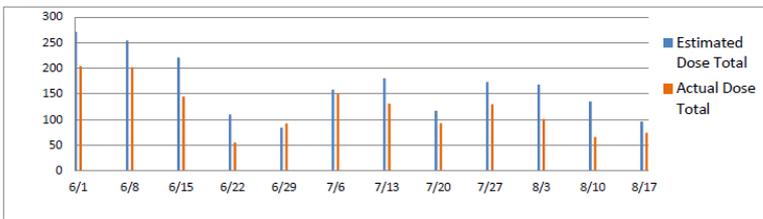
Once individual estimates are complete they are submitted to ALARA for review.

Each Department breaks down dose estimates by each Unit and daily.

* Any estimate of 15 mR or greater in one unit will be discussed at the T-2 meeting by the work group's representative.



T+1 Site ALARA Summary
WW1534 08/17/2015 - 08/23/2015



Notable work:

DCS Start 02/09/2015

3R18 REFUEL OUTAGE 4/4/15

- Good Alara Practice
- Emergent / Expan Scope
- Est. Needs Improvement
- Work Not Perf./Canceled

Department	Weekly Estimate	Weekly Actual	% of Weekly Estimate	2015 Online Estimate	YTD Online Actual	% of Yearly of Estimate	Dose Estimate Trend (Estimate / Actual)											
							8/10	8/3	7/27	7/20	7/13	7/6	6/29	6/22	6/15	6/8	6/1	
Operations	12	10	83%	690	468	68%	14/4	13/8	12/14	15/5	15/10	12/17	10/6	12/8	14/13	28/8	12/17	
Electrical Maint	0	0	0%	258	130	50%	0/0	0/0	12/5	0/0	0/0	2/1	0/0	0/0	0/0	0/0	0/0	
I & C	2	1	50%	276	99	36%	0/0	11/2	12/2	17/4	0/1	5/9	2/3	2/2	0/0	0/2	0/3	
Mechanical Maint	3	0	0%	175	139	79%	3/0	3/0	3/1	1/0	16/10	6/2	1/0	9/2	3/0	0/0	0/4	
Valve Services	0	0	0%	644	219	34%	5/0	14/10	1/6	5/2	5/0	15/25	4/8	5/4	7/3	15/20	20/25	
Maint. Other	0	0	0%	46	81	176%	0/0	0/1	3/1	3/1	3/0	3/0	0/1	3/1	3/1	3/0	3/3	
Out. Maint / Fuels	2	6	300%	1280	656	51%	5/6	17/5	2/1	2/1	3/0	5/3	5/0	9/1	67/47	64/47	68/53	
Flex Mods	5	3	60%	829	701	85%	12/5	50/35	53/59	30/44	30/32	42/35	20/25	4/15	22/19	18/17	15/1	
Carpenters	19	17	89%	755	405	54%	38/25	8/8	15/12	0/0	17/9	10/11	0/1	19/14	26/11	19/22	40/10	
Insulators	0	0	0%	221	140	63%	12/5	8/5	10/0	0/0	0/0	25/3	3/4	7/2	1/0	0/2	33/7	
Weld	0	0	0%	147	42	29%	5/3	0/1	0/2	0/0	0/1	5/4	0/0	5/0	0/0	0/0	0/0	
Utilities / Coaters	0	0	0%	105	136	130%	4/2	0/0	0/0	0/0	0/0	0/0	0/0	5/0	0/0	16/3	20/16	
Chemistry	0	0	0%	37	15	41%	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/1	0/1	0/0	
Radiation Protection	44	34	77%	2265	1476	65%	21/13	34/22	40/23	34/35	82/65	16/24	28/34	21/5	68/47	81/65	51/59	
Engineering Projects	0	0	0%	37	56	151%	6/0	0/0	0/1	0/0	0/1	0/9	2/2	0/0	0/0	0/6	0/0	
Plant Engineering	2	0	0%	110	93	85%	3/1	3/1	3/0	3/0	0/0	2/0	0/0	2/1	3/0	3/4	2/0	
Program Engineering	7	2	29%	313	148	47%	7/1	7/3	7/4	7/1	9/2	9/6	9/7	7/0	7/3	7/5	7/6	
Other	0	1	100%	51	46	90%	0/1	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	
Total	96	74	77%	8239	5050	61%	135/66	168/101	173/130	117/93	180/131	158/149	84/92	110/55	221/145	254/202	271/204	

T+1 ALARA Review

Department Deltas and Good ALARA Practices are reviewed.

Following each work week, department dose performance is reviewed weekly at the T+1 Meetings.

Deltas outside the threshold are outlined on the Stations Factors Affecting Dose Sheet.

When the estimate or actual dose is greater than or equal to 8 mRem, the work group representative will discuss any delta that exceeds +/- 25%.
* Department dose now includes neutron dose.



Questions or Comments?



Martha Wagner



Risk Category	High Risk Activities	Radiological Risk Level	Risk Level Code
High Radiation	Activities involving the removal of stuck Incore Instrumentation (ICIs) or Control Element Assemblies (CEAs) which could be completely removed from the reactor by inadvertent movement or if activity is performed improperly.	High	RH-1
	Entry into the Incore Chase under the vessel.	High	RH-2
	Work activities where whole body dose rates are greater than or equal to 1000 mrem/hr OR the dose estimate for a worker is expected to be equal to or exceed 300 mrem in a single entry. If effective dose equivalent-external (EDEX) is used with multiple dosimetry, this dose rate / dose would apply to the whole body compartment(s) that comprise the trunk only.	High	RH-3
	Containment entries at power inside the pump bay bioshield 134' elevation and below.	High	RH-4
	Involves work in the 127' Containment Regenerative Heat Exchanger room with no shielding installed.	High	RH-5
	Full / Half jumps into the Primary Side Steam Generators OR Primary Side Steam Generator Maintenance requiring reach-ins when effective dose equivalent-external (EDEX) is not used.	High	RH-6
	Work activities on the 114' elevation of the Reactor Cavity when the Reactor Head is above the flange OR work activities on the 98' elevation of the Reactor Cavity.	High	RH-7
Contamination Alpha / Discrete Particles / Skin Dose	Potential shallow dose equivalent exposure rate in excess of 10 rads open window (OW) per hour OR individual directly handling items with contact dose equivalent rate exceeding 10 rads per hour (OW).	High	CH-1
	Work area contamination levels in excess of 1 rad per hour on a smear (OW).	High	CH-2
	Potential for worker exposure to radioactive particles that exceeds 400 mrad per hour (OW).	High	CH-3
	Entry into a large area, tank, tent, or a similar space that a worker(s) can occupy which is posted an Alpha Level III Area (i.e., not a "reach-in").	High	CH-4
	Involves surface destruction or aggressive mechanical action on an Alpha Level III Component.	High	CH-5
	Initial Cavity Decontamination / Flange inspection on the 114' cavity or below (activity may be downgraded to Medium Radiological Risk depending on assessment).	High	CH-6
Airborne	Potential for exposure to airborne radioactivity concentrations (excluding noble gas) exceeding 10 DAC. (TEDE ALARA evaluation required)	High	AH-1
	Performing high speed grinding or lapping in confined areas on contaminated surfaces of a Level II or III Alpha component.	High	AH-2
Diving	Diving activities in spent fuel pool, refuel pool, or transfer canals.	High	DH-1
Effluents / Environmental	Potential radioactive effluent pathway is not evaluated per the Off Site Dose Calculation Manual.	High	EH-1
Radiography	Radiography activities (does not include activities such as boundary guards or individuals transporting film)	High	TH-1
Miscellaneous	Any activity that the Radiation Protection Manager deems prudent to control as a High Risk radiological activity.	High	MH-1

Risk Category	Medium Risk Activities	Radiological Risk Level	Risk Level Code
High Radiation	Workers are expected to be exposed to external dose rates exceeding 100 mrem (gamma plus neutron) per hour AND the planned exposure per individual entry is > 200 mrem.	Medium	RM-1
	Involves handling any irradiated materials underwater or removal of any items from radioactive pools such as reactor cavity, transfer canal, and spent fuel pool	Medium	RM-2
	Involves work in non-uniform radiation fields where multiple dosimetry is used.	Medium	RM-3
	CH and PC Resin Transfers	Medium	RM-4
	Activities in areas subject to changing and elevated radiological conditions caused by the forced oxygenation of RCS (i.e., peroxide injection).	Medium	RM-5
	Containment entries at power where work activities are on the 140' elevation or above (to include lubricating CEDM fans). This does not include 140' airlock maintenance / operation or traveling between the airlock and the south stairwell.	Medium	RM-6
	Containment entries at power inside the following cubicles: Pressurizer, Pressurizer Spray Valves 100E and 100F, Reactor Drain Tank, 111' Regen HX Room, 100' Regen HX Valve Gallery OR entry inside the pump bay bioshield above the 134' elevation.	Medium	RM-7
	Activities involving Incore Instrumentation (ICIs) or Control Element Assemblies (CEAs) which are normal outage maintenance activities.	Medium	RM-8
	Involves activities working in front of an open Primary Steam Generator manway (Reach-Ins may be included if effective dose equivalent-external (EDEX) is used) OR Reaching into a Secondary Side Steam Generator handhole.	Medium	RM-9
Contamination Alpha / Discrete Particles / Skin Dose	Involves work in areas where general contamination levels are greater than 200,000 dpm/100 cm ² OR within Posted Alpha Level II Areas.	Medium	CM-1
	A potential for exposure to radioactive particles that are greater than 500,000 dpm as measured with a standard frisker.	Medium	CM-2
	Disassembly, inspection and/or handling components with contamination levels exceeding 200,000 dpm/100 cm ² following the initial decontamination of the area(s) of the component that is being inspected/worked.	Medium	CM-3
	Involves non-aggressive activities on an Alpha Level III Component such as an RP survey, decon, engineering inspection, testing, and taking measurements.	Medium	CM-4
	Flushing, draining or venting of a highly contaminated or high activity system that has the potential or has previous history to cause a spread of contamination or personal contamination event.	Medium	CM-5
Airborne	Has potential for exposure to airborne radioactivity concentration (excluding noble gas) exceeding 1 DAC OR for an individual to receive 4 DAC-hours in a single entry. (TEDE ALARA evaluation required)	Medium	AM-1
	Work activity involving abrasive or aggressive mechanical action such as grinding, machining or lapping and welding on contaminated material with beta-gamma contamination levels greater than 50,000 dpm/100 cm ² .	Medium	AM-2
Effluents	Involves radiological work outdoors or in buildings not designed for radiological work (such as machining a radioactive pump seal in a non radiological machine shop) OR activity can result in radioactive spills contacting soil.	Medium	EM-1
Miscellaneous	Any activity that the ALARA Planning Supervisor deems prudent to control as a Medium Risk radiological activity.	Medium	MM-1