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RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 88-011-00:on 880522,overexposure to radiation.
W/8 ltr.

DISTRIBUTION CODE: IE22D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 10
TITLE: 50.73 Licensee Event Report (LER), Incident Rpt, etc.

NOTES:Standardized plant. 05000529

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	NRR/DEST/ADS 7E	1	0	NRR/DEST/CEB 8H	1	1
	NRR/DEST/ESB 8D	1	1	NRR/DEST/ICSB 7	1	1
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	NRR/DEST/SGB 8D	1	1	NRR/DLPQ/HFB 10	1	1
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NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

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TITLE (4)

Overexposure to Radiation

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)
0 5	2 2	8 8	8 8	0 1 1	0 0	0 6	2 2	8 8	N/A	0 5 0 0 0
									N/A	0 5 0 0 0

OPERATING MODE (9)	5
POWER LEVEL (10)	0 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)

	20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)
X	20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)
	20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		OTHER (Specify in Abstract below and in Text, NRC Form 366A)
	20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		
	20.405(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		
	20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
Timothy D. Shriver, Compliance Manager	AREA CODE 6 0 2 3 9 3 - 2 5 2 1

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)

		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE)				
X	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On May 22, 1988 at approximately 2340 MST, Palo Verde Unit 2 was in Mode 5 (COLD SHUTDOWN), when a decontamination worker (contractor, non-licensed) received 2.607 Rem whole body dose to his right thigh/upper leg area which resulted in a cumlative whole body exposure for the quarter of 3.209 Rem. The overexposure occurred during preparations for painting the containment side of the refueling transfer canal area with strippable paint.

The principal causes of this event were incomplete decontamination, an incomplete survey, and insufficient job planning.

As immediate corrective action to ensure the worker would not receive additional radiological exposure, the individual was prohibited from further work in the Radiological Controlled Area. As corrective action to prevent recurrence, the Radiological Survey procedure will be revised to provide guidance for obstructions to surveys and resurveys following their subsequent removal. Additionally, the radiological program procedures will be reviewed and revised as necessary. This event and procedural changes will be reviewed by the supervisors with the RP Technicians.

No similar events have be reported.

IE29
1/1

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

I. DESCRIPTION OF WHAT OCCURRED:

A. Initial Conditions:

On May 23, 1988 at approximately 0107 MST, Palo Verde Unit 2 was in Mode 5 (COLD SHUTDOWN), when a Thermoluminescent Dosemeter (TLD) was processed which showed that a decontamination worker (contractor, non-licensed) received a whole body dose to his right thigh/upper leg area which, in conjunction with previous exposure, exceeded the limits of 10CFR20.101.

B. Reportable Event Description (Including Dates and Approximate Times of Major Occurrences):

Event Classification: Overexposure exceeding the limits of 10CFR20.101.

On May 22, 1988 at approximately 2340 MST, a decontamination worker received 2.607 Rem whole body dose to his right thigh/upper leg area. This yielded a cumulative whole body exposure for the quarter of 3.209 Rem which exceeded the limits of 10CFR20.101. The overexposure occurred during preparations for painting the containment side of the refueling transfer canal area with strippable paint. The painting was being performed to fix the loose contamination in the cavity area which would preclude the contamination from becoming airborne during the upcoming ILRT (Integrated Leak Rate Test) depressurization.

Decontamination efforts (i.e. vacuuming) were performed prior to the refueling canal draindown. The vacuum is designed to operate completely underwater. The canister sits on the floor of the canal and takes a suction through the vacuum head (via a suction hose) filters the water, and returns the water to the pool. For efficient operation, several feet of water above the canister top are required. However, after approximately 2 hours of vacuuming, the refueling transfer canal area and the Upper Guide Structure Lift Rig pit were drained. This decision was made by the containment coordinator based on his perception of the effectiveness of vacuuming in Unit 1 and the knowledge that further hydrolazing would be performed.

Subsequent decontamination efforts included hydrolazing and high pressure washing. The refueling canal floor drain leads to a ten inch standpipe from which two, four-inch Fuel Pool Cooling System (DA) pipes exit part way down. The resulting "trap" is drained by a 3/4" "ALARA Filter". The Pool Cooling pumps take a suction on one of the four-inch pipes while the other four-inch pipe connects to the Radioactive Drain system (WD). This Radioactive Drain pipe terminates in the 80 foot elevation of the containment building sumps. During the hydrolazing and high pressure washing, the flow is

routed in parallel through the ALARA filter and Pool Cooling/Radioactive Drain piping to the containment sump. The flowrate produced by the hydrolazing and high pressure washing overflowed the containment sump and, therefore, the flow was throttled through the Pool Cooling/Radioactive Drain piping. Thus, the standpipe filled and backed up into the refueling canal floor. This resulted in high activity contamination being left in the refueling canal.

On May 20, 1988, at a management meeting, it was decided to continue with a plan to paint the refueling transfer canal area with strippable paint. The decision was based upon the results of a radiological survey of the area dated May 14, 1988 and the fact that the area had been hydrolazed four times and high pressure washed four times with diminishing improvement in the contamination levels.

Following the hydrolazing and high pressure washing, the canal was flooded with three feet of demineralized water to provide shielding for the installation of the fuel transfer flange. On May 21, 1988, after the canal had been drained, but with the scaffolding still installed, the floors of the refueling transfer canal were squeegeed and mopped in an attempt to push any radioactive contamination down the floor drain. Another survey was performed on May 21, 1988 and when compared to the previous survey of May 14, 1988, the radiological conditions (as shown on the surveys) were similar. The general area dose rates in the canal ranged from approximately 200 mR per hour to approximately 5 to 10 Rem per hour. One notable difference between the surveys was a 1000 Rem per hour hot spot on the bottom of the fuel basket that was identified on the May 21, 1988 survey; however, this hot spot was identified on previous surveys made prior to May 14 and its omission on the May 14 survey did not contribute to the event.

On May 22, 1988, prior to the containment entry and in accordance with Radiation Exposure Permit (REP) 2-88-0280B, an ALARA Pre-Job Briefing was conducted by the Unit 2 Radiation Protection (RP) Lead (utility, non-licensed) with the ARC workers. The planned work was to remove an underwater vacuum and hose, cover the fuel transfer tube flange (DF) with a visqueen sheet and tape it down, and place a tape line on the walls approximately 7 feet from the floor.

At approximately 2320 on May 22, 1988, two decontamination workers entered the west refueling cavity to perform their job tasks. Their actions were monitored by a Radiation Protection (RP)(contractor, non-licensed) technician using (remote) teledose instrumentation. In addition to the teledose equipment, and in accordance with REP #2-88-0280B, each worker wore a standard jump pack. A jump pack consists of several individual packs distributed over the body to measure the dose received for each area. Each individual pack has a TLD, and several locations include a low range Self Indicating Dosimeter (SID), a high range SID of 0-1R and 0-5R.

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TEXT *(If more space is required, use additional NRC Form 366A's)* (17)

The workers first removed the underwater vacuum system and performed work in a low dose area. This activity took approximately 10 minutes. Upon completion of these tasks, the decontamination workers placed a strip of "duct" tape ("paintline" approximately 7 feet from the floor) on the transfer canal walls with the exception of the plant east end wall; this evolution lasted approximately 4 minutes. They then took the roll of visqueen and taped it over the refueling transfer tube flange. In order to tape the upper portion of the flange, the workers had to stand on the fuel upender for 3 to 5 minutes. Another 3 to 5 minutes were spent standing on the canal floor facing the flange and taping the sides of the flange. In order to tape the lower portion of the flange, both individuals knelt on one knee. The affected worker knelt on his right knee on the plant north side of the west end of the refueling transfer canal. They maintained this position for another 3 to 5 minutes.

After they completed taping the refueling transfer tube flange, they were told to continue to tape down the visqueen covering the fuel upender.

At this point, the affected decontamination worker returned to the west end of the upender and knelt to tape around the Northwest leg of the upender. At this time, the teledose monitor, which was attached to his upper right arm and, therefore, facing the North West corner of the refueling transfer canal, indicated substantially increased dose rates. The RP technician monitoring the teledose instrument performed a quick calculation and ordered the technician out of the area to a low dose area. Total time of exposure after the dose rate increased was approximately 15 seconds.

The workers continued to perform work in the low dose area (east end of the upender) until the stay time was complete (approximately 7 minutes later). The stay time was based on the permissible dose and the measured dose rates. The dose rates were monitored using the remote teledose dosimetry. A five-to-one dose ratio for exposure to the thigh relative to the upper body (i.e., the location of the teledose) was used to calculate the stay time. At 2355 MST, the workers exited the refueling cavity. At this time the teledose instrumentation read 330 mR for the affected worker and 300 mR for the other worker.

Upon exiting the RCA it was found that the affected worker's high range SID for his right thigh was reading approximately 2 Rem. The Dosimetry clerk immediately notified the RP Lead Technician and all TLDs were expeditiously processed. Dosemetry evaluations determined that the worker received 2.607 Rem to his right thigh.

The Control Room was notified of this incident. The NRC was given an "information call" at 1608 MST on May 23, 1988.

The canal was subsequently painted without further incident.

C. Status of structures, systems, or components that were inoperable at the start of the event that contributed to the event:

Not applicable. No structures, systems, or components were inoperable at the start of the event that contributed to the event.

D. Cause of each component or system failure, if known:

Not applicable. No component or system failures were involved.

E. Failure mode, mechanism, and effect of each failed component, if known:

Not applicable. No component failures were involved.

F. For failures of components with multiple functions, list of systems or secondary functions that were also affected:

Not applicable. No component failures were involved.

G. For failures that rendered a train of a safety system inoperable, estimated elapsed time from the discovery of the failure until the train was returned to service:

Not applicable. No component failures were involved.

H. Method of discovery of each component or system failure or procedural error:

During the investigation of this event, the Radiological Survey Procedure, 75RP-9ZZ46, was determined not to specifically address conditions which prevent or impair complete surveys or the removal of these impediments. The programmatic controls which define the responsibilities for performance of job planning and ALARA review were determined to be inadquate.

I. CAUSE OF EVENT:

During the investigation of this event, several causes and contributing circumstances were identified. The principal causes were a cognitive personnel error by an RP Technician (contractor, non-licensed) for not performing an adequate radiological survey, a cognitive personnel error by RP management (utility, non-licensed) for not ensuring adequate decontamination, and deficient administrative controls defining the requirements and responsibilites for performimg pre-job planning. Contributing circumstances which led to the event were scaffolding which inhibited the survey and the difficulty in obtaining remote dose (teledose) instrumentation to perform adequate monitoring of work.

The inadequate preventive measures and subsequent decontamination of the refueling pool canal created radiological hot spots. Existing methods of filling the refueling pool through the reactor vessel in part led to the contamination of the refueling pool and canal area. Subsequent efforts to filter and vacuum the water did not prevent the radiological contamination.

The four hydrolazings and four high pressure washings were not fully effective in decontaminating the floor. Due to the equipment configuration, the spray water backed up in the filter. Contamination removed from the walls and floor settled in low points on the floor and was not efficiently transported to the drain and filter. A review of the event has determined that a final hydrolazing following the drain down may have removed further contamination. RP management did not vigorously pursue further hydrolazing.

The radiological survey did not identify the 75 Rem per hour hot spot in the Northwest corner of the refueling pool canal. ANPP procedure 75RP-9ZZ46, "Radiological Surveys", states: "For comprehensive (REP) surveys, a survey with sufficient detail of the actual work area is required in order to determine contact, beta, and general area dose rate to the components to be worked on. Hot spots should be identified on the survey as well as area(s) with comparatively low radiation levels."

Scaffolding in the area inhibited an adequate survey. The scaffolding obstructed access and blocked light to see the area under the scaffolding. No notation on the survey indicated that the survey was not completed around the scaffolding. When the scaffolding was removed, another survey was not performed.

The job planning to keep the exposure As Low As Reasonably Achievable (ALARA) was not adequate. Additionally, the surveys used to plan and perform the work were not appropriate. The survey was intended to evaluate the effectiveness of the decontamination and not for specific job planning and performance.

The job planning did not adequately identify the appropriate step by step sequence and the positioning of the workers to perform the task. These responsibilities were not adequately defined in the procedures. Additionally, the job was allowed to proceed although RP personnel had concerns about the radiological conditions.

Contributing to the event was insufficient teledosimetry. The teledose dosimeter was only located on the affected workers' upper body instead of the both upper and lower body. The RP technician selected to remotely monitor the upper body due to experience with the teledose slipping down when attached to the lower body and the presence of a 1000 Rem per hour hot spot on the upender approximately

six feet above the floor. The RP technician utilized a five to one dose ratio of lower body to upper body exposure. The RP technician did not expect the worker to be kneeling especially in the unknown 75 Rem per hour hot spot.

J. Safety System Response:

Not applicable. No safety system responses occurred or were expected.

K. Failed Component Information:

Not applicable. No component failures were involved.

II. ASSESSMENT OF THE SAFETY CONSEQUENCES AND IMPLICATIONS OF THIS EVENT:

No adverse safety consequences or implications to the health and safety of the public resulted from this event. No release of radiological effluents or exposure to the public resulted from this event.

The overexposure of the worker was less than 10% greater than the quarterly exposure limits of 10CFR201(b)(1). The worker's 1988 annual dose is 3.794 Rem.

III. CORRECTIVE ACTIONS:

A. Immediate:

To ensure the worker would not receive additional radiological exposure, the individual was prohibited from further work in the Radiologically Controlled Area for the remainder of the quarter.

B. Action to Prevent Recurrence:

A Revision to the RP survey procedure will be made to require surveys to be annotated if an area cannot be surveyed. The procedure will also require a subsequent survey if changes to the work environment affect accessibility.

Although the following aspects of the procedures and programs were deemed adequate, the Unit 2 Plant Manager took prompt corrective action by issuing instructions reiterating the following items a) through c). Items d) and e) are corrective actions identified as a result of the investigation.

a) A careful pre-job review will be conducted to determine the adequacy and completeness of data necessary to support safe work in a given area. This is not limited to but will include review and assessment of survey data, REP's, dosimetry assignments, and scope of work.

b) All work to be performed in High Radiation, High Contamination, and Hot Particle Control Areas will require vigilant RP coverage at the job site.

c) Significant radiological concerns expressed by the individuals involved will be documented and resolved prior to work continuing/commencing. Discrepancies not easily rectified to the satisfaction of those involved will require that the matter be taken to the next management level for resolution.

d) Workers in the pre-job briefing should be reminded to notify the cognizant RP technician if the job scope changes significantly from what was initially planned. This will alert the cognizant individuals of the need for reevaluation.

e) REPs should include cautions with respect to body position. That is, if the REP is written with the intent that the worker will be in a standing position, the REP should caution the worker that kneeling or lying on the floor may bring the "whole body" into higher radiation fields and additional dosimetry may be necessary.

The actions above shall be incorporated as appropriate into the applicable Station Manual Procedures, e.g. 75RP-9ZZ94, ALARA Pre-Job Review; 75RP-9ZZ44, Radiation Exposure Permits; 75RP-9ZZ46, Radiological Surveys; and 75RP-9ZZ83, Hot Particle Control.

The RP Technicians will be trained on the procedural changes described above and shall be required to review this event.

Radiation Protection Standards, in conjunction with ALARA, will develop a plan to adequately decontaminate the fuel transfer canal for future refueling outages.

Plant Standards will evaluate the current method used to fill the refueling pool area to determine the possibility of filling the refueling area without going through the reactor vessel.

Engineering will evaluate the design of the filter and drain system. In particular, changes to accommodate the full flow from the high pressure washing or the hydrolazing.

IV. PREVIOUS SIMILAR EVENTS:

No similar events have been reported pursuant to 10CFR20.405.

V. ADDITIONAL INFORMATION:

Attached to this report is information concerning the overexposed worker as required by 10CFR20.405(b).

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TEXT *(If more space is required, use additional NRC Form 366A's)* (17)

ATTACHMENT TO LER

Personal information required by 10CFR20.405:

Overexposed worker's name: David Wayne Rickett
Date of Birth: June 14, 1957
Social Security Number: 239-98-9927
Radiation Exposure History:

2.607 Rem	Event Dose
3.209 Rem	Second Quarter of 1988 Dose
3.794 Rem	For the year of 1988 Dose
16.912 Rem	Life Time Dose

Arizona Nuclear Power Project
P.O. BOX 52034 • PHOENIX, ARIZONA 85072-2034

192-00387-JGH/TDS/DAJ
June 22, 1988

U. S. Nuclear Regulatory Commission
NRC Document Control Desk
Washington, D.C. 20555

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 2
Docket No. STN 50-529 (License No. NPF-51)
Licensee Event Report 88-011-00
File: 88-020-404

Attached please find Licensee Event Report (LER) No. 88-011-00 prepared and submitted pursuant to 10CFR 20.405. In accordance with 10CFR 50.73(d), we are herewith forwarding a copy of the LER to the Regional Administrator of the Region V office.

If you have any questions, please contact T. D. Shriver, Compliance Manager at (602) 393-2521.

Very truly yours,

J. G. Haynes
Vice President
Nuclear Production

JGH/TDS/DAJ/kj

Attachment

cc: E. E. Van Brunt, Jr. (all w/a)
J. B. Martin
T. J. Polich
E. A. Licitra
A. C. Gehr
INPO Records Center

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