

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)												DOCKET NUMBER (2)	PAGE (3)
SAN ONOFRE NUCLEAR GENERATING STATION, UNIT 3												0 5 0 0 0 3 6 1 2	1 OF 0 6

TITLE (4)

RADIOACTIVE PARTICLES IN AN UNRESTRICTED AREA

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MONTH	DAY	YEAR	YEAR	SEQ. NUMBER	REV. NUMBER	MONTH	DAY	YEAR	FACILITY NAMES	DOCKET NUMBER(S)	
02	02	87	87	003		01	09	01	87	05000	

OPERATING MODE (9)		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)	
POWER LEVEL (10)	5	20.405(a)(1)(i)			50.36(c)(1)			50.73(a)(2)(v)		73.71(c)	
	000	20.405(a)(1)(ii)			50.36(c)(2)			50.73(a)(2)(vii)	X	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)			
										Informational	

LICENSEE CONTACT FOR THIS LER (12)

NAME										TELEPHONE NUMBER		
H. E. MORGAN, STATION MANAGER										714	368-6241	

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRPDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRPDS

SUPPLEMENTAL REPORT EXPECTED (14)

<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

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

On February 2, 1987, a fuel fragment (particle) was inadvertently removed from the San Onofre Restricted Area by a worker. The particle was returned to the Restricted Area and located on February 3, 1987, on a garment the worker had worn in the plant the day before. Health Physics (HP) Technicians had been unable, the day before, to find the particle even though it apparently had repeatedly alarmed the newly installed and highly beta sensitive personnel monitoring booths.

On February 21, 1987, an HP Technician discovered a particle in his home as the result of a self-initiated survey. The particle was returned to the site the same day. The particle may have left the site on the individual or on one of the survey instruments used by the technician to perform the home survey. The cause of this event was evidently lack of thoroughness in personnel or equipment monitoring on the part of the trained and knowledgeable Technician.

Subsequent to the February 2 occurrence, HP Technicians have been provided additional instruction and additional administrative controls have been developed to preclude future release of potentially contaminated individuals.

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LICENSEE EVENT REPORT (LER)
TEXT CONTINUATIONU.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/85

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

This report describes two events, which occurred on February 2 and 21, 1987, respectively, involving the temporary removal, or potential removal, from the San Onofre Restricted Area of fuel fragments (particles). The particles were subsequently returned to the Restricted Area. This report also describes a third event, which occurred on February 19, 1987, originally believed to involve an IFP, but later determined to involve a routine particle contaminant.

During the first fuel cycle of Unit 3, fuel degradation occurred due to fuel fabrication deficiencies. This degradation resulted in small uranium dioxide particles being liberated to the Reactor Coolant System (EIIS System Code AB) and the spent fuel pool. A discussion of the characteristics of the radioactive particles and their distribution as a function of activity has been previously submitted to the NRC in a report submitted with LER 86-15, Revision 1, (Docket Number 50-362) entitled "Evaluation of the Reported High Exposure to Extremity TLD # 80365 in October 1986, Revision 1."

FEBRUARY 2, 1987 EVENT

On February 2, 1987, a worker located in containment noted foreign material on his protective clothing and suspected it may have become contaminated. The worker exited containment and was surveyed. The survey determined that his protective clothing was contaminated and the clothing was subsequently removed. The individual performed a whole body frisk, with emphasis on the area in question, and did not detect contamination on his skin or modesty garments.

Upon entering a PBM-200 personnel contamination monitor (Beta Booth) shortly thereafter, an alarm was received together with indication of contamination on the chest and lower back. Subsequent manual frisking failed to detect any radioactive contamination in these areas. Re-entry into this and other Beta Booths resulted in similar alarms. These alarms indicated contamination in the same locations, but repeated efforts to locate any contamination through manual surveys, and to remove it through washing of the suspected area and general showering were unsuccessful in eliminating the alarms. Eventually, a contract Health Physics (HP) Technician improperly concluded that the individual was not contaminated and that the new Beta Booths were alarming spuriously, perhaps due to low level noble gas daughter products which had not fully decayed. Accordingly, the individual was released at 1615 and he went straight home.

On the morning of February 3, the individual returned to work wearing the same sweat shirt type jacket he had worn on February 2. On entering the first control point at 0815, he monitored himself in a Beta Booth and detected contamination. The HP Technician on duty frisked the individual, found nothing unusual and sent him back to the Beta Booth which again alarmed. The Technician ultimately had the individual remove his sweat shirt and, upon frisking the jacket, found a 16,000 count per minute hot spot on the inside of the right sleeve cuff. The particle was removed with masking tape.

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As a result of finding this particle on the worker as he entered a restricted area, a survey of appropriate personal belongings of the worker was initiated. The individual's automobile and home were thoroughly surveyed by an experienced HP Technician who had been specially trained in particle surveys and no contamination was found. It has been concluded no other particles were inadvertently removed by the worker.

Analysis of the particle indicated about 0.1 uCi activity, consisting primarily of Nb-95, Zr-95, and Ce-141/144. The calculated dose was 1.77 rem to the skin of the whole body and 1.2 rem to the extremity. A whole body count of the individual indicated no ingestion of radioactive material.

Interviews with the worker and HP Technicians involved in frisking the worker on February 2, indicated that both of them had frisked only the upper torso area of his body where the Beta Booths indicated contamination. Beta Booths, by their design, view the individual from a series of sensors located throughout the machine. There is no specific sensor, however, to detect contamination on the upper forearm or bicep. Such contamination would most likely be indicated as chest or back contamination. Since, at that time, the particle was most likely located on the individual's upper forearm, the location of the particle was incorrectly indicated by the booth and, it was not located at this time. Because the individual thoroughly showered before being released, the particle is assumed to have become lodged on personal clothing which was removed and put back on after the shower.

Subsequent measurements in a Beta Booth using the individual and the particle (suitably shielded to prevent further exposure to the individual) confirmed that the particle must have been on the individual's upper forearm when he initially alarmed the booth. The particle was ultimately found to be lodged in the inside cuff of the sweat shirt against the upper forearm when it was found the following day. Particle movement is attributed to donning and removing the sweat shirt type jacket, and frequently pushing the sleeves half way to the elbow (the cuffs are too small to pass over the man's elbow).

Immediately following this incident, written guidance was issued to all Health Physics personnel directing that they not be misled by the location of contamination indicated by the Beta Booths. In a document provided to all personnel who access the Restricted/Protected areas, all individuals were admonished to observe the location of contamination indicated by the booth detectors and assure that all portions of their bodies are properly positioned when using the detector.

HP personnel have been subsequently instructed that when any individual alarms a Beta Booth, and the source of the alarm cannot be detected and removed, that individual cannot be released until: 1) the alarm source (e.g., noble gas, or any other source) has been determined; 2) any removable contamination has been removed; and 3) HP supervision or management has reviewed the situation and approves the individual's release. Other aspects of the radioactive particle control program are discussed below.

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FEBRUARY 19, 1987

Revision 0 to this LER described a contamination event which was still under investigation at the time the LER was submitted. SCE has completed the investigation and concludes this event should not have been included in the LER. For completeness, the event is discussed below.

On February 19, 1987, a Health Physics Technician received an alarm on a Beta Booth located at the entry to the Units 2 and 3 locker room which is within a radiologically controlled area. The technician had walked several hundred yards within the Radiologically Controlled Area to reach the Beta Booth. The Beta Booth alarm indicated contamination on the technician's left lower leg (calf). He frisked himself and found a contamination particle on an outside seam near the heel of his shoe.

SCE promptly performed an isotopic analysis on the particle which determined it contained 7.2E-3 microcuries of cerium-144 and 5.7E-7 microcuries of cesium-137. Based on the ratio of Cesium to Cerium, it was concluded that the particle was a plant contaminant other than an irradiated fuel particle.

SCE's investigation into this incident concluded: (1) The activity of the particle is below 10CFR30.18 exempt quantity limits and therefore no unauthorized transfer of radioactive material occurred; (2) it is possible that the individual contaminated himself when he travelled several hundred yards within the Radiation Controlled Area immediately prior to the Beta Booth alarm; (3) the individual did not receive an exposure in excess of applicable regulatory limits. Therefore, no further actions other than those described elsewhere in this LER are appropriate.

FEBRUARY 21, 1987 EVENT

On February 21, 1987 an SCE HP Technician reported discovering a radioactive particle in his home as the result of a self-initiated survey. The radioactive particle was found in the carpet at a corner of the door jamb at a rear entry to his home. The Technician notified his supervisor of the finding, and returned the particle to the site the same day. The Technician's home, grounds and automobile were extensively surveyed later that day, and no other contamination was found. The whole body counts of the individual and his family members revealed no internal or external contamination.

Evaluation of the particle determined that its activity was 0.2 uCi, and the principal isotopes observed were Nb/Zr-95, Ce-141, Ce/Pr-144, Ru/Rh-106, Co-57, Co-60 and Cs-137.

In view of the fact that the particle was found in the corner of the door jamb at the rear of the Technician's home, it is possible that the particle was carried to the Technician's home on the sole of his shoe and deposited there. It is also possible, however, that the individual carried the particle to his home on the surface of a survey instrument from the site and without determining that the survey instrument was free of contamination.

A dose evaluation for the individual and his family was performed. There was no significant exposure to the technician's wife or children. No dose was assigned to the technician.

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The cause of this event is believed to have been a failure of the HP Technician to thoroughly survey either the instruments he took or himself to assure that he and the equipment were free of contamination before exiting the Restricted/Protected Area. This was true notwithstanding the fact that the individual had spent considerable time as part of a crew specifically assigned to perform surveys to determine whether irradiated fuel particles could be found outside of previously designated radiologically controlled areas within the Restricted/Protected Area.

In response to these events involving fuel particles, an aggressive program to inform everyone affected, including all plant personnel, of the program and its requirements has been implemented.

A Radiological Concerns Phoneline has been established. A large illuminated sign at the entrance to the Restricted/Protected Area frequently announces the availability of radiation protection information to anyone who calls the indicated phone number.

A small building with "voluntary" PBM-200 Beta Booths was set up outside the Restricted/Protected Area for the remainder of the refueling outage. The Booths were attended by personnel who were assigned to assist all who wished to use them for self-monitoring.

The presence of the booths, their purpose and instructions on how to gain access to a booth on other than weekday day shift periods were provided by means of a five page hand-out which was given to everyone who entered the Restricted/Protected Area during a three day period. Additional copies of the hand-out continue to be made available at the exit point to the area. The contents of the hand-out are being added to the training provided to all radiation workers. Additional means are being utilized to increase the availability of the material to non-radiation workers at San Onofre.

RADIOACTIVE PARTICLE CONTROL PROGRAM

Upon recognition of the fuel particle contamination problem following fuel reconstitution during the first Unit 3 refueling outage, SCE initiated a program to detect and control these radioactive particles. This program was further enhanced in November and December 1986 following a Unit 3 maintenance outage and in anticipation of the Unit 3 refueling outage which began in early January 1987.

Major aspects of the enhanced program include the following:

Six hours of formal training was provided to all Health Physics Technicians, including contractors. This training included presentations on: the source of the problem, characteristics of irradiated fuel fragments and the procedures specifically developed to deal with them. The training included several hours of hands-on laboratory training in radioactive particle detection and identification, with special emphasis on fuel fragments.

Two hour briefing sessions were provided for involved first line supervision (and above) to explain the problem and the measures being taken to deal with it.

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A five page special hand-out, describing fuel fragments, explaining what must be done to work safely where they may be present was provided to each person who entered the Restricted Area. First line supervisors used this same document as the basis for tailboard sessions with all their workers.

Traffic flow was routed to require use of the PBM-200 Beta Booths by all who work in protective clothing in Units 2/3. All personnel departing the Units 2/3 radiologically controlled area are required to pass through the PBM-200s or perform a thorough hand frisk. Furthermore, individuals (frisker monitors) are employed continuously during outages to assure that everyone uses the PBM-200s properly and to direct anyone causing the PBM-200 to alarm, to a health physics Technician for disposition.

A procedure was issued to deal specifically with fuel fragment controls. This procedure features a "zone" control system whereby the areas where fragments are known to exist or where their presence cannot reasonably be ruled out, are designated and subjected to especially stringent controls. Such areas are then surrounded by a buffer zone, or physical barriers. Frequent surveys in the buffer zone are used to verify that control over the inner zone is intact.

A running inventory of all radioactive particles is maintained and provided to all managers by electronic mail and to workers by random posting to keep everyone aware of radioactive particles, their rate and method of discovery, and the jobs with which they are associated.

Additional specialized monitors were added to the protective clothing cleaning facility to assure an adequate monitoring capability.

SCE has established a task force to recommend and implement action to minimize the future production and movement of radioactive particles. This task force also evaluates plant systems containing radioactive particles for feasible methods of removing the particles.