

Enclosure to TXX-93424

NRC FORM 388										U.S. NUCLEAR REGULATORY COMMISSION										APPROVED OMB NO.3150-0104 EXPIRES: 4/30/97																													
LICENSEE EVENT REPORT (LER)																																																	
Facility Name (1)																				Docket Number (2)										Page (3)																			
COMANCHE PEAK-UNIT 1																				0150100445										1 OF 6																			
TIME (4)																																																	
HOT PARTICLE CONTAMINATION RESULTING IN EXPOSURE EXCEEDING 10CFR20 SKIN DOSE LIMITS																																																	
Event Date (5)										LER Number (6)										Report Date (7)										Other Facilities Involved (8)																			
Month Day Year										Sequential Number										Month Day Year										Facility Name										Docket Number									
11 20 93										0110										01 21 93										N/A										0150100111									
Operating Mode (9)										20.405(b)										20.405(c)										60.73(a)(2)(iv)										73.71(b)									
6										20.405(a)(1)(H)										60.26(c)(1)										60.73(a)(2)(iv)										73.71(c)									
Power Level (10)										20.405(a)(1)(H)										60.36(c)(2)										60.73(a)(2)(iv)										Other (Specify in Abstract below and in Text, NRC Form 388A)									
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Licensee Contact For This LER (11)																																																	
Name																				Area Code										Telephone Number																			
R. J. PRINCE, RADIATION PROTECTION MANAGER																				817										817-8971-5297																			
Complete One Line For Each Component Failure Described in This Report (13)																																																	
Cause										System										Component										Manufacturer										Reportable To NRC									
Supplemental Report Expected (14)																																																	
<input type="checkbox"/> Yes If yes, complete Expected Submission Date:																				<input checked="" type="checkbox"/> No										Expected Submission Date (15)																			
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Abstract (Link to 1200 species, i.e., approximately fifteen single-space typewritten lines) (16)																																																	
<p>On November 20, 1993, between 1050 and 1235, with Comanche Peak Steam Electric Station Unit 1 was in Mode 6 (Refueling), a technician (non-licensed, contractor) involved with decontamination and clean up of the reactor cavity after refueling, received an estimated dose to a localized area of the skin of 72.1 rem below the right knee from a discrete radioactive hot particle. The contamination occurred while the individual was working in the Hot Particle Buffer Zone of the Unit 1 cavity area. It is suspected that a hot particle in the buffer zone or from materials removed from the reactor cavity penetrated the protective clothing when the individual kneeled.</p> <p>In response to this event, Radiation Protection increased the hot particle personnel survey frequency and required a second set of paper protective clothing for entries into the Hot Particle Buffer Zone. Subsequently, the Hot Particle Control Zone boundary was expanded to include the areas adjacent to the reactor cavity on the 860' elevation which was previously identified as the buffer zone.</p> <p>This event is reported pursuant to the requirements noted in 10CFR20.1201(a)(2)(11) and 10CFR20.2203(a)(2)(1).</p>																																																	

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC. 20586, AND TO THE PAPERWORK REDUCTION PROJECT (3160-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC. 20503.

Facility Name (1)

Docket Number (2)

LER Number (3)

Page (4)

COMANCHE PEAK-UNIT 1

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Year	Sequence Number	Revision Number	Page	OF
93	010	00	2	6

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I. DESCRIPTION OF REPORTABLE EVENT

A. REPORTABLE EVENT CLASSIFICATION

Exposure of an individual in excess of the applicable limits of 10CFR20.1201 to a localized area of the skin resulting from exposure to radiation emitted from a hot particle found on the skin.

B. CONDITIONS PRIOR TO THE EVENT

On November 20, 1993, Unit 1 was in Mode 6 (Refueling) with the Reactor Coolant System at atmospheric pressure.

C. STATUS OF STRUCTURES, SYSTEMS, OR COMPONENTS THAT WERE INOPERABLE AT THE START OF THE EVENT AND THAT CONTRIBUTED TO THE EVENT

Not applicable - There were no inoperable structures, systems or components that contributed to the event.

D. DESCRIPTION OF THE EVENT, INCLUDING DATES AND APPROXIMATE TIMES

On November 20, 1993, Unit 1 was in Mode 6 during its third scheduled refueling outage. Fuel sipping during the outage identified two leaking fuel assemblies. At the time of the event, the reactor cavity had been recently drained following completion of core reload. Contamination surveys in the reactor cavity showed the presence of discrete radioactive particles which were determined to be microscopic fuel fragments by gamma spectroscopy analysis. Based on survey results, radiation protection personnel had established the reactor cavity as a Hot Particle Control Zone, requiring double protective clothing for entry and surveys of personnel for hot particles at specified frequencies. The area immediately adjacent to the reactor cavity was established as a Hot Particle Buffer Zone (buffer zone) to prevent the spread of hot particles to other plant areas.

On November 20, 1993, at 0930, a decontamination technician (non-licensed, contractor) entered the Unit 1 Containment Building to perform assigned duties related to decontamination of areas in and around the reactor cavity. He proceeded to the radiation protection control point at the refueling area on the 860' elevation where he remained on standby and observed decontamination activities on a remote television monitor. The technician was subsequently logged onto the "Personnel Hot Particle Survey Log" at 1040, on November 1993.

NRC FORM 568A		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED OMB NO. 3160-0104 EXPIRES: 4/30/92							
LICENSEE EVENT REPORT (LER) TEXT CONTINUATION				ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-5301, U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PARTICIPATION REDUCTION PROJECT (3160-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.							
Facility Name (1)		DocId Number (2)		LER Number (3)							
COMANCHE PEAK-UNIT 1		015101014145		<table border="1"> <tr> <th>Year</th> <th>Sequential Number</th> <th>Revision Number</th> </tr> <tr> <td>93</td> <td>0110</td> <td>010</td> </tr> </table>		Year	Sequential Number	Revision Number	93	0110	010
Year	Sequential Number	Revision Number									
93	0110	010									
				Page (3) 3 OF 6							

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On November 20, 1993, at approximately 1050, the technician entered the Hot Particle Buffer Zone around the reactor cavity to support decontamination and clean up activities. Based on the work assignment, the technician would remain in the buffer zone around the cavity and not enter the Hot Particle Control Zone, the radiation protection technician (non-licensed, contractor) covering these activities allowed entry with a single set of protective clothing, double shoe covers and double gloves. This was consistent with the radiological safety controls established for the area. The technician remained in the buffer zone and pulled bags of trash from the reactor cavity with a rope. Radiation protection coverage was continuously present during this activity to ensure proper hot particle control measures were implemented. The technician recalled kneeling twice during these activities.

The technician completed his activities and exited the buffer zone at 1205. Prior to exiting containment, the individual took the bags of trash to the elevator and returned to the control point to verify that all of the trash and materials had been removed from the area. These activities took approximately 10 minutes. At approximately 1215, he arrived at the Unit 1 containment exit point.

At the containment exit point, the individual was monitored for contamination with a whole body contamination monitor (PCM-1), which alarmed. A second attempt to clear the monitor also resulted in an alarm. The location of the contamination was identified with a frisker. At 1230, the individual was taken to the decontamination facility at the Radiological Control Area (RCA) access point, where the particle was removed at 1235.

E. METHOD OF DISCOVERY

During normal egress from Unit 1 Containment, the decontamination technician alarmed a whole body contamination monitor at the Containment exit point. Further examination by radiation protection personnel revealed a discrete radioactive particle (i.e., hot particle) on the individual's skin just below the right knee. Gamma spectroscopy analysis revealed that the particle was a microscopic fuel fragment. Estimated activity of the particle was 9.08 μCi .

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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Facility Name (1)	Docket Number (2)	LER Number (3)			Page (3)	
COMANCHE PEAK-UNIT 1	015101010141415	Year	Sequential Number	Revision Number		
		913	0110	010	4	OF 6

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II. COMPONENT OR SYSTEM FAILURES

A. FAILURE MODE, MECHANISM, AND EFFECTS OF EACH FAILED COMPONENT

Not applicable - no component or system failures led to this event.

B. DURATION OF SAFETY SYSTEM TRAIN INOPERABILITY

Not applicable - there were no safety systems which were rendered inoperable due to this event.

C. SAFETY CONSEQUENCES AND IMPLICATIONS

This event had no adverse impact on the safe operation of Unit 1. The dose to the individual was assessed using the VARSKIN MOD2 computer code. The total Beta and Gamma dose to a 1 cm² area of skin was calculated to be 72.1 rem. The VARSKIN MOD2 computer code, documented in NUREG/CR-5873, is widely used throughout the industry.

Gamma spectroscopy analysis of the particle showed that the particle was a microscopic fuel fragment. The age of the particle was estimated based on isotopic ratios and corrections to the particle activity were made to account for pure beta emitters. The activity of the particle was estimated to be 9.68 μ Ci. An exact time that the individual became contaminated could not be determined; therefore, it was conservatively assumed that the individual received the particle contamination immediately upon entry into the buffer zone at 1050. Based on removal of the particle at 1235, an exposure duration of 1 hour, 45 minutes was assigned. Using the estimated particle activity and exposure duration, the calculated exposure based on beta emission rate was 16.9 μ Ci-hours.

The assigned exposure is well within the 75 μ Ci-hour guideline for limiting hot particle exposure to the skin discussed in USNRC Information Notice No. 90-48, "Enforcement Policy for Hot Particle Exposures," and Council on Radiation Protection and Measurement Report No. NCRP-106, "Limit for Exposure to Hot Particles."

The event did not impact or impair the health and safety of the public.

NRC FORM 588A		U.S. NUCLEAR REGULATORY COMMISSION		APPROVED OMB NO. 3150-0104 EXPIRES: 4/30/92	
LICENSEE EVENT REPORT (LER) TEXT CONTINUATION				ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20585, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.	
Facility Name (1)	Docket Number (2)	LER Number (3)		Page (3)	
COMANCHE PEAK-UNIT 1	015101010141415	Year	Sequential Number	Revision Number	
		913	0110	010	5 OF 6

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III. CAUSE OF THE EVENT

The cause of the exposure to the decontamination technician was hot particle contamination on the individual's skin just below the right knee. Specific contributing factors causing the contamination event could not be determined; however, it is suspected that a hot particle in the buffer zone or from materials removed from the reactor cavity came in contact with the individual's protective clothing and then penetrated the protective clothing when the individual kneeled on one of two occasions.

IV. CORRECTIVE ACTIONS

A. IMMEDIATE ACTIONS

In response to this hot particle contamination event, Radiation Protection personnel immediately increased the hot particle personnel survey frequency and required a second outer set of paper protective clothing for entries into the Hot Particle Buffer Zone. This was later followed by movement of the Hot Particle Control Zone boundary to include the areas adjacent to the reactor cavity on the 860' elevation which was previously identified as the buffer zone.

B. ACTIONS TO PREVENT RECURRENCE

Even though no specific items have been identified that would have prevented the contamination event, a comprehensive evaluation of the CPSES hot particle control program will be performed to identify potential improvements. The evaluation will address the following items at a minimum:

- (1) Review of RPI-613, "Hot Particle Contamination Control"
- (2) Specific review of requirements for performing personnel hot particle surveys at specified frequencies while in the hot particle control zones and prior to exiting the zones, and proceeding promptly to a personnel contamination monitor after exiting.
- (3) Review of the areas in and around the reactor cavity to identify unique problems associated with hot particle control for this area.

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Facility Name (1)

Docket Number (2)

LER Number (3)

Page (4)

COMANCHE PEAK-UNIT 1

01501010445

Year	Sequential Number	Revision Number			
93	-	0110	-	010	6

OF 6

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V. PREVIOUS SIMILAR EVENTS

There have been no previous similar reportable events at CPSES.

VI. ADDITIONAL INFORMATION

A. All times identified are Central Standard Time (CST).

ATTACHMENT

Name: [REDACTED]

SSN: [REDACTED]

Birthdate: [REDACTED]

Exposure: 72.1 rem to 1cm² area of
skin below the right knee
resulting from hot particle
exposure.

B/1