

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)										DOCKET NUMBER (2)										PAGE (3)	
WOLF CREEK GENERATING STATION										01501010482										1 OF 11	
TITLE (4)																					
HOT PARTICLE PICKED UP DURING FILLING AND VENTING OF THE SAFETY INJECTION SYSTEM RESULTS IN EXPOSURE EXCEEDING 10 CFR 20.101 REQUIREMENTS																					
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)									
04	02	93	93	006	00	04	30	93				06000									
THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more of the following) (15)																					
OPERATING MODE (9)		N		20 402(b)		20 408(e)		80 73a(2)(iv)		73.71(b)											
POWER LEVEL (10)		1.10		20 408(a)(1)(i)		80 36(c)(1)		80 73a(2)(vi)		73.71(d)											
				20 408(a)(1)(ii)		80 34(c)(2)		80 73a(2)(vii)		OTHER (Specify in Abstract below and in Text NRC Form 308A)											
				20 408(a)(1)(iii)		80 73a(2)(iii)		80 72a(2)(viii)(A)													
				20 408(a)(1)(iv)		80 73a(2)(iv)		80 73a(2)(viii)(B)													
				20 408(a)(1)(v)		80 73a(2)(v)		80 73a(2)(ix)													
LICENSEE CONTACT FOR THIS LER (12)																					
NAME										TELEPHONE NUMBER											
KEVIN J. MOLES - MANAGER REGULATORY SERVICES										AREA CODE 3116 31614 1818 811											
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																					
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC												
SUPPLEMENTAL REPORT EXPECTED (14)										EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR							
YES (If yes, complete EXPECTED SUBMISSION DATE)										NO											

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

On April 2, 1993 at 2313 CST, an Auxiliary Operator (non-licensed operator) who had been working in the Radiological Controlled Area (RCA) was discovered to have a highly localized area of contamination on his left thigh. The contamination was determined to be a discreet radioactive particle (hot particle) which probably originated from previous draining of the Reactor Cavity to the East Containment Drain Trench. The exposure was conservatively estimated, using the VARSKIN computer code, to be 33.902 Rem (eight micro-curie hours) to the skin of the whole body. This exposure exceeds the 10CFR20.101 quarterly dose limit of 7.5 Rem for the skin of the whole body, but does not exceed the NRC Enforcement Policy on hot particles of 75 micro-curie hours.

The event probably resulted from the transfer of a discreet radioactive particle to the individuals left thigh during venting of the Safety Injection System to the East Containment Drain Trench. In order to reduce the probability of recurrence, Wolf Creek Nuclear Operating Corporation has reviewed the applicable operations procedures and training and has concluded additional training on the proper methodology for performing both filling/venting and venting/draining of radioactive systems is

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 800 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-830), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20545, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

WOLF CREEK GENERATING STATION

DOCKET NUMBER (2)

0150004812

LER NUMBER (3)

YEAR

SEQUENTIAL NUMBER

REVISION NUMBER

93-006-01002

PAGE (3)

OF 11

TEXT (If more space is required, use additional NRC Form 348A (1/77))

PLANT CONDITIONS AT THE TIME OF EVENT:

MODE "E", (Core off loaded)
Reactor Coolant System Level was greater than or equal to 12 inches below the vessel flange.
Reactor Coolant System Temperature less than or equal to 100 degrees Fahrenheit.
The Reactor Cavity was drained below the level of the reactor vessel flange.

DESCRIPTION OF EVENT:

On March 16, 1993, at 0441 CST, during core off load activities, Wolf Creek Nuclear Operating Corporation (WCNOC) discovered a Fuel Assembly (F67) with a broken fuel rod. Reference Licensee Event Report (LER) 482/93-004 for a detailed discussion on the cause of the fuel failure.

On March 20, 1993, at 2326 CST, upon completion of the core off load activity, the Reactor Cavity/Reactor Vessel level was lowered to support Reactor Coolant System Half Loop maintenance/inspection activities. During this evolution, due to plant system limitations (configuration of the Reactor Cavity Drain System with clogged strainers), a small portion of the water in the lowest portion of the Reactor Cavity was manually drained to the East Normal Containment Sump via the East Containment Drain Trench (east drain trench) on March 20, 1993 from 1035 CST to 1240 CST. The east drain trench spans the east side of the Bio-Shield walls for the Reactor Vessel and Reactor Coolant System Loops "2" and "3" (see clouded areas of the attached drawing). The east drain trench is approximately twelve inches in width and three to six inches deep and is covered by grating. The water from the Reactor Cavity is introduced into the south east corner of the east drain trench (see "#1" on the attached drawing).

On March 22, 1993, at 0115 CST, due to high activity levels (300 milli-Rem per hour) around the east drain trench, the Health Physics personnel flushed the trench with de-ionized water. Based on area surveys, this flushing activity reduced the contamination levels in the east drain trench to 1000 disintegration's per minute per square centimeter on the floor and trench grating and 20 to 40 milli Rem per hour on contact with the trench grating.

LICENSEE EVENT REPORT (LER)

TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 600 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATES TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-330), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20546, AND TO THE PAPERWORK REDUCTION PROJECT (3180-0104), OFFICE FOR MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

DOCKET NUMBER (2)

EVENT LER NUMBER (3) PAGE (2)

WOLF CREEK GENERATING STATION

0500048293-005-010034 OF 11

TEXT (If more space is required, use additional NRC Form 264-A (1/89))

On April 2, 1993, at 2010 CST, an Auxiliary Operator assisted by an Radwaste Operator (both non-licensed operators) entered the Containment Building to fill and vent the Safety Injection System (the "EM" system) in accordance with procedure SYS EM-410, Revision 0, "Fill And Vent Of Safety Injection System After Maintenance." The operators gathered the venting flange, hose (Tygon tubing) and tools from the Operation's Lockers inside the Containment Building. Prior to commencing the venting and filling activity, the operators contacted and informed Health Physics personnel inside Containment about the activities they were assigned to perform. Upon receiving Health Physics clearance, the operators proceeded to vent valve EM-V184, "SI Pump A to RCS Hot Legs 2/3 Header Down Stream Vent" (see "#2" on the attached drawing). At 2030 CST the Radwaste Operator removed the blank flange from valve EM-V184 and attached the venting flange and Tygon tube to EM-V184. The Auxiliary Operator ran the Tygon tube to the east drain trench and pushed the Tygon tube a few inches through the grating but did not make contact with the floor of the trench. After the Auxiliary Operator stepped several feet back (five to ten feet) the Radwaste Operator opened vent valve EM-V184. During the venting process, the Auxiliary Operator noted that some water had splashed out of the trench. The filling/venting process was stopped and Health Physics was notified. Upon determination the water was uncontaminated the operators completed the filling and venting activity, closed EM-V184, removed the venting flange and Tygon tube, placed a blind flange on valve EM-V184 and proceeded on with the filling and venting of the Safety Injection System. Repeating the filling and venting steps at EM-V185, "SI Pump A To RCS Hot Legs 2/3 Header UP Stream Vent" (see "#3" on the attached drawing) and EM-V218, "SI Pumps to Accumulator Injection Test Line Vent" (see "#4" on the attached drawing). These valves are drained to the "West" Containment Drain Trench. The west drain trench does not receive water from the Reactor Cavity. Upon completion of the filling and venting activities, the operators returned their tools to the Operation's lockers and exited the Containment Building at 2300 CST on April 2, 1993.

After exiting Containment, the Auxiliary Operator alarmed the Beta Max and PCM-1B radiation monitors at the Containment Exit Portal at 2300 CST on April 2, 1993. Health Physics personnel were contacted and a detailed survey of the Auxiliary Operator was performed. A two hundred and twenty eight milli-Rem per hour contact radiation level was noted on the operator's upper left thigh. During this survey, the Health Physics technician removed a discreet radioactive particle (hot particle) from the upper

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST. 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-8301) U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555 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)

WOLF CREEK GENERATING STATION

YEAR SEQUENTIAL NUMBER REVISION

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TEXT (If any space is required, use additional NRC Form 366A (1/117))

left thigh of the Auxiliary Operator at 2313 CST on April 2, 1993. Per procedure ADM 03-011, Revision 4, "Radiological Occurrence Report Program", a Radiological Occurrence Report (ROR # 93-027) was written on April 3, 1993, to document the condition and investigate the circumstances. Dose calculations (both initial and final) conservatively assumed that the particle was on the Auxiliary Operator's thigh from the time he started work on EMV-184 until it was removed. Using this exposure period (2.717 hours) and the results of an initial isotopic analysis the exposure was estimated to be 16.23 Rem to the skin of the whole body. The Control Room Duty Shift Supervisor (SS) was notified at 0220 CST on April 3, 1993. A Reportability Evaluation Request (RER) had been initiated and was taken to the SS at 1044 CST that day identifying this condition was reportable per 10CFR20.405(a)(1)(i). Upon further review, conducted on April 4, 1993, of the isotopic analysis indicating various fission products, the exposure was conservatively recalculated to be 33.902 Rem (eight micro-curie hours) to the skin of the whole body using the VARSKIN computer code. The Control Room Duty SS was subsequently informed by Health Physics personnel. On April 4, 1993, at 1830 CST, the SS performed a 24-hour call-in notification of the NRC (completed at 1938 EST per NRC Form 361) for an overexposure per 10CFR20.403(b)(1); i.e., exceeding 30 Rem dose to the skin of the whole body. RER 93-027 was thus revised.

ROOT CAUSE AND CORRECTIVE ACTION:

An investigation team was formed, comprised of Health Physics, Regulatory Compliance and System Engineering personnel, to evaluate the circumstances surrounding this discreet radioactive particle contamination event. A Performance Improvement Request (PIR # TS 93-0301) was also initiated on April 5, 1993, to document the investigation results, root cause and corrective actions.

Direct Causes:

The discrete radioactive particle was determined to be comprised of fuel fragments, with an estimated age of seven to ten weeks, based on isotopic analysis indicating the presence of short-lived fission products. Because of the isotopes that were identified, the particle (approximately 8 micro-curie hours of fission products) is believed to have resulted from plant operating Cycle Six failed fuel and subsequent drain down of the lower Reactor Vessel Cavity to the east drain trench.

provide adequate protection of worker and public health and safety at a repository. As such, comments by CWFNC and ECNP about possible modifications to the Commission's radiation protection standards as they would apply to an operating repository are beyond the scope of this rulemaking.

The Commission agrees with ECNP that the term "critical design basis events" is undefined and, in the Section-by-Section Analysis of §60.21 of this final rule, has changed "critical design basis events" to "Category 2 design basis events." With regard to the scope of design basis accidents that should be considered in the license application, the Commission previously addressed this issue in the discussion of probability bounds for Category 2 design basis events and determined that events with probabilities of occurrence lower than 1×10^{-6} per year could be screened from further consideration due to their negligible contribution to individual risk.

Regarding the rationale for the 0.05 Sv (5 rem) dose limit in §60.136, the Commission continues to believe that the potential risks to members of the public from an operating repository are very small. In light of this limited risk, the 0.05 Sv (5 rem) dose limit provides an adequate margin of safety and an appropriate basis for the design of repository structures, systems, and components to prevent or mitigate the consequences of low probability, but credible events. The Commission's

reasoning behind the 0.05 Sv (5 rem) dose limit can be found in the Section-by-Section Analysis of §60.136 that appears later in this notice.

12. Exclusion of the Public from Preclosure Controlled Area.

Vernon J. Brechin objected to the use of the word "can" versus "will" in the description of preclosure controlled area.

The Commission disagrees with this comment. It is not the Commission's intention to generally exclude members of the public from the preclosure controlled area (which would be the "controlled area" as defined in 10 CFR 20.1003). However, access to the preclosure controlled area can be limited by the licensee for any reason (not necessarily one related to radiation protection). Within the preclosure controlled area will be a "restricted area" (as defined in §60.2 and §20.1003). Access to a restricted area must be controlled for purposes of radiation protection. Members of the public in the preclosure controlled area will be subject to the dose limits for members of the public in 10 CFR 20.1301. However, an individual who receives occupational dose in the preclosure controlled area will be

handling, packaging, storing, placing, and retrieving high-level waste.

14. Definition of "Important to Safety" - Function.

Virginia Power noted that in the proposed rule, the definition of "important to safety" refers to "... (1) to provide reasonable assurance that high-level waste can be received, handled, packaged, stored, emplaced, and retrieved without exceeding the requirements of [10 CFR] 60.111(a) for Category 1 design basis events; or...." Virginia Power recommended that this part of the definition should be revised to make it clear that the focus of important to safety is design basis events and not the normal operations that are described by the definition in the proposed rule.

The Commission disagrees with this comment. As explained in Item 13, the Commission intends that events occurring regularly or frequently during the course of normal operations are considered as Category 1 design basis events.

15. Definition of "Important to Safety" - Quality Assurance Issues.

Virginia Power and NEI stated that the definition of "important to safety" proposed in the proposed rule would apply

subject to the occupational dose limits of Part 20, Subpart C. All doses in a restricted area are occupational doses. The size of the preclosure controlled area is not specified by the regulations because it will be dependent upon the particular activities conducted during the operational period.

13. Definition of Design Basis Events.

Virginia Power and NEI recommended that the definition of "design basis events" should make clear that the normal operations associated with receiving, handling, packaging, storing, emplacing, and retrieving high-level waste are not design basis events.

The Commission disagrees with this comment. It is the Commission's intent that events occurring regularly or frequently during the course of normal operations are considered as Category 1 design basis events. Category 1 design basis events effectively embody repository activities and conditions previously identified in Part 60 as "normal operations, including anticipated operational occurrences." In this regard, the Commission intends the Part 20 dose limits to be applicable to the conduct of repository activities, such as receiving,

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATES TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (F-830), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20548, AND TO THE PAPERWORK REDUCTION PROJECT (3180-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

WOLF CREEK GENERATING STATION

DOCKET NUMBER (2)

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LER NUMBER (3)

YEAR	24	SEQUENTIAL NUMBER	REVISION NUMBER
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PAGE (3)

0 6 OF 1 1

TEXT (If more space is required, use additional NRC Form 308A 3/117)

precautions on performing filling and venting activities. These precautions are; "Use proper Radiological Precautions while venting since Fill Water must be considered contaminated" and "Care must be taken to prevent excessive pressure on Vent Hoses being used."

- Through interviews with Operations Training Personnel it was determined that Operations personnel only receive training on the information contained in the specific system procedure. Additionally, NO specific training is provided to Operations personnel on proper fill, vent and draining techniques, especially when radiological hazards exist.
- Procedure CKL WQ-008, Revision 3, "Auxiliary Building Operator Watch Qual Card", (which includes the Containment Building) does not require Operations personnel to demonstrate proficiency/knowledge in performing the filling and venting of the Safety Injection System.

Mitigating Actions Taken Prior To Or During Root Cause Analysis:

Upon identification of the discreet radioactive particle the following areas/items were surveyed for the presence of additional discreet radioactive particles and none were detected:

- Actual flanges, Tygon tube and tools used.
- Operation's flange lockers in Containment Building used to stow flanges and hoses.
- Floor areas under and adjacent to valves being manipulated.
- Valves being vented and adjacent piping.
- East and west drain trench outside Bio-Shield where vent hoses were routed. However, pre-existing activity levels in the east drain trench were high enough to mask the presence of a hot particle.

The east and west drain trenches outside the Bio-Shield were covered with herculite and radiologically posted as a Highly Contaminated Area. This action was implemented to prevent any potential undetected particles in the trenches, which could be masked by the high area background radiation levels, from escaping.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST 908 WAS FORWARDED COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH #8301, U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20548, AND TO THE PAPERWORK REDUCTION PROJECT (3190-0104) OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503

FACILITY NAME (1)

WOLF CREEK GENERATING STATION

DOCKET NUMBER (2)

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LER NUMBER (3)

YEAR SEQUENTIAL NUMBER PREVIOUS NUMBER

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PAGE (3)

0 5 OF 1 1

TEXT IF more space is required, use additional NRC Form 206A (1/17)

Following discovery of the discreet radioactive particle, the personnel involved were interviewed to determine the actual sequence of events in order to determine the most likely time and location that the particle had been picked up. In addition to these interviews, surveys and contamination reports and radiation work permits were reviewed. The investigation indicates the particle was most likely blown out of the east drain trench and onto the Tygon tube during the venting of valve EM-V184. It was then subsequently transferred to the thigh of the Auxiliary Operator when he was retrieving the Tygon tube upon completion of the venting activity. The particle worked through the operator's protective clothing while he was completing the filling and venting activities associated with the Safety Injection System. The protective clothing donned by the operator and the Radiation Work Permit were evaluated and found to be adequate for the task being performed. This was further proven by the extensive surveys of the actual flange, hose, tools, and work areas involved. None of the surveys identified the presence of any additional discreet radioactive particles. However, the east drain trench surveys did indicate the presence of fission products and activity levels in the east drain trench were high enough to mask the presence of a discreet radioactive particle.

Contributing Factor / Underlying Causes:

A contributing factor to this event was the method the Auxiliary Operator used to vent valve EM-V184. The Auxiliary Operator pushed the Tygon tube through the grating over the east drain trench but did not bring the hose in contact with the floor of the trench. This action compressed the Tygon tube causing the escaping air and water to accelerate as it exited the tube and it created a splash back hazard by forcing the escaping air and water to make about a ninety degree turn. The compression of the Tygon tube, when coupled with the proximity of the end of the tube to the floor of the trench is believed to have caused the escaping air to blow the particle out of the trench and onto the Tygon tube.

Identified Underlying Causes include:

- Procedure SYS EM-410, Revision 0, "Fill And Vent Of Safety Injection System After Maintenance", does not provide clear instructions on how to fill and vent a potentially contaminated system. The procedure contains only two general

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-30), U.S. NUCLEAR REGULATORY COMMISSION WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

DOCKET NUMBER (2)

LER NUMBER (6)

PAGE (3)

WOLF CREEK GENERATING STATION

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TEXT (If more space is required, use additional NRC Form 305A's) (17)

5. Service Request MS-335 was initiated to remove the drain trench grating to support decontamination of the drain trench for incorporation into the preventive maintenance program for future outages.
6. Performance Improvement Request PIR # TS 93-0301 will be included in the Operations Plant Event Reading for Regualification Training.
7. WCNOG designed and fabricated ten venting/drainng nozzles which will be affixed to the end of the Tygon tube and slid through the grating during all filling/venting and venting/drainng activities. The venting/drainng nozzles have two approximately 3/4 inch wide and 1 inch high discharge ports and are designed to discharge the escaping air/water down (at a slight angle) along the length of the trench to eliminate the nozzle and splash back effects caused by pressing a Tygon Tube through the grating over the trench.

The corrective actions described above will be completed by July 15, 1993, with the exception of item five which will be completed prior to the seventh refueling outage.

SAFETY ANALYSIS:

After a review of the incident, it was determined that the WCNOG Hot Particle Contamination Control program was acceptable. The actions of the personnel caused the discreet radioactive particle to be relocated from the east drain trench onto the Auxiliary Operators skin; this event was not a failure of the program to identify and control the presence of discreet radioactive particles.

Discreet radioactive particles are usually microscopic in nature and come from two primary sources; i.e., failed fuel and neutron activated corrosion and wear products. Discreet radioactive particles which are insoluble have always been present in nuclear facilities, but have only been detectable with today's sensitive personnel monitoring equipment. Because of the nature of principle radiation involved (Beta particles), and their extreme localized effects, the risk of biological injury is low. This fact was recognized by the NRC when Information Notice 90-88 "Enforcement Policy For Hot Particle Exposure" was issued in August, 1990. This policy sets a limit of 75 micro-curie hours for a discreet radioactive particle. This particle (eight micro-

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 600 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (F-930), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20549, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

DOCKET NUMBER (2)

LER NUMBER (6)

PAGE (3)

WOLF CREEK GENERATING STATION

0 5 0 0 0 4 8 2 9 3 - 0 0 6 - 0 0 0 7 OF 1 1

TEXT (If more space is required, use additional NRC Form 304A-1 (17))

Corrective Actions To Be Taken To Prevent Recurrence:

1. To heighten the awareness of the Operations personnel to the need for proper and careful venting/draining techniques, a memo describing the event was issued and placed in Operations Essential Reading. This memo described the event and contained the following precautions which must be followed when draining systems to the drain trenches in the Containment:
 - Do not pinch the end of the hose in such a manner that a nozzle/jetting effect could be created.
 - Do not direct the stream in a manner which could result in splashing (i.e., directing a strong stream into a shallow receptacle or placing the hose outlet close to the bottom of a dry receptacle).
 - When draining to a shallow receptacle, where possible, direct the hose discharge along the bottom of the receptacle.
 - Open vent valves very slowly - carefully observing the hose discharge to prevent splashing.
 - Consider use of a poly vent bottle to vent the air off. Once some water comes through, shut the vent then place the hose to a drain.
2. The Drain Trench will be decontaminated after fuel is loaded into the core and final reactor cavity drain down is completed.
3. Operations Qualification Card Checklist Procedures CKL WQ-006, "Radwaste Operator Watch Qual Card", and CKL WQ-008, "Auxiliary Building Operator Watch Qual Card", will be revised to include specific training on venting and draining operations.
4. All presently qualified Auxiliary Operators and Radwaste Operators will receive training on the information added to procedures CKL WQ-006 and CKL WQ-008.

full Quality Assurance (QA) requirements to almost every system and component of the repository, and that the latter definition does not establish a graded QA system to properly distinguish systems that are "important to safety" and ensure that the full QA program is only applied to those systems.

The Commission disagrees with this comment. When identifying items "important to safety," if it is determined that a particular structure, system, or component is essential to maintaining doses below Part 20 limits during normal operations (or during any Category 1 design basis event), then that structure, system, or component must be designated as "important to safety." The list of structures, systems, and components "important to safety," as well as the list of engineered barriers "important to waste isolation," are collectively referred to as the "Q-list" and are subject to the QA provisions of Part 60, Subpart G. The Commission supports a graded approach to meeting the QA provisions of Part 60. Such an approach is consistent with the NRC staff's "Technical Position on Items and Activities in the High-Level Waste Geologic Repository Program Subject to QA Requirements (NUREG-1318)." The guidance given in that technical position (TP) is still applicable under the rule's changes. The TP describes a graded application of QA measures consistent with that applied to other facilities (e.g., nuclear power reactors) licensed by the Commission. In this regard, the application of QA program requirements to repository structures, systems, and

components would generally be commensurate with their importance to safety.

16. Design Bases - Similarities between GROA Facility and other Facilities Licensed by NRC.

ECNP stated that it is wrong to liken design basis for a waste repository (or long-term storage) facility to design basis for an operating nuclear reactor or other contemporary nuclear facility because of the longevity of the hazard and uncertainties of future monitoring and control.

The Commission disagrees with this comment. The design bases provided in the rule are for operations at the GROA and not for postclosure performance. Because operations at the repository are expected to be similar to operations at other facilities licensed by the Commission (e.g., 10 CFR Part 72 facilities), the Commission believes that it is appropriate that their design bases be comparable.

17. The Phrase "At All Times".

ECNP recommended that the phrase "at all times" should be retained throughout Part 60.

The Commission disagrees with this comment. The phrase "at

all times" was originally included in the regulation to emphasize the need to design the GROA such that retrieval activities, if found necessary, would be conducted in accordance with Part 20. The Commission continues to interpret the regulation in this manner but has removed the phrase "at all times" from §60.111 in the rule to clarify that the limits of Part 20 apply to Category 1 design basis events and that the separate design bases of §60.136 apply for Category 2 design basis events. Further, the Commission recognizes that conformance to the regulations should not hinder any actions that are necessary to protect public health and safety, such as lifesaving or maintaining confinement of radioactive materials (May 21, 1991; 56 FR 23365). The phrase "at all times" is ambiguous in this respect and was therefore removed.

18. AS HIGH AS REASONABLY ACHIEVABLE (AHARA) Design Standard for the GROA.

ECNP recommended that NRC adopt an AHARA standard with respect to criteria for the design of the GROA. ECNP states that the purpose of such a standard would be to provide an extra measure of conservatism in the design. ECNP further states that, for an operating nuclear facility, regulatory changes over time that mandate tighter standards and reduced emissions can be

accommodated by means of backfitting, but this is not so readily accomplished at a disposal facility.

The Commission disagrees with this comment and considers that the requirements of Part 60, as amended in this rulemaking, are sufficient to ensure public health and safety. The Commission also considers that backfitting, if necessary, can be accomplished at a disposal facility.

Section-by-Section Analysis

Section 60.2. Definitions.

The amendments involve 10 definitions needed in Part 60.

The term "preclosure controlled area" is new. It is essentially the same as the term "preclosure control area" proposed by DOE in its petition (PRM-60-3) and corresponds closely to the term "controlled area," as defined in 10 CFR 72.3. The term "preclosure controlled area" is adopted because Part 60 already refers to a "controlled area" (which area has been committed to use as a geologic repository and from which incompatible activities would be restricted following permanent closure). The function of the new term is to delimit an area over which the licensee exercises control of activities to meet regulatory requirements. Control includes the power to exclude

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 600 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-20), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20546, AND TO THE PAPERWORK REDUCTION PROJECT (3190-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

DOCKET NUMBER (2)

LER NUMBER (3)

PAGE (3)

WOLF CREEK GENERATING STATION

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TEXT (If more space is required, use additional NRC Form 308A's) (17)

curie hours) was ten percent of the established limit set in the Information Notice.

Exposure from discreet radioactive particles is conservatively calculated for a one square centimeter area of skin at a depth of seven milligram per square centimeter, using the VARSKIN computer code.

PREVIOUS SIMILAR OCCURRENCES:

Licensee Event Report (LER) 482/92-007-01 reported a previous discreet radioactive particle contamination event which resulted in an overexposure beyond 10CFR20.101 limits. On March 26, 1992, an engineer in the Radiological Controlled Area was discovered to have a localized area of contamination on the left cheek. The contamination was determined to be a discreet radioactive particle which probably originated from work previously performed which required breaching the Reactor Coolant System. The event probably resulted from the transfer of a discreet radioactive particle to the individual's left cheek during use of plant communications equipment. In order to reduce the probability of recurrence, WCNOG added information regarding the use of communications equipment in contaminated areas into the radiation worker training and requalification programs.

The current event resulted from the methodology used to fill and vent the Safety Injection System. The venting of the Safety Injection System is believed to have caused an existing discreet radioactive particle to become dislodged and exit the drain trench. Because the corrective actions implemented in LER 482/92-007-01 would not have prevented the occurrence of this recent event, additional training is being provided to all Radwaste and Auxiliary Operators on the proper method of performing system venting and draining activities.

LER 482/88-028-J1 reported a previous discreet radioactive particle contamination event which resulted in an overexposure beyond 10CFR20.101 limits. On December 9, 1988, at 1750 CST, an individual in the Radiologically Controlled Area (RCA) was discovered to have a localized area of facial contamination. Health Physics personnel subsequently removed a 0.7093 micro Curie Cobalt-60 particle from his chin. The individual had been working in the area of the polar crane inside the containment building. Work in the area was suspended while surveys for the presence of additional discreet radioactive particles were performed. These surveys identified no unusual conditions and

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED NUMBER FOR RESPONSE TO COMPLY WITH THIS
INFORMATION COLLECTION REQUEST 900 HRS FORWARD
COMMENTS REGARDING NUMBER ESTIMATE TO THE RECORDS
AND REPORTS BRANCHES BY BRANCH PAPER U.S. NUCLEAR
REGULATORY COMMISSION WASHINGTON, DC 20546 AND TO
THE PAPERWORK REDUCTION PROJECT (3190-0104) OFFICE
OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503

FACILITY NAME (1)

DOCKET NUMBER (2)

LER NUMBER (3)

PAGE (4)

WOLF CREEK GENERATING STATION

0 5 0 0 0 4 8 1 2 9 3 - 0 1 0 6 - 0 1 0 1 0 OF 11

TEXT (5) must appear in required use additional NRC Form 306A (11)

work was resumed. The maximum possible time the individual could have been exposed to this particle was determined to be four hours and sixteen minutes. Using this exposure time, it was conservatively determined that the individual may have received an occupational dose of 12.5 Rem to the skin of the whole body. The individual was precluded from further RCA entries during the quarter.

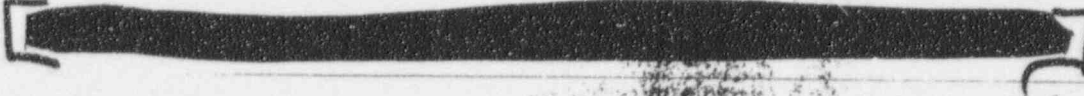
Investigation into the cause of this event revealed:

- There had been no previously identified discreet radioactive particles, no unusual radiation levels or evidence of abnormal contamination had been detected in the polar crane area.
- Records of previous incidence of personnel contamination during this refueling outage were reviewed. No similarities to this event were identified.
- Based on the particle's type and abundance it was determined that the particle had originated some years prior to it's identification.

Based on the above evaluation, it was concluded that this event was an isolated incident and consequently no changes to the Hot Particle Contamination Control Program were warranted. The actions taken during the investigation of LER 88-028-01 would not have prevented the occurrence of this recent event.

Attachment to LER 93-006-00

Individual Exposure Information

Name	Social Security No.	Date of Birth	Estimated Exposure
			

Ex 6

In accordance with 10 CFR 2.790 the information contained in this attachment is considered personal and should not be disclosed.

10 CFR 2.790 INFORMATION
WITHHOLD FROM PUBLIC DISCLOSURE

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS
INFORMATION COLLECTION REQUEST: 600 HRS. FORWARD
COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS
AND REPORTS MANAGEMENT BRANCH, P-430, U.S. NUCLEAR
REGULATORY COMMISSION, WASHINGTON, DC 20545, 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)

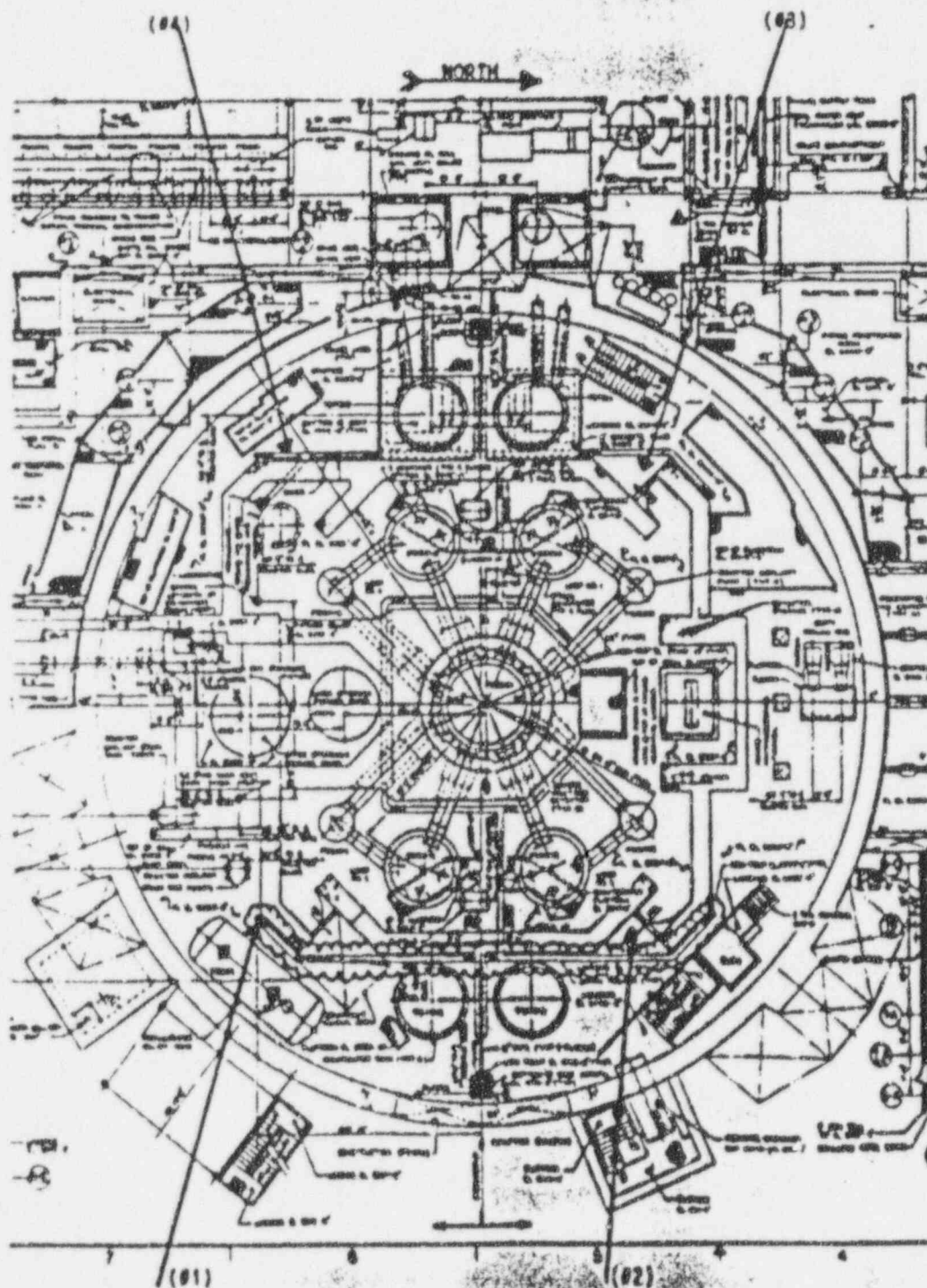
PAGE (3)

WOLF CREEK GENERATING STATION

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2000' CONTAINMENT BUILDING



specifying different numerical limits for each of the two categories (1 and 2) of design basis events. The structures, systems, and components "important to safety" are those necessary: (1) to provide reasonable assurance that the requirements of §60.111(a) would be observed for Category 1 design basis events; or (2) to prevent or mitigate Category 2 design basis events that could result in doses equal to, or greater than, the values specified in [new] §60.136 to any individual located on or beyond any point on the boundary of the preclosure controlled area.

Although the term "design bases" appears in existing Part 60, in §60.21(c)(2), it was not defined. As the previous discussion makes clear, "design bases" should be understood in relation to that range of events, including external natural or man-induced events, that is taken into account in the design, and, in particular, in relation to conditions that could result in radiological consequences beyond specified limits. The definition in Part 72 is inserted, without change, into the list of defined terms in §60.2.

The inclusion of a definition of "design basis events" serves two purposes. First, it identifies a set of events (referred to elsewhere as Category 1 design basis events) that must be taken into account in demonstrating compliance with the requirement to show, with reasonable assurance, that the

members of the public, if necessary. Because Part 60 (unlike Part 72) involves ongoing underground operations and timeframes of concern over centuries and millennia, language in the definition is included that, consistent with its function, limits the area to the surface and limits the duration to the period up to, and including, permanent closure.

The existing term "controlled area" is renamed "postclosure controlled area," to avoid any confusion or misunderstanding about this term in relation to its use in Parts 20 and 72. However, no substantive change is intended for the "postclosure controlled area" because this is a change in nomenclature only. Consistent with this nomenclature change, the term "controlled area" is changed to "postclosure controlled area," where it appears in the definitions for "accessible environment," "disturbed zone," and "site."

The term "important to safety" is amended to address the issues previously discussed. The existing provision is unclear and fails to ensure proper levels of protection of public and worker health and safety for the broad range of conditions or events that might occur at a repository site. This is an important term because it is the predicate for required design features as well as required quality assurance measures that provide defense-in-depth. The Commission is retaining the quantitative features of the existing definition but is

The definitions of "restricted area" and "unrestricted area" are amended to conform with the definitions in Part 20. The current definitions in Part 60 do not precisely conform to the current Part 20 because no change was made to these Part 60 definitions when Part 20 was revised.

The amendments of §60.2 adopted in this final rule differ from the amendments of §60.2 proposed in the proposed rule (March 22, 1995; 60 FR 15180) in the following respects: (1) the revised definitions of "restricted area" and "unrestricted area" were not proposed in the proposed rule; (2) in the definition of "important to safety," the phrases "features of the repository" and "nearest boundary" in the proposed rule were changed to "engineered features of the repository" and "any point on the boundary," respectively; (3) in the definition of "preclosure controlled area", the phrase "immediately surrounding the geologic repository operations area" in the proposed rule was changed to "surrounding the GROA"; and (4) in the definition of "site", the phrase "location of the postclosure controlled area" was changed to "location of the preclosure controlled area, or of the postclosure controlled area, or both." The rationale for the revised definitions of "restricted area" and "unrestricted area" is provided in the preceding paragraph. The rationale for the other changes is discussed under "Response to Public Comments on the Proposed Rule."

Section 60.8. Information collection requirements:

OMB approval.

NRC is updating 10 CFR 60.8, "Information Collection Requirements: OMB Approval," to reflect the fact that subsequent to the original issuance of Part 60, NRC requested, and obtained Office of Management and Budget (OMB) approval for the Part 60 "Information Collection Requirements." Section 60.8 was to be corrected the first time other revisions were made.

The amendment of §60.8 adopted in this final rule differs from the amendment of §60.8 in the proposed rule (60 FR 15180) in that the term "Paperwork Reduction Act of 1980," in the proposed rule, has been changed to the term "Paperwork Reduction Act of 1995" in the final rule.

Section 60.21. Content of application.

The DOE petition suggested that provision for accident analysis might be accomplished by amendment of §60.111. The Commission, instead, is requiring an accident analysis as part of the content of the application section (i.e., §60.21). The language requires that the application address the potential dose, to any individual located on or beyond any point on the preclosure controlled area boundary, that is attributable to Category 2 design basis events. The procedure that is envisaged

provisions of Part 20 will be met. (This set of events is described as "...those natural and human-induced events that are reasonably likely to occur regularly, moderately frequently, or one or more times before permanent closure of the geologic repository operations area.") Second, it identifies an additional set of events (previously referred to as Category 2 design basis events) that must be taken into account in applying the Commission's defense-in-depth philosophy. (This set of events is described as those "...other natural and human-induced events that are considered unlikely, but sufficiently credible to warrant consideration, taking into account the potential for significant radiological impacts on public health and safety.") The Commission recognizes that the criterion of "sufficiently credible to warrant consideration" is inexact, leaving its application to a consideration of the particular site and design that are the subjects of a license application. Generally, the Commission would expect that such design basis events would include as broad a range of external phenomena as would be taken into account in defining the design basis for other regulated facilities, including nuclear reactors. The Commission would also expect that the analysis of a specific design basis event would require an analysis which includes an initiating event (e.g., an earthquake) and the associated combinations of repository system or component failures that can potentially lead to exposure of the public to radiation.