NRC FOF (4-95)	RM 366		· · · · · · · · · · · · · · · · · · ·	U.S. CLEA	R REG	ULATOR		MISSION				ES 04/3	0/98		
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while the CRVS was degraded. Both conditions were corrected prior to the assessment of effects on habitability. Subsequent to the notification on May 13, a second evaluation determined that the CRVS would have maintained control room doses within 30 rem (thyroid). The NRC notification was updated to report this information on May 29, 1998. This voluntary report is being submitted for NRC information.

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NRC FORM 366A	· · · · · · · · · · · · · · · · · · ·		U.S. NUCLEA	R REGULAT	ORY COMMIS	SION
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FACILITY NAME (1)	DOCKET		LER NUMBER	(6)	PAGE (	3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
Indian Point 3	05000286	1998	- 004	00	2 OF	7
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#### DESCRIPTION OF EVENT

Note:

The Energy Industry Identification System codes are identified within the brackets [ ].

At approximately 1655 hours on May 13, 1998, with the plant at 100 percent power, NYPA notified the NRC that, on six prior occasions, the Control Room Ventilation System (CRVS) would not have been able to keep Control Room (CR) doses within limits. The plant design basis limit not met was the 30 rem thyroid required to meet 10 CFR 50, Appendix A, General Design Criterion (GDC) 19. This report was made following an evaluation of CR habitability that considered two past First, the CRVS had been degraded between January 1983 and events. June 1997. Surveillance testing did not assure that the air flows assumed in the CR habitability dose calculation could be achieved. Second, the leakage from systems outside containment (that would or could contain highly radioactive fluid during recirculation after a Loss of Coolant Accident (LOCA)) had exceeded the leakage used in the CR habitability dose calculation on six occasions while the CRVS was degraded. Both conditions were corrected prior to the assessment of effects on habitability. Subsequent to the notification on May 13, a second evaluation determined that the CRVS would have maintained control room doses within 30 rem thyroid. The NRC notification was updated to report this information on May 29, 1998.

The following chronological description identifies occurrences that were considered in assessing this event:

- The original plant Technical Specification (TS) 4.4.I identified a leakage limit of 2 gallons per hour (gph) for portions of the Residual Heat Removal System [OP] outside containment. The purpose, stated in the basis, was to limit off-site exposures due to leakage to insignificant levels relative to calculated values.
  - In a February 3, 1980 letter to NRC, NYPA identified systems that would or could contain highly radioactive fluid outside containment following a postulated LOCA. The February 3 letter stated that a program had been established to identify and reduce leakage from those systems. The letter identified the results of the first leakage test (44.5 cubic centimeter per minute(cc/min) or 0.7054 gallons per hour (gph)). The NRC approved this program with an acceptance criteria of 2 gph on February 21, 1980. License condition 2.L was added in License Amendment 38 requiring leakage testing, preventive maintenance and visual inspection to reduce leakage.

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<ul> <li>Indian Point 3</li> <li>D5000266</li> <li>Year Stormer Structure (Inverse structure)</li> <li>In a March 23, 1981 letter to the NRC, NYPA provided a respect to the post-TMI CR radiological habitability requirement. Tresponse identified the calculated CR dose as 28.8 rem thyre i.8 rem whole body and 28.2 rem beta skin. These values are currently found in the FSAR (Table 14.3-14G). The letter identified a portion of the dose due to leakage outside containment. The leakage used to calculate the CR dose refit the as found value reported for the first test (i.e., 0.765 gph). The use of this leakage was not identified in the letter surveillance test procedure 3PT-C01 was revised to track let from systems outside containment that would or could contain highly radioactive fluid during recirculation after a LOCA. revision used a 2 gph leakage acceptance criteria rather the 0.7054 gph.</li> <li>In January 1983, revision 3 to the CRVS refueling interval surveillance test procedure 3PT-R32C was approved. That revision used as 250 cubic feet per minute (cfm) and later 250 t cfm with a tolerance of 5 percent) and air flow through the filters (acceptance criteria) to determine recirculation air flow (accept criteria was 1125 to 1400 cfm) and recirculation air flow (acceptance criteria) to determine recirculation air flow (acceptance criteria) to 250 to 400 cfm). Testing in the abb manner allowed recirculation flow tho was 1125 to 1400 cfm mode the secure flow through the filters deceptance artistion flow the set less than assume the CR dose calculations and described in the FSAR. This occurred seven (7) times for fan 32 and twice for fan 31 dum nine tests between January 1983 and November 1993. Revision measured air flow was 250 to 400 cfm. This made the test methodology acceptable to measure the asceptance criteria to the relater flow shows and the recirculation air flow through the filters (acceptance criteria) to determine recirculatin air flow theose and a sume the CR dose calculation flow the</li></ul>	· · /	•	-	.ER)	
<ul> <li>Indian Point 3</li> <li>D5000286</li> <li>1998 - 004 - 00</li> <li>3</li> <li>TEXT (If more space is required, use additional copies of MRC Form 3664) (17)</li> <li>In a March 23, 1981 letter to the NRC, NYPA provided a response identified the calculated CR dose as 28.8 rem thyrr 1.8 rem whole body and 28.2 rem beta skin. These values are currently found in the FSAR (Table 14.3-146). The letter identified a portion of the dose due to leakage outside containment. The leakage used to calculate the CR dose refit the as found value reported for the first test (i.e., 0.7054 gph). The use of this leakage was not identified in the lett from systems outside containment that would or could contain highly radioactive fluid during recirculation after a LOCA. revision used a 2 gph leakage acceptance criteria rather the 0.7054 gph.</li> <li>In January 1983, revision 3 to the CRVS refueling interval surveillance test procedure 3PT-R32C was approved. That revision used a 2 gph leakage acceptance criteria rather the 0.7054 gph.</li> <li>In January 1983, revision 3 to the CRVS refueling interval surveillance test proceed or 3PT-R32C was approved. That revision used a 2 gph leakage acceptance criteria rather the 0.7054 gph.</li> <li>In January 1983, revision 3 to the CRVS refueling interval surveillance test proceent) and air flow (accept criteria was 250 cubic feet per minute (cfm) and later 250 to fm with a tolerance of 5 percent) and air flow through the filters (acceptance criteria) to determine outside makeup air flow (acceptance criteria) to determine</li></ul>		FACILITY NAME (1)	DOCKET		PAGE (3)
<ul> <li>TEXT (If more space is required, use additional copies of NRC Form 3664) (17)</li> <li>In a March 23, 1981 letter to the NRC, NYPA provided a response identified the calculated CR dose as 28.8 rem thyror 1.8 rem whole body and 28.2 rem beta skin. These values are currently found in the FSAR (Table 14.3-14G). The letter identified a portion of the dose due to leakage outside containment. The leakage used to calculate the CR dose refit the as found value reported for the first test (i.e. 0.7055 gph). The use of this leakage was not identified in the letter indication of the dose due to leakage outside containment. The leakage to calculate the CR dose refit the as found value reported for the first test (i.e. 0.7055 gph). The use of this leakage was not identified in the letter surveillance test procedure 3PT-CO1 was revised to track letter from systems outside containment that would or could contain highly radioactive fluid during recirculation after a LOCA. revision used a 2 gph leakage acceptance criteria rather tha 0.7054 gph.</li> <li>In January 1983, revision 3 to the CRVS refueling interval surveillance test procedure 3PT-R32C was approved. That revision used a 2 gph leakage acceptance criteria rather tha 0.7054 gph.</li> <li>In January 1983, revision 3 to the CRVS refueling interval surveillance test procedure 3PT-R32C fm with a tolerance rincorporated the air flow rates used in the habitability analysis. Revisions 3 to 5 measured makeup air flow (accept criteria was 125 to 1400 cfm) and recirculation air flow (acceptance criteria) to determine recirculation air flow (acceptance criteria vas 125 to 1400 cfm). Testing in the abb manner allowed recirculation flow to be set less than assume the CR dose calculations and described in the FSAR. This occurred seven (7) times for fan 32 and twice for fan 31 du un ine tests between January 1983 and November 1993. Revision measured air similiar to revision 6 but changed the acceptance criteria did not reflect margin for filloating as discussed later.</li> &lt;</ul>	Indian Daint 2		05000286	YEAR SEQUENTIAL REVISION NUMBER NUMBER	3 OF 7
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<ul> <li>to the post-TMI CR radiological habitability requirement. Tresponse identified the calculated CR dose as 28.8 rem thyror 1.8 rem whole body and 28.2 rem beta skin. These values are currently found in the FSAR (Table 14.3-14G). The letter identified a portion of the dose due to leakage outside containment. The leakage used to calculate the CR dose refit the as found value reported for the first test (i.e., 0.7654 gph). The use of this leakage was not identified in the leat radiological habitability evaluation. Several months later, surveillance test procedure 3PT-COI was revised to track leaf from systems outside containment that would or could contain highly radioactive fluid during recirculation after a LOCA. revision used a 2 gph leakage acceptance criteria rather the 0.7054 gph.</li> <li>In January 1983, revision 3 to the CRVS refueling interval surveillance test procedure 3PT-R32C was approved. That revincorporated the air flow rates used in the habitability analysis. Revisions 3 to 5 measured makeup air flow (accept criteria was 250 cubic feet per minute (cfm) and later 250 c fm with a tolerance of 5 percent) and air flow through the filters (acceptance criteria) to determine recirculation air flow (acceptance criteria to 450 to 400 cfm). Testing in the aba manner allowed recirculation flow to be set less than assume the CR dose calculations and described in the FSAR. This occurred seven (7) times for fan 32 and twice for fan 31 du nine tests between January 1983 and November 1993. Revision measured air flow was 250 to 400 cfm. This made the test methodology acceptable to measure the assumed air flows. At time the acceptance criteria did not reflect margin for filloading as discussed later.</li> <li>On May 20, 1992, NYPA issued LER 92-005 to report that the post of the test for the set the test for set the test for the test for the set the test for the test for the test for the test for the set</li></ul>	FEXT (If more spa	ce is required, use additional copies of NRC Form 366A)(	(17)		-
<ul> <li>radiological habitability evaluation. Several months later, surveillance test procedure 3PT-C01 was revised to track lead from systems outside containment that would or could contain highly radioactive fluid during recirculation after a LOCA. revision used a 2 gph leakage acceptance criteria rather that 0.7054 gph.</li> <li>In January 1983, revision 3 to the CRVS refueling interval surveillance test procedure 3PT-R32C was approved. That revisionporated the air flow rates used in the habitability analysis. Revisions 3 to 5 measured makeup air flow (accept criteria was 250 cubic feet per minute (cfm) and later 250 t cfm with a tolerance of 5 percent) and air flow through the filters (acceptance criteria was 1,250 cfm with a tolerance criteria was 1,250 m with a tolerance criteria was 1,250 to 400 cfm) and recirculation air flow (acceptance criteria) to determine recirculation air flow (acceptance criteria) to determine outside makeup air flow (acceptance criteria of 250 to 400 cfm). Testing in the abb manner allowed recirculation flow to be set less than assume the CR dose calculations and described in the FSAR. This occurred seven (7) times for fan 32 and twice for fan 31 dur nine tests between January 1983 and November 1993. Revision measured air similiar to revision 6 but changed the acceptar criteria so that recirculation air flow was 1125 to 1400 cfm. This made the test methodology acceptable to measure the assumed air flows. At time the acceptance criteria did not reflect margin for filloading as discussed later.</li> <li>On May 20, 1992, NYPA issued LER 92-005 to report that the p was operated outside the TS limit of 2 gph leakage. The effiltered acceptance outside the TS limit of 2 gph leakage.</li> </ul>	•	to the post-TMI CR radiologi response identified the calc 1.8 rem whole body and 28.2 currently found in the FSAR identified a portion of the containment. The leakage us the as found value reported	cal habital ulated CR of rem beta sl (Table 14.3 dose due to ed to calcu for the fig	bility requirement. dose as 28.8 rem thy kin. These values a 3-14G). The letter o leakage outside ulate the CR dose re rst test (i.e., 0.70	This yroid, are eflected 054
<ul> <li>surveillance test procedure 3PT-R32C was approved. That revincorporated the air flow rates used in the habitability analysis. Revisions 3 to 5 measured makeup air flow (accept criteria was 250 cubic feet per minute (cfm) and later 250 to cfm with a tolerance of 5 percent) and air flow through the filters (acceptance criteria was 1,250 cfm with a tolerance ranged from 5 to 10 percent) to determine recirculation air. Revision 6 measured air flow through the filters (acceptance criteria) to determine outside makeup air flow (acceptance criteria) to determine outside makeup air flow (acceptance criteria of 250 to 400 cfm). Testing in the above (acceptance criteria of 250 to 400 cfm). Testing in the above manner allowed recirculation flow to be set less than assume the CR dose calculations and described in the FSAR. This occurred seven (7) times for fan 32 and twice for fan 31 durnine tests between January 1983 and November 1993. Revision measured air similiar to revision 6 but changed the acceptar criteria so that recirculation air flow was 1125 to 1400 cfm. This made the test methodology acceptable to measure the assumed air flows. At time the acceptance criteria did not reflect margin for filt loading as discussed later.</li> <li>On May 20, 1992, NYPA issued LER 92-005 to report that the p was operated outside the TS limit of 2 gph leakage. The effect of a 2 gph leakage.</li> </ul>	•	radiological habitability ev surveillance test procedure from systems outside contain highly radioactive fluid dur revision used a 2 gph leakag	aluation. 3PT-C01 was ment that wing recircu	Several months late s revised to track i would or could conta ulation after a LOCA	er, leakage ain A. The
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NRC FORM 366 (4-95)

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Indian Point 3	· · · · · ·	05000286	YEAR SEQUENTIAL REVISION NUMBER NUMBER	4 OF 7
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TEXT (If more spa	ce is required, use additional copies of NRC Form 366A)(	17)		
•	In September 1992, a design track an issue related to sy description stated that the based on a three (3) inch wa filtration unit while the TS drop. The effect of the hig evaluated. The comments not cfm with a static pressure o the filtration unit. The fa 1400 cfm and the correspondi known. On September 11, 1995, NYPA plant had operated on two oc limit of 2 gph. The LER als procedure for leakage from s incorporated the leakage lim	stem press booster fa ter gage p allowed a her pressu ed that th f three (3 ns were be ng differe issued LER casions wi o reported ystems out it assumed	ure drop. The open n [FAN] motors were ressure drop across six (6) inch press re drop was to be e fan design was fo ) inch water gage a ing operated to pro ntial pressure was 95-016 to report t th leakage exceedin that the surveilla side containment ha in the CR habitabi	item sized the ure r 2000 cross vide not hat the g the TS nce test d not lity
٠	<ul><li>(1.34 gph). This was based leakage to begin from 30 min with a plant safety analysis</li><li>On June 11, 1996, a proposed the allowable leakage rate o the NRC. This proposed chan</li></ul>	on a chang utes to 14 for exter Technical utside con ge was bas	nal recirculation. Specification chan	me for nsistent ge to ted to
•	limit discussed in LER 95-01 Deviation Event Report (DER) to document an operability of dose limits of GDC 19 be met the filter had been defined identified when resolving th item. A subsequent assessme GDC 19 would be met. The as surveillance test results to performance, degraded that p filter loading (this resulte filtration in less than 30 d dose calculation to assess d consider whether the 0.7054 habitability analysis had be was no in-leakage following	97-1439 w oncern wit since no or tested) e Septembe nt conclud sessment 1 o determine erformance d in loss lays) and u lose. This gph leakag	h the CRVS (i.e., w design value for lo . That concern was r 1992 design docum ed that the dose li ooked at actual CRV initial system over time to accou of pressurization a sed a ratio of the assessment did not e assumed in the CR d and assumed that	ould the ading of mits of S Int for 1981
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<ul> <li>Indian Point 3</li> <li>Discrete Provided and the procession of the process</li></ul>	······································	FACILITY NAME (1)	TINUATION DOCKET	1		3 (6)	PAGE
<ul> <li>On February 23, 1998, an Emergency Operating Procedure was changed to increase minimum recirculation flow requirements. In response to NRC questions, the change was reviewed and the potential for operators to go to external recirculation flow requirements. In response to NRC questions, the change was reviewed and the potential for operators to go to external recirculation prematurely was identified. On April 10, 1998, DER 98-0592 was written which required a reasonable expectation of operability (REO). The REO found that CR doses were within GDC 19 limits even though there was leakage greater than 1.34 gph at the time The calculation to support this used criteria different from the FSAR, including: 1) the dose conversion factors of ICRP 30 rather than TID-14844 were used, and 2) a flashing fraction of 4.9 percent rather than 10 percent was used.</li> <li>On April 10, 1998, DER 98-0594 was written to identify that 33 charging pump (P] recirculation line leakage up to 2.2 gph. This exceeded the leakage limit of 1.34 gph identified in LER 95-016 An operability determination concluded that the FSAR limit of 28.8 rem thyroid could be met with leakage up to 2.2 gph. The calculation to support this used criteria different from the original habitability analysis, including: 1) the dose conversion factors of ICRP 30 rather than TID-14844 were used, and, 2) the leakage was assumed to begin in 14 hours rather tha 30 minutes.</li> <li>On May 13, 1998, calculations were done to address NRC staff questions regarding the assessment of operability made in response to DER 97-1439. The NRC had observed that unfiltered in-leakage had not been considered after pressurization stopped The NRC also observed that periods of leakage in exceess 0.705 gph (i.e., leakage of 1.26 gph from Augut 23, 1987 to June 19, 1989, Leakage of 2.69 gph from Augut 23, 1987 to June 19, 1989, leakage of 2.69 gph from Augut 23, 1987 to June 19, 1980 to April 19, 1992; leakage of 0.9 gph from April 14, 1992 to April 19, 1992 (reported in LER 92-00</li></ul>				YEAR			
<ul> <li>On February 23, 1998, an Emergency Operating Procedure was changed to increase minimum recirculation flow requirements. In response to NRC questions, the change was reviewed and the potential for operators to go to external recirculation prematurely was identified. On April 10, 1998, DER 98-0592 waw written which required a reasonable expectation of operability (REO). The REO found that CR doese were within GDC 19 limits even though there was leakage greater than 1.34 gph at the time The calculation to support this used criteria different from the FSAR, including: 1) the dose conversion factors of ICRP 30 rather than TID-14844 were used, and 2) a flashing fraction of 4.9 percent rather than 10 percent was used.</li> <li>On April 10, 1998, DER 98-0594 was written to identify that 33 charging pump [P] recirculation line leakage was 1.5 gph. This exceeded the leakage limit of 1.34 gph identified in LER 95-016 An operability determination concluded that the FSAR limit of 28.8 rem thyroid could be met with leakage up to 2.2 gph. The calculation to support this used criteria different from the original habitability analysis, including: 1) the dose conversion factors of ICRP 30 rather than TID-14844 were used, and, 2) the leakage was assumed to begin in 14 hours rather tha 30 minutes.</li> <li>On May 13, 1998, calculations were done to address NRC staff questions regarding the assessment of operability made in response to DER 97-143. The NRC had observed that unfiltered in-leakage had not been considered after pressurization stopped The NRC also observed that periods of leakage in exceed 0.7054 gph from April 14, 1992 to April 19, 1992, leakage of 2.69 gph from April 14, 1992 to April 19, 1992 (reported in LER 92-005); leakage of 1.47 gph from October 9 to December 14, 1992 to April 19, 1992 to April 20, 1992 (reported in LER 92-005); leakage of 1.47 gph from October 9 to December 14, 1993 to February 4, 1993. DER 98-0.98 gph from January 8, 1993 to February 4, 1993.</li> </ul>	ndian Point 3		05000286	1998		•	5 OF
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been met. That evaluation used performance data for the degraded CRVS based on a conventional system resistance curve developed to establish the fan operating point due to filter loading. Based on this curve, the pressurization and filtration functions would have been performed for 30 days after a postulated LOCA although at a reduced flow rate. The dose calculation used criteria different from the original habitability calculation, including: 1) the dose conversion factors of ICRP 30 rather than TID-14844 2) a flashing fraction of 4.9 percent rather than 10 percent 3) a 95 percent rather than 90 percent charcoal filter efficiency for those cases where testing showed charcoal efficiency greater than 99 percent; and , 4) booster fan flow rates were based on surveillance test results and system curves accounting for filter loading.

### CAUSE OF EVENT

The causes of the individual events were as follows:

- In a January 27, 1982 letter, the NRC issued an SER approving the radiological habitability evaluation. The acceptance criteria of surveillance test procedure 3PT-C01 was changed to 2 gph leakage rather than 0.7054 gph due to a lack of design control when incorporating regulatory requirements and design bases into procedures.
- The January 1983 revision to surveillance test procedure 3PT-R32C did not properly test flow assumed in the habitability analysis due to a lack of design control that did not assure regulatory requirements and design bases were adequately incorporated into procedures.
- The lack of a design value for loading of the filter system is due to a lack of this design value in the original design.

### CORRECTIVE ACTIONS

Corrective action has been taken as follows:

Surveillance test procedure 3PT-R32C has been revised to ensure as-left conditions meet CR habitability calculation assumptions when adjusted for filter loading.

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Surveillance test procedure 3PT-C01 has been revised to ensure that leakage is controlled within the assumption of the CR habitability calculation.

# ANALYSIS OF EVENT

This voluntary report is being made to describe past instances of inadequate design control and the evaluations done to assess those occurrences. As noted above, the issues seem to have been caused by inadequate documentation of the system design bases and inadequate implementation of design bases into surveillance tests. The CR Ventilation System was evaluated and found to be operable for those past events.

## SAFETY SIGNIFICANCE

There was no effect on the public health and safety since the CR would have remained habitable. This conclusion is based on the calculations that determined the CR dose would have remained within GDC 19 limits. The significant assumptions in the evaluations leading to this conclusion that were changed from the original habitability analysis are reasonable for the following reasons:

- Use of ICRP 30 dose conversion factors has been accepted for a number of plants.
- The Standard Review Plan allows the use of a flashing fraction of less than 10% when justified and this was done for the operability determination.
- The 95 percent charcoal filter efficiency was based on the tested charcoal efficiency of greater than 99 percent based on the guidance of Generic Letter 83-13.
- The 14 hour duration before leakage starts was based on the planned operation of the plant emergency systems following a postulated LOCA with a single failure.