

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) McGuire Nuclear Station - Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 3 6 9	PAGE (3) 1 OF 6
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TITLE (4)  
Contaminated Resin Released Through Unit Vent

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES		DOCKET NUMBER(S)
0	2	2	0	8	5	0	0	3			0 5 0 0 0
0	2	2	0	8	5	0	0	3			0 5 0 0 0

OPERATING MODE (9) 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 8: (Check one or more of the following) (11)										
POWER LEVEL (10) 1 0 0	20.402(b)			20.406(c)			50.73(a)(2)(iv)			73.71(b)	
	20.406(a)(1)(i)			50.36(e)(1)			50.73(a)(2)(v)			73.71(c)	
	20.406(a)(1)(ii)			50.36(e)(2)			50.73(a)(2)(vii)			<input checked="" type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 365A)  Informational Purposes	
	20.406(a)(1)(iii)			50.73(a)(2)(ii)			50.73(a)(2)(viii)(A)				
	20.406(a)(1)(iv)			50.73(a)(2)(iii)			50.73(a)(2)(ix)(i)				
	20.406(a)(1)(v)			50.73(a)(2)(iii)			50.73(a)(2)(ix)				

LICENSEE CONTACT FOR THIS LER (12)								TELEPHONE NUMBER			
NAME Scott Gewehr - Licensing								AREA CODE			
								7 1 0 4 3 1 7 1 3 1 - 7 1 5 8 1 1			

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)										
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)				<input checked="" type="checkbox"/> NO				

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

On February 19, 1985, an estimated one cubic foot (1 ft<sup>3</sup>) of contaminated spent resin was released from the McGuire Unit 1 vent, via the auxiliary building ventilation system. The resin was discovered on February 20, 1985 on the roof of the auxiliary building and other buildings, and in yard area. Offsite dose calculations indicated that no technical specification or reportable release limits had been exceeded.

The major cause of the event was personnel error, because the unit vent was not placed in the filtration mode. Corrective actions have been or will be taken to eliminate this pathway for contaminated resins to reach the environment, and will address procedural changes to ensure that the Resin Batching Tank is not allowed to overflow.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)  McGuire Nuclear Station - Unit 1	DOCKET NUMBER (2)  0 5 0 0 0 3 6 9 8 5 - 0 0 9 - 0 0 0 0 2 OF 6	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		

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

Introduction: At 1300 hrs, on February 20, 1985, spent resin was discovered on the roof of the Auxiliary Building. Subsequent investigation indicated spent resin on the Unit 1 Containment Building, Fuel Building, Unit 1 Doghouse, Solidification Building, and in the yard area at the north end of the Auxiliary Building. During a transfer of spent resin from Spent Resin Storage Tank "A" to the Resin Batching Tank on February 19, 1985, resin entered the Auxiliary Building Ventilation (VA) System via the Resin Batching Tank vent. The resin migrated through the VA system and out the Unit 1 Unit Vent. The amount of resin released was estimated at one cubic foot (1 ft<sup>3</sup>).

The Unit 1 Unit Vent was placed in the filtration mode at 1626 on February 20, 1985 as a precautionary measure against the release of additional resin.

Station Management, G. O. Management, Local and Region 2 NRC Representatives were notified the afternoon of February 20, 1985 of the event. Environmental sampling and decontamination efforts also began at this time.

Estimated offsite dose calculation performed February 21-24, 1985 indicated no Technical Specifications or Reportable Release Limits (Immediate) had been exceeded.

Unit 1 was in Mode 1 at 100% power on February 19 and 20, 1985.

This incident is classified as a Personnel Error, because of poor communication between Radwaste Technicians A and B which resulted in the omission of the Unit 1 Unit Vent being placed in the filtration mode during the resin transfer as required by OP/O/B/6200/32 (Radwaste Procedure for the Nuclear Solid Waste Disposal System Operation). Contributory to the incident are a Design Deficiency, due to the ability of spent resin to enter the VA system, and a Administrative/Procedural Deficiency, due to inadequate procedural control of a previously identified problem involving a radiation release pathway.

Evaluation:

Normal Operation

Resin is transferred from the Spent Resin Storage Tanks (SRSTs) to the Resin Batching Tank (RBT) on using OP/O/B/6200/32. This operation is performed by pressurizing the SRST with nitrogen to approximately 80 psig, then opening the appropriate transfer valves. The RBT level is monitored by observing the water/resin slurry through 3 view ports located on the West-South-West side of the RBT using a remote camera. Camera controls and viewing screen are located just outside the RBT room. This arrangement for monitoring level is used due to the long-term inoperability of the RBT sonar level instrument. Resin/water slurry levels were routinely allowed to reach the upper view port of the RBT during transfers. The transfer piping is then flushed back to the SRST. The RBT is recirculated with the mixer on and sampled prior to transferring to a vendor supplied liner located in the Solidification Building.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)  McGuire Nuclear Station - Unit 1	DOCKET NUMBER (2)  0   5   0   0   0   3   6   9	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		8   5	-   0   0   9	-   0   0	0   3	OF   6

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

Design Deficiency

The RBT is equipped with a 4" overflow line routed to the Mixing and Settling Tank. There is no screen or arrangement provided to prevent resin from entering and clogging this piping, which can easily plug due to the physical routing of the piping. The 1" RBT vent line is not provided with a resin screen. This allows any resin exiting the RBT vent to enter the VA system and potentially exit via the Unit 1 Unit Vent. These design deficiencies became apparent in September of 1984 when on a routine survey Health Physics detected a radiation source in the VA filters unit which proved to be spent resin. An overflow of the RBT had clogged the overflow line and resin had entered the VA system through the RBT vent. On September 17, 1984, Radwaste Chemistry wrote a change to OP/O/B/6200/32 as a safeguard against resin exiting the Unit Vent. A Health Physics Problem Report was written on September 18, 1984. A Station Problem Report was submitted on October 9, 1984. The Station Problem Report was not approved by station management due to the belief that the procedural control was sufficient and that resin physically could not be ejected out the unit vent.

Administrative/Procedural Deficiency

Station Directive 4.2.2, Independent Verification, includes that any operation involving a release pathway of gas or liquid must be independently verified. Once the potential for resin to escape via the Unit Vent was identified, a more appropriate administrative control would have been to require the use of signoff steps and Independent Verification during the transfer operation to ensure Unit 1 Unit Vent was in the filtration mode. There was also no procedural insurance that filtration would remain in service until the VA system was inspected for resin after a transfer in either OP/O/B/6200/32 or OP/O/A/6450/03 (Auxiliary Building Ventilation). Seven transfers of SRST A or B to the RBT were performed between September 1984 and the incident date of February 19, 1985, with no identified problem.

Cause of Incident Related to Personnel Error

On February 19, 1985, at 0800, Supervisor A instructed Technician A to prepare SRST "A" for transfer to the RBT, Technician B to transfer the contents of the RBT to the vendor liner, and Technician A and B to work on the SRST to RBT transfer together. Both technicians were experienced with these operations. Technician A prepared the SRST for transfer to the RBT per OP/O/B/6200/32 with the support of Technician C, while Technician B transferred the RBT to the liner.

Technician B relieved Technician A at lunchtime. Technician A verbally updated Technician B on the transfer status, indicating that the SRST was ready to transfer. Technician A left to eat lunch. Technician B took this turnover to mean that Technician A had performed steps of OP/O/B/6200/32 which would have placed the vent infiltration mode, while in fact this had not been done. Had Technician A and B turned over by physically indicating in the procedure what had been done, the step would not have been omitted.

The SRST was then pressurized and transferred to the RBT. Technicians B, C, and D performed the transfer and post transfer piping flush. The resin/water level in the RBT was at the midpoint of the upper sightglass as verified by Technicians B and C and later by Technician A.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

FACILITY NAME (1)  McGuire Nuclear Station - Unit 1	DOCKET NUMBER (2)  0   5   0   0   0   3   6   9   8   5   -   0   0   9   -   0   0   0   4   OF   6	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			

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Currently it is unknown how resin entered the RBT vent. The best guess is that with the overflow clogged, the force of pressure relief during the transfer coupled with the close proximity of the vent to the transfer piping enables resin to be blown out the vent without appearing to overflow the tank as viewed by camera.

#### Discovery of Spent Resin on Auxiliary Building Roof and Other Areas

On February 20, at 1230, 2 workers on a vendor roofing crew who had been working on the Auxiliary Building roof alarmed the personnel radiation monitor at the Auxiliary Building exit checkpoint. Inspection of their shoes indicated they had been stepping in spent resin. Health Physics personnel began an extensive survey and discovered the areas listed in sequence of events to be contaminated with spent resin. Based on the amount of resin observed or detected, approximately one cubic foot of resin was estimated to have been released. Radiation Control Areas were set up and decontamination efforts initiated. The Resident NRC Inspector, the Station Manager, and the General Office were notified. An extensive sampling program was initiated.

At 1626 on February 20, 1985, the Unit 1 Unit Vent was placed into the filtration mode.

At 1740 on February 20, 1985, the NRC Operations Center was given an ENS notification.

Resin was found in the VA filter unit on February 21, 1985. This resin was sampled and verified to match the resin in the liner currently being filled.

#### Sampling Program

Since resin was identified in the Unit 1 yard drains, environmental sampling included daily samples of the Waste Water Collection Basin (WWCB) to ensure no radiation was released via this pathway. This sampling will be performed until all decontamination is completed. No WWCB sample has indicated contamination to date. No contamination of the Unit 2 yard drains was detected. The area north of the boundary fence was sampled to determine if any contamination was present. The results of these surveys show contamination due to resin to a distance of approximately 1000 feet from the Unit Vent.

Based on sample results and a conservative estimation of beads transported past the boundary fence, conservative estimates of concentrations in the discharge canal were made. These concentrations are less than any immediately reportable limits.

#### Additional Offsite Dose Calculations to Determine Reportability of Event

On February 21 and 22, 1985, preliminary estimates of offsite dose calculations were performed to determine whether or not the event constituted an immediately reportable incident or Tech. Spec. violation. The following steps were taken in the assessment:

1. Various samples obtained and analyzed. (VA resin, resin on roof, etc.).



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FACILITY NAME (1)  McGuire Nuclear Station - Unit 1	DOCKET NUMBER (2)  0   5   0   0   0   3   6   9   8   5	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
		- 0   0   9	- 0   0	0   5	OF	6

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

2. Resin analysis of liners shipped in the 7 months prior to the event compared with analyser of VA/Roof/Vent Resin. Decay-corrected Cobalt and Cesium ratios match only the lines filled February 18-19, 1985.
3. Activity found in 1 m<sup>2</sup> soil samples 400 to 1000 feet from Unit Vent are used to determine if Tech. Spec. or CFR violations were possible.
4. Based on the rough estimate given in Item 3, above Tech. Specs. and various Regulations were reviewed. It was determined the probability of exceeding any limits was extremely small.

More formal assessments of the potential extent of the release were performed by Design Engineering on February 23-26, 1985 using information provided by Radwaste Engineering, G. O. Health Physics, Civil and Environmental Section of Design Engineering, and Station personnel. The conditions under which resin particles 300 microns or larger could be carried to the site boundary (2500 feet from Unit Vent) were calculated by the Civil Environmental Section of Design Engineering. Based on these calculations, 99.8% of the resin would not go beyond the site boundary unless the wind speed exceeded 15 mph and the resin was thrown 500 feet above the Unit Vent. Since meteorological conditions recorded at McGuire on February 18-19, 1985 at no time exceeded 13 mph and since the Unit Vent velocity is insufficient to eject such particles to 500 feet above the Unit Vent, these parameters were deemed sufficiently conservative. Soil samples beyond 1000 feet from the Unit Vent showed no detectable radioactivity above background which appears to substantiate this conclusion.

Dose estimates at the site boundary were performed by Design Mechanical and Nuclear Division. Assumptions for particle transport <300 microns in size assumed 1% (rather than previously conservative estimate 0.2%) of the particles were in this range for additional conservatism. Meteorology was assumed to be the worst case for conservatism. The NRC's GASPARG computer model was used to calculate the dose. The latest Land Use Survey was used to determine that ground dose and inhalation dose are the only dose pathways valid for the sector to which particles were projected to carry (wind prevailing from 170° to 190° per McGuire meteorology). The maximum dose by inhalation was conservatively calculated at:

0.0014 mR - Adult Total Body

0.066 mR - Teen Lung

The maximum ground dose was conservatively calculated at:

0.27 mR/year - Adult Total Body

0.33 mR/year - Teen Lung

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FACILITY NAME (1)  McGuire Nuclear Station - Unit 1	DOCKET NUMBER (2)  0   5   0   0   0   3   6   9   8   5	LER NUMBER (6)			PAGE (3)		
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER			
					0   6	OF	6

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

These calculations confirmed early estimates and are levels not formally reportable (immediately) to the NRC. Therefore the informal notification was appropriate.

This information was reviewed with Region 2 NRC on February, 1985.

Decontamination Steps

Decontamination efforts were initiated the afternoon of February 20, 1985. Decontamination efforts have included high suction vacuuming, sand blasting, and the use of strippable coating. Decontamination efforts still continue at this date.

Corrective Action

- Immediate: Unit 1 Unit Vent was placed in the filtration mode. Surveys/Sampling of the affected area was initiated to ensure no offsite release had occurred. Decontamination efforts were initiated.
- Subsequent: The RBT vent connection to the VA system was cut and rerouted to vent to the RBT room. A 55 gallon drum was placed under the vent.  
  
A Station Problem Report was submitted to cut and cap the RBT overflow line to the MST and reroute the overflow to the SRST inlet header.
- Planned: All Radwaste Technicians will be instructed to properly turnover procedures by physically pointing out which step shall be performed next.  
  
OP/O/B/6200/32 will be revised to ensure that the RBT will not be operated at a level above the second sight glass without the specified permission of the Radwaste Supervisor.  
  
All operating procedures will be reviewed to ensure compliance with Station Directive 4.2.2.  
  
The WWCB will be sampled daily until all decontamination is completed.  
  
Decontamination of affected areas to continue until complete.
- Recommended: A thorough review of the vent and overflow arrangement, for components which contain a radioactive process to help ensure a similar incident does not occur.

Safety Analysis:

This event had no effect on any safety related system. An extremely conservative estimated dose received by any member of the public was calculated at 0.33 mR/year; therefore the health and safety of the public were not affected by this event. However, a similar incident involving a greater volume or higher radiological concentration of resin under harsher meteorological conditions could potentially exceed Tech. Spec. and NRC Reportability Limits, therefore being considered as having a potential effect on the health of members of the public.

DUKE POWER COMPANY

P.O. BOX 33189  
CHARLOTTE, N.C. 28242

HAL B. TUCKER  
VICE PRESIDENT  
NUCLEAR PRODUCTION

TELEPHONE  
(704) 373-4531

March 29, 1985

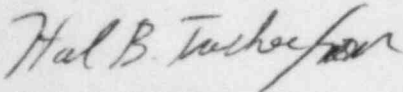
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U. S. Nuclear Regulatory Commission  
Washington, D. C. 20555

Subject: McGuire Nuclear Station, Unit 1  
Docket No. 50-369  
LER 369/85-09

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 369/85-09 concerning a Release of Contaminated Resins, which is submitted as an informational (voluntary) LER. This event was considered to be of no significance with respect to the health and safety of the public.

Very truly yours,



Hal B. Tucker

SAG/mjf

Attachment

cc: Dr. J. Nelson Grace, Regional Administrator  
U. S. Nuclear Regulatory Commission  
Region II  
101 Marietta Street, NW, Suite 2900  
Atlanta, Georgia 30323

INPO Records Center  
Suite 1500  
1100 Circle 75 Parkway  
Atlanta, Georgia 30339

M&M Nuclear Consultants  
1221 Avenue of the Americas  
New York, New York 10020

Mr. W. T. Orders  
NRC Resident Inspector  
McGuire Nuclear Station

American Nuclear Insurers  
c/o Dottie Sherman, ANI Library  
The Exchange, Suite 245  
270 Farmington Avenue  
Farmington, CT 06032

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