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U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Subject: Duke Energy Corporation
Catawba Nuclear Station, Units 1 and 2
Docket Numbers 50-413 and 50-414
Proposed Technical Specifications and Bases Amendment
Technical Specification and Bases 3.6.10
Annulus Ventilation System (AVS)
Technical Specification and Bases 3.6.16
Reactor Building
Technical Specification Bases 3.7.10
Control Room Area Ventilation System (CRAVS)
Technical Specification Bases 3.7.12
Auxiliary Building Filtered Ventilation Exhaust System (ABFVES)
Technical Specification Bases 3.7.13
Fuel Handling Ventilation Exhaust System (FHVES)
Technical Specification and Bases 3.9.3
Containment Penetrations
Technical Specification 5.5.11
Ventilation Filter Testing Program (VFTP)
TAC Numbers MB7014 and MB7015

References: Letters from Duke Energy Corporation to NRC, dated November 25, 2002, November 13, 2003, December 16, 2003, September 22, 2004, April 6, 2005, June 14, 2005, and July 8, 2005

The reference letters comprise Duke Energy Corporation's collective submittal to date concerning the subject license amendment request. In a recent conference call between Duke Energy Corporation and NRC staff concerning this amendment request, we indicated that we would revise our dose analyses. The revisions would incorporate a safety factor of two between the filter penetration fraction of elemental iodine by the carbon bed filters of the ventilation systems discussed in the amendment request and the methyl iodide

A001

penetration criteria for these carbon bed filters. The revisions would also include a precise simulation of bypass airflow around these carbon bed filters.

This work has been completed and the attachment to this letter describes the results of this effort. This effort demonstrated that for all analyzed accidents, all doses to the public and to the operators remain within established regulatory criteria.

Pursuant to 10 CFR 50.91, a copy of this letter is being sent to the appropriate State of South Carolina official.

Inquiries on this matter should be directed to L.J. Rudy at (803) 831-3084.

Very truly yours,

D.M. Jamil

LJR/s

Attachment

D.M. Jamil affirms that he is the person who subscribed his name to the foregoing statement, and that all the matters and facts set forth herein are true and correct to the best of his knowledge.

D.M. Jamil, Vice President

Subscribed and sworn to me: 8/17/05
Date

Notary Public

My commission expires: 7/2/2014
Date

SEAL

xc (with attachment):

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ATTACHMENT

REVISED DOSE ANALYSIS RESULTS

Duke Energy Corporation has submitted to the NRC a license amendment request (LAR) requesting approval for amendments to a number of technical specifications related to the reactor building and Engineered Safety Features (ESF) grade filtered ventilation systems at Catawba Nuclear Station (Ref. 1-9). The technical justification for the LAR included an analysis of radiological consequences of a design basis loss of coolant accident (LOCA) at Catawba Nuclear Station. This analysis was completed with the method of Alternative Source Terms and generally in conformance to Regulatory Guide 1.183 (Ref. 10). The supplemental submittals include analyses of radiological consequences of the design basis locked rotor accident (LRA), rod ejection accident (REA), and supplementary analyses of the effect of insertion of mixed oxide (MOX) lead fuel assemblies (LFAs) on the radiological consequences of the design basis LOCA, LRA, and REA (Ref. 7).

The proposed technical specification amendments included proposed revisions to the ventilation filter test program (VFTP) in Technical Specification 5.5.11. The revisions included changes to the criteria for bypass airflow around the high efficiency particulate adsorbers (HEPAs) and 2 inch carbon bed adsorbers of the Unit 2 ESF grade ventilation systems from 0.05% to 1%. The methyl iodide penetration criteria for all 2 inch ESF grade carbon bed filters is unchanged at 4%. In the original submittal and in a number of responses to requests for additional information, Duke described and provided technical justification for the VFTP criteria, the proposed changes to them, and the associated assumptions in the analyses of radiological consequences of the design basis LOCA, LRA, and REA.

Recently, representatives of Duke and the NRC have had telephone conferences concerning this submittal and in particular to the assumptions in the dose analyses pertaining to penetration of diatomic iodine into the ESF grade carbon adsorbers and bypass airflow. Following these telephone conferences, Duke is submitting the results of revised analyses of radiological consequences of the design basis LOCA, LRA, and REA. In the analyses, new values were assumed for the efficiencies for the ESF grade carbon bed adsorbers for removal of diatomic iodine and organic iodine compounds from the airflow penetration these filters. These new values incorporate a safety factor of two (2) between the filter penetration fraction for both diatomic iodine and organic iodine compounds and the criteria for the methyl iodide penetration tests (4% for 2 inch carbon beds and 0.95% for the 4 inch carbon beds). Also, the computer models for the carbon bed adsorbers were revised. The

revised models precisely simulate both penetration of iodine species through the carbon bed adsorbers and bypass airflow around the carbon bed adsorbers.

The analyses of radiological consequences of the DB LOCA and REA credit operation of the Annulus Ventilation System (AVS) and Auxiliary Building Filtered Ventilation Exhaust System (ABFVES). The calculation of radiation doses in the control room for the DB LOCA, LRA, and REA credits the Control Room Area Ventilation System (CRAVS). The values assumed for the efficiencies of the carbon bed in removing iodine from the airflow through them and the bypass fractions are presented below:

Table A-1
ABFVES (2 inch carbon beds)

Current filtration efficiency requirement (Lab test T.S. Requirement)	96.0%
Future Value	96.0%
Filtration efficiency assumed in dose analysis for elemental iodine	92.0%
Filtration efficiency assumed in dose analysis for organic iodine	92.0%
T.S. allowed by-pass fraction	1.0%
By-pass fraction explicitly accounted for in dose analysis	1.0%
Imputed factor of safety for both elemental and organic iodine filtration	2.0 = (100-92)/(100-96)

Table A-2
AVS (2 inch carbon beds)

Current filtration efficiency requirement (Lab test T.S. Requirement)	96.0%
Future Value	96.0%
Filtration efficiency assumed in dose analysis for elemental iodine	92.0%
Filtration efficiency assumed in dose analysis for organic iodine	92.0%
T.S. allowed by-pass fraction	1.0%
By-pass fraction explicitly accounted for in dose analysis	1.0%
Imputed factor of safety for both elemental and organic iodine filtration	2.0 = (100-92)/(100-96)

Table A-3
CRAVS (4 inch carbon beds)

Current filtration efficiency requirement (Lab test T.S. Requirement)	99.05%
Future Value	99.05%
Filtration efficiency assumed in dose analysis for elemental iodine	98.1%
Filtration efficiency assumed in dose analysis for organic iodine	98.1%
T.S. allowed by-pass fraction	0.05%
By-pass fraction explicitly accounted for in dose analysis	0.05%
Imputed factor of safety for both elemental and organic iodine filtration	2.0 = (100-98.1)/(100-99.05)

Note for Tables A-1, A-2, and A-3 regarding RG 1.52, Rev. 3:

It should be noted that Duke is not using the specific activated carbon decontamination factors shown in Table 1 for 2 inch and 4 inch beds. In particular, Duke is retaining the current filtration efficiency requirements, equating the future values to the current values. However, Duke is rigorously following the intent and philosophy of Regulatory Guide 1.52 in determining the allowable decontamination factors as described in Note 4 under Table 1 where the following equation is given to calculate the Technical Specification laboratory penetration test criterion:

Allowable Penetration = (100% - organic iodide efficiency for activated carbon credited in licensee's accident analysis) / safety factor

where the safety factor should be at least 2.

Radiological consequences of the design basis LOCA, LRA, and REA were reanalyzed. The revised analyses included scenarios in which the affected core included either all low enriched uranium (LEU) fuel or four (4) MOX LFAs. Total effective dose equivalents (TEDEs) at the Exclusion Area Boundary (EAB) and the boundary of the Low Population Zone (denoted as the LPZ) were recalculated for the design basis LOCA and REA only. No ESF grade ventilation system is credited for mitigating releases of radioactivity to the environment following a design basis LRA. Therefore, offsite (EAB and LPZ) TEDEs were not recalculated for the design basis LRA. TEDEs to the control room operators were recalculated for the design basis LOCA, LRA, and REA.

The results of the revised analyses are presented below.

Table A-4
Radiological Consequences of the
Design Basis LOCA at Catawba Nuclear Station
All LEU Fuel

Table A-4a
EAB TEDEs

Catawba Nuclear Station Design Basis LOCA Scenario	Radioactivity Release Path	Revised EAB TEDE's (Rem)
CNS DB LOCA with a Minimum Safeguards Failure	Cont Leakage	3.03
	ESF Leakage	0.60
	Total	3.63
CNS DB LOCA with a AVS pressure transmitter failure (runaway AVS train)	Cont Leakage	3.95
	ESF Leakage	0.68
	Total	4.63
CNS DB LOCA with failure of a RHRS or CSS Heat Exchanger	Cont Leakage	2.67
	ESF Leakage	2.83
	Total	5.50
CNS DB LOCA with an initially closed CRAVS Outside Air Intake	Cont Leakage	2.67
	ESF Leakage	0.68
	Total	3.35

Table A-4b
LPZ TEDEs

Catawba Nuclear Station Design Basis LOCA Scenario	Radioactivity Release Path	Revised LPZ TEDE's (Rem)
CNS DB LOCA with a Minimum Safeguards Failure	Cont Leakage	1.79
	ESF Leakage	0.60
	Total	2.39
CNS DB LOCA with a AVS pressure transmitter failure (runaway AVS train)	Cont Leakage	1.88
	ESF Leakage	0.62
	Total	2.50
CNS DB LOCA with failure of a RHRS or CSS Heat Exchanger	Cont Leakage	1.68
	ESF Leakage	1.47
	Total	3.15
CNS DB LOCA with an initially closed CRAVS Outside Air Intake	Cont Leakage	1.68
	ESF Leakage	0.62
	Total	2.30

Table A-4c
Control Room TEDEs

Catawba Nuclear Station Design Basis LOCA Scenario	Radioactivity Release Path	Revised Control Room TEDEs (Rem)
CNS DB LOCA with a Minimum Safeguards Failure	Cont Leakage	1.22
	ESF Leakage	0.31
	Total	1.54
CNS DB LOCA with a AVS pressure transmitter failure (runaway AVS train)	Cont Leakage	1.29
	ESF Leakage	0.32
	Total	1.61
CNS DB LOCA with failure of a RHRS or CSS Heat Exchanger	Cont Leakage	1.15
	ESF Leakage	0.77
	Total	1.92
CNS DB LOCA with an initially closed CRAVS Outside Air Intake	Cont Leakage	1.79
	ESF Leakage	0.41
	Total	2.20

Notes on Tables A-4a - A-4c

1) Regulatory acceptance criteria given in Regulatory Guide 1.183 for TEDEs following the design basis LOCA are 25 Rem for TEDEs to the EAB and LPZ, and 5 Rem in the control room.

2) Lower bound values were taken for the CRAVS total airflow rate to the control room. A sensitivity study showed that this lower bound value yielded the upper bounds to the control room TEDEs for the design basis LOCA.

Table A-5
Radiological Consequences of the
Design Basis LOCA at Catawba Nuclear Station
Four MOX LFAs in the Affected Core

Table A-5a
EAB TEDEs

Catawba Nuclear Station Design Basis LOCA Scenario	Radioactivity Release Path	Revised EAB TEDE's (Rem)
CNS DB LOCA with a Minimum Safeguards Failure	Cont Leakage	3.04
	ESF Leakage	0.61
	Total	3.64
CNS DB LOCA with a AVS pressure transmitter failure (runaway AVS train)	Cont Leakage	3.96
	ESF Leakage	0.73
	Total	4.69
CNS DB LOCA with failure of a RHRS or CSS Heat Exchanger	Cont Leakage	2.67
	ESF Leakage	2.88
	Total	5.55
CNS DB LOCA with an initially closed CRAVS Outside Air Intake	Cont Leakage	2.67
	ESF Leakage	0.73
	Total	3.40

Table A-5b
LPZ TEDEs

Catawba Nuclear Station Design Basis LOCA Scenario	Radioactivity Release Path	Revised LPZ TEDE's (Rem)
CNS DB LOCA with a Minimum Safeguards Failure	Cont Leakage	1.80
	ESF Leakage	0.61
	Total	2.41
CNS DB LOCA with a AVS pressure transmitter failure (runaway AVS train)	Cont Leakage	1.89
	ESF Leakage	0.63
	Total	2.52
CNS DB LOCA with failure of a RHRS or CSS Heat Exchanger	Cont Leakage	1.69
	ESF Leakage	1.50
	Total	3.19
CNS DB LOCA with an initially closed CRAVS Outside Air Intake	Cont Leakage	1.69
	ESF Leakage	0.63
	Total	2.32

Table A-5c
Control Room TEDEs

Catawba Nuclear Station Design Basis LOCA Scenario	Radioactivity Release Path	Revised Control Room TEDEs (Rem)
CNS DB LOCA with a Minimum Safeguards Failure	Cont Leakage	1.22
	ESF Leakage	0.32
	Total	1.54
CNS DB LOCA with a AVS pressure transmitter failure (runaway AVS train)	Cont Leakage	1.29
	ESF Leakage	0.33
	Total	1.62
CNS DB LOCA with failure of a RHRS or CSS Heat Exchanger	Cont Leakage	1.15
	ESF Leakage	0.78
	Total	1.93
CNS DB LOCA with an initially closed CRAVS Outside Air Intake	Cont Leakage	1.78
	ESF Leakage	0.43
	Total	2.21

Notes on Tables A-5a - A-5c

1) Regulatory acceptance criteria given in Regulatory Guide 1.183 for TEDEs following the design basis are 25 Rem for TEDEs to the EAB and LPZ, and 5 Rem in the control room.

2) Cf. Note 2 to Tables A-4a - A-4c.

Table A-6
Control Room TEDEs Following a
Design Basis Locked Rotor Accident at
Catawba Nuclear Station

Catawba Nuclear Station design basis locked rotor accident scenario	Revised Control Room TEDEs (Rem)
CNS Unit 1 DB LRA with LOOP, all LEU core	0.27
CNS Unit 1 DB LRA with LOOP, 4 MOX LFAs	0.29
CNS Unit 2 DB LRA with LOOP, all LEU core	0.47
CNS Unit 2 DB LRA with LOOP, 4 MOX LFAs	0.51

Notes on Table A-6

1) The regulatory acceptance criterion for control room TEDE for all design basis accidents is 5 Rem.

2) Lower bound values are taken for CRAVS total airflow rate to the control room. Cf. Note 2 to Tables A-7a - A-7c.

3) All design basis LRA scenarios include a Minimum Safeguards failure.

Table A-7
Radiological Consequences of a Design Basis Rod Ejection Accident at Catawba Nuclear Station

Table A-7a
EAB TEDEs

CNS DB REA Scenario	Release Path	TEDE (Rem)
CNS Unit1 DB REA, no LOOP, all LEU Core	SG Boiloff	1.30
	Cont Leakage	2.88
	ESF Leakage	0.66
	Total	4.17
CNS Unit 1 DB REA, no LOOP, 4 MOX LFAs	SG Boiloff	1.32
	Cont Leakage	2.92
	ESF Leakage	0.67
	Total	4.23
CNS Unit 2 DB REA, no LOOP, all LEU Core	SG Boiloff	2.02
	Cont Leakage	2.88
	ESF Leakage	0.66
	Total	4.89
CNS Unit 2 DB REA, no LOOP, 4 MOX LFAs	SG Boiloff	2.05
	Cont Leakage	2.92
	ESF Leakage	0.67
	Total	4.97

Table A-7b
LPZ TEDEs

CNS DB REA Scenario	Release Path	TEDE (Rem)
CNS Unit1 DB REA, no LOOP, all LEU Core	SG Boiloff	0.22
	Cont Leakage	3.04
	ESF Leakage	2.65
	Total	3.26
CNS Unit 1 DB REA, no LOOP, 4 MOX LFAs	SG Boiloff	0.22
	Cont Leakage	3.09
	ESF Leakage	2.71
	Total	3.31
CNS Unit 2 DB REA, no LOOP, all LEU Core	SG Boiloff	0.33
	Cont Leakage	3.04
	ESF Leakage	2.65
	Total	3.37
CNS Unit 2 DB REA, no LOOP, 4 MOX LFAs	SG Boiloff	0.34
	Cont Leakage	3.09
	ESF Leakage	2.71
	Total	3.43

Table A-7c
Control Room TEDEs

CNS DB REA Scenario	Release Path	TEDE (Rem)
CNS Unit1 DB REA, no LOOP, all LEU Core	SG Boiloff	0.24
	Cont Leakage	1.74
	ESF Leakage	1.52
	Total	1.98
CNS Unit 1 DB REA, no LOOP, 4 MOX LFAs	SG Boiloff	0.25
	Cont Leakage	1.76
	ESF Leakage	1.56
	Total	2.01
CNS Unit 2 DB REA, no LOOP, all LEU Core	SG Boiloff	0.37
	Cont Leakage	1.74
	ESF Leakage	1.52
	Total	2.10
CNS Unit 2 DB REA, no LOOP, 4 MOX LFAs	SG Boiloff	0.37
	Cont Leakage	1.76
	ESF Leakage	1.56
	Total	2.14

Notes on Tables A-7a - A-7c

1) Regulatory acceptance criteria given in Regulatory Guide 1.183 for TEDEs following the design basis REA are 6.3 Rem for TEDEs to the EAB and LPZ, and 5 Rem in the control room.

2) Lower bound values were taken for the CRAVS total airflow rate to the control room. A sensitivity study showed that this lower bound value yielded the upper bounds to the control room TEDEs for the design basis REA.

3) All design basis REA scenarios include a Minimum Safeguards failure.

The regulatory acceptance criteria for the radiological consequences of the design basis LOCA, LRA, and REA are given in Regulatory Guide 1.183 and repeated in Notes 1 to Tables A-4 through A-7. All TEDEs calculated at either the EAB, LPZ, or in the control room following a design basis LOCA, LRA, REA, either with an all LEU core or with a core with four MOX LFAs remain within these regulatory acceptance criteria.

REFERENCES

1) G.R. Peterson (Duke Energy Corporation) to U.S. Nuclear Regulatory Commission, "Duke Energy Corporation Catawba Nuclear Station, Units 1 and 2 (Docket Nos. 50-413 and 50-414, Proposed Technical Specifications and Bases Amendment, Technical Specification and Bases 3.6.10 Annulus Ventilation System (AVS), Technical Specification and Bases 3.6.16 Reactor Building, Technical Specification Bases 3.7.10 Control Room Area Ventilation System (CRAVS), Technical Specification Bases 3.7.12 Auxiliary Building Filtered Ventilation Exhaust System (ABFVES), Technical Specification Bases 3.7.13 Fuel Handling Ventilation Exhaust System (FHVES), Technical Specification and Bases 3.9.3 Containment Penetrations, Technical Specification 5.5.11 Ventilation Filter Testing Program (VFTP)," November 25, 2002.

2) Robert E. Martin (USNRC) to D.M. Jamil (Duke Energy Corporation), "Catawba Nuclear Station, Units 1 and 2 Re: Request for Additional Information (TAC Nos. MB7014 and MB7015)," September 11, 2003.

3) D.M. Jamil to U.S. Nuclear Regulatory Commission, "Duke Energy Corporation Catawba Nuclear Station, Units 1 and 2 (Docket Nos. 50-413 and 50-414, Proposed Technical Specifications and Bases Amendment, Technical Specification and Bases 3.6.10 Annulus Ventilation System (AVS), Technical Specification and Bases 3.6.16 Reactor Building, Technical Specification Bases 3.7.10 Control Room Area Ventilation System (CRAVS), Technical Specification Bases 3.7.12 Auxiliary Building Filtered Ventilation Exhaust System (ABFVES), Technical Specification Bases 3.7.13 Fuel Handling Ventilation Exhaust System (FHVES), Technical Specification and Bases 3.9.3 Containment Penetrations, Technical Specification 5.5.11 Ventilation Filter Testing Program (VFTP), TAC Numbers MB7014 and MB7015," November 13, 2003.

4) D.M. Jamil to U.S. Nuclear Regulatory Commission, "Duke Energy Corporation Catawba Nuclear Station, Units 1 and 2 (Docket Nos. 50-413 and 50-414, Proposed Technical Specifications and Bases Amendment, Technical Specification and Bases 3.6.10 Annulus Ventilation System (AVS), Technical Specification and Bases 3.6.16 Reactor Building, Technical Specification Bases 3.7.10 Control Room Area Ventilation System (CRAVS), Technical Specification Bases 3.7.12 Auxiliary Building Filtered Ventilation Exhaust System (ABFVES), Technical

Specification Bases 3.7.13 Fuel Handling Ventilation Exhaust System (FHVES), Technical Specification and Bases 3.9.3 Containment Penetrations, Technical Specification 5.5.11 Ventilation Filter Testing Program (VFTP), TAC Numbers MB7014 and MB7015," December 16, 2003.

5) S.E. Peters (USNRC) to D.M. Jamil, "Catawba Nuclear Station, Units 1 and 2 Re: Request for Additional Information (TAC Nos. MB7014 and MB7015)," May 25, 2004.

6) D.M. Jamil to U.S. Nuclear Regulatory Commission, "Duke Energy Corporation Catawba Nuclear Station, Units 1 and 2 (Docket Nos. 50-413 and 50-414, Proposed Technical Specifications and Bases Amendment, Technical Specification and Bases 3.6.10 Annulus Ventilation System (AVS), Technical Specification and Bases 3.6.16 Reactor Building, Technical Specification Bases 3.7.10 Control Room Area Ventilation System (CRAVS), Technical Specification Bases 3.7.12 Auxiliary Building Filtered Ventilation Exhaust System (ABFVES), Technical Specification Bases 3.7.13 Fuel Handling Ventilation Exhaust System (FHVES), Technical Specification and Bases 3.9.3 Containment Penetrations, Technical Specification 5.5.11 Ventilation Filter Testing Program (VFTP), TAC Numbers MB7014 and MB7015," September 22, 2004.

7) D.M. Jamil to U.S. Nuclear Regulatory Commission, "Duke Energy Corporation Catawba Nuclear Station, Units 1 and 2 (Docket Nos. 50-413 and 50-414, Proposed Technical Specifications and Bases Amendment, Technical Specification and Bases 3.6.10 Annulus Ventilation System (AVS), Technical Specification and Bases 3.6.16 Reactor Building, Technical Specification Bases 3.7.10 Control Room Area Ventilation System (CRAVS), Technical Specification Bases 3.7.12 Auxiliary Building Filtered Ventilation Exhaust System (ABFVES), Technical Specification Bases 3.7.13 Fuel Handling Ventilation Exhaust System (FHVES), Technical Specification and Bases 3.9.3 Containment Penetrations, Technical Specification 5.5.11 Ventilation Filter Testing Program (VFTP), TAC Numbers MB7014 and MB7015," April 6, 2005.

8) D.M. Jamil to U.S. Nuclear Regulatory Commission, "Duke Energy Corporation Catawba Nuclear Station, Units 1 and 2 (Docket Nos. 50-413 and 50-414, Proposed Technical Specifications and Bases Amendment, Technical Specification and Bases 3.6.10 Annulus Ventilation System (AVS), Technical Specification and Bases 3.6.16

Reactor Building, Technical Specification Bases 3.7.10 Control Room Area Ventilation System (CRAVS), Technical Specification Bases 3.7.12 Auxiliary Building Filtered Ventilation Exhaust System (ABFVES), Technical Specification Bases 3.7.13 Fuel Handling Ventilation Exhaust System (FHVES), Technical Specification and Bases 3.9.3 Containment Penetrations, Technical Specification 5.5.11 Ventilation Filter Testing Program (VFTP), TAC Numbers MB7014 and MB7015," June 14, 2005.

9) D.M. Jamil to U.S. Nuclear Regulatory Commission, "Duke Energy Corporation Catawba Nuclear Station, Units 1 and 2 (Docket Nos. 50-413 and 50-414, Proposed Technical Specifications and Bases Amendment, Technical Specification and Bases 3.6.10 Annulus Ventilation System (AVS), Technical Specification and Bases 3.6.16 Reactor Building, Technical Specification Bases 3.7.10 Control Room Area Ventilation System (CRAVS), Technical Specification Bases 3.7.12 Auxiliary Building Filtered Ventilation Exhaust System (ABFVES), Technical Specification Bases 3.7.13 Fuel Handling Ventilation Exhaust System (FHVES), Technical Specification and Bases 3.9.3 Containment Penetrations, Technical Specification 5.5.11 Ventilation Filter Testing Program (VFTP), TAC Numbers MB7014 and MB7015," July 8, 2005.

10) USNRC, Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors, Regulatory Guide 1.183, July 2000.