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May 4, 2006

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

ATTENTION: Document Control Desk

Subject: Duke Power Company LLC d/b/a
Duke Energy Carolinas, LLC (Duke)
McGuire Nuclear Station, Units 1 and 2
Docket Nos. 50-369 and 50-370

License Amendment Request for Selective Implementation of the Alternative Source Term and Revision to Technical Specification 3.9.4, Containment Penetrations.
Response to Request for Additional Information

Reference 1: Duke letter to NRC dated December 20, 2005

This letter provides the additional information requested by the NRC staff via electronic mail from John F. Stang on March 27, 2006 and further clarified during a conference call with the NRC staff on March 30, 2006. The NRC staff's questions and Duke's responses are provided in Attachment 1.

With this letter, Duke is also revising the table of site specific data contained in Appendix B of the License Amendment Request (LAR). The revised table clarifies Question 2c and is contained in Attachment 2. A third column of equipment hatch input data has been added to reflect the limiting modeled condition of a horizontal point source. There are no changes in the calculated

A001

atmospheric dispersion factors listed in Appendix D of the LAR. This editorial change has no impact on the results of the radiological analyses. The revised table supersedes the original table in Appendix B of Reference 1.

The conclusions reached in the original determination that the LAR contains No Significant Hazards Considerations and the basis for the categorical exclusion from performing an Environmental/Impact Statement have not changed as a result of this revision.

Please contact Lee A. Hentz at 704-875-4187 if additional questions arise regarding this license amendment request.

Sincerely,

Gary R. Peterson

Attachments

cc: w/attachments

W. D. Travers
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Atlanta, GA 30303

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J. B. Brady
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OATH AND AFFIRMATION

Gary R. Peterson 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.

Gary R. Peterson

Gary R. Peterson, Site Vice President

Subscribed and sworn to me: May 3, 2006

Date

Freda K. Crump

Notary Public

My commission expires: August 17, 2006

Date

ATTACHMENT 1

Additional information for the Office of Nuclear Reactor Regulation Division of Risk Assessment and Accident Dose Branch regarding the Selective Implementation of the Alternative Source Term and revision to Technical Specification 3.9.4 License Amendment Request submitted by McGuire.

Question 1:

New control room atmospheric dispersion factors (χ/Q values) were calculated in support of this license amendment request using onsite meteorological data for the period 1995-1999. Section 2.3.3.5 of the McGuire Nuclear Station (MNS) updated final safety analysis report states that a new meteorological tower and new meteorological instrumentation became operational in September 1998. Wind roses comparing wind direction frequency distributions between the 1995-1997 and the 1999 data are presented in Exhibit A.[1] These wind roses show considerable discrepancies for the following wind direction sectors:

Period of Record	Wind Direction Sector - Lower Level				
	NE	S	SSW	SW	WSW
1995-1997	11.6%	10.1%	17.0%	10.9%	5.4%
1999	13.7%	5.7%	9.1%	12.8%	7.9%

Period of Record	Wind Direction Sector - Upper Level				
	NE	S	SSW	SW	WSW
1995-1997	9.6%	8.3%	14.2%	9.3%	4.9%

[1]The 1998 data are excluded from the data comparisons presented here because 1998 represents a "transition year" between the earlier monitoring program (pre-September 1998) and the later monitoring program (post-September 1998).

1999	12.2%	3.7%	8.4%	12.7%	7.3%

Similarly, stability class frequency distributions comparing the 1995-1997 data set and the 1999 data set are presented in Exhibit B. These frequency distributions show considerable discrepancies for the following stability classes:

Period of Record	Stability Class		
	A	D	G
1995-1997	15.4%	32.6%	14.3%
1999	3.3%	53.6%	4.6%

The following questions relate to these data discrepancies:

1a. Please explain what might have caused the discrepancies in wind direction and stability class frequency distributions between the 1995-1997 and 1999 data sets (e.g., changes in tower structure, tower location, sensor elevation, boom orientation, vegetation growth, instrumentation, data processing, etc). Please also explain which of these two data sets is considered the most representative of current site conditions.

Response

Data from the current meteorological tower (operational on September 1, 1998) is considered more representative of ambient conditions at the plant site. The current meteorological tower has an open exposure in all directions and fewer occurrences of extreme stability classes (A and G) are observed.

Previously, meteorological data was collected from two separate towers on the west side of the plant at a base elevation of 756 feet (ft) mean sea level (msl), one instrumented at the 10 meter (m) level, and the second tower instrumented at the 40 m level. This location is on a plateau below the eastern embankment of the Cowans Ford Dam at the south end of Lake Norman. While below the dam, the location is still at an elevation above the Catawba River, flowing southward downstream from the dam. The

distance from the towers to the embankment of the dam is approximately 350 ft. Closest buildings were the Support Office and Warehouse buildings, located between the Turbine Building and the towers, at distances of approximately 250 to 280 ft from the 10 m tower and 160 to 175 ft from the 40 m tower.

These earlier towers were not like the standard meteorological towers of today, and were not designed to minimize effects on the winds. The previous tower location would also have been subject to mechanical turbulence from the wakes of nearby buildings. The greater frequency of stability classes A and G in the older data is attributable to local terrain and building effects on temperatures. Nighttime drainage flow of cooler air down into the river valley would produce more hours of stability class G, while daytime heating of the buildings in proximity to the old towers would result in more hours of stability class A.

The current tower is located approximately 1350 ft NNE of station center, with base elevation of 767.1 ft msl. It is a standard meteorological tower, designed as a more open and aerodynamic structure, with instrumentation at the 10 m and 60 m levels above ground. The location of the current tower has an open exposure in all directions. The increased vertical separation distance between the upper and lower level temperatures provides a better categorization of the temperature differences by which stability class can be determined.

Wind directions are noted to have shifted slightly between the earlier data and data from the current tower location. This is expected, due to the previous location being at a lower elevation above sea level, below the dam. Wind directions typically turn clockwise, veering with higher elevations or heights above ground. Thus, it is expected that the 10 m winds would show more of a clockwise shift at the current tower location than at the previous location. Also, the 60 m level wind direction would be expected to shift clockwise more than the 40 m level wind direction from the old tower.

1b. The discrepancies in wind direction and stability class frequency distributions create uncertainty as to which data set (e.g., pre-1998 versus post-1998) is most representative of current site conditions. Given the uncertainty in the data, please justify why control room X/Q values should not be generated using both data sets

independently and the more conservative resulting X/Q values used in the control room dose assessment.

Response

Typically five years of hourly meteorological data are used in X/Q analyses to be climatologically representative of a site. The data combined from both meteorological towers (1995-AUG 1998) and (SEPT 1998-1999) provides five years of on-site data, albeit from different locations on the west side of the plant and on the north side of the plant. These years were the same meteorological data period that had been used in similar analyses at Duke Power, and represented recent data when the McGuire control room habitability X/Q calculation was performed. When combined, the differences in data between the towers should counter-balance each other and still provide a representative dataset for modeling.

The pre-SEPT 1998 data came from a shorter 40 m tower, while the current tower is a standard 60 m tower, thus improving measurements of vertical temperature gradient, and hence providing better atmospheric stability classifications. The current tower has improved instrument exposure to ambient conditions and is more representative of conditions at the plant site. The previous tower had generally lower wind speeds and more hours of artificial G-stability. Thus, while X/Q's generated from the shorter tower might be higher, they would be less representative of conditions as a whole on site, and even non-representative of conditions in the immediate vicinity off-site.

The 5-year dataset used as input to the ARCON96 model includes 3 years and 8 months of data from the old towers and 1 year 4 months of data from the current tower. This introduces some conservatism into the calculation, while still using the earliest data available from the new tower, which is more representative of the site and vicinity. Along with the slightly greater frequency of low wind speeds at the old tower(s), a slight shift was noted in wind direction sectors, between the earlier meteorological data and newer data from the current tower. However, this should not have an impact on the analyses, due to the relative proximity of the sources to the control room air intakes and the use of 90-degree downwind sectors (i.e. 90-degree "windows") from source to receptor in ARCON96.

Fuel Handling Accident release pathways of concern for control room habitability in this license amendment are the Unit Vents and Equipment Hatches, located on generally opposite sides of the containment building from the air intake. A "ground-level release" mode was selected for all release scenarios. Vertical velocities and stack radius parameters were also input as zero to ARCON96; this ensures that the releases are treated as ground-level releases. The X/Q's resulting from a release scenario at the Equipment Hatch (unit 1), with a receptor at the unit 1 air intake, results in higher X/Q's for all averaging periods than any Unit Vent release.

Since data from two different tower locations was being used, the stability classes were calculated separately, based on delta-T categories for each towers' respective vertical separation distance (approximately 30 m for the old towers and 50 m for the current tower).

Thus, stability class categories were not affected when data from the two tower locations were combined. Note that delta-T values are not directly input into ARCON96, only stability classes.

Both lower and upper levels of wind direction and wind speed are contained in the meteorological input files for ARCON96. However, ARCON96 only allows the user to specify two measurement heights (one for the lower level and one for the upper level). The lower level height was the same at both tower locations, and was input as "10 m". The upper level height was 40 m for the earlier data and 60 m for the upper level winds starting on September 1, 1998. The single height for the upper level winds was input as "60 m", even though for the majority of the years in the 1995-1999 period, the upper level measurements were taken at a height of 40 m. Since wind speed increases with height, this remains a conservative approach.

- So, if ARCON96 uses the upper level winds to calculate the wind speed at the height of a release, instead of using the lower level winds, any wind speed calculated for a height less than the upper level measurement height would be exponentially less by the Power Law (and give higher X/Q's) than an upper level wind speed, defined as "60m."
- However, ARCON96 should use the 10 m level winds when "ground-level release" mode is selected, as well as when the source vertical velocity and stack diameter are set to

Response

Tracer gas testing conducted at McGuire Nuclear Station (McGuire) was performed with the intent of quantifying the amount of unfiltered in-leakage to the control room. The testing was successful in achieving this objective, but it was not intended to provide information about potential flow paths associated with this in-leakage. Thus, information of this type was not produced by the testing.

However, Duke recognizes that radioactive material can be introduced into the control room from intentional and unintentional pathways. A review of potential flow paths for unfiltered in-leakage was previously performed. This review examined the assumption that the use of the dispersion factors associated with the control room intakes was limiting for MNS control room dose calculations. It included plant walkdowns, and the review of drawings and regulatory guidance. Alternate pathways for the flow of unfiltered in-leakage into the control room evaluated include:

- Control room access doors and the doors' seals.
- The boundary separating the outside environment from inside plant spaces.
- Control room outside air intake penetrations.
- Control room envelope air intake dampers.
- Intra-plant transport.
- Releases directly from the Fuel Building (though the rollup doors).

A review of the postulated flow paths associated with the accident shows that the distance from the projected release points (equipment hatch, unit vent stack) to the control room intakes is short in comparison with other flow paths. Other than the reactor building (which, due to the location of the control room intakes, will have some effect on the dispersion regardless of the release point) these flow paths are direct and have no other restrictions. The alternate flow paths reviewed which travel inside of the QA-1, seismic Auxiliary Building on the way to the control room or the control room ventilation system would encounter additional distance as well as flow restrictions not found in the dispersion factors used. The alternate postulated entrances of radiation into plant structures (such as the doors from the Turbine Building to the

exterior environment) are farther from the potential release points and would involve further travel along a torturous path through the buildings. These paths would be more restrictive to the transport of air than the external paths modeled in the control room dispersion factors used.

Besides the transport flow path, other release points could also be postulated. The most probable would be a release from the spent fuel building rollup door. This is a large opening near the North end of the spent fuel pool used for receiving and staging. This release point has been modeled and was evaluated. But, it was not used in favor of the unit vent release point for spent fuel pool accidents since the unit vent atmospheric dispersion factors are more conservative. This is expected since the unit vent is much closer to the control room intakes than the fuel building release point. Thus, the atmospheric dispersion factors used bound this release point scenario.

In response to the accident, the control room operators are procedurally driven to pressurize the control room. This operation would increase the pressure in the control room above that in the adjacent spaces. This function is periodically tested as required by Technical Specifications. The control room envelope was tracer gas tested in the pressurization mode to quantify the amount of in-leakage. This test addressed all potential control room envelope in-leakage sources. An allowance has also been made for control room ingress and egress in the radiological calculations.

In conclusion, the shortest and easiest flow path for a postulated radioactivity release to flow into the control room would be via the control room area ventilation system and its intakes. Other potential release points were evaluated and they were found to be bounded by those used in the accident model. Other flow paths through the plant were evaluated but found to be more restrictive to flow and requiring a longer distance which would result in less conservative dispersion factors. Therefore, the atmospheric dispersion factors based upon releases from the unit vent and the equipment hatch to the control room intakes bound those which would result from the other potential paths investigated. Thus, it can be concluded that the atmospheric dispersion factors modeled are conservative relative to those associated with the alternate paths investigated.

2c. Please explain the basis for assuming the Unit 1 equipment hatch release pathway is an vertical area source for releases to the Unit 1 control room outside air intakes and a horizontal point source for releases to the Unit 2 control room outside air intakes. Likewise, please explain the basis for assuming the Unit 2 equipment hatch release pathway is an vertical area source for releases to the Unit 2 control room outside air intakes and a horizontal point source for releases to the Unit 1 control room outside air intakes. Also explain the basis for determining the values of the initial diffusion coefficients for the vertical area sources.

Response

The equipment hatch X/Q's for a horizontal point source on Unit 1 and receptor at Unit 1 Control Room Air Intake were greater than those from the Unit Vent scenarios modeled with ARCON96. The worst case scenario from all the runs was identified and used in the LAR for the control room assessment; thus the treatment of the sources was conservative, to ensure a determination of the maximum possible X/Q values. The limiting equipment hatch run was for a release height of 0 m. The release height for the Unit Vent runs was 40.2 m.

To clarify information about the Equipment Hatch model runs, which is not apparent from the table in Appendix B of the LAR submittal, the following three scenarios were evaluated with separate runs for each combination of source to receptor.

- Equipment hatch was treated as a point source, with a horizontal release from a single hole, and was located on the same unit as the receptor air intake. This scenario provided the limiting X/Q's for the Fuel Handling Accident analyses, with the Unit 1 equipment hatch as the source and the Unit 1 Control Room Air Intake as the receptor. The output file for this run is M1EQ1PTM.log; refer to item 2e. below. It was modeled as a ground-level release, with release height of 0 m. All output files for these runs are denoted by "PTM" filenames.

- Equipment hatch was treated as a vertical area source on the same unit as the receptor air intake; the vertical area source represented multiple holes or having an open door. The output

files for these runs are denoted by "VAS" or "VA" in the filenames. They were modeled as ground-level releases, with a release height of 0 m. This treatment of the equipment hatch was less conservative than the horizontal point source release, and the resulting X/Q's were not used.

- Equipment hatch was treated as a point source, when on the unit opposite from the receptor air intake. Due to the distance between source and receptor, these scenarios give the lowest X/Q values. The output files for these runs are denoted by "PT" in the filenames. They were modeled as ground-level releases, with a release height of 8.3 m. The resulting X/Q's from these scenarios were not used.

The evaluation of the equipment hatch as a vertical area source was originally included because of guidance in section 3.2.6 of NUREG/CR-6331 (Rev. 1, 1997). Treatment of sources as diffuse area sources is also now discussed in section 3.2.4 of Regulatory Guide 1.194 (June 2003).

The equipment hatch is approximately 20 ft wide and 27 ft tall, providing a characteristic dimension of 7 m [i.e. square root of (10 x Area)], per NUREG/CR-6331. Since the distance between source and receptor is less than ten times the characteristic dimension (70 m), then the source could be considered an area source. For example, on Unit 1, the shortest arc length distance from the hatch to the control room air intake is 36 m, which is less than 70 m. Therefore, the area source scenario was included, but did not provide the limiting X/Q's.

When the plume path was between source and receptors on opposite units, the distances were greater than ten times the characteristic dimension, so in these cases, the equipment hatch was treated as a point source.

For point sources, initial diffusion coefficients (sigma-Y and sigma-Z) are set to 0 m. For area sources, the values of sigma are calculated based upon the width and height of the horizontal or vertical area source, divided by 6. For the McGuire equipment hatch, this would provide a value of 1 m for both sigma-Y and sigma-Z.

Duke has revised the table of site specific data contained in Appendix B of the License Amendment Request (attached). A third

column of equipment hatch input data has been added to reflect the limiting modeled condition of a horizontal point source. There are no changes in the calculated atmospheric dispersion factors listed in Appendix D of the License Amendment Request. This editorial change has no impact on the results of the radiological analyses.

2d. Please explain how the assumption that MNS has a dual control room inlet design was used in deriving the resulting control room χ/Q values.

Response

McGuire is considered to be a dual inlet plant without manual or automatic inlet selection controls. The Control Room Area Ventilation System consists of two pressurization trains and two inlet locations. Each inlet location has two intakes. Either train is capable of providing a positive pressure in the control room as required by Technical Specifications.

The control room atmospheric dispersion factors were computed using combinations of release points for each unit to each of the control room intake locations. For example, atmospheric dispersion calculations are performed for four flow paths related to releases from the equipment hatch to the control room inlets: Unit 1 hatch to the Unit 1 inlet, Unit 1 hatch to the Unit 2 inlet, Unit 2 hatch to the Unit 1 inlet and Unit 2 hatch to the Unit 2 inlet. The maximum value of the flow path specific results for a release/receptor combination is taken as the χ/Q value for that pathway. This value bounds all of the combinations of location specific flow paths for both units.

In the Fuel Handling Accident models, the Control Room Area Ventilation System is conservatively modeled to credit only one train and one inlet (both intakes at one location) at the start of the accident. Therefore, only one train and one inlet are available to provide air flow to the control room for the duration of the accident. With the control room model for the fuel handling accident analysis only crediting one intake, the resulting bounding atmospheric dispersion values computed for point-to-point flow paths are not modified for use in the model and the dilution credit available to dual intake plants is not utilized.

2e. Please provide a copy of the ARCON96 output files.

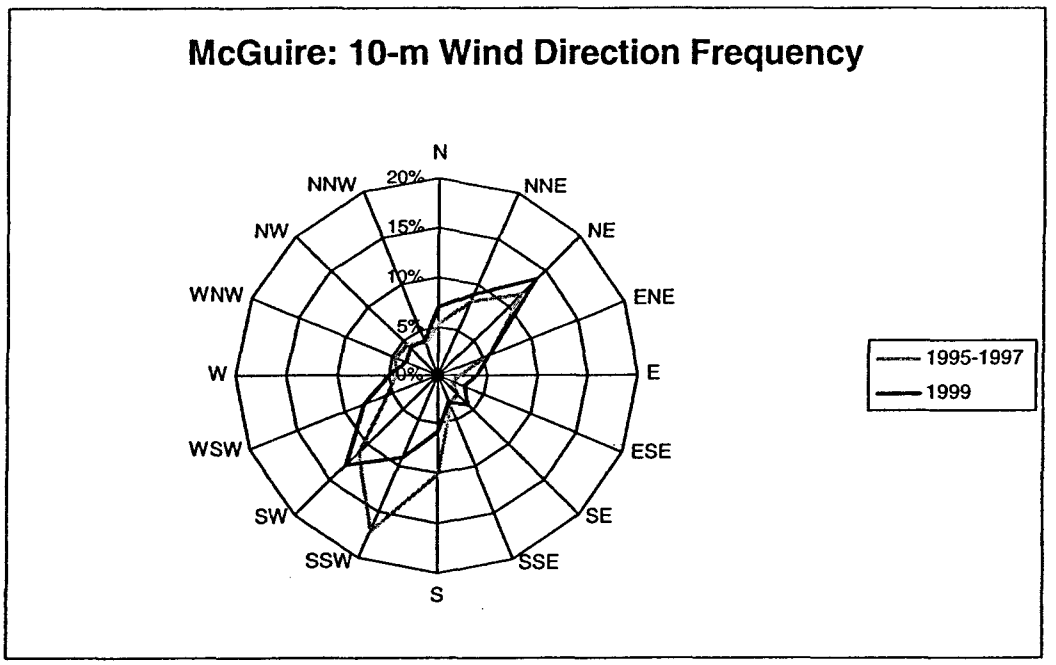
Response

Refer to attached copies of ARCON96 output files (*.log) for:

(a) Unit vent releases
(b) Equipment hatch release

EXHIBIT A

McGuire Nuclear Station Wind Roses



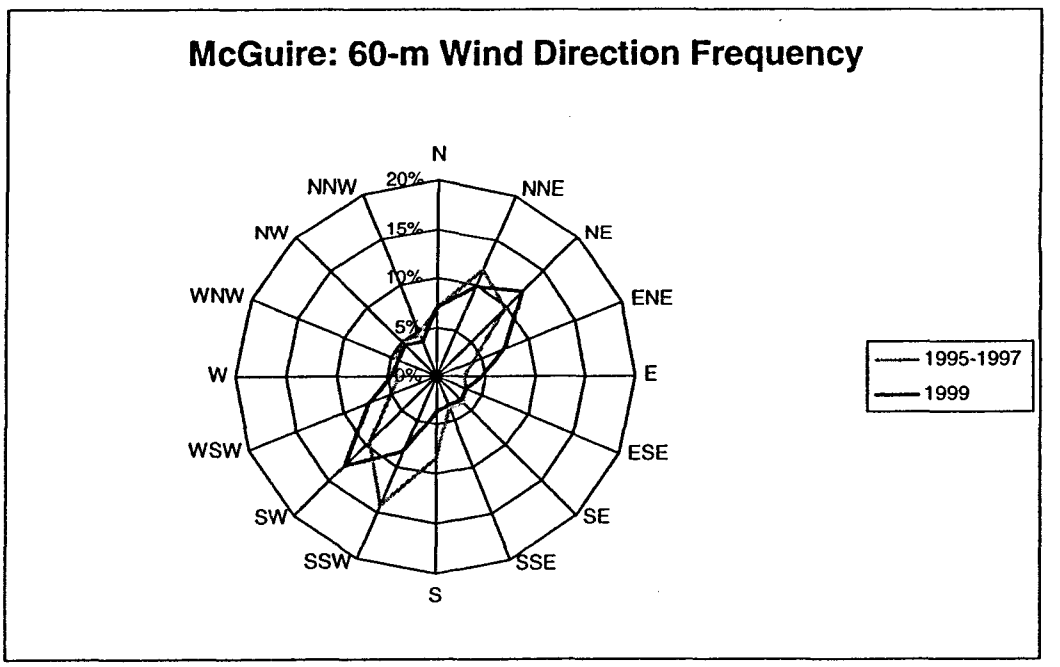
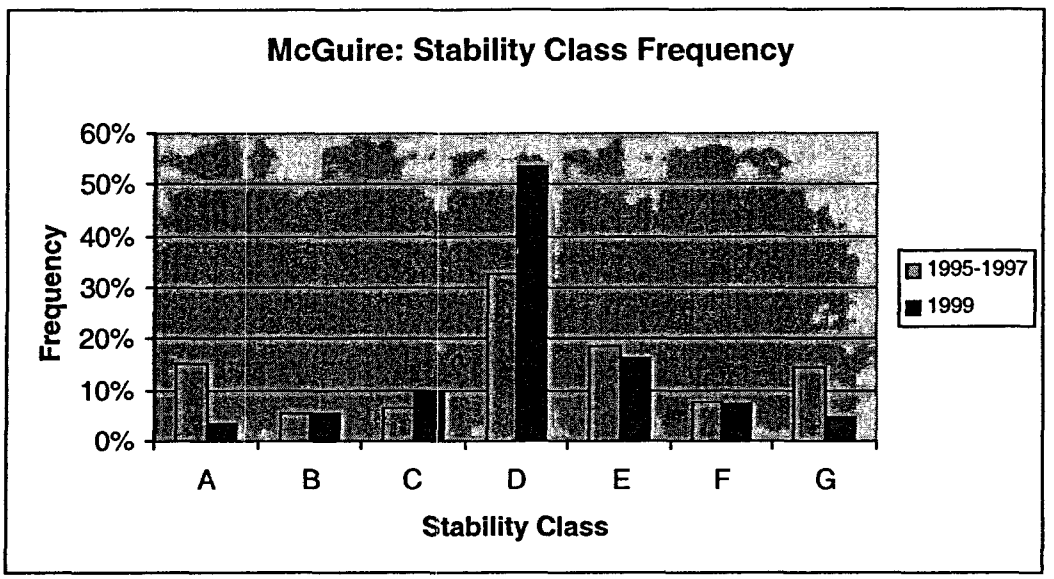


EXHIBIT B

McGuire Nuclear Station Stability Class Frequency Distributions



[1]The 1998 data are excluded from the data comparisons presented here because 1998 represents a "transition year" between the earlier monitoring program (pre-September 1998) and the later monitoring program (post-September 1998).

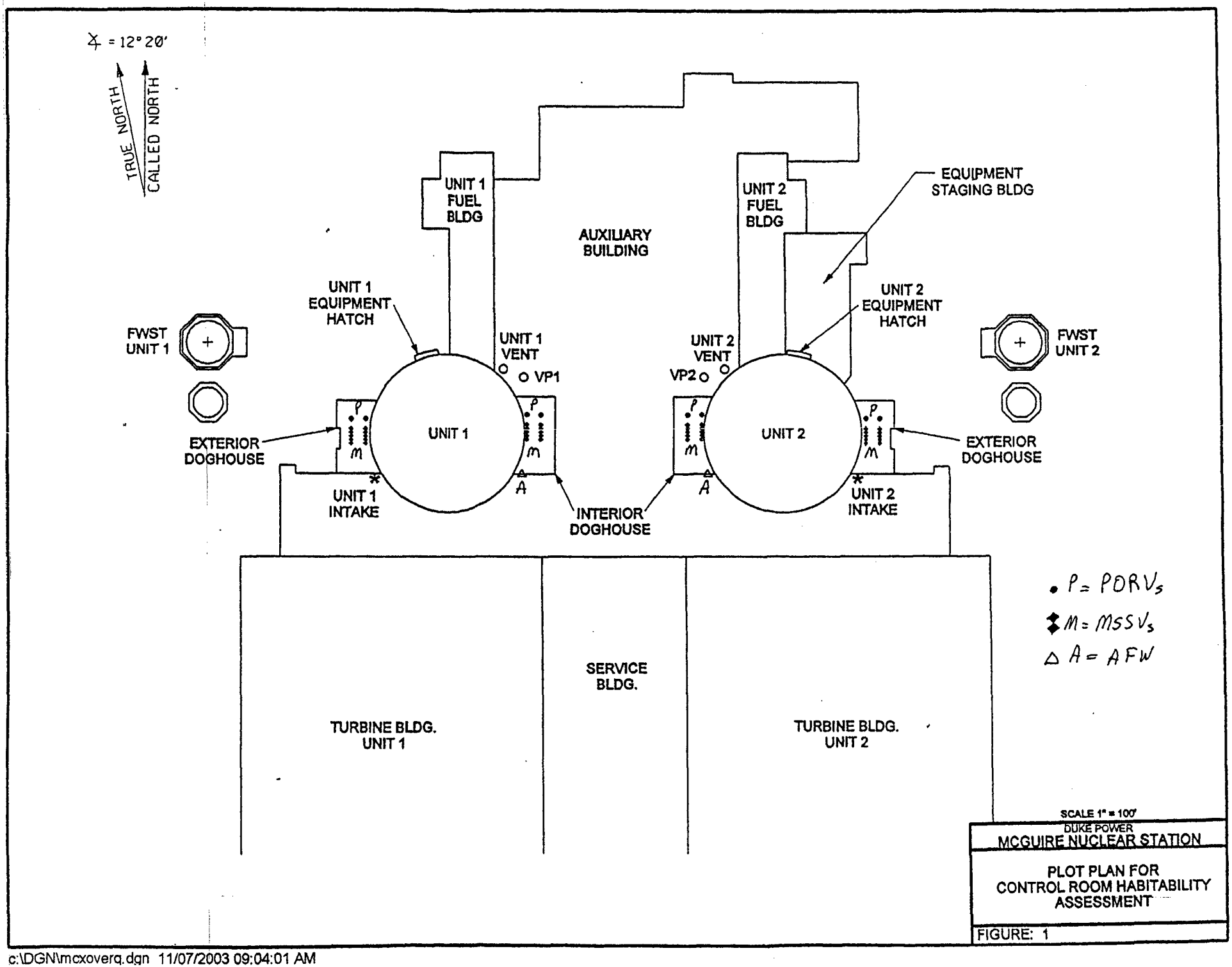


FIGURE 1

c:\DGN\mcxoverq.dgn 11/07/2003 09:04:01 AM

ATTACHMENT 2

Site Specific Data for the Calculation of Control Room Atmospheric Dispersion Factors Applicable to Fuel Handling and Weir Gate Drop Accidents at McGuire Nuclear Station

(REVISED)

Site Specific Data for the Calculation of Control Room Atmospheric Dispersion Factors At McGuire Nuclear Station

Parameter[1]	Unit Vent	Equipment Hatch[2]	Equipment Hatch[3]	Equipment Hatch[4]
Source Type	Vertical Point Source	Horizontal or Capped Point	Vertical Area Source	Horizontal or Capped Point
Release Height (m)	40.2	8.3	0	0
Flow Rate (m^3/sec)	8.6	0	0	0
Sigma-Y (m)	0	0	1	0
Sigma-Z (ms)	0	0	1	0
Building Cross Section Area (m^2)	1588	1588	1588	1588
Source / Stack Radius (m)	0	0	0	0
Vertical Velocity (meters/sec)	0	0	0	0
Distance (m), Direction (°)				
U1 Release to U1 CR OAI	43, 62		36, 32 (arc)	36, 32 (arc)
U1 Release to U2 CR OAI	94, 299	116, 298		
U2 Release to U1 CR OAI	94, 83	137, 76		
U2 Release to U2 CR OAI	43, 323		61, 10 (arc)	61, 10 (arc)

Notes:

[1]Abbreviations are as follows: U = Unit, CR = Control Room, OAI = outside air intake (outside air intake pair or outside air intake location).

[2]Release location set as a horizontal point source for transport of fission products from the Unit 1 release location to the Unit 2 CRAVS outside air intakes and from the Unit 2 release location to the Unit 1 CRAVS outside air intakes.

[3]Release location set as a vertical area source for transport of fission products from the Unit 1 release location to the Unit 1 CRAVS outside air intakes and from the Unit 2 release location to the Unit 2 CRAVS outside air intakes. This represents having the hatch open or multiple holes in the hatch.

[4]Release location set as a horizontal point source for transport of fission products from the Unit 1 release location to the Unit 1 CRAVS outside air intakes and from the Unit 2 release location to the Unit 2 CRAVS outside air intakes. This is the limiting case, representing a horizontal release from a single hole in the hatch.

M1EQ1PTM.LOG

Program Title: ARCON96.

Developed For: U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Reactor Program Management

Date: June 25, 1997 11:00 a.m.

NRC Contacts: J. Y. Lee Phone: (301) 415 1080
e-mail: jyl1@nrc.gov
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Code Developer: J. V. Ramsdell Phone: (509) 372 6316
e-mail: j_ramsdell@pnl.gov

Code Documentation: NUREG/CR-6331 Rev. 1

Program Run 4/24/2001 at 11:50:26

******* ARCON INPUT **********

Number of Meteorological Data Files = 5
Meteorological Data File Names
C:\DATA\ARCON96\ARMET95M.MET
C:\DATA\ARCON96\ARMET96M.MET
C:\DATA\ARCON96\ARMET97M.MET
C:\DATA\ARCON96\ARMET98M.MET
C:\DATA\ARCON96\ARMET99M.MET

Height of lower wind instrument (m) = 10.0
Height of upper wind instrument (m) = 60.0
Wind speeds entered as miles per hour

Ground-level release
Release height (m) = .0
Building Area (m^2) = 1588.0
Effluent vertical velocity (m/s) = .00
Vent or stack flow (m^3/s) = .00
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 032
Wind direction sector width (deg) = 90
Wind direction window (deg) = 347 - 077
Distance to intake (m) = 36.0
Intake height (m) = 1.5
Terrain elevation difference (m) = -2.1

Output file names
M1EQ1PTM.log
M1EQ1PTM.cfd

Minimum Wind Speed (m/s) = .5
Surface roughness length (m) = .20
Sector averaging constant = 4.3

Initial value of sigma y = .00
Initial value of sigma z = .00

Expanded output for code testing not selected

Total number of hours of data processed = 43824
Hours of missing data = 820
Hours direction in window = 13697
Hours elevated plume w/ dir. in window = 0
Hours of calm winds = 205
Hours direction not in window or calm = 29102

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
LOW LIM.	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	13902.	15731.	18334.	21968.	25434.	31587.	40979.	41551.	42426.	41783.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	29102.	27060.	24033.	19559.	16699.	10549.	685.	3.	0.	0.
TOTAL X/Qs	43004.	42791.	42367.	41527.	42133.	42136.	41664.	41554.	42426.	41783.
% NON ZERO	32.33	36.76	43.27	52.90	60.37	74.96	98.36	99.99	100.00	100.00

95th PERCENTILE X/Q VALUES

4.06E-03	3.93E-03	3.81E-03	3.57E-03	2.92E-03	2.16E-03	1.40E-03	1.18E-03	9.98E-04	8.64E-04

95% X/Q for standard averaging intervals

0 to 2 hours	4.06E-03
2 to 8 hours	3.40E-03
8 to 24 hours	1.45E-03
1 to 4 days	1.14E-03
4 to 30 days	7.82E-04

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	5.92E-03	3.33E-04
SECTOR-AVERAGE	3.45E-03	1.94E-04

NORMAL PROGRAM COMPLETION

Program Title: ARCON96.

Developed For: U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Reactor Program Management

Date: June 25, 1997 11:00 a.m.

NRC Contacts: J. Y. Lee Phone: (301) 415 1080
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L. A Brown Phone: (301) 415 1232
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Code Developer: J. V. Ramsdell Phone: (509) 372 6316
e-mail: j_ramsdell@pnl.gov

Code Documentation: NUREG/CR-6331 Rev. 1

Program Run 4/24/2001 at 13:43:36

******* ARCON INPUT **********

Number of Meteorological Data Files = 5
Meteorological Data File Names
C:\DATA\ARCON96\ARMET95M.MET
C:\DATA\ARCON96\ARMET96M.MET
C:\DATA\ARCON96\ARMET97M.MET
C:\DATA\ARCON96\ARMET98M.MET
C:\DATA\ARCON96\ARMET99M.MET

Height of lower wind instrument (m) = 10.0
Height of upper wind instrument (m) = 60.0
Wind speeds entered as miles per hour

Ground-level release
Release height (m) = .0
Building Area (m^2) = 1588.0
Effluent vertical velocity (m/s) = .00
Vent or stack flow (m^3/s) = .00
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 032
Wind direction sector width (deg) = 90
Wind direction window (deg) = 347 - 077
Distance to intake (m) = 36.0
Intake height (m) = 1.5
Terrain elevation difference (m) = -2.1

Output file names
M1EQ1VAS.log
M1EQ1VAS.cfd

Minimum Wind Speed (m/s) = .5
Surface roughness length (m) = .20
Sector averaging constant = 4.3

Initial value of sigma y = 1.00
Initial value of sigma z = 1.00

Expanded output for code testing not selected

Total number of hours of data processed = 43824
Hours of missing data = 820
Hours direction in window = 13697
Hours elevated plume w/ dir. in window = 0
Hours of calm winds = 205
Hours direction not in window or calm = 29102

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
LOW LIM.	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	13902.	15731.	18334.	21968.	25434.	31587.	40979.	41551.	42426.	41783.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	29102.	27060.	24033.	19559.	16699.	10549.	685.	3.	0.	0.
TOTAL X/Qs	43004.	42791.	42367.	41527.	42133.	42136.	41664.	41554.	42426.	41783.
% NON ZERO	32.33	36.76	43.27	52.90	60.37	74.96	98.36	99.99	100.00	100.00

95th PERCENTILE X/Q VALUES

1	2	4	8	12	24	96	168	360	720
3.21E-03	3.17E-03	3.06E-03	2.83E-03	2.32E-03	1.72E-03	1.12E-03	9.51E-04	8.05E-04	6.95E-04

95% X/Q for standard averaging intervals

0 to 2 hours	3.21E-03
2 to 8 hours	2.70E-03
8 to 24 hours	1.16E-03
1 to 4 days	9.16E-04
4 to 30 days	6.30E-04

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	4.86E-03	2.86E-04
SECTOR-AVERAGE	2.83E-03	1.67E-04

NORMAL PROGRAM COMPLETION

Program Title: ARCON96.

Developed For: U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Reactor Program Management

Date: June 25, 1997 11:00 a.m.

NRC Contacts: J. Y. Lee Phone: (301) 415 1080
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Code Documentation: NUREG/CR-6331 Rev. 1

Program Run 4/24/2001 at 13:44:55

******* ARCON INPUT **********

Number of Meteorological Data Files = 5
Meteorological Data File Names
C:\DATA\ARCON96\ARMET95M.MET
C:\DATA\ARCON96\ARMET96M.MET
C:\DATA\ARCON96\ARMET97M.MET
C:\DATA\ARCON96\ARMET98M.MET
C:\DATA\ARCON96\ARMET99M.MET

Height of lower wind instrument (m) = 10.0
Height of upper wind instrument (m) = 60.0
Wind speeds entered as miles per hour

Ground-level release
Release height (m) = 8.3
Building Area (m^2) = 1588.0
Effluent vertical velocity (m/s) = .00
Vent or stack flow (m^3/s) = .00
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 076
Wind direction sector width (deg) = 90
Wind direction window (deg) = 031 - 121
Distance to intake (m) = 137.0
Intake height (m) = 1.5
Terrain elevation difference (m) = -2.1

Output file names
M1EQ2PT.log
M1EQ2PT.cfd

Minimum Wind Speed (m/s) = .5
Surface roughness length (m) = .20
Sector averaging constant = 4.3

Initial value of sigma y = .00
Initial value of sigma z = .00

Expanded output for code testing not selected

Total number of hours of data processed = 43824
Hours of missing data = 820
Hours direction in window = 9696
Hours elevated plume w/ dir. in window = 0
Hours of calm winds = 205
Hours direction not in window or calm = 33103

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03
LOW LIM.	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	9901.	11831.	14625.	18295.	21466.	27780.	40262.	41421.	42426.	41783.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	33103.	30960.	27742.	23232.	20667.	14356.	1402.	133.	0.	0.
TOTAL X/Qs	43004.	42791.	42367.	41527.	42133.	42136.	41664.	41554.	42426.	41783.
% NON ZERO	23.02	27.65	34.52	44.06	50.95	65.93	96.63	99.68	100.00	100.00

95th PERCENTILE X/Q VALUES

	3.19E-04	3.16E-04	3.09E-04	2.85E-04	2.30E-04	1.68E-04	1.02E-04	8.56E-05	7.07E-05	6.05E-05

95% X/Q for standard averaging intervals

0 to 2 hours	3.19E-04
2 to 8 hours	2.73E-04
8 to 24 hours	1.10E-04
1 to 4 days	7.96E-05
4 to 30 days	5.41E-05

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	4.34E-04	3.37E-05
SECTOR-AVERAGE	2.53E-04	1.96E-05

NORMAL PROGRAM COMPLETION

Program Title: ARCON96.

Developed For: U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Reactor Program Management

Date: June 25, 1997 11:00 a.m.

NRC Contacts: J. Y. Lee Phone: (301) 415 1080
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Code Documentation: NUREG/CR-6331 Rev. 1

Program Run 4/24/2001 at 13:51:48

******* ARCON INPUT **********

Number of Meteorological Data Files = 5
Meteorological Data File Names
C:\DATA\ARCON96\ARMET95M.MET
C:\DATA\ARCON96\ARMET96M.MET
C:\DATA\ARCON96\ARMET97M.MET
C:\DATA\ARCON96\ARMET98M.MET
C:\DATA\ARCON96\ARMET99M.MET

Height of lower wind instrument (m) = 10.0
Height of upper wind instrument (m) = 60.0
Wind speeds entered as miles per hour

Ground-level release
Release height (m) = 8.3
Building Area (m^2) = 1588.0
Effluent vertical velocity (m/s) = .00
Vent or stack flow (m^3/s) = .00
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 298
Wind direction sector width (deg) = 90
Wind direction window (deg) = 253 - 343
Distance to intake (m) = 116.0
Intake height (m) = 1.5
Terrain elevation difference (m) = -2.1

Output file names
M2EQ1PT.log
M2EQ1PT.cfd

Minimum Wind Speed (m/s) = .5
Surface roughness length (m) = .20
Sector averaging constant = 4.3

Initial value of sigma y = .00
Initial value of sigma z = .00

Expanded output for code testing not selected

Total number of hours of data processed = 43824
Hours of missing data = 820
Hours direction in window = 7137
Hours elevated plume w/ dir. in window = 0
Hours of calm winds = 205
Hours direction not in window or calm = 35662

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03
LOW LIM.	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	7342.	9741.	13319.	18319.	22558.	30427.	40853.	41517.	42426.	41783.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	35662.	33050.	29048.	23208.	19575.	11709.	811.	37.	0.	0.
TOTAL X/Qs	43004.	42791.	42367.	41527.	42133.	42136.	41664.	41554.	42426.	41783.
% NON ZERO	17.07	22.76	31.44	44.11	53.54	72.21	98.05	99.91	100.00	100.00

95th PERCENTILE X/Q VALUES

4.22E-04	3.92E-04	3.33E-04	2.92E-04	2.35E-04	1.68E-04	9.12E-05	7.67E-05	6.40E-05	5.74E-05

95% X/Q for standard averaging intervals

0 to 2 hours 4.22E-04
2 to 8 hours 2.49E-04
8 to 24 hours 1.06E-04
1 to 4 days 6.55E-05
4 to 30 days 5.22E-05

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	6.34E-04	4.65E-05
SECTOR-AVERAGE	3.70E-04	2.71E-05

NORMAL PROGRAM COMPLETION

Program Title: ARCON96.

Developed For: U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Reactor Program Management

Date: June 25, 1997 11:00 a.m.

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Code Documentation: NUREG/CR-6331 Rev. 1

Program Run 4/24/2001 at 13:54:29

******* ARCON INPUT **********

Number of Meteorological Data Files = 5
Meteorological Data File Names
C:\DATA\ARCON96\ARMET95M.MET
C:\DATA\ARCON96\ARMET96M.MET
C:\DATA\ARCON96\ARMET97M.MET
C:\DATA\ARCON96\ARMET98M.MET
C:\DATA\ARCON96\ARMET99M.MET

Height of lower wind instrument (m) = 10.0
Height of upper wind instrument (m) = 60.0
Wind speeds entered as miles per hour

Ground-level release
Release height (m) = .0
Building Area (m^2) = 1588.0
Effluent vertical velocity (m/s) = .00
Vent or stack flow (m^3/s) = .00
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 010
Wind direction sector width (deg) = 90
Wind direction window (deg) = 325 - 055
Distance to intake (m) = 61.0
Intake height (m) = 1.5
Terrain elevation difference (m) = -2.1

Output file names
M2EQ2PTM.log
M2EQ2PTM.CFD

Minimum Wind Speed (m/s) = .5
Surface roughness length (m) = .20
Sector averaging constant = 4.3

Initial value of sigma y = .00
Initial value of sigma z = .00

Expanded output for code testing not selected

Total number of hours of data processed = 43824
Hours of missing data = 820
Hours direction in window = 12886
Hours elevated plume w/ dir. in window = 0
Hours of calm winds = 205
Hours direction not in window or calm = 29913

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
LOW LIM.	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	13091.	15307.	18386.	22537.	26372.	32952.	41330.	41541.	42426.	41783.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	29913.	27484.	23981.	18990.	15761.	9184.	334.	13.	0.	0.
TOTAL X/Qs	43004.	42791.	42367.	41527.	42133.	42136.	41664.	41554.	42426.	41783.
% NON ZERO	30.44	35.77	43.40	54.27	62.59	78.20	99.20	99.97	100.00	100.00

95th PERCENTILE X/Q VALUES

1.49E-03	1.44E-03	1.35E-03	1.21E-03	9.82E-04	7.14E-04	4.36E-04	3.82E-04	3.21E-04	2.85E-04

95% X/Q for standard averaging intervals

0 to 2 hours 1.49E-03
2 to 8 hours 1.12E-03
8 to 24 hours 4.65E-04
1 to 4 days 3.44E-04
4 to 30 days 2.62E-04

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	2.15E-03	1.25E-04
SECTOR-AVERAGE	1.25E-03	7.26E-05

NORMAL PROGRAM COMPLETION

M2EQ2VA.LOG

Program Title: ARCON96.

Developed For: U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Reactor Program Management

Date: June 25, 1997 11:00 a.m.

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Code Documentation: NUREG/CR-6331 Rev. 1

Program Run 4/24/2001 at 13:52:46

******* ARCON INPUT **********

Number of Meteorological Data Files = 5
Meteorological Data File Names
C:\DATA\ARCON96\ARMET95M.MET
C:\DATA\ARCON96\ARMET96M.MET
C:\DATA\ARCON96\ARMET97M.MET
C:\DATA\ARCON96\ARMET98M.MET
C:\DATA\ARCON96\ARMET99M.MET

Height of lower wind instrument (m) = 10.0
Height of upper wind instrument (m) = 60.0
Wind speeds entered as miles per hour

Ground-level release
Release height (m) = .0
Building Area (m^2) = 1588.0
Effluent vertical velocity (m/s) = .00
Vent or stack flow (m^3/s) = .00
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 010
Wind direction sector width (deg) = 90
Wind direction window (deg) = 325 - 055
Distance to intake (m) = 61.0
Intake height (m) = 1.5
Terrain elevation difference (m) = -2.1

Output file names
M2EQ2VA.log
M2EQ2VA.cfd

Minimum Wind Speed (m/s) = .5
Surface roughness length (m) = .20
Sector averaging constant = 4.3

Initial value of sigma y = 1.00
Initial value of sigma z = 1.00

Expanded output for code testing not selected

Total number of hours of data processed = 43824
Hours of missing data = 820
Hours direction in window = 12886
Hours elevated plume w/ dir. in window = 0
Hours of calm winds = 205
Hours direction not in window or calm = 29913

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
LOW LIM.	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	13091.	15307.	18386.	22537.	26372.	32952.	41330.	41541.	42426.	41783.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	29913.	27484.	23981.	18990.	15761.	9184.	334.	13.	0.	0.
TOTAL X/Qs	43004.	42791.	42367.	41527.	42133.	42136.	41664.	41554.	42426.	41783.
% NON ZERO	30.44	35.77	43.40	54.27	62.59	78.20	99.20	99.97	100.00	100.00

95th PERCENTILE X/Q VALUES

1	2	4	8	12	24	96	168	360	720
1.27E-03	1.25E-03	1.18E-03	1.06E-03	8.61E-04	6.26E-04	3.85E-04	3.36E-04	2.83E-04	2.52E-04

95% X/Q for standard averaging intervals

0 to 2 hours	1.27E-03
2 to 8 hours	9.91E-04
8 to 24 hours	4.09E-04
1 to 4 days	3.05E-04
4 to 30 days	2.31E-04

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	1.94E-03	1.14E-04
SECTOR-AVERAGE	1.13E-03	6.64E-05

NORMAL PROGRAM COMPLETION

Program Title: ARCON96.

Developed For: U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Reactor Program Management

Date: June 25, 1997 11:00 a.m.

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Code Developer: J. V. Ramsdell Phone: (509) 372 6316
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Code Documentation: NUREG/CR-6331 Rev. 1

Program Run 4/25/2001 at 09:15:13

******* ARCON INPUT **********

Number of Meteorological Data Files = 5
Meteorological Data File Names
C:\DATA\ARCON96\ARMET95M.MET
C:\DATA\ARCON96\ARMET96M.MET
C:\DATA\ARCON96\ARMET97M.MET
C:\DATA\ARCON96\ARMET98M.MET
C:\DATA\ARCON96\ARMET99M.MET

Height of lower wind instrument (m) = 10.0
Height of upper wind instrument (m) = 60.0
Wind speeds entered as miles per hour

Ground-level release
Release height (m) = 40.2
Building Area (m^2) = 1588.0
Effluent vertical velocity (m/s) = .00
Vent or stack flow (m^3/s) = 8.60
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 062
Wind direction sector width (deg) = 90
Wind direction window (deg) = 017 - 107
Distance to intake (m) = 43.0
Intake height (m) = 1.5
Terrain elevation difference (m) = -2.1

Output file names
m1UV1.log
m1UV1.cfd

Minimum Wind Speed (m/s) = .5
Surface roughness length (m) = .20
Sector averaging constant = 4.3

Initial value of sigma y = .00
Initial value of sigma z = .00

Expanded output for code testing not selected

Total number of hours of data processed = 43824
Hours of missing data = 820
Hours direction in window = 11744
Hours elevated plume w/ dir. in window = 0
Hours of calm winds = 1112
Hours direction not in window or calm = 30148

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
LOW LIM.	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	12856.	14873.	17693.	21240.	24451.	30437.	40810.	41474.	42426.	41783.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	30148.	27918.	24674.	20287.	17682.	11699.	854.	80.	0.	0.
TOTAL X/Qs	43004.	42791.	42367.	41527.	42133.	42136.	41664.	41554.	42426.	41783.
% NON ZERO	29.89	34.76	41.76	51.15	58.03	72.24	97.95	99.81	100.00	100.00

95th PERCENTILE X/Q VALUES

1	2	4	8	12	24	96	168	360	720
1.67E-03	1.65E-03	1.60E-03	1.47E-03	1.20E-03	8.80E-04	5.61E-04	4.71E-04	4.02E-04	3.52E-04

95% X/Q for standard averaging intervals

0 to 2 hours	1.67E-03
2 to 8 hours	1.40E-03
8 to 24 hours	5.85E-04
1 to 4 days	4.54E-04
4 to 30 days	3.20E-04

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	2.26E-03	1.39E-04
SECTOR-AVERAGE	1.33E-03	8.12E-05

NORMAL PROGRAM COMPLETION

Program Title: ARCON96.

Developed For: U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Reactor Program Management

Date: June 25, 1997 11:00 a.m.

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Code Developer: J. V. Ramsdell Phone: (509) 372 6316
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Code Documentation: NUREG/CR-6331 Rev. 1

Program Run 4/25/2001 at 09:15:41

******* ARCON INPUT **********

Number of Meteorological Data Files = 5
Meteorological Data File Names
C:\DATA\ARCON96\ARMET95M.MET
C:\DATA\ARCON96\ARMET96M.MET
C:\DATA\ARCON96\ARMET97M.MET
C:\DATA\ARCON96\ARMET98M.MET
C:\DATA\ARCON96\ARMET99M.MET

Height of lower wind instrument (m) = 10.0
Height of upper wind instrument (m) = 60.0
Wind speeds entered as miles per hour

Ground-level release
Release height (m) = 40.2
Building Area (m^2) = 1588.0
Effluent vertical velocity (m/s) = .00
Vent or stack flow (m^3/s) = 8.60
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 083
Wind direction sector width (deg) = 90
Wind direction window (deg) = 038 - 128
Distance to intake (m) = 94.0
Intake height (m) = 1.5
Terrain elevation difference (m) = -2.1

Output file names
m1UV2.log
m1UV2.cfd

Minimum Wind Speed (m/s) = .5
Surface roughness length (m) = .20
Sector averaging constant = 4.3

Initial value of sigma y = .00
Initial value of sigma z = .00

Expanded output for code testing not selected

Total number of hours of data processed = 43824
Hours of missing data = 820
Hours direction in window = 8319
Hours elevated plume w/ dir. in window = 0
Hours of calm winds = 1112
Hours direction not in window or calm = 33573

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03
LOW LIM.	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	9431.	11455.	14365.	18173.	21480.	27882.	40206.	41425.	42426.	41783.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	33573.	31336.	28002.	23354.	20653.	14254.	1458.	129.	0.	0.
TOTAL X/Qs	43004.	42791.	42367.	41527.	42133.	42136.	41664.	41554.	42426.	41783.
% NON ZERO	21.93	26.77	33.91	43.76	50.98	66.17	96.50	99.69	100.00	100.00

95th PERCENTILE X/Q VALUES

	5.63E-04	5.50E-04	5.27E-04	4.68E-04	3.74E-04	2.65E-04	1.51E-04	1.31E-04	1.05E-04	9.36E-05

95% X/Q for standard averaging intervals

0 to 2 hours	5.63E-04
2 to 8 hours	4.36E-04
8 to 24 hours	1.64E-04
1 to 4 days	1.13E-04
4 to 30 days	8.48E-05

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	7.80E-04	7.76E-05
SECTOR-AVERAGE	4.56E-04	4.53E-05

NORMAL PROGRAM COMPLETION

Program Title: ARCON96.

Developed For: U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Reactor Program Management

Date: June 25, 1997 11:00 a.m.

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Code Documentation: NUREG/CR-6331 Rev. 1

Program Run 4/25/2001 at 09:18:37

******* ARCON INPUT **********

Number of Meteorological Data Files = 5
Meteorological Data File Names
C:\DATA\ARCON96\ARMET95M.MET
C:\DATA\ARCON96\ARMET96M.MET
C:\DATA\ARCON96\ARMET97M.MET
C:\DATA\ARCON96\ARMET98M.MET
C:\DATA\ARCON96\ARMET99M.MET

Height of lower wind instrument (m) = 10.0
Height of upper wind instrument (m) = 60.0
Wind speeds entered as miles per hour

Ground-level release
Release height (m) = 40.2
Building Area (m^2) = 1588.0
Effluent vertical velocity (m/s) = .00
Vent or stack flow (m^3/s) = 8.60
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 299
Wind direction sector width (deg) = 90
Wind direction window (deg) = 254 - 344
Distance to intake (m) = 94.0
Intake height (m) = 1.5
Terrain elevation difference (m) = -2.1

Output file names
m2UV1.log
m2UV1.cfd

Minimum Wind Speed (m/s) = .5
Surface roughness length (m) = .20
Sector averaging constant = 4.3

Initial value of sigma y = .00
Initial value of sigma z = .00

Expanded output for code testing not selected

Total number of hours of data processed = 43824
Hours of missing data = 820
Hours direction in window = 7332
Hours elevated plume w/ dir. in window = 0
Hours of calm winds = 1112
Hours direction not in window or calm = 34560

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03
LOW LIM.	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	8444.	10611.	13839.	18354.	22271.	29640.	40625.	41403.	42426.	41783.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	34560.	32180.	28528.	23173.	19862.	12496.	1039.	151.	0.	0.
TOTAL X/Qs	43004.	42791.	42367.	41527.	42133.	42136.	41664.	41554.	42426.	41783.
% NON ZERO	19.64	24.80	32.66	44.20	52.86	70.34	97.51	99.64	100.00	100.00

95th PERCENTILE X/Q VALUES

5.75E-04	5.47E-04	4.89E-04	4.31E-04	3.46E-04	2.46E-04	1.34E-04	1.13E-04	9.47E-05	8.25E-05

95% X/Q for standard averaging intervals

0 to 2 hours	5.75E-04
2 to 8 hours	3.83E-04
8 to 24 hours	1.54E-04
1 to 4 days	9.70E-05
4 to 30 days	7.46E-05

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	8.22E-04	4.81E-05
SECTOR-AVERAGE	4.81E-04	2.80E-05

NORMAL PROGRAM COMPLETION

Program Title: ARCON96.

Developed For: U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Division of Reactor Program Management

Date: June 25, 1997 11:00 a.m.

NRC Contacts: J. Y. Lee Phone: (301) 415 1080
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Code Developer: J. V. Ramsdell Phone: (509) 372 6316
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Code Documentation: NUREG/CR-6331 Rev. 1

Program Run 4/25/2001 at 09:19:21

******* ARCON INPUT **********

Number of Meteorological Data Files = 5
Meteorological Data File Names
C:\DATA\ARCON96\ARMET95M.MET
C:\DATA\ARCON96\ARMET96M.MET
C:\DATA\ARCON96\ARMET97M.MET
C:\DATA\ARCON96\ARMET98M.MET
C:\DATA\ARCON96\ARMET99M.MET

Height of lower wind instrument (m) = 10.0
Height of upper wind instrument (m) = 60.0
Wind speeds entered as miles per hour

Ground-level release
Release height (m) = 40.2
Building Area (m^2) = 1588.0
Effluent vertical velocity (m/s) = .00
Vent or stack flow (m^3/s) = 8.60
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 323
Wind direction sector width (deg) = 90
Wind direction window (deg) = 278 - 008
Distance to intake (m) = 43.0
Intake height (m) = 1.5
Terrain elevation difference (m) = -2.1

Output file names
m2UV2.log
m2UV2.cfd

Minimum Wind Speed (m/s) = .5
Surface roughness length (m) = .20
Sector averaging constant = 4.3

Initial value of sigma y = .00
Initial value of sigma z = .00

Expanded output for code testing not selected

Total number of hours of data processed = 43824
Hours of missing data = 820
Hours direction in window = 8431
Hours elevated plume w/ dir. in window = 0
Hours of calm winds = 1112
Hours direction not in window or calm = 33461

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
LOW LIM.	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	9543.	11872.	15335.	20175.	24376.	31955.	41300.	41554.	42426.	41783.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	33461.	30919.	27032.	21352.	17757.	10181.	364.	0.	0.	0.
TOTAL X/Qs	43004.	42791.	42367.	41527.	42133.	42136.	41664.	41554.	42426.	41783.
% NON ZERO	22.19	27.74	36.20	48.58	57.85	75.84	99.13	100.00	100.00	100.00

95th PERCENTILE X/Q VALUES

1.68E-03	1.59E-03	1.42E-03	1.24E-03	9.93E-04	6.96E-04	3.84E-04	3.21E-04	2.67E-04	2.46E-04

95% X/Q for standard averaging intervals

0 to 2 hours	1.68E-03
2 to 8 hours	1.09E-03
8 to 24 hours	4.24E-04
1 to 4 days	2.80E-04
4 to 30 days	2.24E-04

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	2.46E-03	9.50E-05
SECTOR-AVERAGE	1.45E-03	5.54E-05

NORMAL PROGRAM COMPLETION

ATTACHMENT 2

Site Specific Data for the Calculation of Control Room Atmospheric Dispersion Factors Applicable to Fuel Handling and Weir Gate Drop Accidents at McGuire Nuclear Station

(REVISED)

Site Specific Data for the Calculation of Control Room Atmospheric Dispersion Factors At McGuire Nuclear Station

Parameter[1]	Unit Vent	Equipment Hatch[2]	Equipment Hatch[3]	Equipment Hatch[4]
Source Type	Vertical Point Source	Horizontal or Capped Point	Vertical Area Source	Horizontal or Capped Point
Release Height (m)	40.2	8.3	0	0
Flow Rate (m^3/sec)	8.6	0	0	0
Sigma-Y (m)	0	0	1	0
Sigma-Z (ms)	0	0	1	0
Building Cross Section Area (m^2)	1588	1588	1588	1588
Source / Stack Radius (m)	0	0	0	0
Vertical Velocity (meters/sec)	0	0	0	0
Distance (m), Direction (°)				
U1 Release to U1 CR OAI	43, 62		36, 32 (arc)	36, 32 (arc)
U1 Release to U2 CR OAI	94, 299	116, 298		
U2 Release to U1 CR OAI	94, 83	137, 76		
U2 Release to U2 CR OAI	43, 323		61, 10 (arc)	61, 10 (arc)

Notes:

[1]Abbreviations are as follows: U = Unit, CR = Control Room, OAI = outside air intake (outside air intake pair or outside air intake location).

[2]Release location set as a horizontal point source for transport of fission products from the Unit 1 release location to the Unit 2 CRAVS outside air intakes and from the Unit 2 release location to the Unit 1 CRAVS outside air intakes.

[3]Release location set as a vertical area source for transport of fission products from the Unit 1 release location to the Unit 1 CRAVS outside air intakes and from the Unit 2 release location to the Unit 2 CRAVS outside air intakes. This represents having the hatch open or multiple holes in the hatch.

[4]Release location set as a horizontal point source for transport of fission products from the Unit 1 release location to the Unit 1 CRAVS outside air intakes and from the Unit 2 release location to the Unit 2 CRAVS outside air intakes. This is the limiting case, representing a horizontal release from a single hole in the hatch.