

# NAI Report Release


Report Number: NAI-1149-002

Revision Number: 0

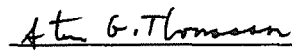
Title: Determination of Atmospheric Dispersion Factors for Palisades

Description:

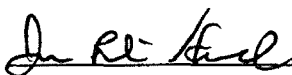
Determines atmospheric dispersion  $\chi/Q$  factors for various release scenarios at the Palisades site.

  
\_\_\_\_\_  
Author  
Joe Sinodis

Sept. 15, 2004  
Date

  
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Reviewer  
Steve Thomasson

9/15/04  
Date

  
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NAI Management  
Jim Harrell

9/15/04  
Date

## NAI Calculation Approval


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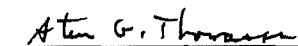
Sept. 15, 2004  
Date

Scope of Review:

All spreadsheets used for manipulating the met. data were spot checked. All of the PAVAN and ARCON runs were checked against the spreadsheets to ensure that the met. data were properly transferred. The case specific input for all of the PAVAN and ARCON cases was checked against the referenced design inputs to ensure that the case data were input properly. The data provided in the IAM were presumed to be correct; therefore, these data were not verified. The methodology presented in the body of the calculation was compared to the referenced guidelines and was found to be correct.

Design Verification -

The only comments were related to typographical errors. A marked up copy was provided to the preparer for correction.

  
\_\_\_\_\_  
Reviewer  
Steve Thomasson

9/15/04  
Date

Check items in the following lists to verify that project documentation and engineering calculations are complete. Mark any items that are not applicable with N/A notation.

Project Documentation Checklist:

- N/A
- Project QA Plan.
  - Project Organization.
  - Project Work Scope and Design Plan.
  - Project Calculation and Document Index.
  - Project QA Requirements.
  - Project Engineer Training and Qualification Forms.
  - Project QA Training Certification Forms.
  - Project Correspondence.

Engineering Calculations Checklist:

- Identification by subject, originator, reviewer, date and Project so that the calculation is retrievable.
- Table of contents.
- Statement of the objective of the analysis.
- Analysis inputs and their sources.
- Assumptions and how they were developed or determined.
- Hand calculations.
- Identification of computer calculations, including computer type, computer program name and version, code input and output.
- Conclusions.
- Review summary.
- Responses to review comments.
- References.
- Each page of the calculation shall be numbered and the first page shall indicate the total number of pages. The calculation pages may be numbered by sections with the first page of the section indicating the total number of pages in the section.
- The Calculation Approval Sheet shall be signed and dated by the originator.

TABLE OF CONTENTS

	Page No.
<b>PURPOSE</b>	<b>6</b>
<b>RESULTS, CONCLUSIONS AND RECOMMENDATIONS</b>	<b>6</b>
RESULTS	6
CONCLUSIONS	8
RECOMMENDATIONS	9
<b>ASSUMPTIONS AND DESIGN INPUTS</b>	<b>9</b>
<b>METHODOLOGY</b>	<b>10</b>
<b>COMPUTATIONS</b>	<b>10</b>
METEOROLOGICAL DATA	10
ONSITE $\chi/Q$ DETERMINATION	12
OFFSITE $\chi/Q$ DETERMINATION	13
<b>REFERENCES</b>	<b>14</b>

LIST OF TABLES

	Page No.
<b>TABLE 1 – BASE <math>\chi/Q</math> FACTORS FROM ARCON96 RUNS</b>	<b>6</b>
<b>TABLE 2 – EAB <math>\chi/Q</math> FACTORS FROM PAVAN RUN</b>	<b>7</b>
<b>TABLE 3 – LPZ <math>\chi/Q</math> FACTORS FROM PAVAN RUN</b>	<b>8</b>
<b>TABLE 4 – CONTROL ROOM <math>\chi/Q</math> FACTORS FOR ANALYSIS EVENTS</b>	<b>8</b>
<b>TABLE 5 – OFFSITE BOUNDARY <math>\chi/Q</math> FACTORS FOR ANALYSIS EVENTS</b>	<b>9</b>

LIST OF FIGURES

	<b>Page No.</b>
<b>FIGURE 1 – ONSITE RELEASE/RECEPTOR LOCATION SKETCH</b>	<b>15</b>

LIST OF ATTACHMENTS

	<b>Page No.</b>
<b>Attachment A – ARCON96 Case Runs – .log files</b>	<b>A1-A56</b>
<b>Attachment B – PAVAN Case Run – pals01</b>	<b>B1-B94</b>
<b>Attachment C – CD Electronic File Listing</b>	<b>C1-C3</b>
<b>Attachment D – ARCON96 Cases Input Reference Compilation</b>	<b>D1-D31</b>

**PURPOSE**

The purpose of this analysis is to determine new  $\chi/Q$  atmospheric dispersion factors for the Palisades plant for various release scenarios. Onsite atmospheric dispersion factors are generated for the control room air intakes for several dose events that include Loss of Coolant Accident (LOCA) or Maximum Hypothetical Accident (MHA), Main Steam Line Break (MSLB), Steam Generator Tube Rupture (SGTR), Fuel Handling Accident (FHA), Control Rod Ejection (CRE), Volume Control Tank Rupture (VCTR), Small Line Break Outside Containment, Cask Drop, and Waste Gas Decay Tank rupture (WGDT). Offsite atmospheric dispersion factors are determined at the Exclusion Area Boundary (EAB) and inside edge of the Low Population Zone (LPZ).

**RESULTS, CONCLUSIONS AND RECOMMENDATIONS**

**RESULTS**

The following table lists the results from the various cases run for the onsite  $\chi/Q$  atmospheric dispersion factors. Figure 1 provides a sketch of the general layout of the Palisades release and receptor locations.

**TABLE 1 – Base  $\chi/Q$  Factors from ARCON96 Runs**

Case	Release Point	Receptor Point	0-2 hr $\chi/Q$	2-8 hr $\chi/Q$	8-24 hr $\chi/Q$	1-4 days $\chi/Q$	4-30 days $\chi/Q$
1	Containment Closest Point	Normal Intake 'A'	1.14E-02	9.00E-03	3.27E-03	2.61E-03	2.07E-03
2	Containment Closest Point	Normal Intake 'B'	1.43E-02	1.11E-02	4.13E-03	3.23E-03	2.49E-03
3	Containment Closest Point	Emergency Intake	7.26E-04	6.18E-04	2.47E-04	1.77E-04	1.30E-04
4	SIRWT Vent	Normal Intake 'A'	5.55E-02	4.35E-02	1.54E-02	1.25E-02	1.01E-02
5	SIRWT Vent	Normal Intake 'B'	9.57E-02	7.59E-02	2.87E-02	2.19E-02	1.65E-02
6	SIRWT Vent	Emergency Intake	9.66E-04	7.92E-04	3.13E-04	2.20E-04	1.64E-04
7	Plant Stack	Normal Intake 'A'	5.83E-03	4.16E-03	1.55E-03	1.19E-03	9.09E-04
8	Plant Stack	Normal Intake 'B'	6.10E-03	4.32E-03	1.73E-03	1.27E-03	9.79E-04
9	Plant Stack	Emergency Intake	8.32E-04	7.69E-04	2.83E-04	2.15E-04	1.57E-04
10	Closest ADV	Normal Intake 'A'	1.65E-02	1.34E-02	5.40E-03	4.03E-03	2.98E-03
11	Closest ADV	Normal Intake 'B'	1.58E-02	1.30E-02	5.12E-03	3.65E-03	2.71E-03
12	Closest ADV	Emergency Intake	7.36E-04	6.42E-04	2.43E-04	1.75E-04	1.28E-04
13	Closest SSRV	Normal Intake 'A'	2.10E-02	1.70E-02	6.80E-03	4.98E-03	3.72E-03
14	Closest SSRV	Normal Intake 'B'	2.11E-02	1.71E-02	6.91E-03	4.90E-03	3.65E-03
15	Closest SSRV	Emergency Intake	7.96E-04	6.91E-04	2.60E-04	1.90E-04	1.37E-04

Case	Release Point	Receptor Point	0-2 hr $\chi/Q$	2-8 hr $\chi/Q$	8-24 hr $\chi/Q$	1-4 days $\chi/Q$	4-30 days $\chi/Q$
16	Containment Equipment Door	Normal Intake 'A'	9.40E-03	7.36E-03	2.72E-03	2.12E-03	1.72E-03
17	Containment Equipment Door	Normal Intake 'B'	1.25E-02	9.83E-03	3.62E-03	2.86E-03	2.28E-03
18	Containment Equipment Door	Emergency Intake	7.32E-04	6.13E-04	2.45E-04	1.75E-04	1.29E-04
19	Turbine Building NE Roof Exhauster	Normal Intake 'A'	1.31E-02	1.13E-02	4.68E-03	2.87E-03	2.36E-03
20	Turbine Building NE Roof Exhauster	Normal Intake 'B'	9.09E-03	8.14E-03	3.43E-03	2.02E-03	1.74E-03
21	Turbine Building NE Roof Exhauster	Emergency Intake	7.92E-04	6.43E-04	2.58E-04	1.74E-04	1.30E-04
22	Turbine Building NW Roof Exhauster	Normal Intake 'A'	1.10E-02	1.02E-02	4.33E-03	2.58E-03	2.17E-03
23	Turbine Building NW Roof Exhauster	Normal Intake 'B'	8.20E-03	7.06E-03	3.09E-03	1.80E-03	1.57E-03
24	Turbine Building NW Roof Exhauster	Emergency Intake	7.99E-04	6.43E-04	2.57E-04	1.75E-04	1.32E-04

The results for the offsite atmospheric dispersion factors for the EAB and LPZ are presented in the following tables. In accordance with Regulatory Position 4 from Reference [4], the maximum value from all downwind sectors for each time period is compared with the 5% overall site  $\chi/Q$ , and the larger of the values are used in evaluations. Note that the EAB distance in the limiting NNW direction is offshore. However, this distance is used in all directions and the NNW result is used for conservatism.

**TABLE 2 – EAB  $\chi/Q$  Factors from PAVAN Run**

Time Period	Maximum Downwind $\chi/Q$ (sec/m <sup>3</sup> )	Maximum Downwind $\chi/Q$ Direction	5% overall site $\chi/Q$ (sec/m <sup>3</sup> )
0-2 hours	5.39E-04	NNW	3.67E-04
0-8 hours	3.31E-04	NNW	2.40E-04
8-24 hours	2.59E-04	NNW	1.94E-04
1-4 days	1.53E-04	NNW	1.23E-04
4-30 days	7.14E-05	NNW	6.33E-05

**TABLE 3 – LPZ  $\chi/Q$  Factors from PAVAN Run**

Time Period	Maximum Downwind $\chi/Q$ (sec/m <sup>3</sup> )	Maximum Downwind $\chi/Q$ Direction	5% overall site $\chi/Q$ (sec/m <sup>3</sup> )
0-2 hours	6.66E-05	NNW	4.30E-05
0-8 hours	3.03E-05	NNW	2.10E-05
8-24 hours	2.04E-05	NNW	1.47E-05
1-4 days	8.67E-06	NNW	6.76E-06
4-30 days	2.54E-06	NNW	2.21E-06

**CONCLUSIONS**

The following table summarizes the results for  $\chi/Q$  factors for the control room intakes for the various release/receptor combinations. The results for the limiting receptor point for the normal intake and the emergency intake are presented in the table below, and may be used for onsite control room dose consequence analyses. Based on the layout of the plant and the intake configuration no credit for dilution due to dual intakes is allowed.

**TABLE 4 – Control Room  $\chi/Q$  Factors for Analysis Events**

Release Point	Receptor Point	0-2 hr $\chi/Q$	2-8 hr $\chi/Q$	8-24 hr $\chi/Q$	1-4 days $\chi/Q$	4-30 days $\chi/Q$
Containment Closest Point	Normal Intake 'B'	1.43E-02	1.11E-02	4.13E-03	3.23E-03	2.49E-03
Containment Closest Point	Emergency Intake	7.26E-04	6.18E-04	2.47E-04	1.77E-04	1.30E-04
SIRWT Vent	Normal Intake 'B'	9.57E-02	7.59E-02	2.87E-02	2.19E-02	1.65E-02
SIRWT Vent	Emergency Intake	9.66E-04	7.92E-04	3.13E-04	2.20E-04	1.64E-04
Plant Stack	Normal Intake 'B'	6.10E-03	4.32E-03	1.73E-03	1.27E-03	9.79E-04
Plant Stack	Emergency Intake	8.32E-04	7.69E-04	2.83E-04	2.15E-04	1.57E-04
Closest ADV	Normal Intake 'A'	1.65E-02	1.34E-02	5.40E-03	4.03E-03	2.98E-03
Closest ADV	Emergency Intake	7.36E-04	6.42E-04	2.43E-04	1.75E-04	1.28E-04
Closest SSRV	Normal Intake 'A'	-	-	-	4.98E-03	3.72E-03
Closest SSRV	Normal Intake 'B'	2.11E-02	1.71E-02	6.91E-03	-	-
Closest SSRV	Emergency Intake	7.96E-04	6.91E-04	2.60E-04	1.90E-04	1.37E-04
Containment Equipment Door	Normal Intake 'B'	1.25E-02	9.83E-03	3.62E-03	2.86E-03	2.28E-03
Containment Equipment Door	Emergency Intake	7.32E-04	6.13E-04	2.45E-04	1.75E-04	1.29E-04



Release Point	Receptor Point	0-2 hr $\chi/Q$	2-8 hr $\chi/Q$	8-24 hr $\chi/Q$	1-4 days $\chi/Q$	4-30 days $\chi/Q$
Turbine Building NE Roof Exhauster	Normal Intake 'A'	1.31E-02	1.13E-02	4.68E-03	2.87E-03	2.36E-03
Turbine Building NE Roof Exhauster	Emergency Intake	-	-	2.58E-04	-	-
Turbine Building NW Roof Exhauster	Emergency Intake	7.99E-04	6.43E-04	-	1.75E-04	1.32E-04

The following table summarizes the maximum  $\chi/Q$  factors for the EAB and LPZ.

**TABLE 5 – Offsite Boundary  $\chi/Q$  Factors for Analysis Events**

Time Period	EAB $\chi/Q$ (sec/m <sup>3</sup> )	LPZ $\chi/Q$ (sec/m <sup>3</sup> )
0-2 hours	5.39E-04	6.66E-05
0-8 hours	3.31E-04	3.03E-05
8-24 hours	2.59E-04	2.04E-05
1-4 days	1.53E-04	8.67E-06
4-30 days	7.14E-05	2.54E-06

**RECOMMENDATIONS**

It is recommended that the limiting  $\chi/Q$  atmospheric dispersion factors for the control room, EAB, and LPZ presented in the Conclusions section be used for dose analyses for the events at the Palisades plant. Future analysis of events other than those studied in this project (i.e. NAI 1149) may require different release-receptor combinations to determine the bounding scenario.

**ASSUMPTIONS AND DESIGN INPUTS**

1. It is assumed that the Palisades meteorological program conforms to Reference [2].
2. Distances, directions, and elevations for onsite atmospheric dispersion factors are taken from References [7], [12], [13] and [15], which are compiled in Attachment D.
3. All releases are considered ground level releases since there are no release points higher than 2.5 times the tallest surrounding structure as put forth by References [1] and [4].
4. The actual release height is used when known based on the guidance from Table A-2 of Reference [1] for the onsite cases.
5. If a release elevation is unknown for onsite releases, the release height is set equal to the intake height as called out in Table A-2 of Reference [1].
6. The stack top elevation is assumed to be the release height for releases from the plant stack for the onsite cases because no credit is taken for an effective height due to plume rise.
7. The default value in ARCON96 for surface roughness length is changed to 0.2 based on guidance from Table A-2 of Reference [1].
8. The default value in ARCON96 for the averaging sector width constant is changed to 4.3 based on guidance from Table A-2 of Reference [1].
9. The minimum EAB distance assumed for all directions is 677 m from Section 2.1 of Reference [9].
10. The LPZ distance is taken from Section 2.1 of Reference [9] as 4,820 m in all directions.
11. All other inputs and assumptions are listed in the Computations section of this calculation.

## **METHODOLOGY**

ARCON96 and PAVAN are used to determine onsite control room dispersion factors and offsite Exclusion Area Boundary (EAB) and Low Population Zone (LPZ) dispersion factors. Annual meteorological data is properly formatted for code input from Reference [14], which is presented in Attachment D. The yearly data for the ARCON96 code is combined into one file, while the data provided for the PAVAN code is formatted using an Excel spreadsheet.

Other inputs are determined for each of the analysis scenarios. These inputs, combined with the meteorological data, are then used with the computer codes to determine the  $\chi/Q$  atmospheric dispersion factors for each case.

All computer codes were run on a machine with an AMD Athlon processor using the Windows 98 operating system. The ARCON96 and PAVAN codes are qualified for use on this project in Reference [6].

## **COMPUTATIONS**

### **METEOROLOGICAL DATA**

Five years worth of meteorological data was used which meets the guidance set forth in Section 3.1 of Reference [1]. The meteorological data for 1999 through 2003 was provided in electronic format in formatted text files. These files were appended to each other in chronological order to create one file, pal9903.met, to be accessed by ARCON96.

The lower and upper windspeeds were recorded at heights of 10.1 m and 57.8 m, respectively, as listed in Section 2.5.2.3 of Reference [9]. These heights are appropriate to use without any adjustment for the base elevation of the meteorological tower. To verify this several ARCON96 sensitivity cases were run with the meteorological sensor heights at a value of the height on the tower plus the height of the base of the tower that resulted in less conservative results with the Palisades meteorological data set. The description of the input for the sensor height for PAVAN from Table 3.1 of Reference [5] states that the height is above "ground-level." Therefore, the 10.1 m height is appropriate to use for the PAVAN case as well.

The windspeed values were provided in meters per second. Section 4.4.2 of Reference [3] requires the windspeed input to be entered to the nearest tenth of a reporting unit sans the decimal point. The wind directions are provided in degrees from the original format of the meteorological data. The data meets the requirement that a wind from the east is entered as 90°, a wind from the south is entered as 180°, etc. Other information regarding the formatting of the meteorological data file may be found in References [1] and [3].

ARCON96 analyzes the meteorological data file used and lists the total number of hours of data processed and the number of hours of missing data in the case output. A meteorological data recovery rate may be determined from this information. Since all of the Palisades cases use the same meteorological data file, pal9903.met, all of the cases in this analysis have the same data recovery rate. Each of the output listings in Appendix A present the number of hours of data processed as 43,824 and the number of missing data hours as 179. This yields a meteorological data recovery rate of 99.6%. No regulatory guidance is provided in References [1] and [3] on the valid meteorological data recovery rate required for use in determining onsite  $\chi/Q$  values. However, Regulatory Position C.5 of Reference [2] requires a 90% data recovery threshold for measuring and capturing meteorological data. Clearly, the 99.6% valid meteorological data rate for the cases in this analysis exceeds the 90% data recovery limit set forth by Reference [2]. With a data recovery rate of 99.6% and a total of five years worth of data, the contents of the meteorological data file pal9903.met are representative of the long term meteorological trends at the Palisades site.

The meteorological data were also provided in annual joint frequency distribution format for 1999 through 2003. An Excel spreadsheet was created to merge the five years worth of data into one joint frequency distribution file. The joint frequency distribution file requires the annual meteorological data to be sorted into several classifications. This is accomplished by using three classifications that include wind direction, wind speed, and atmospheric stability class. The format for the original files conform to the format provided in Table 1 of Reference [2]. These data were provided for the five years in terms of the percentage of hours of that time period that fell into each classification category. The percentage of hours are converted to a number of whole hours in the spreadsheet. The final numbers are then copied from the spreadsheet and pasted into the input file for PAVAN. The hours of calm for each stability class were taken from the original data file and included in the PAVAN input file. Other information regarding the joint frequency distribution format for the PAVAN meteorological data may be found in Reference [2].

The meteorological data used in these analyses are provided in electronic format on a compact disk that accompanies this calculation and listed in Attachment C. The disk contains the original meteorological data files for Palisades from 1999 to 2003, the spreadsheets used to manipulate the data, and the final meteorological data files for the ARCON96 and PAVAN runs.

A process was performed on the meteorological data used for the ARCON96 runs to determine the 95<sup>th</sup> percentile wind speed at the SSRV and ADV release heights. The meteorological data file pal9903.met was opened in an Excel spreadsheet. A column was added to the spreadsheet that contains the lower wind speed value and is set equal to 999 if the wind speed data for that hour is bad. Another column was added to the spreadsheet where the wind speed multiplier is selected based upon the stability class for each hour of data. The final column multiplies the wind speed multiplier by the 10.1 m wind speed to obtain the wind speed at the height of the release.

The wind speed multiplier is selected based upon the stability class, and is taken from special ARCON96 case runs. Case 10, for a release from an ADV to the normal 'A' control room intake, was renamed pal10qa and rerun with the Expanded QA output option selected. This QA file, pal10qa.qao, which is listed in Attachment C, presents the wind speed correction factors for the release height from this case. A review of Reference [3] indicates that the value C2, which is listed in the pal10qa.qao file, is the multiplier based on stability class used on the meteorological lower wind speed data for each hour to determine the wind speed at the release height. The IF function is used in the spreadsheet to select the appropriate C2 value to use as a multiplier on the hourly met data. The release from an SSRV is at the same release height, therefore the 95<sup>th</sup> percentile wind speed determined using the ADV expanded output case is the same for the SSRV case.

The PERCENTILE function in the spreadsheet program was used to identify all of the hourly release height wind speeds as the range to return the 95<sup>th</sup> percentile value. Hours with bad data for the lower wind speed or the stability class are neglected. The 95<sup>th</sup> percentile wind speed for the ADV and SSRV release height is 7.29 meters per second. That is, 95% of all of the hourly wind speeds at the ADV and SSRV release height of 17.37 m are less than 7.29 meters per second.

As mentioned previously, the meteorological data from which this calculation is performed is considered indicative of the meteorological trends at the Palisades site, and the calculated 95<sup>th</sup> percentile wind speed values for the SSRV and ADV release height may be used with confidence. The spreadsheet, palmetdata.xls, is provided in electronic format on a compact disk, which is listed in Attachment C that accompanies the electronic version of this calculation.

Reference [8] lists the range of dry bulb temperature for various places in the United States. The most similar listed location to the Palisades site is for Muskegon, MI, where the temperature range is 18.1 °F. It is the second closest listed city to Covert, MI where the Palisades plant is located. However, it is chosen (instead of Grand Rapids which is slightly closer) because it also is on the eastern shore of Lake Michigan. This information is from Table 1b in Chapter 27 of Reference [8].

## ONSITE $\chi/Q$ DETERMINATION

A number of various release-receptor combinations were considered for the onsite control room atmospheric dispersion factors. These different cases were considered to determine the limiting release-receptor combination for the events. The case matrix for these combinations is provided in the table in the Results section of this calculation. Figure 1 provides a sketch of the general layout of the Palisades release and receptor locations. The .log files for each ARCON96 run completed, which include the input listing and results, are provided in Attachment A. All of the ARCON96 files are provided in electronic format on a compact disk that is listed as Attachment C.

The distance and direction inputs for the ARCON96 runs are taken from and may be found in References [7], [12], [13] and [15], which are listed in Attachment D. The intake heights are also taken from those references, while the elevation difference term is set equal to zero for each case since all elevation points are taken with respect to the same datum.

The file pal9903.met was entered as the meteorological data file for each case run. The lower and upper measurement heights were entered as 10.1 m and 57.8 m, respectively, for each case. The m/s option was selected for the windspeed units.

A ground level release is chosen for each scenario since none of the release points are 2.5 times taller than the closest solid structure as called out in Section 3.2.2 of Reference [1] for stack releases. From Reference [10], the top of the containment structure is at an elevation of 782 ft. The highest release point is from the top of the plant stack at a release height of 58.52 m, or 192 ft for an elevation of 782 ft, as given in Reference [7] in Attachment D, which is clearly not 2.5 times higher than the containment structure. The vertical velocity, stack flow, and stack radius terms are all set equal to zero since each case is a ground level release. The vent release option was not selected for any of the scenarios based on the guidance set forth in Section 3.2.3 of Reference [1].

The actual release heights from the references in Attachment D are used in the cases. For the releases from the plant stack, the release elevations are set equal to the plant stack release elevation from Reference [7] in Attachment D because no credit is taken for effective release height due to plume rise.

The cases in this analysis that take credit for the building wake effect are the scenarios where the release is from the containment building and the SIRWT vent. Some of the other scenarios have buildings between the release and receptor points, but for those cases the building wake is not credited for the sake of conservatism. Not crediting wakes is accomplished by setting the building area term equal to 0.01 m<sup>2</sup> as stated in Table A-2 of Reference [1]. The building area used is a conservatively determined containment cross sectional area. The area is created by the cylindrical portion of the containment structure above the nearby auxiliary building roof. The width used is equal to the diameter of the containment structure. The height of the cylindrical portion is taken as the distance between the top of the cylinder portion of the containment structure and the auxiliary building roof elevation. The calculation of the building area is shown below.

Containment structure inner diameter = 116' from Section 5.8.2 of Reference [9]  
Containment structure nominal wall thickness = 3.5' from Section 5.8.2 of Reference [9]

Containment structure diameter = ID + 2 x wall thickness  
Containment structure diameter = 116' + 2 x 3.5'  
Containment structure diameter = 123 ft

Containment structure top elevation = 782' from Reference [10]  
Distance from top of containment structure to cylinder top elevation = 16' from Figure 5.8-1, Sh. 1  
of Reference [9]

Auxiliary building roof elevation = 643' from Reference [11]

Containment cylinder top elevation = top elevation – distance to cylinder top  
 Containment cylinder top elevation = 782' – 16'  
 Containment cylinder top elevation = 766 ft

Height = Cylinder top elevation – Auxiliary building roof elevation  
 Height = 766' – 643'  
 Height = 123 ft

Area = Diameter x Height  
 Area = 123 ft x 123 ft  
 Area = 15,129 ft<sup>2</sup> x (0.3048 m)<sup>2</sup> / (1 ft)<sup>2</sup>  
 Area = 1,405 m<sup>2</sup>

The output files for each case were titled palxx.log and palxx.cfd, where xx is a unique identifier for each case run. As stated previously, the .log files are presented in Attachment A.

All of the default values in the ARCON96 code are unchanged from the code default values with a couple of exceptions. Table A-2 of Reference [1] suggests to use a value of 0.2 for the Surface Roughness Length, and to use a value of 4.3 for the Averaging Sector Width Constant. These two changes were made for each case, while the minimum wind speed was left at 0.5 m/s per the guidance instruction in Table A-2 of Reference [1].

**OFFSITE  $\chi/Q$  DETERMINATION**

The joint frequency meteorological data is used in the input for the offsite atmospheric dispersion factors. PAVAN requires that a distance be input for each of the 16 directions where offsite  $\chi/Q$  values are calculated. Section 2.1 of Reference [9] gives the minimum distance to the EAB as 677 m. The regulatory guidance usually uses the term Exclusion Area Boundary (EAB). This term is synonymous with Site Boundary (SB), and either may be used interchangeably in this calculation. Section 2.1 of Reference [9] provides the LPZ boundary distance as 4,820 m. The EAB and LPZ distances are conservatively assumed in all directions.

All of the releases are considered ground level releases because the highest possible release height is at an elevation of 782 ft from the plant stack. From Section 1.3.2 of Reference [4], a release is only considered a stack release if the release point is at a level higher than two and one-half times the height of adjacent solid structures. For the Palisades plant, the elevation of the top of the containment structure is given as 782 ft from Reference [10]. Clearly, the highest possible release point is not 2.5 times higher than the adjacent containment building, and therefore all releases are considered ground level releases. As such, the release height is set equal to 10.0 meters as required by Table 3.1 of Reference [5]. The building area used for the building wake term is larger than the area used for the ARCON96 onsite  $\chi/Q$  cases. This area of 2,011 m<sup>2</sup> is calculated as the entire containment structure area. Although other plant buildings obstruct some of the containment structure, a point at the EAB or LPZ downwind will notice the effects of an area the size of the containment structure, even though that area is comprised of the containment and the adjacent buildings. This area is calculated below.

Plant grade elevation = 590' from Reference [7] in Attachment D

Height = Cylinder top elevation – Plant grade elevation  
 Height = 766' – 590'  
 Height = 176 ft

Area = Diameter x Height  
 Area = 123 ft x 176 ft  
 Area = 21,648 ft<sup>2</sup> x (0.3048 m)<sup>2</sup> / (1 ft)<sup>2</sup>  
 Area = 2,011 m<sup>2</sup>

The containment height used in the building wake term is calculated below as the containment top elevation minus the bottom (grade) elevation of 590 ft.

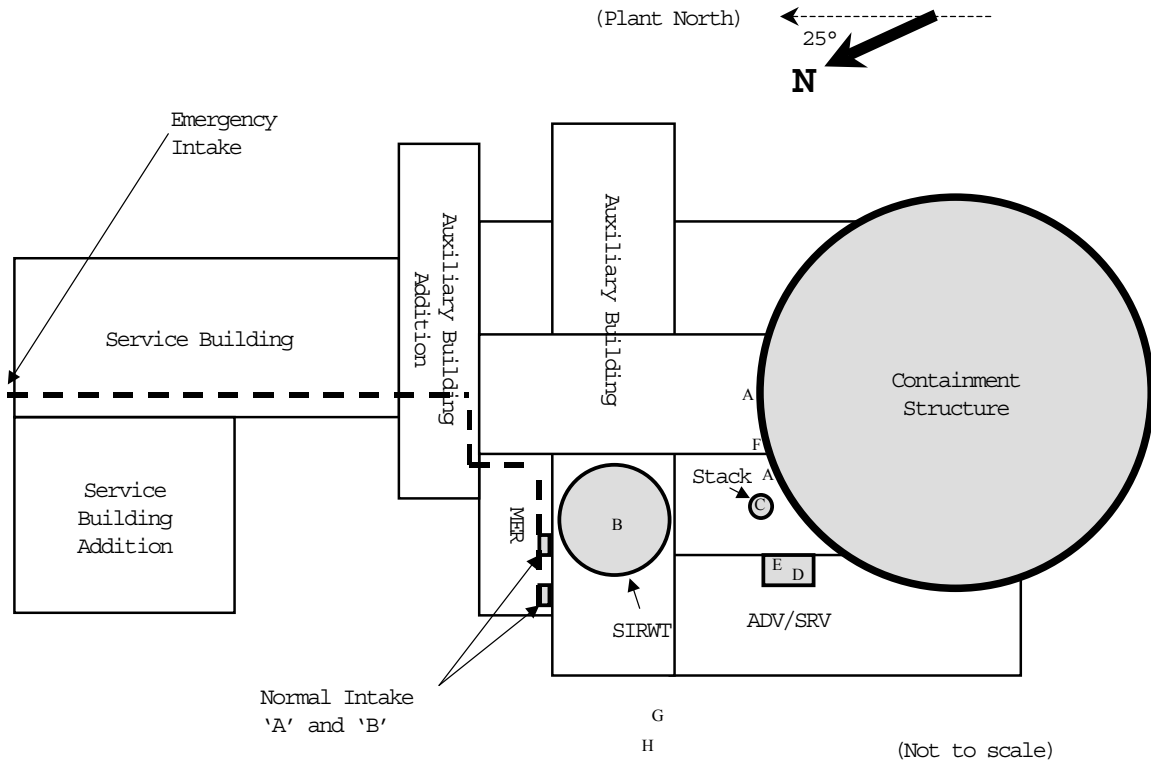
$$\begin{aligned}\text{Height} &= 782 \text{ ft} - 590 \text{ ft} = 192 \text{ ft} \\ \text{Height} &= 192 \text{ ft} \times (0.3048 \text{ m} / 1 \text{ ft}) = 58.5 \text{ m}\end{aligned}$$

The tower height at which the wind speeds were measured is 10.1 m. The windspeed units are given in meters per second, therefore the PAVAN variable UCOR is set equal to -1 to not apply any unit corrections as described in Table 3.1 of Reference [5]. The maximum windspeed in each windspeed category is chosen to match the raw joint frequency distribution data, which is provided in electronic format on compact disk and listed in Attachment C. A windspeed of 0.1 meters per second was assumed for the lowest wind speed category which the calms are distributed into.

The PAVAN case run is titled pals01, and may be found in Attachment B. This file lists an input echo followed by the calculation details and output for the determination of the  $\chi/Q$  values for the EAB and LPZ boundaries. A maximum  $\chi/Q$  value was determined from the output for each of the appropriate downwind distances as listed in the table above. The maximum downwind distance results for the EAB and LPZ boundaries are compared with the 5% overall site values for those boundaries. The electronic version of the PAVAN file is found on the compact disk listed as Attachment C. The PAVAN input file is identified as palsinput.dat.

## REFERENCES

1. Regulatory Guide 1.194, "Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants," U. S. NRC, June 2003.
2. Regulatory Guide 1.23, "Onsite Meteorological Programs," U. S. NRC, February 1972.
3. NUREG/CR-6331, "Atmospheric Relative Concentrations in Building Wakes," Rev. 1 May 1997 with associated Errata July 1997.
4. Regulatory Guide 1.145, "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants," Rev. 1, U. S. NRC, February 1983.
5. NUREG/CR-2858, PNL-4413, "PAVAN: An Atmospheric Dispersion Program for Evaluating Design Basis Accidental Releases of Radioactive Materials from Nuclear Power Stations," November 1982.
6. NAI-PQAP-1149-0, "Project Quality Assurance Plan for Control Room Habitability Analyses at Consumers Energy Palisades Nuclear Plant," Rev. 0.
7. Email from Gary Pratt (Palisades) to Joe Sinodis (NAI), "X/Q Input Data," with attachment, June 23, 2004.
8. 2001 ASHRAE Fundamentals (IP Edition), American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc.
9. FSAR – Palisades Nuclear Plant, Revision 24.
10. Drawing M-7, "Equipment Location Reactor Building Section F-F," Rev. 11.
11. Dwg. C-539(Q), "Cellular Slab Repair Plan of Control Room Roof El 643'-0" Palisades Plant," Rev. 0.
12. Email from Gary Pratt (Palisades) to Joe Sinodis (NAI), "RE: Remaining X/Qs," with attachment, June 29, 2004.
13. Email from Gary Pratt (Palisades) to Joe Sinodis (NAI), "Re: Fax," with attachment, June 28, 2004.
14. Email from Gary Pratt (Palisades) to Jim Harrell (NAI), "ARCON96 data," with attachment, March 3, 2004.
15. Email from Gary Pratt (Palisades) to Joe Sinodis (NAI), "MSLB X/Q Data," with attachment, September 14, 2004.



- \* – Control Room Intakes / Receptor Point
- A – Containment Closest Point
- B – SIRWT Vent
- C – Plant Stack
- D – Closest ADV
- E – Closest SSRV
- F – Equipment Door
- G – Turbine Building NE Roof Exhauster
- H – Turbine Building NW Roof Exhauster

**Figure 1 – Onsite Release/Receptor Location Sketch**

ATTACHMENT A

ARCON96 Case Runs – .log files



pal01.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  
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Code Developer: J. V. Ramsdell Phone: (509) 372 6316  
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Code Documentation: NUREG/CR-6331 Rev. 1

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Program Run 6/24/2004 at 11:47:04

\*\*\*\*\* ARCON INPUT \*\*\*\*\*

Number of Meteorological Data Files = 1  
Meteorological Data File Names  
C:\ARCON96\PAL\PAL9903.MET

Height of lower wind instrument (m) = 10.1  
Height of upper wind instrument (m) = 57.8  
Wind speeds entered as meters/second

Ground-level release  
Release height (m) = 22.5  
Building Area (m<sup>2</sup>) = 1405.0  
Effluent vertical velocity (m/s) = .00

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

Vent or stack flow (m<sup>3</sup>/s) = .00  
 Vent or stack radius (m) = .00  
 Direction .. intake to source (deg) = 168  
 Wind direction sector width (deg) = 90  
 Wind direction window (deg) = 123 - 213  
 Distance to intake (m) = 24.2  
 Intake height (m) = 22.5  
 Terrain elevation difference (m) = .0

Output file names  
 pal01.log  
 pal01.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 = 179  
 Hours direction in window = 13643  
 Hours elevated plume w/ dir. in window = 0  
 Hours of calm winds = 254  
 Hours direction not in window or calm = 29748

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
LOW LIM.	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	13897.	15678.	18376.	22497.	25742.	32272.	42728.	43188.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	29748.	27950.	25220.	21035.	17859.	11309.	696.	55.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	31.84	35.94	42.15	51.68	59.04	74.05	98.40	99.87	100.00	100.00

95th PERCENTILE X/Q VALUES  
 1.14E-02 1.11E-02 1.05E-02 9.60E-03 7.69E-03 5.38E-03 3.31E-03 2.84E-03 2.41E-03 2.23E-03

95% X/Q for standard averaging intervals

0 to 2 hours 1.14E-02

**NUMERICAL APPLICATIONS, Inc.**  
Determination of Atmospheric Dispersion Factors for Palisades  
Calculation Number: NAI-1149-002, Rev. 0

2 to 8 hours	9.00E-03
8 to 24 hours	3.27E-03
1 to 4 days	2.61E-03
4 to 30 days	2.07E-03

	HOURLY VALUE RANGE	
	MAX X/Q	MIN X/Q
CENTERLINE	1.31E-02	9.87E-04
SECTOR-AVERAGE	7.62E-03	5.75E-04

NORMAL PROGRAM COMPLETION

pal02.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  
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Code Documentation: NUREG/CR-6331 Rev. 1

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Program Run 6/24/2004 at 11:47:40

\*\*\*\*\* ARCON INPUT \*\*\*\*\*



**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	13564.	15379.	18144.	22249.	25474.	32024.	42645.	43181.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	30081.	28249.	25452.	21283.	18127.	11557.	779.	62.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	31.08	35.25	41.62	51.11	58.43	73.48	98.21	99.86	100.00	100.00

95th PERCENTILE X/Q VALUES

	1.43E-02	1.38E-02	1.30E-02	1.19E-02	9.62E-03	6.72E-03	4.10E-03	3.49E-03	2.95E-03	2.70E-03
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95% X/Q for standard averaging intervals

0 to 2 hours	1.43E-02
2 to 8 hours	1.11E-02
8 to 24 hours	4.13E-03
1 to 4 days	3.23E-03
4 to 30 days	2.49E-03

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	1.65E-02	1.23E-03
SECTOR-AVERAGE	9.61E-03	7.19E-04

NORMAL PROGRAM COMPLETION

pal03.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 Developer: J. V. Ramsdell Phone: (509) 372 6316  
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**NUMERICAL APPLICATIONS, Inc.**  
Determination of Atmospheric Dispersion Factors for Palisades  
Calculation Number: NAI-1149-002, Rev. 0

Code Documentation: NUREG/CR-6331 Rev. 1

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Program Run 6/24/2004 at 11:48:13

\*\*\*\*\* ARCON INPUT \*\*\*\*\*

Number of Meteorological Data Files = 1  
Meteorological Data File Names  
C:\ARCON96\PAL\PAL9903.MET

Height of lower wind instrument (m) = 10.1  
Height of upper wind instrument (m) = 57.8  
Wind speeds entered as meters/second

Ground-level release  
Release height (m) = 14.9  
Building Area (m<sup>2</sup>) = 1405.0  
Effluent vertical velocity (m/s) = .00  
Vent or stack flow (m<sup>3</sup>/s) = .00  
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 202  
Wind direction sector width (deg) = 90  
Wind direction window (deg) = 157 - 247  
Distance to intake (m) = 95.1  
Intake height (m) = 14.9  
Terrain elevation difference (m) = .0

Output file names  
pal03.log  
pal03.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 = 179  
 Hours direction in window = 12288  
 Hours elevated plume w/ dir. in window = 0  
 Hours of calm winds = 254  
 Hours direction not in window or calm = 31103

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	12542.	14403.	17108.	20950.	23934.	30368.	42047.	43025.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	31103.	29225.	26488.	22582.	19667.	13213.	1377.	218.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	28.74	33.01	39.24	48.13	54.89	69.68	96.83	99.50	100.00	100.00

95th PERCENTILE X/Q VALUES  
 7.26E-04 7.10E-04 6.84E-04 6.45E-04 5.25E-04 3.80E-04 2.27E-04 1.93E-04 1.60E-04 1.43E-04

95% X/Q for standard averaging intervals

0 to 2 hours 7.26E-04  
 2 to 8 hours 6.18E-04  
 8 to 24 hours 2.47E-04  
 1 to 4 days 1.77E-04  
 4 to 30 days 1.30E-04

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	9.29E-04	1.11E-04
SECTOR-AVERAGE	5.42E-04	6.47E-05

NORMAL PROGRAM COMPLETION

pal04.log

Program Title: ARCON96.

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

**NUMERICAL APPLICATIONS, Inc.**  
Determination of Atmospheric Dispersion Factors for Palisades  
Calculation Number: NAI-1149-002, Rev. 0

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

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Program Run 6/24/2004 at 11:52:19

\*\*\*\*\* ARCON INPUT \*\*\*\*\*

Number of Meteorological Data Files = 1  
Meteorological Data File Names  
C:\ARCON96\PAL\PAL9903.MET

Height of lower wind instrument (m) = 10.1  
Height of upper wind instrument (m) = 57.8  
Wind speeds entered as meters/second

Ground-level release  
Release height (m) = 24.5  
Building Area (m<sup>2</sup>) = 1405.0  
Effluent vertical velocity (m/s) = .00  
Vent or stack flow (m<sup>3</sup>/s) = .00  
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 157  
Wind direction sector width (deg) = 90  
Wind direction window (deg) = 112 - 202  
Distance to intake (m) = 10.6  
Intake height (m) = 22.5



Terrain elevation difference (m) = .0

Output file names  
 pal04.log  
 pal04.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 = 179  
 Hours direction in window = 14146  
 Hours elevated plume w/ dir. in window = 0  
 Hours of calm winds = 254  
 Hours direction not in window or calm = 29245

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
LOW LIM.	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	14400.	16213.	18971.	23202.	26558.	33195.	42938.	43231.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	54.	0.	0.	0.
ZERO	29245.	27415.	24625.	20330.	17043.	10386.	432.	12.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	32.99	37.16	43.52	53.30	60.91	76.17	99.01	99.97	100.00	100.00

95th PERCENTILE X/Q VALUES

	5.55E-02	5.44E-02	5.13E-02	4.65E-02	3.72E-02	2.58E-02	1.58E-02	1.36E-02	1.17E-02	1.08E-02
--	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------

95% X/Q for standard averaging intervals

0 to 2 hours	5.55E-02
2 to 8 hours	4.35E-02
8 to 24 hours	1.54E-02
1 to 4 days	1.25E-02
4 to 30 days	1.01E-02

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	6.42E-02	4.45E-03

SECTOR-AVERAGE      3.74E-02                      2.59E-03

NORMAL PROGRAM COMPLETION

pal05.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  
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Code Documentation: NUREG/CR-6331 Rev. 1

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Program Run 6/24/2004 at 11:52:47

\*\*\*\*\* ARCON INPUT \*\*\*\*\*

Number of Meteorological Data Files = 1  
Meteorological Data File Names  
C:\ARCON96\PAL\PAL9903.MET

Height of lower wind instrument (m) = 10.1  
Height of upper wind instrument (m) = 57.8  
Wind speeds entered as meters/second

Ground-level release  
 Release height (m) = 24.5  
 Building Area (m<sup>2</sup>) = 1405.0  
 Effluent vertical velocity (m/s) = .00  
 Vent or stack flow (m<sup>3</sup>/s) = .00  
 Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 184  
 Wind direction sector width (deg) = 90  
 Wind direction window (deg) = 139 - 229  
 Distance to intake (m) = 7.7  
 Intake height (m) = 22.5  
 Terrain elevation difference (m) = .0

Output file names  
 pal05.log  
 pal05.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 = 179  
 Hours direction in window = 13357  
 Hours elevated plume w/ dir. in window = 0  
 Hours of calm winds = 254  
 Hours direction not in window or calm = 30034

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
LOW LIM.	1.00E-04	1.00E-04	1.00E-04	1.00E-04	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	13611.	15443.	18200.	22241.	25317.	31738.	42313.	42980.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	30034.	28185.	25396.	21291.	18284.	11843.	1111.	263.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	31.19	35.40	41.75	51.09	58.07	72.83	97.44	99.39	100.00	100.00

95th PERCENTILE X/Q VALUES

9.57E-02 9.30E-02 8.82E-02 8.08E-02 6.53E-02 4.61E-02 2.80E-02 2.36E-02 1.99E-02 1.80E-02

95% X/Q for standard averaging intervals

0 to 2 hours	9.57E-02
2 to 8 hours	7.59E-02
8 to 24 hours	2.87E-02
1 to 4 days	2.19E-02
4 to 30 days	1.65E-02

	HOURLY VALUE RANGE	
	MAX X/Q	MIN X/Q
CENTERLINE	1.16E-01	7.80E-03
SECTOR-AVERAGE	6.74E-02	4.55E-03

NORMAL PROGRAM COMPLETION

### pal06.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  
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Code Developer: J. V. Ramsdell Phone: (509) 372 6316  
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Code Documentation: NUREG/CR-6331 Rev. 1

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party would not infringe privately owned rights.

Program Run 6/24/2004 at 11:53:24

\*\*\*\*\* ARCON INPUT \*\*\*\*\*

Number of Meteorological Data Files = 1  
Meteorological Data File Names  
C:\ARCON96\PAL\PAL9903.MET

Height of lower wind instrument (m) = 10.1  
Height of upper wind instrument (m) = 57.8  
Wind speeds entered as meters/second

Ground-level release  
Release height (m) = 24.5  
Building Area (m<sup>2</sup>) = 1405.0  
Effluent vertical velocity (m/s) = .00  
Vent or stack flow (m<sup>3</sup>/s) = .00  
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 214  
Wind direction sector width (deg) = 90  
Wind direction window (deg) = 169 - 259  
Distance to intake (m) = 81.2  
Intake height (m) = 14.9  
Terrain elevation difference (m) = .0

Output file names  
pal06.log  
pal06.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 = 179  
Hours direction in window = 11463  
Hours elevated plume w/ dir. in window = 0  
Hours of calm winds = 254  
Hours direction not in window or calm = 31928

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	11717.	13486.	16120.	20091.	23162.	29573.	41741.	42969.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	9.	0.	0.
ZERO	31928.	30142.	27476.	23441.	20439.	14008.	1683.	265.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	26.85	30.91	36.98	46.15	53.12	67.86	96.12	99.39	100.00	100.00

95th PERCENTILE X/Q VALUES  
 9.66E-04 9.42E-04 9.01E-04 8.35E-04 6.77E-04 4.87E-04 2.86E-04 2.39E-04 2.02E-04 1.80E-04

95% X/Q for standard averaging intervals

0 to 2 hours 9.66E-04  
 2 to 8 hours 7.92E-04  
 8 to 24 hours 3.13E-04  
 1 to 4 days 2.20E-04  
 4 to 30 days 1.64E-04

HOURLY VALUE RANGE		
	MAX X/Q	MIN X/Q
CENTERLINE	1.24E-03	1.34E-04
SECTOR-AVERAGE	7.22E-04	7.78E-05

NORMAL PROGRAM COMPLETION

pal07.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  
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**NUMERICAL APPLICATIONS, Inc.**  
Determination of Atmospheric Dispersion Factors for Palisades  
Calculation Number: NAI-1149-002, Rev. 0

L. A Brown Phone: (301) 415 1232  
e-mail: lab2@nrc.gov

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

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Program Run 6/24/2004 at 11:54:04

\*\*\*\*\* ARCON INPUT \*\*\*\*\*

Number of Meteorological Data Files = 1  
Meteorological Data File Names  
C:\ARCON96\PAL\PAL9903.MET

Height of lower wind instrument (m) = 10.1  
Height of upper wind instrument (m) = 57.8  
Wind speeds entered as meters/second

Ground-level release  
Release height (m) = 58.5  
Building Area (m<sup>2</sup>) = .0  
Effluent vertical velocity (m/s) = .00  
Vent or stack flow (m<sup>3</sup>/s) = .00  
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 169  
Wind direction sector width (deg) = 90  
Wind direction window (deg) = 124 - 214  
Distance to intake (m) = 22.3  
Intake height (m) = 22.5  
Terrain elevation difference (m) = .0

Output file names  
pal07.log  
pal07.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 = 179  
 Hours direction in window = 12421  
 Hours elevated plume w/ dir. in window = 0  
 Hours of calm winds = 324  
 Hours direction not in window or calm = 30900

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	12745.	14355.	16889.	20834.	24004.	30756.	42445.	43155.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	30900.	29273.	26707.	22698.	19597.	12825.	979.	88.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	29.20	32.90	38.74	47.86	55.05	70.57	97.75	99.80	100.00	100.00

95th PERCENTILE X/Q VALUES

	5.83E-03	5.45E-03	5.04E-03	4.58E-03	3.68E-03	2.56E-03	1.53E-03	1.31E-03	1.09E-03	9.92E-04
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95% X/Q for standard averaging intervals

0 to 2 hours	5.83E-03
2 to 8 hours	4.16E-03
8 to 24 hours	1.55E-03
1 to 4 days	1.19E-03
4 to 30 days	9.09E-04

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	9.92E-03	3.80E-04
SECTOR-AVERAGE	5.14E-03	2.21E-04

NORMAL PROGRAM COMPLETION



pal08.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  
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Code Developer: J. V. Ramsdell Phone: (509) 372 6316  
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Code Documentation: NUREG/CR-6331 Rev. 1

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Program Run 6/24/2004 at 11:54:41

\*\*\*\*\* ARCON INPUT \*\*\*\*\*

Number of Meteorological Data Files = 1  
Meteorological Data File Names  
C:\ARCON96\PAL\PAL9903.MET

Height of lower wind instrument (m) = 10.1  
Height of upper wind instrument (m) = 57.8  
Wind speeds entered as meters/second

Ground-level release  
Release height (m) = 58.5  
Building Area (m<sup>2</sup>) = .0  
Effluent vertical velocity (m/s) = .00

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

Vent or stack flow (m<sup>3</sup>/s) = .00  
 Vent or stack radius (m) = .00  
 Direction .. intake to source (deg) = 181  
 Wind direction sector width (deg) = 90  
 Wind direction window (deg) = 136 - 226  
 Distance to intake (m) = 19.8  
 Intake height (m) = 22.5  
 Terrain elevation difference (m) = .0

Output file names  
 pal08.log  
 pal08.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 = 179  
 Hours direction in window = 13235  
 Hours elevated plume w/ dir. in window = 0  
 Hours of calm winds = 324  
 Hours direction not in window or calm = 30086

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02	1.00E-02
LOW LIM.	1.00E-05	1.00E-05	1.00E-05	1.00E-05	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	13559.	15173.	17724.	21545.	24562.	31097.	42269.	43003.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	30086.	28455.	25872.	21987.	19039.	12484.	1155.	240.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	31.07	34.78	40.66	49.49	56.33	71.35	97.34	99.44	100.00	100.00

95th PERCENTILE X/Q VALUES  
 6.10E-03 5.63E-03 5.28E-03 4.76E-03 3.89E-03 2.74E-03 1.64E-03 1.41E-03 1.18E-03 1.07E-03

95% X/Q for standard averaging intervals

0 to 2 hours 6.10E-03

**NUMERICAL APPLICATIONS, Inc.**  
Determination of Atmospheric Dispersion Factors for Palisades  
Calculation Number: NAI-1149-002, Rev. 0

2 to 8 hours	4.32E-03
8 to 24 hours	1.73E-03
1 to 4 days	1.27E-03
4 to 30 days	9.79E-04

	HOURLY VALUE RANGE	
	MAX X/Q	MIN X/Q
CENTERLINE	1.05E-02	3.43E-04
SECTOR-AVERAGE	5.44E-03	2.00E-04

NORMAL PROGRAM COMPLETION

pal09.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  
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Code Developer: J. V. Ramsdell Phone: (509) 372 6316  
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Code Documentation: NUREG/CR-6331 Rev. 1

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Program Run 6/24/2004 at 11:55:13

\*\*\*\*\* ARCON INPUT \*\*\*\*\*



**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	14222.	15772.	18159.	21755.	24611.	30689.	41887.	42918.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	55.	62.	0.	0.
ZERO	29423.	27856.	25437.	21777.	18990.	12892.	1482.	263.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	32.59	36.15	41.65	49.97	56.45	70.42	96.59	99.39	100.00	100.00

95th PERCENTILE X/Q VALUES

	8.32E-04	8.32E-04	8.26E-04	7.85E-04	6.31E-04	4.50E-04	2.74E-04	2.32E-04	1.93E-04	1.73E-04
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95% X/Q for standard averaging intervals

0 to 2 hours	8.32E-04
2 to 8 hours	7.69E-04
8 to 24 hours	2.83E-04
1 to 4 days	2.15E-04
4 to 30 days	1.57E-04

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	1.66E-03	5.99E-05
SECTOR-AVERAGE	8.72E-04	3.49E-05

NORMAL PROGRAM COMPLETION

pal10.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  
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Code Documentation: NUREG/CR-6331 Rev. 1

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Program Run 6/29/2004 at 12:23:40

\*\*\*\*\* ARCON INPUT \*\*\*\*\*

Number of Meteorological Data Files = 1  
Meteorological Data File Names  
C:\ARCON96\PAL\PAL9903.MET

Height of lower wind instrument (m) = 10.1  
Height of upper wind instrument (m) = 57.8  
Wind speeds entered as meters/second

Ground-level release  
Release height (m) = 17.4  
Building Area (m<sup>2</sup>) = .0  
Effluent vertical velocity (m/s) = .00  
Vent or stack flow (m<sup>3</sup>/s) = .00  
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 192  
Wind direction sector width (deg) = 90  
Wind direction window (deg) = 147 - 237  
Distance to intake (m) = 20.1  
Intake height (m) = 22.5  
Terrain elevation difference (m) = .0

Output file names  
pal10.log  
pal10.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 = 179  
 Hours direction in window = 13519  
 Hours elevated plume w/ dir. in window = 0  
 Hours of calm winds = 254  
 Hours direction not in window or calm = 29872

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
LOW LIM.	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	13773.	15655.	18278.	22066.	24993.	31279.	42164.	42955.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	29872.	27973.	25318.	21466.	18608.	12302.	1260.	288.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	31.56	35.88	41.93	50.69	57.32	71.77	97.10	99.33	100.00	100.00

95th PERCENTILE X/Q VALUES  
 1.65E-02 1.60E-02 1.52E-02 1.41E-02 1.16E-02 8.31E-03 5.10E-03 4.28E-03 3.66E-03 3.26E-03

95% X/Q for standard averaging intervals

0 to 2 hours 1.65E-02  
 2 to 8 hours 1.34E-02  
 8 to 24 hours 5.40E-03  
 1 to 4 days 4.03E-03  
 4 to 30 days 2.98E-03

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	2.90E-02	1.72E-03
SECTOR-AVERAGE	1.69E-02	1.00E-03

NORMAL PROGRAM COMPLETION

pal11.log

Program Title: ARCON96.

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

**NUMERICAL APPLICATIONS, Inc.**  
Determination of Atmospheric Dispersion Factors for Palisades  
Calculation Number: NAI-1149-002, Rev. 0

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

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Program Run 6/29/2004 at 12:24:35

\*\*\*\*\* ARCON INPUT \*\*\*\*\*

Number of Meteorological Data Files = 1  
Meteorological Data File Names  
C:\ARCON96\PAL\PAL9903.MET

Height of lower wind instrument (m) = 10.1  
Height of upper wind instrument (m) = 57.8  
Wind speeds entered as meters/second

Ground-level release  
Release height (m) = 17.4  
Building Area (m<sup>2</sup>) = .0  
Effluent vertical velocity (m/s) = .00  
Vent or stack flow (m<sup>3</sup>/s) = .00  
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 207  
Wind direction sector width (deg) = 90  
Wind direction window (deg) = 162 - 252  
Distance to intake (m) = 19.8  
Intake height (m) = 22.5



Terrain elevation difference (m) = .0

Output file names  
 pal11.log  
 pal11.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 = 179  
 Hours direction in window = 11857  
 Hours elevated plume w/ dir. in window = 0  
 Hours of calm winds = 254  
 Hours direction not in window or calm = 31534

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
LOW LIM.	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	12111.	13923.	16558.	20431.	23495.	29974.	41999.	43046.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	31534.	29705.	27038.	23101.	20106.	13607.	1425.	197.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	27.75	31.91	37.98	46.93	53.89	68.78	96.72	99.54	100.00	100.00

95th PERCENTILE X/Q VALUES

	1.58E-02	1.52E-02	1.45E-02	1.37E-02	1.12E-02	7.99E-03	4.74E-03	3.97E-03	3.32E-03	2.98E-03
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95% X/Q for standard averaging intervals

0 to 2 hours	1.58E-02
2 to 8 hours	1.30E-02
8 to 24 hours	5.12E-03
1 to 4 days	3.65E-03
4 to 30 days	2.71E-03

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	2.98E-02	2.23E-03

SECTOR-AVERAGE      1.74E-02                      1.30E-03

NORMAL PROGRAM COMPLETION

pal12.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  
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Code Developer: J. V. Ramsdell Phone: (509) 372 6316  
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Code Documentation: NUREG/CR-6331 Rev. 1

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Program Run 6/29/2004 at 12:25:26

\*\*\*\*\* ARCON INPUT \*\*\*\*\*

Number of Meteorological Data Files = 1  
Meteorological Data File Names  
C:\ARCON96\PAL\PAL9903.MET

Height of lower wind instrument (m) = 10.1  
Height of upper wind instrument (m) = 57.8  
Wind speeds entered as meters/second

Ground-level release  
 Release height (m) = 17.4  
 Building Area (m<sup>2</sup>) = .0  
 Effluent vertical velocity (m/s) = .00  
 Vent or stack flow (m<sup>3</sup>/s) = .00  
 Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 214  
 Wind direction sector width (deg) = 90  
 Wind direction window (deg) = 169 - 259  
 Distance to intake (m) = 100.4  
 Intake height (m) = 14.9  
 Terrain elevation difference (m) = .0

Output file names  
 pal12.log  
 pal12.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 = 179  
 Hours direction in window = 11463  
 Hours elevated plume w/ dir. in window = 0  
 Hours of calm winds = 254  
 Hours direction not in window or calm = 31928

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-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03	1.00E-03
LOW LIM.	1.00E-06	1.00E-06	1.00E-06	1.00E-06	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	11717.	13486.	16120.	20091.	23162.	29573.	41741.	42978.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	31928.	30142.	27476.	23441.	20439.	14008.	1683.	265.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	26.85	30.91	36.98	46.15	53.12	67.86	96.12	99.39	100.00	100.00

95th PERCENTILE X/Q VALUES

7.36E-04 7.21E-04 6.96E-04 6.66E-04 5.42E-04 3.84E-04 2.27E-04 1.88E-04 1.62E-04 1.41E-04

95% X/Q for standard averaging intervals

0 to 2 hours	7.36E-04
2 to 8 hours	6.42E-04
8 to 24 hours	2.43E-04
1 to 4 days	1.75E-04
4 to 30 days	1.28E-04

	HOURLY VALUE RANGE	
	MAX X/Q	MIN X/Q
CENTERLINE	1.39E-03	1.20E-04
SECTOR-AVERAGE	8.12E-04	7.02E-05

NORMAL PROGRAM COMPLETION

### pal13.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  
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e-mail: lab2@nrc.gov

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

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party would not infringe privately owned rights.

Program Run 6/29/2004 at 12:26:05

\*\*\*\*\* ARCON INPUT \*\*\*\*\*

Number of Meteorological Data Files = 1  
Meteorological Data File Names  
C:\ARCON96\PAL\PAL9903.MET

Height of lower wind instrument (m) = 10.1  
Height of upper wind instrument (m) = 57.8  
Wind speeds entered as meters/second

Ground-level release  
Release height (m) = 17.4  
Building Area (m<sup>2</sup>) = .0  
Effluent vertical velocity (m/s) = .00  
Vent or stack flow (m<sup>3</sup>/s) = .00  
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 187  
Wind direction sector width (deg) = 90  
Wind direction window (deg) = 142 - 232  
Distance to intake (m) = 17.6  
Intake height (m) = 22.5  
Terrain elevation difference (m) = .0

Output file names  
pal13.log  
pal13.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 = 179  
Hours direction in window = 13410  
Hours elevated plume w/ dir. in window = 0  
Hours of calm winds = 254  
Hours direction not in window or calm = 29981

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL										
AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
LOW LIM.	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	13664.	15489.	18200.	22162.	25169.	31549.	42237.	42980.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	29981.	28139.	25396.	21370.	18432.	12032.	1187.	263.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	31.31	35.50	41.75	50.91	57.73	72.39	97.27	99.39	100.00	100.00

95th PERCENTILE X/Q VALUES  
 2.10E-02 2.04E-02 1.95E-02 1.80E-02 1.46E-02 1.05E-02 6.37E-03 5.37E-03 4.59E-03 4.08E-03

95% X/Q for standard averaging intervals

0 to 2 hours 2.10E-02  
 2 to 8 hours 1.70E-02  
 8 to 24 hours 6.80E-03  
 1 to 4 days 4.98E-03  
 4 to 30 days 3.72E-03

HOURLY VALUE RANGE		
	MAX X/Q	MIN X/Q
CENTERLINE	3.66E-02	2.15E-03
SECTOR-AVERAGE	2.13E-02	1.25E-03

NORMAL PROGRAM COMPLETION

pal14.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  
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**NUMERICAL APPLICATIONS, Inc.**  
Determination of Atmospheric Dispersion Factors for Palisades  
Calculation Number: NAI-1149-002, Rev. 0

L. A Brown Phone: (301) 415 1232  
e-mail: lab2@nrc.gov

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

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Program Run 6/29/2004 at 12:27:31

\*\*\*\*\* ARCON INPUT \*\*\*\*\*

Number of Meteorological Data Files = 1  
Meteorological Data File Names  
C:\ARCON96\PAL\PAL9903.MET

Height of lower wind instrument (m) = 10.1  
Height of upper wind instrument (m) = 57.8  
Wind speeds entered as meters/second

Ground-level release  
Release height (m) = 17.4  
Building Area (m<sup>2</sup>) = .0  
Effluent vertical velocity (m/s) = .00  
Vent or stack flow (m<sup>3</sup>/s) = .00  
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 204  
Wind direction sector width (deg) = 90  
Wind direction window (deg) = 159 - 249  
Distance to intake (m) = 17.0  
Intake height (m) = 22.5  
Terrain elevation difference (m) = .0

Output file names  
pall4.log  
pall4.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 = 179  
 Hours direction in window = 12090  
 Hours elevated plume w/ dir. in window = 0  
 Hours of calm winds = 254  
 Hours direction not in window or calm = 31301

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
LOW LIM.	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	12344.	14165.	16811.	20687.	23730.	30246.	42115.	43046.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	31301.	29463.	26785.	22845.	19871.	13335.	1309.	197.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	28.28	32.47	38.56	47.52	54.43	69.40	96.99	99.54	100.00	100.00

95th PERCENTILE X/Q VALUES

	2.11E-02	2.02E-02	1.92E-02	1.81E-02	1.48E-02	1.06E-02	6.34E-03	5.36E-03	4.49E-03	4.01E-03
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95% X/Q for standard averaging intervals

0 to 2 hours	2.11E-02
2 to 8 hours	1.71E-02
8 to 24 hours	6.91E-03
1 to 4 days	4.90E-03
4 to 30 days	3.65E-03

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	3.92E-02	2.90E-03
SECTOR-AVERAGE	2.29E-02	1.69E-03

NORMAL PROGRAM COMPLETION



pal15.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  
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Code Developer: J. V. Ramsdell Phone: (509) 372 6316  
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Code Documentation: NUREG/CR-6331 Rev. 1

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Program Run 6/29/2004 at 12:28:08

\*\*\*\*\* ARCON INPUT \*\*\*\*\*

Number of Meteorological Data Files = 1  
Meteorological Data File Names  
C:\ARCON96\PAL\PAL9903.MET

Height of lower wind instrument (m) = 10.1  
Height of upper wind instrument (m) = 57.8  
Wind speeds entered as meters/second

Ground-level release  
Release height (m) = 17.4  
Building Area (m<sup>2</sup>) = .0  
Effluent vertical velocity (m/s) = .00

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

Vent or stack flow (m<sup>3</sup>/s) = .00  
 Vent or stack radius (m) = .00  
 Direction .. intake to source (deg) = 213  
 Wind direction sector width (deg) = 90  
 Wind direction window (deg) = 168 - 258  
 Distance to intake (m) = 96.8  
 Intake height (m) = 14.9  
 Terrain elevation difference (m) = .0

Output file names  
 pall5.log  
 pall5.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 = 179  
 Hours direction in window = 11515  
 Hours elevated plume w/ dir. in window = 0  
 Hours of calm winds = 254  
 Hours direction not in window or calm = 31876

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	11769.	13542.	16168.	20090.	23163.	29569.	41733.	42877.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	101.	0.	0.
ZERO	31876.	30086.	27428.	23442.	20438.	14012.	1691.	265.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	26.97	31.04	37.09	46.15	53.12	67.85	96.11	99.39	100.00	100.00

95th PERCENTILE X/Q VALUES  
 7.96E-04 7.76E-04 7.52E-04 7.17E-04 5.83E-04 4.12E-04 2.45E-04 2.04E-04 1.74E-04 1.51E-04

95% X/Q for standard averaging intervals

0 to 2 hours 7.96E-04

**NUMERICAL APPLICATIONS, Inc.**  
Determination of Atmospheric Dispersion Factors for Palisades  
Calculation Number: NAI-1149-002, Rev. 0

2 to 8 hours	6.91E-04
8 to 24 hours	2.60E-04
1 to 4 days	1.90E-04
4 to 30 days	1.37E-04

	HOURLY VALUE RANGE	
	MAX X/Q	MIN X/Q
CENTERLINE	1.49E-03	1.29E-04
SECTOR-AVERAGE	8.71E-04	7.50E-05

NORMAL PROGRAM COMPLETION

pal16.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  
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Code Developer: J. V. Ramsdell Phone: (509) 372 6316  
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Code Documentation: NUREG/CR-6331 Rev. 1

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Program Run 6/28/2004 at 18:13:22

\*\*\*\*\* ARCON INPUT \*\*\*\*\*



**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	14541.	16377.	19154.	23420.	26801.	33431.	42956.	43231.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	29104.	27251.	24442.	20112.	16800.	10150.	468.	12.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	33.32	37.54	43.94	53.80	61.47	76.71	98.92	99.97	100.00	100.00

95th PERCENTILE X/Q VALUES

	9.40E-03	9.13E-03	8.54E-03	7.87E-03	6.29E-03	4.43E-03	2.70E-03	2.33E-03	2.00E-03	1.85E-03
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95% X/Q for standard averaging intervals

0 to 2 hours	9.40E-03
2 to 8 hours	7.36E-03
8 to 24 hours	2.72E-03
1 to 4 days	2.12E-03
4 to 30 days	1.72E-03

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	1.06E-02	8.26E-04
SECTOR-AVERAGE	6.19E-03	4.82E-04

NORMAL PROGRAM COMPLETION

pal17.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  
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Code Developer: J. V. Ramsdell Phone: (509) 372 6316  
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Code Documentation: NUREG/CR-6331 Rev. 1

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Program Run 6/28/2004 at 18:14:12

\*\*\*\*\* ARCON INPUT \*\*\*\*\*

Number of Meteorological Data Files = 1  
Meteorological Data File Names  
C:\ARCON96\PAL\PAL9903.MET

Height of lower wind instrument (m) = 10.1  
Height of upper wind instrument (m) = 57.8  
Wind speeds entered as meters/second

Ground-level release  
Release height (m) = 20.4  
Building Area (m<sup>2</sup>) = 1405.0  
Effluent vertical velocity (m/s) = .00  
Vent or stack flow (m<sup>3</sup>/s) = .00  
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 161  
Wind direction sector width (deg) = 90  
Wind direction window (deg) = 116 - 206  
Distance to intake (m) = 23.1  
Intake height (m) = 22.5  
Terrain elevation difference (m) = .0

Output file names  
pal17.log  
pal17.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 = 179  
 Hours direction in window = 13984  
 Hours elevated plume w/ dir. in window = 0  
 Hours of calm winds = 254  
 Hours direction not in window or calm = 29407

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
LOW LIM.	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	14238.	16020.	18702.	22816.	26130.	32731.	42833.	43231.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	29407.	27608.	24894.	20716.	17471.	10850.	591.	12.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	32.62	36.72	42.90	52.41	59.93	75.10	98.64	99.97	100.00	100.00

95th PERCENTILE X/Q VALUES  
 1.25E-02 1.21E-02 1.15E-02 1.05E-02 8.41E-03 5.91E-03 3.63E-03 3.12E-03 2.66E-03 2.46E-03

95% X/Q for standard averaging intervals

0 to 2 hours 1.25E-02  
 2 to 8 hours 9.83E-03  
 8 to 24 hours 3.62E-03  
 1 to 4 days 2.86E-03  
 4 to 30 days 2.28E-03

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	1.43E-02	1.10E-03
SECTOR-AVERAGE	8.31E-03	6.40E-04

NORMAL PROGRAM COMPLETION

pal18.log

Program Title: ARCON96.

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

**NUMERICAL APPLICATIONS, Inc.**  
Determination of Atmospheric Dispersion Factors for Palisades  
Calculation Number: NAI-1149-002, Rev. 0

Division of Reactor Program Management

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

NRC Contacts: J. Y. Lee Phone: (301) 415 1080  
e-mail: jy11@nrc.gov  
J. J. Hayes Phone: (301) 415 3167  
e-mail: jjh@nrc.gov  
L. A. Brown Phone: (301) 415 1232  
e-mail: lab2@nrc.gov

Code Developer: J. V. Ramsdell Phone: (509) 372 6316  
e-mail: j\_ramsdell@pnl.gov

Code Documentation: NUREG/CR-6331 Rev. 1

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Program Run 6/ 9/2004 at 15:23:09

\*\*\*\*\* ARCON INPUT \*\*\*\*\*

Number of Meteorological Data Files = 1  
Meteorological Data File Names  
C:\ARCON96\PAL\PAL9903.MET

Height of lower wind instrument (m) = 10.1  
Height of upper wind instrument (m) = 57.8  
Wind speeds entered as meters/second

Ground-level release  
Release height (m) = 20.4  
Building Area (m<sup>2</sup>) = 1405.0  
Effluent vertical velocity (m/s) = .00  
Vent or stack flow (m<sup>3</sup>/s) = .00  
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 204  
Wind direction sector width (deg) = 90  
Wind direction window (deg) = 159 - 249  
Distance to intake (m) = 95.4  
Intake height (m) = 14.9



Terrain elevation difference (m) = .0

Output file names  
 pal18.log  
 pal18.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 = 179  
 Hours direction in window = 12090  
 Hours elevated plume w/ dir. in window = 0  
 Hours of calm winds = 254  
 Hours direction not in window or calm = 31301

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	12344.	14165.	16811.	20687.	23730.	30246.	42115.	43046.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	512.	0.	0.	0.
ZERO	31301.	29463.	26785.	22845.	19871.	13335.	797.	197.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	28.28	32.47	38.56	47.52	54.43	69.40	98.16	99.54	100.00	100.00

95th PERCENTILE X/Q VALUES

	7.32E-04	7.15E-04	6.85E-04	6.43E-04	5.22E-04	3.78E-04	2.26E-04	1.91E-04	1.57E-04	1.42E-04
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95% X/Q for standard averaging intervals

0 to 2 hours	7.32E-04
2 to 8 hours	6.13E-04
8 to 24 hours	2.45E-04
1 to 4 days	1.75E-04
4 to 30 days	1.29E-04

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	9.19E-04	1.08E-04

SECTOR-AVERAGE      5.36E-04                      6.31E-05

NORMAL PROGRAM COMPLETION

pal19.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  
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L. A. Brown Phone: (301) 415 1232  
e-mail: lab2@nrc.gov

Code Developer: J. V. Ramsdell Phone: (509) 372 6316  
e-mail: j\_ramsdell@pnl.gov

Code Documentation: NUREG/CR-6331 Rev. 1

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Program Run 9/ 8/2004 at 16:20:50

\*\*\*\*\* ARCON INPUT \*\*\*\*\*

Number of Meteorological Data Files = 1  
Meteorological Data File Names  
C:\ARCON96\PAL\PAL9903.MET

Height of lower wind instrument (m) = 10.1  
Height of upper wind instrument (m) = 57.8  
Wind speeds entered as meters/second

Ground-level release  
 Release height (m) = 27.4  
 Building Area (m<sup>2</sup>) = .0  
 Effluent vertical velocity (m/s) = .00  
 Vent or stack flow (m<sup>3</sup>/s) = .00  
 Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 257  
 Wind direction sector width (deg) = 90  
 Wind direction window (deg) = 212 - 302  
 Distance to intake (m) = 20.8  
 Intake height (m) = 22.5  
 Terrain elevation difference (m) = .0

Output file names  
 pall19.log  
 pall19.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 = 179  
 Hours direction in window = 11743  
 Hours elevated plume w/ dir. in window = 0  
 Hours of calm winds = 254  
 Hours direction not in window or calm = 31648

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
LOW LIM.	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	11997.	13746.	16523.	20764.	24131.	30845.	42285.	43176.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	31648.	29882.	27073.	22768.	19470.	12736.	1139.	67.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	27.49	31.51	37.90	47.70	55.35	70.78	97.38	99.85	100.00	100.00

95th PERCENTILE X/Q VALUES

1.31E-02 1.30E-02 1.25E-02 1.17E-02 9.67E-03 7.03E-03 3.91E-03 3.30E-03 2.87E-03 2.57E-03

95% X/Q for standard averaging intervals

0 to 2 hours	1.31E-02
2 to 8 hours	1.13E-02
8 to 24 hours	4.68E-03
1 to 4 days	2.87E-03
4 to 30 days	2.36E-03

	HOURLY VALUE RANGE	
	MAX X/Q	MIN X/Q
CENTERLINE	3.49E-02	1.83E-03
SECTOR-AVERAGE	1.89E-02	1.07E-03

NORMAL PROGRAM COMPLETION

## pal20.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  
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e-mail: jjh@nrc.gov  
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e-mail: lab2@nrc.gov

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

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party would not infringe privately owned rights.

Program Run 9/ 8/2004 at 16:21:44

\*\*\*\*\* ARCON INPUT \*\*\*\*\*

Number of Meteorological Data Files = 1  
Meteorological Data File Names  
C:\ARCON96\PAL\PAL9903.MET

Height of lower wind instrument (m) = 10.1  
Height of upper wind instrument (m) = 57.8  
Wind speeds entered as meters/second

Ground-level release  
Release height (m) = 27.4  
Building Area (m<sup>2</sup>) = .0  
Effluent vertical velocity (m/s) = .00  
Vent or stack flow (m<sup>3</sup>/s) = .00  
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 264  
Wind direction sector width (deg) = 90  
Wind direction window (deg) = 219 - 309  
Distance to intake (m) = 25.2  
Intake height (m) = 22.5  
Terrain elevation difference (m) = .0

Output file names  
pal20.log  
pal20.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 = 179  
Hours direction in window = 12353  
Hours elevated plume w/ dir. in window = 0  
Hours of calm winds = 254  
Hours direction not in window or calm = 31038

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
LOW LIM.	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	12607.	14399.	17179.	21374.	24800.	31616.	42528.	43179.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	31038.	29229.	26417.	22158.	18801.	11965.	896.	64.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	28.89	33.00	39.40	49.10	56.88	72.55	97.94	99.85	100.00	100.00

95th PERCENTILE X/Q VALUES  
 9.09E-03 9.05E-03 8.86E-03 8.38E-03 6.94E-03 5.08E-03 2.79E-03 2.43E-03 2.10E-03 1.88E-03

95% X/Q for standard averaging intervals

0 to 2 hours 9.09E-03  
 2 to 8 hours 8.14E-03  
 8 to 24 hours 3.43E-03  
 1 to 4 days 2.02E-03  
 4 to 30 days 1.74E-03

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	2.49E-02	1.31E-03
SECTOR-AVERAGE	1.34E-02	7.61E-04

NORMAL PROGRAM COMPLETION

pal21.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: jy11@nrc.gov  
 J. J. Hayes Phone: (301) 415 3167  
 e-mail: jjh@nrc.gov

**NUMERICAL APPLICATIONS, Inc.**  
Determination of Atmospheric Dispersion Factors for Palisades  
Calculation Number: NAI-1149-002, Rev. 0

L. A Brown Phone: (301) 415 1232  
e-mail: lab2@nrc.gov

Code Developer: J. V. Ramsdell Phone: (509) 372 6316  
e-mail: j\_ramsdell@pnl.gov

Code Documentation: NUREG/CR-6331 Rev. 1

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Program Run 9/ 8/2004 at 16:22:40

\*\*\*\*\* ARCON INPUT \*\*\*\*\*

Number of Meteorological Data Files = 1  
Meteorological Data File Names  
C:\ARCON96\PAL\PAL9903.MET

Height of lower wind instrument (m) = 10.1  
Height of upper wind instrument (m) = 57.8  
Wind speeds entered as meters/second

Ground-level release  
Release height (m) = 27.4  
Building Area (m<sup>2</sup>) = .0  
Effluent vertical velocity (m/s) = .00  
Vent or stack flow (m<sup>3</sup>/s) = .00  
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 227  
Wind direction sector width (deg) = 90  
Wind direction window (deg) = 182 - 272  
Distance to intake (m) = 99.1  
Intake height (m) = 14.9  
Terrain elevation difference (m) = .0

Output file names  
pal21.log  
pal21.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 = 179  
 Hours direction in window = 11051  
 Hours elevated plume w/ dir. in window = 0  
 Hours of calm winds = 254  
 Hours direction not in window or calm = 32340

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	11305.	13103.	15823.	19841.	22918.	29353.	41831.	42948.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	3.	0.	0.
ZERO	32340.	30525.	27773.	23691.	20683.	14228.	1593.	292.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	25.90	30.03	36.29	45.58	52.56	67.35	96.33	99.32	100.00	100.00

95th PERCENTILE X/Q VALUES

	7.92E-04	7.62E-04	7.23E-04	6.81E-04	5.59E-04	3.99E-04	2.30E-04	1.88E-04	1.63E-04	1.44E-04
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95% X/Q for standard averaging intervals

0 to 2 hours	7.92E-04
2 to 8 hours	6.43E-04
8 to 24 hours	2.58E-04
1 to 4 days	1.74E-04
4 to 30 days	1.30E-04

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	1.90E-03	1.17E-04
SECTOR-AVERAGE	9.87E-04	6.83E-05

NORMAL PROGRAM COMPLETION



pal22.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: jy11@nrc.gov  
J. J. Hayes Phone: (301) 415 3167  
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e-mail: lab2@nrc.gov  
Code Developer: J. V. Ramsdell Phone: (509) 372 6316  
e-mail: j\_ramsdell@pnl.gov

Code Documentation: NUREG/CR-6331 Rev. 1

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Program Run 9/ 8/2004 at 16:23:29

\*\*\*\*\* ARCON INPUT \*\*\*\*\*

Number of Meteorological Data Files = 1  
Meteorological Data File Names  
C:\ARCON96\PAL\PAL9903.MET  
  
Height of lower wind instrument (m) = 10.1  
Height of upper wind instrument (m) = 57.8  
Wind speeds entered as meters/second  
  
Ground-level release  
Release height (m) = 27.4  
Building Area (m<sup>2</sup>) = .0

Effluent vertical velocity (m/s) = .00  
 Vent or stack flow (m<sup>3</sup>/s) = .00  
 Vent or stack radius (m) = .00  
  
 Direction .. intake to source (deg) = 266  
 Wind direction sector width (deg) = 90  
 Wind direction window (deg) = 221 - 311  
 Distance to intake (m) = 22.3  
 Intake height (m) = 22.5  
 Terrain elevation difference (m) = .0

Output file names  
 pal22.log  
 pal22.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 = 179  
 Hours direction in window = 12473  
 Hours elevated plume w/ dir. in window = 0  
 Hours of calm winds = 254  
 Hours direction not in window or calm = 30918

DISTRIBUTION SUMMARY DATA BY AVERAGING INTERVAL

AVER. PER.	1	2	4	8	12	24	96	168	360	720
UPPER LIM.	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01	1.00E-01
LOW LIM.	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	12727.	14520.	17321.	21553.	24992.	31756.	42540.	43180.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	30918.	29108.	26275.	21979.	18609.	11825.	884.	63.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	29.16	33.28	39.73	49.51	57.32	72.87	97.96	99.85	100.00	100.00

95th PERCENTILE X/Q VALUES

	1.10E-02	1.09E-02	1.08E-02	1.04E-02	8.63E-03	6.36E-03	3.53E-03	3.00E-03	2.62E-03	2.35E-03
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95% X/Q for standard averaging intervals

**NUMERICAL APPLICATIONS, Inc.**  
Determination of Atmospheric Dispersion Factors for Palisades  
Calculation Number: NAI-1149-002, Rev. 0

0 to 2 hours	1.10E-02
2 to 8 hours	1.02E-02
8 to 24 hours	4.33E-03
1 to 4 days	2.58E-03
4 to 30 days	2.17E-03

	HOURLY VALUE RANGE	
	MAX X/Q	MIN X/Q
CENTERLINE	3.09E-02	1.62E-03
SECTOR-AVERAGE	1.67E-02	9.45E-04

NORMAL PROGRAM COMPLETION

pal23.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  
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e-mail: lab2@nrc.gov

Code Developer: J. V. Ramsdell Phone: (509) 372 6316  
e-mail: j\_ramsdell@pnl.gov

Code Documentation: NUREG/CR-6331 Rev. 1

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Program Run 9/ 8/2004 at 16:24:21



**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

LOW LIM.	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05
ABOVE RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
IN RANGE	12747.	14566.	17410.	21742.	25257.	32191.	42594.	43181.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
ZERO	30898.	29062.	26186.	21790.	18344.	11390.	830.	62.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	29.21	33.39	39.93	49.94	57.93	73.86	98.09	99.86	100.00	100.00

95th PERCENTILE X/Q VALUES

	8.20E-03	8.07E-03	7.70E-03	7.34E-03	6.11E-03	4.51E-03	2.48E-03	2.13E-03	1.86E-03	1.69E-03
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95% X/Q for standard averaging intervals

0 to 2 hours	8.20E-03
2 to 8 hours	7.06E-03
8 to 24 hours	3.09E-03
1 to 4 days	1.80E-03
4 to 30 days	1.57E-03

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	2.20E-02	1.15E-03
SECTOR-AVERAGE	1.18E-02	6.72E-04

NORMAL PROGRAM COMPLETION

pal24.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  
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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

The program was prepared for an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, expressed or implied, or assumes any legal liability or responsibilities for any third party's use, or the results of such use, of any portion of this program or represents that its use by such third party would not infringe privately owned rights.

Program Run 9/ 8/2004 at 16:25:05

\*\*\*\*\* ARCON INPUT \*\*\*\*\*

Number of Meteorological Data Files = 1  
Meteorological Data File Names  
C:\ARCON96\PAL\PAL9903.MET

Height of lower wind instrument (m) = 10.1  
Height of upper wind instrument (m) = 57.8  
Wind speeds entered as meters/second

Ground-level release  
Release height (m) = 27.4  
Building Area (m<sup>2</sup>) = .0  
Effluent vertical velocity (m/s) = .00  
Vent or stack flow (m<sup>3</sup>/s) = .00  
Vent or stack radius (m) = .00

Direction .. intake to source (deg) = 229  
Wind direction sector width (deg) = 90  
Wind direction window (deg) = 184 - 274  
Distance to intake (m) = 98.6  
Intake height (m) = 14.9  
Terrain elevation difference (m) = .0

Output file names  
pal24.log  
pal24.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 = 179  
 Hours direction in window = 11025  
 Hours elevated plume w/ dir. in window = 0  
 Hours of calm winds = 254  
 Hours direction not in window or calm = 32366

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	11279.	13054.	15752.	19769.	22874.	29366.	41826.	42951.	43075.	42462.
BELOW RANGE	0.	0.	0.	0.	0.	0.	0.	3.	0.	0.
ZERO	32366.	30574.	27844.	23763.	20727.	14215.	1598.	289.	0.	0.
TOTAL X/Qs	43645.	43628.	43596.	43532.	43601.	43581.	43424.	43243.	43075.	42462.
% NON ZERO	25.84	29.92	36.13	45.41	52.46	67.38	96.32	99.33	100.00	100.00

95th PERCENTILE X/Q VALUES

	7.99E-04	7.66E-04	7.28E-04	6.82E-04	5.61E-04	3.99E-04	2.31E-04	1.86E-04	1.65E-04	1.45E-04
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95% X/Q for standard averaging intervals

0 to 2 hours	7.99E-04
2 to 8 hours	6.43E-04
8 to 24 hours	2.57E-04
1 to 4 days	1.75E-04
4 to 30 days	1.32E-04

HOURLY VALUE RANGE

	MAX X/Q	MIN X/Q
CENTERLINE	1.92E-03	1.18E-04
SECTOR-AVERAGE	9.97E-04	6.90E-05

NORMAL PROGRAM COMPLETION

**NUMERICAL APPLICATIONS, Inc.**

Determination of Atmospheric Dispersion Factors for Palisades

Calculation Number: NAI-1149-002, Rev. 0

**ATTACHMENT B**

**PAVVAN Case Run – pals01**



NUMERICAL APPLICATIONS, Inc.  
Determination of Atmospheric Dispersion Factors for Palisades  
Calculation Number: NAI-1149-002, Rev. 0

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0-NAI FIXED 10/15/02

RUN DATE: Wed Apr 14 10:41:55 2004

OPRINTOUT OF INPUT CARDS

```
1 00000 01101 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000
2 Palisades          1999-2003          Ground Level Release
3 10 Meters          DT from 10m to 60m
4 Data from onsite met tower
5 NONE
6      7 43550      0
7      0.500 2011.000 58.500 10.000 10.100
8      2.000 1.000 2.000 53.000 45.000 17.000 5.000
9      17.000 17.000 9.000 17.000 9.000 13.000 13.000 22.000 35.000 17.000 17.000 31.000 65.000 83.000118.000 35.000
9      52.000 48.000 78.000 57.000 57.000 74.000 92.000196.000131.000 83.000200.000414.000375.000501.000702.000553.000
9      48.000 31.000 39.000 31.000 61.000109.000174.000192.000126.000 35.000353.000292.000131.000118.000270.000488.000
9      13.000 0.000 9.000 9.000 13.000 26.000 52.000 52.000 13.000 0.000 26.000 17.000 13.000 17.000 26.000 65.000
9      0.000 0.000 0.000 0.000 4.000 0.000 9.000 9.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 13.000
9      0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
9      0.000 0.000 0.000 0.000 4.000 4.000 0.000 9.000 4.000 4.000 4.000 22.000 17.000 22.000 13.000 22.000
9      17.000 13.000 13.000 9.000 9.000 13.000 17.000 26.000 35.000 26.000 61.000 48.000 35.000 31.000 61.000 61.000
9      17.000 9.000 17.000 17.000 17.000 31.000 44.000 44.000 26.000 13.000 96.000 70.000 22.000 39.000 57.000 78.000
9      4.000 0.000 4.000 4.000 9.000 9.000 22.000 13.000 0.000 0.000 13.000 4.000 9.000 9.000 17.000 26.000
9      0.000 0.000 0.000 0.000 4.000 4.000 4.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 4.000
9      0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
9      4.000 9.000 9.000 4.000 0.000 4.000 0.000 4.000 13.000 0.000 9.000 13.000 13.000 13.000 26.000 17.000
9      31.000 22.000 17.000 13.000 13.000 13.000 17.000 39.000 52.000 31.000 87.000 39.000 39.000 35.000 57.000 96.000
9      26.000 13.000 17.000 13.000 31.000 39.000 65.000 65.000 44.000 13.000105.000 61.000 35.000 61.000 70.000 74.000
9      13.000 4.000 4.000 9.000 13.000 26.000 35.000 31.000 4.000 4.000 26.000 13.000 9.000 22.000 35.000 35.000
9      0.000 0.000 0.000 0.000 0.000 4.000 4.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 4.000
9      0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
9      70.000 61.000 74.000 70.000 57.000 48.000 48.000 78.000 87.000 74.000 61.000 87.000 52.000 61.000109.000135.000
9      266.000214.000231.000192.000183.000161.000231.000379.000449.000288.000322.000205.000200.000227.000279.000440.000
9      331.000183.000148.000209.000266.000366.000436.000566.000288.000275.000806.000453.000549.000767.000636.000580.000
9      126.000 22.000 44.000109.000148.000288.000292.000248.000 44.000 26.000270.000270.000458.000475.000619.000488.000
9      13.000 0.000 0.000 0.000 26.000 61.000 57.000 22.000 0.000 0.000 4.000 31.000100.000 39.000135.000118.000
9      0.000 0.000 0.000 0.000 0.000 0.000 9.000 0.000 0.000 0.000 0.000 0.000 13.000 4.000 13.000 4.000
9      118.000 87.000 83.000 65.000 61.000 78.000 83.000144.000157.000 92.000 74.000 57.000 57.000 57.000105.000131.000
9      379.000257.000209.000183.000196.000218.000322.000558.000610.000362.000257.000222.000161.000166.000179.000309.000
9      113.000 70.000 39.000 57.000153.000209.000340.000458.000192.000179.000288.000209.000187.000148.000122.000148.000
9      4.000 0.000 9.000 13.000 31.000 57.000122.000118.000 13.000 9.000 70.000 74.000 57.000 39.000 35.000 26.000
9      0.000 0.000 0.000 0.000 9.000 17.000 17.000 13.000 0.000 0.000 4.000 4.000 9.000 0.000 0.000 4.000
9      0.000 0.000 0.000 0.000 0.000 4.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
9      57.000 39.000 52.000 44.000 52.000 52.000 78.000122.000131.000 44.000 35.000 35.000 26.000 22.000 39.000 48.000
9      87.000113.000135.000126.000179.000196.000275.000410.000279.000135.000 61.000 48.000 26.000 31.000 22.000 39.000
9      9.000 4.000 9.000 17.000 35.000 39.000 96.000 92.000 13.000 13.000 9.000 9.000 26.000 9.000 4.000 4.000
9      0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 4.000 9.000 0.000 0.000
9      0.000 0.000 0.000 0.000 4.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000
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**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9	22.000	17.000	13.000	26.000	35.000	35.000	48.000	105.000	118.000	44.000	22.000	9.000	9.000	17.000	9.000	13.000	
9	26.000	31.000	74.000	135.000	170.000	253.000	462.000	601.000	514.000	153.000	26.000	4.000	13.000	9.000	13.000	22.000	
9	4.000	4.000	4.000	13.000	17.000	35.000	35.000	65.000	35.000	4.000	0.000	0.000	0.000	0.000	0.000	0.000	
9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
9	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
10	-1.	0.100	1.500	3.000	5.000	7.500	10.000	15.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
11	677.	677.	677.	677.	677.	677.	677.	677.	677.	677.	677.	677.	677.	677.	677.	677.	
11	4820.	4820.	4820.	4820.	4820.	4820.	4820.	4820.	4820.	4820.	4820.	4820.	4820.	4820.	4820.	4820.	

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145  
 JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS A

WIND SPEED (M/S)		N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
TOWER RELEASE																		
0.10	0.10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.005
1.50	1.50	0.039	0.039	0.021	0.039	0.021	0.030	0.030	0.051	0.080	0.039	0.039	0.071	0.149	0.191	0.271	0.080	1.189
3.00	2.99	0.119	0.110	0.179	0.131	0.131	0.170	0.211	0.450	0.301	0.191	0.459	0.951	0.861	1.150	1.612	1.270	8.296
5.00	4.99	0.110	0.071	0.090	0.071	0.140	0.250	0.400	0.441	0.289	0.080	0.811	0.670	0.301	0.271	0.620	1.121	5.736
7.50	7.48	0.030	0.000	0.021	0.021	0.030	0.060	0.119	0.119	0.030	0.000	0.060	0.039	0.030	0.039	0.060	0.149	0.806
10.00	9.98	0.000	0.000	0.000	0.000	0.009	0.000	0.021	0.021	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.030	0.080
15.00	14.96	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL		0.30	0.22	0.31	0.26	0.33	0.51	0.78	1.08	0.70	0.31	1.37	1.73	1.34	1.65	2.56	2.65	16.11

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS B

WIND SPEED (M/S)		N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
TOWER RELEASE																		
0.10	0.10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002
1.50	1.50	0.000	0.000	0.000	0.000	0.009	0.009	0.000	0.021	0.009	0.009	0.009	0.051	0.039	0.051	0.030	0.051	0.287
3.00	2.99	0.039	0.030	0.030	0.021	0.021	0.030	0.039	0.060	0.080	0.060	0.140	0.110	0.080	0.071	0.140	0.140	1.091
5.00	4.99	0.039	0.021	0.039	0.039	0.039	0.071	0.101	0.101	0.060	0.030	0.220	0.161	0.051	0.090	0.131	0.179	1.371
7.50	7.48	0.009	0.000	0.009	0.009	0.021	0.021	0.051	0.030	0.000	0.000	0.030	0.009	0.021	0.021	0.039	0.060	0.328
10.00	9.98	0.000	0.000	0.000	0.000	0.009	0.009	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.037
15.00	14.96	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL		0.09	0.05	0.08	0.07	0.10	0.14	0.20	0.21	0.15	0.10	0.40	0.33	0.19	0.23	0.34	0.44	3.12

JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS C

WIND SPEED (M/S)		N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
TOWER RELEASE																		
0.10	0.10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.005
1.50	1.50	0.009	0.021	0.021	0.009	0.000	0.009	0.000	0.009	0.030	0.000	0.021	0.030	0.030	0.030	0.060	0.039	0.317



**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

1.50	1.49	0.051	0.039	0.030	0.060	0.080	0.080	0.110	0.241	0.271	0.101	0.051	0.021	0.021	0.039	0.021	0.030	1.245
3.00	2.99	0.060	0.071	0.170	0.310	0.390	0.581	1.061	1.380	1.180	0.351	0.060	0.009	0.030	0.021	0.030	0.051	5.754
5.00	4.98	0.009	0.009	0.009	0.030	0.039	0.080	0.080	0.149	0.080	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.496
7.50	7.46	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10.00	9.95	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
15.00	14.93	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
TOTAL		0.12	0.12	0.21	0.40	0.51	0.74	1.25	1.77	1.53	0.46	0.11	0.03	0.05	0.06	0.05	0.08	7.51

OWIND MEASURED AT 10.1 METERS.

WIND SPEED CORRECTED TO THE RELEASE HEIGHT OF 10.0 METERS.

OVERALL WIND DIRECTION FREQUENCY

WIND DIRECTION:	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
FREQUENCY:	4.3	2.9	3.1	3.3	4.3	5.7	8.0	10.8	7.9	4.4	7.6	6.3	6.2	7.0	8.7	9.4

OVERALL WIND SPEED FREQUENCY AS MEASURED ON THE TOWER:

MAX.WIND SPEED (M/S):	0.100	1.500	3.000	5.000	7.500	10.000	15.000
WIND SPEED FREQUENCY:	0.29	11.07	41.82	32.61	12.39	1.72	0.11

OBUILDING AND RELEASE CHARACTERISTICS:

RELEASE HEIGHT:	10.00 METERS
MIXING VOLUME COEFFICIENT:	0.50

BUILDING CROSS-SECTIONAL AREA: 2011.00 SQUARE METERS

BOUNDARY DISTANCES (METERS) FROM THE SOURCE FOR EACH DOWNWIND SECTOR:

DOWNWIND SECTOR	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE
BOUNDARY 1	677.	677.	677.	677.	677.	677.	677.	677.	677.	677.	677.	677.	677.	677.	677.	677.
BOUNDARY 2	4820.	4820.	4820.	4820.	4820.	4820.	4820.	4820.	4820.	4820.	4820.	4820.	4820.	4820.	4820.	4820.

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades

METEOROLOGICAL INSTRUMENTATION

DATA PERIOD: 1999-2003

WIND SENSORS HEIGHT: 10 Meters

DT

TYPE OF RELEASE: Ground Level Release

DELTA-T HEIGHTS: from 10m to 60m

SOURCE OF DATA: Data from onsite met tower

COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OWINDSPEEDS ADJUSTED TO 10.0 METERS.

OPERCENT OF THE TIME A GIVEN WINDSPEED IS LOWER:

OWINDSPEED CUMULATIVE FREQUENCY

(METER/SEC)	(PERCENT)
0.10	0.15
0.10	0.29
1.49	6.87
1.50	11.35
2.99	32.61
2.99	53.17
4.98	61.25
4.99	85.78
7.46	87.37
7.48	98.17
9.95	98.36

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

WINDSPEED (INTERPOLATED) (METER/SEC)	CUMULATIVE FREQUENCY (PERCENT)
9.98	99.89
14.93	99.90
14.96	100.00
0.10	0.29
1.49	11.35
2.99	53.17
4.98	85.78
7.48	98.17
9.97	99.89
14.96	100.00

0

WINDSPEED (METER/SEC)	CUMULATIVE FREQUENCY (PERCENT)
0.21	1.00
0.46	3.00
0.70	5.00
1.31	10.00
1.64	15.00
1.82	20.00
1.99	25.00
2.16	30.00
2.33	35.00
2.50	40.00
2.68	45.00
2.86	50.00
3.06	55.00
3.27	60.00
3.50	65.00
3.76	70.00
4.06	75.00
4.43	80.00
5.00	85.00
5.42	90.00

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE  
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145  
 OPARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE S SECTOR.  
 STABILITY WINDSPEED FREQUENCY DISTANCE TERRAIN HT EFF PLUME HT SIGMA-Y SIGMA-Z MEANDER-SY \*\* CHI/Q VALUES (SEC/CUBIC METER)

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

CLASS	METER/SEC AT 10.0 METERS	PERCENT	METERS	METERS	METERS	METERS	METERS	METERS	METERS	MEANDER	BLDG WAKE CA=1006.SQ.METERS	USED
A	0.1	0.00	677.	0.	0.	131.7	215.2	131.7	1.126E-04	1.113E-04	1.113E-04	
A	1.5	0.91	677.	0.	0.	131.7	215.2	131.7	7.507E-06	7.423E-06	7.423E-06	
A	3.0	2.77	677.	0.	0.	131.7	215.2	131.7	3.753E-06	3.711E-06	3.711E-06	
A	5.0	2.56	677.	0.	0.	131.7	215.2	131.7	2.252E-06	2.227E-06	2.227E-06	
A	7.5	0.69	677.	0.	0.	131.7	215.2	131.7	1.501E-06	1.485E-06	1.485E-06	
B	3.0	0.91	677.	0.	0.	99.0	71.6	99.0	1.500E-05	1.435E-05	1.435E-05	
B	5.0	0.91	677.	0.	0.	99.0	71.6	99.0	9.000E-06	8.612E-06	8.612E-06	
B	7.5	0.21	677.	0.	0.	99.0	71.6	99.0	6.000E-06	5.741E-06	5.741E-06	
C	0.1	0.00	677.	0.	0.	75.2	42.8	75.2	9.907E-04	9.012E-04	9.012E-04	
C	1.5	0.21	677.	0.	0.	75.2	42.8	75.2	6.605E-05	6.008E-05	6.008E-05	
C	3.0	1.65	677.	0.	0.	75.2	42.8	75.2	3.302E-05	3.004E-05	3.004E-05	
C	5.0	1.39	677.	0.	0.	75.2	42.8	75.2	1.981E-05	1.802E-05	1.802E-05	
C	7.5	0.69	677.	0.	0.	75.2	42.8	75.2	1.321E-05	1.202E-05	1.202E-05	
D	0.1	0.17	677.	0.	0.	53.0	23.3	105.9	1.291E-03	2.051E-03	1.291E-03	
D	1.5	3.73	677.	0.	0.	53.0	23.3	105.9	8.608E-05	1.367E-04	8.608E-05	
D	3.0	14.18	677.	0.	0.	53.0	23.3	82.1	5.550E-05	6.837E-05	5.550E-05	
D	5.0	17.65	677.	0.	0.	53.0	23.3	59.5	4.596E-05	4.102E-05	4.102E-05	
D	7.5	6.72	677.	0.	0.	53.0	23.3	53.0	3.443E-05	2.735E-05	2.735E-05	
D	10.0	0.69	677.	0.	0.	53.0	23.3	53.0	2.582E-05	2.051E-05	2.051E-05	
E	0.1	0.20	677.	0.	0.	37.7	16.2	113.0	1.746E-03	3.437E-03	1.746E-03	
E	1.5	6.29	677.	0.	0.	37.7	16.2	113.0	1.164E-04	2.292E-04	1.164E-04	
E	3.0	20.21	677.	0.	0.	37.7	16.2	75.7	8.688E-05	1.146E-04	8.688E-05	
E	5.0	6.03	677.	0.	0.	37.7	16.2	45.4	8.688E-05	6.875E-05	6.875E-05	
E	7.5	0.21	677.	0.	0.	37.7	16.2	37.7	6.985E-05	4.583E-05	4.583E-05	
F	0.1	0.06	677.	0.	0.	26.0	10.3	104.0	2.975E-03	5.432E-03	2.975E-03	
F	1.5	3.04	677.	0.	0.	26.0	10.3	104.0	1.983E-04	3.621E-04	1.983E-04	
F	3.0	4.64	677.	0.	0.	26.0	10.3	62.7	1.644E-04	1.811E-04	1.644E-04	
F	5.0	0.48	677.	0.	0.	26.0	10.3	32.9	1.879E-04	1.086E-04	1.086E-04	
G	0.1	0.01	677.	0.	0.	17.9	6.6	107.6	4.504E-03	9.007E-03	4.504E-03	
G	1.5	1.17	677.	0.	0.	17.9	6.6	107.6	3.003E-04	6.004E-04	3.003E-04	
G	3.0	1.39	677.	0.	0.	17.9	6.6	56.0	2.885E-04	3.002E-04	2.885E-04	
G	5.0	0.21	677.	0.	0.	17.9	6.6	24.4	3.982E-04	1.801E-04	1.801E-04	

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades  
 DATA PERIOD: 1999-2003  
 TYPE OF RELEASE: Ground Level Release  
 SOURCE OF DATA: Data from onsite met tower

METEOROLOGICAL INSTRUMENTATION  
 WIND SENSORS HEIGHT: 10 Meters DT  
 DELTA-T HEIGHTS: from 10m to 60m

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OSITE EXCLUSION BOUNDARY CALCULATIONS:

0 S SECTOR BOUNDARY DISTANCE = 677.0 METERS  
 OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED  
 AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

0BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	4.504E-03	2.975E-03	1.746E-03	1.291E-03	9.012E-04	3.003E-04	2.885E-04	1.983E-04	1.801E-04	1.644E-04
	0.011	0.070	0.265	0.434	0.437	1.610	2.997	6.036	6.250	10.889
	0.00047	0.00301	0.01142	0.01869	0.01882	0.06934	0.12904	0.25992	0.26911	0.46888
0	1.164E-04	1.113E-04	1.086E-04	8.688E-05	8.608E-05	6.875E-05	6.008E-05	5.550E-05	4.583E-05	4.102E-05
	17.181	17.185	17.665	37.875	41.608	47.634	47.847	62.032	62.245	79.896
	0.73983	0.73998	0.76065	1.63091	1.79165	2.05112	2.06030	2.67110	2.68028	3.44033
0	3.004E-05	2.735E-05	2.051E-05	1.802E-05	1.435E-05	1.202E-05	8.612E-06	7.423E-06	5.741E-06	3.711E-06
	81.549	88.268	88.962	90.348	91.255	91.948	92.854	93.761	93.974	96.747
	3.51151	3.80083	3.83068	3.89039	3.92942	3.95927	3.99831	4.03734	4.04653	4.16593
0	2.227E-06	1.485E-06								
	99.307	100.000								
	4.27615	4.30600								

0 X/Q PERCENTILES

(BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED

CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 0.011  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 0.739  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 6) = 2.668  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 7) = 3.437

8.119E-04	0.043	1.000
4.064E-04	0.129	3.000
2.881E-04	0.215	5.000
1.757E-04	0.431	10.000
1.294E-04	0.646	15.000
1.108E-04	0.861	20.000
1.029E-04	1.076	25.000
9.665E-05	1.292	30.000
9.158E-05	1.507	35.000
8.732E-05	1.722	40.000
7.914E-05	1.938	45.000

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

7.058E-05	2.153	50.000
6.353E-05	2.368	55.000
5.763E-05	2.584	60.000
5.254E-05	2.799	65.000
4.812E-05	3.014	70.000
4.430E-05	3.229	75.000
0 1.572E-04	0.5	11.61

0ANNUAL AVERAGE = 1.07E-05  
 1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OPARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE SSW SECTOR.

CLASS	METER/SEC	PERCENT	METERS	METERS	METERS	SIGMA-Y	SIGMA-Z	MEANDER-SY	** CHI/Q VALUES (SEC/CUBIC METER)		
									MEANDER	BLDG WAKE	USED
AT 10.0 METERS									CA=1006.SQ.METERS		
A	0.1	0.01	677.	0.	0.	131.7	215.2	131.7	1.126E-04	1.113E-04	1.113E-04
A	1.5	1.33	677.	0.	0.	131.7	215.2	131.7	7.507E-06	7.423E-06	7.423E-06
A	3.0	3.77	677.	0.	0.	131.7	215.2	131.7	3.753E-06	3.711E-06	3.711E-06
A	5.0	2.43	677.	0.	0.	131.7	215.2	131.7	2.252E-06	2.227E-06	2.227E-06
B	3.0	1.02	677.	0.	0.	99.0	71.6	99.0	1.500E-05	1.435E-05	1.435E-05
B	5.0	0.71	677.	0.	0.	99.0	71.6	99.0	9.000E-06	8.612E-06	8.612E-06
C	0.1	0.01	677.	0.	0.	75.2	42.8	75.2	9.907E-04	9.012E-04	9.012E-04
C	1.5	0.71	677.	0.	0.	75.2	42.8	75.2	6.605E-05	6.008E-05	6.008E-05
C	3.0	1.73	677.	0.	0.	75.2	42.8	75.2	3.302E-05	3.004E-05	3.004E-05
C	5.0	1.02	677.	0.	0.	75.2	42.8	75.2	1.981E-05	1.802E-05	1.802E-05
C	7.5	0.31	677.	0.	0.	75.2	42.8	75.2	1.321E-05	1.202E-05	1.202E-05
D	0.1	0.22	677.	0.	0.	53.0	23.3	105.9	1.291E-03	2.051E-03	1.291E-03
D	1.5	4.79	677.	0.	0.	53.0	23.3	105.9	8.608E-05	1.367E-04	8.608E-05
D	3.0	16.79	677.	0.	0.	53.0	23.3	82.1	5.550E-05	6.837E-05	5.550E-05
D	5.0	14.36	677.	0.	0.	53.0	23.3	59.5	4.596E-05	4.102E-05	4.102E-05
D	7.5	1.73	677.	0.	0.	53.0	23.3	53.0	3.443E-05	2.735E-05	2.735E-05
E	0.1	0.21	677.	0.	0.	37.7	16.2	113.0	1.746E-03	3.437E-03	1.746E-03
E	1.5	6.83	677.	0.	0.	37.7	16.2	113.0	1.164E-04	2.292E-04	1.164E-04
E	3.0	20.16	677.	0.	0.	37.7	16.2	75.7	8.688E-05	1.146E-04	8.688E-05
E	5.0	5.49	677.	0.	0.	37.7	16.2	45.4	8.688E-05	6.875E-05	6.875E-05
F	0.1	0.06	677.	0.	0.	26.0	10.3	104.0	2.975E-03	5.432E-03	2.975E-03



**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

F	1.5	3.06	677.	0.	0.	26.0	10.3	104.0	1.983E-04	3.621E-04	1.983E-04
F	3.0	8.87	677.	0.	0.	26.0	10.3	62.7	1.644E-04	1.811E-04	1.644E-04
F	5.0	0.31	677.	0.	0.	26.0	10.3	32.9	1.879E-04	1.086E-04	1.086E-04
G	0.1	0.01	677.	0.	0.	17.9	6.6	107.6	4.504E-03	9.007E-03	4.504E-03
G	1.5	1.33	677.	0.	0.	17.9	6.6	107.6	3.003E-04	6.004E-04	3.003E-04
G	3.0	2.43	677.	0.	0.	17.9	6.6	56.0	2.885E-04	3.002E-04	2.885E-04
G	5.0	0.31	677.	0.	0.	17.9	6.6	24.4	3.982E-04	1.801E-04	1.801E-04

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OSITE EXCLUSION BOUNDARY CALCULATIONS:

0 SSW SECTOR BOUNDARY DISTANCE = 677.0 METERS

0 LATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED

AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

0 BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	4.504E-03	2.975E-03	1.746E-03	1.291E-03	9.012E-04	3.003E-04	2.885E-04	1.983E-04	1.801E-04	1.644E-04
	0.012	0.072	0.284	0.500	0.510	1.844	4.276	7.336	7.650	16.516
	0.00036	0.00210	0.00830	0.01464	0.01494	0.05397	0.12515	0.21471	0.22389	0.48336
0	1.164E-04	1.113E-04	1.086E-04	8.688E-05	8.608E-05	6.875E-05	6.008E-05	5.550E-05	4.102E-05	3.004E-05
	23.342	23.347	23.661	43.824	48.610	54.102	54.808	71.598	85.956	87.682
	0.68313	0.68328	0.69247	1.28259	1.42266	1.58340	1.60406	2.09545	2.51566	2.56618
0	2.735E-05	1.802E-05	1.435E-05	1.202E-05	8.612E-06	7.423E-06	3.711E-06	2.227E-06		
	89.408	90.428	91.448	91.762	92.468	93.802	97.568	100.000		
	2.61669	2.64654	2.67639	2.68558	2.70625	2.74528	2.85550	2.92668		

0 X/Q PERCENTILES

(BASED ON THE UPPER ENVELOPE OF THE ORDERED X/Q-FREQUENCY VALUES, AND AS PLOTTED ON A LOG-NORMAL GRAPH.)

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED

CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 2) = 0.002  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 0.008  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 0.483  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5) = 1.421

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 6)= 2.093

9.055E-04	0.029	1.000	
4.866E-04	0.088	3.000	
3.578E-04	0.146	5.000	
2.304E-04	0.293	10.000	
1.756E-04	0.439	15.000	
1.474E-04	0.585	20.000	
1.295E-04	0.732	25.000	
1.162E-04	0.878	30.000	
1.058E-04	1.024	35.000	
9.738E-05	1.171	40.000	
9.042E-05	1.317	45.000	
8.344E-05	1.463	50.000	
7.504E-05	1.610	55.000	
6.802E-05	1.756	60.000	
6.208E-05	1.902	65.000	
5.698E-05	2.049	70.000	
0	1.613E-04	0.5	17.08

0ANNUAL AVERAGE = 8.20E-06

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades  
 DATA PERIOD: 1999-2003  
 TYPE OF RELEASE: Ground Level Release  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

METEOROLOGICAL INSTRUMENTATION  
 WIND SENSORS HEIGHT: 10 Meters DT  
 DELTA-T HEIGHTS: from 10m to 60m

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE SW SECTOR.

CLASS	WINDSPEED METER/SEC	FREQUENCY PERCENT	DISTANCE METERS	TERRAIN METERS	HT METERS	EFF METERS	PLUME METERS	HT METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)		
												MEANDER	BLDG WAKE	USED
AT 10.0 METERS												CA=1006.SQ.METERS		
A	0.1	0.00	677.	0.	0.	0.	131.7	215.2	131.7	1.126E-04	1.113E-04	1.113E-04		
A	1.5	0.67	677.	0.	0.	0.	131.7	215.2	131.7	7.507E-06	7.423E-06	7.423E-06		
A	3.0	5.79	677.	0.	0.	0.	131.7	215.2	131.7	3.753E-06	3.711E-06	3.711E-06		
A	5.0	2.89	677.	0.	0.	0.	131.7	215.2	131.7	2.252E-06	2.227E-06	2.227E-06		
A	7.5	0.67	677.	0.	0.	0.	131.7	215.2	131.7	1.501E-06	1.485E-06	1.485E-06		
B	3.0	0.96	677.	0.	0.	0.	99.0	71.6	99.0	1.500E-05	1.435E-05	1.435E-05		
B	5.0	1.26	677.	0.	0.	0.	99.0	71.6	99.0	9.000E-06	8.612E-06	8.612E-06		
B	7.5	0.30	677.	0.	0.	0.	99.0	71.6	99.0	6.000E-06	5.741E-06	5.741E-06		
C	0.1	0.01	677.	0.	0.	0.	75.2	42.8	75.2	9.907E-04	9.012E-04	9.012E-04		
C	1.5	0.67	677.	0.	0.	0.	75.2	42.8	75.2	6.605E-05	6.008E-05	6.008E-05		
C	3.0	1.26	677.	0.	0.	0.	75.2	42.8	75.2	3.302E-05	3.004E-05	3.004E-05		
C	5.0	1.26	677.	0.	0.	0.	75.2	42.8	75.2	1.981E-05	1.802E-05	1.802E-05		
C	7.5	0.30	677.	0.	0.	0.	75.2	42.8	75.2	1.321E-05	1.202E-05	1.202E-05		

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

D	0.1	0.25	677.	0.	0.	53.0	23.3	105.9	1.291E-03	2.051E-03	1.291E-03
D	1.5	5.49	677.	0.	0.	53.0	23.3	105.9	8.608E-05	1.367E-04	8.608E-05
D	3.0	17.15	677.	0.	0.	53.0	23.3	82.1	5.550E-05	6.837E-05	5.550E-05
D	5.0	10.99	677.	0.	0.	53.0	23.3	59.5	4.596E-05	4.102E-05	4.102E-05
D	7.5	3.27	677.	0.	0.	53.0	23.3	53.0	3.443E-05	2.735E-05	2.735E-05
E	0.1	0.19	677.	0.	0.	37.7	16.2	113.0	1.746E-03	3.437E-03	1.746E-03
E	1.5	6.16	677.	0.	0.	37.7	16.2	113.0	1.164E-04	2.292E-04	1.164E-04
E	3.0	15.51	677.	0.	0.	37.7	16.2	75.7	8.688E-05	1.146E-04	8.688E-05
E	5.0	2.89	677.	0.	0.	37.7	16.2	45.4	8.688E-05	6.875E-05	6.875E-05
E	7.5	0.67	677.	0.	0.	37.7	16.2	37.7	6.985E-05	4.583E-05	4.583E-05
F	0.1	0.07	677.	0.	0.	26.0	10.3	104.0	2.975E-03	5.432E-03	2.975E-03
F	1.5	3.86	677.	0.	0.	26.0	10.3	104.0	1.983E-04	3.621E-04	1.983E-04
F	3.0	10.02	677.	0.	0.	26.0	10.3	62.7	1.644E-04	1.811E-04	1.644E-04
F	5.0	0.67	677.	0.	0.	26.0	10.3	32.9	1.879E-04	1.086E-04	1.086E-04
G	0.1	0.01	677.	0.	0.	17.9	6.6	107.6	4.504E-03	9.007E-03	4.504E-03
G	1.5	0.96	677.	0.	0.	17.9	6.6	107.6	3.003E-04	6.004E-04	3.003E-04
G	3.0	5.49	677.	0.	0.	17.9	6.6	56.0	2.885E-04	3.002E-04	2.885E-04
G	5.0	0.30	677.	0.	0.	17.9	6.6	24.4	3.982E-04	1.801E-04	1.801E-04

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OSITE EXCLUSION BOUNDARY CALCULATIONS:

0 SW SECTOR BOUNDARY DISTANCE = 677.0 METERS

OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED

AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

OBELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	4.504E-03	2.975E-03	1.746E-03	1.291E-03	9.012E-04	3.003E-04	2.885E-04	1.983E-04	1.801E-04	1.644E-04
	0.009	0.084	0.275	0.524	0.533	1.498	6.991	10.851	11.148	21.168
	0.00028	0.00259	0.00851	0.01620	0.01649	0.04635	0.21627	0.33567	0.34485	0.65484
0	1.164E-04	1.113E-04	1.086E-04	8.688E-05	8.608E-05	6.875E-05	6.008E-05	5.550E-05	4.583E-05	4.102E-05
	27.329	27.332	28.000	43.513	49.006	51.901	52.569	69.715	70.383	81.369
	0.84543	0.84551	0.86617	1.34608	1.51600	1.60555	1.62622	2.15664	2.17731	2.51715
0	3.004E-05	2.735E-05	1.802E-05	1.435E-05	1.202E-05	8.612E-06	7.423E-06	5.741E-06	3.711E-06	2.227E-06

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

	82.631	85.897	87.159	88.124	88.421	89.682	90.350	90.647	96.437	99.332
	2.55618	2.65722	2.69625	2.72610	2.73529	2.77432	2.79499	2.80417	2.98328	3.07283
0	1.485E-06									
	100.000									
	3.09350									

0 X/Q PERCENTILES  
 (BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)  
 0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
 CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 0.016  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 0.654  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5) = 1.514  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 6) = 2.154  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 7) = 2.515

	9.391E-04	0.031	1.000
	5.284E-04	0.093	3.000
	3.973E-04	0.155	5.000
	2.642E-04	0.309	10.000
	2.054E-04	0.464	15.000
	1.706E-04	0.619	20.000
	1.454E-04	0.773	25.000
	1.267E-04	0.928	30.000
	1.125E-04	1.083	35.000
	1.013E-04	1.237	40.000
	9.223E-05	1.392	45.000
	8.401E-05	1.547	50.000
	7.475E-05	1.701	55.000
	6.709E-05	1.856	60.000
	6.067E-05	2.011	65.000
	5.507E-05	2.165	70.000
	4.816E-05	2.320	75.000
	4.242E-05	2.475	80.000
0	1.958E-04	0.5	16.16

0ANNUAL AVERAGE = 8.94E-06  
 1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades	METEOROLOGICAL INSTRUMENTATION
DATA PERIOD: 1999-2003	WIND SENSORS HEIGHT: 10 Meters DT
TYPE OF RELEASE: Ground Level Release	DELTA-T HEIGHTS: from 10m to 60m
SOURCE OF DATA: Data from onsite met tower	
COMMENTS: NONE	
PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145	
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE WSW SECTOR.	

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

STABILITY CLASS	WINDSPEED METER/SEC AT 10.0 METERS	FREQUENCY PERCENT	DISTANCE METERS	TERRAIN HT METERS	EFF PLUME HT METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)		
									MEANDER	BLDG WAKE CA=1006.SQ.METERS	USED
A	0.1	0.00	677.	0.	0.	131.7	215.2	131.7	1.126E-04	1.113E-04	1.113E-04
A	1.5	1.17	677.	0.	0.	131.7	215.2	131.7	7.507E-06	7.423E-06	7.423E-06
A	3.0	3.94	677.	0.	0.	131.7	215.2	131.7	3.753E-06	3.711E-06	3.711E-06
A	5.0	2.14	677.	0.	0.	131.7	215.2	131.7	2.252E-06	2.227E-06	2.227E-06
A	7.5	0.62	677.	0.	0.	131.7	215.2	131.7	1.501E-06	1.485E-06	1.485E-06
B	3.0	0.62	677.	0.	0.	99.0	71.6	99.0	1.500E-05	1.435E-05	1.435E-05
B	5.0	1.17	677.	0.	0.	99.0	71.6	99.0	9.000E-06	8.612E-06	8.612E-06
B	7.5	0.28	677.	0.	0.	99.0	71.6	99.0	6.000E-06	5.741E-06	5.741E-06
C	0.1	0.00	677.	0.	0.	75.2	42.8	75.2	9.907E-04	9.012E-04	9.012E-04
C	1.5	0.28	677.	0.	0.	75.2	42.8	75.2	6.605E-05	6.008E-05	6.008E-05
C	3.0	0.90	677.	0.	0.	75.2	42.8	75.2	3.302E-05	3.004E-05	3.004E-05
C	5.0	0.90	677.	0.	0.	75.2	42.8	75.2	1.981E-05	1.802E-05	1.802E-05
C	7.5	0.62	677.	0.	0.	75.2	42.8	75.2	1.321E-05	1.202E-05	1.202E-05
D	0.1	0.22	677.	0.	0.	53.0	23.3	105.9	1.291E-03	2.051E-03	1.291E-03
D	1.5	4.83	677.	0.	0.	53.0	23.3	105.9	8.608E-05	1.367E-04	8.608E-05
D	3.0	13.26	677.	0.	0.	53.0	23.3	82.1	5.550E-05	6.837E-05	5.550E-05
D	5.0	14.43	677.	0.	0.	53.0	23.3	59.5	4.596E-05	4.102E-05	4.102E-05
D	7.5	7.53	677.	0.	0.	53.0	23.3	53.0	3.443E-05	2.735E-05	2.735E-05
E	0.1	0.14	677.	0.	0.	37.7	16.2	113.0	1.746E-03	3.437E-03	1.746E-03
E	1.5	4.49	677.	0.	0.	37.7	16.2	113.0	1.164E-04	2.292E-04	1.164E-04
E	3.0	12.63	677.	0.	0.	37.7	16.2	75.7	8.688E-05	1.146E-04	8.688E-05
E	5.0	3.94	677.	0.	0.	37.7	16.2	45.4	8.688E-05	6.875E-05	6.875E-05
E	7.5	0.90	677.	0.	0.	37.7	16.2	37.7	6.985E-05	4.583E-05	4.583E-05
F	0.1	0.06	677.	0.	0.	26.0	10.3	104.0	2.975E-03	5.432E-03	2.975E-03
F	1.5	3.04	677.	0.	0.	26.0	10.3	104.0	1.983E-04	3.621E-04	1.983E-04
F	3.0	8.70	677.	0.	0.	26.0	10.3	62.7	1.644E-04	1.811E-04	1.644E-04
F	5.0	1.17	677.	0.	0.	26.0	10.3	32.9	1.879E-04	1.086E-04	1.086E-04
G	0.1	0.02	677.	0.	0.	17.9	6.6	107.6	4.504E-03	9.007E-03	4.504E-03
G	1.5	1.80	677.	0.	0.	17.9	6.6	107.6	3.003E-04	6.004E-04	3.003E-04
G	3.0	9.32	677.	0.	0.	17.9	6.6	56.0	2.885E-04	3.002E-04	2.885E-04
G	5.0	0.90	677.	0.	0.	17.9	6.6	24.4	3.982E-04	1.801E-04	1.801E-04

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades  
 DATA PERIOD: 1999-2003  
 TYPE OF RELEASE: Ground Level Release  
 SOURCE OF DATA: Data from onsite met tower

METEOROLOGICAL INSTRUMENTATION  
 WIND SENSORS HEIGHT: 10 Meters DT  
 DELTA-T HEIGHTS: from 10m to 60m

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OSITE EXCLUSION BOUNDARY CALCULATIONS:

0 WSW SECTOR BOUNDARY DISTANCE = 677.0 METERS  
 OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED  
 AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

0BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	4.504E-03	2.975E-03	1.746E-03	1.291E-03	9.012E-04	3.003E-04	2.885E-04	1.983E-04	1.801E-04	1.644E-04
	0.017	0.076	0.215	0.433	0.437	2.233	11.553	14.591	15.489	24.188
	0.00055	0.00251	0.00715	0.01442	0.01455	0.07425	0.38424	0.48527	0.51512	0.80445
0	1.164E-04	1.113E-04	1.086E-04	8.688E-05	8.608E-05	6.875E-05	6.008E-05	5.550E-05	4.583E-05	4.102E-05
	28.675	28.680	29.854	42.488	47.321	51.257	51.533	64.789	65.686	80.116
	0.95370	0.95385	0.99289	1.41309	1.57383	1.70471	1.71390	2.15477	2.18462	2.66453
0	3.004E-05	2.735E-05	1.802E-05	1.435E-05	1.202E-05	8.612E-06	7.423E-06	5.741E-06	3.711E-06	2.227E-06
	81.014	88.539	89.437	90.058	90.679	91.853	93.027	93.303	97.238	99.379
	2.69438	2.94466	2.97452	2.99518	3.01585	3.05488	3.09392	3.10310	3.23399	3.30517
0	1.485E-06									
	100.000									
	3.32584									

0 X/Q PERCENTILES

(BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED

CHI/Q	WITH RESPECT TO	WHEN THE WIND BLOWS
SEC/CUBIC METER	THE TOTAL TIME	INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 2) = 0.003  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 0.384  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 0.803  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5) = 1.572  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 6) = 2.662  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 7) = 2.942

9.965E-04	0.033	1.000
5.894E-04	0.100	3.000
4.543E-04	0.166	5.000
3.128E-04	0.333	10.000
2.377E-04	0.499	15.000
1.908E-04	0.665	20.000
1.594E-04	0.831	25.000
1.344E-04	0.998	30.000
1.159E-04	1.164	35.000

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

1.018E-04	1.330	40.000
9.054E-05	1.497	45.000
7.988E-05	1.663	50.000
7.008E-05	1.829	55.000
6.208E-05	1.996	60.000
5.546E-05	2.162	65.000
4.990E-05	2.328	70.000
4.517E-05	2.494	75.000
4.111E-05	2.661	80.000
3.230E-05	2.827	85.000
0 2.373E-04	0.5	15.03

0ANNUAL AVERAGE = 9.41E-06

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OPARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE W SECTOR.

STABILITY WINDSPEED FREQUENCY DISTANCE TERRAIN HT EFF PLUME HT SIGMA-Y SIGMA-Z MEANDER-SY \*\* CHI/Q VALUES (SEC/CUBIC METER)  
 CLASS METER/SEC PERCENT METERS METERS METERS METERS METERS METERS MEANDER BLDG WAKE USED  
 AT 10.0 METERS CA=1006.SQ.METERS

A	0.1	0.00	677.	0.	0.	131.7	215.2	131.7	1.126E-04	1.113E-04	1.113E-04
A	1.5	0.48	677.	0.	0.	131.7	215.2	131.7	7.507E-06	7.423E-06	7.423E-06
A	3.0	3.05	677.	0.	0.	131.7	215.2	131.7	3.753E-06	3.711E-06	3.711E-06
A	5.0	3.26	677.	0.	0.	131.7	215.2	131.7	2.252E-06	2.227E-06	2.227E-06
A	7.5	0.69	677.	0.	0.	131.7	215.2	131.7	1.501E-06	1.485E-06	1.485E-06
A	10.0	0.21	677.	0.	0.	131.7	215.2	131.7	1.126E-06	1.113E-06	1.113E-06
B	0.1	0.00	677.	0.	0.	99.0	71.6	99.0	4.500E-04	4.306E-04	4.306E-04
B	1.5	0.21	677.	0.	0.	99.0	71.6	99.0	3.000E-05	2.871E-05	2.871E-05
B	3.0	0.48	677.	0.	0.	99.0	71.6	99.0	1.500E-05	1.435E-05	1.435E-05
B	5.0	0.91	677.	0.	0.	99.0	71.6	99.0	9.000E-06	8.612E-06	8.612E-06
B	7.5	0.48	677.	0.	0.	99.0	71.6	99.0	6.000E-06	5.741E-06	5.741E-06
B	10.0	0.21	677.	0.	0.	99.0	71.6	99.0	4.500E-06	4.306E-06	4.306E-06
C	3.0	0.69	677.	0.	0.	75.2	42.8	75.2	3.302E-05	3.004E-05	3.004E-05
C	5.0	1.66	677.	0.	0.	75.2	42.8	75.2	1.981E-05	1.802E-05	1.802E-05
C	7.5	0.69	677.	0.	0.	75.2	42.8	75.2	1.321E-05	1.202E-05	1.202E-05
D	0.1	0.14	677.	0.	0.	53.0	23.3	105.9	1.291E-03	2.051E-03	1.291E-03
D	1.5	3.05	677.	0.	0.	53.0	23.3	105.9	8.608E-05	1.367E-04	8.608E-05
D	3.0	9.78	677.	0.	0.	53.0	23.3	82.1	5.550E-05	6.837E-05	5.550E-05
D	5.0	14.21	677.	0.	0.	53.0	23.3	59.5	4.596E-05	4.102E-05	4.102E-05

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

D	7.5	7.91	677.	0.	0.	53.0	23.3	53.0	3.443E-05	2.735E-05	2.735E-05
D	10.0	1.39	677.	0.	0.	53.0	23.3	53.0	2.582E-05	2.051E-05	2.051E-05
E	0.1	0.10	677.	0.	0.	37.7	16.2	113.0	1.746E-03	3.437E-03	1.746E-03
E	1.5	3.26	677.	0.	0.	37.7	16.2	113.0	1.164E-04	2.292E-04	1.164E-04
E	3.0	10.47	677.	0.	0.	37.7	16.2	75.7	8.688E-05	1.146E-04	8.688E-05
E	5.0	8.17	677.	0.	0.	37.7	16.2	45.4	8.688E-05	6.875E-05	6.875E-05
E	7.5	1.66	677.	0.	0.	37.7	16.2	37.7	6.985E-05	4.583E-05	4.583E-05
E	10.0	0.48	677.	0.	0.	37.7	16.2	37.7	5.239E-05	3.437E-05	3.437E-05
F	0.1	0.05	677.	0.	0.	26.0	10.3	104.0	2.975E-03	5.432E-03	2.975E-03
F	1.5	2.78	677.	0.	0.	26.0	10.3	104.0	1.983E-04	3.621E-04	1.983E-04
F	3.0	9.56	677.	0.	0.	26.0	10.3	62.7	1.644E-04	1.811E-04	1.644E-04
F	5.0	1.87	677.	0.	0.	26.0	10.3	32.9	1.879E-04	1.086E-04	1.086E-04
F	10.0	0.21	677.	0.	0.	26.0	10.3	26.0	1.190E-04	5.432E-05	5.432E-05
G	0.1	0.02	677.	0.	0.	17.9	6.6	107.6	4.504E-03	9.007E-03	4.504E-03
G	1.5	1.87	677.	0.	0.	17.9	6.6	107.6	3.003E-04	6.004E-04	3.003E-04
G	3.0	9.08	677.	0.	0.	17.9	6.6	56.0	2.885E-04	3.002E-04	2.885E-04
G	5.0	0.91	677.	0.	0.	17.9	6.6	24.4	3.982E-04	1.801E-04	1.801E-04

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE  
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145  
 OSITE EXCLUSION BOUNDARY CALCULATIONS:  
 0 W SECTOR BOUNDARY DISTANCE = 677.0 METERS  
 OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED  
 AS A FUNCTION OF DOWNWIND DISTANCE.  
 MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.  
 BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5  
 CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.  
 OBELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.  
 THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.  
 THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	4.504E-03	2.975E-03	1.746E-03	1.291E-03	4.306E-04	3.003E-04	2.885E-04	1.983E-04	1.801E-04	1.644E-04
	0.017	0.071	0.172	0.310	0.312	2.182	11.263	14.041	14.950	24.512
	0.00074	0.00306	0.00741	0.01333	0.01340	0.09377	0.48412	0.60353	0.64256	1.05358
0	1.164E-04	1.113E-04	1.086E-04	8.688E-05	8.608E-05	6.875E-05	5.550E-05	5.432E-05	4.583E-05	4.102E-05
	27.771	27.773	29.643	40.113	43.158	51.332	61.108	61.322	62.978	77.189
	1.19365	1.19373	1.27410	1.72416	1.85504	2.20636	2.62657	2.63575	2.70694	3.31773
0	3.437E-05	3.004E-05	2.871E-05	2.735E-05	2.051E-05	1.802E-05	1.435E-05	1.202E-05	8.612E-06	7.423E-06
	77.669	78.364	78.578	86.484	87.873	89.529	90.010	90.704	91.613	92.093
	3.33839	3.36825	3.37743	3.71727	3.77697	3.84815	3.86882	3.89867	3.93771	3.95837



**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

0	5.741E-06	4.306E-06	3.711E-06	2.227E-06	1.485E-06	1.113E-06
	92.574	92.788	95.833	99.092	99.786	100.000
	3.97904	3.98822	4.11911	4.25918	4.28903	4.29821

0 X/Q PERCENTILES

(BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED

CHI/Q	WITH RESPECT TO	WHEN THE WIND BLOWS
SEC/CUBIC METER	THE TOTAL TIME	INTO THIS SECTOR ONLY

HANDCHECK GRAPH:	SLOPE LT -1.0 FOR LOW PERCENTAGES.	XSAVE ( 2) =	0.003
HANDCHECK GRAPH:	SLOPE LT -1.0 FOR LOW PERCENTAGES.	XSAVE ( 3) =	0.484
HANDCHECK GRAPH:	SLOPE LT -1.0 FOR LOW PERCENTAGES.	XSAVE ( 4) =	1.052
HANDCHECK GRAPH:	SLOPE LT -1.0 FOR LOW PERCENTAGES.	XSAVE ( 5) =	1.853
HANDCHECK GRAPH:	SLOPE LT -1.0 FOR LOW PERCENTAGES.	XSAVE ( 6) =	3.315
HANDCHECK GRAPH:	SLOPE LT -1.0 FOR LOW PERCENTAGES.	XSAVE ( 7) =	3.714

9.815E-04	0.043	1.000
5.815E-04	0.129	3.000
4.482E-04	0.215	5.000
3.084E-04	0.430	10.000
2.359E-04	0.645	15.000
1.914E-04	0.860	20.000
1.608E-04	1.075	25.000
1.312E-04	1.289	30.000
1.100E-04	1.504	35.000
9.418E-05	1.719	40.000
8.180E-05	1.934	45.000
7.182E-05	2.149	50.000
6.373E-05	2.364	55.000
5.705E-05	2.579	60.000
5.145E-05	2.794	65.000
4.670E-05	3.009	70.000
4.263E-05	3.224	75.000
3.614E-05	3.439	80.000
2.911E-05	3.653	85.000
0 2.821E-04	0.5	11.63

0ANNUAL AVERAGE = 1.10E-05

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades

METEOROLOGICAL INSTRUMENTATION

DATA PERIOD: 1999-2003

WIND SENSORS HEIGHT: 10 Meters DT

TYPE OF RELEASE: Ground Level Release

DELTA-T HEIGHTS: from 10m to 60m

SOURCE OF DATA: Data from onsite met tower

COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE WNW SECTOR.

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

STABILITY CLASS	WINDSPEED METER/SEC AT 10.0 METERS	FREQUENCY PERCENT	DISTANCE METERS	TERRAIN HT METERS	EFF PLUME HT METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)		
									MEANDER	BLDG WAKE CA=1006 .SQ.METERS	USED
A	0.1	0.00	677.	0.	0.	131.7	215.2	131.7	1.126E-04	1.113E-04	1.113E-04
A	1.5	0.52	677.	0.	0.	131.7	215.2	131.7	7.507E-06	7.423E-06	7.423E-06
A	3.0	2.96	677.	0.	0.	131.7	215.2	131.7	3.753E-06	3.711E-06	3.711E-06
A	5.0	4.36	677.	0.	0.	131.7	215.2	131.7	2.252E-06	2.227E-06	2.227E-06
A	7.5	1.04	677.	0.	0.	131.7	215.2	131.7	1.501E-06	1.485E-06	1.485E-06
B	0.1	0.00	677.	0.	0.	99.0	71.6	99.0	4.500E-04	4.306E-04	4.306E-04
B	1.5	0.16	677.	0.	0.	99.0	71.6	99.0	3.000E-05	2.871E-05	2.871E-05
B	3.0	0.52	677.	0.	0.	99.0	71.6	99.0	1.500E-05	1.435E-05	1.435E-05
B	5.0	1.24	677.	0.	0.	99.0	71.6	99.0	9.000E-06	8.612E-06	8.612E-06
B	7.5	0.36	677.	0.	0.	99.0	71.6	99.0	6.000E-06	5.741E-06	5.741E-06
B	10.0	0.16	677.	0.	0.	99.0	71.6	99.0	4.500E-06	4.306E-06	4.306E-06
C	0.1	0.00	677.	0.	0.	75.2	42.8	75.2	9.907E-04	9.012E-04	9.012E-04
C	1.5	0.16	677.	0.	0.	75.2	42.8	75.2	6.605E-05	6.008E-05	6.008E-05
C	3.0	0.52	677.	0.	0.	75.2	42.8	75.2	3.302E-05	3.004E-05	3.004E-05
C	5.0	1.56	677.	0.	0.	75.2	42.8	75.2	1.981E-05	1.802E-05	1.802E-05
C	7.5	1.04	677.	0.	0.	75.2	42.8	75.2	1.321E-05	1.202E-05	1.202E-05
C	10.0	0.16	677.	0.	0.	75.2	42.8	75.2	9.907E-06	9.012E-06	9.012E-06
D	0.1	0.09	677.	0.	0.	53.0	23.3	105.9	1.291E-03	2.051E-03	1.291E-03
D	1.5	1.92	677.	0.	0.	53.0	23.3	105.9	8.608E-05	1.367E-04	8.608E-05
D	3.0	6.44	677.	0.	0.	53.0	23.3	82.1	5.550E-05	6.837E-05	5.550E-05
D	5.0	14.63	677.	0.	0.	53.0	23.3	59.5	4.596E-05	4.102E-05	4.102E-05
D	7.5	11.52	677.	0.	0.	53.0	23.3	53.0	3.443E-05	2.735E-05	2.735E-05
D	10.0	2.44	677.	0.	0.	53.0	23.3	53.0	2.582E-05	2.051E-05	2.051E-05
D	15.0	0.36	677.	0.	0.	53.0	23.3	53.0	1.722E-05	1.367E-05	1.367E-05
E	0.1	0.10	677.	0.	0.	37.7	16.2	113.0	1.746E-03	3.437E-03	1.746E-03
E	1.5	3.12	677.	0.	0.	37.7	16.2	113.0	1.164E-04	2.292E-04	1.164E-04
E	3.0	8.72	677.	0.	0.	37.7	16.2	75.7	8.688E-05	1.146E-04	8.688E-05
E	5.0	8.36	677.	0.	0.	37.7	16.2	45.4	8.688E-05	6.875E-05	6.875E-05
E	7.5	2.28	677.	0.	0.	37.7	16.2	37.7	6.985E-05	4.583E-05	4.583E-05
E	10.0	0.68	677.	0.	0.	37.7	16.2	37.7	5.239E-05	3.437E-05	3.437E-05
E	14.9	0.16	677.	0.	0.	37.7	16.2	37.7	3.493E-05	2.292E-05	2.292E-05
F	0.1	0.04	677.	0.	0.	26.0	10.3	104.0	2.975E-03	5.432E-03	2.975E-03
F	1.5	2.08	677.	0.	0.	26.0	10.3	104.0	1.983E-04	3.621E-04	1.983E-04
F	3.0	7.84	677.	0.	0.	26.0	10.3	62.7	1.644E-04	1.811E-04	1.644E-04
F	5.0	1.56	677.	0.	0.	26.0	10.3	32.9	1.879E-04	1.086E-04	1.086E-04
G	0.1	0.01	677.	0.	0.	17.9	6.6	107.6	4.504E-03	9.007E-03	4.504E-03
G	1.5	1.40	677.	0.	0.	17.9	6.6	107.6	3.003E-04	6.004E-04	3.003E-04

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

G 3.0 10.12 677. 0. 0. 17.9 6.6 56.0 2.885E-04 3.002E-04 2.885E-04  
 G 5.0 1.40 677. 0. 0. 17.9 6.6 24.4 3.982E-04 1.801E-04 1.801E-04  
 IUSNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145  
 OSITE EXCLUSION BOUNDARY CALCULATIONS:

0 WNW SECTOR BOUNDARY DISTANCE = 677.0 METERS  
 OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED  
 AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.  
 BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.  
 0BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.  
 THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.  
 THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	4.504E-03	2.975E-03	1.746E-03	1.291E-03	9.012E-04	4.306E-04	3.003E-04	2.885E-04	1.983E-04	1.801E-04
	0.013	0.053	0.150	0.237	0.239	0.240	1.640	11.756	13.835	15.234
	0.00074	0.00306	0.00862	0.01361	0.01374	0.01381	0.09418	0.67512	0.79452	0.87489
0	1.644E-04	1.164E-04	1.113E-04	1.086E-04	8.688E-05	8.608E-05	6.875E-05	6.008E-05	5.550E-05	4.583E-05
	23.071	26.189	26.191	27.751	36.467	38.386	46.743	46.903	53.340	55.619
	1.32495	1.50405	1.50417	1.59372	2.09429	2.20451	2.68442	2.69361	3.06330	3.19418
0	4.102E-05	3.437E-05	3.004E-05	2.871E-05	2.735E-05	2.292E-05	2.051E-05	1.802E-05	1.435E-05	1.367E-05
	70.253	70.932	71.452	71.612	83.127	83.287	85.726	87.285	87.805	88.165
	4.03459	4.07363	4.10348	4.11266	4.77397	4.78316	4.92323	5.01278	5.04263	5.06329
0	1.202E-05	9.012E-06	8.612E-06	7.423E-06	5.741E-06	4.306E-06	3.711E-06	2.227E-06	1.485E-06	
	89.205	89.365	90.604	91.124	91.484	91.644	94.602	98.960	100.000	
	5.12300	5.13218	5.20336	5.23321	5.25388	5.26307	5.43299	5.68327	5.74297	

0 X/Q PERCENTILES  
 (BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
 CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 2) = 0.003  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 0.674  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 1.323  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5) = 2.682  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 6) = 4.031  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 7) = 4.770

9.436E-04 0.057 1.000

**NUMERICAL APPLICATIONS, Inc.**  
Determination of Atmospheric Dispersion Factors for Palisades  
Calculation Number: NAI-1149-002, Rev. 0

5.750E-04	0.172	3.000
4.492E-04	0.287	5.000
3.147E-04	0.574	10.000
2.367E-04	0.861	15.000
1.859E-04	1.149	20.000
1.495E-04	1.436	25.000
1.201E-04	1.723	30.000
9.936E-05	2.010	35.000
8.400E-05	2.297	40.000
7.222E-05	2.584	45.000
6.328E-05	2.871	50.000
5.619E-05	3.159	55.000
5.032E-05	3.446	60.000
4.540E-05	3.733	65.000
4.122E-05	4.020	70.000
3.510E-05	4.307	75.000
3.003E-05	4.594	80.000
0	3.386E-04	0.5
		8.71

0ANNUAL AVERAGE = 1.30E-05

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
SOURCE OF DATA: Data from onsite met tower  
COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE NW SECTOR.

CLASS	METER/SEC	PERCENT	DISTANCE METERS	TERRAIN METERS	HT METERS	EFF METERS	PLUME METERS	HT METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)		
												MEANDER	BLDG WAKE	USED
AT 10.0 METERS												CA=1006.SQ.METERS		
A	0.1	0.00	677.	0.	0.	0.	131.7	215.2	131.7	1.126E-04	1.113E-04	1.113E-04		
A	1.5	0.37	677.	0.	0.	0.	131.7	215.2	131.7	7.507E-06	7.423E-06	7.423E-06		
A	3.0	2.63	677.	0.	0.	0.	131.7	215.2	131.7	3.753E-06	3.711E-06	3.711E-06		
A	5.0	4.98	677.	0.	0.	0.	131.7	215.2	131.7	2.252E-06	2.227E-06	2.227E-06		
A	7.5	1.49	677.	0.	0.	0.	131.7	215.2	131.7	1.501E-06	1.485E-06	1.485E-06		
A	10.0	0.26	677.	0.	0.	0.	131.7	215.2	131.7	1.126E-06	1.113E-06	1.113E-06		
B	3.0	0.49	677.	0.	0.	0.	99.0	71.6	99.0	1.500E-05	1.435E-05	1.435E-05		
B	5.0	1.26	677.	0.	0.	0.	99.0	71.6	99.0	9.000E-06	8.612E-06	8.612E-06		
B	7.5	0.63	677.	0.	0.	0.	99.0	71.6	99.0	6.000E-06	5.741E-06	5.741E-06		
B	10.0	0.11	677.	0.	0.	0.	99.0	71.6	99.0	4.500E-06	4.306E-06	4.306E-06		
C	3.0	0.49	677.	0.	0.	0.	75.2	42.8	75.2	3.302E-05	3.004E-05	3.004E-05		
C	5.0	1.86	677.	0.	0.	0.	75.2	42.8	75.2	1.981E-05	1.802E-05	1.802E-05		
C	7.5	1.00	677.	0.	0.	0.	75.2	42.8	75.2	1.321E-05	1.202E-05	1.202E-05		

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

C	10.0	0.11	677.	0.	0.	75.2	42.8	75.2	9.907E-06	9.012E-06	9.012E-06
D	0.1	0.06	677.	0.	0.	53.0	23.3	105.9	1.291E-03	2.051E-03	1.291E-03
D	1.5	1.37	677.	0.	0.	53.0	23.3	105.9	8.608E-05	1.367E-04	8.608E-05
D	3.0	6.61	677.	0.	0.	53.0	23.3	82.1	5.550E-05	6.837E-05	5.550E-05
D	5.0	12.47	677.	0.	0.	53.0	23.3	59.5	4.596E-05	4.102E-05	4.102E-05
D	7.5	8.35	677.	0.	0.	53.0	23.3	53.0	3.443E-05	2.735E-05	2.735E-05
D	10.0	1.63	677.	0.	0.	53.0	23.3	53.0	2.582E-05	2.051E-05	2.051E-05
E	0.1	0.07	677.	0.	0.	37.7	16.2	113.0	1.746E-03	3.437E-03	1.746E-03
E	1.5	2.37	677.	0.	0.	37.7	16.2	113.0	1.164E-04	2.292E-04	1.164E-04
E	3.0	9.21	677.	0.	0.	37.7	16.2	75.7	8.688E-05	1.146E-04	8.688E-05
E	5.0	9.72	677.	0.	0.	37.7	16.2	45.4	8.688E-05	6.875E-05	6.875E-05
E	7.5	3.49	677.	0.	0.	37.7	16.2	37.7	6.985E-05	4.583E-05	4.583E-05
E	10.0	0.49	677.	0.	0.	37.7	16.2	37.7	5.239E-05	3.437E-05	3.437E-05
F	0.1	0.04	677.	0.	0.	26.0	10.3	104.0	2.975E-03	5.432E-03	2.975E-03
F	1.5	2.23	677.	0.	0.	26.0	10.3	104.0	1.983E-04	3.621E-04	1.983E-04
F	3.0	7.86	677.	0.	0.	26.0	10.3	62.7	1.644E-04	1.811E-04	1.644E-04
F	5.0	2.75	677.	0.	0.	26.0	10.3	32.9	1.879E-04	1.086E-04	1.086E-04
G	0.1	0.01	677.	0.	0.	17.9	6.6	107.6	4.504E-03	9.007E-03	4.504E-03
G	1.5	1.37	677.	0.	0.	17.9	6.6	107.6	3.003E-04	6.004E-04	3.003E-04
G	3.0	13.21	677.	0.	0.	17.9	6.6	56.0	2.885E-04	3.002E-04	2.885E-04
G	5.0	1.00	677.	0.	0.	17.9	6.6	24.4	3.982E-04	1.801E-04	1.801E-04

IUSNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OSITE EXCLUSION BOUNDARY CALCULATIONS:

0 NW SECTOR BOUNDARY DISTANCE = 677.0 METERS

OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED  
 AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	4.504E-03	2.975E-03	1.746E-03	1.291E-03	3.003E-04	2.885E-04	1.983E-04	1.801E-04	1.644E-04	1.164E-04
	0.013	0.056	0.130	0.192	1.564	14.777	17.007	18.008	25.873	28.246
	0.00102	0.00449	0.01041	0.01540	0.12561	1.18646	1.36557	1.44594	2.07739	2.26798
0	1.113E-04	1.086E-04	8.688E-05	8.608E-05	6.875E-05	5.550E-05	4.583E-05	4.102E-05	3.437E-05	3.004E-05

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

	28.248	30.993	40.202	41.574	51.298	57.904	61.393	73.861	74.348	74.834
	2.26809	2.48853	3.22791	3.33813	4.11884	4.64926	4.92940	5.93055	5.96959	6.00862
0	2.735E-05	2.051E-05	1.802E-05	1.435E-05	1.202E-05	9.012E-06	8.612E-06	7.423E-06	5.741E-06	4.306E-06
	83.184	84.814	86.673	87.160	88.160	88.275	89.533	89.905	90.534	90.648
	6.67912	6.81000	6.95925	6.99829	7.07866	7.08784	7.18888	7.21873	7.26924	7.27843
0	3.711E-06	2.227E-06	1.485E-06	1.113E-06						
	93.279	98.256	99.743	100.000						
	7.48968	7.88922	8.00862	8.02929						

0 X/Q PERCENTILES  
 (BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)  
 0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
 CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 2) = 0.004  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 3) = 1.185  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 4) = 2.075  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 5) = 4.115  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 6) = 5.927  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 7) = 6.675

	1.017E-03	0.080	1.000
	6.331E-04	0.241	3.000
	4.995E-04	0.401	5.000
	3.545E-04	0.803	10.000
	2.843E-04	1.204	15.000
	2.141E-04	1.606	20.000
	1.703E-04	2.007	25.000
	1.373E-04	2.409	30.000
	1.133E-04	2.810	35.000
	9.550E-05	3.212	40.000
	8.189E-05	3.613	45.000
	7.116E-05	4.015	50.000
	6.246E-05	4.416	55.000
	5.532E-05	4.818	60.000
	4.938E-05	5.219	65.000
	4.437E-05	5.621	70.000
	3.896E-05	6.022	75.000
	3.128E-05	6.423	80.000
0	4.494E-04	0.5	6.23

0ANNUAL AVERAGE = 1.86E-05  
 1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades  
 DATA PERIOD: 1999-2003  
 TYPE OF RELEASE: Ground Level Release

METEOROLOGICAL INSTRUMENTATION  
 WIND SENSORS HEIGHT: 10 Meters DT  
 DELTA-T HEIGHTS: from 10m to 60m

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

SOURCE OF DATA: Data from onsite met tower

COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE NNW SECTOR.

CLASS	METER/SEC AT 10.0 METERS	PERCENT	DISTANCE METERS	TERRAIN HT METERS	EFF PLUME HT METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)		
									MEANDER	BLDG WAKE CA=1006.SQ.METERS	USED
A	0.1	0.00	677.	0.	0.	131.7	215.2	131.7	1.126E-04	1.113E-04	1.113E-04
A	1.5	0.47	677.	0.	0.	131.7	215.2	131.7	7.507E-06	7.423E-06	7.423E-06
A	3.0	4.18	677.	0.	0.	131.7	215.2	131.7	3.753E-06	3.711E-06	3.711E-06
A	5.0	4.09	677.	0.	0.	131.7	215.2	131.7	2.252E-06	2.227E-06	2.227E-06
A	7.5	1.11	677.	0.	0.	131.7	215.2	131.7	1.501E-06	1.485E-06	1.485E-06
A	10.0	0.19	677.	0.	0.	131.7	215.2	131.7	1.126E-06	1.113E-06	1.113E-06
B	0.1	0.00	677.	0.	0.	99.0	71.6	99.0	4.500E-04	4.306E-04	4.306E-04
B	1.5	0.19	677.	0.	0.	99.0	71.6	99.0	3.000E-05	2.871E-05	2.871E-05
B	3.0	0.55	677.	0.	0.	99.0	71.6	99.0	1.500E-05	1.435E-05	1.435E-05
B	5.0	0.94	677.	0.	0.	99.0	71.6	99.0	9.000E-06	8.612E-06	8.612E-06
B	7.5	0.28	677.	0.	0.	99.0	71.6	99.0	6.000E-06	5.741E-06	5.741E-06
C	0.1	0.00	677.	0.	0.	75.2	42.8	75.2	9.907E-04	9.012E-04	9.012E-04
C	1.5	0.09	677.	0.	0.	75.2	42.8	75.2	6.605E-05	6.008E-05	6.008E-05
C	3.0	0.83	677.	0.	0.	75.2	42.8	75.2	3.302E-05	3.004E-05	3.004E-05
C	5.0	1.39	677.	0.	0.	75.2	42.8	75.2	1.981E-05	1.802E-05	1.802E-05
C	7.5	0.66	677.	0.	0.	75.2	42.8	75.2	1.321E-05	1.202E-05	1.202E-05
D	0.1	0.08	677.	0.	0.	53.0	23.3	105.9	1.291E-03	2.051E-03	1.291E-03
D	1.5	1.66	677.	0.	0.	53.0	23.3	105.9	8.608E-05	1.367E-04	8.608E-05
D	3.0	8.08	677.	0.	0.	53.0	23.3	82.1	5.550E-05	6.837E-05	5.550E-05
D	5.0	12.06	677.	0.	0.	53.0	23.3	59.5	4.596E-05	4.102E-05	4.102E-05
D	7.5	5.28	677.	0.	0.	53.0	23.3	53.0	3.443E-05	2.735E-05	2.735E-05
D	10.0	0.47	677.	0.	0.	53.0	23.3	53.0	2.582E-05	2.051E-05	2.051E-05
E	0.1	0.10	677.	0.	0.	37.7	16.2	113.0	1.746E-03	3.437E-03	1.746E-03
E	1.5	3.07	677.	0.	0.	37.7	16.2	113.0	1.164E-04	2.292E-04	1.164E-04
E	3.0	11.89	677.	0.	0.	37.7	16.2	75.7	8.688E-05	1.146E-04	8.688E-05
E	5.0	9.76	677.	0.	0.	37.7	16.2	45.4	8.688E-05	6.875E-05	6.875E-05
E	7.5	2.51	677.	0.	0.	37.7	16.2	37.7	6.985E-05	4.583E-05	4.583E-05
E	10.0	0.28	677.	0.	0.	37.7	16.2	37.7	5.239E-05	3.437E-05	3.437E-05
F	0.1	0.05	677.	0.	0.	26.0	10.3	104.0	2.975E-03	5.432E-03	2.975E-03
F	1.5	2.60	677.	0.	0.	26.0	10.3	104.0	1.983E-04	3.621E-04	1.983E-04
F	3.0	8.74	677.	0.	0.	26.0	10.3	62.7	1.644E-04	1.811E-04	1.644E-04
F	5.0	1.96	677.	0.	0.	26.0	10.3	32.9	1.879E-04	1.086E-04	1.086E-04
G	0.1	0.02	677.	0.	0.	17.9	6.6	107.6	4.504E-03	9.007E-03	4.504E-03

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

G	1.5	2.24	677.	0.	0.	17.9	6.6	107.6	3.003E-04	6.004E-04	3.003E-04
G	3.0	12.81	677.	0.	0.	17.9	6.6	56.0	2.885E-04	3.002E-04	2.885E-04
G	5.0	1.39	677.	0.	0.	17.9	6.6	24.4	3.982E-04	1.801E-04	1.801E-04

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0                      RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades    METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003    WIND SENSORS HEIGHT: 10 Meters                      DT  
 TYPE OF RELEASE: Ground Level Release    DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OSITE EXCLUSION BOUNDARY CALCULATIONS:

0 NNW SECTOR                      BOUNDARY DISTANCE = 677.0 METERS  
 OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED  
 AS A FUNCTION OF DOWNWIND DISTANCE.  
 MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5                      A= 2011.                      D= 58.5  
 CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

0BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.  
 THE TOP NUMBER IS THE CHI/Q.                      THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.  
 THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	4.504E-03	2.975E-03	1.746E-03	1.291E-03	9.012E-04	4.306E-04	3.003E-04	2.885E-04	1.983E-04	1.801E-04
	0.021	0.071	0.166	0.242	0.243	0.244	2.482	15.289	17.889	19.274
	0.00222	0.00766	0.01793	0.02603	0.02616	0.02633	0.26743	1.64745	1.92759	2.07684
0	1.644E-04	1.164E-04	1.113E-04	1.086E-04	8.688E-05	8.608E-05	6.875E-05	6.008E-05	5.550E-05	4.583E-05
	28.012	31.080	31.082	33.043	44.934	46.596	56.356	56.442	64.518	67.033
	3.01829	3.34895	3.34914	3.56039	4.84168	5.02078	6.07245	6.08163	6.95190	7.22285
0	4.102E-05	3.437E-05	3.004E-05	2.871E-05	2.735E-05	2.051E-05	1.802E-05	1.435E-05	1.202E-05	8.612E-06
	79.095	79.372	80.203	80.394	85.679	86.148	87.533	88.088	88.748	89.686
	8.52250	8.55236	8.64191	8.66257	9.23203	9.28255	9.43181	9.49151	9.56269	9.66372
0	7.423E-06	5.741E-06	3.711E-06	2.227E-06	1.485E-06	1.113E-06				
	90.155	90.432	94.608	98.700	99.808	100.000				
	9.71424	9.74409	10.19415	10.63502	10.75442	10.77509				

0                      X/Q PERCENTILES  
 (BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
                     CHI/Q                      WITH RESPECT TO                      WHEN THE WIND BLOWS  
                     SEC/CUBIC METER                      THE TOTAL TIME                      INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.                      XSAVE ( 2) = 0.008  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.                      XSAVE ( 3) = 1.646  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.                      XSAVE ( 4) = 3.015  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.                      XSAVE ( 5) = 6.069  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.                      XSAVE ( 6) = 8.519  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.                      XSAVE ( 7) = 9.229



**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

1.080E-03	0.108	1.000
6.639E-04	0.323	3.000
5.199E-04	0.539	5.000
3.644E-04	1.078	10.000
2.916E-04	1.616	15.000
2.262E-04	2.155	20.000
1.834E-04	2.694	25.000
1.516E-04	3.233	30.000
1.261E-04	3.771	35.000
1.070E-04	4.310	40.000
9.221E-05	4.849	45.000
8.050E-05	5.388	50.000
7.101E-05	5.926	55.000
6.268E-05	6.465	60.000
5.559E-05	7.004	65.000
4.965E-05	7.543	70.000
4.461E-05	8.081	75.000
3.874E-05	8.620	80.000
2.849E-05	9.159	85.000
0 5.392E-04	0.5	4.64

0 ANNUAL AVERAGE = 2.82E-05

1 USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

0 PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE N SECTOR.

CLASS	WINDSPEED METER/SEC	FREQUENCY PERCENT	DISTANCE METERS	TERRAIN HT METERS	EFF PLUME HT METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)			
									MEANDER	BLDG WAKE	USED	
AT 10.0 METERS										CA=1006.SQ.METERS		
A	0.1	0.00	677.	0.	0.	131.7	215.2	131.7	1.126E-04	1.113E-04	1.113E-04	
A	1.5	1.02	677.	0.	0.	131.7	215.2	131.7	7.507E-06	7.423E-06	7.423E-06	
A	3.0	3.82	677.	0.	0.	131.7	215.2	131.7	3.753E-06	3.711E-06	3.711E-06	
A	5.0	3.68	677.	0.	0.	131.7	215.2	131.7	2.252E-06	2.227E-06	2.227E-06	
A	7.5	0.38	677.	0.	0.	131.7	215.2	131.7	1.501E-06	1.485E-06	1.485E-06	
B	0.1	0.00	677.	0.	0.	99.0	71.6	99.0	4.500E-04	4.306E-04	4.306E-04	
B	1.5	0.12	677.	0.	0.	99.0	71.6	99.0	3.000E-05	2.871E-05	2.871E-05	
B	3.0	1.02	677.	0.	0.	99.0	71.6	99.0	1.500E-05	1.435E-05	1.435E-05	
B	5.0	0.76	677.	0.	0.	99.0	71.6	99.0	9.000E-06	8.612E-06	8.612E-06	
C	0.1	0.01	677.	0.	0.	75.2	42.8	75.2	9.907E-04	9.012E-04	9.012E-04	
C	1.5	0.38	677.	0.	0.	75.2	42.8	75.2	6.605E-05	6.008E-05	6.008E-05	

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

C	3.0	1.52	677.	0.	0.	75.2	42.8	75.2	3.302E-05	3.004E-05	3.004E-05
C	5.0	1.28	677.	0.	0.	75.2	42.8	75.2	1.981E-05	1.802E-05	1.802E-05
C	7.5	0.12	677.	0.	0.	75.2	42.8	75.2	1.321E-05	1.202E-05	1.202E-05
D	0.1	0.11	677.	0.	0.	53.0	23.3	105.9	1.291E-03	2.051E-03	1.291E-03
D	1.5	2.54	677.	0.	0.	53.0	23.3	105.9	8.608E-05	1.367E-04	8.608E-05
D	3.0	13.11	677.	0.	0.	53.0	23.3	82.1	5.550E-05	6.837E-05	5.550E-05
D	5.0	8.41	677.	0.	0.	53.0	23.3	59.5	4.596E-05	4.102E-05	4.102E-05
D	7.5	1.28	677.	0.	0.	53.0	23.3	53.0	3.443E-05	2.735E-05	2.735E-05
E	0.1	0.14	677.	0.	0.	37.7	16.2	113.0	1.746E-03	3.437E-03	1.746E-03
E	1.5	4.58	677.	0.	0.	37.7	16.2	113.0	1.164E-04	2.292E-04	1.164E-04
E	3.0	17.81	677.	0.	0.	37.7	16.2	75.7	8.688E-05	1.146E-04	8.688E-05
E	5.0	5.60	677.	0.	0.	37.7	16.2	45.4	8.688E-05	6.875E-05	6.875E-05
E	7.5	0.38	677.	0.	0.	37.7	16.2	37.7	6.985E-05	4.583E-05	4.583E-05
F	0.1	0.07	677.	0.	0.	26.0	10.3	104.0	2.975E-03	5.432E-03	2.975E-03
F	1.5	3.82	677.	0.	0.	26.0	10.3	104.0	1.983E-04	3.621E-04	1.983E-04
F	3.0	8.14	677.	0.	0.	26.0	10.3	62.7	1.644E-04	1.811E-04	1.644E-04
F	5.0	0.38	677.	0.	0.	26.0	10.3	32.9	1.879E-04	1.086E-04	1.086E-04
G	0.1	0.03	677.	0.	0.	17.9	6.6	107.6	4.504E-03	9.007E-03	4.504E-03
G	1.5	3.44	677.	0.	0.	17.9	6.6	107.6	3.003E-04	6.004E-04	3.003E-04
G	3.0	15.00	677.	0.	0.	17.9	6.6	56.0	2.885E-04	3.002E-04	2.885E-04
G	5.0	1.02	677.	0.	0.	17.9	6.6	24.4	3.982E-04	1.801E-04	1.801E-04

IUSNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OSITE EXCLUSION BOUNDARY CALCULATIONS:

0 N SECTOR BOUNDARY DISTANCE = 677.0 METERS

OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED

AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	4.504E-03	2.975E-03	1.746E-03	1.291E-03	9.012E-04	4.306E-04	3.003E-04	2.885E-04	1.983E-04	1.801E-04
	0.032	0.106	0.248	0.363	0.369	0.370	3.814	18.818	22.642	23.663
	0.00250	0.00834	0.01953	0.02857	0.02900	0.02907	0.30003	1.48028	1.78108	1.86145
0	1.644E-04	1.164E-04	1.113E-04	1.086E-04	8.688E-05	8.608E-05	6.875E-05	6.008E-05	5.550E-05	4.583E-05

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

	31.808	36.390	36.394	36.774	54.580	57.119	62.724	63.103	76.210	76.589
	2.50209	2.86260	2.86291	2.89276	4.29345	4.49322	4.93409	4.96394	5.99494	6.02479
0	4.102E-05	3.004E-05	2.871E-05	2.735E-05	1.802E-05	1.435E-05	1.202E-05	8.612E-06	7.423E-06	3.711E-06
	84.996	86.514	86.631	87.915	89.200	90.221	90.338	91.097	92.119	95.943
	6.68610	6.80550	6.81469	6.91572	7.01675	7.09712	7.10631	7.16601	7.24637	7.54718
0	2.227E-06	1.485E-06								
	99.621	100.000								
	7.83650	7.86635								

0 X/Q PERCENTILES  
 (BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)  
 0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
 CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 2) = 0.008  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 3) = 1.479  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 4) = 4.490  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 5) = 5.991  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 6) = 6.682

	1.226E-03	0.079	1.000
	7.494E-04	0.236	3.000
	5.858E-04	0.393	5.000
	4.102E-04	0.787	10.000
	3.284E-04	1.180	15.000
	2.714E-04	1.573	20.000
	2.160E-04	1.967	25.000
	1.782E-04	2.360	30.000
	1.508E-04	2.753	35.000
	1.301E-04	3.147	40.000
	1.138E-04	3.540	45.000
	1.008E-04	3.933	50.000
	9.005E-05	4.326	55.000
	8.001E-05	4.720	60.000
	7.094E-05	5.113	65.000
	6.334E-05	5.506	70.000
	5.691E-05	5.900	75.000
	4.856E-05	6.293	80.000
0	5.194E-04	0.5	6.36

0ANNUAL AVERAGE = 2.57E-05

LUSNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades  
 DATA PERIOD: 1999-2003  
 TYPE OF RELEASE: Ground Level Release  
 SOURCE OF DATA: Data from onsite met tower

METEOROLOGICAL INSTRUMENTATION  
 WIND SENSORS HEIGHT: 10 Meters DT  
 DELTA-T HEIGHTS: from 10m to 60m

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145  
 OPARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE NNE SECTOR.

CLASS	WINDSPEED METER/SEC AT 10.0 METERS	FREQUENCY PERCENT METERS	DISTANCE METERS	TERRAIN HT METERS	EFF PLUME HT METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)			
									MEANDER	BLDG WAKE	USED	
									CA=1006	.SQ.	METERS	
A	0.1	0.00	677.	0.	0.	131.7	215.2	131.7	1.126E-04	1.113E-04	1.113E-04	
A	1.5	0.88	677.	0.	0.	131.7	215.2	131.7	7.507E-06	7.423E-06	7.423E-06	
A	3.0	4.30	677.	0.	0.	131.7	215.2	131.7	3.753E-06	3.711E-06	3.711E-06	
A	5.0	1.81	677.	0.	0.	131.7	215.2	131.7	2.252E-06	2.227E-06	2.227E-06	
B	0.1	0.00	677.	0.	0.	99.0	71.6	99.0	4.500E-04	4.306E-04	4.306E-04	
B	1.5	0.21	677.	0.	0.	99.0	71.6	99.0	3.000E-05	2.871E-05	2.871E-05	
B	3.0	1.35	677.	0.	0.	99.0	71.6	99.0	1.500E-05	1.435E-05	1.435E-05	
B	5.0	0.67	677.	0.	0.	99.0	71.6	99.0	9.000E-06	8.612E-06	8.612E-06	
C	3.0	1.60	677.	0.	0.	75.2	42.8	75.2	3.302E-05	3.004E-05	3.004E-05	
C	5.0	0.67	677.	0.	0.	75.2	42.8	75.2	1.981E-05	1.802E-05	1.802E-05	
C	7.5	0.21	677.	0.	0.	75.2	42.8	75.2	1.321E-05	1.202E-05	1.202E-05	
D	0.1	0.17	677.	0.	0.	53.0	23.3	105.9	1.291E-03	2.051E-03	1.291E-03	
D	1.5	3.83	677.	0.	0.	53.0	23.3	105.9	8.608E-05	1.367E-04	8.608E-05	
D	3.0	14.91	677.	0.	0.	53.0	23.3	82.1	5.550E-05	6.837E-05	5.550E-05	
D	5.0	14.24	677.	0.	0.	53.0	23.3	59.5	4.596E-05	4.102E-05	4.102E-05	
D	7.5	1.35	677.	0.	0.	53.0	23.3	53.0	3.443E-05	2.735E-05	2.735E-05	
E	0.1	0.15	677.	0.	0.	37.7	16.2	113.0	1.746E-03	3.437E-03	1.746E-03	
E	1.5	4.76	677.	0.	0.	37.7	16.2	113.0	1.164E-04	2.292E-04	1.164E-04	
E	3.0	18.74	677.	0.	0.	37.7	16.2	75.7	8.688E-05	1.146E-04	8.688E-05	
E	5.0	9.27	677.	0.	0.	37.7	16.2	45.4	8.688E-05	6.875E-05	6.875E-05	
E	7.5	0.47	677.	0.	0.	37.7	16.2	37.7	6.985E-05	4.583E-05	4.583E-05	
F	0.1	0.04	677.	0.	0.	26.0	10.3	104.0	2.975E-03	5.432E-03	2.975E-03	
F	1.5	2.28	677.	0.	0.	26.0	10.3	104.0	1.983E-04	3.621E-04	1.983E-04	
F	3.0	6.99	677.	0.	0.	26.0	10.3	62.7	1.644E-04	1.811E-04	1.644E-04	
F	5.0	0.67	677.	0.	0.	26.0	10.3	32.9	1.879E-04	1.086E-04	1.086E-04	
G	0.1	0.02	677.	0.	0.	17.9	6.6	107.6	4.504E-03	9.007E-03	4.504E-03	
G	1.5	2.28	677.	0.	0.	17.9	6.6	107.6	3.003E-04	6.004E-04	3.003E-04	
G	3.0	7.92	677.	0.	0.	17.9	6.6	56.0	2.885E-04	3.002E-04	2.885E-04	
G	5.0	0.21	677.	0.	0.	17.9	6.6	24.4	3.982E-04	1.801E-04	1.801E-04	

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades  
 DATA PERIOD: 1999-2003  
 TYPE OF RELEASE: Ground Level Release

METEOROLOGICAL INSTRUMENTATION  
 WIND SENSORS HEIGHT: 10 Meters DT  
 DELTA-T HEIGHTS: from 10m to 60m

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

SOURCE OF DATA: Data from onsite met tower

COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

0 SITE EXCLUSION BOUNDARY CALCULATIONS:

0 NNE SECTOR BOUNDARY DISTANCE = 677.0 METERS

0 LATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED

AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

0 BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	4.504E-03	2.975E-03	1.746E-03	1.291E-03	4.306E-04	3.003E-04	2.885E-04	1.983E-04	1.801E-04	1.644E-04
	0.021	0.065	0.213	0.386	0.388	2.666	10.587	12.865	13.072	20.061
	0.00093	0.00289	0.00945	0.01714	0.01721	0.11824	0.46956	0.57060	0.57978	0.88977
0	1.164E-04	1.113E-04	1.086E-04	8.688E-05	8.608E-05	6.875E-05	5.550E-05	4.583E-05	4.102E-05	3.004E-05
	24.824	24.828	25.501	44.242	48.073	57.340	72.250	72.716	86.954	88.558
	1.10102	1.10117	1.13102	1.96225	2.13217	2.54319	3.20450	3.22517	3.85663	3.92781
0	2.871E-05	2.735E-05	1.802E-05	1.435E-05	1.202E-05	8.612E-06	7.423E-06	3.711E-06	2.227E-06	
	88.766	90.112	90.785	92.131	92.338	93.011	93.891	98.188	100.000	
	3.93699	3.99670	4.02655	4.08625	4.09543	4.12528	4.16432	4.35490	4.43527	

0 X/Q PERCENTILES

(BASED ON THE UPPER ENVELOPE OF THE ORDERED X/Q-FREQUENCY VALUES, AND AS PLOTTED ON A LOG-NORMAL GRAPH.)

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED

CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 2) = 0.003  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 3) = 0.469  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 4) = 2.130  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 5) = 3.202

9.489E-04	0.044	1.000
5.620E-04	0.133	3.000
4.331E-04	0.222	5.000
2.979E-04	0.444	10.000
2.227E-04	0.665	15.000
1.785E-04	0.887	20.000
1.495E-04	1.109	25.000
1.288E-04	1.331	30.000
1.132E-04	1.552	35.000
1.011E-04	1.774	40.000
9.123E-05	1.996	45.000
8.261E-05	2.218	50.000
7.470E-05	2.439	55.000

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

6.805E-05            2.661            60.000  
 6.238E-05            2.883            65.000  
 5.749E-05            3.105            70.000  
 0 2.755E-04            0.5            11.27

0ANNUAL AVERAGE = 1.23E-05

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades  
 DATA PERIOD: 1999-2003  
 TYPE OF RELEASE: Ground Level Release  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

METEOROLOGICAL INSTRUMENTATION  
 WIND SENSORS HEIGHT: 10 Meters DT  
 DELTA-T HEIGHTS: from 10m to 60m

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145  
 OPARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE NE SECTOR.

CLASS	METER/SEC	PERCENT	DISTANCE METERS	TERRAIN HT METERS	EFF PLUME HT METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)		
									MEANDER	BLDG WAKE	USED
AT 10.0 METERS									CA=1006.SQ.METERS		
A	0.1	0.00	677.	0.	0.	131.7	215.2	131.7	1.126E-04	1.113E-04	1.113E-04
A	1.5	0.51	677.	0.	0.	131.7	215.2	131.7	7.507E-06	7.423E-06	7.423E-06
A	3.0	6.04	677.	0.	0.	131.7	215.2	131.7	3.753E-06	3.711E-06	3.711E-06
A	5.0	10.66	677.	0.	0.	131.7	215.2	131.7	2.252E-06	2.227E-06	2.227E-06
A	7.5	0.78	677.	0.	0.	131.7	215.2	131.7	1.501E-06	1.485E-06	1.485E-06
B	0.1	0.00	677.	0.	0.	99.0	71.6	99.0	4.500E-04	4.306E-04	4.306E-04
B	1.5	0.12	677.	0.	0.	99.0	71.6	99.0	3.000E-05	2.871E-05	2.871E-05
B	3.0	1.84	677.	0.	0.	99.0	71.6	99.0	1.500E-05	1.435E-05	1.435E-05
B	5.0	2.90	677.	0.	0.	99.0	71.6	99.0	9.000E-06	8.612E-06	8.612E-06
B	7.5	0.39	677.	0.	0.	99.0	71.6	99.0	6.000E-06	5.741E-06	5.741E-06
C	0.1	0.00	677.	0.	0.	75.2	42.8	75.2	9.907E-04	9.012E-04	9.012E-04
C	1.5	0.27	677.	0.	0.	75.2	42.8	75.2	6.605E-05	6.008E-05	6.008E-05
C	3.0	2.63	677.	0.	0.	75.2	42.8	75.2	3.302E-05	3.004E-05	3.004E-05
C	5.0	3.17	677.	0.	0.	75.2	42.8	75.2	1.981E-05	1.802E-05	1.802E-05
C	7.5	0.78	677.	0.	0.	75.2	42.8	75.2	1.321E-05	1.202E-05	1.202E-05
D	0.1	0.08	677.	0.	0.	53.0	23.3	105.9	1.291E-03	2.051E-03	1.291E-03
D	1.5	1.84	677.	0.	0.	53.0	23.3	105.9	8.608E-05	1.367E-04	8.608E-05
D	3.0	9.72	677.	0.	0.	53.0	23.3	82.1	5.550E-05	6.837E-05	5.550E-05
D	5.0	24.33	677.	0.	0.	53.0	23.3	59.5	4.596E-05	4.102E-05	4.102E-05
D	7.5	8.15	677.	0.	0.	53.0	23.3	53.0	3.443E-05	2.735E-05	2.735E-05
D	10.0	0.12	677.	0.	0.	53.0	23.3	53.0	2.582E-05	2.051E-05	2.051E-05
E	0.1	0.07	677.	0.	0.	37.7	16.2	113.0	1.746E-03	3.437E-03	1.746E-03
E	1.5	2.23	677.	0.	0.	37.7	16.2	113.0	1.164E-04	2.292E-04	1.164E-04
E	3.0	7.76	677.	0.	0.	37.7	16.2	75.7	8.688E-05	1.146E-04	8.688E-05
E	5.0	8.70	677.	0.	0.	37.7	16.2	45.4	8.688E-05	6.875E-05	6.875E-05

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

E	7.5	2.11	677.	0.	0.	37.7	16.2	37.7	6.985E-05	4.583E-05	4.583E-05
E	10.0	0.12	677.	0.	0.	37.7	16.2	37.7	5.239E-05	3.437E-05	3.437E-05
F	0.1	0.02	677.	0.	0.	26.0	10.3	104.0	2.975E-03	5.432E-03	2.975E-03
F	1.5	1.06	677.	0.	0.	26.0	10.3	104.0	1.983E-04	3.621E-04	1.983E-04
F	3.0	1.84	677.	0.	0.	26.0	10.3	62.7	1.644E-04	1.811E-04	1.644E-04
F	5.0	0.27	677.	0.	0.	26.0	10.3	32.9	1.879E-04	1.086E-04	1.086E-04
G	0.1	0.01	677.	0.	0.	17.9	6.6	107.6	4.504E-03	9.007E-03	4.504E-03
G	1.5	0.66	677.	0.	0.	17.9	6.6	107.6	3.003E-04	6.004E-04	3.003E-04
G	3.0	0.78	677.	0.	0.	17.9	6.6	56.0	2.885E-04	3.002E-04	2.885E-04

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OSITE EXCLUSION BOUNDARY CALCULATIONS:

0 NE SECTOR BOUNDARY DISTANCE = 677.0 METERS  
 OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED  
 AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

OBELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	4.504E-03	2.975E-03	1.746E-03	1.291E-03	9.012E-04	4.306E-04	3.003E-04	2.885E-04	1.983E-04	1.644E-04
	0.006	0.027	0.096	0.179	0.183	0.184	0.848	1.633	2.690	4.532
	0.00047	0.00203	0.00730	0.01364	0.01394	0.01401	0.06453	0.12423	0.20460	0.34466
0	1.164E-04	1.113E-04	1.086E-04	8.688E-05	8.608E-05	6.875E-05	6.008E-05	5.550E-05	4.583E-05	4.102E-05
	6.766	6.768	7.040	14.799	16.641	25.336	25.608	35.329	37.443	61.777
	0.51458	0.51473	0.53540	1.12553	1.26560	1.92690	1.94757	2.68695	2.84768	4.69843
0	3.437E-05	3.004E-05	2.871E-05	2.735E-05	2.051E-05	1.802E-05	1.435E-05	1.202E-05	8.612E-06	7.423E-06
	61.898	64.525	64.646	72.797	72.918	76.088	77.930	78.715	81.613	82.127
	4.70762	4.90739	4.91657	5.53655	5.54573	5.78683	5.92690	5.98661	6.20704	6.24608
0	5.741E-06	3.711E-06	2.227E-06	1.485E-06						
	82.519	88.557	99.215	100.000						
	6.27593	6.73517	7.54573	7.60544						

0 X/Q PERCENTILES

(BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED

CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS

SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 2) = 0.002  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 0.007  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 0.014  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5) = 0.344  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 6) = 1.925  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 7) = 4.695  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 8) = 5.533

4.604E-04	0.076	1.000
2.208E-04	0.228	3.000
1.571E-04	0.380	5.000
1.126E-04	0.761	10.000
9.148E-05	1.141	15.000
7.841E-05	1.521	20.000
6.927E-05	1.901	25.000
6.270E-05	2.282	30.000
5.752E-05	2.662	35.000
5.329E-05	3.042	40.000
4.975E-05	3.422	45.000
4.672E-05	3.803	50.000
4.409E-05	4.183	55.000
4.178E-05	4.563	60.000
3.623E-05	4.944	65.000
3.017E-05	5.324	70.000
0	1.381E-04	0.5
		6.57

0ANNUAL AVERAGE = 1.10E-05

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE ENE SECTOR.

CLASS	METER/SEC AT 10.0 METERS	PERCENT	DISTANCE METERS	TERRAIN METERS	HT METERS	EFF METERS	PLUME METERS	HT METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)		
												MEANDER	BLDG WAKE	USED
A	0.1	0.00	677.	0.	0.	131.7	215.2	131.7	1.126E-04	1.113E-04	1.113E-04			
A	1.5	1.13	677.	0.	0.	131.7	215.2	131.7	7.507E-06	7.423E-06	7.423E-06			
A	3.0	15.04	677.	0.	0.	131.7	215.2	131.7	3.753E-06	3.711E-06	3.711E-06			
A	5.0	10.61	677.	0.	0.	131.7	215.2	131.7	2.252E-06	2.227E-06	2.227E-06			
A	7.5	0.62	677.	0.	0.	131.7	215.2	131.7	1.501E-06	1.485E-06	1.485E-06			
B	0.1	0.01	677.	0.	0.	99.0	71.6	99.0	4.500E-04	4.306E-04	4.306E-04			

CA=1006.SQ.METERS



**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

B	1.5	0.80	677.	0.	0.	99.0	71.6	99.0	3.000E-05	2.871E-05	2.871E-05
B	3.0	1.74	677.	0.	0.	99.0	71.6	99.0	1.500E-05	1.435E-05	1.435E-05
B	5.0	2.54	677.	0.	0.	99.0	71.6	99.0	9.000E-06	8.612E-06	8.612E-06
B	7.5	0.15	677.	0.	0.	99.0	71.6	99.0	6.000E-06	5.741E-06	5.741E-06
C	0.1	0.01	677.	0.	0.	75.2	42.8	75.2	9.907E-04	9.012E-04	9.012E-04
C	1.5	0.47	677.	0.	0.	75.2	42.8	75.2	6.605E-05	6.008E-05	6.008E-05
C	3.0	1.42	677.	0.	0.	75.2	42.8	75.2	3.302E-05	3.004E-05	3.004E-05
C	5.0	2.22	677.	0.	0.	75.2	42.8	75.2	1.981E-05	1.802E-05	1.802E-05
C	7.5	0.47	677.	0.	0.	75.2	42.8	75.2	1.321E-05	1.202E-05	1.202E-05
D	0.1	0.14	677.	0.	0.	53.0	23.3	105.9	1.291E-03	2.051E-03	1.291E-03
D	1.5	3.16	677.	0.	0.	53.0	23.3	105.9	8.608E-05	1.367E-04	8.608E-05
D	3.0	7.45	677.	0.	0.	53.0	23.3	82.1	5.550E-05	6.837E-05	5.550E-05
D	5.0	16.46	677.	0.	0.	53.0	23.3	59.5	4.596E-05	4.102E-05	4.102E-05
D	7.5	9.81	677.	0.	0.	53.0	23.3	53.0	3.443E-05	2.735E-05	2.735E-05
D	10.0	1.13	677.	0.	0.	53.0	23.3	53.0	2.582E-05	2.051E-05	2.051E-05
E	0.1	0.06	677.	0.	0.	37.7	16.2	113.0	1.746E-03	3.437E-03	1.746E-03
E	1.5	2.07	677.	0.	0.	37.7	16.2	113.0	1.164E-04	2.292E-04	1.164E-04
E	3.0	8.07	677.	0.	0.	37.7	16.2	75.7	8.688E-05	1.146E-04	8.688E-05
E	5.0	7.59	677.	0.	0.	37.7	16.2	45.4	8.688E-05	6.875E-05	6.875E-05
E	7.5	2.69	677.	0.	0.	37.7	16.2	37.7	6.985E-05	4.583E-05	4.583E-05
E	10.0	0.15	677.	0.	0.	37.7	16.2	37.7	5.239E-05	3.437E-05	3.437E-05
F	0.1	0.02	677.	0.	0.	26.0	10.3	104.0	2.975E-03	5.432E-03	2.975E-03
F	1.5	1.27	677.	0.	0.	26.0	10.3	104.0	1.983E-04	3.621E-04	1.983E-04
F	3.0	1.74	677.	0.	0.	26.0	10.3	62.7	1.644E-04	1.811E-04	1.644E-04
F	5.0	0.33	677.	0.	0.	26.0	10.3	32.9	1.879E-04	1.086E-04	1.086E-04
F	7.5	0.15	677.	0.	0.	26.0	10.3	26.0	1.586E-04	7.243E-05	7.243E-05
G	0.1	0.00	677.	0.	0.	17.9	6.6	107.6	4.504E-03	9.007E-03	4.504E-03
G	1.5	0.33	677.	0.	0.	17.9	6.6	107.6	3.003E-04	6.004E-04	3.003E-04
G	3.0	0.15	677.	0.	0.	17.9	6.6	56.0	2.885E-04	3.002E-04	2.885E-04

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades

METEOROLOGICAL INSTRUMENTATION

DATA PERIOD: 1999-2003

WIND SENSORS HEIGHT: 10 Meters DT

TYPE OF RELEASE: Ground Level Release

DELTA-T HEIGHTS: from 10m to 60m

SOURCE OF DATA: Data from onsite met tower

COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OSITE EXCLUSION BOUNDARY CALCULATIONS:

0 ENE SECTOR BOUNDARY DISTANCE = 677.0 METERS

OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED

AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5  
 CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.  
 OBELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.  
 THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.  
 THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	4.504E-03	2.975E-03	1.746E-03	1.291E-03	9.012E-04	4.306E-04	3.003E-04	2.885E-04	1.983E-04	1.644E-04
	0.003	0.028	0.092	0.235	0.242	0.248	0.575	0.721	1.992	3.737
	0.00019	0.00175	0.00582	0.01485	0.01528	0.01569	0.03635	0.04554	0.12590	0.23612
0	1.164E-04	1.113E-04	1.086E-04	8.688E-05	8.608E-05	7.243E-05	6.875E-05	6.008E-05	5.550E-05	4.583E-05
	5.808	5.812	6.139	14.206	17.368	17.513	25.108	25.580	33.029	35.718
	0.36701	0.36728	0.38795	0.89771	1.09748	1.10666	1.58657	1.61642	2.08714	2.25706
0	4.102E-05	3.437E-05	3.004E-05	2.871E-05	2.735E-05	2.051E-05	1.802E-05	1.435E-05	1.202E-05	8.612E-06
	52.179	52.325	53.742	54.541	64.353	65.479	67.696	69.440	69.912	72.456
	3.29725	3.30643	3.39598	3.44650	4.06648	4.13766	4.27773	4.38795	4.41780	4.57853
0	7.423E-06	5.741E-06	3.711E-06	2.227E-06	1.485E-06					
	73.582	73.728	88.772	99.382	100.000					
	4.64971	4.65890	5.60953	6.28002	6.31906					

0 X/Q PERCENTILES  
 (BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)  
 0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
 CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 0.015  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 0.367  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 6) = 1.585  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 7) = 3.294  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 8) = 4.063

4.696E-04	0.063	1.000
2.017E-04	0.190	3.000
1.323E-04	0.316	5.000
1.007E-04	0.632	10.000
8.984E-05	0.948	15.000
7.908E-05	1.264	20.000
6.893E-05	1.580	25.000
6.095E-05	1.896	30.000
5.478E-05	2.212	35.000
4.984E-05	2.528	40.000
4.577E-05	2.844	45.000
4.235E-05	3.160	50.000
3.711E-05	3.475	55.000
3.137E-05	3.791	60.000
0 1.073E-04	0.5	7.91

0ANNUAL AVERAGE = 8.90E-06  
 1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: Wed Apr 14 10:41:55 2004

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

/PLANT NAME: Palisades										METEOROLOGICAL INSTRUMENTATION			
DATA PERIOD: 1999-2003										WIND SENSORS HEIGHT: 10 Meters DT			
TYPE OF RELEASE: Ground Level Release										DELTA-T HEIGHTS: from 10m to 60m			
SOURCE OF DATA: Data from onsite met tower													
COMMENTS: NONE													
PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145													
PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE E SECTOR.													
CLASS	METER/SEC	FREQUENCY PERCENT	DISTANCE METERS	TERRAIN METERS	HT METERS	EFF PLUME METERS	HT METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)		
AT 10.0 METERS										MEANDER	BLDG WAKE	USED	
										CA=1006.SQ.METERS			
A	0.1	0.01	677.	0.	0.	0.	0.	131.7	215.2	131.7	1.126E-04	1.113E-04	1.113E-04
A	1.5	2.39	677.	0.	0.	0.	0.	131.7	215.2	131.7	7.507E-06	7.423E-06	7.423E-06
A	3.0	13.79	677.	0.	0.	0.	0.	131.7	215.2	131.7	3.753E-06	3.711E-06	3.711E-06
A	5.0	4.82	677.	0.	0.	0.	0.	131.7	215.2	131.7	2.252E-06	2.227E-06	2.227E-06
A	7.5	0.48	677.	0.	0.	0.	0.	131.7	215.2	131.7	1.501E-06	1.485E-06	1.485E-06
B	0.1	0.00	677.	0.	0.	0.	0.	99.0	71.6	99.0	4.500E-04	4.306E-04	4.306E-04
B	1.5	0.62	677.	0.	0.	0.	0.	99.0	71.6	99.0	3.000E-05	2.871E-05	2.871E-05
B	3.0	1.29	677.	0.	0.	0.	0.	99.0	71.6	99.0	1.500E-05	1.435E-05	1.435E-05
B	5.0	0.81	677.	0.	0.	0.	0.	99.0	71.6	99.0	9.000E-06	8.612E-06	8.612E-06
B	7.5	0.33	677.	0.	0.	0.	0.	99.0	71.6	99.0	6.000E-06	5.741E-06	5.741E-06
C	0.1	0.01	677.	0.	0.	0.	0.	75.2	42.8	75.2	9.907E-04	9.012E-04	9.012E-04
C	1.5	0.48	677.	0.	0.	0.	0.	75.2	42.8	75.2	6.605E-05	6.008E-05	6.008E-05
C	3.0	1.43	677.	0.	0.	0.	0.	75.2	42.8	75.2	3.302E-05	3.004E-05	3.004E-05
C	5.0	1.29	677.	0.	0.	0.	0.	75.2	42.8	75.2	1.981E-05	1.802E-05	1.802E-05
C	7.5	0.33	677.	0.	0.	0.	0.	75.2	42.8	75.2	1.321E-05	1.202E-05	1.202E-05
D	0.1	0.09	677.	0.	0.	0.	0.	53.0	23.3	105.9	1.291E-03	2.051E-03	1.291E-03
D	1.5	1.91	677.	0.	0.	0.	0.	53.0	23.3	105.9	8.608E-05	1.367E-04	8.608E-05
D	3.0	7.35	677.	0.	0.	0.	0.	53.0	23.3	82.1	5.550E-05	6.837E-05	5.550E-05
D	5.0	20.18	677.	0.	0.	0.	0.	53.0	23.3	59.5	4.596E-05	4.102E-05	4.102E-05
D	7.5	16.84	677.	0.	0.	0.	0.	53.0	23.3	53.0	3.443E-05	2.735E-05	2.735E-05
D	10.0	3.68	677.	0.	0.	0.	0.	53.0	23.3	53.0	2.582E-05	2.051E-05	2.051E-05
D	15.0	0.48	677.	0.	0.	0.	0.	53.0	23.3	53.0	1.722E-05	1.367E-05	1.367E-05
E	0.1	0.07	677.	0.	0.	0.	0.	37.7	16.2	113.0	1.746E-03	3.437E-03	1.746E-03
E	1.5	2.10	677.	0.	0.	0.	0.	37.7	16.2	113.0	1.164E-04	2.292E-04	1.164E-04
E	3.0	5.92	677.	0.	0.	0.	0.	37.7	16.2	75.7	8.688E-05	1.146E-04	8.688E-05
E	5.0	6.87	677.	0.	0.	0.	0.	37.7	16.2	45.4	8.688E-05	6.875E-05	6.875E-05
E	7.5	2.10	677.	0.	0.	0.	0.	37.7	16.2	37.7	6.985E-05	4.583E-05	4.583E-05
E	10.0	0.33	677.	0.	0.	0.	0.	37.7	16.2	37.7	5.239E-05	3.437E-05	3.437E-05
F	0.1	0.02	677.	0.	0.	0.	0.	26.0	10.3	104.0	2.975E-03	5.432E-03	2.975E-03
F	1.5	0.96	677.	0.	0.	0.	0.	26.0	10.3	104.0	1.983E-04	3.621E-04	1.983E-04

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

F	3.0	0.96	677.	0.	0.	26.0	10.3	62.7	1.644E-04	1.811E-04	1.644E-04
F	5.0	0.96	677.	0.	0.	26.0	10.3	32.9	1.879E-04	1.086E-04	1.086E-04
F	7.5	0.33	677.	0.	0.	26.0	10.3	26.0	1.586E-04	7.243E-05	7.243E-05
G	0.1	0.00	677.	0.	0.	17.9	6.6	107.6	4.504E-03	9.007E-03	4.504E-03
G	1.5	0.33	677.	0.	0.	17.9	6.6	107.6	3.003E-04	6.004E-04	3.003E-04
G	3.0	0.48	677.	0.	0.	17.9	6.6	56.0	2.885E-04	3.002E-04	2.885E-04

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0                      RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades    METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003    WIND SENSORS HEIGHT: 10 Meters                      DT  
 TYPE OF RELEASE: Ground Level Release    DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OSITE EXCLUSION BOUNDARY CALCULATIONS:

0 E SECTOR                      BOUNDARY DISTANCE = 677.0 METERS  
 OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED  
 AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.  
 BUILDING WAKE CREDIT ALLOWED: C= 0.5                      A= 2011.                      D= 58.5  
 CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

0BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.  
 THE TOP NUMBER IS THE CHI/Q.                      THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.  
 THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	4.504E-03	2.975E-03	1.746E-03	1.291E-03	9.012E-04	4.306E-04	3.003E-04	2.885E-04	1.983E-04	1.644E-04
	0.003	0.022	0.087	0.173	0.180	0.185	0.516	0.994	1.950	2.905
	0.00019	0.00135	0.00541	0.01081	0.01125	0.01156	0.03222	0.06208	0.12178	0.18148
0	1.164E-04	1.113E-04	1.086E-04	8.688E-05	8.608E-05	7.243E-05	6.875E-05	6.008E-05	5.550E-05	4.583E-05
	5.001	5.010	5.966	11.884	13.796	14.127	21.001	21.479	28.831	30.926
	0.31236	0.31294	0.37264	0.74233	0.86173	0.88240	1.31179	1.34164	1.80088	1.93177
0	4.102E-05	3.437E-05	3.004E-05	2.871E-05	2.735E-05	2.051E-05	1.802E-05	1.435E-05	1.367E-05	1.202E-05
	51.108	51.439	52.873	53.498	70.334	74.010	75.297	76.583	77.061	77.392
	3.19239	3.21305	3.30261	3.34164	4.39331	4.62293	4.70329	4.78366	4.81351	4.83418
0	8.612E-06	7.423E-06	5.741E-06	3.711E-06	2.227E-06	1.485E-06				
	78.201	80.590	80.921	94.706	99.522	100.000				
	4.88470	5.03395	5.05462	5.91569	6.21650	6.24635				

0 X/Q PERCENTILES  
 (BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
 CHI/Q                      WITH RESPECT TO                      WHEN THE WIND BLOWS  
 SEC/CUBIC METER                      THE TOTAL TIME                      INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.                      XSAVE( 3)= 0.005  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.                      XSAVE( 4)= 0.011

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5) = 0.372  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 7) = 3.189  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 8) = 4.390

4.124E-04	0.062	1.000
1.862E-04	0.187	3.000
1.252E-04	0.312	5.000
9.437E-05	0.625	10.000
8.242E-05	0.937	15.000
7.073E-05	1.249	20.000
6.256E-05	1.562	25.000
5.643E-05	1.874	30.000
5.160E-05	2.186	35.000
4.766E-05	2.499	40.000
4.438E-05	2.811	45.000
4.159E-05	3.123	50.000
3.745E-05	3.435	55.000
3.356E-05	3.748	60.000
3.030E-05	4.060	65.000
2.752E-05	4.372	70.000
0 1.004E-04	0.5	8.00

0ANNUAL AVERAGE = 8.09E-06

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145  
 0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE ESE SECTOR.

CLASS	METER/SEC	PERCENT	DISTANCE METERS	TERRAIN HT METERS	EFF PLUME HT METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)			
									MEANDER	BLDG WAKE	USED	
AT 10.0 METERS										CA=1006.SQ.METERS		
A	0.1	0.01	677.	0.	0.	131.7	215.2	131.7	1.126E-04	1.113E-04	1.113E-04	
A	1.5	2.74	677.	0.	0.	131.7	215.2	131.7	7.507E-06	7.423E-06	7.423E-06	
A	3.0	16.55	677.	0.	0.	131.7	215.2	131.7	3.753E-06	3.711E-06	3.711E-06	
A	5.0	3.90	677.	0.	0.	131.7	215.2	131.7	2.252E-06	2.227E-06	2.227E-06	
A	7.5	0.56	677.	0.	0.	131.7	215.2	131.7	1.501E-06	1.485E-06	1.485E-06	
B	0.1	0.01	677.	0.	0.	99.0	71.6	99.0	4.500E-04	4.306E-04	4.306E-04	
B	1.5	0.73	677.	0.	0.	99.0	71.6	99.0	3.000E-05	2.871E-05	2.871E-05	
B	3.0	1.02	677.	0.	0.	99.0	71.6	99.0	1.500E-05	1.435E-05	1.435E-05	
B	5.0	1.29	677.	0.	0.	99.0	71.6	99.0	9.000E-06	8.612E-06	8.612E-06	
B	7.5	0.30	677.	0.	0.	99.0	71.6	99.0	6.000E-06	5.741E-06	5.741E-06	
C	0.1	0.01	677.	0.	0.	75.2	42.8	75.2	9.907E-04	9.012E-04	9.012E-04	

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

C	1.5	0.43	677.	0.	0.	75.2	42.8	75.2	6.605E-05	6.008E-05	6.008E-05
C	3.0	1.16	677.	0.	0.	75.2	42.8	75.2	3.302E-05	3.004E-05	3.004E-05
C	5.0	2.01	677.	0.	0.	75.2	42.8	75.2	1.981E-05	1.802E-05	1.802E-05
C	7.5	0.73	677.	0.	0.	75.2	42.8	75.2	1.321E-05	1.202E-05	1.202E-05
D	0.1	0.09	677.	0.	0.	53.0	23.3	105.9	1.291E-03	2.051E-03	1.291E-03
D	1.5	2.01	677.	0.	0.	53.0	23.3	105.9	8.608E-05	1.367E-04	8.608E-05
D	3.0	7.50	677.	0.	0.	53.0	23.3	82.1	5.550E-05	6.837E-05	5.550E-05
D	5.0	25.33	677.	0.	0.	53.0	23.3	59.5	4.596E-05	4.102E-05	4.102E-05
D	7.5	15.69	677.	0.	0.	53.0	23.3	53.0	3.443E-05	2.735E-05	2.735E-05
D	10.0	1.29	677.	0.	0.	53.0	23.3	53.0	2.582E-05	2.051E-05	2.051E-05
D	15.0	0.13	677.	0.	0.	53.0	23.3	53.0	1.722E-05	1.367E-05	1.367E-05
E	0.1	0.06	677.	0.	0.	37.7	16.2	113.0	1.746E-03	3.437E-03	1.746E-03
E	1.5	1.88	677.	0.	0.	37.7	16.2	113.0	1.164E-04	2.292E-04	1.164E-04
E	3.0	5.48	677.	0.	0.	37.7	16.2	75.7	8.688E-05	1.146E-04	8.688E-05
E	5.0	4.89	677.	0.	0.	37.7	16.2	45.4	8.688E-05	6.875E-05	6.875E-05
E	7.5	1.29	677.	0.	0.	37.7	16.2	37.7	6.985E-05	4.583E-05	4.583E-05
F	0.1	0.01	677.	0.	0.	26.0	10.3	104.0	2.975E-03	5.432E-03	2.975E-03
F	1.5	0.73	677.	0.	0.	26.0	10.3	104.0	1.983E-04	3.621E-04	1.983E-04
F	3.0	1.02	677.	0.	0.	26.0	10.3	62.7	1.644E-04	1.811E-04	1.644E-04
F	5.0	0.30	677.	0.	0.	26.0	10.3	32.9	1.879E-04	1.086E-04	1.086E-04
G	0.1	0.01	677.	0.	0.	17.9	6.6	107.6	4.504E-03	9.007E-03	4.504E-03
G	1.5	0.56	677.	0.	0.	17.9	6.6	107.6	3.003E-04	6.004E-04	3.003E-04
G	3.0	0.30	677.	0.	0.	17.9	6.6	56.0	2.885E-04	3.002E-04	2.885E-04

IUSNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OSITE EXCLUSION BOUNDARY CALCULATIONS:

0 ESE SECTOR BOUNDARY DISTANCE = 677.0 METERS  
 OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED  
 AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.  
 BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

OBELow ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	4.504E-03	2.975E-03	1.746E-03	1.291E-03	9.012E-04	4.306E-04	3.003E-04	2.885E-04	1.983E-04	1.644E-04
	0.005	0.019	0.078	0.169	0.175	0.181	0.742	1.040	1.766	2.790

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

	0.00036	0.00134	0.00541	0.01174	0.01217	0.01258	0.05161	0.07228	0.12279	0.19398
0	1.164E-04	1.113E-04	1.086E-04	8.688E-05	8.608E-05	6.875E-05	6.008E-05	5.550E-05	4.583E-05	4.102E-05
	4.673	4.683	4.980	10.463	12.478	17.366	17.795	25.292	26.580	51.912
	0.32486	0.32560	0.34626	0.72743	0.86750	1.20734	1.23719	1.75843	1.84798	3.60918
0	3.004E-05	2.871E-05	2.735E-05	2.051E-05	1.802E-05	1.435E-05	1.367E-05	1.202E-05	8.612E-06	7.423E-06
	53.068	53.795	69.483	70.771	72.785	73.809	73.941	74.668	75.956	78.697
	3.68955	3.74006	4.83076	4.92032	5.06038	5.13157	5.14075	5.19127	5.28082	5.47141
0	5.741E-06	3.711E-06	2.227E-06	1.485E-06						
	78.995	95.541	99.439	100.000						
	5.49207	6.64247	6.91343	6.95246						

0 X/Q PERCENTILES  
 (BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)  
 0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
 CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 2) = 0.001  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 3) = 0.012  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 4) = 0.324  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 6) = 3.606  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 7) = 4.827

	3.845E-04	0.070	1.000
	1.669E-04	0.209	3.000
	1.141E-04	0.348	5.000
	9.241E-05	0.695	10.000
	7.887E-05	1.043	15.000
	6.849E-05	1.390	20.000
	6.116E-05	1.738	25.000
	5.560E-05	2.086	30.000
	5.118E-05	2.433	35.000
	4.757E-05	2.781	40.000
	4.453E-05	3.129	45.000
	4.192E-05	3.476	50.000
	3.792E-05	3.824	55.000
	3.363E-05	4.171	60.000
	3.007E-05	4.519	65.000
0	1.024E-04	0.5	7.19

0ANNUAL AVERAGE = 8.91E-06  
 1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

**NUMERICAL APPLICATIONS, Inc.**  
Determination of Atmospheric Dispersion Factors for Palisades  
Calculation Number: NAI-1149-002, Rev. 0

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145  
OPARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE SE SECTOR.

CLASS	WINDSPEED METER/SEC AT 10.0 METERS	FREQUENCY PERCENT	DISTANCE METERS	TERRAIN METERS	HT METERS	EFF METERS	PLUME METERS	HT METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)		
												MEANDER	BLDG WAKE	USED
												CA=1006.SQ.METERS		
A	0.1	0.01	677.	0.	0.	0.	131.7	215.2	131.7	1.126E-04	1.113E-04	1.113E-04		
A	1.5	3.12	677.	0.	0.	0.	131.7	215.2	131.7	7.507E-06	7.423E-06	7.423E-06		
A	3.0	18.57	677.	0.	0.	0.	131.7	215.2	131.7	3.753E-06	3.711E-06	3.711E-06		
A	5.0	7.14	677.	0.	0.	0.	131.7	215.2	131.7	2.252E-06	2.227E-06	2.227E-06		
A	7.5	0.69	677.	0.	0.	0.	131.7	215.2	131.7	1.501E-06	1.485E-06	1.485E-06		
B	0.1	0.00	677.	0.	0.	0.	99.0	71.6	99.0	4.500E-04	4.306E-04	4.306E-04		
B	1.5	0.34	677.	0.	0.	0.	99.0	71.6	99.0	3.000E-05	2.871E-05	2.871E-05		
B	3.0	1.61	677.	0.	0.	0.	99.0	71.6	99.0	1.500E-05	1.435E-05	1.435E-05		
B	5.0	1.51	677.	0.	0.	0.	99.0	71.6	99.0	9.000E-06	8.612E-06	8.612E-06		
B	7.5	0.45	677.	0.	0.	0.	99.0	71.6	99.0	6.000E-06	5.741E-06	5.741E-06		
C	0.1	0.01	677.	0.	0.	0.	75.2	42.8	75.2	9.907E-04	9.012E-04	9.012E-04		
C	1.5	0.69	677.	0.	0.	0.	75.2	42.8	75.2	6.605E-05	6.008E-05	6.008E-05		
C	3.0	1.51	677.	0.	0.	0.	75.2	42.8	75.2	3.302E-05	3.004E-05	3.004E-05		
C	5.0	1.85	677.	0.	0.	0.	75.2	42.8	75.2	1.981E-05	1.802E-05	1.802E-05		
C	7.5	0.93	677.	0.	0.	0.	75.2	42.8	75.2	1.321E-05	1.202E-05	1.202E-05		
D	0.1	0.13	677.	0.	0.	0.	53.0	23.3	105.9	1.291E-03	2.051E-03	1.291E-03		
D	1.5	2.88	677.	0.	0.	0.	53.0	23.3	105.9	8.608E-05	1.367E-04	8.608E-05		
D	3.0	7.38	677.	0.	0.	0.	53.0	23.3	82.1	5.550E-05	6.837E-05	5.550E-05		
D	5.0	16.82	677.	0.	0.	0.	53.0	23.3	59.5	4.596E-05	4.102E-05	4.102E-05		
D	7.5	16.37	677.	0.	0.	0.	53.0	23.3	53.0	3.443E-05	2.735E-05	2.735E-05		
D	10.0	3.57	677.	0.	0.	0.	53.0	23.3	53.0	2.582E-05	2.051E-05	2.051E-05		
D	15.0	0.34	677.	0.	0.	0.	53.0	23.3	53.0	1.722E-05	1.367E-05	1.367E-05		
E	0.1	0.09	677.	0.	0.	0.	37.7	16.2	113.0	1.746E-03	3.437E-03	1.746E-03		
E	1.5	2.78	677.	0.	0.	0.	37.7	16.2	113.0	1.164E-04	2.292E-04	1.164E-04		
E	3.0	4.73	677.	0.	0.	0.	37.7	16.2	75.7	8.688E-05	1.146E-04	8.688E-05		
E	5.0	3.23	677.	0.	0.	0.	37.7	16.2	45.4	8.688E-05	6.875E-05	6.875E-05		
E	7.5	0.93	677.	0.	0.	0.	37.7	16.2	37.7	6.985E-05	4.583E-05	4.583E-05		
F	0.1	0.02	677.	0.	0.	0.	26.0	10.3	104.0	2.975E-03	5.432E-03	2.975E-03		
F	1.5	1.03	677.	0.	0.	0.	26.0	10.3	104.0	1.983E-04	3.621E-04	1.983E-04		
F	3.0	0.58	677.	0.	0.	0.	26.0	10.3	62.7	1.644E-04	1.811E-04	1.644E-04		
F	5.0	0.11	677.	0.	0.	0.	26.0	10.3	32.9	1.879E-04	1.086E-04	1.086E-04		
G	0.1	0.00	677.	0.	0.	0.	17.9	6.6	107.6	4.504E-03	9.007E-03	4.504E-03		
G	1.5	0.24	677.	0.	0.	0.	17.9	6.6	107.6	3.003E-04	6.004E-04	3.003E-04		
G	3.0	0.34	677.	0.	0.	0.	17.9	6.6	56.0	2.885E-04	3.002E-04	2.885E-04		



**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE  
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OSITE EXCLUSION BOUNDARY CALCULATIONS:

0 SE SECTOR BOUNDARY DISTANCE = 677.0 METERS  
 OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED  
 AS A FUNCTION OF DOWNWIND DISTANCE.  
 MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5  
 CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

0BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.  
 THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	4.504E-03	2.975E-03	1.746E-03	1.291E-03	9.012E-04	4.306E-04	3.003E-04	2.885E-04	1.983E-04	1.644E-04
	0.002	0.022	0.108	0.239	0.249	0.252	0.490	0.833	1.865	2.447
	0.00019	0.00193	0.00942	0.02073	0.02160	0.02184	0.04250	0.07236	0.16191	0.21242
0	1.164E-04	1.113E-04	1.086E-04	8.688E-05	8.608E-05	6.875E-05	6.008E-05	5.550E-05	4.583E-05	4.102E-05
	5.224	5.236	5.342	10.076	12.959	16.185	16.873	24.252	25.178	41.999
	0.45353	0.45457	0.46376	0.87478	1.12507	1.40520	1.46491	2.10555	2.18592	3.64631
0	3.004E-05	2.871E-05	2.735E-05	2.051E-05	1.802E-05	1.435E-05	1.367E-05	1.202E-05	8.612E-06	7.423E-06
	43.506	43.850	60.222	63.792	65.644	67.257	67.601	68.527	70.034	73.155
	3.77719	3.80704	5.22840	5.53838	5.69912	5.83919	5.86904	5.94941	6.08029	6.35124
0	5.741E-06	3.711E-06	2.227E-06	1.485E-06						
	73.605	92.171	99.312	100.000						
	6.39028	8.00222	8.62220	8.68190						

0 X/Q PERCENTILES

(BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
 CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 0.009  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 0.021  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5) = 0.453  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 7) = 3.643  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 8) = 5.225

4.559E-04	0.087	1.000
1.885E-04	0.260	3.000
1.211E-04	0.434	5.000
9.414E-05	0.868	10.000
7.904E-05	1.302	15.000

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

6.648E-05	1.736	20.000
5.784E-05	2.170	25.000
5.144E-05	2.605	30.000
4.645E-05	3.039	35.000
4.243E-05	3.473	40.000
3.804E-05	3.907	45.000
3.383E-05	4.341	50.000
3.037E-05	4.775	55.000
2.747E-05	5.209	60.000
0	1.129E-04	0.5
		5.76

0ANNUAL AVERAGE = 1.14E-05

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE SSE SECTOR.

CLASS	WINDSPEED METER/SEC AT 10.0 METERS	FREQUENCY PERCENT	DISTANCE METERS	TERRAIN METERS	HT METERS	EFF METERS	PLUME METERS	HT METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)		
												MEANDER	BLDG WAKE	USED
CA=1006.SQ.METERS														
A	0.1	0.00	677.	0.	0.	0.	131.7	215.2	131.7	1.126E-04	1.113E-04	1.113E-04		
A	1.5	0.86	677.	0.	0.	0.	131.7	215.2	131.7	7.507E-06	7.423E-06	7.423E-06		
A	3.0	13.51	677.	0.	0.	0.	131.7	215.2	131.7	3.753E-06	3.711E-06	3.711E-06		
A	5.0	11.93	677.	0.	0.	0.	131.7	215.2	131.7	2.252E-06	2.227E-06	2.227E-06		
A	7.5	1.59	677.	0.	0.	0.	131.7	215.2	131.7	1.501E-06	1.485E-06	1.485E-06		
A	10.0	0.32	677.	0.	0.	0.	131.7	215.2	131.7	1.126E-06	1.113E-06	1.113E-06		
B	0.1	0.00	677.	0.	0.	0.	99.0	71.6	99.0	4.500E-04	4.306E-04	4.306E-04		
B	1.5	0.54	677.	0.	0.	0.	99.0	71.6	99.0	3.000E-05	2.871E-05	2.871E-05		
B	3.0	1.49	677.	0.	0.	0.	99.0	71.6	99.0	1.500E-05	1.435E-05	1.435E-05		
B	5.0	1.91	677.	0.	0.	0.	99.0	71.6	99.0	9.000E-06	8.612E-06	8.612E-06		
B	7.5	0.64	677.	0.	0.	0.	99.0	71.6	99.0	6.000E-06	5.741E-06	5.741E-06		
B	10.0	0.10	677.	0.	0.	0.	99.0	71.6	99.0	4.500E-06	4.306E-06	4.306E-06		
C	0.1	0.01	677.	0.	0.	0.	75.2	42.8	75.2	9.907E-04	9.012E-04	9.012E-04		
C	1.5	0.42	677.	0.	0.	0.	75.2	42.8	75.2	6.605E-05	6.008E-05	6.008E-05		
C	3.0	2.35	677.	0.	0.	0.	75.2	42.8	75.2	3.302E-05	3.004E-05	3.004E-05		
C	5.0	1.81	677.	0.	0.	0.	75.2	42.8	75.2	1.981E-05	1.802E-05	1.802E-05		
C	7.5	0.86	677.	0.	0.	0.	75.2	42.8	75.2	1.321E-05	1.202E-05	1.202E-05		
C	10.0	0.10	677.	0.	0.	0.	75.2	42.8	75.2	9.907E-06	9.012E-06	9.012E-06		
D	0.1	0.15	677.	0.	0.	0.	53.0	23.3	105.9	1.291E-03	2.051E-03	1.291E-03		
D	1.5	3.30	677.	0.	0.	0.	53.0	23.3	105.9	8.608E-05	1.367E-04	8.608E-05		

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

D	3.0	10.75	677.	0.	0.	53.0	23.3	82.1	5.550E-05	6.837E-05	5.550E-05
D	5.0	14.17	677.	0.	0.	53.0	23.3	59.5	4.596E-05	4.102E-05	4.102E-05
D	7.5	11.93	677.	0.	0.	53.0	23.3	53.0	3.443E-05	2.735E-05	2.735E-05
D	10.0	2.88	677.	0.	0.	53.0	23.3	53.0	2.582E-05	2.051E-05	2.051E-05
D	15.0	0.10	677.	0.	0.	53.0	23.3	53.0	1.722E-05	1.367E-05	1.367E-05
E	0.1	0.10	677.	0.	0.	37.7	16.2	113.0	1.746E-03	3.437E-03	1.746E-03
E	1.5	3.20	677.	0.	0.	37.7	16.2	113.0	1.164E-04	2.292E-04	1.164E-04
E	3.0	7.55	677.	0.	0.	37.7	16.2	75.7	8.688E-05	1.146E-04	8.688E-05
E	5.0	3.62	677.	0.	0.	37.7	16.2	45.4	8.688E-05	6.875E-05	6.875E-05
E	7.5	0.64	677.	0.	0.	37.7	16.2	37.7	6.985E-05	4.583E-05	4.583E-05
E	10.0	0.10	677.	0.	0.	37.7	16.2	37.7	5.239E-05	3.437E-05	3.437E-05
F	0.1	0.02	677.	0.	0.	26.0	10.3	104.0	2.975E-03	5.432E-03	2.975E-03
F	1.5	1.17	677.	0.	0.	26.0	10.3	104.0	1.983E-04	3.621E-04	1.983E-04
F	3.0	0.95	677.	0.	0.	26.0	10.3	62.7	1.644E-04	1.811E-04	1.644E-04
F	5.0	0.10	677.	0.	0.	26.0	10.3	32.9	1.879E-04	1.086E-04	1.086E-04
G	0.1	0.00	677.	0.	0.	17.9	6.6	107.6	4.504E-03	9.007E-03	4.504E-03
G	1.5	0.32	677.	0.	0.	17.9	6.6	107.6	3.003E-04	6.004E-04	3.003E-04
G	3.0	0.54	677.	0.	0.	17.9	6.6	56.0	2.885E-04	3.002E-04	2.885E-04

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE  
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OSITE EXCLUSION BOUNDARY CALCULATIONS:

0 SSE SECTOR BOUNDARY DISTANCE = 677.0 METERS

OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED

AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

OBELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	4.504E-03	2.975E-03	1.746E-03	1.291E-03	9.012E-04	4.306E-04	3.003E-04	2.885E-04	1.983E-04	1.644E-04
	0.003	0.026	0.125	0.274	0.280	0.285	0.602	1.140	2.313	3.266
	0.00028	0.00241	0.01176	0.02577	0.02634	0.02674	0.05659	0.10711	0.21733	0.30688
0	1.164E-04	1.113E-04	1.086E-04	8.688E-05	8.608E-05	6.875E-05	6.008E-05	5.550E-05	4.583E-05	4.102E-05
	6.468	6.471	6.569	14.121	17.420	21.037	21.452	32.206	32.841	47.016
	0.60769	0.60800	0.61718	1.32671	1.63670	1.97654	2.01557	3.02591	3.08561	4.41741
0	3.437E-05	3.004E-05	2.871E-05	2.735E-05	2.051E-05	1.802E-05	1.435E-05	1.367E-05	1.202E-05	9.012E-06
	47.114	49.460	49.997	61.924	64.808	66.616	68.107	68.205	69.060	69.158



**NUMERICAL APPLICATIONS, Inc.**  
Determination of Atmospheric Dispersion Factors for Palisades  
Calculation Number: NAI-1149-002, Rev. 0

A	0.1	0.00	677.	0.	0.	131.7	215.2	131.7	1.126E-04	1.113E-04	1.113E-04
A	1.5	1.19	677.	0.	0.	131.7	215.2	131.7	7.507E-06	7.423E-06	7.423E-06
A	3.0	8.30	677.	0.	0.	131.7	215.2	131.7	3.753E-06	3.711E-06	3.711E-06
A	5.0	5.74	677.	0.	0.	131.7	215.2	131.7	2.252E-06	2.227E-06	2.227E-06
A	7.5	0.81	677.	0.	0.	131.7	215.2	131.7	1.501E-06	1.485E-06	1.485E-06
A	10.0	0.08	677.	0.	0.	131.7	215.2	131.7	1.126E-06	1.113E-06	1.113E-06
B	0.1	0.00	677.	0.	0.	99.0	71.6	99.0	4.500E-04	4.306E-04	4.306E-04
B	1.5	0.29	677.	0.	0.	99.0	71.6	99.0	3.000E-05	2.871E-05	2.871E-05
B	3.0	1.09	677.	0.	0.	99.0	71.6	99.0	1.500E-05	1.435E-05	1.435E-05
B	5.0	1.37	677.	0.	0.	99.0	71.6	99.0	9.000E-06	8.612E-06	8.612E-06
B	7.5	0.33	677.	0.	0.	99.0	71.6	99.0	6.000E-06	5.741E-06	5.741E-06
B	10.0	0.04	677.	0.	0.	99.0	71.6	99.0	4.500E-06	4.306E-06	4.306E-06
C	0.1	0.00	677.	0.	0.	75.2	42.8	75.2	9.907E-04	9.012E-04	9.012E-04
C	1.5	0.32	677.	0.	0.	75.2	42.8	75.2	6.605E-05	6.008E-05	6.008E-05
C	3.0	1.38	677.	0.	0.	75.2	42.8	75.2	3.302E-05	3.004E-05	3.004E-05
C	5.0	1.68	677.	0.	0.	75.2	42.8	75.2	1.981E-05	1.802E-05	1.802E-05
C	7.5	0.65	677.	0.	0.	75.2	42.8	75.2	1.321E-05	1.202E-05	1.202E-05
C	10.0	0.03	677.	0.	0.	75.2	42.8	75.2	9.907E-06	9.012E-06	9.012E-06
D	0.1	0.12	677.	0.	0.	53.0	23.3	53.0	2.582E-03	2.051E-03	2.051E-03
D	1.5	2.69	677.	0.	0.	53.0	23.3	53.0	1.722E-04	1.367E-04	1.367E-04
D	3.0	9.80	677.	0.	0.	53.0	23.3	53.0	8.608E-05	6.837E-05	6.837E-05
D	5.0	15.75	677.	0.	0.	53.0	23.3	53.0	5.165E-05	4.102E-05	4.102E-05
D	7.5	9.02	677.	0.	0.	53.0	23.3	53.0	3.443E-05	2.735E-05	2.735E-05
D	10.0	1.39	677.	0.	0.	53.0	23.3	53.0	2.582E-05	2.051E-05	2.051E-05
D	15.0	0.10	677.	0.	0.	53.0	23.3	53.0	1.722E-05	1.367E-05	1.367E-05
E	0.1	0.10	677.	0.	0.	37.7	16.2	37.7	5.239E-03	3.437E-03	3.437E-03
E	1.5	3.33	677.	0.	0.	37.7	16.2	37.7	3.493E-04	2.292E-04	2.292E-04
E	3.0	10.54	677.	0.	0.	37.7	16.2	37.7	1.746E-04	1.146E-04	1.146E-04
E	5.0	6.69	677.	0.	0.	37.7	16.2	37.7	1.048E-04	6.875E-05	6.875E-05
E	7.5	1.55	677.	0.	0.	37.7	16.2	37.7	6.985E-05	4.583E-05	4.583E-05
E	10.0	0.18	677.	0.	0.	37.7	16.2	37.7	5.239E-05	3.437E-05	3.437E-05
E	14.9	0.01	677.	0.	0.	37.7	16.2	37.7	3.493E-05	2.292E-05	2.292E-05
F	0.1	0.04	677.	0.	0.	26.0	10.3	26.0	1.190E-02	5.432E-03	5.432E-03
F	1.5	2.01	677.	0.	0.	26.0	10.3	26.0	7.932E-04	3.621E-04	3.621E-04
F	3.0	4.96	677.	0.	0.	26.0	10.3	26.0	3.966E-04	1.811E-04	1.811E-04
F	5.0	0.89	677.	0.	0.	26.0	10.3	26.0	2.380E-04	1.086E-04	1.086E-04
F	7.5	0.03	677.	0.	0.	26.0	10.3	26.0	1.586E-04	7.243E-05	7.243E-05
F	10.0	0.01	677.	0.	0.	26.0	10.3	26.0	1.190E-04	5.432E-05	5.432E-05
G	0.1	0.01	677.	0.	0.	17.9	6.6	17.9	2.702E-02	9.007E-03	9.007E-03
G	1.5	1.24	677.	0.	0.	17.9	6.6	17.9	1.802E-03	6.004E-04	6.004E-04
G	3.0	5.75	677.	0.	0.	17.9	6.6	17.9	9.008E-04	3.002E-04	3.002E-04

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

G 5.0 0.50 677. 0. 0. 17.9 6.6 17.9 5.405E-04 1.801E-04 1.801E-04  
 1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OSITE EXCLUSION BOUNDARY CALCULATIONS:  
 DIRECTION-INDEPENDENT (S.R.P 2.3.4) MODEL.  
 MINIMUM BOUNDARY DISTANCE = 677.0 METERS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5  
 CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

0BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.  
 THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	9.007E-03	5.432E-03	3.437E-03	2.051E-03	9.012E-04	6.004E-04	4.306E-04	3.621E-04	3.002E-04	2.292E-04
	0.011	0.051	0.154	0.276	0.280	1.525	1.527	3.538	9.293	12.620
	0.01148	0.05052	0.15385	0.27555	0.28014	1.52468	1.52698	3.53846	9.29277	12.61998
0	1.811E-04	1.801E-04	1.367E-04	1.146E-04	1.113E-04	1.086E-04	7.243E-05	6.875E-05	6.837E-05	6.008E-05
	17.584	18.080	20.772	31.307	31.311	32.202	32.232	38.918	48.716	49.033
	17.58438	18.08037	20.77153	31.30654	31.31114	32.20206	32.23191	38.91848	48.71641	49.03329
0	5.432E-05	4.583E-05	4.102E-05	3.437E-05	3.004E-05	2.871E-05	2.735E-05	2.292E-05	2.051E-05	1.802E-05
	49.042	50.597	66.347	66.524	67.904	68.191	77.208	77.217	78.608	80.289
	49.04247	50.59701	66.34672	66.52353	67.90355	68.19057	77.20779	77.21698	78.60848	80.28931
0	1.435E-05	1.367E-05	1.202E-05	9.012E-06	8.612E-06	7.423E-06	5.741E-06	4.306E-06	3.711E-06	2.227E-06
	81.380	81.479	82.129	82.156	83.527	84.716	85.045	85.082	93.378	99.114
	81.38000	81.47874	82.12857	82.15613	83.52696	84.71640	85.04476	85.08150	93.37772	99.11366
0	1.485E-06	1.113E-06								
	99.920	100.000								
	99.91962	99.99999								

0 X/Q PERCENTILES

(BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED

CHI/Q	WITH RESPECT TO	WHEN THE WIND BLOWS
SEC/CUBIC METER	THE TOTAL TIME	INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 2) = 0.050  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 3) = 0.154  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 4) = 18.083

1.381E-03	1.000	1.000
7.269E-04	3.000	3.000
5.175E-04	5.000	5.000
3.067E-04	10.000	10.000

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

2.154E-04	15.000	15.000
1.671E-04	20.000	20.000
1.398E-04	25.000	25.000
1.192E-04	30.000	30.000
1.021E-04	35.000	35.000
8.795E-05	40.000	40.000
7.614E-05	45.000	45.000
6.607E-05	50.000	50.000
5.734E-05	55.000	55.000
4.964E-05	60.000	60.000
4.276E-05	65.000	65.000
3.622E-05	70.000	70.000
3.018E-05	75.000	75.000
2.464E-05	80.000	80.000
1.944E-05	85.000	85.000
1.443E-05	90.000	90.000
0 5.175E-04	5.0	5.00

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0                      RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades    METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003    WIND SENSORS HEIGHT: 10 Meters                      DT  
 TYPE OF RELEASE: Ground Level Release    DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE  
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OSITE EXCLUSION BOUNDARY CALCULATIONS:  
 OFIVE PERCENT OVERALL SITE LIMIT

BUILDING WAKE CREDIT ALLOWED: C= 0.5      A= 2011.      D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

OBELow ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.  
 THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.  
 THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	4.504E-03	2.975E-03	1.746E-03	1.291E-03	9.012E-04	4.306E-04	3.003E-04	2.885E-04	1.983E-04	1.801E-04
	0.011	0.051	0.154	0.276	0.280	0.282	1.527	7.281	9.293	9.789
	0.01148	0.05052	0.15385	0.27555	0.28014	0.28243	1.52698	7.28129	9.29277	9.78875
0	1.644E-04	1.164E-04	1.113E-04	1.086E-04	8.688E-05	8.608E-05	7.243E-05	6.875E-05	6.008E-05	5.550E-05
	14.753	18.080	18.085	18.976	29.511	32.202	32.232	38.918	39.235	49.033
	14.75316	18.08037	18.08496	18.97589	29.51091	32.20206	32.23191	38.91848	39.23536	49.03329
0	5.432E-05	4.583E-05	4.102E-05	3.437E-05	3.004E-05	2.871E-05	2.735E-05	2.292E-05	2.051E-05	1.802E-05
	49.042	50.597	66.347	66.524	67.904	68.191	77.208	77.217	78.608	80.289
	49.04248	50.59701	66.34672	66.52353	67.90355	68.19057	77.20780	77.21699	78.60849	80.28933
0	1.435E-05	1.367E-05	1.202E-05	9.012E-06	8.612E-06	7.423E-06	5.741E-06	4.306E-06	3.711E-06	2.227E-06
	81.380	81.479	82.129	82.156	83.527	84.716	85.045	85.082	93.378	99.114
	81.38004	81.47878	82.12862	82.15618	83.52702	84.71644	85.04481	85.08155	93.37775	99.11370
0	1.485E-06	1.113E-06								
	99.920	100.000								
	99.91967	100.00005								

0 X/Q PERCENTILES  
 (BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)  
 0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
 CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

0 ERROR IN NORMAL TRANSFORMATION FOR A( 42)= 100.00005  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 2)= 0.050  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 3)= 7.277

8.749E-04	1.000	1.000
4.961E-04	3.000	3.000
3.673E-04	5.000	5.000
2.335E-04	10.000	10.000
1.733E-04	15.000	15.000
1.367E-04	20.000	20.000
1.115E-04	25.000	25.000
9.287E-05	30.000	30.000
8.071E-05	35.000	35.000
7.225E-05	40.000	40.000
6.492E-05	45.000	45.000
5.843E-05	50.000	50.000
5.260E-05	55.000	55.000
4.726E-05	60.000	60.000
4.230E-05	65.000	65.000
3.622E-05	70.000	70.000
3.018E-05	75.000	75.000
2.464E-05	80.000	80.000
1.944E-05	85.000	85.000
1.443E-05	90.000	90.000
0 3.673E-04	5.0	5.00

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE  
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

0 RELATIVE CONCENTRATION (X/Q) VALUES (SEC/CUBIC METER)  
 VERSUS HOURS PER YEAR MAX  
 AVERAGING TIME 0-2 HR X/Q IS EXCEEDED DOWNWIND SECTOR

DOWNWIND DISTANCE SECTOR (METERS)	0-2 HOURS	0-8 HOURS	8-24 HOURS	1-4 DAYS	4-30 DAYS	ANNUAL AVERAGE	IN SECTOR	DOWNWIND SECTOR
S 677.	1.57E-04	1.01E-04	8.07E-05	4.98E-05	2.49E-05	1.07E-05	7.3	S
SSW 677.	1.61E-04	9.85E-05	7.70E-05	4.51E-05	2.10E-05	8.20E-06	225.9	SSW



**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

SW	677.	1.96E-04	1.18E-04	9.11E-05	5.24E-05	2.36E-05	8.94E-06	7.8	SW
WSW	677.	2.37E-04	1.39E-04	1.07E-04	5.97E-05	2.60E-05	9.41E-06	10.4	WSW
W	677.	2.82E-04	1.65E-04	1.26E-04	7.04E-05	3.05E-05	1.10E-05	13.1	W
WNW	677.	3.39E-04	1.98E-04	1.51E-04	8.41E-05	3.63E-05	1.30E-05	17.3	WNW
NW	677.	4.49E-04	2.65E-04	2.04E-04	1.15E-04	5.07E-05	1.86E-05	29.9	NW
NNW	677.	5.39E-04	3.31E-04	2.59E-04	1.53E-04	7.14E-05	2.82E-05	43.7	NNW
N	677.	5.19E-04	3.16E-04	2.46E-04	1.44E-04	6.63E-05	2.57E-05	40.6	N
NNE	677.	2.76E-04	1.65E-04	1.27E-04	7.30E-05	3.28E-05	1.23E-05	12.6	NNE
NE	677.	1.38E-04	9.09E-05	7.38E-05	4.69E-05	2.44E-05	1.10E-05	5.2	NE
ENE	677.	1.07E-04	7.11E-05	5.79E-05	3.70E-05	1.95E-05	8.90E-06	4.6	ENE
E	677.	1.00E-04	6.62E-05	5.38E-05	3.42E-05	1.79E-05	8.09E-06	3.7	E
ESE	677.	1.02E-04	6.84E-05	5.59E-05	3.61E-05	1.92E-05	8.91E-06	3.8	ESE
SE	677.	1.13E-04	7.73E-05	6.39E-05	4.24E-05	2.35E-05	1.14E-05	6.1	SE
SSE	677.	1.38E-04	9.43E-05	7.80E-05	5.16E-05	2.85E-05	1.38E-05	7.9	SSE
MAX X/Q		5.39E-04					TOTAL HOURS AROUND SITE:	439.9	
SRP 2.3.4	677.	5.18E-04	3.20E-04	2.51E-04	1.49E-04	7.05E-05	2.82E-05		
SITE LIMIT		3.67E-04	2.40E-04	1.94E-04	1.23E-04	6.33E-05	2.82E-05		

00.5 PERCENT X/Q TO AN INDIVIDUAL IS LIMITING.

0\*\*NOTE\*\*: VALUES ON THIS PAGE ARE APPROXIMATIONS ONLY.  
 CHECK THE REASONABLENESS OF THE ENVELOPES  
 COMPUTED FOR THE 0-2 HOUR VALUES. FOR ANY  
 FAULTY ENVELOPES, ADJUST THE ABOVE VALUES.

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE S SECTOR.

CLASS	METER/SEC	PERCENT	DISTANCE METERS	TERRAIN METERS	HT METERS	EFF PLUME METERS	HT METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)			
											MEANDER	BLDG WAKE	USED	
AT 10.0 METERS											CA=1006.SQ.METERS			
A	0.1	0.00	4820.	0.	0.	775.2	1000.0	775.2	4.116E-06	4.115E-06	4.115E-06			
A	1.5	0.91	4820.	0.	0.	775.2	1000.0	775.2	2.744E-07	2.743E-07	2.743E-07			
A	3.0	2.77	4820.	0.	0.	775.2	1000.0	775.2	1.372E-07	1.372E-07	1.372E-07			
A	5.0	2.56	4820.	0.	0.	775.2	1000.0	775.2	8.233E-08	8.230E-08	8.230E-08			
A	7.5	0.69	4820.	0.	0.	775.2	1000.0	775.2	5.489E-08	5.486E-08	5.486E-08			
B	3.0	0.91	4820.	0.	0.	583.0	610.6	583.0	2.988E-07	2.985E-07	2.985E-07			
B	5.0	0.91	4820.	0.	0.	583.0	610.6	583.0	1.793E-07	1.791E-07	1.791E-07			
B	7.5	0.21	4820.	0.	0.	583.0	610.6	583.0	1.195E-07	1.194E-07	1.194E-07			
C	0.1	0.00	4820.	0.	0.	442.7	256.1	442.7	2.815E-05	2.807E-05	2.807E-05			

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

C	1.5	0.21	4820.	0.	0.	442.7	256.1	442.7	1.877E-06	1.871E-06	1.871E-06
C	3.0	1.65	4820.	0.	0.	442.7	256.1	442.7	9.384E-07	9.357E-07	9.357E-07
C	5.0	1.39	4820.	0.	0.	442.7	256.1	442.7	5.630E-07	5.614E-07	5.614E-07
C	7.5	0.69	4820.	0.	0.	442.7	256.1	442.7	3.753E-07	3.743E-07	3.743E-07
D	0.1	0.17	4820.	0.	0.	311.7	87.2	373.3	9.804E-05	1.160E-04	9.804E-05
D	1.5	3.73	4820.	0.	0.	311.7	87.2	373.3	6.536E-06	7.736E-06	6.536E-06
D	3.0	14.18	4820.	0.	0.	311.7	87.2	345.6	3.529E-06	3.868E-06	3.529E-06
D	5.0	17.65	4820.	0.	0.	311.7	87.2	319.3	2.292E-06	2.321E-06	2.292E-06
D	7.5	6.72	4820.	0.	0.	311.7	87.2	311.7	1.565E-06	1.547E-06	1.547E-06
D	10.0	0.69	4820.	0.	0.	311.7	87.2	311.7	1.174E-06	1.160E-06	1.160E-06
E	0.1	0.20	4820.	0.	0.	221.7	55.4	309.2	1.867E-04	2.539E-04	1.867E-04
E	1.5	6.29	4820.	0.	0.	221.7	55.4	309.2	1.245E-05	1.693E-05	1.245E-05
E	3.0	20.21	4820.	0.	0.	221.7	55.4	265.9	7.239E-06	8.463E-06	7.239E-06
E	5.0	6.03	4820.	0.	0.	221.7	55.4	230.7	5.006E-06	5.078E-06	5.006E-06
E	7.5	0.21	4820.	0.	0.	221.7	55.4	221.7	3.473E-06	3.385E-06	3.385E-06
F	0.1	0.06	4820.	0.	0.	153.0	34.5	243.7	3.809E-04	5.719E-04	3.809E-04
F	1.5	3.04	4820.	0.	0.	153.0	34.5	243.7	2.539E-05	3.813E-05	2.539E-05
F	3.0	4.64	4820.	0.	0.	153.0	34.5	195.7	1.581E-05	1.906E-05	1.581E-05
F	5.0	0.48	4820.	0.	0.	153.0	34.5	161.1	1.153E-05	1.144E-05	1.144E-05
G	0.1	0.01	4820.	0.	0.	105.6	21.4	209.9	7.107E-04	1.238E-03	7.107E-04
G	1.5	1.17	4820.	0.	0.	105.6	21.4	209.9	4.738E-05	8.251E-05	4.738E-05
G	3.0	1.39	4820.	0.	0.	105.6	21.4	149.9	3.318E-05	4.126E-05	3.318E-05
G	5.0	0.21	4820.	0.	0.	105.6	21.4	113.1	2.639E-05	2.475E-05	2.475E-05

IUSNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

LOW POPULATION ZONE CALCULATIONS:

0 S SECTOR BOUNDARY DISTANCE = 4820.0 METERS  
 OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED  
 AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.  
 BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	7.107E-04	3.809E-04	1.867E-04	9.804E-05	4.738E-05	3.318E-05	2.807E-05	2.539E-05	2.475E-05	1.581E-05
	0.011	0.070	0.265	0.434	1.607	2.994	2.997	6.036	6.250	10.889

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

0	0.00047	0.00301	0.01142	0.01869	0.06921	0.12891	0.12904	0.25992	0.26911	0.46888
0	1.245E-05	1.144E-05	7.239E-06	6.536E-06	5.006E-06	4.115E-06	3.529E-06	3.385E-06	2.292E-06	1.871E-06
	17.181	17.661	37.872	41.605	47.631	47.634	61.819	62.032	79.683	79.896
	0.73983	0.76050	1.63076	1.79150	2.05097	2.05112	2.66191	2.67110	3.43114	3.44033
0	1.547E-06	1.160E-06	9.357E-07	5.614E-07	3.743E-07	2.985E-07	2.743E-07	1.791E-07	1.372E-07	1.194E-07
	86.615	87.308	88.962	90.348	91.041	91.948	92.854	93.761	96.534	96.747
	3.72965	3.75950	3.83068	3.89039	3.92024	3.95927	3.99831	4.03734	4.15675	4.16593
0	8.230E-08	5.486E-08								
	99.307	100.000								
	4.27615	4.30600								

0 X/Q PERCENTILES  
 (BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)  
 0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
 CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 2) = 0.003  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 0.739  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 1.629  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5) = 1.790  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 6) = 2.659  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 7) = 3.428

	8.698E-05	0.043	1.000
	4.350E-05	0.129	3.000
	3.083E-05	0.215	5.000
	1.880E-05	0.431	10.000
	1.384E-05	0.646	15.000
	1.126E-05	0.861	20.000
	9.692E-06	1.076	25.000
	8.544E-06	1.292	30.000
	7.661E-06	1.507	35.000
	6.823E-06	1.722	40.000
	5.802E-06	1.938	45.000
	4.933E-06	2.153	50.000
	4.250E-06	2.368	55.000
	3.702E-06	2.584	60.000
	3.246E-06	2.799	65.000
	2.864E-06	3.014	70.000
	2.545E-06	3.229	75.000
0	1.682E-05	0.5	11.61

0ANNUAL AVERAGE = 2.22E-07

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades  
 DATA PERIOD: 1999-2003

METEOROLOGICAL INSTRUMENTATION  
 WIND SENSORS HEIGHT: 10 Meters DT

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m

SOURCE OF DATA: Data from onsite met tower

COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OPARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE SSW SECTOR.

STABILITY WINDSPEED FREQUENCY DISTANCE TERRAIN HT EFF PLUME HT SIGMA-Y SIGMA-Z MEANDER-SY \*\* CHI/Q VALUES (SEC/CUBIC METER)  
 CLASS METER/SEC PERCENT METERS METERS METERS METERS METERS METERS METERS MEANDER BLDG WAKE USED  
 AT 10.0 METERS CA=1006.SQ.METERS

A	0.1	0.01	4820.	0.	0.	775.2	1000.0	775.2	4.116E-06	4.115E-06	4.115E-06
A	1.5	1.33	4820.	0.	0.	775.2	1000.0	775.2	2.744E-07	2.743E-07	2.743E-07
A	3.0	3.77	4820.	0.	0.	775.2	1000.0	775.2	1.372E-07	1.372E-07	1.372E-07
A	5.0	2.43	4820.	0.	0.	775.2	1000.0	775.2	8.233E-08	8.230E-08	8.230E-08
B	3.0	1.02	4820.	0.	0.	583.0	610.6	583.0	2.988E-07	2.985E-07	2.985E-07
B	5.0	0.71	4820.	0.	0.	583.0	610.6	583.0	1.793E-07	1.791E-07	1.791E-07
C	0.1	0.01	4820.	0.	0.	442.7	256.1	442.7	2.815E-05	2.807E-05	2.807E-05
C	1.5	0.71	4820.	0.	0.	442.7	256.1	442.7	1.877E-06	1.871E-06	1.871E-06
C	3.0	1.73	4820.	0.	0.	442.7	256.1	442.7	9.384E-07	9.357E-07	9.357E-07
C	5.0	1.02	4820.	0.	0.	442.7	256.1	442.7	5.630E-07	5.614E-07	5.614E-07
C	7.5	0.31	4820.	0.	0.	442.7	256.1	442.7	3.753E-07	3.743E-07	3.743E-07
D	0.1	0.22	4820.	0.	0.	311.7	87.2	373.3	9.804E-05	1.160E-04	9.804E-05
D	1.5	4.79	4820.	0.	0.	311.7	87.2	373.3	6.536E-06	7.736E-06	6.536E-06
D	3.0	16.79	4820.	0.	0.	311.7	87.2	345.6	3.529E-06	3.868E-06	3.529E-06
D	5.0	14.36	4820.	0.	0.	311.7	87.2	319.3	2.292E-06	2.321E-06	2.292E-06
D	7.5	1.73	4820.	0.	0.	311.7	87.2	311.7	1.565E-06	1.547E-06	1.547E-06
E	0.1	0.21	4820.	0.	0.	221.7	55.4	309.2	1.867E-04	2.539E-04	1.867E-04
E	1.5	6.83	4820.	0.	0.	221.7	55.4	309.2	1.245E-05	1.693E-05	1.245E-05
E	3.0	20.16	4820.	0.	0.	221.7	55.4	265.9	7.239E-06	8.463E-06	7.239E-06
E	5.0	5.49	4820.	0.	0.	221.7	55.4	230.7	5.006E-06	5.078E-06	5.006E-06
F	0.1	0.06	4820.	0.	0.	153.0	34.5	243.7	3.809E-04	5.719E-04	3.809E-04
F	1.5	3.06	4820.	0.	0.	153.0	34.5	243.7	2.539E-05	3.813E-05	2.539E-05
F	3.0	8.87	4820.	0.	0.	153.0	34.5	195.7	1.581E-05	1.906E-05	1.581E-05
F	5.0	0.31	4820.	0.	0.	153.0	34.5	161.1	1.153E-05	1.144E-05	1.144E-05
G	0.1	0.01	4820.	0.	0.	105.6	21.4	209.9	7.107E-04	1.238E-03	7.107E-04
G	1.5	1.33	4820.	0.	0.	105.6	21.4	209.9	4.738E-05	8.251E-05	4.738E-05
G	3.0	2.43	4820.	0.	0.	105.6	21.4	149.9	3.318E-05	4.126E-05	3.318E-05
G	5.0	0.31	4820.	0.	0.	105.6	21.4	113.1	2.639E-05	2.475E-05	2.475E-05

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades  
 DATA PERIOD: 1999-2003

METEOROLOGICAL INSTRUMENTATION  
 WIND SENSORS HEIGHT: 10 Meters DT

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m

SOURCE OF DATA: Data from onsite met tower

COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

LOW POPULATION ZONE CALCULATIONS:

0 SSW SECTOR BOUNDARY DISTANCE = 4820.0 METERS

OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED

AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	7.107E-04	3.809E-04	1.867E-04	9.804E-05	4.738E-05	3.318E-05	2.807E-05	2.539E-05	2.475E-05	1.581E-05
	0.012	0.072	0.284	0.500	1.834	4.266	4.276	7.336	7.650	16.516
	0.00036	0.00210	0.00830	0.01464	0.05367	0.12485	0.12515	0.21471	0.22389	0.48336
0	1.245E-05	1.144E-05	7.239E-06	6.536E-06	5.006E-06	4.115E-06	3.529E-06	2.292E-06	1.871E-06	1.547E-06
	23.342	23.655	43.819	48.605	54.097	54.102	70.892	85.250	85.956	87.682
	0.68313	0.69232	1.28244	1.42251	1.58325	1.58340	2.07479	2.49499	2.51566	2.56618
0	9.357E-07	5.614E-07	3.743E-07	2.985E-07	2.743E-07	1.791E-07	1.372E-07	8.230E-08		
	89.408	90.428	90.742	91.762	93.096	93.802	97.568	100.000		
	2.61669	2.64654	2.65573	2.68558	2.72462	2.74528	2.85550	2.92668		

0 X/Q PERCENTILES

(BASED ON THE UPPER ENVELOPE OF THE ORDERED X/Q-FREQUENCY VALUES, AND AS PLOTTED ON A LOG-NORMAL GRAPH.)

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED

CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 2) = 0.002  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 0.682  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 1.281  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5) = 1.421  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 6) = 2.073  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 7) = 2.492

9.575E-05	0.029	1.000
5.000E-05	0.088	3.000
3.625E-05	0.146	5.000
2.287E-05	0.293	10.000
1.722E-05	0.439	15.000
1.397E-05	0.585	20.000
1.176E-05	0.732	25.000
1.008E-05	0.878	30.000
8.827E-06	1.024	35.000
7.851E-06	1.171	40.000

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

7.053E-06	1.317	45.000
6.248E-06	1.463	50.000
5.361E-06	1.610	55.000
4.654E-06	1.756	60.000
4.079E-06	1.902	65.000
3.605E-06	2.049	70.000
3.098E-06	2.195	75.000
2.664E-06	2.341	80.000
2.308E-06	2.488	85.000
0 1.567E-05	0.5	17.08

0ANNUAL AVERAGE = 1.69E-07

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OPARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE SW SECTOR.

CLASS	METER/SEC AT 10.0 METERS	PERCENT	DISTANCE METERS	TERRAIN METERS	HT METERS	EFF METERS	PLUME METERS	HT METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)		
												MEANDER	BLDG WAKE	USED
CA=1006.SQ.METERS														
A	0.1	0.00	4820.	0.	0.	775.2	1000.0	775.2	4.116E-06	4.115E-06	4.115E-06			
A	1.5	0.67	4820.	0.	0.	775.2	1000.0	775.2	2.744E-07	2.743E-07	2.743E-07			
A	3.0	5.79	4820.	0.	0.	775.2	1000.0	775.2	1.372E-07	1.372E-07	1.372E-07			
A	5.0	2.89	4820.	0.	0.	775.2	1000.0	775.2	8.233E-08	8.230E-08	8.230E-08			
A	7.5	0.67	4820.	0.	0.	775.2	1000.0	775.2	5.489E-08	5.486E-08	5.486E-08			
B	3.0	0.96	4820.	0.	0.	583.0	610.6	583.0	2.988E-07	2.985E-07	2.985E-07			
B	5.0	1.26	4820.	0.	0.	583.0	610.6	583.0	1.793E-07	1.791E-07	1.791E-07			
B	7.5	0.30	4820.	0.	0.	583.0	610.6	583.0	1.195E-07	1.194E-07	1.194E-07			
C	0.1	0.01	4820.	0.	0.	442.7	256.1	442.7	2.815E-05	2.807E-05	2.807E-05			
C	1.5	0.67	4820.	0.	0.	442.7	256.1	442.7	1.877E-06	1.871E-06	1.871E-06			
C	3.0	1.26	4820.	0.	0.	442.7	256.1	442.7	9.384E-07	9.357E-07	9.357E-07			
C	5.0	1.26	4820.	0.	0.	442.7	256.1	442.7	5.630E-07	5.614E-07	5.614E-07			
C	7.5	0.30	4820.	0.	0.	442.7	256.1	442.7	3.753E-07	3.743E-07	3.743E-07			
D	0.1	0.25	4820.	0.	0.	311.7	87.2	373.3	9.804E-05	1.160E-04	9.804E-05			
D	1.5	5.49	4820.	0.	0.	311.7	87.2	373.3	6.536E-06	7.736E-06	6.536E-06			
D	3.0	17.15	4820.	0.	0.	311.7	87.2	345.6	3.529E-06	3.868E-06	3.529E-06			
D	5.0	10.99	4820.	0.	0.	311.7	87.2	319.3	2.292E-06	2.321E-06	2.292E-06			
D	7.5	3.27	4820.	0.	0.	311.7	87.2	311.7	1.565E-06	1.547E-06	1.547E-06			
E	0.1	0.19	4820.	0.	0.	221.7	55.4	309.2	1.867E-04	2.539E-04	1.867E-04			

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

E	1.5	6.16	4820.	0.	0.	221.7	55.4	309.2	1.245E-05	1.693E-05	1.245E-05
E	3.0	15.51	4820.	0.	0.	221.7	55.4	265.9	7.239E-06	8.463E-06	7.239E-06
E	5.0	2.89	4820.	0.	0.	221.7	55.4	230.7	5.006E-06	5.078E-06	5.006E-06
E	7.5	0.67	4820.	0.	0.	221.7	55.4	221.7	3.473E-06	3.385E-06	3.385E-06
F	0.1	0.07	4820.	0.	0.	153.0	34.5	243.7	3.809E-04	5.719E-04	3.809E-04
F	1.5	3.86	4820.	0.	0.	153.0	34.5	243.7	2.539E-05	3.813E-05	2.539E-05
F	3.0	10.02	4820.	0.	0.	153.0	34.5	195.7	1.581E-05	1.906E-05	1.581E-05
F	5.0	0.67	4820.	0.	0.	153.0	34.5	161.1	1.153E-05	1.144E-05	1.144E-05
G	0.1	0.01	4820.	0.	0.	105.6	21.4	209.9	7.107E-04	1.238E-03	7.107E-04
G	1.5	0.96	4820.	0.	0.	105.6	21.4	209.9	4.738E-05	8.251E-05	4.738E-05
G	3.0	5.49	4820.	0.	0.	105.6	21.4	149.9	3.318E-05	4.126E-05	3.318E-05
G	5.0	0.30	4820.	0.	0.	105.6	21.4	113.1	2.639E-05	2.475E-05	2.475E-05

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

LOW POPULATION ZONE CALCULATIONS:

0 SW SECTOR BOUNDARY DISTANCE = 4820.0 METERS

OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED

AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	7.107E-04	3.809E-04	1.867E-04	9.804E-05	4.738E-05	3.318E-05	2.807E-05	2.539E-05	2.475E-05	1.581E-05
	0.009	0.084	0.275	0.524	1.488	6.981	6.991	10.851	11.148	21.168
	0.00028	0.00259	0.00851	0.01620	0.04605	0.21597	0.21627	0.33567	0.34485	0.65484
0	1.245E-05	1.144E-05	7.239E-06	6.536E-06	5.006E-06	4.115E-06	3.529E-06	3.385E-06	2.292E-06	1.871E-06
	27.329	27.997	43.511	49.003	51.898	51.901	69.047	69.715	80.701	81.369
	0.84543	0.86609	1.34600	1.51592	1.60547	1.60555	2.13598	2.15664	2.49648	2.51715
0	1.547E-06	9.357E-07	5.614E-07	3.743E-07	2.985E-07	2.743E-07	1.791E-07	1.372E-07	1.194E-07	8.230E-08
	84.635	85.897	87.159	87.456	88.421	89.089	90.350	96.140	96.437	99.332
	2.61818	2.65722	2.69625	2.70544	2.73529	2.75595	2.79499	2.97409	2.98328	3.07283
0	5.486E-08									
	100.000									
	3.09350									

0 X/Q PERCENTILES

(BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

PLOTTED ON A LOG-NORMAL GRAPH.)  
 0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
 CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 2) = 0.003  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 0.335  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 0.654  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5) = 0.844  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 6) = 1.514  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 7) = 2.134  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 8) = 2.494

1.076E-04	0.031	1.000
5.730E-05	0.093	3.000
4.194E-05	0.155	5.000
2.682E-05	0.309	10.000
2.027E-05	0.464	15.000
1.648E-05	0.619	20.000
1.354E-05	0.773	25.000
1.127E-05	0.928	30.000
9.532E-06	1.083	35.000
8.223E-06	1.237	40.000
7.203E-06	1.392	45.000
6.309E-06	1.547	50.000
5.330E-06	1.701	55.000
4.560E-06	1.856	60.000
3.943E-06	2.011	65.000
3.400E-06	2.165	70.000
2.811E-06	2.320	75.000
2.349E-06	2.475	80.000
0 1.922E-05	0.5	16.16

0ANNUAL AVERAGE = 1.83E-07

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE WSW SECTOR.

STABILITY WINDSPEED FREQUENCY DISTANCE TERRAIN HT EFF PLUME HT SIGMA-Y SIGMA-Z MEANDER-SY \*\* CHI/Q VALUES (SEC/CUBIC METER)  
 CLASS METER/SEC PERCENT METERS METERS METERS METERS METERS METERS MEANDER BLDG WAKE USED  
 AT 10.0 METERS CA=1006.SQ.METERS

A	0.1	0.00	4820.	0.	0.	775.2	1000.0	775.2	4.116E-06	4.115E-06	4.115E-06
A	1.5	1.17	4820.	0.	0.	775.2	1000.0	775.2	2.744E-07	2.743E-07	2.743E-07



**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
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A	3.0	3.94	4820.	0.	0.	775.2	1000.0	775.2	1.372E-07	1.372E-07	1.372E-07
A	5.0	2.14	4820.	0.	0.	775.2	1000.0	775.2	8.233E-08	8.230E-08	8.230E-08
A	7.5	0.62	4820.	0.	0.	775.2	1000.0	775.2	5.489E-08	5.486E-08	5.486E-08
B	3.0	0.62	4820.	0.	0.	583.0	610.6	583.0	2.988E-07	2.985E-07	2.985E-07
B	5.0	1.17	4820.	0.	0.	583.0	610.6	583.0	1.793E-07	1.791E-07	1.791E-07
B	7.5	0.28	4820.	0.	0.	583.0	610.6	583.0	1.195E-07	1.194E-07	1.194E-07
C	0.1	0.00	4820.	0.	0.	442.7	256.1	442.7	2.815E-05	2.807E-05	2.807E-05
C	1.5	0.28	4820.	0.	0.	442.7	256.1	442.7	1.877E-06	1.871E-06	1.871E-06
C	3.0	0.90	4820.	0.	0.	442.7	256.1	442.7	9.384E-07	9.357E-07	9.357E-07
C	5.0	0.90	4820.	0.	0.	442.7	256.1	442.7	5.630E-07	5.614E-07	5.614E-07
C	7.5	0.62	4820.	0.	0.	442.7	256.1	442.7	3.753E-07	3.743E-07	3.743E-07
D	0.1	0.22	4820.	0.	0.	311.7	87.2	373.3	9.804E-05	1.160E-04	9.804E-05
D	1.5	4.83	4820.	0.	0.	311.7	87.2	373.3	6.536E-06	7.736E-06	6.536E-06
D	3.0	13.26	4820.	0.	0.	311.7	87.2	345.6	3.529E-06	3.868E-06	3.529E-06
D	5.0	14.43	4820.	0.	0.	311.7	87.2	319.3	2.292E-06	2.321E-06	2.292E-06
D	7.5	7.53	4820.	0.	0.	311.7	87.2	311.7	1.565E-06	1.547E-06	1.547E-06
E	0.1	0.14	4820.	0.	0.	221.7	55.4	309.2	1.867E-04	2.539E-04	1.867E-04
E	1.5	4.49	4820.	0.	0.	221.7	55.4	309.2	1.245E-05	1.693E-05	1.245E-05
E	3.0	12.63	4820.	0.	0.	221.7	55.4	265.9	7.239E-06	8.463E-06	7.239E-06
E	5.0	3.94	4820.	0.	0.	221.7	55.4	230.7	5.006E-06	5.078E-06	5.006E-06
E	7.5	0.90	4820.	0.	0.	221.7	55.4	221.7	3.473E-06	3.385E-06	3.385E-06
F	0.1	0.06	4820.	0.	0.	153.0	34.5	243.7	3.809E-04	5.719E-04	3.809E-04
F	1.5	3.04	4820.	0.	0.	153.0	34.5	243.7	2.539E-05	3.813E-05	2.539E-05
F	3.0	8.70	4820.	0.	0.	153.0	34.5	195.7	1.581E-05	1.906E-05	1.581E-05
F	5.0	1.17	4820.	0.	0.	153.0	34.5	161.1	1.153E-05	1.144E-05	1.144E-05
G	0.1	0.02	4820.	0.	0.	105.6	21.4	209.9	7.107E-04	1.238E-03	7.107E-04
G	1.5	1.80	4820.	0.	0.	105.6	21.4	209.9	4.738E-05	8.251E-05	4.738E-05
G	3.0	9.32	4820.	0.	0.	105.6	21.4	149.9	3.318E-05	4.126E-05	3.318E-05
G	5.0	0.90	4820.	0.	0.	105.6	21.4	113.1	2.639E-05	2.475E-05	2.475E-05

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades  
 DATA PERIOD: 1999-2003  
 TYPE OF RELEASE: Ground Level Release  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE  
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145  
 LOW POPULATION ZONE CALCULATIONS:  
 0 WSW SECTOR BOUNDARY DISTANCE = 4820.0 METERS  
 OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED  
 AS A FUNCTION OF DOWNWIND DISTANCE.

METEOROLOGICAL INSTRUMENTATION  
 WIND SENSORS HEIGHT: 10 Meters DT  
 DELTA-T HEIGHTS: from 10m to 60m

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	7.107E-04	3.809E-04	1.867E-04	9.804E-05	4.738E-05	3.318E-05	2.807E-05	2.539E-05	2.475E-05	1.581E-05
	0.017	0.076	0.215	0.433	2.229	11.549	11.553	14.591	15.489	24.188
	0.00055	0.00251	0.00715	0.01442	0.07412	0.38411	0.38424	0.48527	0.51512	0.80445
0	1.245E-05	1.144E-05	7.239E-06	6.536E-06	5.006E-06	4.115E-06	3.529E-06	3.385E-06	2.292E-06	1.871E-06
	28.675	29.849	42.484	47.317	51.252	51.257	64.513	65.410	79.840	80.116
	0.95370	0.99273	1.41294	1.57368	1.70456	1.70471	2.14558	2.17543	2.65534	2.66453
0	1.547E-06	9.357E-07	5.614E-07	3.743E-07	2.985E-07	2.743E-07	1.791E-07	1.372E-07	1.194E-07	8.230E-08
	87.642	88.539	89.437	90.058	90.679	91.853	93.027	96.962	97.238	99.379
	2.91481	2.94466	2.97452	2.99518	3.01585	3.05488	3.09392	3.22480	3.23399	3.30517
0	5.486E-08									
	100.000									
	3.32584									

0 X/Q PERCENTILES

(BASED ON THE UPPER ENVELOPE OF THE ORDERED X/Q-FREQUENCY VALUES, AND AS PLOTTED ON A LOG-NORMAL GRAPH.)

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED

CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 2) = 0.384  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 0.803  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 1.572  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5) = 2.653  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 6) = 2.912

1.225E-04	0.033	1.000
7.045E-05	0.100	3.000
5.354E-05	0.166	5.000
3.613E-05	0.333	10.000
2.570E-05	0.499	15.000
1.924E-05	0.665	20.000
1.516E-05	0.831	25.000
1.201E-05	0.998	30.000
9.814E-06	1.164	35.000
8.214E-06	1.330	40.000
7.002E-06	1.497	45.000
5.875E-06	1.663	50.000
4.876E-06	1.829	55.000
4.104E-06	1.996	60.000
3.495E-06	2.162	65.000
3.007E-06	2.328	70.000

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

2.610E-06            2.494            75.000  
 2.273E-06            2.661            80.000  
 1.761E-06            2.827            85.000  
 0 2.565E-05            0.5            15.03

0ANNUAL AVERAGE = 1.89E-07

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades  
 DATA PERIOD: 1999-2003  
 TYPE OF RELEASE: Ground Level Release  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

METEOROLOGICAL INSTRUMENTATION  
 WIND SENSORS HEIGHT: 10 Meters DT  
 DELTA-T HEIGHTS: from 10m to 60m

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145  
 OPARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE W SECTOR.

CLASS	METER/SEC	PERCENT	DISTANCE METERS	TERRAIN HT METERS	EFF PLUME HT METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)		
									MEANDER	BLDG WAKE	USED
AT 10.0 METERS									CA=1006.SQ.METERS		
A	0.1	0.00	4820.	0.	0.	775.2	1000.0	775.2	4.116E-06	4.115E-06	4.115E-06
A	1.5	0.48	4820.	0.	0.	775.2	1000.0	775.2	2.744E-07	2.743E-07	2.743E-07
A	3.0	3.05	4820.	0.	0.	775.2	1000.0	775.2	1.372E-07	1.372E-07	1.372E-07
A	5.0	3.26	4820.	0.	0.	775.2	1000.0	775.2	8.233E-08	8.230E-08	8.230E-08
A	7.5	0.69	4820.	0.	0.	775.2	1000.0	775.2	5.489E-08	5.486E-08	5.486E-08
A	10.0	0.21	4820.	0.	0.	775.2	1000.0	775.2	4.116E-08	4.115E-08	4.115E-08
B	0.1	0.00	4820.	0.	0.	583.0	610.6	583.0	8.964E-06	8.956E-06	8.956E-06
B	1.5	0.21	4820.	0.	0.	583.0	610.6	583.0	5.976E-07	5.971E-07	5.971E-07
B	3.0	0.48	4820.	0.	0.	583.0	610.6	583.0	2.988E-07	2.985E-07	2.985E-07
B	5.0	0.91	4820.	0.	0.	583.0	610.6	583.0	1.793E-07	1.791E-07	1.791E-07
B	7.5	0.48	4820.	0.	0.	583.0	610.6	583.0	1.195E-07	1.194E-07	1.194E-07
B	10.0	0.21	4820.	0.	0.	583.0	610.6	583.0	8.964E-08	8.956E-08	8.956E-08
C	3.0	0.69	4820.	0.	0.	442.7	256.1	442.7	9.384E-07	9.357E-07	9.357E-07
C	5.0	1.66	4820.	0.	0.	442.7	256.1	442.7	5.630E-07	5.614E-07	5.614E-07
C	7.5	0.69	4820.	0.	0.	442.7	256.1	442.7	3.753E-07	3.743E-07	3.743E-07
D	0.1	0.14	4820.	0.	0.	311.7	87.2	373.3	9.804E-05	1.160E-04	9.804E-05
D	1.5	3.05	4820.	0.	0.	311.7	87.2	373.3	6.536E-06	7.736E-06	6.536E-06
D	3.0	9.78	4820.	0.	0.	311.7	87.2	345.6	3.529E-06	3.868E-06	3.529E-06
D	5.0	14.21	4820.	0.	0.	311.7	87.2	319.3	2.292E-06	2.321E-06	2.292E-06
D	7.5	7.91	4820.	0.	0.	311.7	87.2	311.7	1.565E-06	1.547E-06	1.547E-06
D	10.0	1.39	4820.	0.	0.	311.7	87.2	311.7	1.174E-06	1.160E-06	1.160E-06
E	0.1	0.10	4820.	0.	0.	221.7	55.4	309.2	1.867E-04	2.539E-04	1.867E-04
E	1.5	3.26	4820.	0.	0.	221.7	55.4	309.2	1.245E-05	1.693E-05	1.245E-05
E	3.0	10.47	4820.	0.	0.	221.7	55.4	265.9	7.239E-06	8.463E-06	7.239E-06
E	5.0	8.17	4820.	0.	0.	221.7	55.4	230.7	5.006E-06	5.078E-06	5.006E-06

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

E	7.5	1.66	4820.	0.	0.	221.7	55.4	221.7	3.473E-06	3.385E-06	3.385E-06
E	10.0	0.48	4820.	0.	0.	221.7	55.4	221.7	2.605E-06	2.539E-06	2.539E-06
F	0.1	0.05	4820.	0.	0.	153.0	34.5	243.7	3.809E-04	5.719E-04	3.809E-04
F	1.5	2.78	4820.	0.	0.	153.0	34.5	243.7	2.539E-05	3.813E-05	2.539E-05
F	3.0	9.56	4820.	0.	0.	153.0	34.5	195.7	1.581E-05	1.906E-05	1.581E-05
F	5.0	1.87	4820.	0.	0.	153.0	34.5	161.1	1.153E-05	1.144E-05	1.144E-05
F	10.0	0.21	4820.	0.	0.	153.0	34.5	153.0	6.066E-06	5.719E-06	5.719E-06
G	0.1	0.02	4820.	0.	0.	105.6	21.4	209.9	7.107E-04	1.238E-03	7.107E-04
G	1.5	1.87	4820.	0.	0.	105.6	21.4	209.9	4.738E-05	8.251E-05	4.738E-05
G	3.0	9.08	4820.	0.	0.	105.6	21.4	149.9	3.318E-05	4.126E-05	3.318E-05
G	5.0	0.91	4820.	0.	0.	105.6	21.4	113.1	2.639E-05	2.475E-05	2.475E-05

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE  
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

LOW POPULATION ZONE CALCULATIONS:

0 W SECTOR BOUNDARY DISTANCE = 4820.0 METERS

OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED

AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

OBELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	7.107E-04	3.809E-04	1.867E-04	9.804E-05	4.738E-05	3.318E-05	2.539E-05	2.475E-05	1.581E-05	1.245E-05
	0.017	0.071	0.172	0.310	2.180	11.262	14.040	14.948	24.510	27.769
	0.00074	0.00306	0.00741	0.01333	0.09369	0.48405	0.60345	0.64249	1.05351	1.19358
0	1.144E-05	8.956E-06	7.239E-06	6.536E-06	5.719E-06	5.006E-06	4.115E-06	3.529E-06	3.385E-06	2.539E-06
	29.639	29.641	40.112	43.157	43.370	51.544	51.546	61.322	62.978	63.459
	1.27395	1.27402	1.72408	1.85496	1.86415	2.21547	2.21555	2.63575	2.70694	2.72760
0	2.292E-06	1.547E-06	1.160E-06	9.357E-07	5.971E-07	5.614E-07	3.743E-07	2.985E-07	2.743E-07	1.791E-07
	77.669	85.576	86.965	87.659	87.873	89.529	90.224	90.704	91.185	92.093
	3.33839	3.67823	3.73794	3.76779	3.77697	3.84815	3.87800	3.89867	3.91934	3.95837
0	1.372E-07	1.194E-07	8.956E-08	8.230E-08	5.486E-08	4.115E-08				
	95.139	95.619	95.833	99.092	99.786	100.000				
	4.08926	4.10992	4.11911	4.25918	4.28903	4.29821				

0 X/Q PERCENTILES

(BASED ON THE UPPER ENVELOPE OF THE ORDERED X/Q-FREQUENCY VALUES, AND AS PLOTTED ON A LOG-NORMAL GRAPH.)

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
 CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 2) = 0.483  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 1.052  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 2.213  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5) = 3.335  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 6) = 3.675

1.230E-04	0.043	1.000
7.024E-05	0.129	3.000
5.317E-05	0.215	5.000
3.564E-05	0.430	10.000
2.544E-05	0.645	15.000
1.932E-05	0.860	20.000
1.535E-05	1.075	25.000
1.170E-05	1.289	30.000
9.249E-06	1.504	35.000
7.514E-06	1.719	40.000
6.234E-06	1.934	45.000
5.260E-06	2.149	50.000
4.439E-06	2.364	55.000
3.771E-06	2.579	60.000
3.239E-06	2.794	65.000
2.809E-06	3.009	70.000
2.455E-06	3.224	75.000
2.035E-06	3.439	80.000
1.591E-06	3.653	85.000
0 3.221E-05	0.5	11.63

0ANNUAL AVERAGE = 2.21E-07

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades

METEOROLOGICAL INSTRUMENTATION

DATA PERIOD: 1999-2003

WIND SENSORS HEIGHT: 10 Meters DT

TYPE OF RELEASE: Ground Level Release

DELTA-T HEIGHTS: from 10m to 60m

SOURCE OF DATA: Data from onsite met tower

COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145  
 0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE WNW SECTOR.

STABILITY WINDSPEED FREQUENCY DISTANCE TERRAIN HT EFF PLUME HT SIGMA-Y SIGMA-Z MEANDER-SY \*\* CHI/Q VALUES (SEC/CUBIC METER)  
 CLASS METER/SEC PERCENT METERS METERS METERS METERS METERS METERS MEANDER BLDG WAKE USED  
 AT 10.0 METERS CA=1006.SQ.METERS

A	0.1	0.00	4820.	0.	0.	775.2	1000.0	775.2	4.116E-06	4.115E-06	4.115E-06
A	1.5	0.52	4820.	0.	0.	775.2	1000.0	775.2	2.744E-07	2.743E-07	2.743E-07
A	3.0	2.96	4820.	0.	0.	775.2	1000.0	775.2	1.372E-07	1.372E-07	1.372E-07
A	5.0	4.36	4820.	0.	0.	775.2	1000.0	775.2	8.233E-08	8.230E-08	8.230E-08

NUMERICAL APPLICATIONS, Inc.  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

A	7.5	1.04	4820.	0.	0.	775.2	1000.0	775.2	5.489E-08	5.486E-08	5.486E-08
B	0.1	0.00	4820.	0.	0.	583.0	610.6	583.0	8.964E-06	8.956E-06	8.956E-06
B	1.5	0.16	4820.	0.	0.	583.0	610.6	583.0	5.976E-07	5.971E-07	5.971E-07
B	3.0	0.52	4820.	0.	0.	583.0	610.6	583.0	2.988E-07	2.985E-07	2.985E-07
B	5.0	1.24	4820.	0.	0.	583.0	610.6	583.0	1.793E-07	1.791E-07	1.791E-07
B	7.5	0.36	4820.	0.	0.	583.0	610.6	583.0	1.195E-07	1.194E-07	1.194E-07
B	10.0	0.16	4820.	0.	0.	583.0	610.6	583.0	8.964E-08	8.956E-08	8.956E-08
C	0.1	0.00	4820.	0.	0.	442.7	256.1	442.7	2.815E-05	2.807E-05	2.807E-05
C	1.5	0.16	4820.	0.	0.	442.7	256.1	442.7	1.877E-06	1.871E-06	1.871E-06
C	3.0	0.52	4820.	0.	0.	442.7	256.1	442.7	9.384E-07	9.357E-07	9.357E-07
C	5.0	1.56	4820.	0.	0.	442.7	256.1	442.7	5.630E-07	5.614E-07	5.614E-07
C	7.5	1.04	4820.	0.	0.	442.7	256.1	442.7	3.753E-07	3.743E-07	3.743E-07
C	10.0	0.16	4820.	0.	0.	442.7	256.1	442.7	2.815E-07	2.807E-07	2.807E-07
D	0.1	0.09	4820.	0.	0.	311.7	87.2	373.3	9.804E-05	1.160E-04	9.804E-05
D	1.5	1.92	4820.	0.	0.	311.7	87.2	373.3	6.536E-06	7.736E-06	6.536E-06
D	3.0	6.44	4820.	0.	0.	311.7	87.2	345.6	3.529E-06	3.868E-06	3.529E-06
D	5.0	14.63	4820.	0.	0.	311.7	87.2	319.3	2.292E-06	2.321E-06	2.292E-06
D	7.5	11.52	4820.	0.	0.	311.7	87.2	311.7	1.565E-06	1.547E-06	1.547E-06
D	10.0	2.44	4820.	0.	0.	311.7	87.2	311.7	1.174E-06	1.160E-06	1.160E-06
D	15.0	0.36	4820.	0.	0.	311.7	87.2	311.7	7.827E-07	7.736E-07	7.736E-07
E	0.1	0.10	4820.	0.	0.	221.7	55.4	309.2	1.867E-04	2.539E-04	1.867E-04
E	1.5	3.12	4820.	0.	0.	221.7	55.4	309.2	1.245E-05	1.693E-05	1.245E-05
E	3.0	8.72	4820.	0.	0.	221.7	55.4	265.9	7.239E-06	8.463E-06	7.239E-06
E	5.0	8.36	4820.	0.	0.	221.7	55.4	230.7	5.006E-06	5.078E-06	5.006E-06
E	7.5	2.28	4820.	0.	0.	221.7	55.4	221.7	3.473E-06	3.385E-06	3.385E-06
E	10.0	0.68	4820.	0.	0.	221.7	55.4	221.7	2.605E-06	2.539E-06	2.539E-06
E	14.9	0.16	4820.	0.	0.	221.7	55.4	221.7	1.737E-06	1.693E-06	1.693E-06
F	0.1	0.04	4820.	0.	0.	153.0	34.5	243.7	3.809E-04	5.719E-04	3.809E-04
F	1.5	2.08	4820.	0.	0.	153.0	34.5	243.7	2.539E-05	3.813E-05	2.539E-05
F	3.0	7.84	4820.	0.	0.	153.0	34.5	195.7	1.581E-05	1.906E-05	1.581E-05
F	5.0	1.56	4820.	0.	0.	153.0	34.5	161.1	1.153E-05	1.144E-05	1.144E-05
G	0.1	0.01	4820.	0.	0.	105.6	21.4	209.9	7.107E-04	1.238E-03	7.107E-04
G	1.5	1.40	4820.	0.	0.	105.6	21.4	209.9	4.738E-05	8.251E-05	4.738E-05
G	3.0	10.12	4820.	0.	0.	105.6	21.4	149.9	3.318E-05	4.126E-05	3.318E-05
G	5.0	1.40	4820.	0.	0.	105.6	21.4	113.1	2.639E-05	2.475E-05	2.475E-05

LUSNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades  
 DATA PERIOD: 1999-2003  
 TYPE OF RELEASE: Ground Level Release  
 SOURCE OF DATA: Data from onsite met tower

METEOROLOGICAL INSTRUMENTATION  
 WIND SENSORS HEIGHT: 10 Meters DT  
 DELTA-T HEIGHTS: from 10m to 60m

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

LOW POPULATION ZONE CALCULATIONS:

0 WNW SECTOR BOUNDARY DISTANCE = 4820.0 METERS  
 OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED  
 AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

0BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	7.107E-04	3.809E-04	1.867E-04	9.804E-05	4.738E-05	3.318E-05	2.807E-05	2.539E-05	2.475E-05	1.581E-05
	0.013	0.053	0.150	0.237	1.636	11.752	11.754	13.833	15.233	23.069
	0.00074	0.00306	0.00862	0.01361	0.09397	0.67491	0.67505	0.79445	0.87482	1.32487
0	1.245E-05	1.144E-05	8.956E-06	7.239E-06	6.536E-06	5.006E-06	4.115E-06	3.529E-06	3.385E-06	2.539E-06
	26.188	27.747	27.749	36.465	38.384	46.741	46.743	53.180	55.459	56.139
	1.50398	1.59353	1.59360	2.09418	2.20440	2.68431	2.68442	3.05411	3.18499	3.22403
0	2.292E-06	1.871E-06	1.693E-06	1.547E-06	1.160E-06	9.357E-07	7.736E-07	5.971E-07	5.614E-07	3.743E-07
	70.772	70.932	71.092	82.607	85.046	85.566	85.926	86.086	87.645	88.685
	4.06444	4.07363	4.08281	4.74412	4.88419	4.91404	4.93471	4.94389	5.03344	5.09315
0	2.985E-07	2.807E-07	2.743E-07	1.791E-07	1.372E-07	1.194E-07	8.956E-08	8.230E-08	5.486E-08	
	89.205	89.365	89.884	91.124	94.083	94.442	94.602	98.960	100.000	
	5.12300	5.13218	5.16203	5.23321	5.40313	5.42380	5.43299	5.68327	5.74297	

0 X/Q PERCENTILES

(BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED

CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 2) = 0.674  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 1.323  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 2.682  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5) = 4.061  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 6) = 4.740

1.201E-04	0.057	1.000
7.014E-05	0.172	3.000
5.365E-05	0.287	5.000
3.646E-05	0.574	10.000
2.556E-05	0.861	15.000
1.859E-05	1.149	20.000
1.395E-05	1.436	25.000
1.045E-05	1.723	30.000
8.138E-06	2.010	35.000
6.521E-06	2.297	40.000

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

5.343E-06	2.584	45.000
4.426E-06	2.871	50.000
3.710E-06	3.159	55.000
3.150E-06	3.446	60.000
2.703E-06	3.733	65.000
2.342E-06	4.020	70.000
1.981E-06	4.307	75.000
1.680E-06	4.594	80.000
0	3.947E-05	0.5
		8.71

0ANNUAL AVERAGE = 2.61E-07

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades	METEOROLOGICAL INSTRUMENTATION	
DATA PERIOD: 1999-2003	WIND SENSORS HEIGHT: 10 Meters	DT
TYPE OF RELEASE: Ground Level Release	DELTA-T HEIGHTS: from 10m to 60m	
SOURCE OF DATA: Data from onsite met tower		
COMMENTS: NONE		

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OPARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE NW SECTOR.

CLASS	WINDSPEED METER/SEC AT 10.0 METERS	FREQUENCY PERCENT	DISTANCE METERS	TERRAIN HT METERS	EFF PLUME HT METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)		
									MEANDER	BLDG WAKE	USED
									CA=1006	.SQ.	METERS
A	0.1	0.00	4820.	0.	0.	775.2	1000.0	775.2	4.116E-06	4.115E-06	4.115E-06
A	1.5	0.37	4820.	0.	0.	775.2	1000.0	775.2	2.744E-07	2.743E-07	2.743E-07
A	3.0	2.63	4820.	0.	0.	775.2	1000.0	775.2	1.372E-07	1.372E-07	1.372E-07
A	5.0	4.98	4820.	0.	0.	775.2	1000.0	775.2	8.233E-08	8.230E-08	8.230E-08
A	7.5	1.49	4820.	0.	0.	775.2	1000.0	775.2	5.489E-08	5.486E-08	5.486E-08
A	10.0	0.26	4820.	0.	0.	775.2	1000.0	775.2	4.116E-08	4.115E-08	4.115E-08
B	3.0	0.49	4820.	0.	0.	583.0	610.6	583.0	2.988E-07	2.985E-07	2.985E-07
B	5.0	1.26	4820.	0.	0.	583.0	610.6	583.0	1.793E-07	1.791E-07	1.791E-07
B	7.5	0.63	4820.	0.	0.	583.0	610.6	583.0	1.195E-07	1.194E-07	1.194E-07
B	10.0	0.11	4820.	0.	0.	583.0	610.6	583.0	8.964E-08	8.956E-08	8.956E-08
C	3.0	0.49	4820.	0.	0.	442.7	256.1	442.7	9.384E-07	9.357E-07	9.357E-07
C	5.0	1.86	4820.	0.	0.	442.7	256.1	442.7	5.630E-07	5.614E-07	5.614E-07
C	7.5	1.00	4820.	0.	0.	442.7	256.1	442.7	3.753E-07	3.743E-07	3.743E-07
C	10.0	0.11	4820.	0.	0.	442.7	256.1	442.7	2.815E-07	2.807E-07	2.807E-07
D	0.1	0.06	4820.	0.	0.	311.7	87.2	373.3	9.804E-05	1.160E-04	9.804E-05
D	1.5	1.37	4820.	0.	0.	311.7	87.2	373.3	6.536E-06	7.736E-06	6.536E-06
D	3.0	6.61	4820.	0.	0.	311.7	87.2	345.6	3.529E-06	3.868E-06	3.529E-06
D	5.0	12.47	4820.	0.	0.	311.7	87.2	319.3	2.292E-06	2.321E-06	2.292E-06
D	7.5	8.35	4820.	0.	0.	311.7	87.2	311.7	1.565E-06	1.547E-06	1.547E-06
D	10.0	1.63	4820.	0.	0.	311.7	87.2	311.7	1.174E-06	1.160E-06	1.160E-06



**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

E	0.1	0.07	4820.	0.	0.	221.7	55.4	309.2	1.867E-04	2.539E-04	1.867E-04
E	1.5	2.37	4820.	0.	0.	221.7	55.4	309.2	1.245E-05	1.693E-05	1.245E-05
E	3.0	9.21	4820.	0.	0.	221.7	55.4	265.9	7.239E-06	8.463E-06	7.239E-06
E	5.0	9.72	4820.	0.	0.	221.7	55.4	230.7	5.006E-06	5.078E-06	5.006E-06
E	7.5	3.49	4820.	0.	0.	221.7	55.4	221.7	3.473E-06	3.385E-06	3.385E-06
E	10.0	0.49	4820.	0.	0.	221.7	55.4	221.7	2.605E-06	2.539E-06	2.539E-06
F	0.1	0.04	4820.	0.	0.	153.0	34.5	243.7	3.809E-04	5.719E-04	3.809E-04
F	1.5	2.23	4820.	0.	0.	153.0	34.5	243.7	2.539E-05	3.813E-05	2.539E-05
F	3.0	7.86	4820.	0.	0.	153.0	34.5	195.7	1.581E-05	1.906E-05	1.581E-05
F	5.0	2.75	4820.	0.	0.	153.0	34.5	161.1	1.153E-05	1.144E-05	1.144E-05
G	0.1	0.01	4820.	0.	0.	105.6	21.4	209.9	7.107E-04	1.238E-03	7.107E-04
G	1.5	1.37	4820.	0.	0.	105.6	21.4	209.9	4.738E-05	8.251E-05	4.738E-05
G	3.0	13.21	4820.	0.	0.	105.6	21.4	149.9	3.318E-05	4.126E-05	3.318E-05
G	5.0	1.00	4820.	0.	0.	105.6	21.4	113.1	2.639E-05	2.475E-05	2.475E-05

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

LOW POPULATION ZONE CALCULATIONS:

0 NW SECTOR BOUNDARY DISTANCE = 4820.0 METERS

OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED

AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	7.107E-04	3.809E-04	1.867E-04	9.804E-05	4.738E-05	3.318E-05	2.539E-05	2.475E-05	1.581E-05	1.245E-05
	0.013	0.056	0.130	0.192	1.564	14.777	17.007	18.008	25.873	28.246
	0.00102	0.00449	0.01041	0.01540	0.12561	1.18646	1.36557	1.44594	2.07739	2.26798
0	1.144E-05	7.239E-06	6.536E-06	5.006E-06	4.115E-06	3.529E-06	3.385E-06	2.539E-06	2.292E-06	1.547E-06
	30.992	40.200	41.573	51.296	51.298	57.904	61.393	61.879	74.348	82.698
	2.48841	3.22779	3.33801	4.11872	4.11884	4.64926	4.92940	4.96844	5.96959	6.64008
0	1.160E-06	9.357E-07	5.614E-07	3.743E-07	2.985E-07	2.807E-07	2.743E-07	1.791E-07	1.372E-07	1.194E-07
	84.328	84.814	86.673	87.674	88.160	88.275	88.647	89.905	92.536	93.165
	6.77096	6.81000	6.95925	7.03962	7.07866	7.08784	7.11769	7.21873	7.42998	7.48049
0	8.956E-08	8.230E-08	5.486E-08	4.115E-08						
	93.279	98.256	99.743	100.000						
	7.48968	7.88922	8.00862	8.02929						

0 X/Q PERCENTILES

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

(BASED ON THE UPPER ENVELOPE OF THE ORDERED X/Q-FREQUENCY VALUES, AND AS PLOTTED ON A LOG-NORMAL GRAPH.)  
 0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
 CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 2) = 1.185  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 2.075  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 4.115  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5) = 5.966  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 6) = 6.636

1.305E-04	0.080	1.000
7.797E-05	0.241	3.000
6.026E-05	0.401	5.000
4.151E-05	0.803	10.000
3.255E-05	1.204	15.000
2.239E-05	1.606	20.000
1.657E-05	2.007	25.000
1.246E-05	2.409	30.000
9.672E-06	2.810	35.000
7.723E-06	3.212	40.000
6.305E-06	3.613	45.000
5.239E-06	4.015	50.000
4.342E-06	4.416	55.000
3.625E-06	4.818	60.000
3.062E-06	5.219	65.000
2.613E-06	5.621	70.000
2.220E-06	6.022	75.000
1.751E-06	6.423	80.000
0 5.372E-05	0.5	6.23

0ANNUAL AVERAGE = 3.72E-07

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE NNW SECTOR.

CLASS	METER/SEC	PERCENT	METERS	METERS	METERS	METERS	METERS	METERS	MEANDER-SY	** CHI/Q VALUES (SEC/CUBIC METER)		
										MEANDER	BLDG WAKE	USED
STABILITY WINDSPEED FREQUENCY DISTANCE TERRAIN HT EFF PLUME HT SIGMA-Y SIGMA-Z										CA=1006.SQ.METERS		
AT 10.0 METERS												
A	0.1	0.00	4820.	0.	0.	775.2	1000.0	775.2	4.116E-06	4.115E-06	4.115E-06	
A	1.5	0.47	4820.	0.	0.	775.2	1000.0	775.2	2.744E-07	2.743E-07	2.743E-07	

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

A	3.0	4.18	4820.	0.	0.	775.2	1000.0	775.2	1.372E-07	1.372E-07	1.372E-07
A	5.0	4.09	4820.	0.	0.	775.2	1000.0	775.2	8.233E-08	8.230E-08	8.230E-08
A	7.5	1.11	4820.	0.	0.	775.2	1000.0	775.2	5.489E-08	5.486E-08	5.486E-08
A	10.0	0.19	4820.	0.	0.	775.2	1000.0	775.2	4.116E-08	4.115E-08	4.115E-08
B	0.1	0.00	4820.	0.	0.	583.0	610.6	583.0	8.964E-06	8.956E-06	8.956E-06
B	1.5	0.19	4820.	0.	0.	583.0	610.6	583.0	5.976E-07	5.971E-07	5.971E-07
B	3.0	0.55	4820.	0.	0.	583.0	610.6	583.0	2.988E-07	2.985E-07	2.985E-07
B	5.0	0.94	4820.	0.	0.	583.0	610.6	583.0	1.793E-07	1.791E-07	1.791E-07
B	7.5	0.28	4820.	0.	0.	583.0	610.6	583.0	1.195E-07	1.194E-07	1.194E-07
C	0.1	0.00	4820.	0.	0.	442.7	256.1	442.7	2.815E-05	2.807E-05	2.807E-05
C	1.5	0.09	4820.	0.	0.	442.7	256.1	442.7	1.877E-06	1.871E-06	1.871E-06
C	3.0	0.83	4820.	0.	0.	442.7	256.1	442.7	9.384E-07	9.357E-07	9.357E-07
C	5.0	1.39	4820.	0.	0.	442.7	256.1	442.7	5.630E-07	5.614E-07	5.614E-07
C	7.5	0.66	4820.	0.	0.	442.7	256.1	442.7	3.753E-07	3.743E-07	3.743E-07
D	0.1	0.08	4820.	0.	0.	311.7	87.2	373.3	9.804E-05	1.160E-04	9.804E-05
D	1.5	1.66	4820.	0.	0.	311.7	87.2	373.3	6.536E-06	7.736E-06	6.536E-06
D	3.0	8.08	4820.	0.	0.	311.7	87.2	345.6	3.529E-06	3.868E-06	3.529E-06
D	5.0	12.06	4820.	0.	0.	311.7	87.2	319.3	2.292E-06	2.321E-06	2.292E-06
D	7.5	5.28	4820.	0.	0.	311.7	87.2	311.7	1.565E-06	1.547E-06	1.547E-06
D	10.0	0.47	4820.	0.	0.	311.7	87.2	311.7	1.174E-06	1.160E-06	1.160E-06
E	0.1	0.10	4820.	0.	0.	221.7	55.4	309.2	1.867E-04	2.539E-04	1.867E-04
E	1.5	3.07	4820.	0.	0.	221.7	55.4	309.2	1.245E-05	1.693E-05	1.245E-05
E	3.0	11.89	4820.	0.	0.	221.7	55.4	265.9	7.239E-06	8.463E-06	7.239E-06
E	5.0	9.76	4820.	0.	0.	221.7	55.4	230.7	5.006E-06	5.078E-06	5.006E-06
E	7.5	2.51	4820.	0.	0.	221.7	55.4	221.7	3.473E-06	3.385E-06	3.385E-06
E	10.0	0.28	4820.	0.	0.	221.7	55.4	221.7	2.605E-06	2.539E-06	2.539E-06
F	0.1	0.05	4820.	0.	0.	153.0	34.5	243.7	3.809E-04	5.719E-04	3.809E-04
F	1.5	2.60	4820.	0.	0.	153.0	34.5	243.7	2.539E-05	3.813E-05	2.539E-05
F	3.0	8.74	4820.	0.	0.	153.0	34.5	195.7	1.581E-05	1.906E-05	1.581E-05
F	5.0	1.96	4820.	0.	0.	153.0	34.5	161.1	1.153E-05	1.144E-05	1.144E-05
G	0.1	0.02	4820.	0.	0.	105.6	21.4	209.9	7.107E-04	1.238E-03	7.107E-04
G	1.5	2.24	4820.	0.	0.	105.6	21.4	209.9	4.738E-05	8.251E-05	4.738E-05
G	3.0	12.81	4820.	0.	0.	105.6	21.4	149.9	3.318E-05	4.126E-05	3.318E-05
G	5.0	1.39	4820.	0.	0.	105.6	21.4	113.1	2.639E-05	2.475E-05	2.475E-05

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades  
 DATA PERIOD: 1999-2003  
 TYPE OF RELEASE: Ground Level Release  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

METEOROLOGICAL INSTRUMENTATION  
 WIND SENSORS HEIGHT: 10 Meters DT  
 DELTA-T HEIGHTS: from 10m to 60m

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

LOW POPULATION ZONE CALCULATIONS:

0 NNW SECTOR BOUNDARY DISTANCE = 4820.0 METERS

OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED

AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

0BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	7.107E-04	3.809E-04	1.867E-04	9.804E-05	4.738E-05	3.318E-05	2.807E-05	2.539E-05	2.475E-05	1.581E-05
	0.021	0.071	0.166	0.242	2.479	15.287	15.288	17.888	19.273	28.010
	0.00222	0.00766	0.01793	0.02603	0.26713	1.64715	1.64729	1.92742	2.07668	3.01813
0	1.245E-05	1.144E-05	8.956E-06	7.239E-06	6.536E-06	5.006E-06	4.115E-06	3.529E-06	3.385E-06	2.539E-06
	31.079	33.039	33.041	44.932	46.594	56.355	56.356	64.433	66.948	67.225
	3.34878	3.56003	3.56020	4.84148	5.02059	6.07225	6.07245	6.94271	7.21366	7.24352
0	2.292E-06	1.871E-06	1.547E-06	1.160E-06	9.357E-07	5.971E-07	5.614E-07	3.743E-07	2.985E-07	2.743E-07
	79.286	79.372	84.657	85.125	85.956	86.148	87.533	88.194	88.748	89.217
	8.54317	8.55236	9.12182	9.17233	9.26189	9.28255	9.43181	9.50299	9.56269	9.61321
0	1.791E-07	1.372E-07	1.194E-07	8.230E-08	5.486E-08	4.115E-08				
	90.155	94.331	94.608	98.700	99.808	100.000				
	9.71424	10.16430	10.19415	10.63502	10.75442	10.77509				

0 X/Q PERCENTILES

(BASED ON THE UPPER ENVELOPE OF THE ORDERED X/Q-FREQUENCY VALUES, AND AS PLOTTED ON A LOG-NORMAL GRAPH.)

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED

CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 2)= 1.645  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3)= 3.015  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4)= 6.068  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5)= 8.540  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 6)= 9.118

1.443E-04	0.108	1.000
8.392E-05	0.323	3.000
6.391E-05	0.539	5.000
4.303E-05	1.078	10.000
3.358E-05	1.616	15.000
2.408E-05	2.155	20.000
1.827E-05	2.694	25.000
1.421E-05	3.233	30.000
1.114E-05	3.771	35.000
8.970E-06	4.310	40.000
7.374E-06	4.849	45.000

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

6.165E-06	5.388	50.000
5.225E-06	5.926	55.000
4.357E-06	6.465	60.000
3.639E-06	7.004	65.000
3.070E-06	7.543	70.000
2.614E-06	8.081	75.000
2.173E-06	8.620	80.000
0 6.657E-05	0.5	4.64

0ANNUAL AVERAGE = 5.65E-07

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145  
 OPARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE N SECTOR.

CLASS	METER/SEC AT 10.0 METERS	PERCENT	METERS	METERS	METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)			
									MEANDER	BLDG WAKE	USED	
										CA=1006.SQ.METERS		
A	0.1	0.00	4820.	0.	0.	775.2	1000.0	775.2	4.116E-06	4.115E-06	4.115E-06	
A	1.5	1.02	4820.	0.	0.	775.2	1000.0	775.2	2.744E-07	2.743E-07	2.743E-07	
A	3.0	3.82	4820.	0.	0.	775.2	1000.0	775.2	1.372E-07	1.372E-07	1.372E-07	
A	5.0	3.68	4820.	0.	0.	775.2	1000.0	775.2	8.233E-08	8.230E-08	8.230E-08	
A	7.5	0.38	4820.	0.	0.	775.2	1000.0	775.2	5.489E-08	5.486E-08	5.486E-08	
B	0.1	0.00	4820.	0.	0.	583.0	610.6	583.0	8.964E-06	8.956E-06	8.956E-06	
B	1.5	0.12	4820.	0.	0.	583.0	610.6	583.0	5.976E-07	5.971E-07	5.971E-07	
B	3.0	1.02	4820.	0.	0.	583.0	610.6	583.0	2.988E-07	2.985E-07	2.985E-07	
B	5.0	0.76	4820.	0.	0.	583.0	610.6	583.0	1.793E-07	1.791E-07	1.791E-07	
C	0.1	0.01	4820.	0.	0.	442.7	256.1	442.7	2.815E-05	2.807E-05	2.807E-05	
C	1.5	0.38	4820.	0.	0.	442.7	256.1	442.7	1.877E-06	1.871E-06	1.871E-06	
C	3.0	1.52	4820.	0.	0.	442.7	256.1	442.7	9.384E-07	9.357E-07	9.357E-07	
C	5.0	1.28	4820.	0.	0.	442.7	256.1	442.7	5.630E-07	5.614E-07	5.614E-07	
C	7.5	0.12	4820.	0.	0.	442.7	256.1	442.7	3.753E-07	3.743E-07	3.743E-07	
D	0.1	0.11	4820.	0.	0.	311.7	87.2	373.3	9.804E-05	1.160E-04	9.804E-05	
D	1.5	2.54	4820.	0.	0.	311.7	87.2	373.3	6.536E-06	7.736E-06	6.536E-06	
D	3.0	13.11	4820.	0.	0.	311.7	87.2	345.6	3.529E-06	3.868E-06	3.529E-06	
D	5.0	8.41	4820.	0.	0.	311.7	87.2	319.3	2.292E-06	2.321E-06	2.292E-06	
D	7.5	1.28	4820.	0.	0.	311.7	87.2	311.7	1.565E-06	1.547E-06	1.547E-06	
E	0.1	0.14	4820.	0.	0.	221.7	55.4	309.2	1.867E-04	2.539E-04	1.867E-04	
E	1.5	4.58	4820.	0.	0.	221.7	55.4	309.2	1.245E-05	1.693E-05	1.245E-05	

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

E	3.0	17.81	4820.	0.	0.	221.7	55.4	265.9	7.239E-06	8.463E-06	7.239E-06
E	5.0	5.60	4820.	0.	0.	221.7	55.4	230.7	5.006E-06	5.078E-06	5.006E-06
E	7.5	0.38	4820.	0.	0.	221.7	55.4	221.7	3.473E-06	3.385E-06	3.385E-06
F	0.1	0.07	4820.	0.	0.	153.0	34.5	243.7	3.809E-04	5.719E-04	3.809E-04
F	1.5	3.82	4820.	0.	0.	153.0	34.5	243.7	2.539E-05	3.813E-05	2.539E-05
F	3.0	8.14	4820.	0.	0.	153.0	34.5	195.7	1.581E-05	1.906E-05	1.581E-05
F	5.0	0.38	4820.	0.	0.	153.0	34.5	161.1	1.153E-05	1.144E-05	1.144E-05
G	0.1	0.03	4820.	0.	0.	105.6	21.4	209.9	7.107E-04	1.238E-03	7.107E-04
G	1.5	3.44	4820.	0.	0.	105.6	21.4	209.9	4.738E-05	8.251E-05	4.738E-05
G	3.0	15.00	4820.	0.	0.	105.6	21.4	149.9	3.318E-05	4.126E-05	3.318E-05
G	5.0	1.02	4820.	0.	0.	105.6	21.4	113.1	2.639E-05	2.475E-05	2.475E-05

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE  
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

LOW POPULATION ZONE CALCULATIONS:

0 N SECTOR BOUNDARY DISTANCE = 4820.0 METERS

OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED

AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

OBELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	7.107E-04	3.809E-04	1.867E-04	9.804E-05	4.738E-05	3.318E-05	2.807E-05	2.539E-05	2.475E-05	1.581E-05
	0.032	0.106	0.248	0.363	3.808	18.811	18.817	22.641	23.663	31.807
	0.00250	0.00834	0.01953	0.02857	0.29952	1.47977	1.48020	1.78101	1.86138	2.50202
0	1.245E-05	1.144E-05	8.956E-06	7.239E-06	6.536E-06	5.006E-06	4.115E-06	3.529E-06	3.385E-06	2.292E-06
	36.389	36.769	36.770	54.576	57.116	62.720	62.724	75.830	76.210	84.617
	2.86252	2.89237	2.89245	4.29314	4.49291	4.93378	4.93409	5.96509	5.99494	6.65625
0	1.871E-06	1.547E-06	9.357E-07	5.971E-07	5.614E-07	3.743E-07	2.985E-07	2.743E-07	1.791E-07	1.372E-07
	84.996	86.281	87.798	87.915	89.200	89.316	90.338	91.360	92.119	95.943
	6.68610	6.78713	6.90654	6.91572	7.01675	7.02594	7.10631	7.18667	7.24637	7.54718
0	8.230E-08	5.486E-08								
	99.621	100.000								
	7.83650	7.86635								

0 X/Q PERCENTILES

(BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
 CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 2) = 1.478  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 1.859  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 4.290  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5) = 5.961  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 6) = 6.652

1.653E-04	0.079	1.000
9.573E-05	0.236	3.000
7.282E-05	0.393	5.000
4.903E-05	0.787	10.000
3.831E-05	1.180	15.000
3.071E-05	1.573	20.000
2.295E-05	1.967	25.000
1.776E-05	2.360	30.000
1.422E-05	2.753	35.000
1.167E-05	3.147	40.000
9.769E-06	3.540	45.000
8.305E-06	3.933	50.000
7.121E-06	4.326	55.000
5.915E-06	4.720	60.000
4.972E-06	5.113	65.000
4.222E-06	5.506	70.000
3.618E-06	5.900	75.000
2.863E-06	6.293	80.000
0 6.372E-05	0.5	6.36

0ANNUAL AVERAGE = 5.15E-07

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades

METEOROLOGICAL INSTRUMENTATION

DATA PERIOD: 1999-2003

WIND SENSORS HEIGHT: 10 Meters DT

TYPE OF RELEASE: Ground Level Release

DELTA-T HEIGHTS: from 10m to 60m

SOURCE OF DATA: Data from onsite met tower

COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE NNE SECTOR.

STABILITY WINDSPEED FREQUENCY DISTANCE TERRAIN HT EFF PLUME HT SIGMA-Y SIGMA-Z MEANDER-SY \*\* CHI/Q VALUES (SEC/CUBIC METER)  
 CLASS METER/SEC PERCENT METERS METERS METERS METERS METERS METERS METERS MEANDER BLDG WAKE USED  
 AT 10.0 METERS CA=1006.SQ.METERS

A	0.1	0.00	4820.	0.	0.	775.2	1000.0	775.2	4.116E-06	4.115E-06	4.115E-06
A	1.5	0.88	4820.	0.	0.	775.2	1000.0	775.2	2.744E-07	2.743E-07	2.743E-07
A	3.0	4.30	4820.	0.	0.	775.2	1000.0	775.2	1.372E-07	1.372E-07	1.372E-07
A	5.0	1.81	4820.	0.	0.	775.2	1000.0	775.2	8.233E-08	8.230E-08	8.230E-08

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

B	0.1	0.00	4820.	0.	0.	583.0	610.6	583.0	8.964E-06	8.956E-06	8.956E-06
B	1.5	0.21	4820.	0.	0.	583.0	610.6	583.0	5.976E-07	5.971E-07	5.971E-07
B	3.0	1.35	4820.	0.	0.	583.0	610.6	583.0	2.988E-07	2.985E-07	2.985E-07
B	5.0	0.67	4820.	0.	0.	583.0	610.6	583.0	1.793E-07	1.791E-07	1.791E-07
C	3.0	1.60	4820.	0.	0.	442.7	256.1	442.7	9.384E-07	9.357E-07	9.357E-07
C	5.0	0.67	4820.	0.	0.	442.7	256.1	442.7	5.630E-07	5.614E-07	5.614E-07
C	7.5	0.21	4820.	0.	0.	442.7	256.1	442.7	3.753E-07	3.743E-07	3.743E-07
D	0.1	0.17	4820.	0.	0.	311.7	87.2	373.3	9.804E-05	1.160E-04	9.804E-05
D	1.5	3.83	4820.	0.	0.	311.7	87.2	373.3	6.536E-06	7.736E-06	6.536E-06
D	3.0	14.91	4820.	0.	0.	311.7	87.2	345.6	3.529E-06	3.868E-06	3.529E-06
D	5.0	14.24	4820.	0.	0.	311.7	87.2	319.3	2.292E-06	2.321E-06	2.292E-06
D	7.5	1.35	4820.	0.	0.	311.7	87.2	311.7	1.565E-06	1.547E-06	1.547E-06
E	0.1	0.15	4820.	0.	0.	221.7	55.4	309.2	1.867E-04	2.539E-04	1.867E-04
E	1.5	4.76	4820.	0.	0.	221.7	55.4	309.2	1.245E-05	1.693E-05	1.245E-05
E	3.0	18.74	4820.	0.	0.	221.7	55.4	265.9	7.239E-06	8.463E-06	7.239E-06
E	5.0	9.27	4820.	0.	0.	221.7	55.4	230.7	5.006E-06	5.078E-06	5.006E-06
E	7.5	0.47	4820.	0.	0.	221.7	55.4	221.7	3.473E-06	3.385E-06	3.385E-06
F	0.1	0.04	4820.	0.	0.	153.0	34.5	243.7	3.809E-04	5.719E-04	3.809E-04
F	1.5	2.28	4820.	0.	0.	153.0	34.5	243.7	2.539E-05	3.813E-05	2.539E-05
F	3.0	6.99	4820.	0.	0.	153.0	34.5	195.7	1.581E-05	1.906E-05	1.581E-05
F	5.0	0.67	4820.	0.	0.	153.0	34.5	161.1	1.153E-05	1.144E-05	1.144E-05
G	0.1	0.02	4820.	0.	0.	105.6	21.4	209.9	7.107E-04	1.238E-03	7.107E-04
G	1.5	2.28	4820.	0.	0.	105.6	21.4	209.9	4.738E-05	8.251E-05	4.738E-05
G	3.0	7.92	4820.	0.	0.	105.6	21.4	149.9	3.318E-05	4.126E-05	3.318E-05
G	5.0	0.21	4820.	0.	0.	105.6	21.4	113.1	2.639E-05	2.475E-05	2.475E-05

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

LOW POPULATION ZONE CALCULATIONS:

0 NNE SECTOR BOUNDARY DISTANCE = 4820.0 METERS

0 LATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED

AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.



**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	7.107E-04	3.809E-04	1.867E-04	9.804E-05	4.738E-05	3.318E-05	2.539E-05	2.475E-05	1.581E-05	1.245E-05
	0.021	0.065	0.213	0.386	2.664	10.585	12.863	13.070	20.060	24.823
	0.00093	0.00289	0.00945	0.01714	0.11817	0.46949	0.57052	0.57971	0.88970	1.10095
0	1.144E-05	8.956E-06	7.239E-06	6.536E-06	5.006E-06	4.115E-06	3.529E-06	3.385E-06	2.292E-06	1.547E-06
	25.496	25.497	44.239	48.070	57.337	57.340	72.250	72.716	86.954	88.300
	1.13080	1.13087	1.96210	2.13202	2.54304	2.54319	3.20450	3.22517	3.85663	3.91633
0	9.357E-07	5.971E-07	5.614E-07	3.743E-07	2.985E-07	2.743E-07	1.791E-07	1.372E-07	8.230E-08	
	89.905	90.112	90.785	90.992	92.338	93.218	93.891	98.188	100.000	
	3.98751	3.99670	4.02655	4.03573	4.09543	4.13447	4.16432	4.35490	4.43527	

0 X/Q PERCENTILES  
 (BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)  
 0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
 CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 2) = 0.469  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 3) = 1.960  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 4) = 2.130  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 5) = 3.202  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 6) = 3.853

1.246E-04	0.044	1.000
6.960E-05	0.133	3.000
5.211E-05	0.222	5.000
3.438E-05	0.444	10.000
2.346E-05	0.665	15.000
1.743E-05	0.887	20.000
1.375E-05	1.109	25.000
1.126E-05	1.331	30.000
9.477E-06	1.552	35.000
8.137E-06	1.774	40.000
7.089E-06	1.996	45.000
6.169E-06	2.218	50.000
5.356E-06	2.439	55.000
4.698E-06	2.661	60.000
4.158E-06	2.883	65.000
3.708E-06	3.105	70.000
3.239E-06	3.326	75.000
2.788E-06	3.548	80.000
2.419E-06	3.770	85.000
0 3.120E-05	0.5	11.27

0ANNUAL AVERAGE = 2.50E-07  
 1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades

METEOROLOGICAL INSTRUMENTATION

**NUMERICAL APPLICATIONS, Inc.**  
Determination of Atmospheric Dispersion Factors for Palisades  
Calculation Number: NAI-1149-002, Rev. 0

DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
SOURCE OF DATA: Data from onsite met tower  
COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145  
PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE NE SECTOR.

CLASS	WINDSPEED METER/SEC AT 10.0 METERS	FREQUENCY PERCENT	DISTANCE METERS	TERRAIN METERS	HT METERS	EFF METERS	PLUME HT METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)			
											MEANDER	BLDG WAKE	USED	
											CA=1006.SQ.METERS			
A	0.1	0.00	4820.	0.	0.	0.	775.2	1000.0	775.2	4.116E-06	4.115E-06	4.115E-06		
A	1.5	0.51	4820.	0.	0.	0.	775.2	1000.0	775.2	2.744E-07	2.743E-07	2.743E-07		
A	3.0	6.04	4820.	0.	0.	0.	775.2	1000.0	775.2	1.372E-07	1.372E-07	1.372E-07		
A	5.0	10.66	4820.	0.	0.	0.	775.2	1000.0	775.2	8.233E-08	8.230E-08	8.230E-08		
A	7.5	0.78	4820.	0.	0.	0.	775.2	1000.0	775.2	5.489E-08	5.486E-08	5.486E-08		
B	0.1	0.00	4820.	0.	0.	0.	583.0	610.6	583.0	8.964E-06	8.956E-06	8.956E-06		
B	1.5	0.12	4820.	0.	0.	0.	583.0	610.6	583.0	5.976E-07	5.971E-07	5.971E-07		
B	3.0	1.84	4820.	0.	0.	0.	583.0	610.6	583.0	2.988E-07	2.985E-07	2.985E-07		
B	5.0	2.90	4820.	0.	0.	0.	583.0	610.6	583.0	1.793E-07	1.791E-07	1.791E-07		
B	7.5	0.39	4820.	0.	0.	0.	583.0	610.6	583.0	1.195E-07	1.194E-07	1.194E-07		
C	0.1	0.00	4820.	0.	0.	0.	442.7	256.1	442.7	2.815E-05	2.807E-05	2.807E-05		
C	1.5	0.27	4820.	0.	0.	0.	442.7	256.1	442.7	1.877E-06	1.871E-06	1.871E-06		
C	3.0	2.63	4820.	0.	0.	0.	442.7	256.1	442.7	9.384E-07	9.357E-07	9.357E-07		
C	5.0	3.17	4820.	0.	0.	0.	442.7	256.1	442.7	5.630E-07	5.614E-07	5.614E-07		
C	7.5	0.78	4820.	0.	0.	0.	442.7	256.1	442.7	3.753E-07	3.743E-07	3.743E-07		
D	0.1	0.08	4820.	0.	0.	0.	311.7	87.2	373.3	9.804E-05	1.160E-04	9.804E-05		
D	1.5	1.84	4820.	0.	0.	0.	311.7	87.2	373.3	6.536E-06	7.736E-06	6.536E-06		
D	3.0	9.72	4820.	0.	0.	0.	311.7	87.2	345.6	3.529E-06	3.868E-06	3.529E-06		
D	5.0	24.33	4820.	0.	0.	0.	311.7	87.2	319.3	2.292E-06	2.321E-06	2.292E-06		
D	7.5	8.15	4820.	0.	0.	0.	311.7	87.2	311.7	1.565E-06	1.547E-06	1.547E-06		
D	10.0	0.12	4820.	0.	0.	0.	311.7	87.2	311.7	1.174E-06	1.160E-06	1.160E-06		
E	0.1	0.07	4820.	0.	0.	0.	221.7	55.4	309.2	1.867E-04	2.539E-04	1.867E-04		
E	1.5	2.23	4820.	0.	0.	0.	221.7	55.4	309.2	1.245E-05	1.693E-05	1.245E-05		
E	3.0	7.76	4820.	0.	0.	0.	221.7	55.4	265.9	7.239E-06	8.463E-06	7.239E-06		
E	5.0	8.70	4820.	0.	0.	0.	221.7	55.4	230.7	5.006E-06	5.078E-06	5.006E-06		
E	7.5	2.11	4820.	0.	0.	0.	221.7	55.4	221.7	3.473E-06	3.385E-06	3.385E-06		
E	10.0	0.12	4820.	0.	0.	0.	221.7	55.4	221.7	2.605E-06	2.539E-06	2.539E-06		
F	0.1	0.02	4820.	0.	0.	0.	153.0	34.5	243.7	3.809E-04	5.719E-04	3.809E-04		
F	1.5	1.06	4820.	0.	0.	0.	153.0	34.5	243.7	2.539E-05	3.813E-05	2.539E-05		
F	3.0	1.84	4820.	0.	0.	0.	153.0	34.5	195.7	1.581E-05	1.906E-05	1.581E-05		
F	5.0	0.27	4820.	0.	0.	0.	153.0	34.5	161.1	1.153E-05	1.144E-05	1.144E-05		

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

G	0.1	0.01	4820.	0.	0.	105.6	21.4	209.9	7.107E-04	1.238E-03	7.107E-04
G	1.5	0.66	4820.	0.	0.	105.6	21.4	209.9	4.738E-05	8.251E-05	4.738E-05
G	3.0	0.78	4820.	0.	0.	105.6	21.4	149.9	3.318E-05	4.126E-05	3.318E-05

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0                      RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades    METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003    WIND SENSORS HEIGHT: 10 Meters                      DT  
 TYPE OF RELEASE: Ground Level Release                              DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE  
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

LOW POPULATION ZONE CALCULATIONS:  
 0 NE SECTOR                      BOUNDARY DISTANCE = 4820.0 METERS  
 OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED  
 AS A FUNCTION OF DOWNWIND DISTANCE.  
 MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.  
 BUILDING WAKE CREDIT ALLOWED: C= 0.5                      A= 2011.                      D= 58.5  
 CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.  
 OBELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.  
 THE TOP NUMBER IS THE CHI/Q.                      THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.  
 THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	7.107E-04	3.809E-04	1.867E-04	9.804E-05	4.738E-05	3.318E-05	2.807E-05	2.539E-05	1.581E-05	1.245E-05
	0.006	0.027	0.096	0.179	0.844	1.629	1.632	2.689	4.531	6.765
	0.00047	0.00203	0.00730	0.01364	0.06415	0.12385	0.12415	0.20452	0.34459	0.51451
0	1.144E-05	8.956E-06	7.239E-06	6.536E-06	5.006E-06	4.115E-06	3.529E-06	3.385E-06	2.539E-06	2.292E-06
	7.037	7.038	14.797	16.639	25.334	25.336	35.058	37.171	37.292	61.626
	0.53518	0.53525	1.12538	1.26544	1.92675	1.92690	2.66628	2.82702	2.83620	4.68695
0	1.871E-06	1.547E-06	1.160E-06	9.357E-07	5.971E-07	5.614E-07	3.743E-07	2.985E-07	2.743E-07	1.791E-07
	61.898	70.050	70.171	72.797	72.918	76.088	76.873	78.715	79.228	82.127
	4.70762	5.32759	5.33678	5.53655	5.54573	5.78683	5.84654	5.98661	6.02564	6.24608
0	1.372E-07	1.194E-07	8.230E-08	5.486E-08						
	88.165	88.557	99.215	100.000						
	6.70532	6.73517	7.54573	7.60544						

0                      X/Q PERCENTILES  
 (BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)  
 0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
                     CHI/Q                      WITH RESPECT TO                      WHEN THE WIND BLOWS  
                     SEC/CUBIC METER                      THE TOTAL TIME                      INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 2)= 0.002  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 3)= 0.204  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 4)= 1.925  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 5)= 4.683  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 6)= 5.324

4.902E-05                      0.076                      1.000

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

2.367E-05	0.228	3.000
1.687E-05	0.380	5.000
1.034E-05	0.761	10.000
7.619E-06	1.141	15.000
6.074E-06	1.521	20.000
5.062E-06	1.901	25.000
4.353E-06	2.282	30.000
3.820E-06	2.662	35.000
3.402E-06	3.042	40.000
3.064E-06	3.422	45.000
2.785E-06	3.803	50.000
2.551E-06	4.183	55.000
2.351E-06	4.563	60.000
1.949E-06	4.944	65.000
1.551E-06	5.324	70.000
0 1.397E-05	0.5	6.57

0ANNUAL AVERAGE = 2.15E-07

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OPARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE ENE SECTOR.

CLASS	METER/SEC	PERCENT	METERS	METERS	METERS	SIGMA-Y	SIGMA-Z	MEANDER-SY	** CHI/Q VALUES (SEC/CUBIC METER)			
									MEANDER	BLDG WAKE	USED	
									CA=1006.SQ.METERS			
AT 10.0 METERS												
A	0.1	0.00	4820.	0.	0.	775.2	1000.0	775.2	4.116E-06	4.115E-06	4.115E-06	
A	1.5	1.13	4820.	0.	0.	775.2	1000.0	775.2	2.744E-07	2.743E-07	2.743E-07	
A	3.0	15.04	4820.	0.	0.	775.2	1000.0	775.2	1.372E-07	1.372E-07	1.372E-07	
A	5.0	10.61	4820.	0.	0.	775.2	1000.0	775.2	8.233E-08	8.230E-08	8.230E-08	
A	7.5	0.62	4820.	0.	0.	775.2	1000.0	775.2	5.489E-08	5.486E-08	5.486E-08	
B	0.1	0.01	4820.	0.	0.	583.0	610.6	583.0	8.964E-06	8.956E-06	8.956E-06	
B	1.5	0.80	4820.	0.	0.	583.0	610.6	583.0	5.976E-07	5.971E-07	5.971E-07	
B	3.0	1.74	4820.	0.	0.	583.0	610.6	583.0	2.988E-07	2.985E-07	2.985E-07	
B	5.0	2.54	4820.	0.	0.	583.0	610.6	583.0	1.793E-07	1.791E-07	1.791E-07	
B	7.5	0.15	4820.	0.	0.	583.0	610.6	583.0	1.195E-07	1.194E-07	1.194E-07	
C	0.1	0.01	4820.	0.	0.	442.7	256.1	442.7	2.815E-05	2.807E-05	2.807E-05	
C	1.5	0.47	4820.	0.	0.	442.7	256.1	442.7	1.877E-06	1.871E-06	1.871E-06	
C	3.0	1.42	4820.	0.	0.	442.7	256.1	442.7	9.384E-07	9.357E-07	9.357E-07	
C	5.0	2.22	4820.	0.	0.	442.7	256.1	442.7	5.630E-07	5.614E-07	5.614E-07	
C	7.5	0.47	4820.	0.	0.	442.7	256.1	442.7	3.753E-07	3.743E-07	3.743E-07	

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

D	0.1	0.14	4820.	0.	0.	311.7	87.2	373.3	9.804E-05	1.160E-04	9.804E-05
D	1.5	3.16	4820.	0.	0.	311.7	87.2	373.3	6.536E-06	7.736E-06	6.536E-06
D	3.0	7.45	4820.	0.	0.	311.7	87.2	345.6	3.529E-06	3.868E-06	3.529E-06
D	5.0	16.46	4820.	0.	0.	311.7	87.2	319.3	2.292E-06	2.321E-06	2.292E-06
D	7.5	9.81	4820.	0.	0.	311.7	87.2	311.7	1.565E-06	1.547E-06	1.547E-06
D	10.0	1.13	4820.	0.	0.	311.7	87.2	311.7	1.174E-06	1.160E-06	1.160E-06
E	0.1	0.06	4820.	0.	0.	221.7	55.4	309.2	1.867E-04	2.539E-04	1.867E-04
E	1.5	2.07	4820.	0.	0.	221.7	55.4	309.2	1.245E-05	1.693E-05	1.245E-05
E	3.0	8.07	4820.	0.	0.	221.7	55.4	265.9	7.239E-06	8.463E-06	7.239E-06
E	5.0	7.59	4820.	0.	0.	221.7	55.4	230.7	5.006E-06	5.078E-06	5.006E-06
E	7.5	2.69	4820.	0.	0.	221.7	55.4	221.7	3.473E-06	3.385E-06	3.385E-06
E	10.0	0.15	4820.	0.	0.	221.7	55.4	221.7	2.605E-06	2.539E-06	2.539E-06
F	0.1	0.02	4820.	0.	0.	153.0	34.5	243.7	3.809E-04	5.719E-04	3.809E-04
F	1.5	1.27	4820.	0.	0.	153.0	34.5	243.7	2.539E-05	3.813E-05	2.539E-05
F	3.0	1.74	4820.	0.	0.	153.0	34.5	195.7	1.581E-05	1.906E-05	1.581E-05
F	5.0	0.33	4820.	0.	0.	153.0	34.5	161.1	1.153E-05	1.144E-05	1.144E-05
F	7.5	0.15	4820.	0.	0.	153.0	34.5	153.0	8.088E-06	7.625E-06	7.625E-06
G	0.1	0.00	4820.	0.	0.	105.6	21.4	209.9	7.107E-04	1.238E-03	7.107E-04
G	1.5	0.33	4820.	0.	0.	105.6	21.4	209.9	4.738E-05	8.251E-05	4.738E-05
G	3.0	0.15	4820.	0.	0.	105.6	21.4	149.9	3.318E-05	4.126E-05	3.318E-05

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

LOW POPULATION ZONE CALCULATIONS:

0 ENE SECTOR BOUNDARY DISTANCE = 4820.0 METERS

OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED

AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

OBELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	7.107E-04	3.809E-04	1.867E-04	9.804E-05	4.738E-05	3.318E-05	2.807E-05	2.539E-05	1.581E-05	1.245E-05
	0.003	0.028	0.092	0.235	0.562	0.707	0.714	1.986	3.730	5.802
	0.00019	0.00175	0.00582	0.01485	0.03551	0.04470	0.04513	0.12550	0.23572	0.36660
0	1.144E-05	8.956E-06	7.625E-06	7.239E-06	6.536E-06	5.006E-06	4.115E-06	3.529E-06	3.385E-06	2.539E-06
	6.129	6.135	6.280	14.347	17.509	25.103	25.108	32.557	35.246	35.391

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

	0.38727	0.38767	0.39686	0.90662	1.10639	1.58629	1.58657	2.05729	2.22721	2.23640
0	2.292E-06	1.871E-06	1.547E-06	1.160E-06	9.357E-07	5.971E-07	5.614E-07	3.743E-07	2.985E-07	2.743E-07
	51.852	52.325	62.136	63.262	64.680	65.479	67.696	68.168	69.912	71.039
	3.27658	3.30643	3.92641	3.99759	4.08714	4.13766	4.27773	4.30758	4.41780	4.48898
0	1.791E-07	1.372E-07	1.194E-07	8.230E-08	5.486E-08					
	73.582	88.626	88.772	99.382	100.000					
	4.64971	5.60035	5.60953	6.28002	6.31906					

0 X/Q PERCENTILES  
 (BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)  
 0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
 CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 2) = 0.002  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 0.366  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 1.105  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5) = 1.585  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 6) = 3.274  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 7) = 3.923

	4.452E-05	0.063	1.000
	2.056E-05	0.190	3.000
	1.398E-05	0.316	5.000
	9.155E-06	0.632	10.000
	7.190E-06	0.948	15.000
	5.932E-06	1.264	20.000
	5.022E-06	1.580	25.000
	4.166E-06	1.896	30.000
	3.539E-06	2.212	35.000
	3.063E-06	2.528	40.000
	2.690E-06	2.844	45.000
	2.389E-06	3.160	50.000
	2.020E-06	3.475	55.000
	1.671E-06	3.791	60.000
0	1.047E-05	0.5	7.91

0ANNUAL AVERAGE = 1.73E-07  
 1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE  
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145  
 0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE E SECTOR.  
 STABILITY WINDSPEED FREQUENCY DISTANCE TERRAIN HT EFF PLUME HT SIGMA-Y SIGMA-Z MEANDER-SY \*\* CHI/Q VALUES (SEC/CUBIC METER)

NUMERICAL APPLICATIONS, Inc.  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

CLASS	METER/SEC AT 10.0 METERS	PERCENT	METERS	METERS	METERS	METERS	METERS	METERS	METERS	MEANDER	BLDG WAKE CA=1006.SQ.METERS	USED
A	0.1	0.01	4820.	0.	0.	775.2	1000.0	775.2	775.2	4.116E-06	4.115E-06	4.115E-06
A	1.5	2.39	4820.	0.	0.	775.2	1000.0	775.2	775.2	2.744E-07	2.743E-07	2.743E-07
A	3.0	13.79	4820.	0.	0.	775.2	1000.0	775.2	775.2	1.372E-07	1.372E-07	1.372E-07
A	5.0	4.82	4820.	0.	0.	775.2	1000.0	775.2	775.2	8.233E-08	8.230E-08	8.230E-08
A	7.5	0.48	4820.	0.	0.	775.2	1000.0	775.2	775.2	5.489E-08	5.486E-08	5.486E-08
B	0.1	0.00	4820.	0.	0.	583.0	610.6	583.0	583.0	8.964E-06	8.956E-06	8.956E-06
B	1.5	0.62	4820.	0.	0.	583.0	610.6	583.0	583.0	5.976E-07	5.971E-07	5.971E-07
B	3.0	1.29	4820.	0.	0.	583.0	610.6	583.0	583.0	2.988E-07	2.985E-07	2.985E-07
B	5.0	0.81	4820.	0.	0.	583.0	610.6	583.0	583.0	1.793E-07	1.791E-07	1.791E-07
B	7.5	0.33	4820.	0.	0.	583.0	610.6	583.0	583.0	1.195E-07	1.194E-07	1.194E-07
C	0.1	0.01	4820.	0.	0.	442.7	256.1	442.7	442.7	2.815E-05	2.807E-05	2.807E-05
C	1.5	0.48	4820.	0.	0.	442.7	256.1	442.7	442.7	1.877E-06	1.871E-06	1.871E-06
C	3.0	1.43	4820.	0.	0.	442.7	256.1	442.7	442.7	9.384E-07	9.357E-07	9.357E-07
C	5.0	1.29	4820.	0.	0.	442.7	256.1	442.7	442.7	5.630E-07	5.614E-07	5.614E-07
C	7.5	0.33	4820.	0.	0.	442.7	256.1	442.7	442.7	3.753E-07	3.743E-07	3.743E-07
D	0.1	0.09	4820.	0.	0.	311.7	87.2	373.3	373.3	9.804E-05	1.160E-04	9.804E-05
D	1.5	1.91	4820.	0.	0.	311.7	87.2	373.3	373.3	6.536E-06	7.736E-06	6.536E-06
D	3.0	7.35	4820.	0.	0.	311.7	87.2	345.6	345.6	3.529E-06	3.868E-06	3.529E-06
D	5.0	20.18	4820.	0.	0.	311.7	87.2	319.3	319.3	2.292E-06	2.321E-06	2.292E-06
D	7.5	16.84	4820.	0.	0.	311.7	87.2	311.7	311.7	1.565E-06	1.547E-06	1.547E-06
D	10.0	3.68	4820.	0.	0.	311.7	87.2	311.7	311.7	1.174E-06	1.160E-06	1.160E-06
D	15.0	0.48	4820.	0.	0.	311.7	87.2	311.7	311.7	7.827E-07	7.736E-07	7.736E-07
E	0.1	0.07	4820.	0.	0.	221.7	55.4	309.2	309.2	1.867E-04	2.539E-04	1.867E-04
E	1.5	2.10	4820.	0.	0.	221.7	55.4	309.2	309.2	1.245E-05	1.693E-05	1.245E-05
E	3.0	5.92	4820.	0.	0.	221.7	55.4	265.9	265.9	7.239E-06	8.463E-06	7.239E-06
E	5.0	6.87	4820.	0.	0.	221.7	55.4	230.7	230.7	5.006E-06	5.078E-06	5.006E-06
E	7.5	2.10	4820.	0.	0.	221.7	55.4	221.7	221.7	3.473E-06	3.385E-06	3.385E-06
E	10.0	0.33	4820.	0.	0.	221.7	55.4	221.7	221.7	2.605E-06	2.539E-06	2.539E-06
F	0.1	0.02	4820.	0.	0.	153.0	34.5	243.7	243.7	3.809E-04	5.719E-04	3.809E-04
F	1.5	0.96	4820.	0.	0.	153.0	34.5	243.7	243.7	2.539E-05	3.813E-05	2.539E-05
F	3.0	0.96	4820.	0.	0.	153.0	34.5	195.7	195.7	1.581E-05	1.906E-05	1.581E-05
F	5.0	0.96	4820.	0.	0.	153.0	34.5	161.1	161.1	1.153E-05	1.144E-05	1.144E-05
F	7.5	0.33	4820.	0.	0.	153.0	34.5	153.0	153.0	8.088E-06	7.625E-06	7.625E-06
G	0.1	0.00	4820.	0.	0.	105.6	21.4	209.9	209.9	7.107E-04	1.238E-03	7.107E-04
G	1.5	0.33	4820.	0.	0.	105.6	21.4	209.9	209.9	4.738E-05	8.251E-05	4.738E-05
G	3.0	0.48	4820.	0.	0.	105.6	21.4	149.9	149.9	3.318E-05	4.126E-05	3.318E-05

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

LOW POPULATION ZONE CALCULATIONS:

0 E SECTOR BOUNDARY DISTANCE = 4820.0 METERS  
 OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED  
 AS A FUNCTION OF DOWNWIND DISTANCE.  
 MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.  
 BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

0 BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.  
 THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.  
 THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	7.107E-04	3.809E-04	1.867E-04	9.804E-05	4.738E-05	3.318E-05	2.807E-05	2.539E-05	1.581E-05	1.245E-05
	0.003	0.022	0.087	0.173	0.504	0.982	0.989	1.945	2.900	4.996
	0.00019	0.00135	0.00541	0.01081	0.03148	0.06133	0.06176	0.12146	0.18117	0.31205
0	1.144E-05	8.956E-06	7.625E-06	7.239E-06	6.536E-06	5.006E-06	4.115E-06	3.529E-06	3.385E-06	2.539E-06
	5.951	5.956	6.287	12.206	14.117	20.992	21.001	28.353	30.448	30.779
	0.37175	0.37206	0.39273	0.76242	0.88182	1.31121	1.31179	1.77103	1.90192	1.92258
0	2.292E-06	1.871E-06	1.547E-06	1.160E-06	9.357E-07	7.736E-07	5.971E-07	5.614E-07	3.743E-07	2.985E-07
	50.961	51.439	68.275	71.951	73.385	73.863	74.488	75.775	76.105	77.392
	3.18320	3.21305	4.26472	4.49434	4.58389	4.61374	4.65278	4.73314	4.75381	4.83418
0	2.743E-07	1.791E-07	1.372E-07	1.194E-07	8.230E-08	5.486E-08				
	79.782	80.590	94.376	94.706	99.522	100.000				
	4.98343	5.03395	5.89503	5.91569	6.21650	6.24635				

0 X/Q PERCENTILES

(BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED

CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 2) = 0.001  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 0.005  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 0.371  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5) = 1.310  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 6) = 3.180  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 7) = 4.261

4.145E-05	0.062	1.000
1.922E-05	0.187	3.000
1.309E-05	0.312	5.000
8.260E-06	0.625	10.000
6.318E-06	0.937	15.000



**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

5.180E-06	1.249	20.000
4.327E-06	1.562	25.000
3.702E-06	1.874	30.000
3.233E-06	2.186	35.000
2.868E-06	2.499	40.000
2.575E-06	2.811	45.000
2.334E-06	3.123	50.000
2.073E-06	3.435	55.000
1.845E-06	3.748	60.000
1.655E-06	4.060	65.000
0 9.519E-06	0.5	8.00

0ANNUAL AVERAGE = 1.57E-07

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

OPARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE ESE SECTOR.

CLASS	METER/SEC	PERCENT	METERS	METERS	METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)		
									MEANDER	BLDG WAKE	USED
AT 10.0 METERS									CA=1006.SQ.METERS		
A	0.1	0.01	4820.	0.	0.	775.2	1000.0	775.2	4.116E-06	4.115E-06	4.115E-06
A	1.5	2.74	4820.	0.	0.	775.2	1000.0	775.2	2.744E-07	2.743E-07	2.743E-07
A	3.0	16.55	4820.	0.	0.	775.2	1000.0	775.2	1.372E-07	1.372E-07	1.372E-07
A	5.0	3.90	4820.	0.	0.	775.2	1000.0	775.2	8.233E-08	8.230E-08	8.230E-08
A	7.5	0.56	4820.	0.	0.	775.2	1000.0	775.2	5.489E-08	5.486E-08	5.486E-08
B	0.1	0.01	4820.	0.	0.	583.0	610.6	583.0	8.964E-06	8.956E-06	8.956E-06
B	1.5	0.73	4820.	0.	0.	583.0	610.6	583.0	5.976E-07	5.971E-07	5.971E-07
B	3.0	1.02	4820.	0.	0.	583.0	610.6	583.0	2.988E-07	2.985E-07	2.985E-07
B	5.0	1.29	4820.	0.	0.	583.0	610.6	583.0	1.793E-07	1.791E-07	1.791E-07
B	7.5	0.30	4820.	0.	0.	583.0	610.6	583.0	1.195E-07	1.194E-07	1.194E-07
C	0.1	0.01	4820.	0.	0.	442.7	256.1	442.7	2.815E-05	2.807E-05	2.807E-05
C	1.5	0.43	4820.	0.	0.	442.7	256.1	442.7	1.877E-06	1.871E-06	1.871E-06
C	3.0	1.16	4820.	0.	0.	442.7	256.1	442.7	9.384E-07	9.357E-07	9.357E-07
C	5.0	2.01	4820.	0.	0.	442.7	256.1	442.7	5.630E-07	5.614E-07	5.614E-07
C	7.5	0.73	4820.	0.	0.	442.7	256.1	442.7	3.753E-07	3.743E-07	3.743E-07
D	0.1	0.09	4820.	0.	0.	311.7	87.2	373.3	9.804E-05	1.160E-04	9.804E-05
D	1.5	2.01	4820.	0.	0.	311.7	87.2	373.3	6.536E-06	7.736E-06	6.536E-06
D	3.0	7.50	4820.	0.	0.	311.7	87.2	345.6	3.529E-06	3.868E-06	3.529E-06
D	5.0	25.33	4820.	0.	0.	311.7	87.2	319.3	2.292E-06	2.321E-06	2.292E-06

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
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D	7.5	15.69	4820.	0.	0.	311.7	87.2	311.7	1.565E-06	1.547E-06	1.547E-06
D	10.0	1.29	4820.	0.	0.	311.7	87.2	311.7	1.174E-06	1.160E-06	1.160E-06
D	15.0	0.13	4820.	0.	0.	311.7	87.2	311.7	7.827E-07	7.736E-07	7.736E-07
E	0.1	0.06	4820.	0.	0.	221.7	55.4	309.2	1.867E-04	2.539E-04	1.867E-04
E	1.5	1.88	4820.	0.	0.	221.7	55.4	309.2	1.245E-05	1.693E-05	1.245E-05
E	3.0	5.48	4820.	0.	0.	221.7	55.4	265.9	7.239E-06	8.463E-06	7.239E-06
E	5.0	4.89	4820.	0.	0.	221.7	55.4	230.7	5.006E-06	5.078E-06	5.006E-06
E	7.5	1.29	4820.	0.	0.	221.7	55.4	221.7	3.473E-06	3.385E-06	3.385E-06
F	0.1	0.01	4820.	0.	0.	153.0	34.5	243.7	3.809E-04	5.719E-04	3.809E-04
F	1.5	0.73	4820.	0.	0.	153.0	34.5	243.7	2.539E-05	3.813E-05	2.539E-05
F	3.0	1.02	4820.	0.	0.	153.0	34.5	195.7	1.581E-05	1.906E-05	1.581E-05
F	5.0	0.30	4820.	0.	0.	153.0	34.5	161.1	1.153E-05	1.144E-05	1.144E-05
G	0.1	0.01	4820.	0.	0.	105.6	21.4	209.9	7.107E-04	1.238E-03	7.107E-04
G	1.5	0.56	4820.	0.	0.	105.6	21.4	209.9	4.738E-05	8.251E-05	4.738E-05
G	3.0	0.30	4820.	0.	0.	105.6	21.4	149.9	3.318E-05	4.126E-05	3.318E-05

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

LOW POPULATION ZONE CALCULATIONS:

0 ESE SECTOR BOUNDARY DISTANCE = 4820.0 METERS

OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED

AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	7.107E-04	3.809E-04	1.867E-04	9.804E-05	4.738E-05	3.318E-05	2.807E-05	2.539E-05	1.581E-05	1.245E-05
	0.005	0.019	0.078	0.169	0.730	1.028	1.034	1.760	2.784	4.667
	0.00036	0.00134	0.00541	0.01174	0.05077	0.07144	0.07187	0.12239	0.19357	0.32446
0	1.144E-05	8.956E-06	7.239E-06	6.536E-06	5.006E-06	4.115E-06	3.529E-06	3.385E-06	2.292E-06	1.871E-06
	4.964	4.970	10.452	12.467	17.355	17.366	24.863	26.151	51.483	51.912
	0.34512	0.34553	0.72670	0.86677	1.20661	1.20734	1.72858	1.81813	3.57933	3.60918
0	1.547E-06	1.160E-06	9.357E-07	7.736E-07	5.971E-07	5.614E-07	3.743E-07	2.985E-07	2.743E-07	1.791E-07
	67.600	68.888	70.044	70.176	70.903	72.918	73.644	74.668	77.409	78.697
	4.69988	4.78943	4.86980	4.87898	4.92950	5.06957	5.12008	5.19127	5.38185	5.47141
0	1.372E-07	1.194E-07	8.230E-08	5.486E-08						
	95.244	95.541	99.439	100.000						

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

0 6.62181 6.64247 6.91343 6.95246  
 X/Q PERCENTILES  
 (BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)  
 0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
 CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 2) = 0.001  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 0.005  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 0.051  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5) = 0.866  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 6) = 3.576  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 7) = 4.696

3.896E-05	0.070	1.000
1.887E-05	0.209	3.000
1.314E-05	0.348	5.000
7.788E-06	0.695	10.000
5.768E-06	1.043	15.000
4.720E-06	1.390	20.000
4.017E-06	1.738	25.000
3.508E-06	2.086	30.000
3.119E-06	2.433	35.000
2.810E-06	2.781	40.000
2.558E-06	3.129	45.000
2.348E-06	3.476	50.000
2.087E-06	3.824	55.000
1.842E-06	4.171	60.000
1.639E-06	4.519	65.000
0 1.004E-05	0.5	7.19

0ANNUAL AVERAGE = 1.69E-07

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE SE SECTOR.

CLASS	METER/SEC	PERCENT	METERS	METERS	METERS	METERS	METERS	METERS	MEANDER-SY	** CHI/Q VALUES (SEC/CUBIC METER)		
										MEANDER	BLDG WAKE	USED
A	0.1	0.01	4820.	0.	0.	775.2	1000.0	775.2	4.116E-06	4.115E-06	4.115E-06	
A	1.5	3.12	4820.	0.	0.	775.2	1000.0	775.2	2.744E-07	2.743E-07	2.743E-07	

CA=1006.SQ.METERS

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

A	3.0	18.57	4820.	0.	0.	775.2	1000.0	775.2	1.372E-07	1.372E-07	1.372E-07
A	5.0	7.14	4820.	0.	0.	775.2	1000.0	775.2	8.233E-08	8.230E-08	8.230E-08
A	7.5	0.69	4820.	0.	0.	775.2	1000.0	775.2	5.489E-08	5.486E-08	5.486E-08
B	0.1	0.00	4820.	0.	0.	583.0	610.6	583.0	8.964E-06	8.956E-06	8.956E-06
B	1.5	0.34	4820.	0.	0.	583.0	610.6	583.0	5.976E-07	5.971E-07	5.971E-07
B	3.0	1.61	4820.	0.	0.	583.0	610.6	583.0	2.988E-07	2.985E-07	2.985E-07
B	5.0	1.51	4820.	0.	0.	583.0	610.6	583.0	1.793E-07	1.791E-07	1.791E-07
B	7.5	0.45	4820.	0.	0.	583.0	610.6	583.0	1.195E-07	1.194E-07	1.194E-07
C	0.1	0.01	4820.	0.	0.	442.7	256.1	442.7	2.815E-05	2.807E-05	2.807E-05
C	1.5	0.69	4820.	0.	0.	442.7	256.1	442.7	1.877E-06	1.871E-06	1.871E-06
C	3.0	1.51	4820.	0.	0.	442.7	256.1	442.7	9.384E-07	9.357E-07	9.357E-07
C	5.0	1.85	4820.	0.	0.	442.7	256.1	442.7	5.630E-07	5.614E-07	5.614E-07
C	7.5	0.93	4820.	0.	0.	442.7	256.1	442.7	3.753E-07	3.743E-07	3.743E-07
D	0.1	0.13	4820.	0.	0.	311.7	87.2	373.3	9.804E-05	1.160E-04	9.804E-05
D	1.5	2.88	4820.	0.	0.	311.7	87.2	373.3	6.536E-06	7.736E-06	6.536E-06
D	3.0	7.38	4820.	0.	0.	311.7	87.2	345.6	3.529E-06	3.868E-06	3.529E-06
D	5.0	16.82	4820.	0.	0.	311.7	87.2	319.3	2.292E-06	2.321E-06	2.292E-06
D	7.5	16.37	4820.	0.	0.	311.7	87.2	311.7	1.565E-06	1.547E-06	1.547E-06
D	10.0	3.57	4820.	0.	0.	311.7	87.2	311.7	1.174E-06	1.160E-06	1.160E-06
D	15.0	0.34	4820.	0.	0.	311.7	87.2	311.7	7.827E-07	7.736E-07	7.736E-07
E	0.1	0.09	4820.	0.	0.	221.7	55.4	309.2	1.867E-04	2.539E-04	1.867E-04
E	1.5	2.78	4820.	0.	0.	221.7	55.4	309.2	1.245E-05	1.693E-05	1.245E-05
E	3.0	4.73	4820.	0.	0.	221.7	55.4	265.9	7.239E-06	8.463E-06	7.239E-06
E	5.0	3.23	4820.	0.	0.	221.7	55.4	230.7	5.006E-06	5.078E-06	5.006E-06
E	7.5	0.93	4820.	0.	0.	221.7	55.4	221.7	3.473E-06	3.385E-06	3.385E-06
F	0.1	0.02	4820.	0.	0.	153.0	34.5	243.7	3.809E-04	5.719E-04	3.809E-04
F	1.5	1.03	4820.	0.	0.	153.0	34.5	243.7	2.539E-05	3.813E-05	2.539E-05
F	3.0	0.58	4820.	0.	0.	153.0	34.5	195.7	1.581E-05	1.906E-05	1.581E-05
F	5.0	0.11	4820.	0.	0.	153.0	34.5	161.1	1.153E-05	1.144E-05	1.144E-05
G	0.1	0.00	4820.	0.	0.	105.6	21.4	209.9	7.107E-04	1.238E-03	7.107E-04
G	1.5	0.24	4820.	0.	0.	105.6	21.4	209.9	4.738E-05	8.251E-05	4.738E-05
G	3.0	0.34	4820.	0.	0.	105.6	21.4	149.9	3.318E-05	4.126E-05	3.318E-05

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades  
 DATA PERIOD: 1999-2003  
 TYPE OF RELEASE: Ground Level Release  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE  
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145  
 LOW POPULATION ZONE CALCULATIONS:

METEOROLOGICAL INSTRUMENTATION  
 WIND SENSORS HEIGHT: 10 Meters DT  
 DELTA-T HEIGHTS: from 10m to 60m

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

0 SE SECTOR BOUNDARY DISTANCE = 4820.0 METERS  
 OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED  
 AS A FUNCTION OF DOWNWIND DISTANCE.  
 MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.  
 BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5  
 CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.  
 0BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.  
 THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.  
 THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	7.107E-04	3.809E-04	1.867E-04	9.804E-05	4.738E-05	3.318E-05	2.807E-05	2.539E-05	1.581E-05	1.245E-05
	0.002	0.022	0.108	0.239	0.477	0.821	0.831	1.862	2.444	5.221
	0.00019	0.00193	0.00942	0.02073	0.04140	0.07125	0.07212	0.16167	0.21219	0.45329
0	1.144E-05	8.956E-06	7.239E-06	6.536E-06	5.006E-06	4.115E-06	3.529E-06	3.385E-06	2.292E-06	1.871E-06
	5.327	5.330	10.064	12.947	16.173	16.185	23.565	24.490	41.311	41.999
	0.46247	0.46271	0.87373	1.12402	1.40416	1.40520	2.04585	2.12621	3.58661	3.64631
0	1.547E-06	1.160E-06	9.357E-07	7.736E-07	5.971E-07	5.614E-07	3.743E-07	2.985E-07	2.743E-07	1.791E-07
	58.370	61.941	63.448	63.792	64.136	65.988	66.913	68.527	71.647	73.155
	5.06766	5.37765	5.50853	5.53838	5.56823	5.72897	5.80934	5.94941	6.22036	6.35124
0	1.372E-07	1.194E-07	8.230E-08	5.486E-08						
	91.722	92.171	99.312	100.000						
	7.96318	8.00222	8.62220	8.68190						

0 X/Q PERCENTILES  
 (BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
 CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 2) = 0.002  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 0.009  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 0.453  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5) = 1.123  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 6) = 3.583  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 7) = 5.064

4.380E-05	0.087	1.000
1.940E-05	0.260	3.000
1.290E-05	0.434	5.000
7.907E-06	0.868	10.000
5.778E-06	1.302	15.000
4.508E-06	1.736	20.000
3.692E-06	2.170	25.000
3.120E-06	2.605	30.000
2.695E-06	3.039	35.000
2.366E-06	3.473	40.000
2.085E-06	3.907	45.000
1.851E-06	4.341	50.000

**NUMERICAL APPLICATIONS, Inc.**  
Determination of Atmospheric Dispersion Factors for Palisades  
Calculation Number: NAI-1149-002, Rev. 0

1.659E-06                    4.775                    55.000  
0 1.165E-05                    0.5                    5.76  
0ANNUAL AVERAGE = 2.18E-07  
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0                    RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades                    METEOROLOGICAL INSTRUMENTATION  
DATA PERIOD: 1999-2003                    WIND SENSORS HEIGHT: 10 Meters                    DT  
TYPE OF RELEASE: Ground Level Release                    DELTA-T HEIGHTS: from 10m to 60m  
SOURCE OF DATA: Data from onsite met tower  
COMMENTS: NONE  
PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145  
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE SSE SECTOR.

CLASS	WINDSPEED METER/SEC AT 10.0 METERS	FREQUENCY PERCENT	DISTANCE METERS	TERRAIN HT METERS	HT METERS	EFF PLUME HT METERS	SIGMA-Y METERS	SIGMA-Z METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER)		
										MEANDER	BLDG WAKE	USED
CA=1006.SQ.METERS												
A	0.1	0.00	4820.	0.	0.	0.	775.2	1000.0	775.2	4.116E-06	4.115E-06	4.115E-06
A	1.5	0.86	4820.	0.	0.	0.	775.2	1000.0	775.2	2.744E-07	2.743E-07	2.743E-07
A	3.0	13.51	4820.	0.	0.	0.	775.2	1000.0	775.2	1.372E-07	1.372E-07	1.372E-07
A	5.0	11.93	4820.	0.	0.	0.	775.2	1000.0	775.2	8.233E-08	8.230E-08	8.230E-08
A	7.5	1.59	4820.	0.	0.	0.	775.2	1000.0	775.2	5.489E-08	5.486E-08	5.486E-08
A	10.0	0.32	4820.	0.	0.	0.	775.2	1000.0	775.2	4.116E-08	4.115E-08	4.115E-08
B	0.1	0.00	4820.	0.	0.	0.	583.0	610.6	583.0	8.964E-06	8.956E-06	8.956E-06
B	1.5	0.54	4820.	0.	0.	0.	583.0	610.6	583.0	5.976E-07	5.971E-07	5.971E-07
B	3.0	1.49	4820.	0.	0.	0.	583.0	610.6	583.0	2.988E-07	2.985E-07	2.985E-07
B	5.0	1.91	4820.	0.	0.	0.	583.0	610.6	583.0	1.793E-07	1.791E-07	1.791E-07
B	7.5	0.64	4820.	0.	0.	0.	583.0	610.6	583.0	1.195E-07	1.194E-07	1.194E-07
B	10.0	0.10	4820.	0.	0.	0.	583.0	610.6	583.0	8.964E-08	8.956E-08	8.956E-08
C	0.1	0.01	4820.	0.	0.	0.	442.7	256.1	442.7	2.815E-05	2.807E-05	2.807E-05
C	1.5	0.42	4820.	0.	0.	0.	442.7	256.1	442.7	1.877E-06	1.871E-06	1.871E-06
C	3.0	2.35	4820.	0.	0.	0.	442.7	256.1	442.7	9.384E-07	9.357E-07	9.357E-07
C	5.0	1.81	4820.	0.	0.	0.	442.7	256.1	442.7	5.630E-07	5.614E-07	5.614E-07
C	7.5	0.86	4820.	0.	0.	0.	442.7	256.1	442.7	3.753E-07	3.743E-07	3.743E-07
C	10.0	0.10	4820.	0.	0.	0.	442.7	256.1	442.7	2.815E-07	2.807E-07	2.807E-07
D	0.1	0.15	4820.	0.	0.	0.	311.7	87.2	373.3	9.804E-05	1.160E-04	9.804E-05
D	1.5	3.30	4820.	0.	0.	0.	311.7	87.2	373.3	6.536E-06	7.736E-06	6.536E-06
D	3.0	10.75	4820.	0.	0.	0.	311.7	87.2	345.6	3.529E-06	3.868E-06	3.529E-06
D	5.0	14.17	4820.	0.	0.	0.	311.7	87.2	319.3	2.292E-06	2.321E-06	2.292E-06
D	7.5	11.93	4820.	0.	0.	0.	311.7	87.2	311.7	1.565E-06	1.547E-06	1.547E-06
D	10.0	2.88	4820.	0.	0.	0.	311.7	87.2	311.7	1.174E-06	1.160E-06	1.160E-06
D	15.0	0.10	4820.	0.	0.	0.	311.7	87.2	311.7	7.827E-07	7.736E-07	7.736E-07
E	0.1	0.10	4820.	0.	0.	0.	221.7	55.4	309.2	1.867E-04	2.539E-04	1.867E-04
E	1.5	3.20	4820.	0.	0.	0.	221.7	55.4	309.2	1.245E-05	1.693E-05	1.245E-05

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

E	3.0	7.55	4820.	0.	0.	221.7	55.4	265.9	7.239E-06	8.463E-06	7.239E-06
E	5.0	3.62	4820.	0.	0.	221.7	55.4	230.7	5.006E-06	5.078E-06	5.006E-06
E	7.5	0.64	4820.	0.	0.	221.7	55.4	221.7	3.473E-06	3.385E-06	3.385E-06
E	10.0	0.10	4820.	0.	0.	221.7	55.4	221.7	2.605E-06	2.539E-06	2.539E-06
F	0.1	0.02	4820.	0.	0.	153.0	34.5	243.7	3.809E-04	5.719E-04	3.809E-04
F	1.5	1.17	4820.	0.	0.	153.0	34.5	243.7	2.539E-05	3.813E-05	2.539E-05
F	3.0	0.95	4820.	0.	0.	153.0	34.5	195.7	1.581E-05	1.906E-05	1.581E-05
F	5.0	0.10	4820.	0.	0.	153.0	34.5	161.1	1.153E-05	1.144E-05	1.144E-05
G	0.1	0.00	4820.	0.	0.	105.6	21.4	209.9	7.107E-04	1.238E-03	7.107E-04
G	1.5	0.32	4820.	0.	0.	105.6	21.4	209.9	4.738E-05	8.251E-05	4.738E-05
G	3.0	0.54	4820.	0.	0.	105.6	21.4	149.9	3.318E-05	4.126E-05	3.318E-05

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

LOW POPULATION ZONE CALCULATIONS:

0 SSE SECTOR BOUNDARY DISTANCE = 4820.0 METERS

OLATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED

AS A FUNCTION OF DOWNWIND DISTANCE.

MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

OBELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	7.107E-04	3.809E-04	1.867E-04	9.804E-05	4.738E-05	3.318E-05	2.807E-05	2.539E-05	1.581E-05	1.245E-05
	0.003	0.026	0.125	0.274	0.592	1.130	1.136	2.309	3.262	6.463
	0.00028	0.00241	0.01176	0.02577	0.05563	0.10614	0.10671	0.21693	0.30648	0.60728
0	1.144E-05	8.956E-06	7.239E-06	6.536E-06	5.006E-06	4.115E-06	3.529E-06	3.385E-06	2.539E-06	2.292E-06
	6.561	6.566	14.117	17.417	21.034	21.037	31.790	32.426	32.523	46.698
	0.61647	0.61687	1.32640	1.63639	1.97623	1.97654	2.98687	3.04657	3.05576	4.38756
0	1.871E-06	1.547E-06	1.160E-06	9.357E-07	7.736E-07	5.971E-07	5.614E-07	3.743E-07	2.985E-07	2.807E-07
	47.114	59.040	61.924	64.270	64.368	64.905	66.714	67.569	69.060	69.158
	4.42659	5.54715	5.81810	6.03854	6.04772	6.09824	6.26816	6.34852	6.48859	6.49778
0	2.743E-07	1.791E-07	1.372E-07	1.194E-07	8.956E-08	8.230E-08	5.486E-08	4.115E-08		
	70.013	71.919	85.434	86.070	86.167	98.094	99.682	100.000		
	6.57814	6.75725	8.02705	8.08675	8.09594	9.21649	9.36574	9.39559		

0 X/Q PERCENTILES

(BASED ON THE UPPER ENVELOPE OF THE ORDERED X/Q-FREQUENCY VALUES, AND AS PLOTTED ON A LOG-NORMAL GRAPH.)

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
 CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 2) = 0.002  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 3) = 0.012  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 4) = 0.607  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 5) = 1.635  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 6) = 2.984  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 7) = 4.384  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE ( 8) = 5.543

5.001E-05	0.094	1.000
2.274E-05	0.282	3.000
1.531E-05	0.470	5.000
9.468E-06	0.940	10.000
7.242E-06	1.409	15.000
5.701E-06	1.879	20.000
4.546E-06	2.349	25.000
3.755E-06	2.819	30.000
3.177E-06	3.288	35.000
2.737E-06	3.758	40.000
2.393E-06	4.228	45.000
2.048E-06	4.698	50.000
1.746E-06	5.168	55.000
0 1.457E-05	0.5	5.32

0ANNUAL AVERAGE = 2.68E-07

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades

METEOROLOGICAL INSTRUMENTATION

DATA PERIOD: 1999-2003

WIND SENSORS HEIGHT: 10 Meters DT

TYPE OF RELEASE: Ground Level Release

DELTA-T HEIGHTS: from 10m to 60m

SOURCE OF DATA: Data from onsite met tower

COMMENTS: NONE

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145  
 0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE ALL SECTOR.

STABILITY WINDSPEED FREQUENCY DISTANCE TERRAIN HT EFF PLUME HT SIGMA-Y SIGMA-Z MEANDER-SY \*\* CHI/Q VALUES (SEC/CUBIC METER)  
 CLASS METER/SEC PERCENT METERS METERS METERS METERS METERS METERS METERS MEANDER BLDG WAKE USED  
 AT 10.0 METERS CA=1006.SQ.METERS

A	0.1	0.00	4820.	0.	0.	775.2	1000.0	775.2	4.116E-06	4.115E-06	4.115E-06
A	1.5	1.19	4820.	0.	0.	775.2	1000.0	775.2	2.744E-07	2.743E-07	2.743E-07
A	3.0	8.30	4820.	0.	0.	775.2	1000.0	775.2	1.372E-07	1.372E-07	1.372E-07
A	5.0	5.74	4820.	0.	0.	775.2	1000.0	775.2	8.233E-08	8.230E-08	8.230E-08
A	7.5	0.81	4820.	0.	0.	775.2	1000.0	775.2	5.489E-08	5.486E-08	5.486E-08
A	10.0	0.08	4820.	0.	0.	775.2	1000.0	775.2	4.116E-08	4.115E-08	4.115E-08
B	0.1	0.00	4820.	0.	0.	583.0	610.6	583.0	8.964E-06	8.956E-06	8.956E-06



**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

B	1.5	0.29	4820.	0.	0.	583.0	610.6	583.0	5.976E-07	5.971E-07	5.971E-07
B	3.0	1.09	4820.	0.	0.	583.0	610.6	583.0	2.988E-07	2.985E-07	2.985E-07
B	5.0	1.37	4820.	0.	0.	583.0	610.6	583.0	1.793E-07	1.791E-07	1.791E-07
B	7.5	0.33	4820.	0.	0.	583.0	610.6	583.0	1.195E-07	1.194E-07	1.194E-07
B	10.0	0.04	4820.	0.	0.	583.0	610.6	583.0	8.964E-08	8.956E-08	8.956E-08
C	0.1	0.00	4820.	0.	0.	442.7	256.1	442.7	2.815E-05	2.807E-05	2.807E-05
C	1.5	0.32	4820.	0.	0.	442.7	256.1	442.7	1.877E-06	1.871E-06	1.871E-06
C	3.0	1.38	4820.	0.	0.	442.7	256.1	442.7	9.384E-07	9.357E-07	9.357E-07
C	5.0	1.68	4820.	0.	0.	442.7	256.1	442.7	5.630E-07	5.614E-07	5.614E-07
C	7.5	0.65	4820.	0.	0.	442.7	256.1	442.7	3.753E-07	3.743E-07	3.743E-07
C	10.0	0.03	4820.	0.	0.	442.7	256.1	442.7	2.815E-07	2.807E-07	2.807E-07
D	0.1	0.12	4820.	0.	0.	311.7	87.2	311.7	1.174E-04	1.160E-04	1.160E-04
D	1.5	2.69	4820.	0.	0.	311.7	87.2	311.7	7.827E-06	7.736E-06	7.736E-06
D	3.0	9.80	4820.	0.	0.	311.7	87.2	311.7	3.914E-06	3.868E-06	3.868E-06
D	5.0	15.75	4820.	0.	0.	311.7	87.2	311.7	2.348E-06	2.321E-06	2.321E-06
D	7.5	9.02	4820.	0.	0.	311.7	87.2	311.7	1.565E-06	1.547E-06	1.547E-06
D	10.0	1.39	4820.	0.	0.	311.7	87.2	311.7	1.174E-06	1.160E-06	1.160E-06
D	15.0	0.10	4820.	0.	0.	311.7	87.2	311.7	7.827E-07	7.736E-07	7.736E-07
E	0.1	0.10	4820.	0.	0.	221.7	55.4	221.7	2.605E-04	2.539E-04	2.539E-04
E	1.5	3.33	4820.	0.	0.	221.7	55.4	221.7	1.737E-05	1.693E-05	1.693E-05
E	3.0	10.54	4820.	0.	0.	221.7	55.4	221.7	8.683E-06	8.463E-06	8.463E-06
E	5.0	6.69	4820.	0.	0.	221.7	55.4	221.7	5.210E-06	5.078E-06	5.078E-06
E	7.5	1.55	4820.	0.	0.	221.7	55.4	221.7	3.473E-06	3.385E-06	3.385E-06
E	10.0	0.18	4820.	0.	0.	221.7	55.4	221.7	2.605E-06	2.539E-06	2.539E-06
E	14.9	0.01	4820.	0.	0.	221.7	55.4	221.7	1.737E-06	1.693E-06	1.693E-06
F	0.1	0.04	4820.	0.	0.	153.0	34.5	153.0	6.066E-04	5.719E-04	5.719E-04
F	1.5	2.01	4820.	0.	0.	153.0	34.5	153.0	4.044E-05	3.813E-05	3.813E-05
F	3.0	4.96	4820.	0.	0.	153.0	34.5	153.0	2.022E-05	1.906E-05	1.906E-05
F	5.0	0.89	4820.	0.	0.	153.0	34.5	153.0	1.213E-05	1.144E-05	1.144E-05
F	7.5	0.03	4820.	0.	0.	153.0	34.5	153.0	8.088E-06	7.625E-06	7.625E-06
F	10.0	0.01	4820.	0.	0.	153.0	34.5	153.0	6.066E-06	5.719E-06	5.719E-06
G	0.1	0.01	4820.	0.	0.	105.6	21.4	105.6	1.413E-03	1.238E-03	1.238E-03
G	1.5	1.24	4820.	0.	0.	105.6	21.4	105.6	9.418E-05	8.251E-05	8.251E-05
G	3.0	5.75	4820.	0.	0.	105.6	21.4	105.6	4.709E-05	4.126E-05	4.126E-05
G	5.0	0.50	4820.	0.	0.	105.6	21.4	105.6	2.825E-05	2.475E-05	2.475E-05

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades  
 DATA PERIOD: 1999-2003  
 TYPE OF RELEASE: Ground Level Release  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE

METEOROLOGICAL INSTRUMENTATION  
 WIND SENSORS HEIGHT: 10 Meters DT  
 DELTA-T HEIGHTS: from 10m to 60m

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

LOW POPULATION ZONE CALCULATIONS:

DIRECTION-INDEPENDENT (S.R.P 2.3.4) MODEL.

MINIMUM BOUNDARY DISTANCE = 4820.0 METERS.

BUILDING WAKE CREDIT ALLOWED: C= 0.5 A= 2011. D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.

BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.

THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.

THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	1.238E-03	5.719E-04	2.539E-04	1.160E-04	8.251E-05	4.126E-05	3.813E-05	2.807E-05	2.475E-05	1.906E-05
	0.011	0.051	0.154	0.276	1.520	7.274	9.286	9.290	9.786	14.751
	0.01148	0.05052	0.15385	0.27555	1.52009	7.27440	9.28588	9.29047	9.78645	14.75086
0	1.693E-05	1.144E-05	8.956E-06	8.463E-06	7.736E-06	7.625E-06	5.719E-06	5.078E-06	4.115E-06	3.868E-06
	18.078	18.969	18.971	29.506	32.197	32.227	32.237	38.923	38.928	48.726
	18.07807	18.96900	18.97130	29.50632	32.19748	32.22733	32.23651	38.92308	38.92767	48.72560
0	3.385E-06	2.539E-06	2.321E-06	1.871E-06	1.693E-06	1.547E-06	1.160E-06	9.357E-07	7.736E-07	5.971E-07
	50.280	50.457	66.207	66.524	66.533	75.550	76.941	78.321	78.420	78.707
	50.28014	50.45694	66.20666	66.52354	66.53272	75.54994	76.94144	78.32146	78.42020	78.70723
0	5.614E-07	3.743E-07	2.985E-07	2.807E-07	2.743E-07	1.791E-07	1.372E-07	1.194E-07	8.956E-08	8.230E-08
	80.388	81.038	82.129	82.156	83.346	84.716	93.013	93.341	93.378	99.114
	80.38805	81.03788	82.12858	82.15614	83.34557	84.71641	93.01262	93.34098	93.37772	99.11366
0	5.486E-08	4.115E-08								
	99.920	100.000								
	99.91963	100.00000								

0 X/Q PERCENTILES

(BASED ON THE UPPER ENVELOPE OF THE ORDERED X/Q-FREQUENCY VALUES, AND AS PLOTTED ON A LOG-NORMAL GRAPH.)

0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED

CHI/Q	WITH RESPECT TO	WHEN THE WIND BLOWS
SEC/CUBIC METER	THE TOTAL TIME	INTO THIS SECTOR ONLY

1.673E-04	1.000	1.000
8.675E-05	3.000	3.000
6.126E-05	5.000	5.000
3.529E-05	10.000	10.000
2.241E-05	15.000	15.000
1.562E-05	20.000	20.000
1.146E-05	25.000	25.000
8.681E-06	30.000	30.000
6.963E-06	35.000	35.000
5.812E-06	40.000	40.000
4.881E-06	45.000	45.000
4.111E-06	50.000	50.000
3.463E-06	55.000	55.000
2.908E-06	60.000	60.000

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 2) = 9.282

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

2.427E-06	65.000	65.000
2.007E-06	70.000	70.000
1.634E-06	75.000	75.000
1.300E-06	80.000	80.000
9.954E-07	85.000	85.000
7.116E-07	90.000	90.000
0 6.126E-05	5.0	5.00

IUSNRC COMPUTER CODE-PAVAN, VERSION 2.0                      RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades	METEOROLOGICAL INSTRUMENTATION	
DATA PERIOD: 1999-2003	WIND SENSORS HEIGHT: 10 Meters	DT
TYPE OF RELEASE: Ground Level Release	DELTA-T HEIGHTS: from 10m to 60m	
SOURCE OF DATA: Data from onsite met tower		
COMMENTS: NONE		

PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145  
 LOW POPULATION ZONE CALCULATIONS:

FIVE PERCENT OVERALL SITE LIMIT  
 BUILDING WAKE CREDIT ALLOWED: C= 0.5    A= 2011.    D= 58.5

CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.  
 BELOW ARE PRINTED THE ORDERED VALUES OF CHI/Q AND THE FREQUENCY WITH WHICH THAT VALUE IS REACHED OR EXCEEDED.  
 THE TOP NUMBER IS THE CHI/Q. THE MIDDLE NUMBER IS THE FREQUENCY NORMALIZED TO THIS SECTOR.  
 THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.

0	7.107E-04	3.809E-04	1.867E-04	9.804E-05	4.738E-05	3.318E-05	2.807E-05	2.539E-05	2.475E-05	1.581E-05
	0.011	0.051	0.154	0.276	1.520	7.274	7.279	9.290	9.786	14.751
	0.01148	0.05052	0.15385	0.27555	1.52009	7.27440	7.27899	9.29047	9.78645	14.75086
0	1.245E-05	1.144E-05	8.956E-06	7.625E-06	7.239E-06	6.536E-06	5.719E-06	5.006E-06	4.115E-06	3.529E-06
	18.078	18.969	18.971	19.001	29.536	32.227	32.237	38.923	38.928	48.726
	18.07807	18.96901	18.97131	19.00116	29.53617	32.22733	32.23652	38.92308	38.92768	48.72562
0	3.385E-06	2.539E-06	2.292E-06	1.871E-06	1.693E-06	1.547E-06	1.160E-06	9.357E-07	7.736E-07	5.971E-07
	50.280	50.457	66.207	66.524	66.533	75.550	76.941	78.321	78.420	78.707
	50.28015	50.45696	66.20667	66.52356	66.53275	75.54997	76.94147	78.32150	78.42024	78.70727
0	5.614E-07	3.743E-07	2.985E-07	2.807E-07	2.743E-07	1.791E-07	1.372E-07	1.194E-07	8.956E-08	8.230E-08
	80.388	81.038	82.129	82.156	83.346	84.716	93.013	93.341	93.378	99.114
	80.38811	81.03795	82.12865	82.15621	83.34563	84.71647	93.01267	93.34104	93.37778	99.11373
0	5.486E-08	4.115E-08								
	99.920	100.000								
	99.91970	100.00008								

0 X/Q PERCENTILES  
 (BASED ON THE UPPER ENVELOPE OF THE  
 ORDERED X/Q-FREQUENCY VALUES, AND AS  
 PLOTTED ON A LOG-NORMAL GRAPH.)  
 0 PERCENT OF TIME CHI/Q IS EQUALED OR EXCEEDED  
 CHI/Q WITH RESPECT TO WHEN THE WIND BLOWS  
 SEC/CUBIC METER THE TOTAL TIME INTO THIS SECTOR ONLY

0 ERROR IN NORMAL TRANSFORMATION FOR A( 42)= 100.00008  
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 2)= 7.271

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

1.099E-04	1.000	1.000
5.955E-05	3.000	3.000
4.304E-05	5.000	5.000
2.486E-05	10.000	10.000
1.655E-05	15.000	15.000
1.198E-05	20.000	20.000
9.081E-06	25.000	25.000
7.123E-06	30.000	30.000
6.024E-06	35.000	35.000
5.139E-06	40.000	40.000
4.408E-06	45.000	45.000
3.790E-06	50.000	50.000
3.259E-06	55.000	55.000
2.795E-06	60.000	60.000
2.384E-06	65.000	65.000
1.983E-06	70.000	70.000
1.616E-06	75.000	75.000
1.286E-06	80.000	80.000
9.859E-07	85.000	85.000
7.057E-07	90.000	90.000
0 4.304E-05	5.0	5.00

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0

RUN DATE: Wed Apr 14 10:41:55 2004

/PLANT NAME: Palisades METEOROLOGICAL INSTRUMENTATION  
 DATA PERIOD: 1999-2003 WIND SENSORS HEIGHT: 10 Meters DT  
 TYPE OF RELEASE: Ground Level Release DELTA-T HEIGHTS: from 10m to 60m  
 SOURCE OF DATA: Data from onsite met tower  
 COMMENTS: NONE  
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145

0 RELATIVE CONCENTRATION (X/Q) VALUES (SEC/CUBIC METER)

DOWNWIND DISTANCE		VERSUS						HOURS PER YEAR MAX		DOWNWIND
		AVERAGING TIME						0-2 HR X/Q IS		
SECTOR	(METERS)	0-2 HOURS	0-8 HOURS	8-24 HOURS	1-4 DAYS	4-30 DAYS	ANNUAL AVERAGE	EXCEEDED IN SECTOR	SECTOR	
S	4820.	1.68E-05	8.22E-06	5.75E-06	2.65E-06	8.68E-07	2.22E-07	5.8	S	
SSW	4820.	1.57E-05	7.42E-06	5.10E-06	2.26E-06	7.06E-07	1.69E-07	217.8	SSW	
SW	4820.	1.92E-05	8.90E-06	6.06E-06	2.63E-06	7.93E-07	1.83E-07	6.3	SW	
WSW	4820.	2.56E-05	1.14E-05	7.59E-06	3.14E-06	8.88E-07	1.89E-07	9.7	WSW	
W	4820.	3.22E-05	1.41E-05	9.36E-06	3.83E-06	1.06E-06	2.21E-07	12.5	W	
WNW	4820.	3.95E-05	1.72E-05	1.14E-05	4.62E-06	1.27E-06	2.61E-07	16.7	WNW	
NW	4820.	5.37E-05	2.36E-05	1.56E-05	6.41E-06	1.78E-06	3.72E-07	28.9	NW	
NNW	4820.	6.66E-05	3.03E-05	2.04E-05	8.67E-06	2.54E-06	5.65E-07	43.7	NNW	
N	4820.	6.37E-05	2.87E-05	1.93E-05	8.13E-06	2.35E-06	5.15E-07	40.5	N	
NNE	4820.	3.12E-05	1.40E-05	9.42E-06	3.97E-06	1.14E-06	2.50E-07	12.6	NNE	
NE	4820.	1.40E-05	7.01E-06	4.96E-06	2.35E-06	8.02E-07	2.15E-07	4.1	NE	
ENE	4820.	1.05E-05	5.31E-06	3.79E-06	1.81E-06	6.31E-07	1.73E-07	3.0	ENE	
E	4820.	9.52E-06	4.83E-06	3.44E-06	1.65E-06	5.72E-07	1.57E-07	2.6	E	

**NUMERICAL APPLICATIONS, Inc.**  
 Determination of Atmospheric Dispersion Factors for Palisades  
 Calculation Number: NAI-1149-002, Rev. 0

ESE	4820.	1.00E-05	5.11E-06	3.65E-06	1.75E-06	6.13E-07	1.69E-07	2.6	ESE
SE	4820.	1.16E-05	6.03E-06	4.34E-06	2.13E-06	7.62E-07	2.18E-07	4.1	SE
SSE	4820.	1.46E-05	7.53E-06	5.41E-06	2.64E-06	9.45E-07	2.68E-07	5.4	SSE
MAX X/Q		6.66E-05				TOTAL HOURS AROUND SITE:		416.5	
SRP 2.3.4	4820.	6.13E-05	2.82E-05	1.92E-05	8.27E-06	2.47E-06	5.65E-07		
SITE LIMIT		4.30E-05	2.10E-05	1.47E-05	6.76E-06	2.21E-06	5.65E-07		

00.5 PERCENT X/Q TO AN INDIVIDUAL IS LIMITING.  
 0\*\*NOTE\*\* : VALUES ON THIS PAGE ARE APPROXIMATIONS ONLY.  
 CHECK THE REASONABLENESS OF THE ENVELOPES  
 COMPUTED FOR THE 0-2 HOUR VALUES. FOR ANY  
 FAULTY ENVELOPES, ADJUST THE ABOVE VALUES.

ATTACHMENT C

CD Electronic File Listing

Volume in drive E has no label

Volume Serial Number is 123E-11D9

Directory of E:\Projects\Joe\Palisades CR Habitability\XQ\PalCDAttC

```

.           <DIR>           09-14-04  2:13p  .
..          <DIR>           09-14-04  2:13p  ..
PAL03      RSF             398  06-24-04 11:48a PAL03.RSF
PAL01      LOG            4,837  06-24-04 11:47a pal01.log
PAL01      RSF             398  06-24-04 11:47a PAL01.RSF
PAL02      CFD           11,168  06-24-04 11:47a pal02.cfd
PAL02      LOG            4,837  06-24-04 11:47a pal02.log
PAL02      RSF             398  06-24-04 11:47a PAL02.RSF
PAL03      CFD           11,168  06-24-04 11:48a pal03.cfd
PAL03      LOG            4,837  06-24-04 11:48a pal03.log
PAL01      CFD           11,168  06-24-04 11:47a pal01.cfd
PAL19      CFD           11,168  09-08-04  4:20p pal19.cfd
PAL04      LOG            4,837  06-24-04 11:52a pal04.log
PAL04      RSF             398  06-24-04 11:52a PAL04.RSF
PAL05      CFD           11,168  06-24-04 11:52a pal05.cfd
PAL05      LOG            4,837  06-24-04 11:52a pal05.log
PAL05      RSF             398  06-24-04 11:52a PAL05.RSF
PAL06      CFD           11,168  06-24-04 11:53a pal06.cfd
PAL06      LOG            4,837  06-24-04 11:53a pal06.log
PAL06      RSF             398  06-24-04 11:53a PAL06.RSF
PAL07      CFD           11,168  06-24-04 11:54a pal07.cfd
PAL07      LOG            4,837  06-24-04 11:54a pal07.log
PAL07      RSF             398  06-24-04 11:54a PAL07.RSF
PAL08      CFD           11,168  06-24-04 11:54a pal08.cfd
PAL08      LOG            4,837  06-24-04 11:54a pal08.log
PAL08      RSF             398  06-24-04 11:54a PAL08.RSF
PAL09      CFD           11,168  06-24-04 11:55a pal09.cfd
PAL09      LOG            4,837  06-24-04 11:55a pal09.log
PAL09      RSF             398  06-24-04 11:55a PAL09.RSF
PAL10      CFD           11,168  06-29-04 12:23p pal10.cfd
PAL10      LOG            4,837  06-29-04 12:23p pal10.log
PAL10      RSF             398  06-29-04 12:23p PAL10.RSF
PAL10QA    CFD           11,168  06-30-04  1:19p pal10qa.cfd
PAL10QA    LOG            4,997  06-30-04  1:19p pal10qa.log
PAL10QA    QAO           4,922,141 06-30-04  1:19p pal10qa.qao
PAL10QA    RSF             398  06-30-04  1:18p PAL10QA.RSF
PAL11      CFD           11,168  06-29-04 12:24p pal11.cfd
PAL11      LOG            4,837  06-29-04 12:24p pal11.log
PAL11      RSF             398  06-29-04 12:24p PAL11.RSF
PAL12      CFD           11,168  06-29-04 12:25p pal12.cfd
PAL12      LOG            4,837  06-29-04 12:25p pal12.log
PAL12      RSF             398  06-29-04 12:25p PAL12.RSF
PAL13      CFD           11,168  06-29-04 12:26p pal13.cfd
PAL13      LOG            4,837  06-29-04 12:26p pal13.log
PAL13      RSF             398  06-29-04 12:26p PAL13.RSF
PAL14      CFD           11,168  06-29-04 12:27p pal14.cfd
PAL14      LOG            4,837  06-29-04 12:27p pal14.log
PAL14      RSF             398  06-29-04 12:27p PAL14.RSF
PAL15      CFD           11,168  06-29-04 12:28p pal15.cfd
PAL15      LOG            4,837  06-29-04 12:28p pal15.log
    
```

Determination of Atmospheric Dispersion Factors for Palisades

Calculation Number: NAI-1149-002, Rev. 0

PAL15	RSF	398	06-29-04	12:28p	PAL15.RSF
PAL16	CFD	11,168	06-28-04	6:13p	pal16.cfd
PAL16	LOG	4,837	06-28-04	6:13p	pal16.log
PAL16	RSF	398	06-28-04	6:13p	PAL16.RSF
PAL17	CFD	11,168	06-28-04	6:14p	pal17.cfd
PAL17	LOG	4,837	06-28-04	6:14p	pal17.log
PAL17	RSF	398	06-28-04	6:14p	PAL17.RSF
PAL18	CFD	11,168	06-09-04	3:23p	pal18.cfd
PAL18	LOG	4,837	06-09-04	3:23p	pal18.log
PAL18	RSF	398	06-09-04	3:23p	PAL18.RSF
PAL04	CFD	11,168	06-24-04	11:52a	pal04.cfd
PAL19	LOG	4,837	09-08-04	4:20p	pal19.log
PAL19	RSF	398	09-08-04	4:20p	PAL19.RSF
PAL20	CFD	11,168	09-08-04	4:21p	pal20.cfd
PAL20	LOG	4,837	09-08-04	4:21p	pal20.log
PAL20	RSF	398	09-08-04	4:21p	PAL20.RSF
PAL21	CFD	11,168	09-08-04	4:22p	pal21.cfd
PAL21	LOG	4,837	09-08-04	4:22p	pal21.log
PAL21	RSF	398	09-08-04	4:22p	PAL21.RSF
PAL22	CFD	11,168	09-08-04	4:23p	pal22.cfd
PAL22	LOG	4,837	09-08-04	4:23p	pal22.log
PAL22	RSF	398	09-08-04	4:23p	PAL22.RSF
PAL23	CFD	11,168	09-08-04	4:24p	pal23.cfd
PAL23	LOG	4,837	09-08-04	4:24p	pal23.log
PAL23	RSF	398	09-08-04	4:24p	PAL23.RSF
PAL24	CFD	11,168	09-08-04	4:25p	pal24.cfd
PAL24	LOG	4,837	09-08-04	4:25p	pal24.log
PAL24	RSF	398	09-08-04	4:25p	PAL24.RSF
PAL9903	MET	1,621,486	04-01-04	6:37p	pal9903.met
PALSIN~1	DAT	4,373	04-14-04	10:41a	palsinput.dat
PALS01		378,375	04-14-04	10:41a	pals01
PALMET~1	XLS	8,274,432	04-14-04	4:21p	palmetdata.xls
ARCON9~1	TXT	324,195	03-03-04	3:44p	ARCON96 2003.txt
PALISA~1	ZIP	428,930	03-03-04	4:44p	Palisades ARCON96.zip
ARCON9~2	TXT	324,091	03-03-04	3:43p	ARCON96 2002.txt
ARCON9~3	TXT	324,153	03-03-04	3:42p	ARCON96 2001.txt
ARCON9~4	TXT	325,082	03-03-04	3:41p	ARCON96 2000.txt
ARCON9~5	TXT	324,193	03-03-04	3:36p	ARCON96 1999.txt
METTOW~1	PDF	155,729	02-13-04	12:53p	MET tower data.pdf
JFD9903	XLS	122,368	03-19-04	10:02a	jfd9903.xls
JFD9903	TXT	16,720	03-17-04	6:12p	jfd9903.txt
ARCON9~6	TXT	1,621,706	03-18-04	5:12p	ARCON969903.txt
PAL_DOSE	ZIP	66,229	02-12-04	2:39p	PAL_DOSE.ZIP
PAL2003	INP	4,478	02-12-04	1:22p	PAL2003.INP
PAL9903	INP	4,478	02-12-04	1:06p	PAL9903.INP
PALXQD~1	DOC	209,408	02-12-04	10:02a	PALXQDQ2003.DOC
PALXQD~2	DOC	204,800	02-12-04	9:52a	PALXQDQ9903.DOC
FILELIST		0	09-14-04	2:41p	filelist
96 file(s)		20,067,602 bytes			
2 dir(s)		15,419.94 MB free			



## ATTACHMENT D

ARCON96 Cases Input Reference Compilation  
References [7], [12], [13], [14] and [15]

Email from Gary Pratt (Palisades) to Joe Sinodis (NAI), "X/Q Input Data," with attachment, June 23, 2004

Subject: X/Q Input Data

Date: Wed, 23 Jun 2004 17:57:36 -0400

From: "Pratt, Gary F." <GARY.PRATT@nmcco.com>

To: "Joe Sinodis (E-mail)" <joe.sinodis@numerical.com>

CC: "Jim Harrell (E-mail)" <Jim.Harrell@numerical.com>, "Brogan, Brian A." <BRIAN.BROGAN@nmcco.com>, "Voskuil, Jeffrey L." <JEFFREY.VOSKUIL@nmcco.com>

Joe

The attached file contains revised data for closest containment release point and new data for SIRW Tank and Stack Vent release points. Your comment on the containment-emergency inlet was included. Data that has changed since my last letter are high lighted in the table on page 1. Data for the three release points has been reviewed by Jeff.

If you have any questions, please call me.

Gary

<<XQ Input Tech Review.doc>>

**Atmospheric Dispersion Factors**

<b>Input</b>	<b>Units</b>	<b>Value or Range</b>	<b>Ref.</b>	<b>Notes</b>
Release height	m	See release/receptor combination table below		Release heights may be taken as actual elevations less the grade elevation.
Horizontal distance from source to intake	m	See release/receptor combination table below		Horizontal distances will likely be calculated as straight line distances based on trigonometric layout of release and receptor points in relation to the N-S and E-W plant axes. For some scenarios, this may conservatively result in the distance line passing through an intervening structure.
Direction from intake to source (w/r/t true north)	deg	See release/receptor combination table below		Angles will be calculated based on trigonometric layout of release and receptor points in relation to the N-S and E-W axes. Direction values will be corrected for plant N offset from true N if necessary. Direction is as if you were standing at the receptor and facing the release point.

Release/Receptor Combination Table

Release Point	Receptor Point	Release Height (ft)	Release Height (m)	Receptor Height (ft)	Receptor Height (m)	Distance (ft)	Distance (m)	Direction with respect to true North	Reference
Closest Containment Point	Normal Control Room Intake "A"		22.53		22.53		24.20	168.2	See below
Closest Containment Point	Normal Control Room Intake "B"		22.53		22.53		21.49	174.2	See below
Closest Containment Point	Emergency Control Room Intake		14.94		14.94		95.05	202.2	See below
SIRW Tank Vent	Normal Control Room Intake "A"		24.51		22.53		10.56	156.6	See below
SIRW Tank Vent	Normal Control Room Intake "B"		24.51		22.53		7.71	184.3	See below
SIRW Tank Vent	Emergency Control Room Intake		24.51		14.94		81.19	213.9	See below
Stack Vent	Normal Control Room Intake "A"		58.52		22.53		22.27	168.5	See below
Stack Vent	Normal Control Room Intake "B"		58.52		22.53		19.83	181.0	See below
Stack Vent	Emergency Control Room Intake		58.52		14.94		97.45	209.1	See below

## Containment Surface Area Source – Emergency Intake

### Receptor Data:

Containment Radius:

$$\begin{aligned} R_{\text{cont}} &= \\ &+58'0'' \quad (\text{Drawing C-127 Containment inside radius}) \\ &+3'6'' \quad (\text{Drawing C-127 Containment wall thickness}) \\ &=61'6'' = 18.7452 \text{ m} \end{aligned}$$

Location of Emergency Intake:

$$\begin{aligned} X \text{ (West):} \\ &+26'0'' \quad (\text{Drawing M-990 Cont CL to G}) \\ &-16'0'' \quad (\text{Drawing M-990 G to F6}) \\ &-13'9 \frac{1}{2}'' \quad (\text{Drawing M-990 F6 to F4}) \\ &-20'2 \frac{1}{2}'' \quad (\text{Drawing M-990 F4 to F}) \\ &-38'6'' \quad (\text{Drawing M-990 F to C}) \\ &+75'2'' \quad (\text{Drawing M-990 C to F7}) \\ &-9'2'' \quad (\text{Drawing M-990 F7 to inlet CL}) \\ &=3'6'' = 1.067 \text{ m} \end{aligned}$$

Y (North)

$$\begin{aligned} Y &= \\ &+ 2' 4'' \quad (\text{Drawing M-990 Intake to Service Building Wall}) \\ &+ 144' 0'' \quad (\text{Drawing M-990 '41' to '33.3,' 6 spaces @ 24' = 144'}) \\ &+ 15' 6'' \quad (\text{Drawing M-990 '33.3' to '33.2'}) \\ &+ 10' 0'' \quad (\text{Drawing M-990 '33.2' to '33.1'}) \\ &+ 2' 6'' \quad (\text{Drawing M-990 '33.1' to '33'}) \\ &+ 17' 9'' \quad (\text{Drawing M-990 '33' to '32'}) \\ &+ 16' 9'' \quad (\text{Drawing M-990 '32' to '311'}) \\ &+ 2' 6'' \quad (\text{Drawing M-990 '311' to '31'}) \\ &+ 26' 0'' \quad (\text{Drawing M-990 '31' to '28'}) \\ &- 1' 0'' \quad (\text{Drawing C-50 '28' to '29'}) \\ &+ 50' 0'' \quad (\text{Drawing C-51 '29' to '21'}) \\ &+ 87' 0'' \quad (\text{Drawing C-51 '21' to Containment Centerline}) \\ &= 373' 4'' = 113.792 \text{ m} \end{aligned}$$

$$\text{Distance} = [X^2 + Y^2]^{1/2} - R_{\text{cont}} = [1.067^2 + 113.782^2]^{1/2} - 18.7452 = 95.05 \text{ m}$$

Intake Elevation Above Grade =

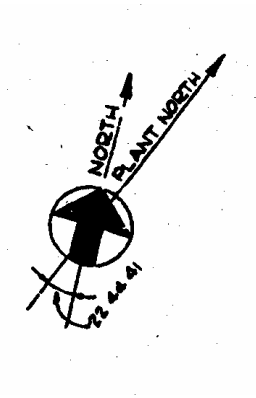
$$\begin{aligned} &+ 641' 0.0625'' \quad (\text{Drawing M-990 Section "A-A" 14" Pipe Centerline}) \\ &- 2' 0'' \quad (\text{Drawing M-990 Elbow to intake distance}) \\ &- 590' 0'' \quad (\text{Grade Elevation}) \\ &= 49' 1/16'' = 14.9367875 \text{ m} \end{aligned}$$

NOTE: elbow center to face distance of about 21'' not included reducing the elevation differences

Intake Height: 14.94 m

Receptor to Source Direction:

True North and Plant North are different by: 22°44'41" (Drawing C-2)



$$\alpha = \text{atan}[X/Y] = \text{atan}[-1.067 / 114.4016] = -0.534^\circ \text{ Relative to Plant North}$$
$$\alpha = -0.534 + 22.75 = 22.216^\circ \text{ Relative to True North}$$

Direction to Source = 22.2° + 180° = 202.2° Relative to True North

#### Source Data

Release Height: Assume Containment release elevation is the elevation as the receptor elevation

Release Height = 14.94 m

## Containment Surface (Area Source) – Normal Intake Train ‘A and B’

### Receptor Data:

Location of Normal Intake Train “A”:

$$\begin{aligned} X \text{ (West)} &= \\ &+ 43' 0'' \quad \text{(Drawing C-51 'J' to 'G')} \\ &+ 26' 6'' \quad \text{(Drawing C-51 'G' to Containment Centerline)} \\ &+ 12' 0'' \quad \text{(Drawing M-119 Sh. 3 'J' to West side of intake "A")} \\ &- 1' 6'' \quad \text{(Drawing M-119 Sh. 3 half of intake width (36"))} \\ &= 80' 0'' = 24.384 \text{ m} \end{aligned}$$

$$\begin{aligned} Y \text{ (North)} &= \\ &- 1' 0'' \quad \text{(Drawing C-50 '28' to '29')} \\ &30' 0'' \quad \text{(Drawing C-51 '29' to '21')} \\ &87' 0'' \quad \text{(Drawing C-51 '21' to Containment Centerline)} \\ &= 116' 0'' = 35.357 \text{ m} \end{aligned}$$

NOTE: Release has to circumvent the SIRWT before it reaches the intake. This will add distance from the containment. However, it is not yet taken into account. NEI 99-03 Appendix D states “For ground releases, it may be appropriate to consider flow around an intervening building if the building is sufficiently tall that it is unrealistic to expect flow from the release point to go over the building.” However, the following equation assumes that the release path goes straight through the SIRWT.

$$\text{Distance} = [X^2 + Y^2]^{1/2} - R_{\text{cont}} = [24.384^2 + 35.357^2]^{1/2} - 18.7452 = 24.20 \text{ m}$$

Intake Elevation Above Grade =

$$\begin{aligned} &+ 663' 11'' \quad \text{(Drawing M-119 Sh. 4 center normal intake duct)} \\ &- 590' 0'' \quad \text{(Grade Elevation)} \\ &= 73' 11'' = 22.5298 \text{ m} \end{aligned}$$

Intake Height: 22.53 m

Receptor to Source Direction:

True North and Plant North are different by: 22°44'41" (Drawing C-2)

$$\begin{aligned} \alpha &= 360 - \arctan[X/Y] = 360 - \arctan[24.384/35.357] = 325.408^\circ \text{ Relative Plant North} \\ \alpha &= 325.408^\circ + 22.75 = 348.16^\circ \text{ Relative True North} \end{aligned}$$

$$\text{Direction to Source} = 348.2^\circ - 180^\circ = 168.2^\circ$$

### Source Data

Release Height: Assume Containment release elevation is the elevation as the receptor elevation

$$\text{Release Height} = 22.53 \text{ m}$$

Location of Normal Intake Train "B":

X (West) =

+80'0"

- 17'0"

= 63'0" = 19.2024 m

Location of Normal Intake Train "A"

(Drawing M-119 Sh. 3 Intake "A" to "B")

Y (North) =

(see above)

= 116'0" = 35.357 m

$$\text{Distance} = [X^2 + Y^2]^{1/2} - R_{\text{cont}} = [19.2024^2 + 35.357^2]^{1/2} - 18.7452 = 21.49 \text{ m}$$

Intake Train "B" Elevation Above Grade is the same as Train "A"

Intake Height: 22.53 m

Receptor to Source Direction:

True North and Plant North are different by: 22°44'41" (Drawing C-2)

$$\alpha = 360 - \arctan[X/Y] = 360 - \arctan[19.2024/35.357] = 331.494^\circ \text{ Relative Plant}$$

North

$$\alpha = 331.494^\circ + 22.75 = 354.24^\circ \text{ Relative True North}$$

$$\text{Direction to Source} = 354.2^\circ - 180^\circ = 174.2^\circ$$

## SIRWT Vent – Emergency Intake

### Receptor Data:

Location of Emergency Intake relative to the SIRWT Vent:

$$\begin{aligned} X \text{ (East)} &= \\ &+ 28' 6'' \quad \text{(Drawing C-38: SIRWT centerline to 'G')} \\ &+ 26' 6'' \quad \text{(Drawing C-51: 'G' to Containment Centerline)} \\ &\quad - 3' 6'' \quad \text{Location of Emergency intake to Containment Centerline} \\ &= 51' 6'' = 15.697 \text{ m} \end{aligned}$$

$$\begin{aligned} Y \text{ (North)} &= \\ &+ 373' 4'' \quad \text{Location of Emergency intake to Containment Centerline} \\ &- 25' 0'' \quad \text{(Drawing C-38 SIRWT Centerline to '21')} \\ &- 87' 0'' \quad \text{(Drawing C-51 '21' to Containment Centerline)} \\ &= 261' 4'' = 79.654 \text{ m} \end{aligned}$$

$$\text{Distance} = [X^2 + Y^2]^{1/2} = [15.697^2 + 79.654^2]^{1/2} = 81.19 \text{ m}$$

Intake Height: 14.94 m

Receptor to Source Direction:

$$\begin{aligned} \text{True North and Plant North are different by: } &22.75^\circ \text{ (Drawing C-2)} \\ \alpha = \arctan[X/Y] = \arctan[15.697/79.654] &= 11.148^\circ \text{ Relative Plant North} \\ \alpha = 11.148^\circ + 22.75^\circ &= 33.90^\circ \text{ Relative True North} \end{aligned}$$

$$\text{Direction to Source} = 33.90^\circ + 180^\circ = 213.9$$

### Source Data

Release Type: Ground

$$\begin{aligned} \text{Release Elevation Above Grade} &= \\ &+ 644' \quad \text{(Drawing C-38 Roof under the SIRWT)} \\ &+ 24' \quad \text{(Drawing C-38 SIRWT Height)} \\ &+ 1' 11'' \quad \text{(Drawing 950X13*C18 Sh 67 roof slope * SIRWT OD/2)} \\ &+ 0' 6'' \quad \text{(Drawing 950X13*C18 Sh 55 roof vent height)} \\ &- 590' \quad \text{(Grade Elevation)} \\ &= 80' 5'' = 24.511 \text{ m} \end{aligned}$$

Release Height = 24.51 m



## SIRWT Vent – Normal Intake Train ‘A’ and ‘B’

### Receptor Data:

Location of Normal Intake Train ‘A’ relative to the SIRWT Vent:

$$\begin{aligned} X \text{ (West)} &= \\ &+ 41' 0'' \quad \text{(Drawing C-38: SIRWT Centerline to 'M')} \\ &- 26' 6'' \quad \text{(Drawing M-119 Sh. 3: 'M' to 'J')} \\ &+ 12' 0'' \quad \text{(Drawing M-119 Sh. 3: 'J' to West side of intake duct 'A')} \\ &- 1' 6'' = \quad \text{(Drawing M-119 Sh. 3: } 36''/2 \text{ half the width of intake duct)} \\ &= 25' = 7.62 \text{ m} \end{aligned}$$

$$\begin{aligned} Y \text{ (North)} &= \\ &-25' 0'' \quad \text{(Drawing C-38 SIWRT Centerline to '21')} \\ &+50' 0'' \quad \text{(Drawing C-51'21' to '29')} \\ &-1' 0'' \quad \text{(Drawing C-50 '29' to '28' see Drawing M119 Sh4)} \\ &= 24' 0'' = 7.315 \text{ m} \end{aligned}$$

$$\text{Distance} = [X^2 + Y^2]^{1/2} = [7.62^2 + 7.315^2]^{1/2} = 10.56 \text{ m}$$

Intake Height: 22.53 m

Source to Receptor Direction:

$$\begin{aligned} \alpha &= 360 - \arctan[X/Y] = 360 - \arctan[7.62/7.315] = 313.83^\circ \text{ Relative Plant North} \\ \alpha &= 313.83^\circ + 22.75 = 365.58^\circ \text{ Relative True North} \end{aligned}$$

$$\text{Direction to Source} = 365.58^\circ - 180^\circ = 185.6^\circ$$

### Source Data

Release Type: Ground

$$\begin{aligned} \text{Release Elevation Above Grade} &= \\ &+ 644' \quad \text{(Drawing C-38 Roof under the SIRWT)} \\ &+ 24' \quad \text{(Drawing C-38 SIRWT Height)} \\ &+ 1' 11'' \quad \text{(Drawing 950X13*C18 Sh 67 roof slope * SIRWT OD/2)} \\ &+ 0' 6'' \quad \text{(Drawing 950X13*C18 Sh 55 roof vent height)} \\ &- 590' \quad \text{(Grade Elevation)} \\ &= 80' 5'' = 24.511 \text{ m} \end{aligned}$$

Release Height = 24.51 m

Location of Normal Intake Train “B” relative to the SIRWT Vent:

$$\begin{aligned} X \text{ (West)} &= \\ &+ 25' 0'' \quad \text{Location of Train “A” relative to the SIRWT} \end{aligned}$$

Determination of Atmospheric Dispersion Factors for Palisades

Calculation Number: NAI-1149-002, Rev. 0

$$\begin{aligned} & - 17' 0'' \quad (\text{Drawing M-119 Sh. 3: Intake "A" to "B"}) \\ & = 8' = 2.438 \text{ m} \end{aligned}$$

$$Y \text{ (North)} = \quad \text{Same as Train "A"}$$

$$= 24' 0'' = 7.315 \text{ m}$$

$$\text{Distance} = [X^2 + Y^2]^{1/2} = [2.438^2 + 7.315^2]^{1/2} = 7.71 \text{ m}$$

$$\text{Intake Height: } 22.53 \text{ m}$$

Source to Receptor Direction:

$$\alpha = 360 - \arctan[X/Y] = 360 - \arctan[2.438/7.315] = 341.56^\circ \text{ Relative Plant North}$$

$$\alpha = 341.56^\circ - 360^\circ + 22.75^\circ = 4.31^\circ \text{ Relative True North}$$

$$\text{Direction to Source} = 4.3^\circ + 180^\circ = 184.3^\circ$$

## Stack Release – Emergency Intake

### Receptor Data:

Location of Emergency Intake relative to the Stack

$$\begin{aligned} X \text{ (East)} &= \\ &-3' 6'' \\ &+ 39' 8'' \\ &- 0' 9 \frac{1}{16}'' \\ &= 36' 8 \frac{15}{16}'' = 10.793 \text{ m} \end{aligned}$$

Location of Emergency Intake to Containment Centerline  
(Drawing C-141: Distance between stack base and Containment centerline)  
(Drawing C-141: Distance between stack top stack base)

$$\begin{aligned} Y \text{ (North)} &= \\ &+ 373' 4'' \\ &- 61' 3'' \\ &+ 5' 8 \frac{1}{8}'' \\ &= 317' 9 \frac{1}{8}'' = 96.853 \text{ m} \end{aligned}$$

Location of Emergency Intake to Containment Centerline  
(Drawing C-141 Stack Base to Containment Centerline)  
(Drawing C-141: Stack top to Stack base distance)

$$\text{Distance} = [X^2 + Y^2]^{1/2} = [10.793^2 + 96.853^2]^{1/2} = 97.45 \text{ m}$$

Intake Height: 14.94 m

Source to Receptor Direction:  
 $\alpha = \text{atan}[X/Y] = \text{atan}[10.793/96.853] = 6.359^\circ$  Relative to Plant North  
 $\alpha = 6.359 + 22.75 = 29.11^\circ$  Relative to True North

$$\text{Direction to Source} = 29.11 + 180 = 209.1^\circ$$

### Source Data

Release Type: Ground

$$\begin{aligned} \text{Above Grade Elevation} &= \\ &+ 782' 0'' \\ &- 590' 0'' \\ &= 192' 0'' = 58.5216 \text{ m} \end{aligned}$$

(Drawing C-141 Stack Height)  
(Grade Elevation)

Release Height = 58.52 m

## Stack Release – Normal Intake Train ‘A’ and ‘B’

### Receptor Data:

Location of Normal Intake ‘A’ relative to the Stack

$$\begin{aligned} X \text{ (West)} &= \\ &+80' 0'' \quad \text{Location of Normal Intake 'A' to Containment Centerline} \\ &- 39' 8'' \quad \text{(Drawing C-141: Distance from Stack Bottom CL to Containment CL)} \\ &+ 0' 9 \frac{1}{16}'' \quad \text{(Drawing C-141: Distance from Stack Bottom CL to Stack Top CL)} \\ &= 41' 1 \frac{1}{16}'' = 12.524 \text{ m} \end{aligned}$$

$$\begin{aligned} Y \text{ (North)} &= \\ &+116' 0'' \quad \text{Location of Normal Intake 'A' to Containment Centerline} \\ &- 61' 3'' \quad \text{(Drawing C-141: Stack Bottom CL to Containment CL)} \\ &+ 5' 8 \frac{1}{8}'' \quad \text{(Drawing C-141: Stack Top CL to Stack Bottom CL)} \\ &= 60' 5 \frac{1}{8}'' = 18.418 \text{ m} \end{aligned}$$

$$\text{Distance} = [X^2 + Y^2]^{1/2} = [12.524^2 + 18.418^2]^{1/2} = 22.27 \text{ m}$$

Intake Height: 22.53 m

$$\begin{aligned} \text{Source to Receptor Direction:} & \quad 325.785 \\ \alpha &= 360 - \arctan[X/Y] = 360 - \arctan[12.524/18.418] = 325.785^\circ \text{ Relative Plant North} \\ \alpha &= 325.785^\circ - 360 + 22.75 = -11.465 + 360 = 348.535^\circ \text{ Relative True North} \end{aligned}$$

$$\text{Direction to Source} = 348.535^\circ - 180 = 168.5$$

#### Source Data

Release Height = 58.5216 m

Location of Normal Intake Train 'B' relative to the Stack:

$$\begin{aligned} X \text{ (West)} &= \\ &+ 41' 1 \frac{1}{16}'' \quad \text{Location of Normal Intake Train "A" relative to the Stack} \\ &- 17' 0'' \quad \text{(Drawing M-119 Sh. 3: Intake "A" to "B") } \\ &= 24' 1 \frac{1}{16}'' = 7.342 \text{ m} \end{aligned}$$

$$\begin{aligned} Y \text{ (North)} &= \quad \text{Same as Train "A"} \\ &= 60' 5 \frac{1}{8}'' = 18.418 \text{ m} \end{aligned}$$

$$\text{Distance} = [X^2 + Y^2]^{1/2} = [7.342^2 + 18.418^2]^{1/2} = 19.83 \text{ m}$$

Intake Height: 22.53 m

Source to Receptor Direction:

$$\begin{aligned} \alpha &= 360 - \arctan[X/Y] = 360 - \arctan[7.342/18.418] = 338.266^\circ \text{ Relative Plant North} \\ \alpha &= 358.520^\circ - 360 + 22.75^\circ = 1.02^\circ \text{ Relative True North} \end{aligned}$$

Direction to Source = $1.02^\circ + 180^\circ = 181.0^\circ$
--

Email from Gary Pratt (Palisades) to Joe Sinodis (NAI), "RE: Remaining X/Qs." with attachment, June 29, 2004

Subject: RE: Remaining X/Qs  
Date: Tue, 29 Jun 2004 07:42:54 -0400  
From: "Pratt, Gary F." <GARY.PRATT@nmcco.com>  
To: "Joe Sinodis" <joe.sinodis@numerical.com>, "Voskuil, Jeffrey L." <JEFFREY.VOSKUIL@nmcco.com>  
CC: "Brogan, Brian A." <BRIAN.BROGAN@nmcco.com>, <Jim.Harrell@numerical.com>

Joe

Attached WORD file contains the X/Q input data for the SSRVs and the ADVs. The input data has been reviewed by Jeff and can be used by NAI for the Palisades dose analysis.

Gary

-----Original Message-----

From: Joe Sinodis [mailto:joe.sinodis@numerical.com]  
Sent: Thursday, June 24, 2004 11:01 AM  
To: Pratt, Gary F.; Voskuil, Jeffrey L.  
Cc: Brogan, Brian A.; Jim.Harrell@numerical.com  
Subject: Remaining X/Qs

Thanks for sending the approved X/Qs for the LOCA event. We are using them to support the presentation that Jim is preparing.

However, we need the remaining approved X/Q inputs so that we can approve the X/Q calculation. Like the source term calculation, the X/Q calculation needs to be approved before any event calculation can be approved. The following is a list of the other release points for which the input information needs to be approved.

Closest ADV  
Closest SSRV  
Containment Equipment Door  
Extended SIRWT release location \*see note below

\* I spent an hour or so yesterday pulling the distances and directions off of drawings and ran some preliminary cases to investigate the X/Qs that would result from moving the SIRWT release location (e.g. attaching a hose to the vent and running it away from the intakes). I looked at two cases that would give much more favorable results for SIRWT releases. One is running the hose from the SIRWT vent to the S end of the turbine building (line 1 on dwg. C-46) lined up with the 'B' normal intake. The other location is the SE corner of the auxiliary building (intersection of lines 21 and A on dwg. C-51). The hose end is assumed to be dropped to a height of about 10' above grade for these cases.

The ADV and SSRV cases will be needed in the CRE event calculation which is scheduled to be approved along with the LOCA calculation. For now

Determination of Atmospheric Dispersion Factors for Palisades  
Calculation Number: NAI-1149-002, Rev. 0

approval of the draft distances and direction previously sent is all that's needed for these release points for the X/Q calculation. Any reduction credit for plume rise is taken into account in the individual event calculations, not the X/Q calculation. The release rates from the ADVs and SSRVs may only be needed if secondary release results need to be improved. The release rates tie to the cooldown rate being assumed (and the NRC will ask about consideration of the cooldown rate in determination of the exit velocity).

I have developed draft handwritten inputs for the containment equipment door release. They are what I faxed to Gary on Monday June 21. They provide better results than simply the closest containment point, and may need to be used if the diffuse release from containment is not implemented. As such, it would be prudent to go ahead and have them approved so the cases may be run in the X/Q calculation.

I can provide the hand-written distance and direction determinations for the potential SIRWT locations if you desire for them to be used in the project. Of course they would need to be approved along with the others to go in the X/Q calculation.

Please let me know if you have any questions and how you wish to proceed.

Thanks,  
Joe

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Release/Receptor Combination Table

Release Point	Receptor Point	Release Height (ft)	Release Height (m)	Receptor Height (ft)	Receptor Height (m)	Distance (ft)	Distance (m)	Direction with respect to true North	Reference
SSRV (East Bank)	Normal Control Room Intake "A"		17.37		22.53		17.65	186.7	See below
SSRV (West Bank)	Normal Control Room Intake "B"		17.37		22.53		16.96	203.8	See below
SSRV (East Bank)	Emergency Control Room Intake		17.37		14.94		96.78	212.5	See below
ADV	Normal Control Room Intake "A"		17.37		22.53		20.08	191.9	See below
ADV	Normal Control Room Intake "B"		17.37		22.53		19.78	206.9	See below
ADV	Emergency Control Room Intake		17.37		14.94		100.39	214.0	See below



## SSRV Release – Emergency Intake

### Receptor Data:

Location of Emergency Intake relative to the SSRV

X (East) =  
-3' 6" (Drawing M-40: Distance SSRV (East Bank) to J)  
-3' 6" (Drawing M-40)  
-5' 6" (Drawing M-40)  
-26' 6" (Drawing C-51: J to M)  
96' 0" (Drawing C-51: M to Containment Centerline)  
57' 0" SSRV (East Bank) to Containment Centerline  
-3' 6" Location Containment Centerline to Emergency Intake  
= 53' 6" = 16.307 m

Y (North) =  
7' 7 11/16" (Drawing M-40: SSRV to 20)  
20' 0" (Drawing M-40) 20-22  
-88' 0" (Drawing M-29: 22 to Containment Centerline)  
-60' 4 5/16" SSRV to Containment Centerline  
+ 373' 4" Location of Containment Centerline to Emergency Intake  
= 312' 11/16" = 95.394 m

$$\text{Distance} = [X^2 + Y^2]^{1/2} = [16.307^2 + 95.394^2]^{1/2} = 96.78 \text{ m}$$

Intake Height: 14.94 m

Source to Receptor Direction:  
 $\alpha = \text{atan}[X/Y] = \text{atan}[16.307/95.394] = 9.701^\circ$  Relative to Plant North  
 $\alpha = 9.701^\circ + 22.75^\circ = 32.45^\circ$  Relative to True North

$$\text{Direction to Source} = 32.45^\circ + 180^\circ = 212.5^\circ$$

### Source Data

Release Type:

Above Grade Elevation =  
+ 639' 0" (Drawing M-40 Roof Elevation)  
+ 8' 0" (Drawing M-40 Stack Height)  
- 590' 0" (Grade Elevation)  
= 57' 0" = 17.37 m

Release Height = 17.37 m

Secondary Safety Relief Valve Discharge Stack Velocity (TBD Later)

1000 psia

FSAR Table 4-5, Rev 21 Design Pressure

Determination of Atmospheric Dispersion Factors for Palisades

Calculation Number: NAI-1149-002, Rev. 0

550 °F	FSAR Table 4-5, Rev 21 Design Temperature
486,600 lb/hr	FSAR Table 4-5, Rev 21 Capacity, Minimum per valve
1000 psia	FSAR Table 4-5, Rev 21 Set Pressure-lowst nominal value
± 3%	FSAR Table 4-5, Rev 21 Set Point Tolerance – as found
12”	Drawing M-79 Discharge Stack Diameter (NEW)

## SSRV Release – Normal Intake Train ‘A’ and ‘B’

### Receptor Data:

Location of Normal Intake ‘A’ relative to the SSRV

$$\begin{aligned} X \text{ (East)} &= \\ +80' 0'' & \text{ Location of Normal Intake ‘A’ to Containment Centerline} \\ - 57' 0'' & \text{ SSRV (East Bank) to Containment Centerline} \\ = 16' 0'' & = 4.877 \text{ m} \end{aligned}$$

$$\begin{aligned} Y \text{ (North)} &= \\ +116' 0'' & \text{ Location of Normal Intake ‘A’ to Containment Centerline} \\ - 60' 4 \frac{5}{16}'' & \text{ Location SSRV to Containment Centerline} \\ & = 55' 7 \frac{11}{16}'' = 16.959 \text{ m} \end{aligned}$$

$$\text{Distance} = [X^2 + Y^2]^{1/2} = [4.877^2 + 16.959^2]^{1/2} = 17.65 \text{ m}$$

Intake Height: 22.53 m

Source to Receptor Direction:

$$\begin{aligned} \alpha &= 360 - \arctan[X/Y] = 360 - \arctan[4.877/16.959] = 343.96^\circ \text{ Relative Plant North} \\ \alpha &= 343.96^\circ - 360^\circ + 22.75^\circ = 6.71^\circ \text{ Relative True North} \end{aligned}$$

$$\text{Direction to Source} = 6.71^\circ + 180^\circ = 186.7^\circ$$

### Source Data

Release Height = 17.37 m

Location of Normal Intake Train ‘B’ relative to the SSRV:

$$\begin{aligned} X \text{ (East)} &= \\ -80' 0'' & \text{ Location of Normal Intake Train ‘A’ relative to Containment} \\ & \text{ Centerline} \\ +17' 0'' & \text{ (Drawing M-119 Sh. 3: Intake ‘A’ to ‘B’)} \\ +57' & \text{ Location of SSRV (East Bank) to Containment Centerline} \\ + 7' & \text{ East Bank to West Bank (M-65 R13)} \\ = 1' 0'' & = 0.3084 \text{ m} \end{aligned}$$

$$\begin{aligned} Y \text{ (North)} &= \text{ Same as Train ‘A’} \\ & = 55' 7 \frac{11}{16}'' = 16.959 \text{ m} \end{aligned}$$

$$\text{Distance} = [X^2 + Y^2]^{1/2} = [0.3084^2 + 16.959^2]^{1/2} = 16.96 \text{ m}$$

Intake Height: 22.53 m

Source to Receptor Direction:

$$\alpha = \arctan[X/Y] = \arctan[.3084/16.96] = 1.042^\circ \text{ Relative Plant North}$$

$$\alpha = 1.042^\circ + 22.75^\circ = 23.79^\circ \text{ Relative True North}$$

$$\text{Direction to Source} = 23.79^\circ + 180^\circ = 203.8^\circ$$

## ADV Release – Emergency Intake

### Receptor Data:

Location of Emergency Intake relative to the ADV

X (East) =  
57' 0"  
10' 8"  
-3' 6"  
= 64' 2" = 19.558 m

SSRV (East Bank) to Containment Centerline  
(Drawing M-42 Section MM scaled distance ADV to SSRV (East Bank)  
Location Containment Centerline to Emergency Intake

Y (North) =  
-60' 4 5/16"  
+10' 1" (Drawing M-40 scaled distance ADV to SSRV)  
+ 373' 4" Location of Containment Centerline to Emergency Intake  
= 323' 11/16" = 98.468 m

$$\text{Distance} = [X^2 + Y^2]^{1/2} = [19.558^2 + 98.468^2]^{1/2} = 100.39 \text{ m}$$

Intake Height: 14.94 m

Source to Receptor Direction:  
 $\alpha = \text{atan}[X/Y] = \text{atan}[19.558/98.468] = 11.234^\circ$  Relative to Plant North  
 $\alpha = 11.234^\circ + 22.75^\circ = 33.98^\circ$  Relative to True North

$$\text{Direction to Source} = 33.98^\circ + 180^\circ = 214.0^\circ$$

### Source Data

Release Type:

Above Grade Elevation =  
+ 639' 0" (Drawing M-40 Roof Elevation)  
+ 8' 0" (Drawing M-40 Stack Height)  
- 590' 0" (Grade Elevation)  
= 57' 0" = 17.37 m

Release Height = 17.37 m

Atmospheric Dump Valve Discharge Stack Velocity (TBD Later)

1000 psia FSAR Table 4-5, Rev 21 Design Pressure  
550 °F FSAR Table 4-5, Rev 21 Design Temperature  
486,600 lb/hr FSAR Table 4-5, Rev 21 Capacity, Minimum per valve  
1000 psia FSAR Table 4-5, Rev 21 Set Pressure-lowst nominal value  
± 3% FSAR Table 4-5, Rev 21 Set Point Tolerance – as found

12"

Drawing M-79 Discharge Stack Diameter (NEW)

**ADV Release – Normal Intake Train ‘A’ and ‘B’**

**Receptor Data:**

Location of Normal Intake ‘A’ relative to the ADV

$$\begin{aligned} X \text{ (West)} &= \\ + 80' 0'' & \text{ Location of Normal Intake ‘A’ to Containment Centerline} \\ - 57' 0'' & \text{ Containment Centerline to SSRV (East Bank)} \\ - 10' 8'' & \text{ (Drawing M-42 Section MM scaled distance SSRV (East Bank) to} \\ & \text{ADV)} \\ &= 12' 4'' = 3.759 \text{ m} \end{aligned}$$

$$\begin{aligned} Y \text{ (North)} &= \\ + 10' 1'' & \text{ (Drawing M-40 scaled distance ADV to SSRV)} \\ - 60' 4 \frac{5}{16}'' & \text{ Location SSRV to Containment Centerline} \\ + 116' 0'' & \text{ Location of Containment Centerline to Normal Intake ‘A’} \\ &= 64' 8 \frac{11}{16}'' = 19.728 \text{ m} \end{aligned}$$

$$\text{Distance} = [X^2 + Y^2]^{1/2} = [3.759^2 + 19.728^2]^{1/2} = 20.08 \text{ m}$$

Intake Height: 22.53 m

Source to Receptor Direction:

$$\begin{aligned} \alpha &= 360 - \arctan[X/Y] = 360 - \arctan[3.759/19.728] = 349.13^\circ \text{ Relative Plant North} \\ \alpha &= 349.13^\circ - 360^\circ + 22.75^\circ = 11.88^\circ \text{ Relative True North} \end{aligned}$$

$$\text{Direction to Source} = 11.88^\circ + 180^\circ = 191.9^\circ$$

**Source Data**

Release Height = 17.37 m

Location of Normal Intake Train ‘B’ relative to the ADV:

$$\begin{aligned} X \text{ (East)} &= \\ - 12' 4'' & \text{ Location of Normal Intake Train ‘A’ relative to ADV} \\ + 17' 0'' & \text{ (Drawing M-119 Sh. 3: Intake ‘A’ to ‘B’)} \\ &= 4' 8'' = 1.422 \text{ m} \end{aligned}$$

$$\begin{aligned} Y \text{ (North)} &= \text{ Same as Train ‘A’} \\ &= 64' 8 \frac{11}{16}'' = 19.728 \text{ m} \end{aligned}$$

$$\text{Distance} = [X^2 + Y^2]^{1/2} = [1.422^2 + 19.728^2]^{1/2} = 19.78\text{m}$$

Intake Height: 22.53 m

Source to Receptor Direction:

$$\alpha = \arctan[X/Y] = \arctan[1.422/19.728] = 4.123^\circ \text{ Relative Plant North}$$

$$\alpha = 4.123^\circ + 22.75^\circ = 26.87^\circ \text{ Relative True North}$$

$$\text{Direction to Source} = 26.87^\circ + 180^\circ = 206.9^\circ$$



Email from Gary Pratt (Palisades) to Joe Sinodis (NAI), "Re: Fax." with attachment, June 28, 2004

Subject: RE: fax  
Date: Mon, 28 Jun 2004 13:24:38 -0400  
From: "Pratt, Gary F." <GARY.PRATT@nmcco.com>  
To: "Joe Sinodis" <joe.sinodis@numerical.com>  
CC: "Voskuil, Jeffrey L." <JEFFREY.VOSKUIL@nmcco.com>, "Brogan, Brian A." <BRIAN.BROGAN@nmcco.com>

Joe

The distance from Containment Centerline was changed from 117' to 116' (see 6/23 email).

distance to "A" = 26.84' (see attached PDF file)  
"B" = 23.06'

Gary

-----Original Message-----

From: Joe Sinodis [mailto:joe.sinodis@numerical.com]  
Sent: Monday, June 21, 2004 11:43 AM  
To: Pratt, Gary F.  
Cc: Voskuil, Jeffrey L.; Brogan, Brian A.; Jim.Harrell@numerical.com  
Subject: fax

Gary,

I just sent you a fax with X/Q input information for a release from the containment equipment hatch for the LOCA event to be included in the approved X/Q inputs.

Joe

--

Joe Sinodis  
Numerical Applications, Inc.  
1210 SE Maynard Rd., Suite 202  
Cary, NC 27511

Joe.Sinodis@numerical.com  
(919) 465-7230 ext. 226  
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JUN-21-2004 10:26A FROM:  
 X/18 From Equipment Hatch

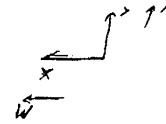
TO: 12697642060

P: 2/2  
 6/19/04

Dwg. M-140 Rev. 7 ~~Other data from approved cont. rel. pt. docs~~  
 Assume release pt. is center of equipment door opening

~~Rel. pt. = 657'~~  
 Rel. pt. = 657' - 590' = 67'  $\times \frac{0.3048}{1}$  = 20.42 m

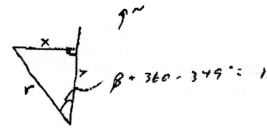
$r = 61.5$



Penetration is @  $A_2 = 349^\circ$  on containment surface.

(x, y) of rel. pt. if (0, 0) is cont. center pt.

$x = r \sin \beta = 61.5 \sin 11^\circ$   
 $x = 11.735'$  ✓

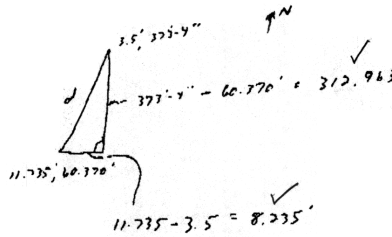


$y = r \cos \beta = 61.5 \cos 11^\circ$   
 $y = 60.370'$  ✓

Emergency Intake

(x, y) = (3.5', 373.4')

$d = \sqrt{312.963^2 + 8.235^2}$   
 $d = 313.0714 \times \frac{0.3048}{1}$   
 $d = 95.42$  m ✓



$\alpha = \tan^{-1} \frac{312.963}{8.235}$

$\alpha = 88.493^\circ$  ✓

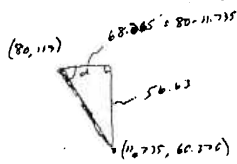
$\phi = 90 - 88.493 = 1.507$   
 $+ 22.75$   
 $+ 180$   
 $\underline{\underline{204.3}}$

Dir. =  $270 - 88.493 = 181.507^\circ$  where plane = N  
 DIR =  $181.507 + 22.75 = 204.257$  ✓

Normal Intake "A"

(x, y) = (80, 119)

$d = \sqrt{68.265^2 + 56.63^2}$   
 $d = 88.636 \times \frac{0.3048}{1}$   
 $d = 27.03$  m  
 26.84



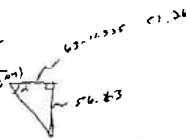
$\alpha = \tan^{-1} \frac{68.265}{68.265} = 39.677^\circ$

Dir. =  $90 + \alpha = 129.677^\circ$  where plane = N  
 DIR =  $129.677 + 22.75 = 152.427$  ✓  
 (151.9)

Normal Intake "B"

(x, y) = (67, 117)

$d = \sqrt{51.265^2 + 56.63^2}$   
 $d = 76.388 \times \frac{0.3048}{1}$   
 $d = 23.28$  m  
 23.06



$\alpha = \tan^{-1} \frac{66.37}{55.635} = 49.87^\circ$

Dir. =  $90 + \alpha = 137.84^\circ$   
 DIR =  $137.84 + 22.75 = 160.60$

DIR = 161 ✓  
 161.1

Email from Gary Pratt (Palisades) to Jim Harrell (NAI), "ARCON96 data," with attachment, March 3, 2004

Subject: ARCON96 data  
Date: Wed, 3 Mar 2004 16:21:54 -0500  
From: Pratt, Gary F. <GARY.PRATT@nmcco.com>  
To: Jim Harrell (E-mail) <Jim.Harrell@numerical.com>

Jim

The attached file contains the five years of Palisades metrological data in ARCON96 input format. I have not completed my review of conversion of the data file we received from Dennis F. Kahlbaum, Senior Meteorologist, AIR, Inc to the ARCON96 required input format. I have performed sufficient reviews to believe that the conversion was done correctly. Let me know if ARCON96 has any problems reading these files.

Gary

<<Palisades ARCON96.zip>>

The .zip file attachment includes a .txt file for each year from 1999 to 2003 of the hourly meteorological data. These are too large to present in hard copy format in this calculation. The files are provided on the compact disk that accompanies this calculation, and are listed in Attachment C.

Email from Gary Pratt (Palisades) to Joe Sinodis (NAI), "MSLB X/Q Data," with attachment, September 14, 2004

Subject: MSLB X/Q Data  
Date: Tue, 14 Sep 2004 08:18:19 -0400  
From: Pratt, Gary F. <GARY.PRATT@nmcco.com>  
To: Joe Sinodis (E-mail) <joe.sinodis@numerical.com>  
CC: Voskuil, Jeffrey L. <JEFFREY.VOSKUIL@nmcco.com>

Joe

I have completed my review of the X/Q input data for MSLB outside of the Containment that you sent to me on September 9, 2004 as shown in the attached PDF file. The current Palisades drawings were used and the calculations are consistent with previous X/Q input data developed and reviewed here at Palisades.

Gary

<<MSLB XQ data.pdf>>

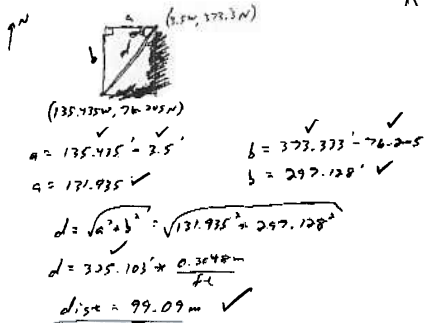


SEP-9-2004 11:09A FROM:

TO: 12697642428

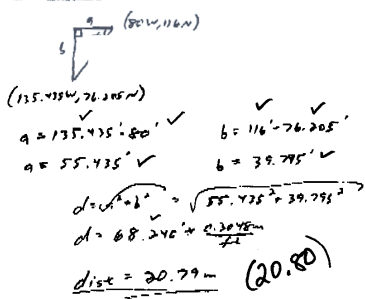
P: 3/4  
 21027

NE vent to Em. Intake



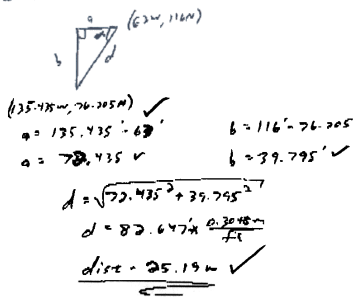
$\alpha = \tan^{-1} \frac{b}{a} = \tan^{-1} \frac{297.128}{132.935}$   
 $\alpha = 66.057^\circ$   
 $Dir = 270 - \alpha = 270 - 66.057$   
 $Dir = 203.943^\circ$  w/r/c plane N  
 $DIR = 203.943 + 22.75 = 226.693^\circ$   
 $DIR = 227^\circ$

NE vent to Intake A



$\alpha = \tan^{-1} \frac{39.795}{55.435} = 35.673^\circ$   
 $Dir = 270 - \alpha = 270 - 35.673$   
 $Dir = 234.327$  w/r/c plane N  
 $DIR = 234.327 + 22.75 = 257.077^\circ$   
 $DIR = 257^\circ$

NE vent to Intake B



$\alpha = \tan^{-1} \frac{39.795}{72.435} = 28.784^\circ$   
 $Dir = 270 - 28.784 = 241.216$  w/r/c plane N  
 $DIR = 241.216 + 22.75 = 263.966^\circ$   
 $DIR = 264^\circ$

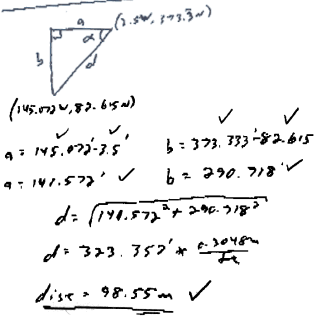
Handwritten signature or initials.

SEP-9-2004 11:09A FROM:

TO: 12697642428

P: 4/4  
 7/2/04

NW vent to Em. Intake



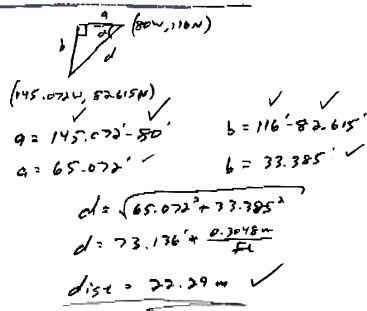
$$\alpha = \tan^{-1} \frac{290.718}{141.572} = 64.035^\circ \checkmark$$

$$Dir = 270 - 64.035 = 205.965^\circ \text{ w/rt plant N}$$

$$DIR = 205.965 + 22.75 = 228.715^\circ \checkmark$$

$$\underline{DIR = 229^\circ \checkmark}$$

NW vent to Intake A



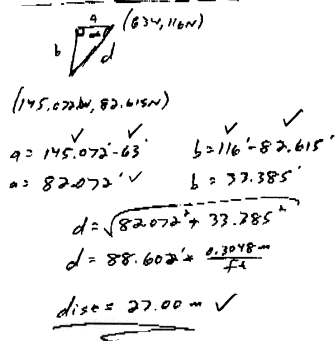
$$\alpha = \tan^{-1} \frac{33.385}{65.072} = 27.160^\circ \checkmark$$

$$Dir = 270 - 27.160 = 242.840^\circ \text{ w/rt plant N}$$

$$DIR = 242.840 + 22.75 = 265.590^\circ \checkmark$$

$$\underline{DIR = 266^\circ \checkmark}$$

NW vent to Intake B



$$\alpha = \tan^{-1} \frac{33.385}{82.072} = 22.135^\circ \checkmark$$

$$Dir = 270 - 22.135 = 247.865^\circ \text{ w/rt plant N}$$

$$DIR = 247.865 + 22.75 = 270.615^\circ \checkmark$$

$$\underline{DIR = 271^\circ \checkmark}$$

Reviewed by  
 Jay [Signature]  
 NAC - Palisades  
 9/14/04