ENERGY NORTHWEST
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CALCULATION COVER SHEET

ORIGINAL

BDC/PDC
PDC 2406

Equipment Piece No.	Project: Columbia	Page 1.0	Cont'd on Page
	Discipline: Nuclear	Calculation No. NE-02-04-06	
		Quality Class 1	
	Remarks		

TITLE/SUBJECT/PURPOSE

Main Steamline Break Accident Off-site and Control Room Doses

Purpose

The purpose of this calculation is three-fold:

(1) To perform a QA evaluation to determine the local (i.e., on-site) atmospheric dispersion factor for the superheated "puff" produced by the steam released from the Columbia Generating Station main steam line break (MSLB) design basis accident (DBA),

(2) To apply this dispersion factor to the dose analysis using Polestar's STARDOSE code to calculate Control Room (CR) doses, and

(3) To perform off-site dose calculations.

CALCULATION REVISION RECORD

REVISION NO.	STATUS/ F,P, OR S	REVISION DESCRIPTION	INITIATING DOCUMENTS	TRANSMITTAL NO.
0	F	New Calculation		
1	F	Add Appendix D " RADTRAD ANALYSIS"		19196

PERFORMANCE VERIFICATION RECORD

REVISION NO.	PERFORMED BY/DATE	VERIFIED BY/DATE	APPROVED BY/DATE
0	Jim Metcalf	Bernard Nowack	Bernard Nowack
1	Mohammed Abu-Shehadeh	Linda Woosley	Shaw Bian
	Mohammed Abu-Shehadeh 9/28/04	LWoosley 9/30/04	S Bian 9/30/04

* Study calculations shall be used only for the purpose of evaluating alternate design options or assisting the engineer in performing assessments.

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		Revision No. 1	

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		Revision No. 1	

Calculation/CMR NE-02-04-06 **Revision** 1
was verified using the following methods:

☒ Checklist Below ☐ Alternate Calculation(s)

Checklist Item	**Verifier Initials**
Clear statement of purpose of analysis	LSW
Methodology is clearly stated, sufficiently detailed, and appropriate for the proposed application	LSW
Does the analysis/calculation methodology (including criteria and assumptions) differ from that described in the Plant or ISFSI FSAR or NRC Safety Evaluation Report, or are the results of the analysis/calculation as described in the Plant or ISFSI FSAR or NRC Safety Evaluation Report affected? ☒ Yes ☐ No	LSW
If Yes, ensure that the requirements of 10 CFR 50.59 and/or 10 CFR 72.48 have been processed in accordance with SWP-LIC-02.	LSW
Does the analysis/calculation result require revising any existing output interface document as identified in DES-4-1, Attachment 7.3? ☐ Yes ☒ No	LSW
If Yes, ensure that the appropriate actions are taken to revise the output interface documents per DES-4-1, section 3.1.8 (i.e., document change is initiated in accordance with applicable procedures).	LSW
Logical consistency of analysis	LSW
• Completeness of documenting references	LSW
• Completeness of input	LSW
• Accuracy of input data	LSW
• Consistency of input data with approved criteria	LSW
• Completeness in stating assumptions	LSW
• Validity of assumptions	LSW
• Calculation sufficiently detailed	LSW
• Arithmetical accuracy	LSW
• Physical units specified and correctly used	LSW
• Reasonableness of output conclusion	LSW
Supervisor independency check (if acting as Verifier)	LSW - N/A
- Did not specify analysis approach - Did not rule out specific analysis options - Did not establish analysis inputs	LSW - N/A
If a computer program was used:	LSW
- Is the program appropriate for the proposed application? - Have the program error notices been reviewed to determine if they pose any limitations for this application? - Is the program name, revision number, and date of run inscribed on the output? - Is the program identified on the Calculation Method Form? If so, is it listed in Chapter 10 of the Engineering Standards Manual?	LSW
Other elements considered: NE-02-02-17 RADTRAD V&V	LSW

If separate Verifiers were used for validating these functions or a portion of these functions, each sign and initial below.
Based on the foregoing, the Calculation/CMR is adequate for the purpose intended.

Verifier Signature(s)/Date	Verifier Initials
LS Woosley [signature] 9/30/04	LSW

25280 R5

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NO	AUTHOR	ISSUE DATE/ EDITION OR REV.	TITLE	DOCUMENT NO.
1	K. Eckerman et al, Oak Ridge National Laboratory, Oak Ridge, TN	1988	"Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion", Federal Guidance Report No. 11, page 136	EPA-520/1-88-020
2	U.S. Nuclear Regulatory Commission	July, 2000	Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors	Regulatory Guide 1.183
3	Polestar Applied Technology, Inc.	Revision 1	Project QA Plan for Application of Alternate Source Term to Non-LOCA DBAs for Columbia Generating Station	PSAT 206CT.QA.02.01
4	Polestar Applied Technology, Inc.	Revision 2	Implementing Procedure for Application of the Alternate Source Term to LOCA and Non-LOCA DBAs for Energy Northwest Columbia Generating Station	PSAT 206CT.QA.01.02
5	U.S. Nuclear Regulatory Commission	June, 2003	Atmospheric Relative Concentrations For Control Room Radiological Habitability Assessments At Nuclear Power Plants	Regulatory Guide 1.194
6	Polestar Applied Technology, Inc.	Revision 0	STARDOSE Validation Report	PSAT CI09.05
7	Polestar Applied Technology, Inc.	Revision 0	STARDOSE Users Manual	PSAT CI09.06
8	Energy Northwest		Tech. Spec. 3.4.8 "RCS Specific Activity"	TS Amendment No. 169
9	Energy Northwest	Amendment 53, Nov. 1998	Columbia Generating Station Final Safety Analysis Report	WNP-2 FSAR
10	Energy Northwest	Rev. 8, Sept. 1997	Columbia Generating Station, WNP-2 Systems Data Sheet	82-RSY-0300-T3, SC
11	Polestar Applied Technology, Inc.	Revision 0	Dose Calculation Data Base	NE-02-04-1
12	Humphreys, S.L., et al.	December, 1997	RADTRAD: A Simplified Model for RADionuclide Transport and Removal And Dose Estimation	NUREG/CR-6604

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The below listed output interface calculations and/or documents are impacted by the current revision of the subject calculation. The listed output interfaces require revision as a result of this calculation. The documents have been revised, or the revision deferred with Manager approval, as indicated below.

AFFECTED DOCUMENT NO.	CHANGED BY (e.g., BDC, SCN, CMR, Rev.)	CHANGED DEFERRED (e.g., RFTS, LETTER NO.)	DEPT. MANAGER *
FSAR 15.6.4	PDC 2406		

* Required for deferred changes only.

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Discussion of Results	Revision No. 0	REV. BAR

Control Room Dose: The Control Room (CR) dose was analyzed for two release scenarios: the first is the direct release of steam to the atmosphere via the blowout panels (this will be the license basis case), the second is the release via the Turbine Generator Building (TGB) to the atmosphere. No credit was taken for the remote intakes or the Control Room Emergency Filtration (CREF) system. The dose conversion factors (DCFs) are based on Reference 1 which is recommended by Reference 2. The dose for each release scenario was calculated with and without the effect of iodine spiking. A summary of the dose results of these two scenarios is as follows:

Control Room Dose From Direct Release to the Atmosphere

	Whole Body	CEDE	TEDE	Reg Limit (TEDE)
Dose without iodine spiking (rem)	2.83E-05	8.95E-02	8.95E-02	5
Dose with iodine spiking (rem)	5.65E-04	1.79	1.79	5

Control Room Dose, Release Via TGB, Mixing w/ TGB Air

	Whole Body	CEDE	TEDE	Reg Limit (TEDE)
Dose without iodine spiking (rem)	1.27E-05	4.03E-02	4.03E-02	5
Dose with iodine spiking (rem)	2.54E-04	0.81	0.81	5

Off-site Dose: The off-site (EAB and LPZ) doses (including iodine spike) were calculated using the formula given below. Per RG 1.183 (Reference 2), the MSLB dose limits with and without iodine spiking are 25 and 2.5 rem, respectively. Since the source from iodine spiking is 20 times higher than that from equilibrium iodine (4 μCi/g vs. 0.2 μCi/g), the dose corresponding to the spike is 20 times higher than that corresponding to equilibrium iodine. Therefore, the spike dose is more limiting since it results in a higher percentage of the dose limit. The results are summarized in the following table.

Dose (rem) = [Activity Release (Ci)] x [χ/Q (s/m^3)] x [Breathing Rate (m^3/s)] x [DCF (rem/Ci)]

Off-site Doses (rem) with and without Iodine Spike

With Iodine Spike	Whole Body	CEDE	TEDE	Reg Limit (TEDE)
EAB Dose (rem)	Negligible	0.398	0.398	25
LPZ Dose (rem)	Negligible	0.109	0.109	25

Without Iodine Spike	Whole Body	CEDE	TEDE	Reg Limit (TEDE)
EAB Dose (rem)	Negligible	0.020	0.020	2.5
LPZ Dose (rem)	Negligible	0.0055	0.0055	2.5

Conclusions

CR Dose Results - The conclusion from these results is that the MSLB CR limiting dose of 1.79 rem (corresponding to direct release to the environment with iodine spiking) is well below the 5.0 rem TEDE regulatory limit for control room operator exposure given in Reference 2 for BWR MSLB.

Off-site Doses Results - The conclusion from these results is that the MSLB off-site doses (including iodine spike) of 0.398 rem and 0.109 rem for EAB and LPZ, respectively, are well below the 25 rem TEDE regulatory limit from Reference 2 for BWR MSLB with spiking. In fact, these results are less than the 2.5 rem TEDE regulatory limit for BWR MSLB without spiking considered.

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Prepared by / Date: [signature] 6/17/04	Verified by/Date: BLH 6-18-04	Revision No. 0

Analysis Method (Check appropriate boxes)

☒ Manual (As required, document source of equations in Reference List)

☒ Computer ☐ Main Frame ☐ Personal

☐ In-House Program

☐ Computer Service Bureau Program

☐ BCS ☐ CDC ☐ PCC ☐ OTHER

☒ Verified Program: Code name/Revision STARDOSE, version 1.01

☐ Unverified Program: Document in Appendix B

Approach/Methodology — REV. BAR

The methodology and scope of this calculation is consistent with References 3 and 4.

Calculation of CR Dispersion Factor (χ/Q) - The Instantaneous Puff Release model described in Reference 5 to determine the time-dependent dispersion of a non-rising, ground level, instantaneous puff release was used to calculate the CR χ/Q value. The initial volume of the puff is established by the amount of steam released by the MSLB and by the flashing of entrained liquid. The calculation of this initial steam volume (and the DE I-131 concentration) is the first step of the calculation.

The puff centerline is then assumed to pass directly over the local CR air intake. The release point from the TGB is assumed to be far enough away from the normal CR air intake to permit the puff to be fully extended (i.e., $x \sim 3\sigma$ for the puff) before movement across the CR air intake begins. This maximizes the time-integrated, normalized concentration (expressed in sec/m^3). No credit is taken for vertical (z-direction) expansion in performing the normalized concentration integration.

Parameters for the MSLB DBA include the mass of liquid-steam mixture released, the timing of release, the temperature of the liquid-steam mixture, and the iodine concentration in the release. These parameters are used to obtain the initial conditions of the released steam puff. The Reference 5 methodology then establishes the puff's transit time, the normalized concentration as a function of distance traveled in the downwind or "x" direction, and, finally, the time-integrated, normalized centerline concentration.

CR Dose - For the licensing-basis CR dose calculation, the transport pathway is based upon direct release to the environment. For completeness, a second transport pathway via the TGB is also considered (see Assumptions A-7 and A-8 for further discussion). The STARDOSE computer code [references 6 and 7] is used to determine the CR dose. A STARDOSE LIBFILE1.TXT file was created with the Dose Equivalent (DE) I-131 inventory for the Columbia MSLB using the DE I-131 coolant concentration from Reference 8 with consideration, also, of the potential for iodine spiking. A STARDOSE INPUT.DAT file was also prepared to represent exposure to the CR operator equivalent to that provided by the passing puff. This equivalency is provided by introducing into the CR at the start of the dose calculation the proper fraction of the total DE I-131 release, and then purging that DE I-131 from the CR at the normal flow rate.

Off-site Dose - For the licensing-basis off-site dose calculation, the same DE I-131 source term as that used for the CR dose calculation is used. It is conservatively assumed that the only transport pathway is a direct release to the environment. The plume dilution effect due to buoyant rise is also conservatively neglected (see Assumption C-2 for further discussion). Because of the simplicity of the off-site dose model, a manual calculation is employed.

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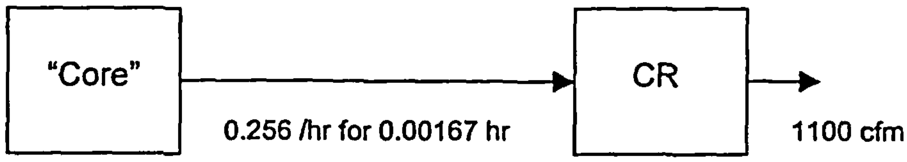

Figure 1. STARDOSE Model for Fission Product Release

Purpose: The purpose of this calculation is to perform radiation dose calculations following a MSLB accident at Columbia. The dose calculations will include the control room, the EAB, and the LPZ.

These calculations are being performed in accordance with References 3 and 4. The activity released in the MSLB accident is from fission products dissolved in the coolant. This activity is limited by Technical Specification to 0.2 μCi/g Dose-Equivalent (DE) I-131 with a short-term allowance for iodine spiking to 4.0 μCi/g DE I-131. The activity concentration (Ci/m^3) to which the CR is exposed (and which must be applied to the dose calculation) is reduced as the plume is diluted by entrained air and expansion of the puff. Although the puff would be buoyant, no credit is taken for buoyant rise. Table 1 presents the input parameters used in the calculations.

Table 1. Design Input Parameters

Columbia Design Input Parameter	Parameter Value	Basis
Maximum time for MSIV closure	6 sec	Reference 11
Approx. volume of TGB	5.71E6 ft^3	Reference 11
Liquid release from MSLB	105,000 lbm	Reference 11
Steam release from MSLB	25,000 lbm	Reference 11
RCS pressure	1060 psia (552 F)	Reference 11
Blowout panel locations for MSLB	Panels A to TGB (N. end of tunnel) and D direct to environment (via B and C) (E. end of tunnel)	Reference 11
Distance from MSLB release point to normal CR intake for Panel D	240 ft = 73 m	Reference 11
Distance from MSLB release point to normal CR intake for Panel A (via TGB)	200 ft = 61 m	Reference 11
Plume transit velocity	1 m/s	Reference 11
Coolant iodine inventories	0.2 μCi/g DE I-131	Reference 11
Iodine spiking factor	20 (increasing coolant activity to 4 μCi/g DE I-131)	Reference 11
Radioactivity release rate to environment	Instantaneous	Reference 5
Vol. of CR	214,000 ft^3	Reference 11
CR occupancy factor	1	Reference 11
CR normal, unfiltered makeup flow	1100 cfm	Reference 11
CR Breathing Rate	3.5E-4	Reference 11
Chi/Q, EAB	1.81E-4 sec/m^3	Reference 11
Chi/Q, LPZ	4.95E-5 sec/m^3	Reference 11
Dose Conversion Factor for I-131 CEDE	32893 rem/Ci	References 1,12

The various transport pathways, geometries, and puff/plume dilutions being considered in the main body of this calculation are summarized in Table 2 below:

Table 2. Summary of Cases

Dose Calculation	Transport Pathway	Geometry	Plume Dilution
CR	Direct to environment (primary case – used for licensing basis)	Instantaneous puff release – Gaussian distribution	Air entrainment and expansion during transit
CR	Via TGB (secondary case for information – not for licensing basis)	Instantaneous puff release – Gaussian distribution	Pre-dilution in TGB - air entrainment and expansion during transit
Off-site	Direct to environment	Plume*	Air entrainment and expansion during transit

* The PAVAN code was used to calculate the off-site χ/Q values.

Calculations of Radiation Doses: The calculation of radiation doses from a MSLB is divided into two main categories, the control room dose and the off-site doses. The details of the calculation are given below:

I. Calculation of Control Room Doses: Calculations of the control room doses involve the calculation of the effective puff relative concentration (X/Q), the source term (i.e; amount of activity released), and the development of a STARDOSE model to calculate the radiation dose. In order to facilitate an acceptable calculation for the effective puff relative concentration (X/Q), the following assumptions and their justifications are introduced.

Assumption A-1 The main steam isolation valve (MSIV) closure time will not exceed 6 seconds. The release of steam resulting from the MSLB (through blowout panels in the steam tunnel) is assumed to be instantaneous. The mass of coolant released is the amount in the steam line and connecting lines at the time of the break plus the amount passing through the MSIVs prior to closure.

Justification The Columbia FSAR (Section 15.6.4.4, page 15.6-7 of Reference 9) states that the MSLB steam and liquid discharge is based on MSIVs closing in 6 seconds. Since this is the basis for the current MSLB radiological licensing evaluation, it is reasonable to assume that this is the maximum allowed closure time. This time duration is small compared to the exposure time of interest for the CR, and in any event it is conservative to assume instantaneous release.

The FSAR evaluation of mass released in the MSLB is based on the 6 second closure time and states that a steam-water mixture flows from the break until the MSIV has closed.

Assumption A-2 The puff from the liquid-steam release (including the flashed steam) is released at ground-level with an initial volume corresponding to standard atmospheric conditions. Activity within the puff becomes normally distributed by dilution with air. No buoyancy is considered. The liquid (assumed to contain no residual activity – a very conservative assumption) settles by gravity.

Justification Since the iodine is in solution, and nearly all of it will tend to stay with the liquid, it is conservative to assume that all of the iodine activity partitions with the steam and becomes airborne. For the most part, the released liquid consists of large droplets from the blowdown that will settle quickly without complete evaporation.

The puff is allowed to entrain air and to expand slightly as it moves downwind. According to the Reference 5 model, the integration of the normalized puff activity concentration as it crosses the CR air intake is performed from x to +3σ (where x is the distance from the release point to the receptor; i.e., the air intake, and "σ" includes the increase in σ by expansion in the downwind direction over the distance x).

Assumption A-3 Control room ventilation remains in normal mode. The normal air intake is the one used for analyzing dispersion.

Justification For the analysis, there is no "FAZ" signal credited to start emergency control room ventilation. No credit is taken for operator actions. MSIV isolation actuates on high steam flow.

Assumption A-4 Control room ventilation intake flow is unfiltered. No consideration is needed of unfiltered inleakage in calculating dispersion.

Justification For the analysis ventilation remains in normal mode. No credit is taken for filtration at all.

Assumption A-5 The time required for the plume to transit to the CR air intake is based on the plume moving with a horizontal velocity of 1 m/s. The local air intake is used as the basis for the transit time.

Justification There are three CR intakes at Columbia. Two of these are remote, located away from the power block (400 feet or more from the MSLB release location described in Assumption A-7). The third is the local intake which is contiguous with the CR building (see Appendix A of Reference 11). This is the CR intake closest to the MSLB release location; and thus, it is assumed that the plume translates directly to the local CR intake.

REV. BAR

Assumption A-6 — The steam-air mixture may be treated as a perfect gas.

Justification — The perfect gas assumption is applicable to low pressure, high temperature gases where there are minimal interaction forces between gas molecules. The puff is at atmospheric pressure and high temperature.

Assumption A-7 — As noted in the CR Dose portion of the Methodology section, the primary release location (transport pathway), and that upon which the final, licensing-basis results are based, is direct release to the environment. Release via the TGB (with brief confinement in the TGB) has also been considered.

Justification — Release directly to the environment is consistent with RG 1.183 which states that for MSLB, all radioactivity in the released coolant should be assumed to be released to the atmosphere instantaneously. This is also consistent with what would be expected for the MSLB at Columbia based on the following.

Per Reference 10 and Reference 11, Appendix A, with the MSLB in the steam tunnel or tunnel extension (located in the TGB), there are three blowout panels that are designed to vent to prevent overpressurization. Panel A at the north end of the tunnel vents into the TGB. Panels B and C vent to a vent-way which vents directly to the atmosphere via blow-out panel D. Thus, the release will vent either directly to the atmosphere or into the TGB.

If the release occurs into the TGB, approximately 65,000 lbm of hot steam will appear essentially instantaneously into a volume of ~5.7E6 ft3 (Reference 11). Based on the perfect gas law, such a steam release would lead to a pressure increase of ~5.4 psi within the TGB (based on an unmixed, isothermal compression such that each component experiences the same fractional reduction in volume but no increase in temperature – see Attachment 1). Thus for the TGB to remain intact, it would have to withstand a pressure of ~5.4 psig. (Per Attachment 1, even a well-mixed model results in a pressure of ~3.7 psig). A fraction of this pressure (~1 psig) would be expected to catastrophically fail the TGB siding; thus, the release into the TGB can be treated as a release directly to the environment.

Release via the TGB with brief confinement has also been considered and is discussed further in Assumption A-8. This is not, however, considered appropriate for the licensing basis and is included only for completeness.

Assumption A-8 — For release into the TGB, there are two possibilities to consider. One is that the TGB fails such that it, in effect, provides no confinement of the steam puff and the result is similar to a release directly to the environment. This is the primary release path and is addressed by the release directly to the atmosphere discussed in Assumption A-7. The other case is where the TGB tends to briefly confine the puff, with release from the TGB at one or more specific failure locations. In this latter case, it is assumed that the steam puff mixes with the air in the TGB prior to release from the TGB.

Justification — The TGB is about 5.7E6 ft^3 in net free volume. Assuming for the moment that the TGB remains largely intact and tends to briefly confine the steam release as it is vented through blowout Panel A, the puff will mix rapidly with the air in the TGB by jet entrainment and density driven exchange. Thus the release to the atmosphere from the TGB will be a mixture of air and steam. To account for isolated volumes in the TGB and displacement of TGB air at the time of venting into the TGB, the mixing is assumed to involve only 2/3 of the gross building volume. The 5.7E6 ft^3 is the net building volume allowing 20% for equipment and internal structures. Therefore, 2/3 of the gross volume is 0.67*5.7E6*1.25 = 84% of the net TGB volume of 5.7E6 ft^3; i.e., the mixture released from the TGB is the steam volume plus approximately 84% of the TGB volume as air.

I.1 Calculation of CR Effective Puff Relative Concentration (χ/Q): The Instantaneous Puff Release model described in Reference 5 to determine the time-dependent dispersion of a non-rising, ground level, instantaneous puff release was used to calculate the control room χ/Q value. The details of calculating this relative concentration are given in the following steps:

I.1.1 Calculation of Initial Steam Volume: The initial volume of the puff is established by the amount of steam released by the MSLB and by the flashing of entrained liquid. The calculation of this initial steam volume (and the DE I-131 concentration) is the first step of the calculation.

I.1.1.1 Evaluation of the Initial Conditions of Steam Release: Per Reference 9, the liquid-steam mixture is released over a period of ~6 seconds (assumed to be instantaneous per Assumption 1), 105,000 lbm as liquid and 25,000 lbm as steam, and the RCS pressure is 1060 psia. The temperature of the liquid-steam mixture at the time of the release to ambient is the saturation temperature corresponding to 1060 psia which is 552 F. Since the liquid is superheated at ambient pressure, some of this liquid will flash to steam. Per Reference 5 and Assumption 2, the steam will form the puff, and the unflashed liquid will settle by gravity.

I.1.1.2 Determination of the liquid flashing fraction (ff): The fraction of the released liquid that flashes into steam can be determined from the following energy balance equation:

$$mh = m_g h_g + m_l h_l$$

where: m = initial liquid mass (lbm)
h = initial liquid enthalpy (Btu/lbm)
m_g = flashed steam mass (lbm)
h_g = flashed steam enthalpy (Btu/lbm)
m_l = unflashed liquid mass (lbm)
h_l = unflashed liquid enthalpy (Btu/lbm)

and the unflashed liquid and flashed steam are at atmospheric pressure and saturation temperature corresponding to atmospheric pressure (212 F).

The flashing fraction, ff, is

$$ff = m_g/m = (mh - m_l h_l)/m/h_g$$

$$= (h - m_l h_l/m)/h_g$$

Since

$$m_l/m = (m - m_g)/m = 1\text{-}ff$$

we have

$$ff = (h - (1\text{-}ff)h_l)/h_g$$

Thus,

$$ff = (h - h_l)/(h_g - h_l)$$

Using the steam tables,

h(552 F) = 552 Btu/lbm

h_l(212 F) = 180.2 Btu/lb

h_g(212 F) = 1150.5 Btu/lb

Thus,

$$ff = (552 - 180.2)/(1150.5 - 180.2)$$

$$= 0.383$$

This means that 38.3% of the released liquid flashes into steam in addition to the 25,000 lbm of coolant initially released as steam.

I.1.1.3 Mass of Liquid Flashed and Total Steam Mass: the mass of flashed steam is calculated by multiplying the flashing fraction by the amount of the released liquid:

$$m_g = 0.383 \times 105{,}000 = 4.02E4 \text{ lbm.}$$

The total initial steam puff mass is the sum of the initial mass of released steam (25,000 lbm) and the mass of steam flashed from the liquid (4.02E4 lbm):

The total steam mass (lbm) = 25,000 lbm + 4.02E4 lbm = 6.52E4 lbm

I.1.1.4 Volume of Steam: The initial volume of the steam puff is calculated as follows:

The weighted average temperature of the mixture of the steam released at 552 F and the steam flashed from the liquid at 212 F is:

$$T_b = (4.02E4 \times 212 + 25000 \times 552)/6.52E4 = 342 \text{ F} = 802 \text{ R}$$

Therefore, the initial volume of the plume (pure steam) is:

$$V = 6.52E4 \text{ lbm}/\rho_s$$

where $\rho_s = 0.0311$ lbm/ft^3 (super heated steam density at 802 R). Thus,

$$\text{Initial puff volume} = V = 2.1E6 \text{ ft}^3 = 5.95E4 \text{ m}^3 \qquad (1)$$

I.1.2 Calculation of the Effective Puff Relative Concentration:

The instantaneous Puff Release model described in RG 1.194 (Reference 5) has been used to evaluate the relative concentration (χ/Q). The activity release to the environment must occur over a period of no longer than about one minute for a release to qualify as a puff release. The diffusion equation for an instantaneous puff ground level release, with no puff rise and no crosswind offset (i.e., the center of puff is assumed to pass directly over control room intake), integrated over the duration of the puff passage is:

$$\frac{\chi}{Q}(x,u,k,h) = \frac{\int_0^T \frac{2}{(\sigma_z^2(x,k)+\sigma_l^2)^{\frac{1}{2}}(2\pi)^{\frac{3}{2}}(\sigma_{x,y}^2(x,k)+\sigma_l^2)} . \exp\left[-\frac{1}{2}\left(\frac{(x-u.t)^2}{(\sigma_{x,y}^2(x,k)+\sigma_l^2)}+\frac{h^2}{(\sigma_z^2(x,k)+\sigma_l^2)}\right)\right].F(t)dt}{\int_0^T F(t)dt} \qquad (2)$$

where:

- χ = Integrated concentration at control room intake, Ci-m^3/sec
- Q = Release quantity, for nuclide, Ci
- x = Release point to receptor distance, m. The distance from the blowout panels to the local CR intake is 200 ft (~ 61 m).
- u = Wind speed, m/sec. Per RG 1.194 the wind speed is assumed to be 1 m/sec
- k = Stability Class. Per RG 1.194 stability class F will be used.
- h = Difference in elevation between the physical release point and the control room intake, m. If the control room intakes is at a higher elevation than the release point and the puff is buoyant, assume h = 0.
- T = Transit time - time for trailing edge of puff to pass control room intake, sec. Per RG 1.194, the following formula should be used to calculate the transient time:

$$T = \frac{x + 3.\left[(\sigma_{x,y}(x,k) + \sigma_l)\right]}{u} \qquad (3)$$

F = Control room total intake flow rate, cfm. (If the control room intake flow rate is constant over the period 0 to T seconds, the F(t) terms can be omitted), since at Columbia the CR intake flow rate is not a function of time, F(t) in the numerator and denominator will cancel each other.

$\sigma_{x,y}(x,k)$ = Standard deviation, m, of the puff in the horizontal along the wind direction and cross-wind directions at the receptor location. Figure 4 in Reference 5 is used with the distance to the receptor and the stability class to determine $\sigma_{x,y}$ at the receptor.

For a distance x = 61 m and stability class F, the value of $\sigma_{x,y}(x,k)$, obtained from Figure 4 in Reference 5, is:

$\sigma_{x,y}(x,k) = 2.9$ m.

$\sigma_z(x,k)$ = Standard deviation, m, of the puff in the vertical cross-wind direction at the receptor location. Figure 5 in Reference 5 may be used with the distance to the receptor and the stability class to determine σ_z at the receptor; but in this case, expansion in the z direction is conservatively neglected.

σ_I = Per RG 1.194, the initial standard deviation, m, is given by the following formula:

$$\sigma_I = \left[\frac{2.V}{(2\pi)^{\frac{3}{2}}}\right]^{\frac{1}{3}} \quad (4)$$

But per equation (1) above, V=5.95E4 m^3, hence,

$\sigma_I = 19.62$ m

The transient time, T, can now be calculated by introducing the values of x, u, σ_I, and $\sigma_{x,y}(x,k)$ into equation (3), the result is:

T = 128.6 seconds.

In order to simplify the integral in equation (2) above, the following constants are defined:

$$A = \frac{2}{(\sigma_z^2(x,k)+\sigma_I^2)^{\frac{1}{2}}(2\pi)^{\frac{3}{2}}(\sigma_{x,y}^2(x,k)+\sigma_I^2)} = 1.65\text{E-5 } m^{-3} \quad (5)$$

$$B = \frac{\frac{1}{2}}{(\sigma_{x,y}^2(x,k)+\sigma_I^2)} = 1.27\text{E-3 } m^{-2} \quad (6)$$

$$C = X \quad (7)$$

$$D = u \quad (8)$$

Introducing the definitions in equations (5) through (8) into equation (2) and multiplying the right-hand side of the equation by $\left(\frac{\sqrt{\pi}}{\sqrt{\pi}}.\frac{2}{2}\right)$, the equation becomes:

$$\chi / Q = \left(\frac{A\sqrt{\pi}}{2}\right)\frac{2}{\sqrt{\pi}}\int_0^T e^{-B(C-Dt)^2}\,dt \qquad (9)$$

Furthermore, we need to introduce the following definitions:

$E = B^{1/2} = 0.0356\ m^{-1}$ (10)

$F = EC = 2.17$ (11)

$G = ED = 0.0356\ sec^{-1}$ (12)

$\nu = F - Gt$ (13)

Introducing equations (10) through (13) into equation (9) yields the following equation:

$$\chi / Q = \left(\frac{A\sqrt{\pi}}{-2G}\right)\frac{2}{\sqrt{\pi}}\int_0^T e^{-\nu^2}\,d\nu \qquad (14)$$

Equation (14) represents the definition of the error function, (erf), which has the following solution:

$$\chi / Q = \left(\frac{A\sqrt{\pi}}{-2G}\right)\frac{2}{\sqrt{\pi}}\int_0^T e^{-\nu^2}\,d\nu = \left(\frac{A\sqrt{\pi}}{-2G}\right)[erf(\nu(T)) - erf(\nu(0))] \qquad (15)$$

where $erf(\nu) = (2/\pi^{1/2})\Sigma\{(-1)^k \nu^{(2k+1)}/[k!(2k+1)]\}$ summed from k = 0 to infinity. Tables of the error function are readily available.

For t = T = 128.6 sec, erf(ν) = erf(F-GT) = erf(F-G(128.6)) = erf(2.17-(0.0356)(128.6)) = erf(2.17-4.58) = erf(-2.41)
For t = 0 sec, erf(ν) = erf(F-Gt) = erf(F-G(0)) = erf(2.17).

Tables for erf(ν) typically extend to ν = 2 which give erf(2) = 0.995322 by using the first 18 terms of the error function expansion, (it has the value of 1.0 at infinity). Therefore, in order to obtain accurate values of the error function at ν = -2.41 and ν = 2.17, the first 25 terms of the series function were used, therefore:

erf(-2.41) = -0.999346 and erf(2.17) = 0.997851

The term [erf(ν(T))-erf(ν(0))] in equation (15) can now be evaluated as follows

[erf(ν(T))-erf(ν(0))] = [(-0.999346)-(0.997851)] = -1.997 (16)

The second part of equation (15) is evaluated as follows:

$-A\pi^{1/2}/2G$ = -(1.65E-5)(1.77)/2/0.0356 = -4.10E-4 sec/m^3. (17)

Multiplying equation (16) by (17) gives the X/Q value:

χ/Q = (-4.10E-4)(-1.997) = 8.19E-04 sec/m^3

Multiplying this value by the intake flowrate of 1100 cfm = 0.520 m^3/sec, one obtains the fraction of the release, F_{CR}, that enters the CR. This fraction is:

In the above analysis the assumption was made that the steam is directly released to the atmosphere via the blowout panel D. If one assumes that the steam release mixes with 2/3 of the TGB gross volume prior to being released to the environment, the puff will become larger and more dilute. Although the puff is more dilute, the exposure time will also become greater. It is expected that the dilution (which increases with the volume of the puff) will have a more significant effect than the extended exposure time (which increases only with the linear dimension of the puff). Therefore, one would expect the fraction of the release which enters the CR to decrease. The following evaluation confirms that expectation. Assume that brief holdup and mixing occurs in the TGB as noted in Assumption A-8; i.e., assume that the vented steam mixes with the TGB air prior to release from the TGB itself. Thus, the release via the TGB is pre-diluted (see "Methodology"). As noted in the Methodology section and discussed in Assumption A-7, this transport pathway evaluation is provided for completeness and is not considered appropriate for use in the licensing basis.

The puff volume was calculated as follows. Per Assumption A-8, the steam mixes with 84% of the air in the TGB volume; i.e., 5.95E+04 m^3 (steam) + 0.84 * 5.7E+06 ft^3 (TGB volume) / 35.3 ft^3/m^3 = 5.95E+04 m^3 + 1.36E+05 m^3 = 1.96E+05 m^3.

Applying this volume to equation (4), the σ_I increases by the ratio $(1.96E+05/5.95E+04)^{1/3}$ = 1.49. The corresponding values of A and B become (from equations (5) and (6)) 5.03E-06 m^{-3} and 5.79E-04 m^{-2}, respectively. Observing that equation (16) is already -1.997 and cannot be greater than -2 (absolute value), it is evident that the χ/Q for the greater volume will vary as A/G from equation (15). Since G = ED (equation (12)) and E = $B^{1/2}$ (equation (10)), and since D = u (equation (8)) = 1.0 m/sec, A/G = 2.09E-04 sec/m^3 for the TGB mixing case compared to 4.63E-04 sec/m^3 for the direct release to the atmosphere. This means that the fraction of the activity which enters the CR for the TGB mixing case will be:

$$F_{CR} \text{ (TGB mixing case)} = 0.0426\% \times (2.09E\text{-}04/4.63E\text{-}04) = 0.0192\%.$$

The CR dose for the case with mixing of the steam puff with the TGB air prior to release to the environment will be 0.45 times that of the case for the pure steam puff released directly to the atmosphere.

I.2 Calculation of the Source Term: The following assumption is applicable to the source term calculations:

Assumption B-1 The fission product inventory available for release is based on the reactor coolant DE I-131 concentration which is allowed by the Columbia Technical Specifications. To account for iodine spiking, the equilibrium level of DE I-131 is increased by a factor of 20.

Justification Per Section 15.6.4.5 of Reference 9, the only activity available for release from the MSLB is that present in the reactor coolant and steam lines prior to the break. This is consistent with the Technical Specifications as stated in Section 15.6.4.5 of Reference 9. Consistency with the current licensing basis is also maintained by the position that only the reactor coolant liquid contains the iodine. However, consistent with Reference 2, an increase by a factor of 20 will be included to take into account iodine spiking. This differs from the current analysis presented in Section 15.6.4.5 of Reference 9.

Based on Assumption B-1, the curie inventory of DE I-131 released in the MSLB is the product of the Technical Specification coolant activity concentration and the coolant liquid release from the break (105,000 lbm). Thus the coolant fission product inventory in Ci may be calculated as activity in μCi/gm x 105,000 lbm x 454 gm/lbm /1E6 μCi/Ci. Per Assumption B-1, the DE I-131 concentration (0.2 μCi/gm, as specified the Technical Specifications) is used in the calculation.

While it is true that a small amount of iodine may normally partition with the steam, the assumption that only the liquid coolant contains the iodine initially is more than compensated for by the iodine treatment in the dose calculation. In the dose calculation, it is assumed that all of the iodine contained in the liquid coolant (even the portion that does not flash) is added to the steam release puff.

As noted in Assumption B-1, there is a point of departure in this calculation relative to that reported in the FSAR; and that is the issue of iodine spiking. RG 1.183 (Reference 2) requires that iodine spiking be considered for analysis of MSLB dose at a value 20 times greater than the 0.2 μCi/gm value used for Section 15.6.4.5 of Reference 9. While the off-site dose limits from Reference 2 for MSLB without iodine spiking are a factor of 10 lower than the corresponding limits with spiking, the factor of 20 increase in activity outweighs the more favorable off-site dose limits by a factor of two. Moreover, for the CR dose, the limit for both cases is the same. Therefore, it is clear that the case with spiking is more limiting than the case without spiking,

and the spiking case is the only case explicitly analyzed. However, for completeness, both sets of results are presented (the spiking case doses are divided by a factor of 20 to obtain the non-spiking case results). The Technical Specification DE I-131 concentration multiplied by a factor of 20 (equivalent to 4 μCi/gm) is used for the spiking case.

I.3 Development of the STARDOSE model: The following assumptions are applicable to the STARDOSE model:

Assumption B-2 The fission product release and other input parameters in STARDOSE are determined such that the amount of activity introduced into the CR (essentially instantaneously) is equal to the product of the time-integrated, normalized activity concentration (from the Reference 5 puff model, in sec/m^3), the activity released (Ci of DE I-131), and the volumetric flow of normal CR makeup (in m^3/sec). This activity is assumed to be instantaneously well-mixed within the CR volume.

Justification If the STARDOSE integrated activity introduced into the CR is equal to the actual time-integrated activity concentration (which results from the MSLB "puff" passing over the CR air intake) times the normal makeup rate, then the CR operators will be exposed to the correct source term. It is slightly conservative to introduce that amount of activity immediately, rather than over the two minute+ duration of the puff passage.

Assumption B-3 For the CR MSLB dose calculation, no credit is taken for isolation and filtration of CR supply air.

Justification The normal makeup is assumed to continue for the duration of the accident. No credit is taken for a more rapid CR purge once the outside air concentration falls below that of the CR atmosphere.

The purpose of this subsection is to determine the STARDOSE model for fission product release which will provide a release equivalent to that from the diluted puff in terms of STARDOSE inputs. The results of this subsection are then used in the subsequent subsection to define the STARDOSE input file.

I.3.1 Activity Release: The STARDOSE fission product release is determined based on Assumption B-2 and is illustrated in Figure 1, page 4.000.

The DE I-131 total activity release is 4 μCi/gm x 105,000 lbm x 454 gm/lbm /1E6 μCi/Ci = 191 Ci. The LIBFILE1.TXT file for STARDOSE (Appendix A) has the inventory set at 4E-6 Ci, the coolant activity per gram obtained by dividing the total activity released (191 Ci) by the mass of liquid released (4.767E7 g). By design, the STARDOSE code expects inventories to be in Ci/MWt. To obtain the DE I-131 activity in the 105,000 lbm of coolant, the "power level" in the STARDOSE INPUT.DAT file must be set to 4.767E7, the number of grams of liquid coolant released.

The 0.0426% release (calculated above) to the CR is assumed to occur over six seconds (the steam release duration); therefore, the percent release per second is 0.0426% / 6 = 0.0071%/sec, and the percent release per hour is 0.0071%/sec x 3600 sec/hr = 25.6%/hr (or a fractional release rate per hour = 0.256). This results in a fractional release to the CR of 0.256 /hr x 6 sec /3600 sec/hr = 0.0426%, which is the fraction previously calculated in the I.1.2. The activity is then removed from the CR by being purged at the same rate of 1100 cfm as is assumed for the supply flowrate.

I.3.2 Control Room Model: The STARDOSE input file (INPUT.DAT) is presented in Appendix B. In this model, the CR control volume is set at 214,000 ft^3. The core control volume is as described above. Only two junctions are used: one from the core to the CR and one from the CR to the environment. No credit is taken for the CREF.

Dose conversion factors (which appear in the LIBFILE1.TXT file in Appendix A) are based on the default FGR 11 & 12 files in Reference 12 (consistent with the recommendations in References 1 and 2).

I.4 CR Dose Results and Conclusions: The STARDOSE-calculated doses include the effect of iodine spiking. To obtain "no spiking" doses, the "spiking included" iodine dose results were reduced by a factor of 20. It should be noted that neither filtered intake flow nor use of the remote intake(s) is credited in these results.

The results are summarized in Table 3 below.

Table 3. Control Room Dose From Direct Release to the Atmosphere

	Whole Body	CEDE	TEDE	Reg Limit (TEDE)
Dose without iodine spiking (rem)	2.83E-05	8.95E-02	8.95E-02	5
Dose with iodine spiking (rem)	5.65E-04	1.79	1.79	5

This licensing-basis case can be confirmed by recognizing that (1) without filtration credit and (2) with a constant CR intake flow and exhaust rate, the normalized, time-integrated exposure within the control room would be the same as that at the CR air intake; i.e 8.19E-04 sec/m^3. If this value is multiplied by the 191 Ci DE I-131 released and by the breathing rate inside the CR (3.5E-04 m^3/sec), the result is the DE I-131 Ci inhaled (i.e., 5.5E-05 Ci). Since the CEDE dose conversion factor (approximately the same as the TEDE dose conversion factor since the whole body dose contribution is so small) for I-131 is 32893 rem/Ci inhaled, the corresponding dose would be 1.8 rem TEDE calculated as follows:

Inhaled Activity (Ci) = X/Q (sec/m^3) x Q (Ci) x Breathing Rate (m^3/sec)
= 8.19E-4 x 191 x 3.5E-4
= 5.5E-5 Ci

Dose (rem) = Inhaled Activity (Ci) x DCF (rem/Ci)
= 5.5E-5 x 32,893
= 1.8 rem

This confirms the STARDOSE calculation.

The above confirmation also provides a simple means of estimating the effect of reducing the intake flow/exhaust rate once activity has been brought into the CR at 1100 cfm. Since the activity decreases in the CR according to $e^{-\lambda t}$ (where λ is the fractional exhaust rate of the CR; i.e., 1100 cfm/214,000 ft^3 = 5.14E-03 /min) and since the integral to t = infinity for that expression is simply 1/λ (i.e., 194.5 minutes or 11,670 seconds), the normalized, time-integrated exposure within the CR is 11,670 seconds divided by the CR volume of 214,000 ft^3 or 6064 m^3. The result is 1.92 sec/m^3. Recalling that 0.000426 x 191 Ci DE I-131 were brought into the CR (i.e., 0.081 Ci), the time-integrated exposure is 1.92 sec/m^3 x 0.081 Ci = 0.156 Ci-sec/m^3. Mulitplying this value by the breathing rate of 3.5E-04 m^3/sec, one obtains the same 5.5E-05 Ci inhaled as in the previous paragraph. This means that the integrated exposure will increase inversely with the exhaust rate after the 0.081 Ci DE I-131 has been introduced. Therefore, if the intake/exhaust rate were 1100 cfm during the passage of the puff but were then reduced to 800 cfm, the CR dose would increase from 1.8 rem TEDE to 1100/800 x 1.8 rem TEDE = 2.5 rem TEDE.

The conclusion from these results is that the MSLB CR doses are below the 5.0 rem TEDE regulatory limit for control room operator exposure given in Reference 2 for BWR MSLB.

For the sensitivity case of pre-mixing the steam with 84% of the air in the TGB, the above doses have been reduced by a 0.45 multiplier; the results are presented in Table 4 below:

Table 4. Control Room Dose, Release Via TGB, Mixing w/ TGB Air

	Whole Body	CEDE	TEDE	Reg Limit (TEDE)
Dose without iodine spiking (rem)	1.27E-05	4.03E-02	4.03E-02	5
Dose with iodine spiking (rem)	2.54E-04	0.81	0.81	5

Even though these results in Table 4 have been compared to the regulatory limits, these are not considered licensing-basis results. They show only that the assumption of a steam-only puff (direct release to the environment rather than mixing with TGB air) is the limiting case (i.e., that any pre-dilution will reduce the dose even though the exposure duration may become longer).

II. Off-site Dose Calculation: Off-site doses include the Exclusion Area Boundary (EAB), and the Low Population Zone (LPZ). The following assumptions apply to the off-site dose calculations:

Assumption C-1 Same as Assumption B-1

Assumption C-2 Offsite dose assumes a direct unfiltered release to the environment; but because of the greater distances to the Exclusion Area Boundary (EAB) and Low Population Zone (LPZ) boundary, the dispersed release is assumed to be a continuous plume, modeled with PAVAN, rather than a puff. As with the onsite (CR) dispersion, plume dilution due to buoyancy is not considered.

Justification This is based on the current licensing basis which assumes a direct unfiltered release to the environment with plume dispersion.

II.1 Dose Calculations: The following expression has been used to calculate the off-site doses:

Dose (rem) = Activity Release (Ci) x χ/Q (sec/m^3) x Breathing Rate (m^3/sec) x Dose Conversion Factor (rem/Ci)

The activity release (from the CR dose calculation above) is 191 Ci DE I-131. The χ/Q is 1.81E-4 sec/m^3 for the EAB and 4.95E-5 sec/m^3 for the LPZ. The breathing rate is 3.5E-4 m^3/sec. The I-131 CEDE DCF (from the CR dose calculation) is 32893 rem/Ci inhaled, and this is approximately the same for TEDE (because the whole body dose is negligible). Therefore, the doses are as follows:

Dose (EAB) = 191 Ci x 1.81E-4 sec/m^3 x 3.5E-4 m^3/sec x 32893 rem/Ci = 0.398 rem TEDE

Dose (LPZ) = 191 Ci x 4.95E-5 sec/m^3 x 3.5E-4 m^3/sec x 32893 rem/Ci = 0.109 rem TEDE

II.2 Offsite Dose Results and Conclusions: The dose results for MSLB with spiking considered are 0.398 rem TEDE for the EAB and 0.109 rem TEDE for the LPZ.

The conclusion from these results is that the MSLB offsite doses with spiking considered are well below the 25 rem TEDE regulatory limit from Reference 2 for BWR MSLB and spiking. In fact, these results are less than the 2.5 rem TEDE regulatory limit for BWR MSLB without spiking. Clearly, the Columbia MSLB is not of concern for offsite dose.

It is noted that the results from this calculation are consistent with the assumptions and inputs from Appendix D of RG 1.183 (Reference 2). This is evident from the following:

- The iodine concentration (with spiking) corresponds to 4.0 µCi/g DE I-131 in the reactor liquid coolant.
- The activity released from the fuel is assumed to mix homogeneously in the reactor coolant and is assumed to enter the steam phase instantaneously.
- Per Assumption A-1, the MSIV closure time (6 seconds) is assumed to be the maximum allowed time.
- Per Assumption A-1, total mass of coolant released is the amount in the steam line and connecting lines at the time of the break plus the amount that passes through the valves prior to closure. The steam release is equal to the sum of (1) the steam in the steam lines and connecting lines at the time of the break, (2) the steam which passes through the valves prior to closure, and (3) the steam which flashes from the liquid coolant which passes through the valves prior to closure.
- All radioactivity in the released liquid coolant is assumed to be released to the atmosphere instantaneously (Assumption A-1).
- All radioactivity in the released coolant is assumed to be released as a ground-level release (Assumption A-2).
- No credit is taken for plateout, holdup, or dilution within facility buildings for the primary license basis case (Assumption A-7).
- All iodine is assumed to partition with the gas (Assumption A-2) during the flashing of the liquid coolant which is very conservative relative to what would occur with the Reference 2, Appendix D, paragraph 4.4 specification. In reality, the bulk of the iodine would be expected to remain with the unflashed liquid coolant.

ENERGY NORTHWEST People·Vision·Solutions	ATTACHMENT 1	Page No. AT-1 Cont'd on page
		Calculation No. NE-02-04-06
Prepared by / Date: [signature] 6/17/04	Verified by/Date: [signature] 6-18-04	Revision No. 0

Calculation of Pressure in the TGB

1- First consider the air in the TGB before the steam is added:

P1 V1 = n1 R T1

P1=1 atm = 14.7 psi
V1=5.7E+6 ft3 = 1.617E+11 cm3 = vol of TGB
R = 82.06 (atm.cm3)/(mol.K)
T1 = 25 C = 298 K = standered room temp.

n1 = 6.61E+6 moles of air exist in the TGB before the steam is added.

2- Consider the steam released:

mass of steam = 65,000 lbm = 2.95E+7 g = (2.95E+6 g)/(18 g/mole) = 1.64E+6 moles

3- Adding steam to the air in the TGB will result in a total number of moles of n2

n2 = Total no. of moles in the TGB = moles of air + moles of steam
n2 = 6.61E+6 + 1.64E=6 = 8.25E+6 moles

4- Average temperature of the air-steam mixture

Temp of steam = 342 F = 172 C = 445 K from MSLB calc, sec I.1.1.4
Temp of air in TGB = 25 C =298 K

T2 = [(6.61E+6 * 298) + (1.64E+6 * 445)]/8.25E+6
T2 = 327 K

5- Now applying the ideal gas law to the mixture

P2 v2 = n2 R T2

V2 = V1 = 5.7E+6 ft3 = 1.617E+11 cm3 = volume of TGB
R = 82.06 (atm.cm3)/(mol.K)
T2 = 327 K from step 4 above

P2 = 1.25 atm the 0.25 atm = 3.67 psi (i.e; 0.25 * 14.7 psi/atm = 3.67 psi)

In fact, in the first two seconds of the puff injection into the TGB, there will be minimum mixing between the steam and the air in the TGB, this means that the steam plume will compress the air in the TGB and the air will compress the steam causing the initial pressure in the TGB to be even higher than the 3.67 psi calculated above using full mixing. The pressure of this isothermal compression of the two gases can be calculated as follows:

P1 V1 = P2 V2

P1 = 14.7 psi (initial pressure in the TGB before steam injection)
V1 = 5.7E+6 ft3 + 1.61E+6 ft3 = 7.3E+6 ft3 (Volume of the TGB + volume of puff before entering the TGB)
P2 = presuure in the TGB after the injection of the steam
V2 = volume of the TGB which will contain both gases (the two gases will be compressed in this volume)

P2 = P1 V1/V2
P2 = (14.7)(2.1E+6 + 5.7E+6)/(5.7E+6)

P2 = 20.1 psi
P2 – P1 = 20.1 – 14.7 = 5.4 psi is the pressure added to the TGB upon the injection of the steam before it mixes with air.

LIBFILE1.TXT File for STARDOSE MSLB Run

```
n_isotopes 3 n_isotope_groups 11

I131Org Org_I   NONE   NONE   4e-6   9.96E-07   1.080E+06   6.734E-02   0   0   0.03   32893   0.13   0   0   0   0   0
I131Elem Elm_I  NONE   NONE   4e-6   9.96E-07   1.080E+06   6.734E-02   0   0   0.03   32893   0.13   0   0   0   0   0
I131Part Prt_I  NONE   NONE   4e-6   9.96E-07   1.080E+06   6.734E-02   0   0   0.03   32893   0.13   0   0   0   0   0
```

REV. BAR

STARDOSE INPUT.DAT File

edit_time
0.0 24 720
end_edit_time

participating_isotopes
I131Org I131Elem I131Part
end_participating_isotopes

core
thermal_power 4.767e+007
elemental_iodine_frac 0.0485
organic_iodine_frac 0.0015
particulate_iodine_frac 0.95
release_frac
to_control_volume Control_Room

Time	N_Gas	I_Grp	CsGrp	TeGrp	BaGrp	NMtls	CeGrp	LaGrp	SrGrp
0.00167	0	0.256	0	0	0	0	0	0	0
720	0	0	0	0	0	0	0	0	0

end_to_control_volume
end_release_frac
end_core

control_volume
obj_type OBJ_CR
name Control_Room
air_volume 2.14e+005
water_volume 0
surface_area 0
has_recirc_filter false
breathing_rate
Time(hr) Value(cms)
720 0.00035
end_breathing_rate
occupancy_factor
Time(hr) Value(frac)
24 1
96 0.6
720 0.4
end_occupancy_factor
end_control_volume

junction
junction_type AIR_JUNCTION
downstream_location AIR_SPACE
upstream Core
downstream Control_Room
has_filter false
flow_rate
Time (hr) Value (cfm)
720 1

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```
end_flow_rate
end_junction

junction
junction_type                 AIR_JUNCTION
downstream_location           AIR_SPACE
upstream                      Control_Room
downstream                    environment
has_filter                    false
flow_rate
Time(hr)        Value(cfm)
720             1100
end_flow_rate
X_over_Q_4_ctrl_room
Time(hr)        Value(s/m*3)
720             0
end_X_over_Q_4_ctrl_room
X_over_Q_4_site_boundary
Time(hr)        Value(s/m*3)
720             0
end_X_over_Q_4_site_boundary
X_over_Q_4_low_population_zone
Time(hr)        Value(s/m*3)
720             0
end_X_over_Q_4_low_population_zone
end_junction

environment
breathing_rate_sb
Time (hr)       Value (cms)
8               0.00035
720             0.0
end_breathing_rate_sb
breathing_rate_lpz
Time (hr)       Value (cms)
8               0.00035
24              0.00018
720             0.00023
end_breathing_rate_lpz
end_environment
```

STARDOSE RESULTS.OUT Excerpts

edit time 720.000000
Control_Room

	thyroid	wbody	skin	CEDE
Total dose:	5.87E+001	5.65E-004	4.66E-003	1.79E+000
Noble gas	0.00E+000	0.00E+000	0.00E+000	0.00E+000
Org iodine	8.81E-002	8.47E-007	6.99E-006	2.68E-003
Elem iodine	2.85E+000	2.74E-005	2.26E-004	8.68E-002
Part iodine	5.58E+001	5.37E-004	4.43E-003	1.70E+000
Cesium	0.00E+000	0.00E+000	0.00E+000	0.00E+000
Tellurium	0.00E+000	0.00E+000	0.00E+000	0.00E+000
Barium	0.00E+000	0.00E+000	0.00E+000	0.00E+000
Noble metal	0.00E+000	0.00E+000	0.00E+000	0.00E+000
Lanthanides	0.00E+000	0.00E+000	0.00E+000	0.00E+000
Cerium	0.00E+000	0.00E+000	0.00E+000	0.00E+000
Strontinum	0.00E+000	0.00E+000	0.00E+000	0.00E+000

	air_space	water_pool	surface	recirc	thyroid	wbody	skin	CEDE
I131Org	6.41E-097	0.00E+000	0.00E+000	0.00E+000	8.81E-002	8.47E-007	6.99E-006	2.68E-003
I131Elem	4.33E-096	0.00E+000	0.00E+000	0.00E+000	2.85E+000	2.74E-005	2.26E-004	8.68E-002
I131Part	3.89E-094	0.00E+000	0.00E+000	0.00E+000	5.58E+001	5.37E-004	4.43E-003	1.70E+000

STARDOSE 1.01 (c) 1996-2002 Polestar Applied Technology, Inc.
Thu Apr 01 09:38:21 2004

Purpose and Approach:

The purpose of this appendix is to provide an analysis of the Columbia MSLB using RADTRAD to check the main calculation. In this case, RADTRAD 3.02a has been used – it is expected that the results would be essentially the same for RADTRAD 3.03. Refer to the RADTRAD documentation (NUREG/CR-6604, main body Reference 12, and supplements) for a discussion of the relationship between RADTRAD 3.02a and 3.03.

In the main body of the calculation, the case with spiking was shown to release 191 Ci of dose-equivalent (DE) I-131. The puff X/Q was calculated to be 8.19E-4 sec/m^3. Finally, the transit time for the puff was calculated to be 127.6 seconds The effective volume dilution rate of the puff may be calculated from the inverse of the X/Q; i.e., 1/8.19E-4 m^3/sec = 1221 m^3/sec. The total volume dilution is the product of the effective volume dilution rate and transit time for the puff = 1221 m^3/sec x 127.6 sec = 1.558E5 m^3. The average puff concentration during its transit across the control room air intake may be calculated from this volume. With the known air intake rate and the known transit time, the RADTRAD analysis may be set up.

RADTRAD Analysis Calculation

The RADTRAD default input files for the iodine inventory and dose conversion factors (i.e., `c:\program files\u s nuclear regulatory commission\radtrad 3.02a\defaults\bwr_i131.nif`, and `c:\program files\u s nuclear regulatory commission\radtrad 3.02a\defaults\fgr11&12.inp`, respectively) were used. The default .nif file provides an iodine inventory per MWt of 0.2581E+05 Ci. Therefore, to release 191 Ci the .rtf file must be set up to release a fraction equal to 191/2.581E4 = 7.4E-3 as long as the power level is input as one MWt. This is the case, as seen in excerpts from the output file provided as Appendix D1 (these values are "boxed" so as to stand out in the input summary).

In RADTRAD, three compartments are used (see Appendix D1). The 191 Ci of DE I-131 are released to a "Plume" control volume with a volume of 5.5E6 ft^3 (same as 1.558E5 m^3) so that the correct average DE I-131 concentration is established. The control room air supply of 1100 cfm draws on this "Plume" control volume for 127.6 seconds (0.0354 hours) so that the correct amount of activity enters the control room. The control room volume is 214000 ft^3, as in the main calculation. The control room exhausts to the environment indefinitely at the same 1100 cfm rate. With a turnover rate of about 0.005 volumes per minute, the activity is cleared from the control room in about 3 x 1/0.005 minutes = 600 minutes = 10 hours. The problem is run for 24 hours.

The 191 Ci of DE-131 is also released from the "plume" to the environment at a rate of 1.44E5 %/day = 100% per minute. However, the release to the environment from the "Plume" control volume is kept at zero until 127.6 seconds (0.0354 hours) so that the control room dose is not affected. Because of the relatively long half-life of I-131, this delay has no effect on the dose calculation. The EAB dose X/Q is 1.81E-4 sec/m^3, the same value as in the main body of the calculation.

Results

The results are shown at the end of Appendix D-1. The doses are summarized as follows:

	CR		EAB	
Time (hr)	Thyroid (rem)	TEDE (rem)	Thyroid (rem)	TEDE (rem)
24.000	5.8236E+01	1.7736E+00	1.3068E+01	4.0017E-01

Conclusions

These doses agree well with the STARDOSE values of 1.79 rem TEDE for the control room and 0.398 rem TEDE for the EAB presented in the main body of the calculation. The RADTRAD analysis confirms the STARDOSE analysis.

ENERGY NORTHWEST People·Vision·Solutions	Appendix D1 – Excerpts from RADTRAD Output for MSLB	Page No. D1-1	Cont'd on page D1-2
		Calculation No. NE-02-04-06	
Prepared by / Date: 9/9/04	Verified by/Date: 9/14/04	Revision No. 1	

REV. BAR

```
########################################################################
          RADTRAD Version 3.02a run on  6/02/2004  at  8:38:43
 ########################################################################

 ########################################################################
                    File information
 ########################################################################

 Plant file name            = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad 3.02a\Columbia_MSLB.psf
 Inventory file name        = c:\program files\u s nuclear regulatory
commission\radtrad 3.02a\defaults\bwr_i131.nif
 Scenario file name         = C:\Program Files\U S Nuclear Regulatory
Commission\Radtrad 3.02a\Columbia_MSLB.psf
 Release file name          = c:\program files\u s nuclear regulatory
commission\radtrad 3.02a\columbia_mslb.rft
 Dose conversion file name = c:\program files\u s nuclear regulatory
commission\radtrad 3.02a\defaults\fgr11&12.inp




    #####    ####   #####    #  #     #  #####   #    #  #####
    #   #  #        #        #  ##    #  #    #  #    #    #
    #   #  #        #        #  # #   #  #    #  #    #    #
    #####   ####   ####      #  #  #  #  #####   #    #    #
    #           #  #         #  #   # #  #       #    #    #
    #           #  #         #  #    ##  #       #    #    #
    #       ####   #         #  #     #  #        ####     #


 Radtrad 3.02 1/5/2000
 Columbia_MSLB
 Nuclide Inventory File:
 c:\program files\u s nuclear regulatory commission\radtrad
3.02a\defaults\bwr_i131.nif
 Plant Power Level:
  1.0000E+00
 Compartments:
   3
 Compartment 1:
 Plume
   3
  5.5000E+06
   0
   0
   0
   0
   0
 Compartment 2:
 CR
   1
  2.1400E+05
```

```
   0
   0
   0
   0
   0
 Compartment 3:
 E
   2
  0.0000E+00
   0
   0
   0
   0
   0
 Pathways:
   3
 Pathway 1:
 Plume to CR
   1
   2
   1
 Pathway 2:
 Plume to E
   1
   3
   4
 Pathway 3:
 CR to E
   2
   3
   1
 End of Plant Model File
 Scenario Description Name:

 Plant Model Filename:

 Source Term:
   1
   1   1.0000E+00
 c:\program files\u s nuclear regulatory commission\radtrad
3.02a\defaults\fgr11&12.inp
 c:\program files\u s nuclear regulatory commission\radtrad 3.02a\columbia_mslb.rft
   0.0000E+00
   0
   9.5000E-01   4.8500E-02   1.5000E-03   1.0000E+00
Overlying Pool:
   0
   0.0000E+00
   0
   0
   0
   0
 Compartments:
   3
```

REV. BAR

```
Compartment 1:
   0
   1
   0
   0
   0
   0
   0
   0
   0
 Compartment 2:
   0
   1
   0
   0
   0
   0
   0
   0
   0
 Compartment 3:
   0
   1
   0
   0
   0
   0
   0
   0
   0
 Pathways:
   3
 Pathway 1:
   0
   0
   1
   3
   0.0000E+00   1.0000E+00   1.1000E+03
   3.5400E-02   1.0000E+00   0.0000E+00
   2.4000E+01   1.0000E+00   0.0000E+00
   1
   3
   0.0000E+00   1.0000E+00   1.1000E+03
   3.5400E-02   1.0000E+00   0.0000E+00
   2.4000E+01   1.0000E+00   0.0000E+00
   1
   3
   0.0000E+00   1.0000E+00   1.1000E+03
   3.5400E-02   1.0000E+00   0.0000E+00
   2.4000E+01   1.0000E+00   0.0000E+00
   0
   0
   0
   0
```

REV. BAR

```
   0
   0
   0
 Pathway 2:
   0
   0
   0
   0
   0
   0
   0
   0
   0
   0
   1
   3
   0.0000E+00   0.0000E+00
   3.5400E-02   1.4400E+05
   2.4000E+01   0.0000E+00
   0
 Pathway 3:
   0
   0
   1
   2
   0.0000E+00   1.0000E+00   1.1000E+03
   2.4000E+01   1.0000E+00   0.0000E+00
   1
   2
   0.0000E+00   1.0000E+00   1.1000E+03
   2.4000E+01   1.0000E+00   0.0000E+00
   1
   2
   0.0000E+00   1.0000E+00   1.1000E+03
   2.4000E+01   1.0000E+00   0.0000E+00
   0
   0
   0
   0
   0
   0
   0
 Dose Locations:
   2
Location 1:
 CR
   2
   0
   1
   2
   0.0000E+00   3.5000E-04
   2.4000E+01   0.0000E+00
   1
   2
```

REV. BAR

```
   0.0000E+00   1.0000E+00
   2.4000E+01   0.0000E+00
Location 2:
 EAB
   3
   1
   3
   0.0000E+00   1.8100E-04
   2.0000E+00   0.0000E+00
   2.4000E+01   0.0000E+00
   1
   3
   0.0000E+00   3.5000E-04
   8.0000E+00   1.8000E-04
   2.4000E+01   0.0000E+00
   0
 Effective Volume Location:
   1
   2
   0.0000E+00   1.0000E+00
   2.4000E+01   0.0000E+00
 Simulation Parameters:
   1
   0.0000E+00   0.0000E+00
 Output Filename:
 C:\Program Files\U S Nuclear Regulatory Commission\Radtrad 3.o0
   1
   1
   1
   0
   0
 End of Scenario File

######################################################################
          RADTRAD Version 3.02a run on   6/02/2004   at   8:38:43
 ######################################################################

 ######################################################################
                          Scenario Description
 ######################################################################

 Radioactive Decay is enabled
 RELEASE_NAME = Columbia_MSLB
 Release Fractions and Timings
                GAP        EARLY IN-VESSEL
             0.0003 hrs     0.0000 hrs
 NOBLES      0.0000E+00     0.0000E+00
 IODINE      7.4000E-03     0.0000E+00
 CESIUM      0.0000E+00     0.0000E+00
 TELLURIUM   0.0000E+00     0.0000E+00
 STRONTIUM   0.0000E+00     0.0000E+00
 BARIUM      0.0000E+00     0.0000E+00
 RUTHENIUM   0.0000E+00     0.0000E+00
 CERIUM      0.0000E+00     0.0000E+00
 LANTHANUM   0.0000E+00     0.0000E+00
```

REV. BAR

##
Cumulative Dose Summary
##

Time (hr)	CR Thyroid (rem)	CR TEDE (rem)	EAB Thyroid (rem)	EAB TEDE (rem)
0.000	9.9475E-06	3.0295E-07	6.2315E-10	1.9083E-11
0.035	3.1832E-01	9.6943E-03	2.9963E-05	9.1757E-07
0.435	7.1078E+00	2.1647E-01	1.3066E+01	4.0012E-01
0.735	1.1672E+01	3.5547E-01	1.3066E+01	4.0013E-01
1.035	1.5828E+01	4.8204E-01	1.3067E+01	4.0014E-01
1.335	1.9613E+01	5.9731E-01	1.3067E+01	4.0015E-01
1.635	2.3060E+01	7.0228E-01	1.3067E+01	4.0016E-01
1.935	2.6198E+01	7.9787E-01	1.3068E+01	4.0017E-01
2.000	2.6837E+01	8.1730E-01	1.3068E+01	4.0017E-01
2.300	2.9638E+01	9.0261E-01	1.3068E+01	4.0017E-01
2.600	3.2189E+01	9.8030E-01	1.3068E+01	4.0017E-01
2.900	3.4512E+01	1.0510E+00	1.3068E+01	4.0017E-01
3.200	3.6627E+01	1.1155E+00	1.3068E+01	4.0017E-01
3.500	3.8553E+01	1.1741E+00	1.3068E+01	4.0017E-01
3.800	4.0308E+01	1.2276E+00	1.3068E+01	4.0017E-01
4.100	4.1905E+01	1.2762E+00	1.3068E+01	4.0017E-01
4.400	4.3360E+01	1.3205E+00	1.3068E+01	4.0017E-01
4.700	4.4685E+01	1.3609E+00	1.3068E+01	4.0017E-01
5.000	4.5891E+01	1.3976E+00	1.3068E+01	4.0017E-01
5.300	4.6990E+01	1.4311E+00	1.3068E+01	4.0017E-01
5.600	4.7990E+01	1.4615E+00	1.3068E+01	4.0017E-01
5.900	4.8901E+01	1.4893E+00	1.3068E+01	4.0017E-01
6.200	4.9731E+01	1.5145E+00	1.3068E+01	4.0017E-01
6.500	5.0486E+01	1.5376E+00	1.3068E+01	4.0017E-01
6.800	5.1174E+01	1.5585E+00	1.3068E+01	4.0017E-01
7.100	5.1801E+01	1.5776E+00	1.3068E+01	4.0017E-01
7.400	5.2372E+01	1.5950E+00	1.3068E+01	4.0017E-01
7.700	5.2891E+01	1.6108E+00	1.3068E+01	4.0017E-01
8.000	5.3364E+01	1.6252E+00	1.3068E+01	4.0017E-01
8.300	5.3795E+01	1.6383E+00	1.3068E+01	4.0017E-01
8.600	5.4187E+01	1.6503E+00	1.3068E+01	4.0017E-01
8.900	5.4545E+01	1.6612E+00	1.3068E+01	4.0017E-01
9.200	5.4870E+01	1.6711E+00	1.3068E+01	4.0017E-01
9.500	5.5166E+01	1.6801E+00	1.3068E+01	4.0017E-01
9.800	5.5436E+01	1.6883E+00	1.3068E+01	4.0017E-01
10.100	5.5682E+01	1.6958E+00	1.3068E+01	4.0017E-01
10.400	5.5906E+01	1.7026E+00	1.3068E+01	4.0017E-01
24.000	5.8236E+01	1.7736E+00	1.3068E+01	4.0017E-01

DIC

ENERGY NORTHWEST

DOCUMENT TRANSMITTAL

TO BE COMPLETED BY ORIGINATOR

To: Energy Northwest P.O. Box 968 Richland, WA. 99352 **Attention: Records Management M/D 964Y**	1. Transmittal No.	2. Page 1 of 1
	9. Initiating Doc. No. PDC 2406	21. Priority 1
3. From Robin Feuerbacher	4. Purchase Order/Contract No.	
5. Energy Northwest Cognizant Engineer Mohammed Abu-Shehadeh Mohammed Abu-Shehadeh 5/6/04	14. Receipt Acknowledged	
6. Originator Remarks Please make a copy for Mohammed		

7. ITEM NO.	8. DOCUMENT OR DRAWING NO.	6. SHEET NO.	6. REV. NO.	10. DOCUMENT TITLE OR ITEM SUBMITTED	Submitted For: 11. APPROVE	12. RELEASE	13. INFO	15. OFFICIAL DISPOS.
1	NE-02-03-16	305	0	Calculation of EAB and LPZ X/Q values using PAVAN with the 1996 – 1999 meteorological data	X			A

TO BE COMPLETED BY ENERGY NORTHWEST

16. Energy Northwest Disposition

Engineering Manager Robin L. Feuerbacher 5/30/04 Plant Technical Services Manager (if required)

6. Engr. Req. Response Date

ACTION PARTIES	19. REQ APPROVE	19. REQ REVIEW	20. RESPONSE APPROVE	20. RESPONSE APPROVED AS NOTED	20. RESPONSE DISAPPROVE	SIGNATURE AND DATE	ACTION PARTIES	19. REQ APPROVE	19. REQ REVIEW	20. RESPONSE APPROVE	20. RESPONSE APPROVED AS NOTED	20. RESPONSE DISAPPROVE	SIGNATURE AND DATE
5. Cognizant Engineer Mohammed Abu-Shehadeh	X		X			5/6/04 Mohammed	18. Design ALARA						
17. Component/System Anal.							18. Penetrations						
17. Mechanical Engineering							18. ASME Code Compliance						
17. Electrical/I&C Engineering							18. Control Sys. Failure						
18. Overall Design Verif. Ted Messler	X	X	X			T.A. Messler 5-7-04	18. Pipe Break.Missile						
18. Equip. Engineering							18. App. R/Electrical Sep.						
18. Human Factors							18. ~~HVAC/Safety/Fire Prot~~ Larry Link SUPV.	x		x			[illegible] 22 may 04
18. Emergency Prep.							~~18. Security~~ Tim Powell Approve to file in records	x	x	x			JPP 5/18/04
18. Environmental							18. Quality Assurance						
18. MEL Input Coord.							18. Project Engineer Abbas Mostala	X		X			A. Mostala 5/30/04

968-12310 R7 (12/00)

ENERGY NORTHWEST
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DMS REFERENCE DOCUMENT INDEX SHEET

EC Number
PDC 2406

Primary Document Identification	Document Type	Document Sub-Type	Document Number	Sheet Number	Document Revision
	AED	CAL	NE-02-03-16		1

Input References

	ADD	DELETE	Type	Subtype	Doc Number	Sheet No
1	☒	☐	AED	STL	S737	
2	☒	☐	AED	ARC	A504	
3	☒	☐	CVI	CAL	981-00,121	1
4	☐	☐				
5	☐	☐				
6	☐	☐				
7	☐	☐				
8	☐	☐				
9	☐	☐				
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16	☐	☐				
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18	☐	☐				
19	☐	☐				
20	☐	☐				

Note:

Output References

	ADD	DELETE	Type	Subtype	Doc Number	Sheet No
1	☒	☐	AED	CAL	NE-02-04-01	
2	☐	☐				
3	☐	☐				
4	☐	☐				
5	☐	☐				
6	☐	☐				
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18	☐	☐				
19	☐	☐				
20	☐	☐				

Note:

ENERGY NORTHWEST
People·Vision·Solutions

CALCULATION COVER SHEET

BDC/PDC Page
PDC 2406

Equipment Piece No.	Project: Columbia	Page: 1.0 / Cont'd on Page
	Discipline: Nuclear	Calculation No.: NE-02-03-16
		Quality Class: I
	Remarks	

TITLE/SUBJECT/PURPOSE

Title/Subject
Calculation of the EAB and LPZ X/Q values using PAVAN with the 1996 - 1999 meteorological data

Purpose
The purpose of this calculation is to determine the X/Q values for the Exclusion Area Boundary (EAB) and Low Population Zone (LPZ) using PAVAN in compliance with the regulatory guide 1.145.

CALCULATION REVISION RECORD

REV NO.	STATUS/ F,P, OR S	REVISION DESCRIPTION	INITIATING DOCUMENTS	TRANSMITTAL NO.
0	F	New Calculation	PDC 2406	

PERFORMANCE/VERIFICATION RECORD

REV NO.	PERFORMED BY/DATE	VERIFIED BY/DATE	APPROVED BY/DATE
0	Mohammed Abu-Shehadeh Mohammed Abu-Shehadeh 5/6/04	Ted Messier Theodore A Messier 5-7-04	Larry Linik [signature] 28 May 04

• Study Calculations shall be used only for the purpose of evaluating alternate design options or assisting the engineer in performing assessments.

18645 R5

ENERGY NORTHWEST	CALCULATION INDEX	Page No. 1.1
Prepared by/Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Calculation No. NE-02-03-16 Revision No. 0

ITEM	PAGE NO. SEQUENCE
Calculation Cover Sheet	1.0
Calculation Index	1.1
Verification Checklist for Calculations and CMRs	1.2
Comment Resolution	1.3
Calculation Reference List	1.4
Calculation Output Interface Document Revision Index	1.5
Calculation Output Summary	2.0
Calculation Method	3.0
Sketches	4.0 / NA
Calculations	5.0 – 5.1

APPENDICES:	
Meteorological data from 1996-1999	Appendix A (pages A.0 - A.12)
PAVAN output with X/Q values for the EAB and LPZ	Appendix B (pages B.0 - B.283)
	Appendix C
	Appendix D
	Appendix E
	Appendix F
	Appendix G
Historical/Information	Appendix H
Superseded Pages	Appendix S

ENERGY NORTHWEST People·Vision·Solutions	VERIFICATION CHECKLIST	Page No. 1.2	Cont'd on page

Calculation/CMR NE-02-03-16
was verified using the following methods: **Revision** 0

☒ Checklist Below ☐ Alternate Calculation(s)

Checklist Item	**Verifier Initials**
Clear statement of purpose of analysis	Jam
Methodology is clearly stated, sufficiently detailed, and appropriate for the proposed application	Jam
Does the analysis/calculation methodology (including criteria and assumptions) differ from that described in the Plant or ISFSI FSAR or NRC Safety Evaluation Report, or are the results of the analysis/calculation as described in the Plant or ISFSI FSAR or NRC Safety Evaluation Report affected? ☒ Yes ☐ No	LBW
If Yes, ensure that the requirements of 10 CFR 50.59 and/or 10 CFR 72.48 have been processed in accordance with SWP-LIC-02.	LBW
Does the analysis/calculation result require revising any existing output interface document as identified in DES-4-1, Attachment 7.3? ☒ Yes ☐ No	Jam LBW
If Yes, ensure that the appropriate actions are taken to revise the output interface documents per DES-4-1, section 3.1.8 (i.e., document change is initiated in accordance with applicable procedures).	Jam LBW
Logical consistency of analysis	Jam
• Completeness of documenting references	Jam
• Completeness of input	Jam
• Accuracy of input data	Jam
• Consistency of input data with approved criteria	Jam
• Completeness in stating assumptions	Jam
• Validity of assumptions	Jam
• Calculation sufficiently detailed	Jam
• Arithmetical accuracy	Jam
• Physical units specified and correctly used	Jam
• Reasonableness of output conclusion	Jam
Supervisor independency check (if acting as Verifier)	
- Did not specify analysis approach	
- Did not rule out specific analysis options	
- Did not establish analysis inputs	
If a computer program was used:	Jam
- Is the program appropriate for the proposed application?	
- Have the program error notices been reviewed to determine if they pose any limitations for this application?	
- Is the program name, revision number, and date of run inscribed on the output?	
- Is the program identified on the Calculation Method Form? If so, is it listed in Chapter 10 of the Engineering Standards Manual?	Jam
Other elements considered:	

If separate Verifiers were used for validating these functions or a portion of these functions, each sign and initial below.

Based on the foregoing, the Calculation/CMR is adequate for the purpose intended.

Verifier Signature(s)/Date		Verifier Initials
Theodore A. Messier	5-7-04	Jam
[signature]	5-28-04	LBW

ENERGY NORTHWEST People · Vision · Solutions	CALCULATION REFERENCE LIST	Page No. 1.3	Cont'd on page
		Calculation No. NE-02-03-16	
:		Revision No. 0	

NO	AUTHOR	ISSUE DATE/ EDITION OR REV.	TITLE	DOCUMENT NO.
1	NRC	February 1983 Rev. 1	Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants	Reg. Guide 1.145
2	T. J. Bander for NRC	November 1982	PAVAN: An Atmospheric Dispersion Program for Evaluating Design Basis Accidental Releases of Radioactive Materials from Nuclear Power Stations	NUREG/CR-2858 PNL-4413
3	CGS FSAR	November 1998	Final Safety Analysis Report	NA
4	Burns & Roe	5/6/1983 Rev. 5	West Elevation (Reactor Building)	DWG. A504
5	Burns and Roe, Inc	5/26/1983 Rev.19	Structural Reactor Building Exterior Walls	DWG. S737
6	Framatome ANP, Inc. By: Ted Messier	12/19/2003 Rev. 1	Generation of CGS Meteorological Data Input Files for Computer Code PAVAN	32-5032044-01

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		Calculation No. NE-02-03-16	
Prepared by / Date: 5/6/04 Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier 5-7-04	Revision No. 0	

The below listed output interface calculations and/or documents are impacted by the current revision of the subject calculation. The listed output interfaces require revision as a result of this calculation. The documents have been revised, or the revision deferred with Manager approval, as indicated below.

AFFECTED DOCUMENT NO.	CHANGED BY (e.g., BDC, SCN, CMR, Rev.)	CHANGED DEFERRED (e.g., RFTS, LETTER NO.)	DEPT. MANAGER *
NE-02-99-13	PDC 2406	PTL – 213161	
NE-02-01-13	PDC 2406	PTL – 213161	
NE-02-01-15	PDC 2406	PTL - 213161	

* Required for deferred changes only.

REV BAR.

Discussion of Results

The X/Q values for the Exclusion Area Boundary (EAB) and Low Population Zone (LPZ) have been calculated using the PAVAN computer program which complies with the requirements of regulatory guide 1.145. Four years (1996-1999) worth of meteorological data have been used in the calculations. Two sets of dispersion coefficients (Pasquill/Gifford and Desert sigma) were activated in running PAVAN, then the highest X/Q values were selected to represent the EAB and LPZ X/Q. The desert sigma X/Q values were slightly higher than the Pasquill-Gifford ones, therefore, the desert sigma X/Q values were selected from the 0.5-percent model (which generated slightly higher results than the 5-percent overall site limit model).

Conclusions

The X/Q values generated by PAVAN are listed in Table 1 and are compared to those values currently in the FSAR.

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Prepared by / Date: 5/6/04 Mohammed Abu-Shehadeh Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier T. A. Messier 5-7-04	Calculation No. NE-02-03-16 Revision No. 0	

REV BAR.

Analysis Method (Check appropriate boxes)

☐ Manual (As required, document source of equations in Reference List)

☒ Computer ☐ Main Frame ☒ Personal

☐ In-House Program
☐ Computer Service Bureau Program

☐ BCS ☐ CDC ☐ PCC ☐ OTHER ________

☒ Verified Program: Code name/Revision PAVAN 2.0

☐ Unverified Program: ________

Approach/Methodology

In order to calculate X/Q for the exclusion area boundary (EAB) and low population zone (LPZ) around CGS the PAVAN code was used to comply with regulatory guide 1.145. The following data were used:

1- Four hourly joint frequency data (JFD) files for the years 1996 - 1999 have been added up to generate a single hourly JFD file representing that period of time.

2- The calm wind category was distributed.

3- The option to use both desert sigma and Pasquill - Gifford sigma was activated in PAVAN, then the highest X/Q values were selected.

REV BAR.

Purpose

To calculate X/Q for the exclusion area boundary (EAB) and low population zone (LPZ) around CGS using the PAVAN code to comply with regulatory guide 1.145.

Methodology

Regulatory guide 1.145 (Ref. 1) recommends the use of two methods for calculating EAB and LPZ X/Q values. The highest X/Q value among the two methods should be selected (these methods are briefly discussed below). PAVAN (Ref. 2) is a computer program designed to comply with the requirements of regulatory guide 1.145 and has been used in this analysis.

Input Data

The following data were used as input to PAVAN.

1- Since CGS is not releasing from a stack that is 2 1/2 times higher than adjacent buildings, the ground level release mode was used.

2- Distance to EAB is 1950 m (Ref. 3, section 2.1.2)

3- Distance to LPZ is 4827 m (Ref. 3, section 2.1.3.4)

4- Reactor building height is 229 ft, or 69.8 m (Ref. 4, A504)

5- Reactor building cross-sectional area is 2861 m2. The smallest width of the wall is 135 ft (41 m), Ref. 5. Therefore, the area is (Height x Width = Area, 69.8 x 41 = 2861 m^2).

6- Four hourly joint frequency data (JFD) files (Ref. 6) for the years 1996 - 1999 have been added up (using an excel spreadsheet) to generate a single hourly JFD file representing that period of time. Eleven wind-speed categories were used in those JFDs (see Appendix A).

7- The calm wind category was distributed separately from the other 11 wind speed categories. The annual hourly calm distributions as well as the total 4-year hourly calm distribution are presented in Appendix A.

8- The option to use both desert sigma and Pasquill - Gifford sigma was activated in PAVAN, then the highest X/Q was selected.

9- The default terrain adjustment factor was used

Results

PAVAN uses three procedures to calculate X/Q for the EAB and LPZ (see Ref. 2 for details). These are:

a- The 0.5-percent procedure

b- The SRP 2.3.4 procedure, and

c- The 5-percent site limit procedure.

Regulatory guide 1.145 requires the use of only two procedures (a and c), therefore the SRP results were ignored in selecting the appropriate X/Q values. The other two procedures were compared and the highest X/Q values were selected for the EAB and LPZ. X/Q values from the 0.5-percent procedure were slightly higher than those from the 5-percent site-limit procedure, therefore the 0.5-percent X/Q values were selected.

Table 1 summarizes the results of X/Q values obtained from the PAVAN output (see Appendix B, pp B.75 and B.143), and provides a comparison to the X/Q values currently in the CGS FSAR (Ref. 3, Table 15.6-2).

Table 1. X/Q (s/m^3) values using PAVAN for the EAB and LPZ
with comparison to the FSAR values

	Current Analysis		FSAR (Table 15.6-2)	
	EAB	LPZ	EAB	LPZ
0 - 2 hrs	1.81E-4	-	2.62 E-4	-
0 - 8 hrs	-	4.95 E-5	-	4.47 E-5
8 - 24 hrs	-	3.69 E-5	-	2.91 E-5
1 - 4 d	-	1.95 E-5	-	1.14 E-5
4 - 30 d	-	7.81 E-6	-	2.97 E-6

APPENDIX A

Meteorological data from 1996-1999

Annual and Total Hourly Calm Distributions for 1996 – 1999

St. Class / Year	A	B	C	D	E	F	G
1996	21	4	8	35	45	60	81
1997	24	11	8	36	40	60	75
1998	40	12	7	25	56	65	100
1999	25	2	5	19	51	55	75
Total	110	29	28	115	192	240	331

1996 JFD

Stab. Class	(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
A	0.95 - 2.25	7	2	2	3	2	5	6	2	8	5	5	6	1	4	4	8
	2.25- 4.55	14	8	4	2	2	5	4	6	20	10	3	5	2	6	10	15
	4.55 - 6.75	7	6	3	0	2	2	4	15	18	7	9	6	0	5	5	7
	6.75 - 8.95	1	5	0	0	0	2	6	10	9	10	6	3	1	1	2	1
	8.95 - 11.25	2	3	1	0	0	1	3	3	10	9	0	0	1	0	0	1
	11.25 - 13.45	0	1	0	0	0	0	0	2	7	5	3	1	1	0	0	0
	13.45 - 17.95	3	1	0	0	0	0	0	0	1	4	1	0	0	0	0	0
	17.95 - 22.45	0	0	0	0	0	0	0	0	0	1	3	1	0	0	1	0
	22.45 - 29.15	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B	0.95 - 2.25	1	1	0	1	2	0	0	0	0	1	0	0	1	1	3	2
	2.25- 4.55	4	2	3	1	1	1	1	0	3	1	1	3	3	1	3	2
	4.55 - 6.75	4	4	1	0	2	1	5	5	4	2	4	1	2	3	1	3
	6.75 - 8.95	5	4	2	0	0	1	3	1	3	5	3	0	1	3	5	2
	8.95 - 11.25	0	0	0	0	0	0	0	1	3	4	1	1	2	1	1	0
	11.25 - 13.45	0	1	0	0	0	0	0	0	3	1	1	0	3	1	1	1
	13.45 - 17.95	1	0	0	0	0	0	0	0	1	10	2	0	1	0	1	2
	17.95 - 22.45	0	0	0	0	0	0	0	0	0	1	2	2	0	0	0	0
	22.45 - 29.15	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	0.95 - 2.25	1	3	1	1	0	0	0	0	0	1	1	0	0	0	2	2
	2.25- 4.55	5	4	3	0	0	1	0	2	5	2	1	2	1	1	1	4
	4.55 - 6.75	6	1	1	0	0	0	5	7	2	3	2	2	2	0	1	5
	6.75 - 8.95	5	2	2	0	0	0	4	8	6	4	2	0	1	0	0	4
	8.95 - 11.25	2	1	1	0	0	0	1	0	4	1	1	2	1	1	2	3
	11.25 - 13.45	1	1	2	0	0	0	0	3	7	5	3	1	3	1	1	0
	13.45 - 17.95	0	0	0	0	0	0	0	0	3	9	5	5	4	0	0	4
	17.95 - 22.45	0	2	0	0	0	0	0	0	0	2	3	4	1	1	0	0
	22.45 - 29.15	0	0	0	0	0	0	0	0	0	3	1	1	0	0	0	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D	0.95 - 2.25	15	7	6	5	3	4	6	11	8	5	13	2	10	13	6	14
	2.25- 4.55	22	18	8	4	1	9	18	29	25	28	12	12	9	19	48	39
	4.55 - 6.75	32	17	13	2	2	6	14	46	23	22	12	13	9	14	54	48
	6.75 - 8.95	19	8	12	1	1	4	11	39	33	13	14	10	7	16	53	31
	8.95 - 11.25	16	5	13	1	0	0	12	24	21	29	11	1	9	12	37	26
	11.25 - 13.45	10	7	3	0	0	0	4	12	20	15	8	7	9	21	26	13
	13.45 - 17.95	0	2	0	0	0	0	0	5	17	23	16	18	8	28	23	18
	17.95 - 22.45	0	4	0	0	0	0	0	0	3	8	10	16	7	6	10	0
	22.45 - 29.15	0	0	2	0	0	0	0	0	2	12	3	0	0	1	7	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

1996 JFD (Cont.)

E	0.95 - 2.25	13	7	3	4	7	1	9	6	18	12	13	13	17	30	30	11
	2.25- 4.55	22	21	9	7	5	12	19	32	37	38	19	23	24	45	68	51
	4.55 - 6.75	20	14	14	5	8	7	29	46	46	20	22	17	20	36	96	46
	6.75 - 8.95	8	7	18	4	1	3	28	47	38	12	11	12	20	35	56	47
	8.95 - 11.25	6	2	4	2	0	1	27	39	43	20	15	11	14	42	52	9
	11.25 - 13.45	2	1	0	1	0	0	10	14	30	22	11	8	10	30	33	4
	13.45 - 17.95	3	5	0	1	1	0	0	18	24	41	13	12	7	55	45	14
	17.95 - 22.45	1	6	0	0	0	0	0	1	3	28	14	3	3	27	16	3
	22.45 - 29.15	0	0	0	0	0	0	0	0	0	7	0	1	0	4	7	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	0.95 - 2.25	28	17	10	4	5	2	5	7	20	17	11	24	25	29	29	26
	2.25- 4.55	34	33	13	5	3	6	18	37	48	36	26	22	27	44	66	64
	4.55 - 6.75	22	15	10	0	0	1	15	41	67	32	15	19	22	27	47	44
	6.75 - 8.95	6	3	5	3	0	1	19	48	41	24	9	8	20	38	36	10
	8.95 - 11.25	0	0	0	0	0	1	10	34	24	13	5	3	2	22	17	0
	11.25 - 13.45	0	0	0	0	0	0	0	8	16	6	4	0	3	10	3	1
	13.45 - 17.95	0	0	0	0	0	0	1	3	10	10	4	4	0	3	0	0
	17.95 - 22.45	0	0	0	0	0	0	0	1	0	6	0	0	0	0	0	0
	22.45 - 29.15	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	0.95 - 2.25	33	19	6	7	0	1	5	12	16	9	18	11	26	16	29	37
	2.25- 4.55	94	78	24	7	1	1	8	42	39	32	18	6	12	23	68	61
	4.55 - 6.75	30	28	20	3	0	0	10	46	41	16	5	5	4	17	36	29
	6.75 - 8.95	0	2	5	1	0	0	3	28	19	5	2	2	4	5	19	3
	8.95 - 11.25	0	0	1	0	0	0	1	12	6	1	0	1	1	1	3	0
	11.25 - 13.45	0	0	0	0	0	0	0	3	1	1	0	0	0	0	1	0
	13.45 - 17.95	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
	17.95 - 22.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22.45 - 29.15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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1997 JFD

Stab. Class	(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
A	0.95 - 2.25	8	7	9	8	9	7	8	7	10	5	2	6	5	5	4	6
	2.25- 4.55	16	18	14	12	10	3	20	20	10	15	10	3	6	11	5	24
	4.55 - 6.75	10	9	15	9	2	5	8	16	9	12	7	6	2	2	8	9
	6.75 - 8.95	2	3	7	2	2	2	11	10	10	11	7	2	4	1	5	4
	8.95 - 11.25	2	2	6	0	0	0	3	1	6	13	9	4	1	1	1	10
	11.25 - 13.45	2	1	2	1	0	0	1	0	2	6	4	0	1	1	1	1
	13.45 - 17.95	4	3	6	0	0	0	0	0	4	3	10	2	2	3	1	8
	17.95 - 22.45	0	0	2	0	0	0	0	0	0	2	3	1	0	0	0	0
	22.45 - 29.15	0	0	0	0	0	0	0	0	0	0	1	0	2	4	0	1
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B	0.95 - 2.25	0	4	1	2	3	2	4	2	2	1	2	0	1	2	1	1
	2.25- 4.55	5	7	3	1	1	5	4	2	5	5	3	3	1	4	2	7
	4.55 - 6.75	5	3	7	1	0	1	2	5	10	6	2	3	1	1	1	6
	6.75 - 8.95	2	8	6	1	1	1	0	7	6	2	2	4	3	2	2	0
	8.95 - 11.25	2	4	3	1	0	0	0	1	6	5	5	1	1	1	3	3
	11.25 - 13.45	2	0	1	1	0	0	0	1	2	2	1	0	3	2	2	0
	13.45 - 17.95	0	1	1	1	0	0	0	1	4	0	6	1	4	2	0	1
	17.95 - 22.45	1	0	0	0	0	0	0	0	0	5	1	2	0	1	0	0
	22.45 - 29.15	0	0	0	0	0	0	0	0	0	1	2	0	2	2	0	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	0.95 - 2.25	1	2	1	0	1	1	1	1	2	1	4	2	1	1	0	0
	2.25- 4.55	9	5	2	1	4	0	5	4	3	7	5	4	2	1	2	4
	4.55 - 6.75	8	3	3	6	3	0	1	8	9	4	4	3	1	3	4	7
	6.75 - 8.95	8	6	1	0	1	0	0	2	5	3	4	2	7	0	1	3
	8.95 - 11.25	5	3	4	0	0	0	2	4	1	4	4	5	1	2	0	0
	11.25 - 13.45	2	1	1	0	0	0	0	0	3	3	2	1	4	3	2	6
	13.45 - 17.95	1	2	2	0	0	0	1	2	0	2	6	3	4	0	3	2
	17.95 - 22.45	0	0	0	0	0	0	0	0	0	1	6	5	1	5	0	1
	22.45 - 29.15	0	0	0	0	0	0	0	0	0	2	0	0	1	1	0	1
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D	0.95 - 2.25	9	11	9	4	3	4	7	5	5	7	6	6	4	5	6	10
	2.25- 4.55	27	26	22	12	19	7	12	30	32	17	6	9	10	8	34	31
	4.55 - 6.75	43	27	17	15	8	12	14	26	32	20	18	9	8	16	36	48
	6.75 - 8.95	20	28	17	8	6	10	15	39	30	20	20	5	9	20	24	47
	8.95 - 11.25	15	13	13	5	2	2	4	16	31	22	15	8	10	10	19	26
	11.25 - 13.45	14	4	6	0	0	0	1	4	8	18	11	6	11	9	14	16
	13.45 - 17.95	4	2	3	2	0	0	0	7	11	19	18	19	14	30	12	20
	17.95 - 22.45	0	2	3	0	0	0	0	0	1	16	20	13	6	10	6	15
	22.45 - 29.15	1	1	2	0	0	0	0	0	0	15	13	6	4	2	4	3
	29.15 - 40.35	0	0	2	0	0	0	0	0	0	0	1	0	2	0	1	3
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

1997 JFD (Cont.)

E	0.95 - 2.25	11	10	6	8	4	4	6	7	18	16	13	10	16	10	11	21
	2.25- 4.55	36	26	28	14	5	6	18	27	53	31	28	19	29	34	49	64
	4.55 - 6.75	34	32	15	13	7	1	14	36	35	30	13	12	9	35	56	53
	6.75 - 8.95	23	16	7	2	3	4	10	47	40	18	22	9	13	22	48	46
	8.95 - 11.25	11	4	5	2	0	5	11	35	39	25	18	4	9	22	37	40
	11.25 - 13.45	3	2	2	4	0	1	7	24	18	28	15	9	4	12	38	27
	13.45 - 17.95	2	2	3	0	0	0	6	18	21	41	24	10	11	16	33	36
	17.95 - 22.45	1	0	0	0	0	0	0	1	7	37	14	6	5	7	8	16
	22.45 - 29.15	1	0	1	0	0	0	0	0	3	13	4	2	3	4	2	4
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	0.95 - 2.25	15	15	11	6	6	5	3	13	17	12	15	15	16	13	11	14
	2.25- 4.55	52	53	30	17	5	3	7	32	49	39	35	22	22	35	49	35
	4.55 - 6.75	36	21	13	12	8	1	5	36	64	40	19	19	7	20	35	43
	6.75 - 8.95	4	3	8	6	2	0	8	43	51	28	10	4	5	16	42	28
	8.95 - 11.25	1	0	0	3	0	0	2	36	23	9	4	5	7	7	14	12
	11.25 - 13.45	1	0	0	0	0	0	2	11	8	21	2	4	2	6	14	2
	13.45 - 17.95	0	0	0	0	0	0	2	10	7	9	3	1	2	5	1	0
	17.95 - 22.45	0	0	0	0	0	0	0	1	3	8	1	0	0	0	0	0
	22.45 - 29.15	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	0.95 - 2.25	18	27	13	8	6	9	4	14	17	10	16	15	12	16	11	15
	2.25- 4.55	65	61	36	15	3	1	5	13	33	26	23	15	13	23	29	54
	4.55 - 6.75	29	17	16	10	1	0	0	12	43	15	11	5	4	8	24	28
	6.75 - 8.95	3	1	5	4	1	0	2	21	25	21	6	3	1	3	10	10
	8.95 - 11.25	0	0	1	2	0	0	0	10	11	5	0	1	3	0	0	1
	11.25 - 13.45	0	0	0	1	0	0	0	5	6	3	0	1	0	0	1	0
	13.45 - 17.95	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0
	17.95 - 22.45	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
	22.45 - 29.15	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Stab. Class	(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
A	0.95 - 2.25	9	16	9	7	9	6	8	6	5	7	1	2	6	9	6	7
	2.25- 4.55	18	13	24	13	9	17	39	21	26	12	13	2	9	3	20	20
	4.55 - 6.75	18	17	13	2	4	16	17	31	22	9	3	4	4	4	2	11
	6.75 - 8.95	16	15	6	4	2	3	16	37	24	8	9	1	2	1	1	1
	8.95 - 11.25	11	15	2	2	3	2	6	19	30	11	5	0	1	0	1	2
	11.25 - 13.45	5	7	2	0	0	1	3	8	23	6	2	0	0	0	0	3
	13.45 - 17.95	6	13	3	0	0	0	0	3	35	12	5	0	0	2	1	0
	17.95 - 22.45	1	1	0	0	0	0	0	2	13	1	0	0	0	1	2	0
	22.45 - 29.15	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B	0.95 - 2.25	2	1	0	0	0	3	1	2	3	2	1	2	1	0	1	7
	2.25- 4.55	6	3	2	1	2	2	1	3	6	9	6	2	4	2	3	6
	4.55 - 6.75	13	11	4	3	1	1	4	9	12	0	2	1	0	0	2	8
	6.75 - 8.95	7	4	1	1	0	2	5	11	12	3	0	0	0	2	1	3
	8.95 - 11.25	4	4	4	0	0	1	1	4	11	3	2	0	1	1	0	2
	11.25 - 13.45	0	1	0	0	0	0	0	0	6	6	2	0	0	1	0	0
	13.45 - 17.95	2	1	1	2	0	0	0	0	5	2	4	1	1	0	1	0
	17.95 - 22.45	0	0	0	0	0	0	0	0	2	0	2	0	0	1	0	0
	22.45 - 29.15	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	0.95 - 2.25	2	4	2	2	1	0	1	1	3	3	1	1	0	0	0	2
	2.25- 4.55	5	8	1	2	2	2	2	6	4	5	1	6	1	1	2	6
	4.55 - 6.75	5	7	4	3	3	1	4	8	10	5	2	0	3	3	3	4
	6.75 - 8.95	3	6	0	1	1	3	2	10	13	4	2	1	0	0	2	4
	8.95 - 11.25	4	4	0	0	0	1	2	8	6	8	5	2	2	1	2	6
	11.25 - 13.45	1	1	0	0	0	0	1	4	4	6	0	0	0	3	0	0
	13.45 - 17.95	2	0	0	0	0	0	0	0	6	3	6	0	0	1	0	2
	17.95 - 22.45	0	0	0	0	0	0	0	0	1	1	0	1	2	0	3	0
	22.45 - 29.15	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D	0.95 - 2.25	13	11	8	9	4	0	9	5	12	2	10	9	6	12	9	8
	2.25- 4.55	32	12	13	8	8	9	17	23	26	16	11	5	10	13	32	33
	4.55 - 6.75	35	16	13	3	5	5	20	32	30	14	12	9	7	8	28	35
	6.75 - 8.95	15	12	7	7	6	3	25	26	43	22	4	2	7	11	33	33
	8.95 - 11.25	19	4	7	0	1	2	13	29	29	22	3	3	8	10	27	24
	11.25 - 13.45	8	4	6	0	0	1	4	6	18	25	5	4	4	10	20	14
	13.45 - 17.95	3	6	0	0	0	0	2	6	26	39	12	5	3	11	13	7
	17.95 - 22.45	1	2	3	0	0	0	0	0	6	26	13	5	1	6	5	0
	22.45 - 29.15	0	0	0	0	0	0	0	0	0	5	14	5	0	4	4	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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E	0.95 - 2.25	15	10	7	7	4	6	5	9	13	15	15	17	16	27	21	10
	2.25- 4.55	32	33	18	5	3	8	15	21	35	30	14	22	16	35	47	43
	4.55 - 6.75	24	16	11	2	2	6	22	52	47	22	20	16	21	25	46	52
	6.75 - 8.95	7	3	10	1	0	1	29	69	44	18	20	7	15	39	54	28
	8.95 - 11.25	3	1	3	0	0	2	13	48	49	18	5	10	7	34	38	17
	11.25 - 13.45	5	0	0	0	0	0	3	33	49	22	25	4	8	48	35	1
	13.45 - 17.95	3	6	3	0	0	0	4	18	46	47	29	8	8	29	17	7
	17.95 - 22.45	1	7	7	0	0	0	0	0	8	28	30	2	3	12	3	1
	22.45 - 29.15	0	0	0	0	0	0	0	0	3	15	16	1	3	7	1	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	2	4	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	0.95 - 2.25	17	17	11	3	2	5	6	11	14	15	20	17	18	27	29	27
	2.25- 4.55	47	33	20	8	2	7	10	38	53	45	17	25	25	34	66	67
	4.55 - 6.75	22	15	14	3	0	3	11	57	66	30	19	13	13	24	38	50
	6.75 - 8.95	1	1	7	1	0	0	22	51	74	21	9	4	5	15	38	13
	8.95 - 11.25	0	0	1	0	0	1	2	25	27	9	2	1	5	10	15	6
	11.25 - 13.45	0	0	0	0	0	0	2	5	4	4	3	0	2	9	3	1
	13.45 - 17.95	0	0	0	0	0	0	1	4	11	1	2	0	0	2	0	4
	17.95 - 22.45	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0
	22.45 - 29.15	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	0.95 - 2.25	29	35	29	9	4	3	7	11	15	17	18	21	13	21	20	40
	2.25- 4.55	52	58	31	4	0	2	15	29	39	36	17	10	18	26	58	67
	4.55 - 6.75	16	7	17	1	0	0	7	56	49	15	6	5	1	4	28	38
	6.75 - 8.95	5	2	5	1	0	0	2	24	36	7	3	0	2	0	19	16
	8.95 - 11.25	0	0	1	0	0	0	0	7	8	2	0	1	0	1	2	0
	11.25 - 13.45	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	13.45 - 17.95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	17.95 - 22.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22.45 - 29.15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Stab.	(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
A	0.95 - 2.25	8	14	10	5	7	7	6	1	4	2	6	4	3	4	11	6
	2.25- 4.55	25	21	9	9	9	14	15	10	15	12	5	10	13	11	14	26
	4.55 - 6.75	25	14	10	0	2	7	21	16	17	6	4	1	3	6	12	27
	6.75 - 8.95	34	14	6	1	1	2	11	26	14	5	2	6	4	2	11	21
	8.95 - 11.25	21	8	2	0	1	1	10	13	16	4	9	4	5	5	2	18
	11.25 - 13.45	9	0	1	0	0	0	2	5	25	8	2	3	3	5	4	13
	13.45 - 17.95	12	1	1	0	0	0	1	4	22	10	5	11	7	6	4	3
	17.95 - 22.45	0	0	0	0	0	0	0	0	7	1	5	6	7	5	1	0
	22.45 - 29.15	0	0	0	0	0	0	0	1	7	0	0	3	1	3	1	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B	0.95 - 2.25	4	2	0	2	2	0	1	2	0	1	0	1	1	0	3	2
	2.25- 4.55	5	1	3	1	2	3	6	3	8	3	6	1	1	1	4	5
	4.55 - 6.75	5	0	3	0	0	2	9	5	4	0	2	0	2	3	5	5
	6.75 - 8.95	1	2	1	0	1	3	4	8	3	5	2	2	2	0	4	5
	8.95 - 11.25	5	2	1	0	0	1	2	10	9	3	2	2	2	3	1	3
	11.25 - 13.45	4	0	0	0	0	0	2	5	4	4	1	0	3	3	1	2
	13.45 - 17.95	1	0	0	0	0	0	3	3	11	7	4	0	4	3	0	1
	17.95 - 22.45	0	0	0	0	0	0	0	1	1	2	3	0	1	0	1	0
	22.45 - 29.15	0	0	0	0	0	0	0	0	0	2	4	0	1	1	0	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	0.95 - 2.25	2	1	4	2	1	3	3	0	1	2	1	0	2	2	1	2
	2.25- 4.55	5	2	5	1	0	0	1	3	2	4	2	2	3	6	11	3
	4.55 - 6.75	6	7	3	0	1	0	10	8	5	2	1	1	3	6	9	9
	6.75 - 8.95	1	1	0	0	0	1	5	4	5	3	6	4	0	3	4	5
	8.95 - 11.25	5	3	0	0	0	1	2	6	9	2	5	2	3	3	3	2
	11.25 - 13.45	3	0	0	0	0	0	0	4	6	4	2	3	0	0	1	1
	13.45 - 17.95	4	0	0	0	0	0	4	3	6	6	0	1	2	4	0	1
	17.95 - 22.45	0	0	0	0	0	0	0	0	5	6	4	4	0	3	4	0
	22.45 - 29.15	0	0	0	0	0	0	0	0	2	1	2	0	0	3	0	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D	0.95 - 2.25	8	3	3	5	6	5	5	2	7	5	11	8	15	9	15	8
	2.25- 4.55	24	12	10	9	9	7	18	20	19	16	14	13	21	10	35	25
	4.55 - 6.75	23	13	11	5	8	6	13	23	22	11	11	16	5	26	30	13
	6.75 - 8.95	15	11	4	3	5	9	18	21	20	10	13	8	9	17	21	18
	8.95 - 11.25	11	10	1	0	2	3	13	27	22	16	16	5	13	15	15	8
	11.25 - 13.45	9	0	1	0	0	4	7	21	26	18	10	9	5	14	13	4
	13.45 - 17.95	3	2	1	0	0	1	2	20	52	36	18	7	9	34	3	4
	17.95 - 22.45	0	0	0	0	0	0	1	3	29	18	2	8	4	29	7	0
	22.45 - 29.15	0	0	0	0	0	0	0	0	11	6	2	0	1	11	1	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	2	3	2	0	0	2	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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E	0.95 - 2.25	6	8	7	7	7	5	10	13	13	10	14	12	13	23	18	13
	2.25- 4.55	27	12	8	4	9	5	26	50	30	25	28	33	29	27	42	56
	4.55 - 6.75	19	17	14	7	2	6	26	38	25	19	17	24	31	56	43	20
	6.75 - 8.95	13	7	11	1	1	17	43	49	31	14	10	17	38	48	35	10
	8.95 - 11.25	5	3	3	5	0	4	27	44	44	16	14	9	13	63	27	8
	11.25 - 13.45	1	1	1	0	0	1	12	20	39	28	12	12	21	50	17	2
	13.45 - 17.95	0	0	0	0	0	0	12	17	43	35	5	8	15	51	17	0
	17.95 - 22.45	0	0	0	0	0	0	1	1	6	17	4	1	1	18	4	1
	22.45 - 29.15	0	0	0	0	0	0	0	0	2	7	6	2	0	5	0	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	2	4	1	0	0	1	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	0.95 - 2.25	26	14	11	5	5	4	9	9	13	3	10	10	16	12	27	16
	2.25- 4.55	35	22	7	0	4	8	31	55	49	24	18	15	28	27	51	46
	4.55 - 6.75	17	14	3	1	0	5	24	57	35	21	12	7	10	30	42	30
	6.75 - 8.95	2	1	2	0	0	3	36	42	17	18	9	12	15	34	24	5
	8.95 - 11.25	1	1	2	0	0	0	21	36	20	7	5	7	18	15	5	5
	11.25 - 13.45	2	0	0	0	0	0	5	5	13	3	1	1	9	3	0	0
	13.45 - 17.95	0	0	0	0	0	0	0	4	5	7	1	0	0	4	1	0
	17.95 - 22.45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	22.45 - 29.15	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	0.95 - 2.25	25	22	15	4	9	7	9	13	7	8	10	10	11	13	27	32
	2.25- 4.55	61	52	15	3	2	2	16	29	18	12	17	7	11	25	56	70
	4.55 - 6.75	14	23	4	0	0	0	19	42	24	3	4	1	6	15	37	33
	6.75 - 8.95	0	3	4	0	0	0	2	24	19	2	4	1	6	6	22	3
	8.95 - 11.25	0	0	0	0	0	0	2	14	2	0	0	1	1	3	1	0
	11.25 - 13.45	0	0	0	0	0	0	0	2	1	2	0	0	0	0	0	0
	13.45 - 17.95	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	17.95 - 22.45	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	22.45 - 29.15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Stab.	(MPH)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WN	NW	NNW
A	0.95 - 2.25	32	39	30	23	27	25	28	16	27	19	14	18	15	22	25	27
	2.25- 4.55	73	60	51	36	30	39	78	57	71	49	31	20	30	31	49	85
	4.55 - 6.75	60	46	41	11	10	30	50	78	66	34	23	17	9	17	27	54
	6.75 - 8.95	53	37	19	7	5	9	44	83	57	34	24	12	11	5	19	27
	8.95 - 11.25	36	28	11	2	4	4	22	36	62	37	23	8	8	6	4	31
	11.25 - 13.45	16	9	5	1	0	1	6	15	57	25	11	4	5	6	5	17
	13.45 - 17.95	25	18	10	0	0	0	1	7	62	29	21	13	9	11	6	11
	17.95 - 22.45	1	1	2	0	0	0	0	2	20	5	11	8	7	6	4	0
	22.45 - 29.15	0	2	0	0	0	0	0	1	7	2	1	3	3	7	3	1
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B	0.95 - 2.25	7	8	1	5	7	5	6	6	5	5	3	3	4	3	8	12
	2.25- 4.55	20	13	11	4	6	11	12	8	22	18	16	9	9	8	12	20
	4.55 - 6.75	27	18	15	4	3	5	20	24	30	8	10	5	5	7	9	22
	6.75 - 8.95	15	18	10	2	2	7	12	27	24	15	7	6	6	7	12	10
	8.95 - 11.25	11	10	8	1	0	2	3	16	29	15	10	4	6	6	5	8
	11.25 - 13.45	6	2	1	1	0	0	2	6	15	13	5	0	9	7	4	3
	13.45 - 17.95	4	2	2	3	0	0	3	4	21	19	16	2	10	5	2	4
	17.95 - 22.45	1	0	0	0	0	0	0	1	3	8	8	4	1	2	1	0
	22.45 - 29.15	0	2	0	0	0	0	0	0	0	4	8	0	4	4	0	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	0.95 - 2.25	6	10	8	5	3	4	5	2	6	7	7	3	3	3	3	6
	2.25- 4.55	24	19	11	4	6	3	8	15	14	18	9	14	7	9	16	17
	4.55 - 6.75	25	18	11	9	7	1	20	31	26	14	9	6	9	12	17	25
	6.75 - 8.95	17	15	3	1	2	4	11	24	29	14	14	7	8	3	7	16
	8.95 - 11.25	16	11	5	0	0	2	7	18	20	15	15	11	7	7	7	11
	11.25 - 13.45	7	3	3	0	0	0	1	11	20	18	7	5	7	7	4	7
	13.45 - 17.95	7	2	2	0	0	0	5	5	15	20	17	9	10	5	3	9
	17.95 - 22.45	0	2	0	0	0	0	0	0	6	10	13	14	4	9	7	1
	22.45 - 29.15	0	0	0	0	0	0	0	0	2	6	3	1	1	8	0	1
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D	0.95 - 2.25	45	32	26	23	16	13	27	23	32	19	40	25	35	39	36	40
	2.25- 4.55	105	68	53	33	37	32	65	102	102	77	43	39	50	50	149	128
	4.55 - 6.75	133	73	54	25	23	29	61	127	107	67	53	47	29	64	148	144
	6.75 - 8.95	69	59	40	19	18	26	69	125	126	65	51	25	32	64	131	129
	8.95 - 11.25	61	32	34	6	5	7	42	96	103	89	45	17	40	47	98	84
	11.25 - 13.45	41	15	16	0	0	5	16	43	72	76	34	26	29	54	73	47
	13.45 - 17.95	10	12	4	2	0	1	4	38	106	117	64	49	34	103	51	49
	17.95 - 22.45	1	8	6	0	0	0	1	3	39	68	45	42	18	51	28	15
	22.45 - 29.15	1	1	4	0	0	0	0	0	13	38	32	11	5	18	16	3
	29.15 - 40.35	0	0	2	0	0	0	0	0	2	7	5	0	2	2	2	3
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Total 1996 - 1999 JFD (Cont.)

E	0.95 - 2.25	45	35	23	26	22	16	30	35	62	53	55	52	62	90	80	55
	2.25- 4.55	117	92	63	30	22	31	78	130	155	124	89	97	98	141	206	214
	4.55 - 6.75	97	79	54	27	19	20	91	172	153	91	72	69	81	152	241	171
	6.75 - 8.95	51	33	46	8	5	25	110	212	153	62	63	45	86	144	193	131
	8.95 - 11.25	25	10	15	9	0	12	78	166	175	79	52	34	43	161	154	74
	11.25 - 13.45	11	4	3	5	0	2	32	91	136	100	63	33	43	140	123	34
	13.45 - 17.95	8	13	6	1	1	0	22	71	134	164	71	38	41	151	112	57
	17.95 - 22.45	3	13	7	0	0	0	1	3	24	110	62	12	12	64	31	21
	22.45 - 29.15	1	0	1	0	0	0	0	0	8	42	26	6	6	20	10	4
	29.15 - 40.35	0	0	0	0	0	0	0	0	2	8	5	0	0	2	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
F	0.95 - 2.25	86	63	43	18	18	16	23	40	64	47	56	66	75	81	96	83
	2.25- 4.55	168	141	70	30	14	24	66	162	199	144	96	84	102	140	232	212
	4.55 - 6.75	97	65	40	16	8	10	55	191	232	123	65	58	52	101	162	167
	6.75 - 8.95	13	8	22	10	2	4	85	184	183	91	37	28	45	103	140	56
	8.95 - 11.25	2	1	3	3	0	2	35	131	94	38	16	16	32	54	51	23
	11.25 - 13.45	3	0	0	0	0	0	9	29	41	34	10	5	16	28	20	4
	13.45 - 17.95	0	0	0	0	0	0	4	21	33	27	10	5	2	14	2	4
	17.95 - 22.45	0	0	0	0	0	0	0	2	3	15	1	0	1	0	0	0
	22.45 - 29.15	0	0	0	0	0	0	0	0	2	3	2	1	0	0	0	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	0.95 - 2.25	105	103	63	28	19	20	25	50	55	44	62	57	62	66	87	124
	2.25- 4.55	272	249	106	29	6	6	44	113	129	106	75	38	54	97	211	252
	4.55 - 6.75	89	75	57	14	1	0	36	156	157	49	26	16	15	44	125	128
	6.75 - 8.95	8	8	19	6	1	0	9	97	99	35	15	6	13	14	70	32
	8.95 - 11.25	0	0	3	2	0	0	3	43	27	8	0	4	5	5	6	1
	11.25 - 13.45	0	0	0	1	0	0	0	10	9	6	0	1	0	0	2	0
	13.45 - 17.95	0	0	0	0	0	0	0	2	3	1	0	0	0	0	0	0
	17.95 - 22.45	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0
	22.45 - 29.15	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	29.15 - 40.35	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	> 40.35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

(1)Each entry in this combined file is the sum of the four corresponding entries from the 4 annual files (1996-1999). For example the number of hours in the combines file for the north direction, stability class A, and wind speed category 0.95-2.25 is 32 obtained follows:

Year	Hrs	
1996	7	Dir = N, ST =A, WSC = 0.95-2.25
1997	8	Dir = N, ST =A, WSC = 0.95-2.25
1998	9	Dir = N, ST =A, WSC = 0.95-2.25
1999	8	Dir = N, ST =A, WSC = 0.95-2.25
1996-1999	32	Dir = N, ST =A, WSC = 0.95-2.25

Mohammed Abu-Shehadeh

APPENDIX B

PAVAN output with X/Q values for the EAB and LPZ

ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-1	Cont'd on page B-2
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE:  11/19/2003     TIME:  23: 4:56
0PRINTOUT OF INPUT CARDS

    1      10010 01101 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000
    2        CGS                 JFD 1996-1999       GROUND LEVEL RELEASE
    3       10.0 METERS             10 - 75 METERS
    4       MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
    5       input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
    6          12 31640      0
    7            .500  2861.000     70.000     10.000     10.000
    8      110.000 29.000 28.000115.000192.000240.000331.000
    9       32.000 39.000 30.000 23.000 27.000 25.000 28.000 16.000 27.000 19.000 14.000 18.000 15.000 22.000 25.000 27.000
    9       73.000 60.000 51.000 36.000 30.000 39.000 78.000 57.000 71.000 49.000 31.000 20.000 30.000 31.000 49.000 85.000
    9       60.000 46.000 41.000 11.000 10.000 30.000 50.000 78.000 66.000 34.000 23.000 17.000  9.000 17.000 27.000 54.000
    9       53.000 37.000 19.000  7.000  5.000  9.000 44.000 83.000 57.000 34.000 24.000 12.000 11.000  5.000 19.000 27.000
    9       36.000 28.000 11.000  2.000  4.000  4.000 22.000 36.000 62.000 37.000 23.000  8.000  8.000  6.000  4.000 31.000
    9       16.000  9.000  5.000  1.000   .000  1.000  6.000 15.000 57.000 25.000 11.000  4.000  5.000  6.000  5.000 17.000
    9       25.000 18.000 10.000   .000   .000   .000  1.000  7.000 62.000 29.000 21.000 13.000  9.000 11.000  6.000 11.000
    9        1.000  1.000  2.000   .000   .000   .000   .000  2.000 20.000  5.000 11.000  8.000  7.000  6.000  4.000   .000
    9         .000  2.000   .000   .000   .000   .000   .000  1.000  7.000  2.000  1.000  3.000  3.000  7.000  3.000  1.000
    9         .000   .000   .000   .000   .000   .000   .000   .000   .000  1.000   .000   .000   .000   .000   .000  1.000
    9         .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000
    9        7.000  8.000  1.000  5.000  7.000  5.000  6.000  6.000  5.000  5.000  3.000  3.000  4.000  3.000  8.000 12.000
    9       20.000 13.000 11.000  4.000  6.000 11.000 12.000  8.000 22.000 18.000 16.000  9.000  9.000  8.000 12.000 20.000
    9       27.000 18.000 15.000  4.000  3.000  5.000 20.000 24.000 30.000  8.000 10.000  5.000  5.000  7.000  9.000 22.000
    9       15.000 18.000 10.000  2.000  2.000  7.000 12.000 27.000 24.000 15.000  7.000  6.000  6.000  7.000 12.000 10.000
    9       11.000 10.000  8.000  1.000   .000  2.000  3.000 16.000 29.000 15.000 10.000  4.000  6.000  6.000  5.000  8.000
    9        6.000  2.000  1.000  1.000   .000   .000  2.000  6.000 15.000 13.000  5.000   .000  9.000  7.000  4.000  3.000
    9        4.000  2.000  2.000  3.000   .000   .000  3.000  4.000 21.000 19.000 16.000  2.000 10.000  5.000  2.000  4.000
    9        1.000   .000   .000   .000   .000   .000   .000  1.000  3.000  8.000  8.000  4.000  1.000  2.000  1.000   .000
    9         .000  2.000   .000   .000   .000   .000   .000   .000   .000  4.000  8.000   .000  4.000  4.000   .000   .000
    9         .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000
    9         .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000
    9        6.000 10.000  8.000  5.000  3.000  4.000  5.000  2.000  6.000  7.000  7.000  3.000  3.000  3.000  3.000  6.000
    9       24.000 19.000 11.000  4.000  6.000  3.000  8.000 15.000 14.000 18.000  9.000 14.000  7.000  9.000 16.000 17.000
    9       25.000 18.000 11.000  9.000  7.000  1.000 20.000 31.000 26.000 14.000  9.000  6.000  9.000 12.000 17.000 25.000
    9       17.000 15.000  3.000  1.000  2.000  4.000 11.000 24.000 29.000 14.000 14.000  7.000  8.000  3.000  7.000 16.000
    9       16.000 11.000  5.000   .000   .000  2.000  7.000 18.000 20.000 15.000 15.000 11.000  7.000  7.000  7.000 11.000
    9        7.000  3.000  3.000   .000   .000   .000  1.000 11.000 20.000 18.000  7.000  5.000  7.000  7.000  4.000  7.000
    9        7.000  2.000  2.000   .000   .000   .000  5.000  5.000 15.000 20.000 17.000  9.000 10.000  5.000  3.000  9.000
    9         .000  2.000   .000   .000   .000   .000   .000   .000  6.000 10.000 13.000 14.000  4.000  9.000  7.000  1.000
    9         .000   .000   .000   .000   .000   .000   .000   .000  2.000  6.000  3.000  1.000  1.000  8.000   .000  1.000
    9         .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000
    9         .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000   .000
    9       45.000 32.000 26.000 23.000 16.000 13.000 27.000 23.000 32.000 19.000 40.000 25.000 35.000 39.000 36.000 40.000
    9      105.000 68.000 53.000 33.000 37.000 32.000 65.000102.000102.000 77.000 43.000 39.000 50.000 50.000149.000128.000
    9      133.000 73.000 54.000 25.000 23.000 29.000 61.000127.000107.000 67.000 53.000 47.000 29.000 64.000148.000144.000
    9       69.000 59.000 40.000 19.000 18.000 26.000 69.000125.000126.000 65.000 51.000 25.000 32.000 64.000131.000129.000
    9       61.000 32.000 34.000  6.000  5.000  7.000 42.000 96.000103.000 89.000 45.000 17.000 40.000 47.000 98.000 84.000
    9       41.000 15.000 16.000   .000   .000  5.000 16.000 43.000 72.000 76.000 34.000 26.000 29.000 54.000 73.000 47.000
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ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-2	Cont'd on page B-3
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

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 9     10.000 12.000  4.000  2.000   .000  1.000  4.000 38.000106.000117.000 64.000 49.000 34.000103.000 51.000 49.000
 9      1.000  8.000  6.000   .000   .000   .000  1.000  3.000 39.000 68.000 45.000 42.000 18.000 51.000 28.000 15.000
 9      1.000  1.000  4.000   .000   .000   .000   .000   .000 13.000 38.000 32.000 11.000  5.000 18.000 16.000  3.000
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 9    117.000 92.000 63.000 30.000 22.000 31.000 78.000130.000155.000124.000 89.000 97.000 98.000141.000206.000214.000
 9     97.000 79.000 54.000 27.000 19.000 20.000 91.000172.000153.000 91.000 72.000 69.000 81.000152.000241.000171.000
 9     51.000 33.000 46.000  8.000  5.000 25.000110.000212.000153.000 62.000 63.000 45.000 86.000144.000193.000131.000
 9     25.000 10.000 15.000  9.000   .000 12.000 78.000166.000175.000 79.000 52.000 34.000 43.000161.000154.000 74.000
 9     11.000  4.000  3.000  5.000   .000  2.000 32.000 91.000136.000100.000 63.000 33.000 43.000140.000123.000 34.000
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 9    272.000249.000106.000 29.000  6.000  6.000 44.000113.000129.000106.000 75.000 38.000 54.000 97.000211.000252.000
 9     89.000 75.000 57.000 14.000  1.000   .000 36.000156.000157.000 49.000 26.000 16.000 15.000 44.000125.000128.000
 9      8.000  8.000 19.000  6.000  1.000   .000  9.000 97.000 99.000 35.000 15.000  6.000 13.000 14.000 70.000 32.000
 9       .000   .000  3.000  2.000   .000   .000  3.000 43.000 27.000  8.000   .000  4.000  5.000  5.000  6.000  1.000
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 9       .000   .000   .000   .000   .000   .000   .000  2.000  3.000  1.000   .000   .000   .000   .000   .000   .000
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10       200.   .950  2.250  4.550  6.750  8.950 11.250 13.450 17.950 22.450 29.150 40.350100.000   .000   .000
11      1950.  1950.  1950.  1950.  1950.  1950.  1950.  1950.  1950.  1950.  1950.  1950.  1950.  1950.  1950.  1950.
11      4827.  4827.  4827.  4827.  4827.  4827.  4827.  4827.  4827.  4827.  4827.  4827.  4827.  4827.  4827.  4827.
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ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-3	Cont'd on page B-4
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0           RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:  CGS                                 METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                       WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE            DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
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0JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION — ATMOSPHERIC STABILITY CLASS A

WIND SPEED (M/S)

TOWER	RELEASE	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
.42	.42	.029	.035	.027	.021	.024	.022	.025	.014	.024	.017	.013	.016	.013	.020	.022	.024	.348
1.01	1.01	.101	.123	.095	.073	.085	.079	.088	.051	.085	.060	.044	.057	.047	.070	.079	.085	1.223
2.03	2.03	.231	.190	.161	.114	.095	.123	.247	.180	.224	.155	.098	.063	.095	.098	.155	.269	2.497
3.02	3.02	.190	.145	.130	.035	.032	.095	.158	.247	.209	.107	.073	.054	.028	.054	.085	.171	1.811
4.00	4.00	.168	.117	.060	.022	.016	.028	.139	.262	.180	.107	.076	.038	.035	.016	.060	.085	1.410
5.03	5.03	.114	.088	.035	.006	.013	.013	.070	.114	.196	.117	.073	.025	.025	.019	.013	.098	1.018
6.01	6.01	.051	.028	.016	.003	.000	.003	.019	.047	.180	.079	.035	.013	.016	.019	.016	.054	.578
8.02	8.02	.079	.057	.032	.000	.000	.000	.003	.022	.196	.092	.066	.041	.028	.035	.019	.035	.705
10.04	10.04	.003	.003	.006	.000	.000	.000	.000	.006	.063	.016	.035	.025	.022	.019	.013	.000	.212
13.03	13.03	.000	.006	.000	.000	.000	.000	.000	.003	.022	.006	.003	.009	.009	.022	.009	.003	.095
18.04	18.04	.000	.000	.000	.000	.000	.000	.000	.000	.000	.003	.000	.000	.000	.000	.000	.003	.006
44.70	44.70	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
TOTAL		.96	.79	.56	.27	.26	.36	.75	.95	1.38	.76	.52	.34	.32	.37	.47	.83	9.90

0JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION — ATMOSPHERIC STABILITY CLASS B

WIND SPEED (M/S)

TOWER	RELEASE	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
.42	.42	.007	.008	.001	.005	.007	.005	.006	.006	.005	.005	.003	.003	.004	.003	.008	.012	.092
1.01	1.01	.022	.025	.003	.016	.022	.016	.019	.019	.016	.016	.009	.009	.013	.009	.025	.038	.278
2.03	2.03	.063	.041	.035	.013	.019	.035	.038	.025	.070	.057	.051	.028	.028	.025	.038	.063	.629
3.02	3.02	.085	.057	.047	.013	.009	.016	.063	.076	.095	.025	.032	.016	.016	.022	.028	.070	.670
4.00	4.00	.047	.057	.032	.006	.006	.022	.038	.085	.076	.047	.022	.019	.019	.022	.038	.032	.569
5.03	5.03	.035	.032	.025	.003	.000	.006	.009	.051	.092	.047	.032	.013	.019	.019	.016	.025	.424
6.01	6.01	.019	.006	.003	.003	.000	.000	.006	.019	.047	.041	.016	.000	.028	.022	.013	.009	.234
8.02	8.02	.013	.006	.006	.009	.000	.000	.009	.013	.066	.060	.051	.006	.032	.016	.006	.013	.307
10.04	10.04	.003	.000	.000	.000	.000	.000	.000	.003	.009	.025	.025	.013	.003	.006	.003	.000	.092
13.03	13.03	.000	.006	.000	.000	.000	.000	.000	.000	.000	.013	.025	.000	.013	.013	.000	.000	.070
18.04	18.04	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
44.70	44.70	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
TOTAL		.29	.24	.15	.07	.06	.10	.19	.30	.48	.34	.27	.11	.17	.16	.18	.26	3.36

0JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION   ATMOSPHERIC STABILITY CLASS C

WIND SPEED (M/S)

TOWER	RELEASE	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
.42	.42	.007	.011	.009	.005	.003	.004	.005	.002	.007	.008	.008	.003	.003	.003	.003	.007	.088
1.01	1.01	.019	.032	.025	.016	.009	.013	.016	.006	.019	.022	.022	.009	.009	.009	.009	.019	.256
2.03	2.03	.076	.060	.035	.013	.019	.009	.025	.047	.044	.057	.028	.044	.022	.028	.051	.054	.613
3.02	3.02	.079	.057	.035	.028	.022	.003	.063	.098	.082	.044	.028	.019	.028	.038	.054	.079	.759
4.00	4.00	.054	.047	.009	.003	.006	.013	.035	.076	.092	.044	.044	.022	.025	.009	.022	.051	.553
5.03	5.03	.051	.035	.016	.000	.000	.006	.022	.057	.063	.047	.047	.035	.022	.022	.022	.035	.480
6.01	6.01	.022	.009	.009	.000	.000	.000	.003	.035	.063	.057	.022	.016	.022	.022	.013	.022	.316
8.02	8.02	.022	.006	.006	.000	.000	.000	.016	.016	.047	.063	.054	.028	.032	.016	.009	.028	.345
10.04	10.04	.000	.006	.000	.000	.000	.000	.000	.000	.019	.032	.041	.044	.013	.028	.022	.003	.209
13.03	13.03	.000	.000	.000	.000	.000	.000	.000	.000	.006	.019	.009	.003	.003	.025	.000	.003	.070
18.04	18.04	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
44.70	44.70	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
TOTAL		.33	.26	.14	.07	.06	.05	.19	.34	.44	.39	.30	.22	.18	.20	.21	.30	3.69

0JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION   ATMOSPHERIC STABILITY CLASS D

WIND SPEED (M/S)

TOWER	RELEASE	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
.42	.42	.035	.025	.020	.018	.012	.010	.021	.018	.025	.015	.031	.019	.027	.030	.028	.031	.363
1.01	1.01	.142	.101	.082	.073	.051	.041	.085	.073	.101	.060	.126	.079	.111	.123	.114	.126	1.489
2.03	2.03	.332	.215	.168	.104	.117	.101	.205	.322	.322	.243	.136	.123	.158	.158	.471	.405	3.581
3.02	3.02	.420	.231	.171	.079	.073	.092	.193	.401	.338	.212	.168	.149	.092	.202	.468	.455	3.742
4.00	4.00	.218	.186	.126	.060	.057	.082	.218	.395	.398	.205	.161	.079	.101	.202	.414	.408	3.312
5.03	5.03	.193	.101	.107	.019	.016	.022	.133	.303	.326	.281	.142	.054	.126	.149	.310	.265	2.547
6.01	6.01	.130	.047	.051	.000	.000	.016	.051	.136	.228	.240	.107	.082	.092	.171	.231	.149	1.729
8.02	8.02	.032	.038	.013	.006	.000	.003	.013	.120	.335	.370	.202	.155	.107	.326	.161	.155	2.035
10.04	10.04	.003	.025	.019	.000	.000	.000	.003	.009	.123	.215	.142	.133	.057	.161	.088	.047	1.027
13.03	13.03	.003	.003	.013	.000	.000	.000	.000	.000	.041	.120	.101	.035	.016	.057	.051	.009	.449
18.04	18.04	.000	.000	.006	.000	.000	.000	.000	.000	.006	.022	.016	.000	.006	.006	.006	.009	.079
44.70	44.70	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
TOTAL		1.51	.97	.78	.36	.33	.37	.92	1.78	2.24	1.98	1.33	.91	.89	1.59	2.34	2.06	20.35

0JOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION   ATMOSPHERIC STABILITY CLASS E

WIND SPEED (M/S)

TOWER	RELEASE	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
.42	.42	.037	.029	.019	.021	.018	.013	.025	.029	.051	.043	.045	.043	.051	.074	.066	.045	.607
1.01	1.01	.142	.111	.073	.082	.070	.051	.095	.111	.196	.168	.174	.164	.196	.284	.253	.174	2.342
2.03	2.03	.370	.291	.199	.095	.070	.098	.247	.411	.490	.392	.281	.307	.310	.446	.651	.676	5.332
3.02	3.02	.307	.250	.171	.085	.060	.063	.288	.544	.484	.288	.228	.218	.256	.480	.762	.540	5.022
4.00	4.00	.161	.104	.145	.025	.016	.079	.348	.670	.484	.196	.199	.142	.272	.455	.620	.414	4.320
5.03	5.03	.079	.032	.047	.028	.000	.038	.247	.525	.553	.250	.164	.107	.136	.509	.487	.234	3.436
6.01	6.01	.035	.013	.009	.016	.000	.006	.101	.288	.430	.316	.199	.104	.136	.442	.389	.107	2.592
8.02	8.02	.025	.041	.019	.003	.003	.000	.070	.224	.424	.518	.224	.120	.130	.477	.354	.180	2.813
10.04	10.04	.009	.041	.022	.000	.000	.000	.003	.009	.076	.348	.196	.038	.038	.202	.098	.066	1.147
13.03	13.03	.003	.000	.003	.000	.000	.000	.000	.000	.025	.133	.082	.019	.019	.063	.032	.013	.392
18.04	18.04	.000	.000	.000	.000	.000	.000	.000	.000	.006	.025	.016	.000	.000	.006	.000	.000	.054
44.70	44.70	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
TOTAL		1.17	.91	.71	.36	.24	.35	1.42	2.81	3.22	2.68	1.81	1.26	1.54	3.44	3.70	2.45	28.06

OJOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS F

WIND SPEED (M/S)

TOWER	RELEASE	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
.42	.42	.075	.055	.037	.016	.016	.014	.020	.035	.055	.041	.049	.057	.065	.070	.083	.072	.759
1.01	1.01	.272	.199	.136	.057	.057	.051	.073	.126	.202	.149	.177	.209	.237	.256	.303	.262	2.765
2.03	2.03	.531	.446	.221	.095	.044	.076	.209	.512	.629	.455	.303	.265	.322	.442	.733	.670	5.954
3.02	3.02	.307	.205	.126	.051	.025	.032	.174	.604	.733	.389	.205	.183	.164	.319	.512	.528	4.558
4.00	4.00	.041	.025	.070	.032	.006	.013	.269	.582	.578	.288	.117	.088	.142	.326	.442	.177	3.195
5.03	5.03	.006	.003	.009	.009	.000	.006	.111	.414	.297	.120	.051	.051	.101	.171	.161	.073	1.583
6.01	6.01	.009	.000	.000	.000	.000	.000	.028	.092	.130	.107	.032	.016	.051	.088	.063	.013	.629
8.02	8.02	.000	.000	.000	.000	.000	.000	.013	.066	.104	.085	.032	.016	.006	.044	.006	.013	.386
10.04	10.04	.000	.000	.000	.000	.000	.000	.000	.006	.009	.047	.003	.000	.003	.000	.000	.000	.070
13.03	13.03	.000	.000	.000	.000	.000	.000	.000	.000	.006	.009	.006	.003	.000	.000	.000	.000	.025
18.04	18.04	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
44.70	44.70	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
TOTAL		1.24	.93	.60	.26	.15	.19	.90	2.44	2.75	1.69	.97	.89	1.09	1.72	2.31	1.81	19.92

OJOINT FREQUENCY DISTRIBUTION OF WIND SPEED AND DIRECTION ATMOSPHERIC STABILITY CLASS G

WIND SPEED (M/S)

TOWER	RELEASE	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	TOTAL
.42	.42	.113	.111	.068	.030	.020	.022	.027	.054	.059	.047	.067	.061	.067	.071	.094	.134	1.046
1.01	1.01	.332	.326	.199	.088	.060	.063	.079	.158	.174	.139	.196	.180	.196	.209	.275	.392	3.066
2.03	2.03	.860	.787	.335	.092	.019	.019	.139	.357	.408	.335	.237	.120	.171	.307	.667	.796	5.648
3.02	3.02	.281	.237	.180	.044	.003	.000	.114	.493	.496	.155	.082	.051	.047	.139	.395	.405	3.123
4.00	4.00	.025	.025	.060	.019	.003	.000	.028	.307	.313	.111	.047	.019	.041	.044	.221	.101	1.365
5.03	5.03	.000	.000	.009	.006	.000	.000	.009	.136	.085	.025	.000	.013	.016	.016	.019	.003	.338
6.01	6.01	.000	.000	.000	.003	.000	.000	.000	.032	.028	.019	.000	.003	.000	.000	.006	.000	.092
8.02	8.02	.000	.000	.000	.000	.000	.000	.000	.006	.009	.003	.000	.000	.000	.000	.000	.000	.019
10.04	10.04	.000	.000	.000	.000	.000	.000	.000	.003	.006	.000	.000	.000	.000	.000	.000	.000	.009
13.03	13.03	.000	.000	.000	.000	.000	.000	.000	.000	.000	.003	.000	.000	.000	.000	.000	.000	.003
18.04	18.04	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.003	.000	.000	.000	.000	.000	.003
44.70	44.70	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
TOTAL		1.61	1.49	.85	.28	.11	.10	.40	1.55	1.58	.84	.63	.45	.54	.79	1.68	1.83	14.71

```
0WIND MEASURED AT  10.0 METERS.
 WIND SPEED CORRECTED TO THE RELEASE HEIGHT OF  10.0 METERS.
0OVERALL WIND DIRECTION FREQUENCY
 WIND DIRECTION:          N   NNE    NE   ENE     E   ESE    SE   SSE     S   SSW    SW   WSW     W   WNW    NW   NNW
 FREQUENCY:             7.1   5.6   3.8   1.7   1.2   1.5   4.8  10.2  12.1   8.7   5.8   4.2   4.7   8.3  10.9   9.5
0OVERALL WIND SPEED FREQUENCY AS MEASURED ON THE TOWER:
 MAX.WIND SPEED (M/S):      .425  1.006  2.034  3.018  4.001  5.029  6.013  8.024 10.036 13.031 18.038 44.704
 WIND SPEED FREQUENCY:     3.30  11.42  24.25  19.68  14.73   9.83   6.17   6.61   2.77   1.10    .14    .00
0BUILDING AND RELEASE CHARACTERISTICS:
 RELEASE HEIGHT:                    10.00 METERS
 MIXING VOLUME COEFFICIENT:           .50
 BUILDING CROSS-SECTIONAL AREA: 2861.00 SQUARE METERS
0BOUNDARY 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         1950.  1950.  1950.  1950.  1950.  1950.  1950.  1950.  1950.  1950.  1950.  1950.  1950.  1950.  1950.  1950.
 BOUNDARY 2         4827.  4827.  4827.  4827.  4827.  4827.  4827.  4827.  4827.  4827.  4827.  4827.  4827.  4827.  4827.  4827.
 THE CONVERSION FACTOR APPLIED TO THE WIND SPEED CLASSES IS      .447
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0           RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                       WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE            DELTA-T HEIGHTS:    10   75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0WINDSPEEDS ADJUSTED TO  10.0 METERS.
0PERCENT OF THE TIME A GIVEN WINDSPEED IS LOWER:
0WINDSPEED    CUMULATIVE FREQUENCY
 (METER/SEC)          (PERCENT)
       .42             3.30
      1.01            14.72
      2.03            38.98
      3.02            58.66
      4.00            73.38
      5.03            83.21
      6.01            89.38
      8.02            95.99
     10.04            98.75
     13.03            99.86
     18.04           100.00
     44.70           100.00
 0
```

0LOG-NORMAL INTERPOLATION PERCENTILES

0WINDSPEED (METER/SEC)	CUMULATIVE FREQUENCY (PERCENT)
.25	1.00
.41	3.00
.52	5.00
.78	10.00
1.02	15.00
1.22	20.00
1.42	25.00
1.63	30.00
1.85	35.00
2.08	40.00
2.30	45.00
2.54	50.00
2.80	55.00
3.09	60.00
3.39	65.00
3.73	70.00
4.14	75.00
4.63	80.00
5.42	85.00
6.13	90.00

ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-8	Cont'd on page B-9
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: 11/19/2003 TIME: 23: 4:56
/PLANT NAME: CGS METEOROLOGICAL INSTRUMENTATION
DATA PERIOD: JFD 1996-1999 WIND SENSORS HEIGHT: 10.0 METERS
TYPE OF RELEASE: GROUND LEVEL RELEASE DELTA-T HEIGHTS: 10 - 75 METERS
SOURCE OF DATA: MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96 99
COMMENTS: input file: P96-99-F.inp output file: P96-99-F.out sigma=desert + P-G
PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE S SECTOR.

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=1431.SQ.METERS	USED
A	.4	.40	1950.	0.	0.	556.3	364.0	556.3	3.701E-06	3.693E-06	3.693E-06
A	1.0	1.42	1950.	0.	0.	556.3	364.0	556.3	1.563E-06	1.559E-06	1.559E-06
A	2.0	3.24	1950.	0.	0.	556.3	364.0	556.3	7.728E-07	7.711E-07	7.711E-07
A	3.0	2.66	1950.	0.	0.	556.3	364.0	556.3	5.209E-07	5.198E-07	5.198E-07
A	4.0	2.35	1950.	0.	0.	556.3	364.0	556.3	3.929E-07	3.920E-07	3.920E-07
A	5.0	1.60	1950.	0.	0.	556.3	364.0	556.3	3.126E-07	3.119E-07	3.119E-07
A	6.0	.71	1950.	0.	0.	556.3	364.0	556.3	2.614E-07	2.609E-07	2.609E-07
A	8.0	1.11	1950.	0.	0.	556.3	364.0	556.3	1.959E-07	1.955E-07	1.955E-07
A	10.0	.04	1950.	0.	0.	556.3	364.0	556.3	1.566E-07	1.563E-07	1.563E-07
B	.4	.10	1950.	0.	0.	320.6	240.6	320.6	9.719E-06	9.662E-06	9.662E-06
B	1.0	.31	1950.	0.	0.	320.6	240.6	320.6	4.104E-06	4.080E-06	4.080E-06
B	2.0	.89	1950.	0.	0.	320.6	240.6	320.6	2.029E-06	2.017E-06	2.017E-06
B	3.0	1.20	1950.	0.	0.	320.6	240.6	320.6	1.368E-06	1.360E-06	1.360E-06
B	4.0	.67	1950.	0.	0.	320.6	240.6	320.6	1.032E-06	1.026E-06	1.026E-06
B	5.0	.49	1950.	0.	0.	320.6	240.6	320.6	8.208E-07	8.159E-07	8.159E-07
B	6.0	.27	1950.	0.	0.	320.6	240.6	320.6	6.865E-07	6.825E-07	6.825E-07
B	8.0	.18	1950.	0.	0.	320.6	240.6	320.6	5.144E-07	5.114E-07	5.114E-07
B	10.0	.04	1950.	0.	0.	320.6	240.6	320.6	4.113E-07	4.089E-07	4.089E-07
C	.4	.09	1950.	0.	0.	253.6	154.7	253.6	1.910E-05	1.888E-05	1.888E-05
C	1.0	.27	1950.	0.	0.	253.6	154.7	253.6	8.064E-06	7.972E-06	7.972E-06
C	2.0	1.07	1950.	0.	0.	253.6	154.7	253.6	3.988E-06	3.942E-06	3.942E-06
C	3.0	1.11	1950.	0.	0.	253.6	154.7	253.6	2.688E-06	2.657E-06	2.657E-06
C	4.0	.76	1950.	0.	0.	253.6	154.7	253.6	2.027E-06	2.004E-06	2.004E-06
C	5.0	.71	1950.	0.	0.	253.6	154.7	253.6	1.613E-06	1.594E 06	1.594E-06
C	6.0	.31	1950.	0.	0.	253.6	154.7	253.6	1.349E-06	1.334E-06	1.334E-06
C	8.0	.31	1950.	0.	0.	253.6	154.7	253.6	1.011E-06	9.992E-07	9.992E-07
D	.4	.49	1950.	0.	0.	114.1	75.2	114.1	8.742E-05	8.301E-05	8.301E-05
D	1.0	2.00	1950.	0.	0.	114.1	75.2	114.1	3.691E-05	3.505E-05	3.505E-05
D	2.0	4.66	1950.	0.	0.	114.1	75.2	114.1	1.825E-05	1.733E-05	1.733E-05
D	3.0	5.91	1950.	0.	0.	114.1	75.2	114.1	1.230E-05	1.168E-05	1.168E-05
D	4.0	3.06	1950.	0.	0.	114.1	75.2	114.1	9.279E-06	8.811E-06	8.811E-06
D	5.0	2.71	1950.	0.	0.	114.1	75.2	114.1	7.382E-06	7.009E-06	7.009E-06
D	6.0	1.82	1950.	0.	0.	114.1	75.2	114.1	6.174E-06	5.863E-06	5.863E-06
D	8.0	.44	1950.	0.	0.	114.1	75.2	114.1	4.626E-06	4.393E-06	4.393E-06
D	10.0	.04	1950.	0.	0.	114.1	75.2	114.1	3.699E-06	3.513E-06	3.513E-06
D	13.0	.04	1950.	0.	0.	114.1	75.2	114.1	2.849E-06	2.705E-06	2.705E-06

E	.4	.52	1950.	0.	0.	195.7	22.3	195.7	1.722E-04	1.559E-04	1.559E-04
E	1.0	2.00	1950.	0.	0.	195.7	22.3	195.7	7.269E-05	6.581E-05	6.581E-05
E	2.0	5.20	1950.	0.	0.	195.7	22.3	195.7	3.595E-05	3.254E-05	3.254E-05
E	3.0	4.31	1950.	0.	0.	195.7	22.3	195.7	2.423E-05	2.194E-05	2.194E-05
E	4.0	2.27	1950.	0.	0.	195.7	22.3	195.7	1.827E-05	1.654E-05	1.654E-05
E	5.0	1.11	1950.	0.	0.	195.7	22.3	195.7	1.454E-05	1.316E-05	1.316E-05
E	6.0	.49	1950.	0.	0.	195.7	22.3	195.7	1.216E-05	1.101E-05	1.101E-05
E	8.0	.36	1950.	0.	0.	195.7	22.3	195.7	9.112E-06	8.249E-06	8.249E-06
E	10.0	.13	1950.	0.	0.	195.7	22.3	195.7	7.285E-06	6.596E-06	6.596E-06
E	13.0	.04	1950.	0.	0.	195.7	22.3	195.7	5.611E-06	5.080E-06	5.080E-06
F	.4	1.05	1950.	0.	0.	303.4	8.4	303.4	2.935E-04	2.491E-04	2.491E-04
F	1.0	3.82	1950.	0.	0.	303.4	8.4	303.4	1.239E-04	1.052E-04	1.052E-04
F	2.0	7.46	1950.	0.	0.	303.4	8.4	303.4	6.128E-05	5.201E-05	5.201E-05
F	3.0	4.31	1950.	0.	0.	303.4	8.4	303.4	4.131E-05	3.506E-05	3.506E-05
F	4.0	.58	1950.	0.	0.	303.4	8.4	303.4	3.115E-05	2.644E-05	2.644E-05
F	5.0	.09	1950.	0.	0.	303.4	8.4	303.4	2.478E-05	2.103E-05	2.103E-05
F	6.0	.13	1950.	0.	0.	303.4	8.4	303.4	2.073E-05	1.759E-05	1.759E-05
G	.4	1.59	1950.	0.	0.	488.9	3.2	488.9	4.828E-04	3.733E-04	3.733E-04
G	1.0	4.66	1950.	0.	0.	488.9	3.2	488.9	2.039E-04	1.576E-04	1.576E-04
G	2.0	12.08	1950.	0.	0.	488.9	3.2	488.9	1.008E-04	7.794E-05	7.794E-05
G	3.0	3.95	1950.	0.	0.	488.9	3.2	488.9	6.795E-05	5.254E-05	5.254E-05
G	4.0	.36	1950.	0.	0.	488.9	3.2	488.9	5.125E-05	3.962E-05	3.962E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
OSITE EXCLUSION BOUNDARY CALCULATIONS:
0   S SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
ODESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:    C=    .5      A=  2861.      D=    70.0
 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   3.733E-04   2.491E-04   1.576E-04   1.559E-04   1.052E-04   8.301E-05   7.794E-05   6.581E-05   5.254E-05   5.201E-05
        1.591       2.639       7.302       7.820      11.640      12.128      24.209      26.207      30.160      37.622
       .11324      .18780      .51965      .55651      .82831      .86304     1.72271     1.86494     2.14623     2.67720
0   3.962E-05   3.506E-05   3.505E-05   3.254E-05   2.644E-05   2.194E-05   2.103E-05   1.888E-05   1.759E-05   1.733E-05
       37.977      42.285      44.284      49.480      50.057      54.366      54.454      54.547      54.680      59.343
      2.70248     3.00906     3.15128     3.52107     3.56215     3.86873     3.87505     3.88160     3.89109     4.22295
0   1.654E-C5   1.316E-05   1.168E-05   1.101E-05   9.662E-06   8.811E-06   8.243E-06   7.972E-06   7.009E-06   6.596E-06
       61.608      62.719      68.626      69.114      69.217      72.281      72.637      72.903      75.612      75.746
      4.38413     4.46315     4.88350     4.91827     4.92556     5.14364     5.16892     5.18788     5.38068     5.39016
0   5.863E-06   5.0803-06   4.393E-06   4.080E-06   3.942E-06   3.693E-06   3.513E-06   2.705E-06   2.657E-06   2.017E-06
       77.567      77.611      78.055      78.366      79.432      79.836      73.880      79.925      81.035      81.923
      5.51974     5.52290     5.55451     5.57663     5.65249     5.68123     5.58439     5.68755     5.76657     5.82978
0   2.004E-06   1.594E-06   1.559E-06   1.360E-06   1.334E-06   1.026E-06   9.992E-07   8.159E-07   7.711E-07   6.825E-07
       82.679      83.389      84.810      86.010      86.320      86.987      87.298      87.786      91.028      91.295
      5.88351     5.93408     6.03521     6.12055     6.14267     6.19008     6.21221     6.24697     6.47769     6.49666
0   5.198E-07   5.114E-07   4.089E-07   3.920E-07   3.119E-07   2.609E-07   1.955E-07   1.563E-07
       93.960      94.137      94.182      96.536      98.135      98.845      99.956     100.000
      6.68629     6.69893     6.70209     6.86960     6.98338     7.03395     7.11297     7.11613
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ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-11	Cont'd on page B-12
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

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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)=    1.721
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=    2.675
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=    3.518
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=    4.381
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=    4.880
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=    5.377
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=    5.516
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=    6.866
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   1  1     -7.89311 -12.99081  -1.66951
   1  2     -9.45953 -14.10528  -2.19641
   1  3     -9.86416 -17.32444  -3.86356
   1  4    -10.33296 -22.39834  -6.66745
   1  5    -11.00948 -22.54719  -6.75459
   1  6    -11.35742 -29.26353 -10.80884
   1  7    -11.86825 -34.68799 -14.17941
   1  8    -12.04686 -50.99743 -24.39349
   1  9    -14.75199       NUMXQ(K)=  9

                                                              BACK EXTRAPOLATION FOR  1 PERCENTILE.
     4.691E-04             .071            1.000
     2.693E-04             .213            3.000
     2.041E-04             .356            5.000
     1.367E-04             .712           10.000
     1.065E-04            1.067           15.000
     8.850E-05            1.423           20.000
     7.574E-05            1.779           25.000
     6.424E-05            2.135           30.000
     5.568E-05            2.491           35.000
     4.692E-05            2.846           40.000
     3.838E-05            3.202           45.000
     3.153E-05            3.558           50.000
     2.356E-05            3.914           55.000
     1.798E-05            4.270           60.000
     1.393E-05            4.625           65.000
     1.053E-05            4.981           70.000
     7.319E-06            5.337           75.000
     4.033E-06            5.693           80.000
     1.921E-06            6.049           85.000
     9.461E-07            6.405           90.000
0    1.683E-04            0.5              7.03
0ANNUAL AVERAGE =    1.17E-05
0K=  1      FIVEXQ(K)= 1.683E-04      FIVEPR(K)= 7.026
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Cont'd on page B-13

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE SSW SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.63	1950.	0.	0.	556.3	364.0	556.3	3.701E-06	3.693E-06	3.693E-06
A	1.0	2.20	1950.	0.	0.	556.3	364.0	556.3	1.563E-06	1.559E-06	1.559E-06
A	2.0	3.39	1950.	0.	0.	556.3	364.0	556.3	7.728E-07	7.711E-07	7.711E-07
A	3.0	2.60	1950.	0.	0.	556.3	364.0	556.3	5.209E-07	5.198E-07	5.198E-07
A	4.0	2.09	1950.	0.	0.	556.3	364.0	556.3	3.929E-07	3.920E-07	3.920E-07
A	5.0	1.58	1950.	0.	0.	556.3	364.0	556.3	3.126E-07	3.119E-07	3.119E-07
A	6.0	.51	1950.	0.	0.	556.3	364.0	556.3	2.614E-07	2.609E-07	2.609E-07
A	8.0	1.02	1950.	0.	0.	556.3	364.0	556.3	1.959E-07	1.955E-07	1.955E-07
A	10.0	.06	1950.	0.	0.	556.3	364.0	556.3	1.566E-07	1.563E-07	1.563E-07
A	13.0	.11	1950.	0.	0.	556.3	364.0	556.3	1.206E-07	1.204E-07	1.204E-07
B	.4	.15	1950.	0.	0.	320.6	240.6	320.6	9.719E-06	9.662E-06	9.662E-06
B	1.0	.45	1950.	0.	0.	320.6	240.6	320.6	4.104E-06	4.080E-06	4.080E-06
B	2.0	.73	1950.	0.	0.	320.6	240.6	320.6	2.029E-06	2.017E-06	2.017E-06
B	3.0	1.02	1950.	0.	0.	320.6	240.6	320.6	1.368E-06	1.360E-06	1.360E-06
B	4.0	1.02	1950.	0.	0.	320.6	240.6	320.6	1.032E-06	1.026E-06	1.026E-06
B	5.0	.56	1950.	0.	0.	320.6	240.6	320.6	8.208E-07	8.159E-07	8.159E-07
B	6.0	.11	1950.	0.	0.	320.6	240.6	320.6	6.865E-07	6.825E-07	6.825E-07
B	8.0	.11	1950.	0.	0.	320.6	240.6	320.6	5.144E-07	5.114E-07	5.114E-07
B	13.0	.11	1950.	0.	0.	320.6	240.6	320.6	3.168E-07	3.149E-07	3.149E-07
C	.4	.20	1950.	0.	0.	253.6	154.7	253.6	1.910E-05	1.888E-05	1.888E-05
C	1.0	.56	1950.	0.	0.	253.6	154.7	253.6	8.064E-06	7.972E-06	7.972E-06
C	2.0	1.07	1950.	0.	0.	253.6	154.7	253.6	3.988E-06	3.942E-06	3.942E-06
C	3.0	1.02	1950.	0.	0.	253.6	154.7	253.6	2.688E-06	2.657E-06	2.657E-06
C	4.0	.85	1950.	0.	0.	253.6	154.7	253.6	2.027E-06	2.004E-06	2.004E-06
C	5.0	.62	1950.	0.	0.	253.6	154.7	253.6	1.613E-06	1.594E-06	1.594E-06
C	6.0	.17	1950.	0.	0.	253.6	154.7	253.6	1.349E-06	1.334E-06	1.334E-06
C	8.0	.11	1950.	0.	0.	253.6	154.7	253.6	1.011E-06	9.992E-07	9.992E-07
C	10.0	.11	1950.	0.	0.	253.6	154.7	253.6	8.082E-07	7.989E-07	7.989E-07

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

Revision No. 0

D	.4	.44	1950.	0.	0.	114.1	75.2	114.1	8.742E-05	8.301E-05	8.301E-05
D	1.0	1.81	1950.	0.	0.	114.1	75.2	114.1	3.691E-05	3.505E-05	3.505E-05
D	2.0	3.84	1950.	0.	0.	114.1	75.2	114.1	1.825E-05	1.733E-05	1.733E-05
D	3.0	4.12	1950.	0.	0.	114.1	75.2	114.1	1.230E-05	1.168E-05	1.168E-05
D	4.0	3.33	1950.	0.	0.	114.1	75.2	114.1	9.279E-06	8.811E-06	8.811E-06
D	5.0	1.81	1950.	0.	0.	114.1	75.2	114.1	7.382E-06	7.009E-06	7.009E-06
D	6.0	.85	1950.	0.	0.	114.1	75.2	114.1	6.174E-06	5.863E-06	5.863E-06
D	8.0	.68	1950.	0.	0.	114.1	75.2	114.1	4.626E-06	4.393E-06	4.393E-06
D	10.0	.45	1950.	0.	0.	114.1	75.2	114.1	3.699E-06	3.513E-06	3.513E-06
D	13.0	.06	1950.	0.	0.	114.1	75.2	114.1	2.849E-06	2.705E-06	2.705E-06
E	.4	.51	1950.	0.	0.	195.7	22.3	195.7	1.722E-04	1.559E-04	1.559E-04
E	1.0	2.98	1950.	0.	0.	195.7	22.3	195.7	7.269E-05	6.581E-05	6.581E-05
E	2.0	5.19	1950.	0.	0.	195.7	22.3	195.7	3.595E-05	3.254E-05	3.254E-05
E	3.0	4.46	1950.	0.	0.	195.7	22.3	195.7	2.423E-05	2.194E-05	2.194E-05
E	4.0	1.86	1950.	0.	0.	195.7	22.3	195.7	1.827E-05	1.654E-05	1.654E-05
E	5.0	.56	1950.	0.	0.	195.7	22.3	195.7	1.454E-05	1.316E-05	1.316E-05
E	6.0	.23	1950.	0.	0.	195.7	22.3	195.7	1.216E-05	1.101E-05	1.101E-05
E	8.0	.73	1950.	0.	0.	195.7	22.3	195.7	9.112E-06	8.249E-06	8.249E-06
E	10.0	.73	1950.	0.	0.	195.7	22.3	195.7	7.285E-06	6.596E-06	6.596E-06
F	.4	.98	1950.	0.	0.	303.4	8.4	303.4	2.935E-04	2.491E-04	2.491E-04
F	1.0	3.56	1950.	0.	0.	303.4	8.4	303.4	1.239E-04	1.052E-04	1.052E-04
F	2.0	7.96	1950.	0.	0.	303.4	8.4	303.4	6.128E-05	5.201E-05	5.201E-05
F	3.0	3.67	1950.	0.	0.	303.4	8.4	303.4	4.131E-05	3.506E-05	3.506E-05
F	4.0	.45	1950.	0.	0.	303.4	8.4	303.4	3.115E-05	2.644E-05	2.644E-05
F	5.0	.06	1950.	0.	0.	303.4	8.4	303.4	2.478E-05	2.103E-05	2.103E-05
G	.4	1.98	1950.	0.	0.	488.9	3.2	488.9	4.828E-04	3.733E-04	3.733E-04
G	1.0	5.81	1950.	0.	0.	488.9	3.2	488.9	2.039E-04	1.576E-04	1.576E-04
G	2.0	14.06	1950.	0.	0.	488.9	3.2	488.9	1.008E-04	7.794E-05	7.794E-05
G	3.0	4.23	1950.	0.	0.	488.9	3.2	488.9	6.795E-05	5.254E-05	5.254E-05
G	4.0	.45	1950.	0.	0.	488.9	3.2	488.9	5.125E-05	3.962E-05	3.962E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0 SSW SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:   C=   .5     A=  2861.     D=   70.0
 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   3.733E-04   2.491E-04   1.576E-04   1.559E-04   1.052E-04   8.301E-05   7.794E-05   6.581E-05   5.254E-05   5.201E-05
        1.984       2.960       8.774       9.286      12.842      13.283      27.339      29.315      33.549      41.508
       .11109      .16570      .49124      .51990      .71901      .74371     1.53069     1.64131     1.87835     2.32399
0   3.962E-05   3.506E-05   3.505E 05   3.254E-05   2.644E-05   2.194E-05   2.103E-05   1.888E 05   1.733E-05   1.654E-05
       41.960      45.629      47.435      52.629      53.080      57.540      57.596      57.791      61.630      63.493
      2.34927     2.55471     2.65585     2.94662     2.97190     3.22159     3.22475     3.23567     3.45059     3.55489
0   1.316E-05   1.168E-05   1.101E-05   9.662E-06   8.811E-06   8.249E-06   7.972E-06   7.009E-06   6.596E-06   5.863E-06
       64.057      68.178      68.404      68.553      71.883      72.617      73.182      74.988      75.722      76.569
      3.58649     3.81721     3.82986     3.83819     4.02466     4.06575     4.09735     4.19849     4.23958     4.28699
0   4.393E-06   4.080E-06   3.942E-06   3.693E-06   3.513E-06   2.705E-06   2.657E-06   2.017E-06   2.004E-06   1.594E-06
       77.246      77.698      78.770      79.396      79.847      79.904      80.920      81.654      82.501      83.122
      4.32491     4.35020     4.41025     4.44529     4.47057     4.47373     4.53062     4.57171     4.61912     4.65388
0   1.559E-06   1.360E-06   1.334E-06   1.026E-06   9.992E-07   8.159E-07   7.989E-07   7.711E-07   6.825E-07   5.198E-07
       85.323      86.339      86.509      87.525      87.638      88.202      88.315      91.702      91.815      94.412
      4.77714     4.83403     4.84352     4.90041     4.90673     4.93833     4.94465     5.13429     5.14061     5.28599
0   5.114E-07   3.920E-07   3.149E-07   3.119E-07   2.609E-07   1.955E-07   1.563E-07   1.204E-07
       94.524      96.613      96.726      98.307      98.815      99.831      99.887     100.000
      5.29232     5.40926     5.41558     5.50407     5.53252     5.58941     5.59257     5.59889
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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)=   1.529
                                                          HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   2.322
                                                          HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   2.944
                                                          HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   3.552
                                                          HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   3.814
                                                          HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   4.021
                                                          HANDCHECK GRAPH: SLOPE LT -1.C FOR LOW PERCENTAGES.  XSAVE( 8)=   4.195
                                                          HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   4.236
                                                          HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   4.284
                                                          HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(11)=   5.131
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   2  1      -7.89311 -13.23726  -1.74693
   2  2      -9.45953 -14.57489  -2.36548
   2  3      -9.86416 -18.98779  -4.58141
   2  4     -10.33296 -25.57276  -8.06715
   2  5     -11.00948 -30.30216 -10.68695
   2  6     -11.35742 -31.78788 -11.52505
   2  7     -11.63953 -31.90096 -11.58974
   2  8     -11.86825 -34.90391 -13.32707
   2  9     -11.92912 -50.76847 -22.52968
   2 10     -12.04686 -52.41453 -23.48742
   2 11     -14.07546      NUMXQ(K)= 11
                                                          BACK EXTRAPOLATION FOR  1 PERCENTILE.
      5.291E-04             .056            1.000
      2.995E-04             .168            3.000
      2.256E-04             .280            5.000
      1.499E-04             .560           10.000
      1.163E-04             .840           15.000
      9.638E-05            1.120           20.000
      8.290E-05            1.400           25.000
      7.139E-05            1.680           30.000
      6.154E-05            1.960           35.000
      5.396E-05            2.240           40.000
      4.443E-05            2.519           45.000
      3.606E-05            2.799           50.000
      2.782E-05            3.079           55.000
      2.034E-05            3.359           60.000
      1.476E-05            3.639           65.000
      1.015E-05            3.919           70.000
      7.002E-06            4.199           75.000
      3.604E-06            4.479           80.000
      1.827E-06            4.759           85.000
      9.552E-07            5.039           90.000
0     1.606E-04            0.5              8.93
0ANNUAL AVERAGE =    1.05E-05
0K=  2      FIVEXQ(K)= 1.606E-04      FIVEPR(K)= 8.930
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE  SW SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.71	1950.	0.	0.	556.3	364.0	556.3	3.701E-06	3.693E-06	3.693E-06
A	1.0	2.50	1950.	0.	0.	556.3	364.0	556.3	1.563E-06	1.559E-06	1.559E-06
A	2.0	4.25	1950.	0.	0.	556.3	364.0	556.3	7.728E-07	7.711E-07	7.711E-07
A	3.0	3.42	1950.	0.	0.	556.3	364.0	556.3	5.209E-07	5.198E-07	5.198E-07
A	4.0	1.58	1950.	0.	0.	556.3	364.0	556.3	3.929E-07	3.920E-07	3.920E-07
A	5.0	.92	1950.	0.	0.	556.3	364.0	556.3	3.126E-07	3.119E-07	3.119E-07
A	6.0	.42	1950.	0.	0.	556.3	364.0	556.3	2.614E-07	2.609E-07	2.609E-07
A	8.0	.83	1950.	0.	0.	556.3	364.0	556.3	1.959E-07	1.955E-07	1.955E-07
A	10.0	.17	1950.	0.	0.	556.3	364.0	556.3	1.566E-07	1.563E-07	1.563E-07
B	.4	.03	1950.	0.	0.	320.6	240.6	320.6	9.719E-06	9.662E-06	9.662E-06
B	1.0	.08	1950.	0.	0.	320.6	240.6	320.6	4.104E-06	4.080E-06	4.080E-06
B	2.0	.92	1950.	0.	0.	320.6	240.6	320.6	2.029E-06	2.017E-06	2.017E-06
B	3.0	1.25	1950.	0.	0.	320.6	240.6	320.6	1.368E-06	1.360E-06	1.360E-06
B	4.0	.83	1950.	0.	0.	320.6	240.6	320.6	1.032E-06	1.026E-06	1.026E-06
B	5.0	.67	1950.	0.	0.	320.6	240.6	320.6	8.208E-07	8.159E-07	8.159E-07
B	6.0	.08	1950.	0.	0.	320.6	240.6	320.6	6.865E-07	6.825E-07	6.825E-07
B	8.0	.17	1950.	0.	0.	320.6	240.6	320.6	5.144E 07	5.114E-07	5.114E-07
C	.4	.23	1950.	0.	0.	253.6	154.7	253.6	1.910E-05	1.888E-05	1.888E-05
C	1.0	.67	1950.	0.	0.	253.6	154.7	253.6	8.064E-06	7.972E-06	7.972E-06
C	2.0	.92	1950.	0.	0.	253.6	154.7	253.6	3.988E-06	3.942E-06	3.942E-06
C	3.0	.92	1950.	0.	0.	253.6	154.7	253.6	2.688E-06	2.657E-06	2.657E-06
C	4.0	.25	1950.	0.	0.	253.6	154.7	253.6	2.027E-06	2.004E-06	2.004E-06
C	5.0	.42	1950.	0.	0.	253.6	154.7	253.6	1.613E-06	1.594E-06	1.594E-06
C	6.0	.25	1950.	0.	0.	253.6	154.7	253.6	1.349E-06	1.334E-06	1.334E-06
C	8.0	.17	1950.	0.	0.	253.6	154.7	253.6	1.011E-06	9.992E-07	9.992E-07

D	.4	.53	1950.	0.	0.	114.1	75.2	114.1	8.742E-05	8.301E-05	8.301E-05
D	1.0	2.17	1950.	0.	0.	114.1	75.2	114.1	3.691E-05	3.505E-05	3.505E-05
D	2.0	4.42	1950.	0.	0.	114.1	75.2	114.1	1.825E-05	1.733E-05	1.733E-05
D	3.0	4.50	1950.	0.	0.	114.1	75.2	114.1	1.230E-05	1.168E-05	1.168E-05
D	4.0	3.33	1950.	0.	0.	114.1	75.2	114.1	9.279E-06	8.811E 06	8.811E-06
D	5.0	2.83	1950.	0.	0.	114.1	75.2	114.1	7.382E-06	7.009E-06	7.009E-06
D	6.0	1.33	1950.	0.	0.	114.1	75.2	114.1	6.174E-06	5.863E-06	5.863E-06
D	8.0	.33	1950.	0.	0.	114.1	75.2	114.1	4.626E-06	4.393E-06	4.393E-06
D	10.0	.50	1950.	0.	0.	114.1	75.2	114.1	3.699E-06	3.513E-06	3.513E-06
D	13.0	.33	1950.	0.	0.	114.1	75.2	114.1	2.849E-06	2.705E-06	2.705E-06
D	18.0	.17	1950.	0.	0.	114.1	75.2	114.1	2.058E-06	1.954E-06	1.954E-06
E	.4	.50	1950.	0.	0.	195.7	22.3	195.7	1.722E-04	1.559E-04	1.559E-04
E	1.0	1.92	1950.	0.	0.	195.7	22.3	195.7	7.269E-05	6.581E-05	6.581E-05
E	2.0	5.25	1950.	0.	0.	195.7	22.3	195.7	3.595E-05	3.254E-05	3.254E-05
E	3.0	4.50	1950.	0.	0.	195.7	22.3	195.7	2.423E-05	2.194E-05	2.194E-05
E	4.0	3.83	1950.	0.	0.	195.7	22.3	195.7	1.827E-05	1.654E-05	1.654E-05
E	5.0	1.25	1950.	0.	0.	195.7	22.3	195.7	1.454E-05	1.316E-05	1.316E-05
E	6.0	.25	1950.	0.	0.	195.7	22.3	195.7	1.216E-05	1.101E-05	1.101E-05
E	8.0	.50	1950.	0.	0.	195.7	22.3	195.7	9.112E-06	8.249E-06	8.249E-06
E	10.0	.58	1950.	0.	0.	195.7	22.3	195.7	7.285E-06	6.596E-06	6.596E-06
E	13.0	.08	1950.	0.	0.	195.7	22.3	195.7	5.611E-06	5.080E-06	5.080E-06
F	.4	.98	1950.	0.	0.	303.4	8.4	303.4	2.935E-04	2.491E-04	2.491E-04
F	1.0	3.58	1950.	0.	0.	303.4	8.4	303.4	1.239E-04	1.052E-04	1.052E-04
F	2.0	5.83	1950.	0.	0.	303.4	8.4	303.4	6.128E-05	5.201E-05	5.201E-05
F	3.0	3.33	1950.	0.	0.	303.4	8.4	303.4	4.131E-05	3.506E-05	3.506E-05
F	4.0	1.83	1950.	0.	0.	303.4	8.4	303.4	3.115E-05	2.644E-05	2.644E-05
F	5.0	.25	1950.	0.	0.	303.4	8.4	303.4	2.478E-05	2.103E-05	2.103E-05
G	.4	1.79	1950.	0.	0.	488.9	3.2	488.9	4.828E-04	3.733E-04	3.733E-04
G	1.0	5.25	1950.	0.	0.	488.9	3.2	488.9	2.039E-04	1.576E-04	1.576E-04
G	2.0	8.83	1950.	0.	0.	488.9	3.2	488.9	1.008E-04	7.794E-05	7.794E-05
G	3.0	4.75	1950.	0.	0.	488.9	3.2	488.9	6.795E-05	5.254E-05	5.254E-05
G	4.0	1.58	1950.	0.	0.	488.9	3.2	488.9	5.125E-05	3.962E-05	3.962E-05
G	5.0	.25	1950.	0.	0.	488.9	3.2	488.9	4.077E-05	3.152E-05	3.152E-05

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0  SW SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:   C=   .5      A=  2861.     D=   70.0
 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   3.733E-04   2.491E-04   1.576E-04   1.559E-04   1.052E-04   8.301E-05   7.794E-05   6.581E-05   5.254E-05   5.201E-05
        1.791       2.774       8.023       8.519      12.102      12.631      21.463      23.379      28.128      33.960
       .06795      .10522      .30434      .32317      .45908      .47914      .81416      .88685     1.06700     1.28824
0   3.962E-05   3.506E-05   3.505E-05   3.254E-05   3.152E-05   2.644E-05   2.194E-05   2.103E-05   1.888E-05   1.733E-05
       35.543      38.876      41.042      46.291      46.541      48.374      52.874      53.124      53.354      57.770
      1.34829     1.47472     1.55689     1.75601     1.76549     1.83502     2.00569     2.01517     2.02391     2.19142
0   1.654E-05   1.316E-05   1.168E-05   1.101E-05   9.662E-06   8.811E-06   8.249E-06   7.972E-06   7.009E-06   6.596E-06
       61.602      62.852      67.351      67.601      67.629      70.961      71.461      72.128      74.961      75.544
      2.33681     2.38421     2.55488     2.56437     2.56541     2.69183     2.71079     2.73608     2.84354     2.86566
0   5.863E-06   5.080E-06   4.393E-06   4.080E-06   3.942E-06   3.693E-06   3.513E-06   2.705E-06   2.657E-06   2.017E-06
       76.877      76.960      77.294      77.377      78.293      79.004      79.504      79.837      80.754      81.670
      2.91623     2.91939     2.93203     2.93519     2.96996     2.99691     3.01587     3.02852     3.06328     3.09805
0   2.004E-06   1.954E-06   1.594E-06   1.559E-06   1.360E-06   1.334E-06   1.026E-06   9.992E-07   8.159E-07   7.711E-07
       81.920      82.087      82.503      85.003      86.253      86.503      87.336      87.502      88.169      92.428
      3.10753     3.11385     3.12965     3.22447     3.27188     3.28136     3.31297     3.31929     3.34457     3.50576
0   6.825E-07   5.198E-07   5.114E-07   3.920E-07   3.119E-07   2.609E-07   1.955E-07   1.563E-07
       92.501      95.917      96.084      97.667      98.584      99.000      99.833     100.000
      3.50892     3.63850     3.64482     3.70487     3.73964     3.75544     3.78705     3.79337
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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)=    .323
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=    .813
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   1.287
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   1.754
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   2.334
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   2.552
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   2.841
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   2.913
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   3.642
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   3  1      -7.89311 -13.72447  -1.82031
   3  2      -8.76654 -14.65135  -2.16062
   3  3      -9.45953 -15.08770  -2.34220
   3  4      -9.86416 -18.38037  -3.81862
   3  5      10.33296 -22.38516  -5.71895
   3  6     -11.00948 -29.20814  -9.14911
   3  7     -11.35742 -32.85490 -11.01820
   3  8     -11.86825 -42.64309 -16.15710
   3  9     -12.04686 -58.33539 -24.44380
   3 10     -14.48615      NUMXQ(K)= 10
                                                  BACK EXTRAPOLATION FOR  1 PERCENTILE.
     5.033E-04              .038              1.000
     2.833E-04              .114              3.000
     2.130E-04              .190              5.000
     1.389E-04              .379             10.000
     1.028E-04              .569             15.000
     8.239E-05              .759             20.000
     6.831E-05              .948             25.000
     5.815E-05             1.138             30.000
     4.973E-05             1.328             35.000
     4.070E-05             1.517             40.000
     3.400E 05             1.707             45.000
     2.719E-05             1.897             50.000
     2.171E-05             2.086             55.000
     1.763E-05             2.276             60.000
     1.343E-05             2.466             65.000
     9.728E-06             2.655             70.000
     6.984E-06             2.845             75.000
     3.819E-06             3.035             80.000
     1.977E-06             3.224             85.000
     1.056E 06             3.414             90.000
0    1.133E-04             0.5               13.18
0ANNUAL AVERAGE =    6.20E-06
0K=  3     FIVEXQ(K)= 1.133E-04     FIVEPR(K)=13.181
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ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-20	Cont'd on page B-21
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE WSW SECTOR.
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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=1431.SQ.METERS	USED
A	.4	1.24	1950.	0.	0.	556.3	364.0	556.3	3.701E-06	3.693E-06	3.693E-06
A	1.0	4.37	1950.	0.	0.	556.3	364.0	556.3	1.563E-06	1.559E-06	1.559E-06
A	2.0	6.83	1950.	0.	0.	556.3	364.0	556.3	7.728E-07	7.712E-07	7.711E-07
A	3.0	2.09	1950.	0.	0.	556.3	364.0	556.3	5.209E-07	5.198E-07	5.198E-07
A	4.0	1.33	1950.	0.	0.	556.3	364.0	556.3	3.929E-07	3.920E-07	3.920E-07
A	5.0	.38	1950.	0.	0.	556.3	364.0	556.3	3.126E-07	3.119E-07	3.119E-07
A	6.0	.19	1950.	0.	0.	556.3	364.0	556.3	2.614E-07	2.609E 07	2.609E-07
B	.4	.31	1950.	0.	0.	320.6	240.6	320.6	9.719E-06	9.662E-06	9.662E-06
B	1.0	.95	1950.	0.	0.	320.6	240.6	320.6	4.104E-06	4.080E-06	4.080E-06
B	2.0	.76	1950.	0.	0.	320.6	240.6	320.6	2.029E-06	2.017E-06	2.017E-06
B	3.0	.76	1950.	0.	0.	320.6	240.6	320.6	1.368E-06	1.360E-06	1.360E-06
B	4.0	.38	1950.	0.	0.	320.6	240.6	320.6	1.032E-06	1.026E-06	1.026E-06
B	5.0	.19	1950.	0.	0.	320.6	240.6	320.6	8.208E-07	8.159E-07	8.159E-07
B	6.0	.19	1950.	0.	0.	320.6	240.6	320.6	6.865E-07	6.825E-07	6.825E-07
B	8.0	.57	1950.	0.	0.	320.6	240.6	320.6	5.144E-07	5.114E-07	5.114E-07
C	.4	.33	1950.	0.	0.	253.6	154.7	253.6	1.910E-05	1.888E-05	1.888E-05
C	1.0	.95	1950.	0.	0.	253.6	154.7	253.6	8.064E-06	7.972E-06	7.972E-06
C	2.0	.76	1950.	0.	0.	253.6	154.7	253.6	3.988E-06	3.942E-06	3.942E-06
C	3.0	1.71	1950.	0.	0.	253.6	154.7	253.6	2.688E-06	2.657E-06	2.657E-06
C	4.0	.19	1950.	0.	0.	253.6	154.7	253.6	2.027E-06	2.004E-06	2.004E-06

Cont'd on page B-22

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

D	.4	1.07	1950.	0.	0.	114.1	75.2	114.1	8.742E-05	8.301E-05	8.301E-05
D	1.0	4.37	1950.	0.	0.	114.1	75.2	114.1	3.691E-05	3.505E-05	3.505E-05
D	2.0	6.26	1950.	0.	0.	114.1	75.2	114.1	1.825E-05	1.733E-05	1.733E-05
D	3.0	4.75	1950.	0.	0.	114.1	75.2	114.1	1.230E-05	1.168E-05	1.168E-05
D	4.0	3.61	1950.	0.	0.	114.1	75.2	114.1	9.279E-06	8.811E-06	8.811E-06
D	5.0	1.14	1950.	0.	0.	114.1	75.2	114.1	7.382E-06	7.009E-06	7.009E-06
D	8.0	.38	1950.	0.	0.	114.1	75.2	114.1	4.626E-06	4.393E-06	4.393E-06
E	.4	1.28	1950.	0.	0.	195.7	22.3	195.7	1.722E-04	1.559E-04	1.559E-04
E	1.0	4.94	1950.	0.	0.	195.7	22.3	195.7	7.269E-05	6.581E-05	6.581E-05
E	2.0	5.70	1950.	0.	0.	195.7	22.3	195.7	3.595E-05	3.254E-05	3.254E-05
E	3.0	5.23	1950.	0.	0.	195.7	22.3	195.7	2.423E-05	2.194E-05	2.194E-05
E	4.0	1.52	1950.	0.	0.	195.7	22.3	195.7	1.827E-05	1.654E-05	1.654E-05
E	5.0	1.71	1950.	0.	0.	195.7	22.3	195.7	1.454E-05	1.316E-05	1.316E-05
E	6.0	.95	1950.	0.	0.	195.7	22.3	195.7	1.216E-05	1.101E-05	1.101E-05
E	8.0	.19	1950.	0.	0.	195.7	22.3	195.7	9.112E-06	8.249E-06	8.249E-06
F	.4	.94	1950.	0.	0.	303.4	8.4	303.4	2.935E-04	2.491E-04	2.491E-04
F	1.0	3.42	1950.	0.	0.	303.4	8.4	303.4	1.239E-04	1.052E-04	1.052E-04
F	2.0	5.70	1950.	0.	0.	303.4	8.4	303.4	6.128E-05	5.201E-05	5.201E-05
F	3.0	3.04	1950.	0.	0.	303.4	8.4	303.4	4.131E-05	3.506E-05	3.506E-05
F	4.0	1.90	1950.	0.	0.	303.4	8.4	303.4	3.115E-05	2.644E-05	2.644E-05
F	5.0	.57	1950.	0.	0.	303.4	8.4	303.4	2.478E-05	2.103E-05	2.103E-05
G	.4	1.81	1950.	0.	0.	488.9	3.2	488.9	4.828E-04	3.733E-04	3.733E-04
G	1.0	5.32	1950.	0.	0.	488.9	3.2	488.9	2.039E-04	1.576E-04	1.576E-04
G	2.0	5.51	1950.	0.	0.	488.9	3.2	488.9	1.008E-04	7.794E-05	7.794E-05
G	3.0	2.66	1950.	0.	0.	488.9	3.2	488.9	6.795E-05	5.254E-05	5.254E-05
G	4.0	1.14	1950.	0.	0.	488.9	3.2	488.9	5.125E-05	3.962E-05	3.962E-05
G	5.0	.38	1950.	0.	0.	488.9	3.2	488.9	4.077E-05	3.152E-05	3.152E-05
G	6.0	.19	1950.	0.	0.	488.9	3.2	488.9	3.410E-05	2.637E-05	2.637E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT: 10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0 WSW SECTOR     BOUNDARY DISTANCE = 1950.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:   C=   .5     A=  2861.     D=   70.0
 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   3.733E-04   2.491E-04   1.576E-04   1.559E-04   1.052E-04   8.301E-05   7.794E-05   6.581E-05   5.254E-05   5.201E-05
        1.814       2.751       8.067       9.346      12.763      13.829      19.334      24.270      26.928      32.623
       .03020      .04580      .13430      .15559      .21248      .23023      .32188      .40406      .44831      .54312
0   3.962E-05   3.506E-05   3.505E-05   3.254E-05   3.152E-05   2.644E-05   2.637E-05   2.194E-05   2.103E-05   1.888E-05
       33.762      36.800      41.166      46.861      47.241      49.139      49.329      54.455      55.024      55.352
       .56209      .61266      .68535      .78017      .78649      .81809      .82125      .90659      .91607      .92153
0   1.733E-05   1.654E-05   1.316E-05   1.168E-05   1.101E-05   9.662E-06   8.811E-06   8.249E-06   7.972E-06   7.009E-06
       61.617      63.136      64.844      69.590      70.540      70.852      74.459      74.649      75.598      76.737
      1.02583     1.05111     1.07956     1.15857     1.17438     1.17958     1.23963     1.24280     1.25860     1.27756
0   4.393E-06   4.080E-06   3.942E-06   3.693E-06   2.657E-06   2.017E-06   2.004E-06   1.559E-06   1.360E-06   1.026E-06
       77.117      78.066      78.826      80.067      81.775      82.535      82.725      87.091      87.850      88.230
      1.28388     1.29969     1.31233     1.33299     1.36143     1.37408     1.37724     1.44993     1.46257     1.46889
0   8.159E-07   7.711E-07   6.825E-07   5.198E-07   5.114E-07   3.920E-07   3.119E-07   2.609E-07
       88.420      95.254      95.444      97.532      98.102      99.430      99.810     100.000
      1.47205     1.58583     1.58900     1.62376     1.63324     1.65537     1.66169     1.66485
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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)=    .155
                                                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=    .542
                                                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=    .779
                                                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   1.050
                                                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   1.157
                                                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   1.238
                                                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   1.257
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   4  1      -7.89311 -14.22389  -1.84570
   4  2      -8.76654 -16.69590  -2.68174
   4  3      -9.86416 -19.12134  -3.63383
   4  4     -10.33296 -25.14385  -6.12401
   4  5     -11.00948 -32.72177  -9.40731
   4  6     -11.35742 -36.02084 -10.85998
   4  7     -11.63953 -49.95643 -17.06721
   4  8     -11.73961      NUMXQ(K)=  8

                                                                 BACK EXTRAPOLATION FOR  1 PERCENTILE.
     5.000E-04              .017            1.000
     2.889E-04              .050            3.000
     2.204E-04              .083            5.000
     1.474E-04              .166           10.000
     1.045E-04              .250           15.000
     8.123E-05              .333           20.000
     6.647E-05              .416           25.000
     5.623E-05              .499           30.000
     4.755E-05              .583           35.000
     4.004E-05              .666           40.000
     3.433E-05              .749           45.000
     2.815E-05              .832           50.000
     2.270E-05              .916           55.000
     1.861E-05              .999           60.000
     1.492E-05             1.082           65.000
     1.140E-05             1.165           70.000
     8.401E-06             1.249           75.000
0    5.617E-05             0.5             30.03
0ANNUAL AVERAGE =    2.62E-06
0K=  4      FIVEXQ(K)= 5.617E-05      FIVEPR(K)=30.033
```

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: 11/19/2003 TIME: 23: 4:56
/PLANT NAME: CGS METEOROLOGICAL INSTRUMENTATION
DATA PERIOD: JFD 1996-1999 WIND SENSORS HEIGHT: 10.0 METERS
TYPE OF RELEASE: GROUND LEVEL RELEASE DELTA-T HEIGHTS: 10 - 75 METERS
SOURCE OF DATA: MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
COMMENTS: input file: P96-99-F.inp output file: P96-99-F.out sigma-desert + P-G
PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE W SECTOR.

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=1431.SQ.METERS	USED
A	.4	2.01	1950.	0.	0.	556.3	364.0	556.3	3.701E-06	3.693E-06	3.693E-06
A	1.0	7.09	1950.	0.	0.	556.3	364.0	556.3	1.563E-06	1.559E-06	1.559E-06
A	2.0	7.87	1950.	0.	0.	556.3	364.0	556.3	7.728E-07	7.711E-07	7.711E-07
A	3.0	2.62	1950.	0.	0.	556.3	364.0	556.3	5.209E-07	5.198E-07	5.198E-07
A	4.0	1.31	1950.	0.	0.	556.3	364.0	556.3	3.929E-07	3.920E-07	3.920E-07
A	5.0	1.05	1950.	0.	0.	556.3	364.0	556.3	3.126E-07	3.119E-07	3.119E-07
B	.4	.61	1950.	0.	0.	320.6	240.6	320.6	9.719E-06	9.662E-06	9.662E-06
B	1.0	1.84	1950.	0.	0.	320.6	240.6	320.6	4.104E-06	4.080E-06	4.080E-06
B	2.0	1.57	1950.	0.	0.	320.6	240.6	320.6	2.029E-06	2.017E-06	2.017E-06
B	3.0	.79	1950.	0.	0.	320.6	240.6	320.6	1.368E-06	1.360E-06	1.360E-06
B	4.0	.52	1950.	0.	0.	320.6	240.6	320.6	1.032E-06	1.026E-06	1.026E-06
C	.4	.27	1950.	0.	0.	253.6	154.7	253.6	1.910E-05	1.888E-05	1.888E-05
C	1.0	.79	1950.	0.	0.	253.6	154.7	253.6	8.064E-06	7.972E-06	7.972E-06
C	2.0	1.57	1950.	0.	0.	253.6	154.7	253.6	3.988E-06	3.942E-06	3.942E-06
C	3.0	1.84	1950.	0.	0.	253.6	154.7	253.6	2.688E-06	2.657E-06	2.657E-06
C	4.0	.52	1950.	0.	0.	253.6	154.7	253.6	2.027E-06	2.004E-06	2.004E-06
D	.4	1.03	1950.	0.	0.	114.1	75.2	114.1	8.742E-05	8.301E-05	8.301E-05
D	1.0	4.20	1950.	0.	0.	114.1	75.2	114.1	3.691E-05	3.505E-05	3.505E-05
D	2.0	9.71	1950.	0.	0.	114.1	75.2	114.1	1.825E-05	1.733E-05	1.733E-05
D	3.0	6.04	1950.	0.	0.	114.1	75.2	114.1	1.230E-05	1.168E-05	1.168E-05
D	4.0	4.72	1950.	0.	0.	114.1	75.2	114.1	9.279E-06	8.811E-06	8.811E-06
D	5.0	1.31	1950.	0.	0.	114.1	75.2	114.1	7.382E-06	7.009E-06	7.009E-06
E	.4	1.50	1950.	0.	0.	195.7	22.3	195.7	1.722E-04	1.559E-04	1.559E-04
E	1.0	5.77	1950.	0.	0.	195.7	22.3	195.7	7.269E-05	6.581E-05	6.581E-05
E	2.0	5.77	1950.	0.	0.	195.7	22.3	195.7	3.595E-05	3.254E-05	3.254E-05
E	3.0	4.99	1950.	0.	0.	195.7	22.3	195.7	2.423E-05	2.194E-05	2.194E-05
E	4.0	1.31	1950.	0.	0.	195.7	22.3	195.7	1.827E-05	1.654E-05	1.654E-05
E	8.0	.26	1950.	0.	0.	195.7	22.3	195.7	9.112E-06	8.249E-06	8.249E-06
F	.4	1.30	1950.	0.	0.	303.4	8.4	303.4	2.935E-04	2.491E-04	2.491E-04
F	1.0	4.72	1950.	0.	0.	303.4	8.4	303.4	1.239E-04	1.052E-04	1.052E-04
F	2.0	3.67	1950.	0.	0.	303.4	8.4	303.4	6.128E-05	5.201E-05	5.201E-05
F	3.0	2.10	1950.	0.	0.	303.4	8.4	303.4	4.131E-05	3.506E-05	3.506E-05
F	4.0	.52	1950.	0.	0.	303.4	8.4	303.4	3.115E-05	2.644E-05	2.644E-05
G	.4	1.70	1950.	0.	0.	488.9	3.2	488.9	4.828E-04	3.733E-04	3.733E-04
G	1.0	4.99	1950.	0.	0.	488.9	3.2	488.9	2.039E-04	1.576E-04	1.576E-04
G	2.0	1.57	1950.	0.	0.	488.9	3.2	488.9	1.008E-04	7.794E-05	7.794E-05
G	3.0	.26	1950.	0.	0.	488.9	3.2	488.9	6.795E-05	5.254E-05	5.254E-05
G	4.0	.26	1950.	0.	0.	488.9	3.2	488.9	5.125E-05	3.962E-05	3.962E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0   W SECTOR       BOUNDARY DISTANCE = 1950.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:   C=    .5      A=  2861.     D=    70.0
 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   3.733E-04   2.491E-04   1.576E-04   1.559E-04   1.052E-04   8.301E-05   7.794E-05   6.581E-05   5.254E-05   5.201E-05
        1.702       2.997       7.983       9.479      14.203      15.229      16.803      22.577      22.839      26.513
       .02049      .03610      .09615      .11416      .17105      .18340      .20236      .27190      .27506      .31930
0   3.962E-05   3.506E-05   3.505E-05   3.254E-05   2.644E-05   2.194E-05   1.888E-05   1.733E-05   1.654E-05   1.168E-05
       26.776      28.875      33.074      38.848      39.373      44.359      44.631      54.341      55.653      61.689
       .32246      .34775      .39832      .46785      .47417      .53422      .53750      .65444      .67024      .74294
0   9.662E-06   8.811E-06   8.249E-06   7.972E-06   7.009E-06   4.080E-06   3.942E-06   3.693E-06   2.657E-06   2.017E-06
       62.295      67.019      67.281      68.068      69.381      71.218      72.792      74.806      76.643      78.218
       .75023      .80712      .81028      .81976      .83556      .85769      .87665      .90090      .92303      .94199
0   2.004E-06   1.559E-06   1.360E-06   1.026E-06   7.711E-07   5.198E-07   3.920E-07   3.119E-07
       78.743      85.829      86.616      87.141      95.014      97.638      98.950     100.000
       .94831     1.03365     1.04313     1.04945     1.14427     1.17587     1.19168     1.20432
```

ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-26	Cont'd on page B-27
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

```
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)=   .114
                                        HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 3)=   .272
                                        HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 4)=   .467
                                        HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 5)=   .654
                                        HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 6)=   .669
                                        HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 7)=   .806
                                        HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 8)=   .819
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   5  1     -7.89311 -14.28541  -1.80889
   5  2     -8.76654 -18.48326  -3.18479
   5  3     -9.62876 -20.43863  -3.88810
   5  4    -10.33296 -24.28579  -5.36827
   5  5     10.96301 -24.50976  -5.45852
   5  6     11.00948 -34.21918  -9.38429
   5  7    -11.63953 -54.01101 -17.60993
   5  8     11.73961      NUMXQ(K)=  8
                                        BACK EXTRAPOLATION FOR  1 PERCENTILE.
     4.792E-04              .012              1.000
     2.832E-04              .036              3.000
     2.186E-04              .060              5.000
     1.481E-04              .120             10.000
     9.963E-05              .181             15.000
     7.454E-05              .241             20.000
     5.782E-05              .301             25.000
     4.573E-05              .361             30.000
     3.737E-05              .422             35.000
     3.083E-05              .482             40.000
     2.477E-05              .542             45.000
     2.031E-05              .602             50.000
     1.693E-05              .662             55.000
     1.284E-05              .723             60.000
     9.783E-06              .783             65.000
0    2.878E-05              0.5              41.52
CANNUAL AVERAGE =    1.67E-06
OK=  5      FIVEXQ(K)= 2.878E-05      FIVEPR(K)=41.517
```

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                METROROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                       WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE            DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE WNW SECTOR.
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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=1431.SQ.METERS	USED
A	.4	1.48	1950.	0.	0.	556.3	364.0	556.3	3.701E-06	3.693E-06	3.693E-06
A	1.0	5.19	1950.	0.	0.	556.3	364.0	556.3	1.563E-06	1.559E-06	1.559E-06
A	2.0	8.10	1950.	0.	0.	556.3	364.0	556.3	7.728E-07	7.711E-07	7.711E-07
A	3.0	6.23	1950.	0.	0.	556.3	364.0	556.3	5.209E-07	5.198E-07	5.198E-07
A	4.0	1.87	1950.	0.	0.	556.3	364.0	556.3	3.929E-07	3.920E-07	3.920E-07
A	5.0	.83	1950.	C.	0.	556.3	364.0	556.3	3.126E-07	3.119E-07	3.119E-07
A	6.0	.21	1950.	0.	0.	556.3	364.0	556.3	2.614E-07	2.609E-07	2.609E-07
B	.4	.34	1950.	0.	0.	320.6	240.6	320.6	9.719E-06	9.662E-06	9.662E-06
B	1.0	1.04	1950.	0.	0.	320.6	240.6	320.6	4.104E-06	4.080E-06	4.080E-06
B	2.0	2.28	1950.	0.	0.	320.6	240.6	320.6	2.029E-06	2.017E-06	2.017E-06
B	3.0	1.04	1950.	0.	0.	320.6	240.6	320.6	1.368E-06	1.360E-06	1.360E-06
B	4.0	1.45	1950.	0.	0.	320.6	240.6	320.6	1.032E-06	1.026E-06	1.026E-06
B	5.0	.42	1950.	0.	0.	320.6	240.6	320.6	8.208E-07	8.159E-07	8.159E-07
C	.4	.29	1950.	0.	0.	253.6	154.7	253.6	1.910E-05	1.888E-05	1.888E-05
C	2.0	.83	1950.	0.	0.	253.6	154.7	253.6	8.064E-06	7.972E-06	7.972E-06
C	2.0	.62	1950.	0.	0.	253.6	154.7	253.6	3.988E-06	3.942E-06	3.942E-06
C	3.0	.21	1950.	0.	0.	253.6	154.7	253.6	2.688E-06	2.657E-06	2.657E-06
C	4.0	.83	1950.	0.	0.	253.6	154.7	253.6	2.027E-06	2.004E-06	2.004E-06
C	5.0	.42	1950.	0.	0.	253.6	154.7	253.6	1.613E-06	1.594E-06	1.594E-06

D	.4	.66	1950.	0.	0.	114.1	75.2	114.1	8.742E-05	8.301E-05	8.301E-05
D	1.0	2.70	1950.	0.	0.	114.1	75.2	114.1	3.691E-05	3.505E-05	3.505E-05
D	2.0	6.64	1950.	0.	0.	114.1	75.2	114.1	1.825E-05	1.733E-05	1.733E-05
D	3.0	6.02	1950.	0.	0.	114.1	75.2	114.1	1.230E-05	1.168E-05	1.168E-05
D	4.0	5.40	1950.	0.	0.	114.1	75.2	114.1	9.279E-06	8.811E-06	8.811E-06
D	5.0	1.45	1950.	0.	0.	114.1	75.2	114.1	7.382E-06	7.009E-06	7.009E-06
D	6.0	1.04	1950.	0.	0.	114.1	75.2	114.1	6.174E-06	5.863E-06	5.863E-06
D	8.0	.21	1950.	0.	0.	114.1	75.2	114.1	4.626E-06	4.393E-06	4.393E-06
E	.4	.86	1950.	0.	0.	195.7	22.3	195.7	1.722E-04	1.559E-04	1.559E-04
E	1.0	3.32	1950.	0.	0.	195.7	22.3	195.7	7.269E-05	6.581E-05	6.581E-05
E	2.0	6.44	1950.	0.	0.	195.7	22.3	195.7	3.595E-05	3.254E-05	3.254E-05
E	3.0	4.15	1950.	0.	0.	195.7	22.3	195.7	2.423E-05	2.194E-05	2.194E-05
E	4.0	5.19	1950.	0.	0.	195.7	22.3	195.7	1.827E-05	1.654E-05	1.654E-05
E	5.0	2.49	1950.	0.	0.	195.7	22.3	195.7	1.454E-05	1.316E-05	1.316E-05
E	6.0	.42	1950.	0.	0.	195.7	22.3	195.7	1.216E-05	1.101E-05	1.101E-05
F	.4	.91	1950.	0.	0.	303.4	8.4	303.4	2.935E-04	2.491E-04	2.491E-04
F	1.0	3.32	1950.	0.	0.	303.4	8.4	303.4	1.239E-04	1.052E-04	1.052E-04
F	2.0	4.98	1950.	0.	0.	303.4	8.4	303.4	6.128E-05	5.201E-05	5.201E-05
F	3.0	2.08	1950.	0.	0.	303.4	8.4	303.4	4.131E-05	3.506E-05	3.506E-05
F	4.0	.83	1950.	0.	0.	303.4	8.4	303.4	3.115E-05	2.644E-05	2.644E-05
F	5.0	.42	1950.	0.	0.	303.4	8.4	303.4	2.478E-05	2.103E-05	2.103E-05
G	.4	1.42	1950.	0.	0.	488.9	3.2	488.9	4.828E-04	3.733E-04	3.733E-04
G	1.0	4.15	1950.	0.	0.	488.9	3.2	488.9	2.039E-04	1.576E-04	1.576E-04
G	2.0	1.25	1950.	0.	0.	488.9	3.2	488.9	1.008E-04	7.794E-05	7.794E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0 WNW SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:   C=   .5     A=  2861.     D=   70.0
 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   3.733E-04   2.491E-04   1.576E-04   1.559E-04   1.052E-04   8.301E-05   7.794E-05   6.581E-05   5.201E-05   3.506E-05
        1.427       2.328       6.480       7.341      10.663      11.322      12.567      15.889      20.872      22.948
       .02157      .03544      .09865      .11175      .16232      .17236      .19132      .24189      .31774      .34935
0   3.505E-05   3.254E-05   2.644E-05   2.194E-05   2.103E-05   1.888E-05   1.733E-05   1.654E-05   1.316E-05   1.168E-05
       25.647      32.083      32.913      37.065      37.481      37.768      44.411      49.602      52.093      58.114
       .39043      .48841      .50105      .56426      .57059      .57496      .67609      .75511      .79303      .88469
0   1.101E-05   9.662E-06   8.811E-06   7.972E-06   7.009E-06   5.863E-06   4.393E-06   4.080E-06   3.942E-06   3.693E-06
       58.529      58.871      64.269      65.099      66.553      67.591      67.798      68.836      69.459      70.934
       .89101      .89622      .97839      .99104     1.01316     1.02896     1.03212     1.04793     1.05741     1.07987
0   2.657E-06   2.017E-06   2.004E-06   1.594E-06   1.559E-06   1.360E-06   1.026E-06   8.159E-07   7.711E-07   5.198E-07
       71.142      73.426      74.256      74.671      79.862      80.900      82.353      82.768      90.865      97.093
      1.08303     1.11779     1.13043     1.13676     1.21577     1.23157     1.25370     1.26002     1.38328     1.47810
0   3.920E-07   3.119E-07   2.609E-07
       98.962      99.792     100.000
      1.50654     1.51918     1.52234
```

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

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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)=    .112
                                                                          HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=    .488
                                                                          HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=    .754
                                                                          HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=    .884
                                                                          HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=    .977
                                                                          HANDCHECK GRAPH:  SLOPE LT  1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   1.012
0  K  I    XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   6  1      -7.89311 -14.53560  -1.88693
   6  2      -8.76654 -18.89070  -3.31139
   6  3     -10.33296  21.68706  -4.39343
   6  4     -11.00948 -25.60153  -6.00410
   6  5     -11.35742 -29.23881  -7.53726
   6  6     -11.63953 -52.42868 -17.46881
   6  7     -11.86825     NUMXQ(K)=  7
                                                                          BACK EXTRAPOLATION FOR  1 PERCENTILE.
      4.435E-04              .015              1.000
      2.540E-04              .046              3.000
      1.930E-04              .076              5.000
      1.142E-04              .152             10.000
      7.499E-05              .228             15.000
      5.509E-05              .304             20.000
      4.310E-05              .381             25.000
      3.513E-05              .457             30.000
      2.850E-05              .533             35.000
      2.320E-05              .609             40.000
      1.930E-05              .685             45.000
      1.626E-05              .761             50.000
      1.319E-05              .837             55.000
      1.069E-05              .913             60.000
      8.182E-06              .990             65.000
0     3.141E-05             0.5               32.84
0ANNUAL AVERAGE =    1.72E-06
0K=  6      FIVEXQ(K)= 3.141E-05      FIVEPR(K)=32.844
```

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: 11/19/2003 TIME: 23: 4:56
/PLANT NAME: CGS
METEOROLOGICAL INSTRUMENTATION
DATA PERIOD: JFD 1996-1999
WIND SENSORS HEIGHT: 10.0 METERS
TYPE OF RELEASE: GROUND LEVEL RELEASE
DELTA-T HEIGHTS: 10 - 75 METERS
SOURCE OF DATA: MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
COMMENTS: input file: P96-99-F.inp output file: P96-99-F.out sigma-desert + P-G
PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE NW SECTOR.

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=1431.SQ.METERS	USED
A	.4	.53	1950.	0.	0.	556.3	364.0	556.3	3.701E-06	3.693E-06	3.693E-06
A	1.0	1.86	1950.	0.	0.	556.3	364.0	556.3	1.563E-06	1.559E-06	1.559E-06
A	2.0	5.18	1950.	0.	0.	556.3	364.0	556.3	7.728E 07	7.711E-07	7.711E-07
A	3.0	3.32	1950.	0.	0.	556.3	364.C	556.3	5.209E-07	5.198E-07	5.198E-07
A	4.0	2.92	1950.	0.	0.	556.3	364.0	556.3	3.929E-07	3.920E-07	3.920E-07
A	5.0	1.46	1950.	0.	0.	556.3	364.0	556.3	3.126E-07	3.119E-07	3.119E-07
A	6.0	.40	1950.	0.	0.	556.3	364.0	556.3	2.614E-07	2.609E-07	2.609E-07
A	8.0	.07	1950.	0.	0.	556.3	364.0	556.3	1.959E-07	1.955E-07	1.955E-07
B	.4	.13	1950.	0.	0.	320.6	240.6	320.6	9.719E-06	9.662E-06	9.662E-06
B	1.0	.40	1950.	0.	0.	320.6	240.6	320.6	4.104E-06	4.080E-06	4.080E-06
B	2.0	.80	1950.	0.	0.	320.6	240.6	320.6	2.029E-06	2.017E-06	2.017E-06
B	3.0	1.33	1950.	0.	0.	320.6	240.6	320.6	1.368E-06	1.360E-06	1.360E-06
B	4.0	.80	1950.	0.	0.	320.6	240.6	320.6	1.032E-06	1.026E-06	1.026E-06
B	5.0	.20	1950.	0.	0.	320.6	240.6	320.6	8.208E-07	8.159E-07	8.159E-07
B	6.0	.13	1950.	0.	0.	320.6	240.6	320.6	6.865E-07	6.825E-07	6.825E-07
B	8.0	.20	1950.	0.	0.	320.6	240.6	320.6	5.144E-07	5.114E-07	5.114E-07
C	.4	.11	1950.	0.	0.	253.6	154.7	253.6	1.910E-05	1.888E-05	1.888E-05
C	1.0	.33	1950.	0.	0.	253.6	154.7	253.6	8.064E-06	7.972E-06	7.972E-06
C	2.0	.53	1950.	0.	0.	253.6	154.7	253.6	3.988E-06	3.942E-06	3.942E-06
C	3.0	1.33	1950.	0.	0.	253.6	154.7	253.6	2.688E-06	2.657E-06	2.657E-06
C	4.0	.73	1950.	0.	0.	253.6	154.7	253.6	2.027E-06	2.004E-06	2.004E-06
C	5.0	.46	1950.	0.	0.	253.6	154.7	253.6	1.613E-06	1.594E-06	1.594E-06
C	6.0	.07	1950.	0.	0.	253.6	154.7	253.6	1.349E-06	1.334E-06	1.334E-06
C	8.0	.33	1950.	0.	0.	253.6	154.7	253.6	1.011E-06	9.992E-07	9.992E-07

Cont'd on page B-33

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

D	.4	.44	1950.	0.	0.	114.1	75.2	114.1	8.742E-05	8.301E-05	8.301E-05
D	1.0	1.79	1950.	0.	0.	114.1	75.2	114.1	3.691E-05	3.505E-05	3.505E-05
D	2.0	4.32	1950.	0.	0.	114.1	75.2	114.1	1.825E-05	1.733E-05	1.733E-05
D	3.0	4.05	1950.	0.	0.	114.1	75.2	114.1	1.230E-05	1.168E-05	1.168E-05
D	4.0	4.58	1950.	0.	0.	114.1	75.2	114.1	9.279E-06	8.811E-06	8.811E-06
D	5.0	2.79	1950.	0.	0.	114.1	75.2	114.1	7.382E-06	7.009E-06	7.009E-06
D	6.0	1.06	1950.	0.	0.	114.1	75.2	114.1	6.174E-06	5.863E-06	5.863E-06
D	8.0	.27	1950.	0.	0.	114.1	75.2	114.1	4.626E-06	4.393E-06	4.393E-06
D	10.0	.07	1950.	0.	0.	114.1	75.2	114.1	3.699E-06	3.513E-06	3.513E-06
E	.4	.52	1950.	0.	0.	195.7	22.3	195.7	1.722E-04	1.559E-04	1.559E-04
E	1.0	1.99	1950.	0.	0.	195.7	22.3	195.7	7.269E-05	6.581E-05	6.581E-05
E	2.0	5.18	1950.	0.	0.	195.7	22.3	195.7	3.595E-05	3.254E 05	3.254E-05
E	3.0	6.04	1950.	0.	0.	195.7	22.3	195.7	2.423E-05	2.194E-05	2.194E-05
E	4.0	7.30	1950.	0.	0.	195.7	22.3	195.7	1.827E-05	1.654E-05	1.654E-05
E	5.0	5.18	1950.	0.	0.	195.7	22.3	195.7	1.454E-05	1.316E-05	1.316E-05
E	6.0	2.13	1950.	0.	0.	195.7	22.3	195.7	1.216E-05	1.101E-05	1.101E-05
E	8.0	1.46	1950.	0.	0.	195.7	22.3	195.7	9.112E-06	8.249E-06	8.249E-06
E	10.0	.07	1950.	0.	0.	195.7	22.3	195.7	7.285E 06	6.596E-06	6.596E-06
F	.4	.42	1950.	0.	0.	303.4	8.4	303.4	2.935E-04	2.491E-04	2.491E-04
F	1.0	1.53	1950.	0.	0.	303.4	8.4	303.4	1.239E-04	1.052E-04	1.052E-04
F	2.0	4.38	1950.	0.	0.	303.4	8.4	303.4	6.128E-05	5.201E-05	5.201E-05
F	3.0	3.65	1950.	0.	0.	303.4	8.4	303.4	4.131E-05	3.506E-05	3.506E-05
F	4.0	5.64	1950.	0.	0.	303.4	8.4	303.4	3.115E-05	2.644E-05	2.644E-05
F	5.0	2.32	1950.	0.	0.	303.4	8.4	303.4	2.478E-05	2.103E-05	2.103E-05
F	6.0	.60	1950.	0.	0.	303.4	8.4	303.4	2.073E-05	1.759E-05	1.759E-05
F	8.0	.27	1950.	0.	0.	303.4	8.4	303.4	1.553E-05	1.318E-05	1.318E-05
G	.4	.57	1950.	0.	0.	488.9	3.2	488.9	4.828E-04	3.733E-04	3.733E-04
G	1.0	1.66	1950.	0.	0.	488.9	3.2	488.9	2.039E-04	1.576E-04	1.576E-04
G	2.0	2.92	1950.	0.	0.	488.9	3.2	488.9	1.008E-04	7.794E-05	7.794E-05
G	3.0	2.39	1950.	0.	0.	488.9	3.2	488.9	6.795E-05	5.254E-05	5.254E-05
G	4.0	.60	1950.	0.	0.	488.9	3.2	488.9	5.125E-05	3.962E-05	3.962E-05
G	5.0	.20	1950.	0.	0.	488.9	3.2	488.9	4.077E-05	3.152E-05	3.152E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003    TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-P.inp   output file: P96-99-P.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0  NW SECTOR     BOUNDARY DISTANCE = 1950.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:   C=   .5      A=  2861.      D=   70.0
 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   3.733E-04   2.491E-04   1.576E-04   1.559E-04   1.052E-04   8.301E-05   7.794E-05   6.581E-05   5.254E-05   5.201E-05
         .567        .985       2.646       3.162       4.689       5.127       8.049      10.041      12.432      16.815
       .02696      .04690      .12591      .15048      .22318      .24401      .38308      .47789      .59167      .80027
0   3.962E-05   3.506E-05   3.505E-05   3.254E-05   3.152E-05   2.644E-05   2.194E-05   2.103E-05   1.888E-05   1.759E-05
       17.412      21.065      22.858      28.037      28.237      33.881      39.924      42.248      42.363      42.961
       .82871     1.00254     1.08788     1.33440     1.34388     1.61253     1.90014     2.01076     2.01622     2.04467
0   1.733E-05   1.654E-05   1.318E-05   1.316E-05   1.168E-05   1.101E-05   9.662E-06   8.811E-06   8.249E-06   7.972E-06
       47.277      54.582      54.848      60.027      64.078      66.203      66.334      70.917      72.378      72.710
      2.25011     2.59777     2.61041     2.85693     3.04973     3.15086     3.15711     3.37519     3.44472     3.46053
0   7.009E-06   6.596E-06   5.863E-06   4.393E-06   4.080E-06   3.942E-06   3.693E-06   3.513E-06   2.657E-06   2.017E-06
       75.499      75.565      76.628      76.893      77.292      77.823      78.351      78.418      79.746      80.543
      3.59327     3.59643     3.64700     3.65964     3.67860     3.70389     3.72904     3.73220     3.79541     3.83334
0   2.004E-06   1.594E-06   1.559E-06   1.360E-06   1.334E-06   1.026E-06   9.992E-07   8.159E-07   7.711E-07   6.825E-07
       81.273      81.738      83.598      84.926      84.992      85.789      86.121      86.320      91.500      91.633
      3.86811     3.89023     3.97873     4.04194     4.04510     4.08303     4.09883     4.10831     4.35483     4.36115
0   5.198E-07   5.114E-07   3.920E-07   3.119E-07   2.609E-07   1.955E-07
       94.953      95.152      98.074      99.535      99.934     100.000
      4.51918     4.52866     4.66773     4.73726     4.75622     4.75938
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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)=    .150
                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=    .799
                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   1.333
                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   2.595
                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   3.148
                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   3.442
                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   3.590
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   7  1      -7.89321 -14.01708  -1.76960
   7  2      -8.76654 -14.60453  -1.96759
   7  3      -9.86416 -15.72441  -2.43242
   7  4     -10.33296 -15.83454  -2.48211
   7  5     -11.00948 -20.38589  -4.82342
   7  6     -11.41681 -24.84470  -7.22130
   7  7     -11.70542 -27.17987  -8.50469
   7  8     -11.86825      NUMXQ(K)=  8
      2.832E-04               .048              1.000
      1.604E-04               .143              3.000
      1.174E-04               .238              5.000
      7.470E-05               .476             10.000
      5.642E-05               .714             15.000
      4.451E-05               .952             20.000
      3.625E-05              1.190             25.000
      3.047E-05              1.428             30.000
      2.617E-05              1.666             35.000
      2.288E-05              1.904             40.000
      2.027E-05              2.142             45.000
      1.816E-05              2.380             50.000
      1.628E-05              2.618             55.000
      1.357E-05              2.856             60.000
      1.145E-05              3.094             65.000
      9.196E-06              3.332             70.000
      7.192E-06              3.570             75.000
0     7.224E-05              0.5               10.51
0ANNUAL AVERAGE =    3.67E-06
0K=  7      FIVEXQ(K)= 7.224E-05      FIVEPR(K)=10.506
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: 11/19/2003 TIME: 23: 4:56
/PLANT NAME: CGS METEOROLOGICAL INSTRUMENTATION
DATA PERIOD: JFD 1996-1999 WIND SENSORS HEIGHT: 10.0 METERS
TYPE OF RELEASE: GROUND LEVEL RELEASE DELTA-T HEIGHTS: 10 - 75 METERS
SOURCE OF DATA: MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
COMMENTS: input file: P96-99-F.inp output file: P96-99-F.out sigma=desert + P-G
PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE NNW SECTOR.

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=1431.SQ.METERS	USED
A	.4	.14	1950.	0.	0.	556.3	364.0	556.3	3.701E-06	3.693E-06	3.693E-06
A	1.0	.50	1950.	0.	0.	556.3	364.0	556.3	1.563E-06	1.559E-06	1.559E-06
A	2.0	1.77	1950.	0.	0.	556.3	364.0	556.3	7.728E-07	7.711E-07	7.711E-07
A	3.0	2.43	1950.	0.	0.	556.3	364.0	556.3	5.209E-07	5.198E-07	5.198E-07
A	4.0	2.58	1950.	0.	0.	556.3	364.0	556.3	3.929E-07	3.920E-07	3.920E-07
A	5.0	1.12	1950.	0.	0.	556.3	364.0	556.3	3.126E-07	3.119E-07	3.119E-07
A	6.0	.47	1950.	0.	0.	556.3	364.0	556.3	2.614E-07	2.609E-07	2.609E-07
A	8.0	.22	1950.	0.	0.	556.3	364.0	556.3	1.959E-07	1.955E-07	1.955E-07
A	10.0	.06	1950.	0.	0.	556.3	364.0	556.3	1.566E-07	1.563E-07	1.563E-07
A	13.0	.03	1950.	0.	0.	556.3	364.0	556.3	1.206E-07	1.204E-07	1.204E-07
B	.4	.06	1950.	0.	0.	320.6	240.6	320.6	9.719E-06	9.662E-06	9.662E-06
B	1.0	.19	1950.	0.	0.	320.6	240.6	320.6	4.104E-06	4.080E-06	4.080E-06
B	2.0	.25	1950.	0.	0.	320.6	240.6	320.6	2.029E-06	2.017E-06	2.017E-06
B	3.0	.75	1950.	0.	0.	320.6	240.6	320.6	1.368E-06	1.360E-06	1.360E-06
B	4.0	.84	1950.	0.	0.	320.6	240.6	320.6	1.032E-06	1.026E-06	1.026E-06
B	5.0	.50	1950.	0.	0.	320.6	240.6	320.6	8.208E-07	8.159E-07	8.159E-07
B	6.0	.19	1950.	0.	0.	320.6	240.6	320.6	6.865E-07	6.825E-07	6.825E-07
B	8.0	.12	1950.	0.	0.	320.6	240.6	320.6	5.144E-07	5.114E-07	5.114E-07
B	10.0	.03	1950.	0.	0.	320.6	240.6	320.6	4.113E-07	4.089E-07	4.089E-07
C	.4	.02	1950.	0.	0.	253.6	154.7	253.6	1.910E-05	1.888E-05	1.888E-05
C	1.0	.06	1950.	0.	0.	253.6	154.7	253.6	8.064E-06	7.972E-06	7.972E-06
C	2.0	.47	1950.	0.	0.	253.6	154.7	253.6	3.988E-06	3.942E-06	3.942E-06
C	3.0	.97	1950.	0.	0.	253.6	154.7	253.6	2.688E-06	2.657E-06	2.657E-06
C	4.0	.75	1950.	0.	0.	253.6	154.7	253.6	2.027E-06	2.004E-06	2.004E-06
C	5.0	.56	1950.	0.	0.	253.6	154.7	253.6	1.613E-06	1.594E-06	1.594E-06
C	6.0	.34	1950.	0.	0.	253.6	154.7	253.6	1.349E-06	1.334E-06	1.334E-06
C	8.0	.16	1950.	0.	0.	253.6	154.7	253.6	1.011E-06	9.992E-07	9.992E-07
D	.4	.17	1950.	0.	0.	114.1	75.2	114.1	8.742E-05	8.301E-05	8.301E-05
D	1.0	.72	1950.	0.	0.	114.1	75.2	114.1	3.691E-05	3.505E-05	3.505E-05
D	2.0	3.18	1950.	0.	0.	114.1	75.2	114.1	1.825E-05	1.733E-05	1.733E-05
D	3.0	3.95	1950.	0.	0.	114.1	75.2	114.1	1.230E-05	1.168E-05	1.168E-05
D	4.0	3.89	1950.	0.	0.	114.1	75.2	114.1	9.279E-06	8.811E-06	8.811E-06
D	5.0	2.99	1950.	0.	0.	114.1	75.2	114.1	7.382E-06	7.009E-06	7.009E-06
D	6.0	1.34	1950.	0.	0.	114.1	75.2	114.1	6.174E-06	5.863E-06	5.863E-06
D	8.0	1.18	1950.	0.	0.	114.1	75.2	114.1	4.626E-06	4.393E-06	4.393E-06
D	10.0	.09	1950.	0.	0.	114.1	75.2	114.1	3.699E-06	3.513E-06	3.513E-06

E	.4	.28	1950.	0.	0.	195.7	22.3	195.7	1.722E-04	1.559E-04	1.559E-04
E	1.0	1.09	1950.	0.	0.	195.7	22.3	195.7	7.269E-05	6.581E-05	6.581E-05
E	2.0	4.05	1950.	0.	0.	195.7	22.3	195.7	3.595E-05	3.254E 05	3.254E-05
E	3.0	5.36	1950.	0.	0.	195.7	22.3	195.7	2.423E-05	2.194E-05	2.194E-05
E	4.0	6.60	1950.	0.	0.	195.7	22.3	195.7	1.827E-05	1.654E-05	1.654E-05
E	5.0	5.17	1950.	0.	0.	195.7	22.3	195.7	1.454E-05	1.316E-05	1.316E-05
E	6.0	2.83	1950.	0.	0.	195.7	22.3	195.7	1.216E-05	1.101E-05	1.101E-05
E	8.0	2.21	1950.	0.	0.	195.7	22.3	195.7	9.112E-06	8.249E-06	8.249E-06
E	10.0	.09	1950.	0.	0.	195.7	22.3	195.7	7.285E-06	6.596E-06	6.596E-06
F	.4	.34	1950.	0.	0.	303.4	8.4	303.4	2.935E-04	2.491E-04	2.491E-04
F	1.0	1.25	1950.	0.	0.	303.4	8.4	303.4	1.239E-04	1.052E-04	1.052E-04
F	2.0	5.04	1950.	0.	0.	303.4	8.4	303.4	6.128E-05	5.201E-05	5.201E-05
F	3.0	5.95	1950.	0.	0.	303.4	8.4	303.4	4.131E-05	3.506E-05	3.506E-05
F	4.0	5.73	1950.	0.	0.	303.4	8.4	303.4	3.115E-05	2.644E-05	2.644E-05
F	5.0	4.08	1950.	0.	0.	303.4	8.4	303.4	2.478E-05	2.103E-05	2.103E-05
F	6.0	.90	1950.	0.	0.	303.4	8.4	303.4	2.073E-05	1.759E-05	1.759E-05
F	8.0	.65	1950.	0.	0.	303.4	8.4	303.4	1.553E-05	1.318E-05	1.318E-05
F	10.0	.06	1950.	0.	0.	303.4	8.4	303.4	1.242E-05	1.054E-05	1.054E-05
G	.4	.53	1950.	0.	0.	488.9	3.2	488.9	4.828E-04	3.733E 04	3.733E-04
G	1.0	1.56	1950.	0.	0.	488.9	3.2	488.9	2.039E-04	1.576E-04	1.576E-04
G	2.0	3.52	1950.	0.	0.	488.9	3.2	488.9	1.008E-04	7.794E-05	7.794E-05
G	3.0	4.86	1950.	0.	0.	488.9	3.2	488.9	6.795E-05	5.254E-05	5.254E-05
G	4.0	3.02	1950.	0.	0.	488.9	3.2	488.9	5.125E-05	3.962E-05	3.962E-05
G	5.0	1.34	1950.	0.	0.	488.9	3.2	488.9	4.077E-05	3.152E-05	3.152E-05
G	6.0	.31	1950.	0.	0.	488.9	3.2	488.9	3.410E-05	2.637E-05	2.637E-05
G	8.0	.06	1950.	0.	0.	488.9	3.2	488.9	2.555E-05	1.976E-05	1.976E-05
G	10.0	.03	1950.	0.	0.	488.9	3.2	488.9	2.043E-05	1.580E-05	1.580E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0 NNW SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:    C=    .5      A=  2861.     D=    70.0
 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   3.733E-04   2.491E-04   1.576E-04   1.559E-04   1.052E-04   8.301E-05   7.794E-05   6.581E-05   5.254E-05   5.201E-05
         .531        .873       2.429       2.712       3.957       4.132       7.650       8.740      13.597      18.640
       .05392      .08860      .24663      .27529      .40171      .41946      .77661      .88722     1.38027     1.89228
0   3.962E-05   3.506E-05   3.505E-05   3.254E-05   3.152E-05   2.644E-05   2.637E-05   2.194E-05   2.103E-05   1.976E-05
       21.660      27.607      28.323      32.370      33.709      39.438      39.749      45.104      49.183      49.245
      2.19886     2.80252     2.87521     3.28609     3.42199     4.00353     4.03514     4.57875     4.99279     4.99911
0   1.888E-05   1.759E-05   1.733E-05   1.654E-05   1.580E-05   1.318E-05   1.316E-05   1.168E-05   1.101E-05   1.054E-05
       49.267      50.169      53.345      59.945      59.977      60.630      65.799      69.753      72.586      72.648
      5.00129     5.09295     5.41533     6.08536     6.08852     6.15490     6.67955     7.08094     7.36855     7.37487
0   9.662E-06   8.811E-06   8.249E-06   7.972E-06   7.009E-06   6.596E-06   5.863E-06   4.393E-06   4.080E-06   3.942E-06
       72.710      76.601      78.812      78.874      81.863      81.956      83.295      84.478      84.665      85.132
      7.38112     7.77619     8.00059     8.00691     8.31033     8.31981     8.45571     8.57581     8.59478     8.64218
0   3.693E-06   3.513E-06   2.657E-06   2.017E-06   2.004E-06   1.594E-06   1.559E-06   1.360E-06   1.334E-06   1.026E-06
       85.274      85.367      86.332      86.581      87.329      87.889      88.387      89.134      89.477      90.317
      8.65656     8.66604     8.76402     8.78930     8.86515     8.92204     8.97261     9.04847     9.08323     9.16857
0   9.992E-07   8.159E-07   7.711E-07   6.825E-07   5.198E-07   5.114E-07   4.089E-07   3.920E-07   3.119E-07   2.609E-07
       90.473      90.971      92.746      92.933      95.361      95.486      95.517      98.101      99.222      99.689
      9.18437     9.23494     9.41509     9.43406     9.68058     9.69322     9.69638     9.95871    10.07249    10.11990
0   1.955E-07   1.563E-07   1.204E-07
       99.907      99.969     100.000
     10.14202    10.14834    10.15150
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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)=   1.890
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   3.419
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   4.989
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   6.082
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   7.365
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   7.997
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   8.307
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   8  1      -7.89311 -13.29717  -1.65290
   8  2      -9.86416 -13.95033  -1.96738
   8  3     -10.36477 -14.54063  -2.29127
   8  4     -10.76940 -14.80393  -2.45124
   8  5      11.00948 -17.39050  -4.12219
   8  6     -11.41681 -20.95011  -6.57852
   8  7     -11.70542 -22.84182  -7.92467
   8  8     -11.86825     NUMXQ(K)=  8
     2.757E-04             .102              1.000
     1.564E-04             .305              3.000
     1.177E-04             .508              5.000
     7.786E-05            1.015             10.000
     6.011E-05            1.523             15.000
     4.912E-05            2.030             20.000
     4.083E-05            2.538             25.000
     3.492E-05            3.045             30.000
     3.032E-05            3.553             35.000
     2.634E-05            4.061             40.000
     2.320E-05            4.568             45.000
     2.062E-05            5.076             50.000
     1.839E-05            5.583             55.000
     1.651E-05            6.091             60.000
     1.396E-05            6.598             65.000
     1.191E-05            7.106             70.000
     9.822E-06            7.614             75.000
     7.738E-06            8.121             80.000
0    1.187E-04            0.5                4.93
0ANNUAL AVERAGE =   8.64E-06
0K=  8     FIVEXQ(K)= 1.187E-04     FIVEPR(K)= 4.925
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Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: 11/19/2003 TIME: 23: 4:56
/PLANT NAME: CGS METEOROLOGICAL INSTRUMENTATION
DATA PERIOD: JFD 1996-1999 WIND SENSORS HEIGHT: 10.0 METERS
TYPE OF RELEASE: GROUND LEVEL RELEASE DELTA-T HEIGHTS: 10 - 75 METERS
SOURCE OF DATA: MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
COMMENTS: input file: P96-99-F.inp output file: P96-99-F.out sigma-desert + P-G
PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE N SECTOR.

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=1431.SQ.METERS	USED
A	.4	.20	1950.	0.	0.	556.3	364.0	556.3	3.701E-06	3.693E-06	3.693E-06
A	1.0	.71	1950.	0.	0.	556.3	364.0	556.3	1.563E-06	1.559E-06	1.559E-06
A	2.0	1.86	1950.	0.	0.	556.3	364.0	556.3	7.728E-07	7.711E-07	7.711E-07
A	3.0	1.73	1950.	0.	0.	556.3	364.0	556.3	5.209E-07	5.198E-07	5.198E-07
A	4.0	1.49	1950.	0.	0.	556.3	364.0	556.3	3.929E-07	3.920E-07	3.920E-07
A	5.0	1.62	1950.	0.	0.	556.3	364.0	556.3	3.126E-07	3.119E-07	3.119E-07
A	6.0	1.49	1950.	0.	0.	556.3	364.0	556.3	2.614E-07	2.609E-07	2.609E-07
A	8.0	1.62	1950.	0.	0.	556.3	364.0	556.3	1.959E-07	1.955E-07	1.955E-07
A	10.0	.52	1950.	0.	0.	556.3	364.0	556.3	1.566E-07	1.563E-07	1.563E-07
A	13.0	.18	1950.	0.	0.	556.3	364.0	556.3	1.206E-07	1.204E-07	1.204E-07
B	.4	.04	1950.	0.	0.	320.6	240.6	320.6	9.719E-06	9.662E-06	9.662E-06
B	1.0	.13	1950.	0.	0.	320.6	240.6	320.6	4.104E-06	4.080E-06	4.080E-06
B	2.0	.58	1950.	0.	0.	320.6	240.6	320.6	2.029E-06	2.017E-06	2.017E-06
B	3.0	.78	1950.	0.	0.	320.6	240.6	320.6	1.368E-06	1.360E-06	1.360E-06
B	4.0	.63	1950.	0.	0.	320.6	240.6	320.6	1.032E-06	1.026E-06	1.026E-06
B	5.0	.76	1950.	0.	0.	320.6	240.6	320.6	8.208E-07	8.159E-07	8.159E-07
B	6.0	.39	1950.	0.	0.	320.6	240.6	320.6	6.865E-07	6.825E-07	6.825E-07
B	8.0	.55	1950.	0.	0.	320.6	240.6	320.6	5.144E-07	5.114E-07	5.114E-07
B	10.0	.08	1950.	0.	0.	320.6	240.6	320.6	4.113E-07	4.089E-07	4.089E-07
C	.4	.05	1950.	0.	0.	253.6	154.7	253.6	1.910E-05	1.888E-05	1.888E-05
C	1.0	.16	1950.	0.	0.	253.6	154.7	253.6	8.064E-06	7.972E-06	7.972E-06
C	2.0	.37	1950.	0.	0.	253.6	154.7	253.6	3.988E-06	3.942E-06	3.942E-06
C	3.0	.68	1950.	0.	0.	253.6	154.7	253.6	2.688E-06	2.657E-06	2.657E-06
C	4.0	.76	1950.	0.	0.	253.6	154.7	253.6	2.027E-06	2.004E-06	2.004E-06
C	5.0	.52	1950.	0.	0.	253.6	154.7	253.6	1.613E-06	1.594E-06	1.594E-06
C	6.0	.52	1950.	0.	0.	253.6	154.7	253.6	1.349E-06	1.334E-06	1.334E-06
C	8.0	.39	1950.	0.	0.	253.6	154.7	253.6	1.011E-06	9.992E-07	9.992E-07
C	10.0	.16	1950.	0.	0.	253.6	154.7	253.6	8.082E-07	7.989E-07	7.989E-07
C	13.0	.05	1950.	0.	0.	253.6	154.7	253.6	6.225E-07	6.153E-07	6.153E-07
D	.4	.20	1950.	0.	0.	114.1	75.2	114.1	8.742E-05	8.301E-05	8.301E-05
D	1.0	.84	1950.	0.	0.	114.1	75.2	114.1	3.691E-05	3.505E-05	3.505E-05
D	2.0	2.67	1950.	0.	0.	114.1	75.2	114.1	1.825E-05	1.733E-05	1.733E-05
D	3.0	2.80	1950.	0.	0.	114.1	75.2	114.1	1.230E-05	1.168E-05	1.168E-05
D	4.0	3.30	1950.	0.	0.	114.1	75.2	114.1	9.279E-06	8.811E-06	8.811E-06
D	5.0	2.69	1950.	0.	0.	114.1	75.2	114.1	7.382E-06	7.009E-06	7.009E-06
D	6.0	1.88	1950.	0.	0.	114.1	75.2	114.1	6.174E-06	5.863E-06	5.863E-06
D	8.0	2.77	1950.	0.	0.	114.1	75.2	114.1	4.626E-06	4.393E-06	4.393E-06
D	10.0	1.02	1950.	0.	0.	114.1	75.2	114.1	3.699E-06	3.513E-06	3.513E-06
D	13.0	.34	1950.	0.	0.	114.1	75.2	114.1	2.849E-06	2.705E-06	2.705E-06
D	18.0	.05	1950.	0.	0.	114.1	75.2	114.1	2.058E-06	1.954E-06	1.954E-06

E	.4	.42	1950.	0.	0.	195.7	22.3	195.7	1.722E-04	1.559E-04	1.559E-04
E	1.0	1.62	1950.	0.	0.	195.7	22.3	195.7	7.269E-05	6.581E-05	6.581E-05
E	2.0	4.05	1950.	0.	0.	195.7	22.3	195.7	3.595E-05	3.254E-05	3.254E-05
E	3.0	4.00	1950.	0.	0.	195.7	22.3	195.7	2.423E-05	2.194E-05	2.194E-05
E	4.0	4.00	1950.	0.	0.	195.7	22.3	195.7	1.827E-05	1.654E-05	1.654E-05
E	5.0	4.58	1950.	0.	0.	195.7	22.3	195.7	1.454E-05	1.316E-05	1.316E-05
E	6.0	3.56	1950.	0.	0.	195.7	22.3	195.7	1.216E-05	1.101E-05	1.101E-05
E	8.0	3.50	1950.	0.	0.	195.7	22.3	195.7	9.112E-06	8.249E-06	8.249E-06
E	10.0	.63	1950.	0.	0.	195.7	22.3	195.7	7.285E-06	6.596E-06	6.596E-06
E	13.0	.21	1950.	0.	0.	195.7	22.3	195.7	5.611E-06	5.080E-06	5.080E-06
E	18.0	.05	1950.	0.	0.	195.7	22.3	195.7	4.053E-06	3.670E-06	3.670E-06
F	.4	.46	1950.	0.	0.	303.4	8.4	303.4	2.935E-04	2.491E-04	2.491E-04
F	1.0	1.67	1950.	0.	0.	303.4	8.4	303.4	1.239E-04	1.052E-04	1.052E-04
F	2.0	5.20	1950.	0.	0.	303.4	8.4	303.4	6.128E-05	5.201E-05	5.201E-05
F	3.0	6.07	1950.	0.	0.	303.4	8.4	303.4	4.131E-05	3.506E-05	3.506E-05
F	4.0	4.79	1950.	0.	0.	303.4	8.4	303.4	3.115E-05	2.644E-05	2.644E-05
F	5.0	2.46	1950.	0.	0.	303.4	8.4	303.4	2.478E-05	2.103E-05	2.103E-05
F	6.0	1.07	1950.	0.	0.	303.4	8.4	303.4	2.073E-05	1.759E-05	1.759E-05
F	8.0	.86	1950.	0.	0.	303.4	8.4	303.4	1.553E-05	1.318E-05	1.318E-05
F	10.0	.08	1950.	0.	0.	303.4	8.4	303.4	1.242E-05	1.054E-05	1.054E-05
F	13.0	.05	1950.	0.	0.	303.4	8.4	303.4	9.565E-06	8.118E-06	8.118E-06
G	.4	.49	1950.	0.	0.	488.9	3.2	488.9	4.828E-04	3.733E-04	3.733E-04
G	1.0	1.44	1950.	0.	0.	488.9	3.2	488.9	2.039E-04	1.576E-04	1.576E-04
G	2.0	3.37	1950.	0.	0.	488.9	3.2	488.9	1.008E-04	7.794E-05	7.794E-05
G	3.0	4.11	1950.	0.	0.	488.9	3.2	488.9	6.795E-05	5.254E-05	5.254E-05
G	4.0	2.59	1950.	0.	0.	488.9	3.2	488.9	5.125E-05	3.962E-05	3.962E-05
G	5.0	.71	1950.	0.	0.	488.9	3.2	488.9	4.077E-05	3.152E-05	3.152E-05
G	6.0	.24	1950.	0.	0.	488.9	3.2	488.9	3.410E-05	2.637E-05	2.637E-05
G	8.0	.08	1950.	0.	0.	488.9	3.2	488.9	2.555E-05	1.976E-05	1.976E-05
G	10.0	.05	1950.	0.	0.	488.9	3.2	488.9	2.043E-05	1.580E-05	1.580E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                       WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE            DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0   N SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:   C=   .5      A=  2861.      D=   70.0
 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   3.733E-04   2.491E-04   1.576E-04   1.559E-04   1.052E-04   8.301E-05   7.794E-05   6.581E-05   5.254E-05   5.201E-05
         .491        .950       2.388       2.809       4.482       4.687       8.060       9.682      13.788      18.993
       .05932      .11480      .28863      .33940      .54168      .56637      .97408     1.17004     1.66625     2.29520
0   3.962E-05   3.506E-05   3.505E-05   3.254E-05   3.152E-05   2.644E-05   2.637E-05   2.194E-05   2.103E-05   1.976E-05
       21.582      27.649      28.486      32.540      33.246      38.032      38.268      42.269      44.728      44.806
      2.60809     3.34134     3.44248     3.93236     4.01770     4.59608     4.62453     5.10809     5.40518     5.41467
0   1.888E-05   1.759E-05   1.733E-05   1.654E-05   1.580E-05   1.318E-05   1.316E-05   1.168E-05   1.101E-05   1.054E-05
       44.860      45.933      48.600      52.602      52.654      53.517      58.094      60.892      64.449      64.528
      5.42122     5.55080     5.87318     6.35675     6.36307     6.46737     7.02046     7.35864     7.78848     7.79796
0   9.662E-06   8.811E-06   8.249E-06   8.118E-06   7.972E-06   7.009E-06   6.596E-06   5.863E-06   5.080E-06   4.393E-06
       64.571      67.866      71.371      71.423      71.580      74.274      74.901      76.784      76.994      79.766
      7.80317     8.20140     8.62491     8.63123     8.65020     8.97573     9.05159     9.27915     9.30443     9.63945
0   4.080E-06   3.942E-06   3.693E-06   3.670E-06   3.513E-06   2.705E-06   2.657E-06   2.017E-06   2.004E-06   1.954E-06
       79.897      80.263      80.463      80.516      81.536      81.876      82.556      83.131      83.890      83.942
      9.65525     9.69950     9.72376     9.73008     9.85334     9.89443     9.97660    10.04613    10.13779    10.14411
0   1.594E-06   1.559E 06   1.360E-06   1.334E-06   1.026E-06   9.992E-07   8.159E-07   7.989E-07   7.711E-07   6.825E-07
       84.465      85.171      85.956      86.479      87.106      87.499      88.257      88.414      90.271      90.663
     10.20732    10.29266    10.38747    10.45069    10.52654    10.57395    10.66560    10.68457    10.90897    10.95637
0   6.153E-07   5.198E-07   5.114E-07   4.089E-07   3.920E-07   3.119E-07   2.609E-07   1.955E-07   1.563E-07   1.204E-07
       90.726      92.442      92.991      93.069      94.560      96.182      97.672      99.294      99.817     100.000
     10.96270    11.17129    11.23766    11.24715    11.42730    11.62325    11.80340    11.99936    12.06257    12.08469
```

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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)=  2.293
                                                  HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 3)=  3.929
                                                  HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 4)=  4.621
                                                  HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 5)=  6.353
                                                  HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 6)=  7.785
                                                  HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 7)=  8.621
                                                  HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 8)=  8.972
                                                  HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 9)=  9.276
0  K  I    XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   9  1      -7.89311 -13.02357  -1.58231
   9  2      -9.86416 -13.80166  -1.97200
   9  3     -10.33296 -15.18981  -2.76117
   9  4     -10.54338 -15.54032  -2.96946
   9  5     -11.00948 -16.86686   3.83886
   9  6     -11.41681 -18.83233  -5.22329
   9  7     -11.70542 -21.81211  -7.40716
   9  8     -11.86825  24.82745  -9.65329
   9  9     -12.04686     NUMXQ(K)=  9
     2.684E-04              .121             1.000
     1.547E-04              .363             3.000
     1.172E 04              .604             5.000
     7.824E-05             1.208            10.000
     6.071E-05             1.813            15.000
     4.981E-05             2.417            20.000
     4.116E-05             3.021            25.000
     3.503E-05             3.625            30.000
     2.963E-05             4.230            35.000
     2.476E-05             4.834            40.000
     2.088E-05             5.438            45.000
     1.786E-05             6.042            50.000
     1.515E-05             6.647            55.000
     1.273E-05             7.251            60.000
     1.075E-05             7.855            65.000
     8.719E-06             8.459            70.000
     6.653E-06             9.064            75.000
0    1.301E-04             0.5               4.14
0ANNUAL AVERAGE =    9.87E-06
0K=  9    FIVEXQ(K)= 1.301E-04     FIVEPR(K)= 4.137
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0           RUN DATE: 11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                                METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                       WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE            DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE NNE SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.20	1950.	0.	0.	556.3	364.0	556.3	3.701E-06	3.693E-06	3.693E-06
A	1.0	.69	1950.	0.	0.	556.3	364.0	556.3	1.563E-06	1.559E-06	1.559E-06
A	2.0	1.78	1950.	0.	0.	556.3	364.0	556.3	7.728E-07	7.711E-07	7.711E-07
A	3.0	1.24	1950.	0.	0.	556.3	364.0	556.3	5.209E-07	5.198E-07	5.198E-07
A	4.0	1.24	1950.	0.	0.	556.3	364.0	556.3	3.929E-07	3.920E-07	3.920E-07
A	5.0	1.35	1950.	0.	0.	556.3	364.0	556.3	3.126E-07	3.119E-07	3.119E-07
A	6.0	.91	1950.	0.	0.	556.3	364.0	556.3	2.614E-07	2.609E-07	2.609E-07
A	8.0	1.06	1950.	0.	0.	556.3	364.0	556.3	1.959E-07	1.955E-07	1.955E-07
A	10.0	.18	1950.	0.	0.	556.3	364.0	556.3	1.566E-07	1.563E-07	1.563E-07
A	13.0	.07	1950.	0.	0.	556.3	364.0	556.3	1.206E-07	1.204E-07	1.204E-07
A	18.0	.04	1950.	0.	0.	556.3	364.0	556.3	8.715E-08	8.695E-08	8.695E-08
B	.4	.06	1950.	0.	0.	320.6	240.6	320.6	9.719E-06	9.662E-06	9.662E-06
B	1.0	.18	1950.	0.	0.	320.6	240.6	320.6	4.104E-06	4.080E-06	4.080E-06
B	2.0	.66	1950.	0.	0.	320.6	240.6	320.6	2.029E-06	2.017E-06	2.017E-06
B	3.0	.29	1950.	0.	0.	320.6	240.6	320.6	1.368E-06	1.360E-06	1.360E-06
B	4.0	.55	1950.	0.	0.	320.6	240.6	320.6	1.032E-06	1.026E-06	1.026E-06
B	5.0	.55	1950.	0.	0.	320.6	240.6	320.6	8.208E-07	8.159E-07	8.159E-07
B	6.0	.47	1950.	0.	0.	320.6	240.6	320.6	6.865E-07	6.825E-07	6.825E-07
B	8.0	.69	1950.	0.	0.	320.6	240.6	320.6	5.144E-07	5.114E-07	5.114E-07
B	10.0	.29	1950.	0.	0.	320.6	240.6	320.6	4.113E-07	4.089E-07	4.089E-07
B	13.0	.15	1950.	0.	0.	320.6	240.6	320.6	3.168E-07	3.149E-07	3.149E-07
C	.4	.09	1950.	0.	0.	253.6	154.7	253.6	1.910E-05	1.888E-05	1.888E-05
C	1.0	.25	1950.	0.	0.	253.6	154.7	253.6	8.064E-06	7.972E-06	7.972E-06
C	2.0	.66	1950.	0.	0.	253.6	154.7	253.6	3.988E-06	3.942E-06	3.942E-06
C	3.0	.51	1950.	0.	0.	253.6	154.7	253.6	2.688E-06	2.657E-06	2.657E-06
C	4.0	.51	1950.	0.	0.	253.6	154.7	253.6	2.027E-06	2.004E-06	2.004E-06
C	5.0	.55	1950.	0.	0.	253.6	154.7	253.6	1.613E-06	1.594E-06	1.594E-06
C	6.0	.66	1950.	0.	0.	253.6	154.7	253.6	1.349E-06	1.334E-06	1.334E-06
C	8.0	.73	1950.	0.	0.	253.6	154.7	253.6	1.011E-06	9.992E-07	9.992E-07
C	10.0	.36	1950.	0.	0.	253.6	154.7	253.6	8.082E-07	7.989E-07	7.989E-07
C	13.0	.22	1950.	0.	0.	253.6	154.7	253.6	6.225E-07	6.153E-07	6.153E-07
D	.4	.17	1950.	0.	0.	114.1	75.2	114.1	8.742E-05	8.301E-05	8.301E-05
D	1.0	.69	1950.	0.	0.	114.1	75.2	114.1	3.691E-05	3.505E-05	3.505E-05
D	2.0	2.80	1950.	0.	0.	114.1	75.2	114.1	1.825E-05	1.733E-05	1.733E-05
D	3.0	2.44	1950.	0.	0.	114.1	75.2	114.1	1.230E-05	1.168E-05	1.168E-05
D	4.0	2.37	1950.	0.	0.	114.1	75.2	114.1	9.279E-06	8.811E-06	8.811E-06
D	5.0	3.24	1950.	0.	0.	114.1	75.2	114.1	7.382E-06	7.009E-06	7.009E-06
D	6.0	2.77	1950.	0.	0.	114.1	75.2	114.1	6.174E-06	5.863E-06	5.863E-06
D	8.0	4.26	1950.	0.	0.	114.1	75.2	114.1	4.626E-06	4.393E-06	4.393E-06
D	10.0	2.48	1950.	0.	0.	114.1	75.2	114.1	3.699E-06	3.513E-06	3.513E-06
D	13.0	1.38	1950.	0.	0.	114.1	75.2	114.1	2.849E-06	2.705E-06	2.705E-06
D	18.0	.25	1950.	0.	0.	114.1	75.2	114.1	2.058E-06	1.954E-06	1.954E-06

Cont'd on page B-45

E	.4	.50	1950.	0.	0.	195.7	22.3	195.7	1.722E-04	1.559E-04	1.559E-04
E	1.0	1.93	1950.	0.	0.	195.7	22.3	195.7	7.269E-05	6.581E-05	6.581E-05
E	2.0	4.52	1950.	0.	0.	195.7	22.3	195.7	3.595E-05	3.254E-05	3.254E-05
E	3.0	3.31	1950.	0.	0.	195.7	22.3	195.7	2.423E-05	2.194E-05	2.194E-05
E	4.0	2.26	1950.	0.	0.	195.7	22.3	195.7	1.827E-05	1.654E-05	1.654E-05
E	5.0	2.88	1950.	0.	0.	195.7	22.3	195.7	1.454E-05	1.316E-05	1.316E-05
E	6.0	3.64	1950.	0.	0.	195.7	22.3	195.7	1.216E-05	1.101E-05	1.101E-05
E	8.0	5.97	1950.	0.	0.	195.7	22.3	195.7	9.112E-06	8.249E-06	8.249E 06
E	10.0	4.01	1950.	0.	0.	195.7	22.3	195.7	7.285E-06	6.596E-06	6.596E-06
E	13.0	1.53	1950.	0.	0.	195.7	22.3	195.7	5.611E-06	5.080E-06	5.080E-06
E	18.0	.29	1950.	0.	0.	195.7	22.3	195.7	4.053E-06	3.670E-06	3.670E-06
F	.4	.47	1950.	0.	0.	303.4	8.4	303.4	2.935E-04	2.491E-04	2.491E-04
F	1.0	1.71	1950.	0.	0.	303.4	8.4	303.4	1.239E-04	1.052E-04	1.052E-04
F	2.0	5.24	1950.	0.	0.	303.4	8.4	303.4	6.128E-05	5.201E-05	5.201E-05
F	3.0	4.48	1950.	0.	0.	303.4	8.4	303.4	4.131E-05	3.506E-05	3.506E-05
F	4.0	3.31	1950.	0.	0.	303.4	8.4	303.4	3.115E-05	2.644E-05	2.644E-05
F	5.0	1.38	1950.	0.	0.	303.4	8.4	303.4	2.478E-05	2.103E-05	2.103E-05
F	6.0	1.24	1950.	0.	0.	303.4	8.4	303.4	2.073E-05	1.759E-05	1.759E-05
F	8.0	.98	1950.	0.	0.	303.4	8.4	303.4	1.553E-05	1.318E-05	1.318E-05
F	10.0	.55	1950.	0.	0.	303.4	8.4	303.4	1.242E-05	1.054E-05	1.054E-05
F	13.0	.11	1950.	0.	0.	301.4	8.4	301.4	9.565E-06	8.118E-06	8.118E-06
G	.4	.55	1950.	0.	0.	488.9	3.2	488.9	4.828E-04	3.733E-04	3.733E-04
G	1.0	1.60	1950.	0.	0.	488.9	3.2	488.9	2.039E-04	1.576E-04	1.576E-04
G	2.0	3.86	1950.	0.	0.	488.9	3.2	488.9	1.008E-04	7.794E-05	7.794E-05
G	3.0	1.78	1950.	0.	0.	488.9	3.2	488.9	6.795E-05	5.254E-05	5.254E-05
G	4.0	1.27	1950.	0.	0.	488.9	3.2	488.9	5.125E-05	3.962E-05	3.962E-05
G	5.0	.29	1950.	0.	0.	488.9	3.2	488.9	4.077E-05	3.152E-05	3.152E-05
G	6.0	.22	1950.	0.	0.	488.9	3.2	488.9	3.410E-05	2.637E-05	2.637E-05
G	8.0	.04	1950.	0.	0.	488.9	3.2	488.9	2.555E-05	1.976E-05	1.976E-05
G	13.0	.04	1950.	0.	0.	488.9	3.2	488.9	1.573E-05	1.217E-05	1.217E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003    TIME: 23: 4:56
/PLANT NAME:   CGS                                METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                       WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE            DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0 NNE SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:    C=   .5     A=  2861.     D=   70.0
 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   3.733E-04   2.491E-04   1.576E-04   1.559E-04   1.052E-04   8.301E-05   7.794E-05   6.581E-05   5.254E-05   5.201E-05
         .547       1.016       2.619       3.119       4.831       5.000       8.860      10.790      12.575      17.819
       .04745      .08820      .22726      .27067      .41921      .43387      .76889      .93640     1.09127     1.54639
0   3.962E-05   3.506E-05   3.505E-05   3.254E-05   3.152E-05   2.644E-05   2.637E-05   2.194E-05   2.103E-05   1.976E-05
       19.094      23.574      24.266      28.782      29.073      32.387      32.606      35.920      37.304      37.341
      1.65701     2.04576     2.10581     2.49772     2.52300     2.81061     2.82958     3.11719     3.23729     3.24045
0   1.888E-05   1.759E-05   1.733E-05   1.654E-05   1.318E-05   1.316E-05   1.217E-05   1.168E-05   1.101E-05   1.054E-05
       37.429      38.667      41.471      43.729      44.713      47.590      47.626      50.066      53.708      54.255
      3.24810     3.35555     3.59892     3.79487     3.88021     4.12989     4.13305     4.34481     4.66086     4.70827
0   9.662E-06   8.811E-06   8.249E-06   8.118E-06   7.972E-06   7.009E-06   6.596E-06   5.863E-06   5.080E-06   4.393E-06
       54.315      56.682      62.655      62.764      63.019      66.261      70.267      73.035      74.564      78.825
      4.71348     4.91892     5.43725     5.44673     5.46885     5.75014     6.09780     6.33801     6.47075     6.84053
0   4.080E-06   3.942E-06   3.693E-06   3.670E-06   3.513E-06   2.705E-06   2.657E-06   2.017E-06   2.004E-06   1.954E-06
       79.008      79.663      79.860      80.151      82.628      84.012      84.522      85.177      85.687      85.942
      6.85634     6.91323     6.93030     6.95558     7.17050     7.29060     7.33485     7.39174     7.43598     7.45811
0   1.594E-06   1.559E-06   1.360E-06   1.334E-06   1.026E-06   9.992E-07   8.155E-07   7.989E-07   7.711E-07   6.825E-07
       86.488      87.180      87.472      88.127      88.673      89.402      85.948      90.312      92.097      92.570
      7.50552     7.56557     7.59085     7.64774     7.69515     7.75836     7.80577     7.83738     7.99224     8.03333
0   6.153E-07   5.198E-07   5.114E-07   4.089E-07   3.920E-07   3.149E-07   3.119E-07   2.609E-07   1.955E-07   1.563E-07
       92.789      94.027      94.719      95.010      96.249      96.394      97.742      98.652      99.709      99.891
      8.05229     8.15975     8.21980     8.24509     8.35255     8.36519     8.48213     8.56114     8.65280     8.66860
    1.204E-07   8.695E-08
       99.964     100.000
      8.67492     8.67808
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ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-46	Cont'd on page B-47
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

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          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)=    .270
                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   1.545
                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   2.495
                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   3.234
                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   3.793
                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   5.433
                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   6.094
                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   6.334
0  K  I    XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  10  1      -7.89311 -13.40578  -1.66776
  10  2      -8.76654 -13.66530   1.76106
  10  3      -9.86416 -14.98350  -2.37177
  10  4     -10.33296 -17.88185  -3.84993
  10  5     -10.76940 -16.92771  -3.33346
  10  6      11.00948 -18.22671  -4.06513
  10  7     -11.70542 -17.97172  -3.90618
  10  8     -11.92912 -21.21210  -6.00089
  10  9     -12.04686      NUMXQ(K)=  9
     2.797E-04              .087                 1.000
     1.592E-04              .260                 3.000
     1.182E-04              .434                 5.000
     7.676E-05              .868                10.000
     5.859E-05             1.302                15.000
     4.660E-05             1.736                20.000
     3.748E-05             2.170                25.000
     3.039E-05             2.603                30.000
     2.346E-05             3.037                35.000
     1.895E-05             3.471                40.000
     1.568E-05             3.905                45.000
     1.284E-05             4.339                50.000
     1.068E-05             4.773                55.000
     8.994E-06             5.207                60.000
     7.683E-06             5.641                65.000
     6.645E-06             6.075                70.000
0    1.085E-04             0.5                   5.76
0ANNUAL AVERAGE =    6.73E-06
0X= 10      FIVEXQ(K)= 1.085E-04      FIVEPR(K)= 5.762
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```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE  NE SECTOR.
```

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=1431.SQ.METERS	USED
A	.4	.22	1950.	0.	0.	556.3	364.0	556.3	3.701E-06	3.693E-06	3.693E-06
A	1.0	.76	1950.	0.	0.	556.3	364.0	556.3	1.563E-06	1.559E-06	1.559E-06
A	2.0	1.68	1950.	0.	0.	556.3	364.0	556.3	7.728E-07	7.711E-07	7.711E-07
A	3.0	1.25	1950.	0.	0.	556.3	364.0	556.3	5.209E-07	5.198E-07	5.198E-07
A	4.0	1.30	1950.	0.	0.	556.3	364.0	556.3	3.929E-07	3.920E-07	3.920E-07
A	5.0	1.25	1950.	0.	0.	556.3	364.0	556.3	3.126E-07	3.119E-07	3.119E-07
A	6.0	.60	1950.	0.	0.	556.3	364.0	556.3	2.614E-07	2.609E-07	2.609E-07
A	8.0	1.14	1950.	0.	0.	556.3	364.0	556.3	1.959E-07	1.955E-07	1.955E-07
A	10.0	.60	1950.	0.	0.	556.3	364.0	556.3	1.566E-07	1.563E-07	1.563E-07
A	13.0	.05	1950.	0.	0.	556.3	364.0	556.3	1.206E-07	1.204E-07	1.204E-07
B	.4	.05	1950.	0.	0.	320.6	240.6	320.6	9.719E-06	9.662E-06	9.662E-06
B	1.0	.16	1950.	0.	0.	320.6	240.6	320.6	4.104E-06	4.080E-06	4.080E-06
B	2.0	.87	1950.	0.	0.	320.6	240.6	320.6	2.029E-06	2.017E-06	2.017E-06
B	3.0	.54	1950.	0.	0.	320.6	240.6	320.6	1.368E-06	1.360E-06	1.360E-06
B	4.0	.38	1950.	0.	0.	320.6	240.6	320.6	1.032E-06	1.026E-06	1.026E-06
B	5.0	.54	1950.	0.	0.	320.6	240.6	320.6	8.208E-07	8.159E-07	8.159E-07
B	6.0	.27	1950.	0.	0.	320.6	240.6	320.6	6.865E-07	6.825E-07	6.825E-07
B	8.0	.87	1950.	0.	0.	320.6	240.6	320.6	5.144E-07	5.114E-07	5.114E-07
B	10.0	.43	1950.	0.	0.	320.6	240.6	320.6	4.113E-07	4.089E-07	4.089E-07
B	13.0	.43	1950.	0.	0.	320.6	240.6	320.6	3.168E-07	3.149E-07	3.149E-07
C	.4	.13	1950.	0.	0.	253.6	154.7	253.6	1.910E-05	1.888E-05	1.888E-05
C	1.0	.38	1950.	0.	0.	253.6	154.7	253.6	8.064E-06	7.972E-06	7.972E-06
C	2.0	.49	1950.	0.	0.	253.6	154.7	253.6	3.988E-06	3.942E-06	3.942E-06
C	3.0	.49	1950.	0.	0.	253.6	154.7	253.6	2.688E-06	2.657E-06	2.657E 06
C	4.0	.76	1950.	0.	0.	253.6	154.7	253.6	2.027E-06	2.004E-06	2.004E-06
C	5.0	.81	1950.	0.	0.	253.6	154.7	253.6	1.613E-06	1.594E-06	1.594E-06
C	6.0	.38	1950.	0.	0.	253.6	154.7	253.6	1.349E-06	1.334E-06	1.334E-06
C	8.0	.92	1950.	0.	0.	253.6	154.7	253.6	1.011E-06	9.992E-07	9.992E-07
C	10.0	.70	1950.	0.	0.	253.6	154.7	253.6	8.082E-07	7.989E-07	7.989E-07
C	13.0	.16	1950.	0.	0.	253.6	154.7	253.6	6.225E-07	6.153E-07	6.153E-07
D	.4	.53	1950.	0.	0.	114.1	75.2	114.1	8.742E-05	8.301E-05	8.301E-05
D	1.0	2.17	1950.	0.	0.	114.1	75.2	114.1	3.691E-05	3.505E-05	3.505E-05
D	2.0	2.33	1950.	0.	0.	114.1	75.2	114.1	1.825E-05	1.733E-05	1.733E-05
D	3.0	2.87	1950.	0.	0.	114.1	75.2	114.1	1.230E-05	1.168E-05	1.168E-05
D	4.0	2.76	1950.	0.	0.	114.1	75.2	114.1	9.279E-06	8.811E-06	8.811E-06
D	5.0	2.44	1950.	0.	0.	114.1	75.2	114.1	7.382E-06	7.009E-06	7.009E-06
D	6.0	1.84	1950.	0.	0.	114.1	75.2	114.1	6.174E-06	5.863E-06	5.863E-06
D	8.0	3.47	1950.	0.	0.	114.1	75.2	114.1	4.626E-06	4.393E-06	4.393E-06
D	10.0	2.44	1950.	0.	0.	114.1	75.2	114.1	3.699E-06	3.513E-06	3.513E-06
D	13.0	1.73	1950.	0.	0.	114.1	75.2	114.1	2.849E-06	2.705E-06	2.705E-06
D	18.0	.27	1950.	0.	0.	114.1	75.2	114.1	2.058E 06	1.954E-06	1.954E-06
E	.4	.77	1950.	0.	0.	195.7	22.3	195.7	1.722E-04	1.559E-04	1.559E-04
E	1.0	2.98	1950.	0.	0.	195.7	22.3	195.7	7.269E-05	6.581E-05	6.581E-05
E	2.0	4.82	1950.	0.	0.	195.7	22.3	195.7	3.595E-05	3.254E-05	3.254E-05
E	3.0	3.90	1950.	0.	0.	195.7	22.3	195.7	2.423E-05	2.194E-05	2.194E-05
E	4.0	3.41	1950.	0.	0.	195.7	22.3	195.7	1.827E-05	1.654E-05	1.654E-05
E	5.0	2.82	1950.	0.	0.	195.7	22.3	195.7	1.454E-05	1.316E-05	1.316E-05
E	6.0	3.41	1950.	0.	0.	195.7	22.3	195.7	1.216E-05	1.101E-05	1.101E-05
E	8.0	3.85	1950.	0.	0.	195.7	22.3	195.7	9.112E-06	8.249E-06	8.249E-06
E	10.0	3.36	1950.	0.	0.	195.7	22.3	195.7	7.285E-06	6.596E-06	6.596E-06
E	13.0	1.41	1950.	0.	0.	195.7	22.3	195.7	5.611E-06	5.080E-06	5.080E-06
E	18.0	.27	1950.	0.	0.	195.7	22.3	195.7	4.053E-06	3.670E-06	3.670E-06
F	.4	.83	1950.	0.	0.	303.4	8.4	303.4	2.935E-04	2.491E-04	2.491E-04
F	1.0	3.03	1950.	0.	0.	303.4	8.4	303.4	1.239E-04	1.052E-04	1.052E-04
F	2.0	5.20	1950.	0.	0.	303.4	8.4	303.4	6.128E-05	5.201E-05	5.201E-05
F	3.0	3.52	1950.	0.	0.	303.4	8.4	303.4	4.131E-05	3.506E-05	3.506E-05
F	4.0	2.00	1950.	0.	0.	303.4	8.4	303.4	3.115E-05	2.644E-05	2.644E-05
F	5.0	.87	1950.	0.	0.	303.4	8.4	303.4	2.478E-05	2.103E-05	2.103E-05
F	6.0	.54	1950.	0.	0.	303.4	8.4	303.4	2.073E-05	1.759E-05	1.759E-05
F	8.0	.54	1950.	0.	0.	303.4	8.4	303.4	1.553E-05	1.318E-05	1.318E-05
F	10.0	.05	1950.	0.	0.	303.4	8.4	303.4	1.242E-05	1.054E-05	1.054E-05
F	13.0	.11	1950.	0.	0.	303.4	8.4	303.4	9.565E-06	8.118E-06	8.118E-06
G	.4	1.15	1950.	0.	0.	488.9	3.2	488.9	4.828E-04	3.733E-04	3.733E-04
G	1.0	3.36	1950.	0.	0.	488.9	3.2	488.9	2.039E-04	1.576E-04	1.576E-04
G	2.0	4.06	1950.	0.	0.	488.9	3.2	488.9	1.008E-04	7.794E-05	7.794E-05
G	3.0	1.41	1950.	0.	0.	488.9	3.2	488.9	6.795E-05	5.254E-05	5.254E-05
G	4.0	.81	1950.	0.	0.	488.9	3.2	488.9	5.125E-05	3.962E-05	3.962E-05
G	18.0	.05	1950.	0.	0.	488.9	3.2	488.9	1.137E-05	8.789E-06	8.789E-06

ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-48	Cont'd on page B-49
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:     10    75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96 99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0  NE SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:    C=    .5      A=  2661.      D=   70.0
 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   3.733E-04   2.491E-04   1.576E-04   1.559E-04   1.052E-04   8.301E-05   7.794E-05   6.581E-05   5.254E-05   5.201E-05
        1.146       1.978       5.337       6.109       9.143       9.672      13.735      16.714      18.123      23.324
       .06687      .11541      .31137      .35641      .53340      .56427      .80131      .97514     1.05731     1.36073
0   3.962E 05   3.506E-05   3.505E-05   3.254E 05   2.644E-05   2.194E-05   2.103E-05   1.888E-05   1.759E-05   1.733E-05
       24.136      27.657      29.824      34.646      36.650      40.551      41.417      41.549      42.09?      44.420
      1.40814     1.61357     1.73999     2.02128     2.13822     2.36578     2.41635     2.42400     2.45561     2.59151
0   1.654E-05   1.318E-05   1.316E-05   1.168E-05   1.101E-05   1.054E-05   9.662E-06   8.811E-06   8.789E-06   8.249E-06
       47.833      48.374      51.191      54.063      57.476      57.530      57.583      60.346      60.400      64.247
      2.79063     2.82223     2.98658     3.15409     3.35320     3.35637     3.35949     3.52068     3.52384     3.74824
0   8.118E-06   7.972E-06   7.009E-06   6.596E-06   5.863E-06   5.080E-06   4.393E-06   4.080E-06   3.942E-06   3.693E-06
       64.355      64.734      67.172      70.531      72.373      73.781      77.248      77.411      77.898      78.114
      3.75456     3.77668     3.91891     4.11486     4.22232     4.30450     4.50677     4.51625     4.54470     4.55728
0   3.670E-06   3.513E-06   2.705E-06   2.657E-06   2.017E-06   2.004E-06   1.954E-06   1.594E-06   1.559E-06   1.360E-06
       78.385      80.823      82.556      83.044      83.910      84.669      84.940      85.752      86.511      87.053
      4.57308     4.71530     4.81644     4.84489     4.89545     4.93970     4.95551     5.00291     5.04716     5.07877
0   1.334E-06   1.026E-06   9.992E-07   8.159E-07   7.989E-07   7.711E-07   6.825E-07   6.153E-07   5.198E-07   5.114E-07
       87.432      87.811      88.732      89.274      89.978      91.657      91.928      92.091      93.337      94.203
      5.10089     5.12301     5.17674     5.20835     5.24944     5.34741     5.36322     5.37270     5.44539     5.49596
0   4.089E-07   3.920E-07   3.149E-07   3.119E-07   2.609E-07   1.955E-07   1.563E-07   1.204E-07
       94.637      95.937      96.370      97.616      98.212      99.350      95.946     100.000
      5.52124     5.59710     5.62238     5.69508     5.72984     5.79621     5.83098     5.83414
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Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

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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)=    .356
                                                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   1.359
                                                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   2.019
                                                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   2.788
                                                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   3.350
                                                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   4.111
                                                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   4.503
                                                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   4.712
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  11  1     -7.89311 -13.31378  -1.68968
  11  2     -8.76654 -14.89098  -2.27575
  11  3     -9.86416 -16.37451  -2.94737
  11  4    -10.33296 -20.46327  -4.94207
  11  5    -11.00948 -20.59740  -5.01218
  11  6    -11.41681 -21.42536  -5.46421
  11  7    -11.92912 -28.41419  -9.48564
  11  8    -12.33547 -29.90431 -10.36474
  11  9    -12.55917      NUMXQ(K)=  9
                                                    BACK EXTRAPOLATION FOR  1 PERCENTILE.
      3.987E-04              .058             1.000
      2.296E-04              .175             3.000
      1.743E-04              .292             5.000
      1.062E-04              .583            10.000
      7.614E-05              .875            15.000
      5.954E-05             1.167            20.000
      4.799E-05             1.459            25.000
      3.872E-05             1.750            30.000
      3.187E-05             2.042            35.000
      2.418E-05             2.334            40.000
      1.886E-05             2.625            45.000
      1.501E-05             2.917            50.000
      1.215E-05             3.209            55.000
      9.902E-06             3.500            60.000
      8.110E-06             3.792            65.000
      6.724E-06             4.084            70.000
      5.017E-06             4.376            75.000
      3.695E-06             4.667            80.000
 0    1.200E-04             0.5               8.57
 0ANNUAL AVERAGE =    6.46E-06
 0K= 11     FIVEXQ(K)= 1.200E-04     FIVEPR(K)= 8.570
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE ENE SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.39	1950.	0.	0.	556.3	364.0	556.3	3.701E-06	3.693E-06	3.693E-06
A	1.0	1.36	1950.	0.	0.	556.3	364.0	556.3	1.563E-06	1.559E-06	1.559E-06
A	2.0	1.51	1950.	0.	0.	556.3	364.0	556.3	7.728E-07	7.711E-07	7.711E-07
A	3.0	1.29	1950.	0.	0.	556.3	364.0	556.3	5.209E-07	5.198E-07	5.198E-07
A	4.0	.91	1950.	0.	0.	556.3	364.0	556.3	3.929E-07	3.920E-07	3.920E-07
A	5.0	.61	1950.	0.	0.	556.3	364.0	556.3	3.126E-07	3.119E-07	3.119E-07
A	6.0	.30	1950.	0.	0.	556.3	364.0	556.3	2.614E-07	2.609E-07	2.609E-07
A	8.0	.98	1950.	0.	0.	556.3	364.0	556.3	1.959E-07	1.955E-07	1.955E-07
A	10.0	.61	1950.	0.	0.	556.3	364.0	556.3	1.566E-07	1.563E-07	1.563E-07
A	13.0	.23	1950.	0.	0.	556.3	364.0	556.3	1.206E-07	1.204E-07	1.204E-07
B	.4	.07	1950.	0.	0.	320.6	240.6	320.6	9.719E-06	9.662E-06	9.662E-06
B	1.0	.23	1950.	0.	0.	320.6	240.6	320.6	4.104E-06	4.080E-06	4.080E-06
B	2.0	.68	1950.	0.	0.	320.6	240.6	320.6	2.029E-06	2.017E-06	2.017E-06
B	3.0	.38	1950.	0.	0.	320.6	240.6	320.6	1.368E-06	1.360E-06	1.360E-06
B	4.0	.45	1950.	0.	0.	320.6	240.6	320.6	1.032E-06	1.026E-06	1.026E-06
B	5.0	.30	1950.	0.	0.	320.6	240.6	320.6	8.208E-07	8.159E-07	8.159E-07
B	8.0	.15	1950.	0.	0.	320.6	240.6	320.6	5.144E-07	5.114E-07	5.114E-07
B	10.0	.30	1950.	0.	0.	320.6	240.6	320.6	4.113E-07	4.089E-07	4.089E-07
C	.4	.08	1950.	0.	0.	253.6	154.7	253.6	1.910E-05	1.888E-05	1.888E-05
C	1.0	.23	1950.	0.	0.	253.6	154.7	253.6	8.064E-06	7.972E-06	7.972E-06
C	2.0	1.06	1950.	0.	0.	253.6	154.7	253.6	3.988E-06	3.942E-06	3.942E-06
C	3.0	.45	1950.	0.	0.	253.6	154.7	253.6	2.688E-06	2.657E-06	2.657E-06
C	4.0	.53	1950.	0.	0.	253.6	154.7	253.6	2.027E-06	2.004E-06	2.004E-06
C	5.0	.83	1950.	0.	0.	253.6	154.7	253.6	1.613E-06	1.594E-06	1.594E-06
C	6.0	.38	1950.	0.	0.	253.6	154.7	253.6	1.349E-06	1.334E-06	1.334E-06
C	8.0	.68	1950.	0.	0.	253.6	154.7	253.6	1.011E-06	9.992E-07	9.992E-07
C	10.0	1.06	1950.	0.	0.	253.6	154.7	253.6	8.082E-07	7.989E-07	7.989E-07
C	13.0	.08	1950.	0.	0.	253.6	154.7	253.6	6.225E-07	6.153E-07	6.153E-07
D	.4	.46	1950.	0.	0.	114.1	75.2	114.1	8.742E-05	8.301E-05	8.301E-05
D	1.0	1.89	1950.	0.	0.	114.1	75.2	114.1	3.691E-05	3.505E-05	3.505E-05
D	2.0	2.95	1950.	0.	0.	114.1	75.2	114.1	1.825E-05	1.733E-05	1.733E-05
D	3.0	3.55	1950.	0.	0.	114.1	75.2	114.1	1.230E-05	1.168E-05	1.168E-05
D	4.0	1.89	1950.	0.	0.	114.1	75.2	114.1	9.279E-06	8.811E-06	8.811E-06
D	5.0	1.29	1950.	0.	0.	114.1	75.2	114.1	7.382E-06	7.009E-06	7.009E-06
D	6.0	1.97	1950.	0.	0.	114.1	75.2	114.1	6.174E-06	5.863E-06	5.863E-06
D	8.0	3.71	1950.	0.	0.	114.1	75.2	114.1	4.626E-06	4.393E-06	4.393E-06
D	10.0	3.18	1950.	0.	0.	114.1	75.2	114.1	3.699E-06	3.513E-06	3.513E-06
D	13.0	.83	1950.	0.	0.	114.1	75.2	114.1	2.849E-06	2.705E-06	2.705E-06

E	.4	1.02	1950.	0.	0.	195.7	22.3	195.7	1.722E-04	1.559E-04	1.559E-04
E	1.0	3.93	1950.	0.	0.	195.7	22.3	195.7	7.269E-05	6.581E-05	6.581E-05
E	2.0	7.34	1950.	0.	0.	195.7	22.3	195.7	3.595E-05	3.254E-05	3.254E-05
E	3.0	5.22	1950.	0.	0.	195.7	22.3	195.7	2.423E-05	2.194E-05	2.194E-05
E	4.0	3.40	1950.	0.	0.	195.7	22.3	195.7	1.827E-05	1.654E-05	1.654E-05
E	5.0	2.57	1950.	0.	0.	195.7	22.3	195.7	1.454E-05	1.316E-05	1.316E-05
E	6.0	2.50	1950.	0.	0.	195.7	22.3	195.7	1.216E-05	1.101E-05	1.101E-05
E	8.0	2.87	1950.	0.	0.	195.7	22.3	195.7	9.112E-06	8.249E-06	8.249E-06
E	10.0	.91	1950.	0.	0.	195.7	22.3	195.7	7.285E-06	6.596E-06	6.596E-06
E	13.0	.45	1950.	0.	0.	195.7	22.3	195.7	5.611E-06	5.080E-06	5.080E-06
F	.4	1.37	1950.	0.	0.	303.4	8.4	303.4	2.935E-04	2.491E-04	2.491E-04
F	1.0	4.99	1950.	0.	0.	303.4	8.4	303.4	1.239E-04	1.052E-04	1.052E-04
F	2.0	6.35	1950.	0.	0.	303.4	8.4	303.4	6.128E-05	5.201E-05	5.201E-05
F	3.0	4.39	1950.	0.	0.	303.4	8.4	303.4	4.131E-05	3.506E-05	3.506E-05
F	4.0	2.12	1950.	0.	0.	303.4	8.4	303.4	3.115E-05	2.644E-05	2.644E-05
F	5.0	1.21	1950.	0.	0.	303.4	8.4	303.4	2.478E-05	2.103E-05	2.103E-05
F	6.0	.38	1950.	0.	0.	303.4	8.4	303.4	2.073E-05	1.759E-05	1.759E-05
F	8.0	.38	1950.	0.	0.	303.4	8.4	303.4	1.553E-05	1.318E-05	1.318E-05
F	13.0	.08	1950.	0.	0.	303.4	8.4	303.4	9.565E-06	8.118E-06	8.118E-06
G	.4	1.47	1950.	0.	0.	488.9	3.2	488.9	4.828E-04	3.733E-04	3.733E-04
G	1.0	4.31	1950.	0.	0.	488.9	3.2	488.9	2.039E-04	1.576E-04	1.576E-04
G	2.0	2.87	1950.	0.	0.	488.9	3.2	488.9	1.008E-04	7.794E-05	7.794E-05
G	3.0	1.21	1950.	0.	0.	488.9	3.2	488.9	6.795E-05	5.254E-05	5.254E-05
G	4.0	.45	1950.	0.	0.	488.9	3.2	488.9	5.125E-05	3.962E-05	3.962E-05
G	5.0	.30	1950.	0.	0.	488.9	3.2	488.9	4.077E-05	3.152E-05	3.152E-05
G	6.0	.08	1950.	0.	0.	488.9	3.2	488.9	3.410E-05	2.637E-05	2.637E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0 ENE SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:   C=   .5     A= 2861.     D=   70.0
 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   3.733E-04   2.491E-04   1.576E-04   1.559E-04   1.052E-04   8.301E-05   7.794E-05   6.581E-05   5.254E-05   5.201E-05
        1.471       2.840       7.151       8.170      13.161      13.623      16.497      20.429      21.639      27.992
       .06147      .11869      .29884      .34143      .55002      .56931      .68942      .85376      .90433     1.16982
0   3.962E-05   3.506E-05   3.505E-05   3.254E-05   3.152E-05   2.644E-05   2.637E-05   2.194E-05   2.103E-05   1.888E-05
       28.446      32.832      34.723      42.059      42.361      44.479      44.554      49.773      50.983      51.061
      1.18878     1.37210     1.45111     1.75768     1.77033     1.85882     1.86198     2.08006     2.13063     2.13391
0   1.759E-05   1.733E-05   1.654E-05   1.318E-05   1.316E-05   1.168E-05   1.101E-05   9.662E-06   8.811E-06   8.249E-06
       51.439      54.389      57.792      58.170      60.741      64.296      66.792      66.866      68.757      71.631
      2.14971     2.27297     2.41520     2.43100     2.53846     2.68700     2.79130     2.79443     2.87344     2.99354
0   8.118E-06   7.972E-06   7.009E-06   6.596E-06   5.863E-06   5.080E-06   4.393E-06   4.080E-06   3.942E-06   3.693E-06
       71.707      71.933      73.219      74.127      76.093      76.547      80.252      80.479      81.538      81.925
      2.99670     3.00618     3.05991     3.09784     3.18002     3.19898     3.35385     3.36333     3.40758     3.42375
0   3.513E-06   2.705E-06   2.657E-06   2.017E-06   2.004E-06   1.594E-06   1.559E-06   1.360E-06   1.334E-06   1.026E-06
       85.101      85.933      86.387      87.068      87.597      88.429      89.790      90.168      90.547      91.000
      3.55649     3.59126     3.61022     3.63866     3.66079     3.69555     3.75244     3.76825     3.78405     3.80301
0   9.992E-07   8.159E-07   7.989E-07   7.711E-07   6.153E-07   5.198E-07   5.114E-07   4.089E-07   3.920E-07   3.119E-07
       91.681      91.984      93.042      94.555      94.631      95.916      96.067      96.370      97.277      97.882
      3.83146     3.84410     3.88835     3.95156     3.95472     4.00845     4.01477     4.02741     4.06534     4.09062
0   2.609E-07   1.955E-07   1.563E-07   1.204E-07
       98.185      99.168      99.773     100.000
      4.10327     4.14435     4.16964     4.17912
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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)=    .341
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=    .549
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   1.168
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   1.756
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   2.413
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   2.789
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   2.991
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   3.351
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   3.553

0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  12  1      -7.89311 -13.25285   1.65823
  12  2      -8.76654 -15.32152  -2.42286
  12  3      -9.15996 -15.65424  -2.55369
  12  4      -9.86416 -16.49446  -2.92427
  12  5     -10.33296 -21.13936  -5.12875
  12  6     -11.00948 -23.92265  -6.53792
  12  7     -11.41681 -29.42709  -9.41558
  12  8     -11.70542 -35.14363 -12.45281
  12  9     -12.33547 -27.78733  -8.43641
  12 10     -12.55917      NUMXQ(K)= 10
                                                      BACK EXTRAPOLATION FOR  1 PERCENTILE.
       4.470E-04              .042              1.000
       2.638E-04              .125              3.000
       2.029E-04              .209              5.000
       1.322E-04              .418             10.000
       9.350E-05              .627             15.000
       7.174E-05              .836             20.000
       5.804E-05             1.045             25.000
       4.811E-05             1.254             30.000
       4.034E-05             1.463             35.000
       3.453E-05             1.672             40.000
       2.826E-05             1.881             45.000
       2.261E-05             2.090             50.000
       1.842E-05             2.299             55.000
       1.490E-05             2.507             60.000
       1.189E-05             2.716             65.000
       9.075E-06             2.925             70.000
       6.403E-06             3.134             75.000
       4.471E-06             3.343             80.000
       3.529E-06             3.552             85.000
0      1.140E-04             0.5               11.96
0ANNUAL AVERAGE =    5.66E-06
0K= 12      FIVEXQ(K)= 1.140E-04      FIVEPR(K)=11.964
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ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-54	Cont'd on page B-55
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

Cont'd on page B-55

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE:  11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE   E SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.28	1950.	0.	0.	556.3	364.0	556.3	3.701E-06	3.693E-06	3.693E-06
A	1.0	1.00	1950.	0.	0.	556.3	364.0	556.3	1.563E-06	1.559E-06	1.559E-06
A	2.0	2.00	1950.	0.	0.	556.3	364.0	556.3	7.728E-07	7.711E-07	7.711E-07
A	3.0	.60	1950.	0.	0.	556.3	364.0	556.3	5.209E-07	5.198E-07	5.198E-07
A	4.0	.73	1950.	0.	0.	556.3	364.0	556.3	3.929E-07	3.920E-07	3.920E-07
A	5.0	.53	1950.	0.	0.	556.3	364.0	556.3	3.126E-07	3.119E-07	3.119E-07
A	6.0	.33	1950.	0.	0.	556.3	364.0	556.3	2.614E-07	2.609E-07	2.609E-07
A	8.0	.60	1950.	0.	0.	556.3	364.0	556.3	1.959E-07	1.955E-07	1.955E-07
A	10.0	.47	1950.	0.	0.	556.3	364.0	556.3	1.566E-07	1.563E-07	1.563E-07
A	13.0	.20	1950.	0.	0.	556.3	364.0	556.3	1.206E-07	1.204E-07	1.204E-07
B	.4	.09	1950.	0.	0.	320.6	240.6	320.6	9.719E-06	9.662E-06	9.662E-06
B	1.0	.27	1950.	0.	0.	320.6	240.6	320.6	4.104E-06	4.080E-06	4.080E-06
B	2.0	.60	1950.	0.	0.	320.6	240.6	320.6	2.029E-06	2.017E-06	2.017E-06
B	3.0	.33	1950.	0.	0.	320.6	240.6	320.6	1.368E-06	1.360E-06	1.360E-06
B	4.0	.40	1950.	0.	0.	320.6	240.6	320.6	1.032E-06	1.026E-06	1.026E-06
B	5.0	.40	1950.	0.	0.	320.6	240.6	320.6	8.208E-07	8.159E-07	8.159E-07
B	6.0	.60	1950.	0.	0.	320.6	240.6	320.6	6.865E-07	6.825E-07	6.825E-07
B	8.0	.67	1950.	0.	0.	320.6	240.6	320.6	5.144E-07	5.114E-07	5.114E-07
B	10.0	.07	1950.	0.	0.	320.6	240.6	320.6	4.113E-07	4.089E-07	4.089E-07
B	13.0	.27	1950.	0.	0.	320.6	240.6	320.6	3.168E-07	3.149E-07	3.149E-07
C	.4	.07	1950.	0.	0.	253.6	154.7	253.6	1.910E-05	1.888E-05	1.888E-05
C	1.0	.20	1950.	0.	0.	253.6	154.7	253.6	8.064E-06	7.972E-06	7.972E-06
C	2.0	.47	1950.	0.	0.	253.6	154.7	253.6	3.988E-06	3.942E-06	3.942E-06
C	3.0	.60	1950.	0.	0.	253.6	154.7	253.6	2.688E-06	2.657E-06	2.657E-06
C	4.0	.53	1950.	0.	0.	253.6	154.7	253.6	2.027E-06	2.004E-06	2.004E-06
C	5.0	.47	1950.	0.	0.	253.6	154.7	253.6	1.613E-06	1.594E-06	1.594E-06
C	6.0	.47	1950.	0.	0.	253.6	154.7	253.6	1.349E-06	1.334E-06	1.334E-06
C	8.0	.67	1950.	0.	0.	253.6	154.7	253.6	1.011E-06	9.992E-07	9.992E-07
C	10.0	.27	1950.	0.	0.	253.6	154.7	253.6	8.082E-07	7.989E-07	7.989E-07
C	13.0	.07	1950.	0.	0.	253.6	154.7	253.6	6.225E-07	6.153E-07	6.153E-07
D	.4	.57	1950.	0.	0.	114.1	75.2	114.1	8.742E-05	8.301E-05	8.301E-05
D	1.0	2.33	1950.	0.	0.	114.1	75.2	114.1	3.691E-05	3.505E-05	3.505E-05
D	2.0	3.33	1950.	0.	0.	114.1	75.2	114.1	1.825E-05	1.733E-05	1.733E-05
D	3.0	1.93	1950.	0.	0.	114.1	75.2	114.1	1.230E-05	1.168E-05	1.168E-05
D	4.0	2.13	1950.	0.	0.	114.1	75.2	114.1	9.279E-06	8.811E-06	8.811E-06
D	5.0	2.67	1950.	0.	0.	114.1	75.2	114.1	7.382E-06	7.009E-06	7.009E-06
D	6.0	1.93	1950.	0.	0.	114.1	75.2	114.1	6.174E-06	5.863E-06	5.863E-06
D	8.0	2.27	1950.	0.	0.	114.1	75.2	114.1	4.626E-06	4.393E-06	4.393E-06
D	10.0	1.20	1950.	0.	0.	114.1	75.2	114.1	3.699E-06	3.513E-06	3.513E-06
D	13.0	.33	1950.	0.	0.	114.1	75.2	114.1	2.849E-06	2.705E-06	2.705E-06
D	18.0	.13	1950.	0.	0.	114.1	75.2	114.1	2.058E-06	1.954E-06	1.954E-06
E	.4	1.07	1950.	0.	0.	195.7	22.3	195.7	1.722E-04	1.559E-04	1.559E-04
E	1.0	4.13	1950.	0.	0.	195.7	22.3	195.7	7.269E-05	6.581E-05	6.581E-05
E	2.0	6.53	1950.	0.	0.	195.7	22.3	195.7	3.595E-05	3.254E-05	3.254E-05
E	3.0	5.40	1950.	0.	0.	195.7	22.3	195.7	2.423E-05	2.194E-05	2.194E-05
E	4.0	5.73	1950.	0.	0.	195.7	22.3	195.7	1.827E-05	1.654E-05	1.654E-05
E	5.0	2.87	1950.	0.	0.	195.7	22.3	195.7	1.454E-05	1.316E-05	1.316E-05
E	6.0	2.87	1950.	0.	0.	195.7	22.3	195.7	1.216E-05	1.101E-05	1.101E-05
E	8.0	2.73	1950.	0.	0.	195.7	22.3	195.7	9.112E-06	8.249E-06	8.249E 06
E	10.0	.80	1950.	0.	0.	195.7	22.3	195.7	7.285E-06	6.596E-06	6.596E-06
E	13.0	.40	1950.	0.	0.	195.7	22.3	195.7	5.611E-06	5.080E-06	5.080E-06
F	.4	1.37	1950.	0.	0.	303.4	8.4	303.4	2.935E-04	2.491E-04	2.491E-04
F	1.0	5.00	1950.	0.	0.	303.4	8.4	303.4	1.239E-04	1.052E-04	1.052E-04
F	2.0	6.80	1950.	0.	0.	303.4	8.4	303.4	6.128E-05	5.201E-05	5.201E-05
F	3.0	3.47	1950.	0.	0.	303.4	8.4	303.4	4.131E-05	3.506E-05	3.506E-05
F	4.0	3.00	1950.	0.	0.	303.4	8.4	303.4	3.115E-05	2.644E-05	2.644E-05
F	5.0	2.13	1950.	0.	0.	303.4	8.4	303.4	2.478E-05	2.103E-05	2.103E-05
F	6.0	1.07	1950.	0.	0.	303.4	8.4	303.4	2.073E-05	1.759E-05	1.759E-05
F	8.0	.13	1950.	0.	0.	303.4	8.4	303.4	1.553E-05	1.318E-05	1.318E-05
F	10.0	.07	1950.	0.	0.	303.4	8.4	303.4	1.242E-05	1.054E-05	1.054E-05
G	.4	1.41	1950.	0.	0.	488.9	3.2	488.9	4.828E-04	3.733E-04	3.733E-04
G	1.0	4.13	1950.	0.	0.	488.9	3.2	488.9	2.039E-04	1.576E-04	1.576E-04
G	2.0	3.60	1950.	0.	0.	488.9	3.2	488.9	1.008E-04	7.794E-05	7.794E-05
G	3.0	1.00	1950.	0.	0.	488.9	3.2	488.9	6.795E-05	5.254E-05	5.254E-05
G	4.0	.87	1950.	0.	0.	488.9	3.2	488.9	5.125E-05	3.962E-05	3.962E-05
G	5.0	.33	1950.	0.	0.	488.9	3.2	488.9	4.077E-05	3.152E-05	3.152E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0               RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:    CGS                                   METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                           WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE                DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0   E SECTOR       BOUNDARY DISTANCE = 1950.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:   C=   .5     A=  2861.     D=   70.0
 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    3.733E-04    2.491E-04    1.576E-04    1.559E-04    1.052E-04    8.301E-05    7.7943-05    6.581E-05    5.254E-05    5.201E-05
         1.410        2.782        6.915        7.986       12.987       13.556       17.156       21.290       22.290       29.090
        .06687       .13188       .32784       .37861       .61565       .64266       .81333      1.00929      1.05670      1.37907
0    3.962E-05    3.506E-05    3.505E-05    3.254E-05    3.152E-05    2.644E-05    2.194E-05    2.103E-05    1.888E-05    1.759E-05
        29.957       33.424       35.757       42.290       42.624       45.624       51.024       53.157       53.227       54.293
       1.42016      1.58451      1.69513      2.00486      2.02067      2.16289      2.41890      2.52003      2.52331      2.57388
0    1.733E-05    1.654E-05    1.318E-05    1.316E-05    1.168E-05    1.101E-05    1.054E-05    9.662E-06    8.811E-06    8.249E-06
        57.627       63.360       63.494       66.360       68.294       71.160       71.227       71.315       73.448       76.182
       2.73191      3.00372      3.01004      3.14594      3.23760      3.37350      3.37666      3.38083      3.48196      3.61155
0    7.972E-06    7.009E-06    6.596E-06    5.863E-06    5.080E-06    4.393E-06    4.080E-06    3.942E-06    3.693E-06    3.513E-06
        76.382       79.048       79.849       81.782       82.182       84.449       84.715       85.182       85.466       86.666
       3.62103      3.74745      3.78538      3.87703      3.89600      4.00346      4.01610      4.03822      4.05170      4.10859
0    2.705E-06    2.657E-06    2.017E-06    2.004E-06    1.954E-06    1.594E-06    1.559E-06    1.360E-06    1.334E-06    1.026E-06
        87.000       87.600       88.200       88.733       88.866       89.333       90.333       90.666       91.133       91.533
       4.12439      4.15284      4.18128      4.20657      4.21289      4.23501      4.28242      4.29822      4.32035      4.33931
0    9.992E-07    8.159E-07    7.989E-07    7.711E-07    6.825E-07    6.153E-07    5.198E-07    5.114E-07    4.089E-07    3.920E-07
        92.200       92.600       92.866       94.867       95.467       95.533       96.133       96.800       96.867       97.600
       4.37091      4.38988      4.40252      4.49734      4.52578      4.52894      4.55739      4.58899      4.59215      4.62692
0    3.149E-07    3.119E-07    2.609E-07    1.955E-07    1.563E-07    1.204E-07
        97.867       98.400       98.733       99.333       99.800      100.000
       4.63956      4.66485      4.68065      4.70909      4.73122      4.74070
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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)=    .378
                                   HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   1.378
                                   HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   2.003
                                   HANDCHECK GRAPH:  SLOPE LT  1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   3.001
                                   HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   3.370
                                   HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   3.608
                                   HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   3.744
                                   HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   3.874
                                   HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   4.105
0  K  I    XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  13  1      -7.89311 -13.10971  -1.62607
  13  2      -8.76654 -15.03985  -2.34871
  13  3      -9.86416 -16.73080  -3.11606
  13  4     -10.33296 -18.38447  -3.92147
  13  5      11.00948 -25.81873  -7.87447
  13  6     -11.41681 -28.51189  -9.34699
  13  7     -11.70642 -29.04175  -9.64168
  13  8     -11.86825 -32.20620 -11.41829
  13  9     -12.04686 -45.64285 -19.02883
  13 10     -12.55917      NUMXQ(K)= 10
                                                                   BACK EXTRAPOLATION FOR  1 PERCENTILE.
     4.375E-04              .047             1.000
     2.595E-04              .142             3.000
     2.001E-04              .237             5.000
     1.303E-04              .474            10.000
     9.320E-05              .711            15.000
     7.277E-05              .948            20.000
     5.969E-05             1.185            25.000
     5.008E-05             1.422            30.000
     4.138E-05             1.659            35.000
     3.495E-05             1.896            40.000
     2.941E-05             2.133            45.000
     2.472E-05             2.370            50.000
     2.107E-05             2.607            55.000
     1.817E-05             2.844            60.000
     1.514E-05             3.081            65.000
     1.167E-05             3.318            70.000
     8.816E-06             3.556            75.000
     6.583E-06             3.793            80.000
     4.172E-06             4.030            85.000
0    1.248E-04             0.5              10.55
0ANNUAL AVERAGE =   6.50E-06
0K= 13     FIVEXQ(K)= 1.248E-04      FIVEPR(K)=10.547
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Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: 11/19/2003 TIME: 23: 4:56
/PLANT NAME: CGS METEOROLOGICAL INSTRUMENTATION
DATA PERIOD: JFD 1996-1999 WIND SENSORS HEIGHT: 10.0 METERS
TYPE OF RELEASE: GROUND LEVEL RELEASE DELTA-T HEIGHTS: 10 - 75 METERS
SOURCE OF DATA: MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
COMMENTS: input file: P96-99-F.inp output file: P96-99-F.out sigma-desert + P-G
PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE ESE SECTOR.

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=1431.SQ.METERS	USED
A	.4	.24	1950.	0.	0.	556.3	364.0	556.3	3.701E-06	3.693E-06	3.693E-06
A	1.0	.84	1950.	0.	0.	556.3	364.0	556.3	1.563E-06	1.559E-06	1.559E-06
A	2.0	1.19	1950.	0.	0.	556.3	364.0	556.3	7.728E-07	7.711E-07	7.711E-07
A	3.0	.65	1950.	0.	0.	556.3	364.0	556.3	5.209E-07	5.198E-07	5.198E-07
A	4.0	.19	1950.	0.	0.	556.3	364.0	556.3	3.929E-07	3.920E-07	3.920E-07
A	5.0	.23	1950.	0.	0.	556.3	364.0	556.3	3.126E-07	3.119E-07	3.119E-07
A	6.0	.23	1950.	0.	0.	556.3	364.0	556.3	2.614E-07	2.609E-07	2.609E-07
A	8.0	.42	1950.	0.	0.	556.3	364.0	556.3	1.959E-07	1.955E-07	1.955E-07
A	10.0	.23	1950.	0.	0.	556.3	364.0	556.3	1.566E-07	1.563E-07	1.563E-07
A	13.0	.27	1950.	0.	0.	556.3	364.0	556.3	1.206E-07	1.204E-07	1.204E-07
B	.4	.04	1950.	0.	0.	320.6	240.6	320.6	9.719E-06	9.662E-06	9.662E-06
B	1.0	.11	1950.	0.	0.	320.6	240.6	320.6	4.104E-06	4.080E-06	4.080E-06
B	2.0	.31	1950.	0.	0.	320.6	240.6	320.6	2.029E-06	2.017E-06	2.017E-06
B	3.0	.27	1950.	0.	0.	320.6	240.6	320.6	1.368E-06	1.360E-06	1.360E-06
B	4.0	.27	1950.	0.	0.	320.6	240.6	320.6	1.032E-06	1.026E-06	1.026E-06
B	5.0	.23	1950.	0.	0.	320.6	240.6	320.6	8.208E-07	8.159E-07	8.159E-07
B	6.0	.27	1950.	0.	0.	320.6	240.6	320.6	6.865E-07	6.825E-07	6.825E-07
B	8.0	.19	1950.	0.	0.	320.6	240.6	320.6	5.144E-07	5.114E-07	5.114E-07
B	10.0	.08	1950.	0.	0.	320.6	240.6	320.6	4.113E-07	4.089E-07	4.089E-07
B	13.0	.15	1950.	0.	0.	320.6	240.6	320.6	3.168E-07	3.149E-07	3.149E-07
C	.4	.04	1950.	0.	0.	253.6	154.7	253.6	1.910E-05	1.888E-05	1.888E-05
C	1.0	.11	1950.	0.	0.	253.6	154.7	253.6	8.064E-06	7.972E-06	7.972E-06
C	2.0	.34	1950.	0.	0.	253.6	154.7	253.6	3.988E-06	3.942E-06	3.942E-06
C	3.0	.46	1950.	0.	0.	253.6	154.7	253.6	2.688E-06	2.657E-06	2.657E-06
C	4.0	.11	1950.	0.	0.	253.6	154.7	253.6	2.027E-06	2.004E-06	2.004E-06
C	5.0	.27	1950.	0.	0.	253.6	154.7	253.6	1.613E-06	1.594E-06	1.594E 06
C	6.0	.27	1950.	0.	0.	253.6	154.7	253.6	1.349E-06	1.334E-06	1.334E-06
C	8.0	.19	1950.	0.	0.	253.6	154.7	253.6	1.011E-06	9.992E-07	9.992E-07
C	10.0	.34	1950.	0.	0.	253.6	154.7	253.6	8.082E-07	7.989E-07	7.989E-07
C	13.0	.31	1950.	0.	0.	253.6	154.7	253.6	6.225E-07	6.153E-07	6.153E-07
D	.4	.36	1950.	0.	0.	114.1	75.2	114.1	8.742E-05	8.301E-05	8.301E-05
D	1.0	1.49	1950.	0.	0.	114.1	75.2	114.1	3.691E-05	3.505E-05	3.505E-05
D	2.0	1.91	1950.	0.	0.	114.1	75.2	114.1	1.825E-05	1.733E-05	1.733E-05
D	3.0	2.45	1950.	0.	0.	114.1	75.2	114.1	1.230E-05	1.168E-05	1.168E-05
D	4.0	2.45	1950.	0.	0.	114.1	75.2	114.1	9.279E-06	8.811E-06	8.811E-06
D	5.0	1.80	1950.	0.	0.	114.1	75.2	114.1	7.382E-06	7.009E-06	7.009E-06
D	6.0	2.07	1950.	0.	0.	114.1	75.2	114.1	6.174E-06	5.863E-06	5.863E-06
D	8.0	3.94	1950.	0.	0.	114.1	75.2	114.1	4.626E-06	4.393E-06	4.393E-06
D	10.0	1.95	1950.	0.	0.	114.1	75.2	114.1	3.699E-06	3.513E-06	3.513E-06
D	13.0	.69	1950.	0.	0.	114.1	75.2	114.1	2.849E-06	2.705E-06	2.705E-06
D	18.0	.08	1950.	0.	0.	114.1	75.2	114.1	2.058E-06	1.954E-06	1.954E-06
E	.4	.89	1950.	0.	0.	195.7	22.3	195.7	1.722E-04	1.559E-04	1.559E-04
E	1.0	3.44	1950.	0.	0.	195.7	22.3	195.7	7.269E-05	6.581E-05	6.581E-05
E	2.0	5.40	1950.	0.	0.	195.7	22.3	195.7	3.595E-05	3.254E-05	3.254E-05
E	3.0	5.82	1950.	0.	0.	195.7	22.3	195.7	2.421E-05	2.194E-05	2.194E-05
E	4.0	5.51	1950.	0.	0.	195.7	22.3	195.7	1.827E-05	1.654E-05	1.654E-05
E	5.0	6.16	1950.	0.	0.	195.7	22.3	195.7	1.454E-05	1.316E-05	1.316E-05
E	6.0	5.36	1950.	0.	0.	195.7	22.3	195.7	1.216E-05	1.101E-05	1.101E-05
E	8.0	5.78	1950.	0.	0.	195.7	22.3	195.7	9.112E-06	8.249E-06	8.249E-06
E	10.0	2.45	1950.	0.	0.	195.7	22.3	195.7	7.285E-06	6.596E-06	6.596E-06
E	13.0	.77	1950.	0.	0.	195.7	22.3	195.7	5.611E-06	5.080E-06	5.080E-06
E	18.0	.08	1950.	0.	0.	195.7	22.3	195.7	4.053E-06	3.670E-06	3.670E-06
F	.4	.85	1950.	0.	0.	303.4	8.4	303.4	2.935E-04	2.491E-04	2.491E-04
F	1.0	3.10	1950.	0.	0.	303.4	8.4	303.4	1.239E-04	1.052E-04	1.052E-04
F	2.0	5.36	1950.	0.	0.	303.4	8.4	303.4	6.128E-05	5.201E-05	5.201E-05
F	3.0	3.87	1950.	0.	0.	303.4	8.4	303.4	4.131E-05	3.506E-05	3.506E-05
F	4.0	3.94	1950.	0.	0.	303.4	8.4	303.4	3.115E-05	2.644E-05	2.644E-05
F	5.0	2.07	1950.	0.	0.	303.4	8.4	303.4	2.478E-05	2.103E-05	2.103E-05
F	6.0	1.07	1950.	0.	0.	303.4	8.4	303.4	2.073E-05	1.759E-05	1.759E-05
F	8.0	.54	1950.	0.	0.	303.4	8.4	303.4	1.553E-05	1.318E-05	1.318E-05
G	.4	.86	1950.	0.	0.	488.9	3.2	488.9	4.828E-04	3.733E-04	3.733E-04
G	1.0	2.53	1950.	0.	0.	488.9	3.2	488.9	2.039E-04	1.576E-04	1.576E-04
G	2.0	3.71	1950.	0.	0.	488.9	3.2	488.9	1.008E-04	7.794E-05	7.794E-05
G	3.0	1.68	1950.	0.	0.	488.9	3.2	488.9	6.795E-05	5.254E-05	5.254E-05
G	4.0	.54	1950.	0.	0.	488.9	3.2	488.9	5.125E-05	3.962E-05	3.962E-05
G	5.0	.19	1950.	0.	0.	488.9	3.2	488.9	4.077E-05	3.152E-05	3.152E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0            RUN DATE: 11/19/2003    TIME: 23: 4:56
/PLANT NAME:   CGS                                 METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                        WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE             DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0 ESE SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:   C=   .5      A=  2861.      D=   70.0
 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   3.733E-04   2.491E-04   1.576E-04   1.559E-04   1.052E-04   8.301E-05   7.794E-05   6.581E-05   5.254E-05   5.201E-05
         .862       1.712       4.238       5.131       8.231       8.595      12.308      15.752      17.436      22.794
       .07118      .14140      .35000      .42370      .67970      .70980     1.01637     1.30082     1.43989     1.88237
0   3.962E-05   3.506E-05   3.505E-05   3.254E-05   3.152E-05   2.644E-05   2.194E-05   2.103E-05   1.888E-05   1.759E-05
       23.330      27.196      28.688      34.085      34.276      38.218      44.035      46.102      46.142      47.213
      1.92661     2.24583     2.36909     2.81473     2.83053     3.15607     3.63648     3.80715     3.81042     3.89892
0   1.733E-05   1.654E-05   1.318E-05   1.316E-05   1.168E-05   1.101E-05   9.662E-06   8.811E-06   8.249E-06   7.972E-06
       49.127      54.638      55.174      61.336      63.785      69.143      69.181      71.631      77.410      77.524
      4.05695     4.51207     4.55631     5.06516     5.26744     5.70992     5.71304     5.91532     6.39256     6.40204
0   7.009E-06   6.596E-06   5.863E-06   5.080E-06   4.393E-06   4.080E-06   3.942E-06   3.693E-06   3.670E-06   3.513E-06
       79.323      81.773      83.839      84.605      88.547      88.662      89.006      89.245      89.322      91.274
      6.55059     6.75286     6.92354     6.98675     7.31228     7.32176     7.35021     7.36997     7.37630     7.53748
0   2.705E-06   2.657E-06   2.017E-06   2.004E-06   1.954E-06   1.594E-06   1.559E-06   1.360E-06   1.334E-06   1.026E-06
       91.963      92.422      92.728      92.843      92.920      93.188      94.030      94.297      94.565      94.833
      7.59437     7.63230     7.65758     7.66707     7.67339     7.69551     7.76504     7.78717     7.80929     7.83141
0   9.992E-07   8.159E-07   7.989E-07   7.711E-07   6.825E-07   6.153E-07   5.198E-07   5.114E-07   4.089E-07   3.920E-07
       95.025      95.254      95.599      96.785      97.053      97.359      98.010      98.201      98.278      98.469
      7.84722     7.86618     7.89463     7.99260     8.01473     8.04001     8.09374     8.10954     8.11586     8.13167
0   3.149E-07   3.119E-07   2.609E-07   1.955E-07   1.563E-07   1.204E-07
       98.622      98.852      99.081      99.502      99.732     100.000
      8.14431     8.16327     8.18224     8.21700     8.23597     8.25809
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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)=   .423
                                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 3)=  1.880
                                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 4)=  2.812
                                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 5)=  4.509
                                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 6)=  5.706
                                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 7)=  6.389
                                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 8)=  6.749
                                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 9)=  6.920
                                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE(10)=  7.308
                                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE(11)=  7.534
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  14  1      -7.89311 -12.89450  -1.56779
  14  2      -8.76654 -13.98449  -1.98177
  14  3      -9.86416 -15.59954  -2.75857
  14  4     -10.33296 -16.34961  -3.15145
  14  5     -11.00948 -17.03407  -3.55538
  14  6     -11.41681 -19.41735  -5.06384
  14  7     -11.70542 -23.79038  -7.93528
  14  8     -11.92912 -25.52002  -9.09243
  14  9     -12.04686 -26.99855 -10.09022
  14 10     -12.33547 -32.60150 -13.94582
  14 11     -12.55917     NUMXQ(K)= 11
      3.489E-04             .083             1.000
      2.058E-04             .248             3.000
      1.580E-04             .413             5.000
      9.779E-05             .826            10.000
      7.230E-05            1.239            15.000
      5.777E-05            1.652            20.000
      4.682E 05            2.065            25.000
      3.788E-05            2.477            30.000
      3.138E-05            2.890            35.000
      2.604E-05            3.303            40.000
      2.201E-05            3.716            45.000
      1.887E-05            4.129            50.000
      1.636E-05            4.542            55.000
      1.410E-05            4.955            60.000
      1.227E-05            5.368            65.000
      1.067E-05            5.781            70.000
      8.950E-06            6.194            75.000
      7.215E-06            6.606            80.000
      5.454E-06            7.019            85.000
      3.897E-06            7.432            90.000
0     1.393E-04            0.5               6.05
0ANNUAL AVERAGE =    8.41E-06
0K= 14    FIVEXQ(K)= 1.393E-04      FIVEPR(K)= 6.055
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE  SE SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.21	1950.	0.	0.	556.3	364.0	556.3	3.701E-06	3.693E-06	3.693E-06
A	1.0	.73	1950.	0.	0.	556.3	364.0	556.3	1.563E-06	1.559E-06	1.559E-06
A	2.0	1.42	1950.	0.	0.	556.3	364.0	556.3	7.728E-07	7.711E-07	7.711E-07
A	3.0	.78	1950.	0.	0.	556.3	364.0	556.3	5.209E-07	5.198E-07	5.198E-07
A	4.0	.55	1950.	0.	0.	556.3	364.0	556.3	3.929E-07	3.920E-07	3.920E-07
A	5.0	.12	1950.	0.	0.	556.3	364.0	556.3	3.126E-07	3.119E-07	3.119E-07
A	6.0	.15	1950.	0.	0.	556.3	364.0	556.3	2.614E-07	2.609E-07	2.609E-07
A	8.0	.17	1950.	0.	0.	556.3	364.0	556.3	1.959E-07	1.955E-07	1.955E-07
A	10.0	.12	1950.	0.	0.	556.3	364.0	556.3	1.566E-07	1.563E-07	1.563E-07
A	13.0	.09	1950.	0.	0.	556.3	364.0	556.3	1.206E-07	1.204E-07	1.204E-07
B	.4	.08	1950.	0.	0.	320.6	240.6	320.6	9.719E-06	9.662E-06	9.662E-06
B	1.0	.23	1950.	0.	0.	320.6	240.6	320.6	4.104E-06	4.080E-06	4.080E-06
B	2.0	.35	1950.	0.	0.	320.6	240.6	320.6	2.029E-06	2.017E-06	2.017E-06
B	3.0	.26	1950.	0.	0.	320.6	240.6	320.6	1.368E-06	1.360E-06	1.360E-06
B	4.0	.35	1950.	0.	0.	320.6	240.6	320.6	1.032E-06	1.026E-06	1.026E-06
B	5.0	.15	1950.	0.	0.	320.6	240.6	320.6	8.208E-07	8.159E-07	8.159E-07
B	6.0	.12	1950.	0.	0.	320.6	240.6	320.6	6.865E-07	6.825E-07	6.825E-07
B	8.0	.06	1950.	0.	0.	320.6	240.6	320.6	5.144E-07	5.114E-07	5.114E-07
B	10.0	.03	1950.	0.	0.	320.6	240.6	320.6	4.113E-07	4.089E-07	4.089E-07
C	.4	.03	1950.	0.	0.	253.6	154.7	253.6	1.910E-05	1.888E-05	1.888E-05
C	1.0	.09	1950.	0.	0.	253.6	154.7	253.6	8.064E-06	7.972E-06	7.972E-06
C	2.0	.46	1950.	0.	0.	253.6	154.7	253.6	3.988E-06	3.942E-06	3.942E-06
C	3.0	.49	1950.	0.	0.	253.6	154.7	253.6	2.688E-06	2.657E-06	2.657E-06
C	4.0	.20	1950.	0.	0.	253.6	154.7	253.6	2.027E-06	2.004E-06	2.004E-06
C	5.0	.20	1950.	0.	0.	253.6	154.7	253.6	1.613E-06	1.594E-06	1.594E-06
C	6.0	.12	1950.	0.	0.	253.6	154.7	253.6	1.349E-06	1.334E-06	1.334E-06
C	8.0	.09	1950.	0.	0.	253.6	154.7	253.6	1.011E-06	9.992E-07	9.992E-07
C	10.0	.20	1950.	0.	0.	253.6	154.7	253.6	8.082E-07	7.989E-07	7.989E-07
D	.4	.26	1950.	0.	0.	114.1	75.2	114.1	8.742E-05	8.301E-05	8.301E-05
D	1.0	1.05	1950.	0.	0.	114.1	75.2	114.1	3.691E-05	3.505E-05	3.505E-05
D	2.0	4.33	1950.	0.	0.	114.1	75.2	114.1	1.825E-05	1.733E-05	1.733E-05
D	3.0	4.30	1950.	0.	0.	114.1	75.2	114.1	1.230E-05	1.168E-05	1.168E-05
D	4.0	3.81	1950.	0.	0.	114.1	75.2	114.1	9.279E-06	8.811E-06	8.811E-06
D	5.0	2.85	1950.	0.	0.	114.1	75.2	114.1	7.382E-06	7.009E-06	7.009E-06
D	6.0	2.12	1950.	0.	0.	114.1	75.2	114.1	6.174E-06	5.863E-06	5.863E-06
D	8.0	1.48	1950.	0.	0.	114.1	75.2	114.1	4.626E-06	4.393E-06	4.393E-06
D	10.0	.81	1950.	0.	0.	114.1	75.2	114.1	3.699E-06	3.513E-06	3.513E-06
D	13.0	.46	1950.	0.	0.	114.1	75.2	114.1	2.849E-06	2.705E-06	2.705E-06
D	18.0	.06	1950.	0.	0.	114.1	75.2	114.1	2.058E-06	1.954E-06	1.954E-06

E	.4	.60	1950.	0.	0.	195.7	22.3	195.7	1.722E-04	1.559E-04	1.559E-04
E	1.0	2.32	1950.	0.	0.	195.7	22.3	195.7	7.269E-05	6.581E-05	6.581E-05
E	2.0	5.99	1950.	0.	0.	195.7	22.3	195.7	3.595E-05	3.254E-05	3.254E-05
E	3.0	7.00	1950.	0.	0.	195.7	22.3	195.7	2.423E-05	2.194E-05	2.194E-05
E	4.0	5.61	1950.	0.	0.	195.7	22.3	195.7	1.827E-05	1.654E-05	1.654E-05
E	5.0	4.48	1950.	0.	0.	195.7	22.3	195.7	1.454E-05	1.316E-05	1.316E-05
E	6.0	3.57	1950.	0.	0.	195.7	22.3	195.7	1.216E-05	1.101E-05	1.101E-05
E	8.0	3.25	1950.	0.	0.	195.7	22.3	195.7	9.112E-06	8.249E-06	8.249E-06
E	10.0	.90	1950.	0.	0.	195.7	22.3	195.7	7.285E-06	6.596E-06	6.596E-06
E	13.0	.29	1950.	0.	0.	195.7	22.3	195.7	5.611E-06	5.080E-06	5.080E-06
F	.4	.77	1950.	0.	0.	303.4	8.4	303.4	2.935E-04	2.491E-04	2.491E-04
F	1.0	2.79	1950.	0.	0.	303.4	8.4	303.4	1.239E-04	1.052E-04	1.052E-04
F	2.0	6.74	1950.	0.	0.	303.4	8.4	303.4	6.128E-05	5.201E-05	5.201E-05
F	3.0	4.71	1950.	0.	0.	303.4	8.4	303.4	4.131E-05	3.506E-05	3.506E-05
F	4.0	4.07	1950.	0.	0.	303.4	8.4	303.4	3.115E-05	2.644E-05	2.644E-05
F	5.0	1.48	1950.	0.	0.	303.4	8.4	303.4	2.478E-05	2.103E-05	2.103E-05
F	6.0	.58	1950.	0.	0.	303.4	8.4	303.4	2.073E-05	1.759E-05	1.759E-05
F	8.0	.06	1950.	0.	0.	303.4	8.4	303.4	1.553E-05	1.318E-05	1.318E-05
G	.4	.86	1950.	0.	0.	488.9	3.2	488.9	4.828E-04	3.733E-04	3.733E-04
G	1.0	2.53	1950.	0.	0.	488.9	3.2	488.9	2.039E-04	1.576E-04	1.576E-04
G	2.0	6.13	1950.	0.	0.	488.9	3.2	488.9	1.008E-04	7.794E-05	7.794E-05
G	3.0	3.63	1950.	0.	0.	488.9	3.2	488.9	6.795E-05	5.254E-05	5.254E-05
G	4.0	2.03	1950.	0.	0.	488.9	3.2	488.9	5.125E-05	3.962E-05	3.962E-05
G	5.0	.17	1950.	0.	0.	488.9	3.2	488.9	4.077E-05	3.152E-05	3.152E-05
G	6.0	.06	1950.	0.	0.	488.9	3.2	488.9	3.410E-05	2.637E-05	2.637E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0            RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:    CGS                                 METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                         WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE              DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96 99
 COMMENTS:  input file: P96-99-P.inp   output file: P96-99-P.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0  SE SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:   C=   .5      A=  2861.      D=   70.0
 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   3.733E-04   2.491E-04   1.576E-04   1.559E-04   1.052E-04   8.301E-05   7.794E-05   6.581E-05   5.254E-05   5.201E-05
         .863       1.628       4.156       4.758       7.548       7.803      13.935      16.259      19.892      26.633
       .09383      .17705      .45202      .51753      .82095      .84873     1.51561     1.76845     2.16352     2.89677
0   3.962E-05   3.506E-05   3.505E-05   3.254E-05   3.152E-05   2.644E-05   2.637E-05   2.194E-05   2.103E-05   1.888E-05
       28.667      33.375      34.421      40.407      40.581      44.650      44.708      51.711      53.193      53.223
      3.11801     3.63002     3.74380     4.39487     4.41384     4.85631     4.86263     5.62433     5.78552     5.78879
0   1.759E-05   1.733E-05   1.654E-05   1.318E-05   1.316E-05   1.168E-05   1.101E-05   9.662E-06   8.811E-06   8.249E-06
       53.804      58.134      63.742      63.800      68.275      72.576      76.150      76.227      80.034      83.288
      5.85201     6.32293     6.93292     6.93924     7.42596     7.89373     8.28247     8.29081     8.70484     9.05882
0   7.972E-06   7.009E-06   6.596E-06   5.863E-06   5.080E-06   4.393E-06   4.080E-06   3.942E-06   3.693E-06   3.513E-06
       83.375      86.223      87.124      89.245      89.536      91.018      91.250      91.715      91.922      92.735
      9.06830     9.37804     9.47602     9.70674     9.73834     9.89953     9.92481     9.97538     9.99784    10.08634
0   2.705E-06   2.657E-06   2.017E-06   2.004E-06   1.954E-06   1.594E-06   1.559E-06   1.360E-06   1.334E-06   1.026E-06
       93.200      93.694      94.043      94.246      94.305      94.508      95.234      95.496      95.612      95.961
     10.13691    10.19064    10.22856    10.25069    10.25701    10.27913    10.35814    10.38659    10.39923    10.43716
0   9.992E-07   8.159E-07   7.989E-07   7.711E-07   6.825E-07   5.198E 07   5.114E-07   4.089E-07   3.920E-07   3.119E-07
       96.048      96.193      96.397      97.821      97.937      98.721      98.780      98.809      99.361      99.477
     10.44664    10.46244    10.48457    10.63943    10.65207    10.73741    10.74373    10.74689    10.80694    10.81959
0   2.609E-07   1.955E-07   1.563E-07   1.204E-07
       99.622      99.797      99.913     100.000
     10.83539    10.85435    10.86699    10.87648
```

```
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)=    .517
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   2.894
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   4.391
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   6.929
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   8.279
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   9.055
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   9.375
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   9.704
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=  10.083
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  15  1      -7.89311 -12.87549  -1.60237
  15  2      -8.76654 -12.98201  -1.64391
  15  3      -9.86416 -14.55278  -2.47211
  15  4     -10.33296 -15.44553  -2.99511
  15  5     -11.00948 -17.39104  -4.30868
  15  6     -11.41681 -19.54949  -5.86537
  15  7     -11.70542 -22.97431  -8.42626
  15  8     -11.86825 -24.00465  -9.20799
  15  9     -12.04686 -42.55036 -23.48894
  15 10     -12.55917     NUMXQ(K)= 10
      3.480E-04               .109             1.000
      2.002E-04               .326             3.000
      1.515E-04               .544             5.000
      1.001E-04              1.088            10.000
      7.722E-05              1.631            15.000
      6.362E-05              2.175            20.000
      5.442E-05              2.719            25.000
      4.565E-05              3.263            30.000
      3.840E-05              3.807            35.000
      3.293E-05              4.351            40.000
      2.790E-05              4.894            45.000
      2.391E-05              5.438            50.000
      2.074E-05              5.982            55.000
      1.817E-05              6.526            60.000
      1.583E-05              7.070            65.000
      1.338E-05              7.614            70.000
      1.141E-05              8.157            75.000
      9.399E-06              8.701            80.000
      7.498E-06              9.245            85.000
      5.242E-06              9.789            90.000
0     1.589E-04              0.5               4.60
0ANNUAL AVERAGE =    1.24E-05
0K= 15     FIVEXQ(K)= 1.589E-04     FIVEPR(K)= 4.597
```

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                       WIND SENSORS HEIGHT: 10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE            DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE SSE SECTOR.
```

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=1431.SQ.METERS	USED
A	.4	.25	1950.	0.	0.	556.3	364.0	556.3	3.701E-06	3.693E-06	3.693E-06
A	1.0	.89	1950.	0.	0.	556.3	364.0	556.3	1.563E-06	1.559E-06	1.559E-06
A	2.0	2.82	1950.	0.	0.	556.3	364.0	556.3	7.728E-07	7.711E-07	7.711E-07
A	3.0	1.79	1950.	0.	0.	556.3	364.0	556.3	5.209E-07	5.198E-07	5.198E-07
A	4.0	.89	1950.	0.	0.	556.3	364.0	556.3	3.929E-07	3.920E-07	3.920E-07
A	5.0	1.03	1950.	0.	0.	556.3	364.0	556.3	3.126E-07	3.119E-07	3.119E-07
A	6.0	.56	1950.	0.	0.	556.3	364.0	556.3	2.614E-07	2.609E-07	2.609E-07
A	8.0	.36	1950.	0.	0.	556.3	364.0	556.3	1.959E-07	1.955E-07	1.955E-07
A	13.0	.03	1950.	0.	0.	556.3	364.0	556.3	1.206E-07	1.204E-07	1.204E-07
A	18.0	.03	1950.	0.	0.	556.3	364.0	556.3	8.715E-08	8.695E-08	8.695E-08
B	.4	.13	1950.	0.	0.	320.6	240.6	320.6	9.719E-06	9.662E-06	9.662E-06
B	1.0	.40	1950.	0.	0.	320.6	240.6	320.6	4.104E-06	4.080E-06	4.080E-06
B	2.0	.66	1950.	0.	0.	320.6	240.6	320.6	2.029E-06	2.017E-06	2.017E-06
B	3.0	.73	1950.	0.	0.	320.6	240.6	320.6	1.368E-06	1.360E-06	1.360E-06
B	4.0	.33	1950.	0.	0.	320.6	240.6	320.6	1.032E-06	1.026E-06	1.026E-06
B	5.0	.27	1950.	0.	0.	320.6	240.6	320.6	8.208E-07	8.159E-07	8.159E-07
B	6.0	.10	1950.	0.	0.	320.6	240.6	320.6	6.865E 07	6.825E-07	6.825E-07
B	8.0	.13	1950.	0.	0.	320.6	240.6	320.6	5.144E-07	5.114E-07	5.114E-07
C	.4	.07	1950.	0.	0.	253.6	154.7	253.6	1.910E-05	1.888E-05	1.888E-05
C	1.0	.20	1950.	0.	0.	253.6	154.7	253.6	8.064E-06	7.972E-06	7.972E-06
C	2.0	.56	1950.	0.	0.	253.6	154.7	253.6	3.988E-06	3.942E-06	3.942E-06
C	3.0	.83	1950.	0.	0.	253.6	154.7	253.6	2.688E-06	2.657E-06	2.657E-06
C	4.0	.53	1950.	0.	0.	253.6	154.7	253.6	2.027E-06	2.004E-06	2.004E-06
C	5.0	.36	1950.	0.	0.	253.6	154.7	253.6	1.613E-06	1.594E-06	1.594E-06
C	6.0	.23	1950.	0.	0.	253.6	154.7	253.6	1.349E-06	1.334E-06	1.334E-06
C	8.0	.30	1950.	0.	0.	253.6	154.7	253.6	1.012E-06	9.992E-07	9.992E 07
C	10.0	.03	1950.	0.	0.	253.6	154.7	253.6	8.082E-07	7.989E-07	7.989E-07
C	13.0	.03	1950.	0.	0.	253.6	154.7	253.6	6.225E-07	6.153E-07	6.153E-07
D	.4	.32	1950.	0.	0.	114.1	75.2	114.1	8.742E-05	8.301E-05	8.301E-05
D	1.0	1.33	1950.	0.	0.	114.1	75.2	114.1	3.691E-05	3.505E-05	3.505E-05
D	2.0	4.24	1950.	0.	0.	114.1	75.2	114.1	1.825E-05	1.733E-05	1.733E-05
D	3.0	4.77	1950.	0.	0.	114.1	75.2	114.1	1.230E-05	1.168E-05	1.168E-05
D	4.0	4.27	1950.	0.	0.	114.1	75.2	114.1	9.279E-06	8.811E-06	8.811E 06
D	5.0	2.78	1950.	0.	0.	114.1	75.2	114.1	7.382E-06	7.009E-06	7.009E-06
D	6.0	1.56	1950.	0.	0.	114.1	75.2	114.1	6.174E-06	5.863E-06	5.863E-06
D	8.0	1.62	1950.	0.	0.	114.1	75.2	114.1	4.626E-06	4.393E-06	4.393E-06
D	10.0	.50	1950.	0.	0.	114.1	75.2	114.1	3.699E-06	3.513E-06	3.513E-06
D	13.0	.10	1950.	0.	0.	114.1	75.2	114.1	2.849E-06	2.705E-06	2.705E-06
D	18.0	.10	1950.	0.	0.	114.1	75.2	114.1	2.058E-06	1.954E-06	1.954E-06

Calculation No. NE-02-03-16

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

Revision No. 0

E	.4	.47	1950.	0.	0.	195.7	22.3	195.7	1.722E-04	1.559E-04	1.559E-04
E	1.0	1.82	1950.	0.	0.	195.7	22.3	195.7	7.269E-05	6.581E-05	6.581E-05
E	2.0	7.09	1950.	0.	0.	195.7	22.3	195.7	3.595E-05	3.254E-05	3.254E-05
E	3.0	5.67	1950.	0.	0.	195.7	22.3	195.7	2.423E-05	2.194E-05	2.194E-05
E	4.0	4.34	1950.	0.	0.	195.7	22.3	195.7	1.827E-05	1.654E-05	1.654E-05
E	5.0	2.45	1950.	0.	0.	195.7	22.3	195.7	1.454E-05	1.316E-05	1.316E-05
E	6.0	2.13	1950.	0.	0.	195.7	22.3	195.7	1.216E-05	1.101E-05	1.101E-05
E	8.0	1.89	1950.	0.	0.	195.7	22.3	195.7	9.112E-06	8.249E-06	8.249E-06
E	10.0	.70	1950.	0.	0.	195.7	22.3	195.7	7.285E-06	6.596E-06	6.596E-06
E	13.0	.13	1950.	0.	0.	195.7	22.3	195.7	5.611E-06	5.080E-06	5.080E-06
F	.4	.75	1950.	0.	0.	303.4	8.4	303.4	2.935E-04	2.491E-04	2.491E-04
F	1.0	2.75	1950.	0.	0.	303.4	8.4	303.4	1.239E-04	1.052E-04	1.052E-04
F	2.0	7.02	1950.	0.	0.	303.4	8.4	303.4	6.128E-05	5.201E-05	5.201E-05
F	3.0	5.53	1950.	0.	0.	303.4	8.4	303.4	4.131E-05	3.506E-05	3.506E-05
F	4.0	1.86	1950.	0.	0.	303.4	8.4	303.4	3.115E-05	2.644E-05	2.644E-05
F	5.0	.76	1950.	0.	0.	303.4	8.4	303.4	2.478E-05	2.103E-05	2.103E-05
F	6.0	.13	1950.	0.	0.	301.4	8.4	303.4	2.073E-05	1.759E-05	1.759E-05
F	8.0	.13	1950.	0.	0.	303.4	8.4	303.4	1.553E-05	1.318E-05	1.318E-05
G	.4	1.40	1950.	0.	0.	488.9	3.2	488.9	4.828E-04	3.733E-04	3.733E-04
G	1.0	4.11	1950.	0.	0.	488.9	3.2	488.9	2.039E-04	1.576E-04	1.576E-04
G	2.0	8.35	1950.	0.	0.	488.9	3.2	488.9	1.008E-04	7.794E-05	7.794E-05
G	3.0	4.24	1950.	0.	0.	488.9	3.2	488.9	6.795E-05	5.254E-05	5.254E-05
G	4.0	1.06	1950.	0.	0.	488.9	3.2	488.9	5.125E-05	3.962E-05	3.962E-05
G	5.0	.03	1950.	0.	0.	488.9	3.2	488.9	4.077E-05	3.152E-05	3.152E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0            RUN DATE: 11/19/2003     TIME:  23: 4:56
/PLANT NAME:    CGS                                METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                        WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE             DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0 SSE SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:    C=    .5      A=  2861.      D=    70.0
 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   3.733E-04   2.491E-04   1.576E-04   1.559E-04   1.052E-04   8.301E-05   7.794E-05   6.581E-05   5.254E-05   5.201E-05
        1.402       2.157       6.265       6.738       9.488       9.812      18.162      19.985      24.226      31.251
       .13373      .20569      .59760      .64264      .90496      .93583     1.73229     1.90612     2.31067     2.98071
0   3.962E 05   3.506E-05   3.505E-05   3.254E-05   3.152E-05   2.644E-05   2.194E-05   2.103E-05   1.888E-05   1.759E-05
       32.312      37.845      39.171      46.262      46.295      48.151      53.817      54.579      54.648      54.781
      3.08185     3.60966     3.73608     4.41244     4.41560     4.59259     5.13305     5.20574     5.21230     5.22494
0   1.733E-05   1.654E-05   1.318E-05   1.316E-05   1.168E-05   1.101E-05   9.662E-06   8.811E-06   8.249E-06   7.972E-06
       59.022      63.363      63.496      65.948      70.719      71.846      71.977      76.252      78.141      78.339
      5.62949     6.04352     6.05617     6.29005     6.74517     6.85263     6.86512     7.27284     7.45299     7.47195
0   7.009E-06   6.596E-06   5.863E-06   5.080E-06   4.393E-06   4.080E-06   3.942E-06   3.693E-06   3.513E-06   2.705E-06
       81.123      81.819      83.376      83.509      85.132      85.530      86.093      86.348      86.845      86.944
      7.73744     7.80381     7.95236     7.96500     8.11987     8.15779     8.21152     8.23578     8.28319     8.29267
0   2.657E-06   2.017E-06   2.004E-06   1.954E 06   1.594E-06   1.559E-06   1.360E-06   1.334E-06   1.026E-06   9.992E-07
       87.773      88.435      88.965      89.065      89.429      90.324      91.053      91.285      91.616      91.915
      8.37168     8.43489     8.48546     8.49494     8.52971     8.61504     8.68458     8.70670     8.73831     8.76675
0   8.159E-07   7.989E-07   7.711E-07   6.825E-07   6.153E-07   5.198E-07   5.114E-07   3.920E-07   3.119E-07   2.609E-07
       92.180      92.213      95.030      95.129      95.162      96.951      97.084      97.979      99.006      99.569
      8.79203     8.79519     9.06384     9.07332     9.07648     9.24715     9.25980     9.34513     9.44311     9.49684
0   1.955E-07   1.204E-07   8.695E-08
       99.934      99.967     100.000
      9.53160     9.53476     9.53792
```

```
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)=    .642
                                                                HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   2.978
                                                                HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   4.409
                                                                HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   6.040
                                                                HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   6.741
                                                                HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   7.449
                                                                HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   7.734
                                                                HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   7.949
                                                                HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   8.208
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  16  1      -7.89311 -12.98725  -1.69626
  16  2      -8.76654 -13.28689  -1.81669
  16  3      -9.86416 -14.79932  -2.61943
  16  4     -10.33296 -17.84130  -4.40350
  16  5     -11.00948 -20.62949  -6.20065
  16  6     -11.35742 -21.32489  -6.66569
  16  7     -11.70542 -23.50493  -8.17633
  16  8     -11.86825 -29.18372 -12.16643
  16  9     -12.04686 -44.34816 -22.93253
  16 10     -12.44381      NUMXQ(K)= 10
                                                                BACK EXTRAPOLATION FOR  1 PERCENTILE.
     4.434E-04              .095              1.000
     2.487E-04              .286              3.000
     1.860E-04              .477              5.000
     1.200E-04              .954             10.000
     9.053E-05             1.431             15.000
     7.339E-05             1.908             20.000
     6.197E-05             2.384             25.000
     5.373E-05             2.861             30.000
     4.557E-05             3.338             35.000
     3.887E-05             3.815             40.000
     3.367E-05             4.292             45.000
     2.765E-05             4.769             50.000
     2.255E-05             5.246             55.000
     1.866E-05             5.723             60.000
     1.527E-05             6.200             65.000
     1.207E-05             6.677             70.000
     9.527E-06             7.153             75.000
     7.449E-06             7.630             80.000
     4.619E-06             8.107             85.000
 0   1.810E-04              0.5               5.24
 0ANNUAL AVERAGE =   1.36E-05
 0K= 16     FIVEXQ(K)= 1.810E-04     FIVEPR(K)= 5.242
```

ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-68	Cont'd on page B-69
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0              RUN DATE: 11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                                   METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996 1999                          WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE               DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out   sigma-desert + P-G
 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 CLASS	WINDSPEED METER/SEC AT 10.0 METERS	FREQUENCY PERCENT	DISTANCE METERS	TERRAIN HT METERS	EFF PLUME HT METERS	SIGMA-Y METERS	SIGMA-2 METERS	MEANDER-SY METERS	** CHI/Q VALUES (SEC/CUBIC METER) MEANDER	BLDG WAKE CA=1431.SQ.METERS	USED
A	.4	.35	1950.	0.	0.	556.3	364.0	556.3	3.701E-06	3.693E-06	3.693E-06
A	1.0	1.22	1950.	0.	0.	556.3	364.0	556.3	1.563E-06	1.559E-06	1.559E-06
A	2.0	2.50	1950.	0.	0.	556.3	364.0	556.3	7.728E-07	7.711E-07	7.711E-07
A	3.0	1.81	1950.	0.	0.	556.3	364.0	556.3	5.209E-07	5.198E-07	5.198E-07
A	4.0	1.41	1950.	0.	0.	556.3	364.0	556.3	3.929E-07	3.920E-07	3.920E-07
A	5.0	1.02	1950.	0.	0.	556.3	364.0	556.3	3.126E-07	3.119E-07	3.119E-07
A	6.0	.58	1950.	0.	0.	556.3	364.0	556.3	2.614E-07	2.609E-07	2.609E-07
A	8.0	.70	1950.	0.	0.	556.3	364.0	556.3	1.959E-07	1.955E-07	1.955E-07
A	10.0	.21	1950.	0.	0.	556.3	364.0	556.3	1.566E-07	1.563E-07	1.563E-07
A	13.0	.09	1950.	0.	0.	556.3	364.0	556.3	1.206E-07	1.204E-07	1.204E-07
A	18.0	.01	1950.	0.	0.	556.3	364.0	556.3	8.715E-08	8.695E-08	8.695E-08
B	.4	.09	1950.	0.	0.	320.6	240.6	320.6	9.719E-06	9.662E-06	9.662E-06
B	1.0	.28	1950.	0.	0.	320.6	240.6	320.6	4.104E-06	4.080E-06	4.080E-06
B	2.0	.63	1950.	0.	0.	320.6	240.6	320.6	2.029E-06	2.017E-06	2.017E-06
B	3.0	.67	1950.	0.	0.	320.6	240.6	320.6	1.368E-06	1.360E-06	1.360E-06
B	4.0	.57	1950.	0.	0.	320.6	240.6	320.6	1.032E-06	1.026E-06	1.026E-06
B	5.0	.42	1950.	0.	0.	320.6	240.6	320.6	8.208E-07	8.159E-07	8.159E-07
B	6.0	.23	1950.	0.	0.	320.6	240.6	320.6	6.865E-07	6.825E 07	6.825E-07
B	8.0	.31	1950.	0.	0.	320.6	240.6	320.6	5.144E-07	5.114E-07	5.114E-07
B	10.0	.09	1950.	0.	0.	320.6	240.6	320.6	4.113E-07	4.089E-07	4.089E-07
B	13.0	.07	1950.	0.	0.	320.6	240.6	320.6	3.168E-07	3.149E-07	3.149E-07
C	.4	.09	1950.	0.	0.	253.6	154.7	253.6	1.910E-05	1.888E-05	1.888E-05
C	1.0	.26	1950.	0.	0.	253.6	154.7	253.6	8.064E-06	7.972E-06	7.972E-06
C	2.0	.61	1950.	0.	0.	253.6	154.7	253.6	3.988E-06	3.942E-06	3.942E-06
C	3.0	.76	1950.	0.	0.	253.6	154.7	253.6	2.688E-06	2.657E-06	2.657E-06
C	4.0	.55	1950.	0.	0.	253.6	154.7	253.6	2.027E-06	2.004E-06	2.004E-06
C	5.0	.48	1950.	0.	0.	253.6	154.7	253.6	1.613E-06	1.594E-06	1.594E-06
C	6.0	.32	1950.	0.	0.	253.6	154.7	253.6	1.349E-06	1.334E-06	1.334E-06
C	8.0	.34	1950.	0.	0.	253.6	154.7	253.6	1.011E-06	9.992E-07	9.992E-07
C	10.0	.21	1950.	0.	0.	253.6	154.7	253.6	8.082E-07	7.989E-07	7.989E-07
C	13.0	.07	1950.	0.	0.	253.6	154.7	253.6	6.225E-07	6.153E-07	6.153E-07
D	.4	.36	1950.	0.	0.	114.1	75.2	114.1	8.742E-05	8.301E-05	8.301E-05
D	1.0	1.49	1950.	0.	0.	114.1	75.2	114.1	3.691E-05	3.505E-05	3.505E-05
D	2.0	3.58	1950.	0.	0.	114.1	75.2	114.1	1.825E-05	1.733E-05	1.733E-05
D	3.0	3.74	1950.	0.	0.	114.1	75.2	114.1	1.230E-05	1.168E-05	1.168E-05
D	4.0	3.31	1950.	0.	0.	114.1	75.2	114.1	9.279E-06	8.811E-06	8.811E-06
D	5.0	2.55	1950.	0.	0.	114.1	75.2	114.1	7.382E-06	7.009E-06	7.009E-06
D	6.0	1.73	1950.	0.	0.	114.1	75.2	114.1	6.174E-06	5.863E-06	5.863E-06
D	8.0	2.04	1950.	0.	0.	114.1	75.2	114.1	4.626E-06	4.393E-06	4.393E-06
D	10.0	1.03	1950.	0.	0.	114.1	75.2	114.1	3.699E-06	3.513E-06	3.513E-06
D	13.0	.45	1950.	0.	0.	114.1	75.2	114.1	2.849E-06	2.705E-06	2.705E-06
D	18.0	.08	1950.	0.	0.	114.1	75.2	114.1	2.058E-06	1.954E-06	1.954E-06
E	.4	.61	1950.	0.	0.	195.7	22.3	195.7	1.722E-04	1.559E-04	1.559E-04
E	1.0	2.34	1950.	0.	0.	195.7	22.3	195.7	7.269E-05	6.581E-05	6.581E-05
E	2.0	5.33	1950.	0.	0.	195.7	22.3	195.7	3.595E-05	3.254E-05	3.254E-05
E	3.0	5.02	1950.	0.	0.	195.7	22.3	195.7	2.423E-05	2.194E-05	2.194E-05
E	4.0	4.32	1950.	0.	0.	195.7	22.3	195.7	1.827E-05	1.654E-05	1.654E-05
E	5.0	3.44	1950.	0.	0.	195.7	22.3	195.7	1.454E-05	1.316E-05	1.316E-05
E	6.0	2.59	1950.	0.	0.	195.7	22.3	195.7	1.216E-05	1.101E-05	1.101E-05
E	8.0	2.81	1950.	0.	0.	195.7	22.3	195.7	9.112E-06	8.249E-06	8.249E-06
E	10.0	1.15	1950.	0.	0.	195.7	22.3	195.7	7.285E-06	6.596E-06	6.596E-06
E	13.0	.39	1950.	0.	0.	195.7	22.3	195.7	5.611E-06	5.080E-06	5.080E-06
E	18.0	.05	1950.	0.	0.	195.7	22.3	195.7	4.053E-06	3.670E-06	3.670E-06
F	.4	.76	1950.	0.	0.	303.4	8.4	303.4	2.935E-04	2.491E-04	2.491E-04
F	1.0	2.77	1950.	0.	0.	303.4	8.4	303.4	1.239E-04	1.052E-04	1.052E-04
F	2.0	5.95	1950.	0.	0.	303.4	8.4	303.4	6.128E-05	5.201E-05	5.201E-05
F	3.0	4.56	1950.	0.	0.	303.4	8.4	303.4	4.131E-05	3.506E-05	3.506E-05
F	4.0	3.20	1950.	0.	0.	303.4	8.4	303.4	3.115E-05	2.644E-05	2.644E-05
F	5.0	1.58	1950.	0.	0.	303.4	8.4	303.4	2.478E-05	2.103E-05	2.103E-05
F	6.0	.63	1950.	0.	0.	303.4	8.4	303.4	2.073E-05	1.759E-05	1.759E-05
F	8.0	.39	1950.	0.	0.	303.4	8.4	303.4	1.553E-05	1.318E-05	1.318E-05
F	10.0	.07	1950.	0.	0.	303.4	8.4	303.4	1.242E-05	1.054E-05	1.054E-05
F	13.0	.03	1950.	0.	0.	303.4	8.4	303.4	9.565E-06	8.118E-06	8.118E-06
G	.4	1.05	1950.	0.	0.	488.9	3.2	488.9	4.828E-04	3.733E-04	3.733E-04
G	1.0	3.07	1950.	0.	0.	488.9	3.2	488.9	2.039E-04	1.576E-04	1.576E-04
G	2.0	5.65	1950.	0.	0.	488.9	3.2	488.9	1.008E-04	7.794E-05	7.794E-05
G	3.0	3.12	1950.	0.	0.	488.9	3.2	488.9	6.795E-05	5.254E-05	5.254E-05
G	4.0	1.37	1950.	0.	0.	488.9	3.2	488.9	5.125E-05	3.962E-05	3.962E-05
G	5.0	.34	1950.	0.	0.	488.9	3.2	488.9	4.077E-05	3.152E-05	3.152E-05
G	6.0	.09	1950.	0.	0.	488.9	3.2	488.9	3.410E-05	2.637E-05	2.637E-05
G	8.0	.02	1950.	0.	0.	488.9	3.2	488.9	2.555E-05	1.976E-05	1.976E-05
G	10.0	.01	1950.	0.	0.	488.9	3.2	488.9	2.043E-05	1.580E-05	1.580E-05
G	13.0	.00	1950.	0.	0.	488.9	3.2	488.9	1.573E-05	1.217E-05	1.217E-05
G	18.0	.00	1950.	0.	0.	488.9	3.2	488.9	1.137E-05	8.789E-06	8.789E-06

ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-69	Cont'd on page B-70
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
 DIRECTION-INDEPENDENT (S.R.P 2.3.4) MODEL.
 MINIMUM BOUNDARY DISTANCE = 1950.0 METERS.
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:   C=   .5      A=  2861.      D=   70.0
 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   3.733E-04   2.491E-04   1.576E-04   1.559E-04   1.052E-04   8.301E-05   7.794E-05   6.581E-05   5.254E-05   5.201E-05
        1.046       1.805       4.870       5.477       8.243       8.606      14.254      16.596      19.719      25.673
      1.04614     1.80468     4.87042     5.47724     8.24273     8.60619    14.25411    16.59608    19.71871    25.67320
0   3.962E-05   3.506E-05   3.505E-05   3.254E-05   3.152E-05   2.644E-05   2.637E-05   2.194E-05   2.103E-05   1.976E-05
       27.039      31.596      33.085      38.417      38.755      41.950      42.042      47.064      48.647      48.666
     27.03856    31.59608    33.08470    38.42656    38.75474    41.95006    42.04172    47.06384    48.64728    48.66624
0   1.888E-05   1.759E-05   1.733E-05   1.654E-05   1.580E-05   1.318E-05   1.316E-05   1.217E-05   1.168E-05   1.101E-05
       48.755      49.384      52.965      57.285      57.295      57.680      61.116      61.119      64.861      67.453
     48.75474    49.38369    52.96460    57.28508    57.29457    57.68016    61.11568    61.11884    64.86094    67.45259
0   1.054E-05   9.662E-06   8.811E-06   8.789E-06   8.249E-06   8.118E-06   7.972E-06   7.009E-06   6.596E-06   5.863E-06
       67.522      67.614      70.926      70.929      73.742      73.767      74.023      76.571      77.718      79.447
     67.52213    67.61378    70.92605    70.92921    73.74210    73.76739    74.02339    76.57080    77.71809    79.44691
0   5.080E-06   4.393E-06   4.080E-06   3.942E-06   3.693E-06   3.670E-06   3.513E-06   2.705E-06   2.657E-06   2.017E-06
       79.839      81.874      82.152      82.765      83.113      83.167      84.194      84.643      85.401      86.030
     79.83881    81.87422    82.15235    82.76550    83.11317    83.16689    84.19408    84.64288    85.40141    86.03036
0   2.004E-06   1.954E-06   1.594E-06   1.559E-06   1.360E-06   1.334E-06   1.026E-06   9.992E-07   8.159E-07   7.989E-07
       86.583      86.662      87.143      88.366      89.036      89.352      89.921      90.265      90.689      90.898
     86.58346    86.66248    87.14288    88.36602    89.03606    89.35211    89.92101    90.26551    90.68903    90.89762
0   7.711E-07   6.825E-07   6.153E-07   5.198E-07   5.114E-07   4.089E-07   3.920E-07   3.149E-07   3.119E-07   2.609E-07
       93.394      93.628      93.698      95.509      95.815      95.907      97.317      97.386      98.404      98.982
     93.39446    93.62834    93.69788    95.50887    95.81544    95.90710    97.31671    97.38625    98.40395    98.98233
    1.955E-07   1.563E-07   1.204E-07   8.695E-08
       99.687      99.899      99.994     100.000
     99.68713    99.89889    99.99371   100.00000
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Cont'd on page B-71


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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

                                                              BACK EXTRAPOLATION FOR  1 PERCENTILE.
     3.809E-04             1.000              1.000
     2.242E-04             3.000              3.000
     1.693E-04             5.000              5.000
     1.099E-04            10.000             10.000
     8.205E-05            15.000             15.000
     6.507E-05            20.000             20.000
     5.332E-05            25.000             25.000
     4.394E-05            30.000             30.000
     3.664E-05            35.000             35.000
     3.037E-05            40.000             40.000
     2.452E-05            45.000             45.000
     2.026E 05            50.000             50.000
     1.764E-05            55.000             55.000
     1.489E-05            60.000             60.000
     1.219E-05            65.000             65.000
     9.828E-06            70.000             70.000
     7.702E-06            75.000             75.000
     5.950E-06            80.000             80.000
     4.615E-06            85.000             85.000
     3.352E-06            90.000             90.000
0    1.693E 04             5.0                5.00
0K= 17     FIVEXQ(K)= 1.693E-04      FIVEPR(K)= 5.000
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0            RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                 METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                        WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE             DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0FIVE PERCENT OVERALL SITE LIMIT
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:    C=    .5      A=  2861.      D=   70.0
 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   3.733E-04   2.491E-04   1.576E-04   1.559E-04   1.052E-04   8.301E-05   7.794E-05   6.581E-05   5.254E-05   5.201E-05
        1.046       1.805       4.870       5.477       8.243       8.606      14.254      16.596      19.719      25.673
      1.04614     1.80468     4.87042     5.47724     8.24273     8.60620    14.25411    16.59609    19.71872    25.67321
0   3.962E-05   3.506E-05   3.505E-05   3.254E-05   3.152E-05   2.644E-05   2.637E-05   2.194E-05   2.103E-05   1.976E-05
       27.039      31.596      33.085      38.417      38.755      41.950      42.042      47.064      48.647      48.666
     27.03857    31.59609    33.08472    38.41658    38.75476    41.95008    42.04174    47.06386    48.64730    48.66627
0   1.888E-05   1.759E-05   1.733E-05   1.654E-05   1.580E-05   1.318E-05   1.316E-05   1.217E-05   1.168E-05   1.101E-05
       48.755      49.384      52.965      57.285      57.295      57.680      61.116      61.119      64.861      67.453
     48.75476    49.38371    52.96462    57.28510    57.29459    57.68017    61.11570    61.11886    64.86096    67.45261
0   1.054E-05   9.662E-06   8.811E-06   8.789E-06   8.249E-06   8.118E-06   7.972E-06   7.009E-06   6.596E-06   5.863E-06
       67.522      67.614      70.926      70.929      73.742      73.767      74.023      76.571      77.718      79.447
     67.52215    67.61383    70.92610    70.92926    73.74215    73.76744    74.02347    76.57088    77.71815    79.44698
0   5.080E-06   4.393E-06   4.080E-06   3.942E-06   3.693E-06   3.670E-06   3.513E-06   2.705E-06   2.657E-06   2.017E-06
       79.839      81.874      82.152      82.766      83.113      83.167      84.194      84.643      85.401      86.030
     79.83890    81.87431    82.15244    82.76559    83.11323    83.16696    84.19415    84.64294    85.40147    86.03042
0   2.004E-06   1.954E-06   1.594E-06   1.559E-06   1.360E-06   1.334E-06   1.026E-06   9.992E-07   8.159E-07   7.989E-07
       86.584      86.663      87.143      88.366      89.036      89.352      89.921      90.266      90.689      90.898
     86.58353    86.66256    87.14297    88.36612    89.03616    89.35222    89.92114    90.26564    90.68917    90.89777
0   7.711E-07   6.825E-07   6.153E-07   5.198E-07   5.114E-07   4.089E-07   3.920E-07   3.149E-07   3.119E-07   2.609E-07
       93.395      93.628      93.698      95.509      95.816      95.907      97.317      97.386      98.404      98.982
     93.39461    93.62849    93.69803    95.50903    95.81561    95.90726    97.31687    97.38641    98.40411    98.98248
    1.955E-07   1.563E-07   1.204E-07   8.695E-08
       99.687      99.899      99.994     100.000
     99.68729    99.89906    99.99388   100.00020
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0          X/Q PERCENTILES
 (BASED ON THE UPPER ENVELOPE CF 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  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  18  1       -7.89311 -10.64124  -1.18976
  18  2       -9.86416  10.71703  -1.30581
  18  3      -10.33296 -10.82610  -1.67665
  18  4      ·10.76940 -10.80680  -1.10587
  18  5      -11.00948 -10.73168   1.51571
  18  6      -11.41681 -10.70420  -1.57651
  18  7      -11.70542 -10.59021  ·1.75600
  18  8      -11.92912 -10.93760  -1.30040
  18  9      -15.93279      NUMXQ(K)=  9
     3.809E-04             1.000              1.000                    BACK EXTRAPOLATION FOR  1 PERCENTILE.
     2.242E-04             3.000              3.000
     1.693E-04             5.000              5.000
     1.099E-04            10.000             10.000
     8.205E-05            15.000             15.000
     6.507E-05            20.000             20.000
     5.332E-05            25.000             25.000
     4.394E-05            30.000             30.000
     3.664E-05            35.000             35.000
     3.037E-05            40.000             40.000
     2.452E-05            45.000             45.000
     2.026E-05            50.000             50.000
     1.764E-05            55.000             55.000
     1.489E-05            60.000             60.000
     1.219E-05            65.000             65.000
     9.828E-06            70.000             70.000
     7.702E-06            75.000             75.000
     5.952E-06            80.000             80.000
     4.619E-06            85.000             85.000
     3.357E-06            90.000             90.000
0    1.693E-04             5.0                5.00
CK= 18      PIVEXQ(K)= 1.693E-04     FIVEPR(K)= 5.000
0  K          HIGHPR            PR        GRNDVT(K)
   1         -2.61965        .44011        7.11613
   2         -1.70114       4.44581        5.59889
   3         -2.80567        .25107        3.79337
   4         -3.03767        .11922        1.66485
   5         -3.13349        .08638        1.20432
   6         -3.13647        .08550        1.52234
   7         -3.05142        .11389        4.75939
   8         -2.83132        .23178       10.15150
   9         -2.78472        .26788       12.08469
  10         -2.87121        .20446        8.67808
  11         -2.77952        .27220        5.83414
  12         -2.79549        .25911        4.17912
  13         -2.76275        .28659        4.74070
  14         -2.72818        .31843        8.25809
  15         -2.65745        .39368       10.87648
  16         -2.57624        .49942        9.53793
```

0 K	HOURS(K)	TOTHRS
1	38.55353	38.55353
2	389.45290	428.00640
3	21.99344	449.99980
4	10.44326	460.44310
5	7.56680	468.00990
6	7.49005	475.50000
7	9.97647	485.47640
8	20.30433	505.78080
9	23.46587	529.24660
10	17.91033	547.15700
11	23.84494	571.00190
12	22.69833	593.70020
13	25.10538	618.80550
14	27.89463	646.70020
15	34.48661	681.18680
16	43.74879	724.93560

0 K	PIVEXQ	SVANN	SLTIME	TIMINT	I	TIME	XQT
1	1.683E-04	1.170E-05	-.3179	-8.4694			
					1	8.0	-9.13048
					2	16.0	-9.35085
					3	72.0	-9.82903
					4	624.0	-10.51557
2	1.606E-04	1.048E-05	-.3255	-8.5111			
					1	8.0	-9.18803
					2	16.0	-9.41366
					3	72.0	-9.90326
					4	624.0	-10.60621
3	1.133E-04	6.203E-06	-.3465	-8.8449			
					1	8.0	-9.56545
					2	16.0	9.80563
					3	72.0	-10.32680
					4	624.0	-11.07507
4	5.617E-05	2.616E-06	-.3657	-9.5336			
					1	8.0	-10.29412
					2	16.0	-10.54763
					3	72.0	-11.09772
					4	624.0	-11.88752
5	2.878E-05	1.666E-06	-.3398	-10.2203			
					2	8.0	-10.92696
					2	16.0	-11.16251
					3	72.0	-11.67363
					4	624.0	-12.40747
6	3.141E-05	1.715E-06	-.3467	-10.1282			
					1	8.0	-10.84922
					2	16.0	-11.08957
					3	72.0	-11.61110
					4	624.0	-12.35988
7	7.224E-05	3.675E-06	-.3552	-9.2893			
					1	8.0	-10.02796
					2	16.0	-10.27418
					3	72.0	-10.80844
					4	624.0	-11.57550
8	1.187E-04	8.638E-06	-.3125	-8.8223			
					1	8.0	-9.47214
					2	16.0	-9.68876
					3	72.0	-10.15880
					4	624.0	-10.83367
9	1.301E-04	9.874E-06	-.3075	-8.7340			
					1	8.0	-9.37345
					2	16.0	-9.58660
					3	72.0	-10.04910
					4	624.0	-10.71314
10	1.085E-04	6.727E-06	-.3317	-8.8985			
					1	8.0	-9.58819
					2	16.0	-9.81808
					3	72.0	-10.31693
					4	624.0	-11.03316
11	1.200E-04	6.459E-06	-.3485	-8.7866			
					1	8.0	-9.51120
					2	16.0	-9.75273
					3	72.0	-10.27685
					4	624.0	-11.02935
12	1.140E-04	5.665E-06	-.3580	-8.8315			
					1	8.0	-9.57592
					2	16.0	-9.82404
					3	72.0	-10.36246
					4	624.0	-11.13548
13	1.248E-04	6.498E-06	-.3524	-8.7447			
					1	8.0	-9.47757
					2	16.0	-9.72185
					3	72.0	-10.25192
					4	624.0	-11.01296
14	1.393E-04	8.409E-06	-.3348	-8.6469			
					1	8.0	-9.34309

```
                                                    2   16.0    -9.57514
                                                    3   72.0   -10.07868
                                                    4  624.0   -10.80164
 15 1.589E-04 1.240E-05     -.3041    -8.5366
                                                    1    8.0    -9.16902
                                                    2   16.0    -9.37983
                                                    3   72.0    -9.83727
                                                    4  624.0   -10.49403
 16 1.810E-04 1.359E-05     -.3C88    -8.4033
                                                    1    8.0    -9.04532
                                                    2   16.0    -9.25935
                                                    3   72.0    -9.72376
                                                    4  624.0   -10.39054
 17 1.693E-04 1.359E-05     -.3008    -8.4753
                                                    1    8.0     9.10087
                                                    2   16.0    -9.30939
                                                    3   72.0    -9.76186
                                                    4  624.0   -10.41151
 18 1.693E-04 1.359E-05     -.3C08    -8.4753
                                                    1    8.0    -9.10087
                                                    2   16.0    -9.30939
                                                    3   72.0    -9.76186
                                                    4  624.0   -10.41151
```

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 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
```

DOWNWIND SECTOR	DISTANCE (METERS)	0-2 HOURS	0-8 HOURS	8-24 HOURS	1-4 DAYS	4-30 DAYS	ANNUAL AVERAGE	HOURS PER YEAR MAX 0-2 HR X/Q IS EXCEEDED IN SECTOR	DOWNWIND SECTOR
S	1950.	1.68E-04	1.08E-04	8.69E-05	5.39E-05	2.71E-05	1.17E-05	38.6	S
SSW	1950.	1.61E-04	1.02E-04	8.16E-05	5.00E-05	2.48E-05	1.05E-05	389.5	SSW
SW	1950.	1.13E-04	7.01E-05	5.51E-05	3.27E-05	1.55E-05	6.20E-06	22.0	SW
WSW	1950.	5.62E-05	3.38E-05	2.63E-05	1.51E-05	6.88E-06	2.62E-06	10.4	WSW
W	1950.	2.88E-05	1.80E-05	1.42E-05	8.52E-06	4.09E-06	1.67E-06	7.6	W
WNW	1950.	3.14E-05	1.94E-05	1.53E-05	9.06E-06	4.29E-06	1.72E-06	7.5	WNW
NW	1950.	7.22E-05	4.41E-05	3.45E-05	2.02E-05	9.39E-06	3.67E-06	10.0	NW
NNW	1950.	1.19E-04	7.70E-05	6.20E-05	3.87E-05	1.97E-05	8.64E-06	20.3	NNW
N	1950.	1.30E-04	8.49E-05	6.86E-05	4.32E-05	2.23E-05	9.87E-06	23.5	N
NNE	1950.	1.09E-04	6.85E-05	5.45E-05	3.31E-05	1.62E-05	6.73E-06	17.9	NNE
NE	1950.	1.20E-04	7.40E-05	5.81E-05	3.44E-05	1.62E-05	6.46E-06	23.8	NE
ENE	1950.	1.14E-04	6.94E-05	5.41E-05	3.16E-05	1.46E-05	5.66E-06	22.7	ENE
E	1950.	1.25E-04	7.65E-05	6.00E-05	3.53E-05	1.65E-05	6.50E-06	25.1	E
ESE	1950.	1.39E-04	8.76E-05	6.94E-05	4.20E-05	2.04E-05	8.41E-06	27.9	ESE
SE	1950.	1.59E-04	1.04E-04	8.44E-05	5.34E-05	2.77E-05	1.24E-05	34.5	SE
SSE	1950.	1.81E-04	1.18E-04	9.52E-05	5.98E-05	3.07E-05	1.36E-05	43.7	SSE
MAX X/Q		1.81E-04				TOTAL HOURS AROUND SITE:		724.9	
SRP 2.3.4	1950.	1.69E-04	1.12E-04	9.06E-05	5.76E-05	3.01E-05	1.36E-05		
SITE LIMIT		1.69E-04	1.12E-04	9.06E-05	5.76E-05	3.01E-05	1.36E-05		

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0THE FIVE-PERCENT-FOR-THE-ENTIRE-SITE X/Q 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.
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                       WIND SENSORS HEIGHT: 10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE            DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE    S SECTOR.
```

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=1431.SQ.METERS	USED
A	.4	.40	4827.	0.	0.	1000.0	1000.0	1000.0	7.495E-07	7.492E-07	7.492E-07
A	1.0	1.42	4827.	0.	0.	1000.0	1000.0	1000.0	3.165E-07	3.163E-07	3.163E-07
A	2.0	3.24	4827.	0.	0.	1000.0	1000.0	1000.0	1.565E-07	1.564E-07	1.564E-07
A	3.0	2.66	4827.	0.	0.	1000.0	1000.0	1000.0	1.055E-07	1.054E-07	1.054E-07
A	4.0	2.35	4827.	0.	0.	1000.0	1000.0	1000.0	7.956E-08	7.952E-08	7.952E-08
A	5.0	1.60	4827.	0.	0.	1000.0	1000.0	1000.0	6.329E-08	6.326E-08	6.326E-08
A	6.0	.71	4827.	0.	0.	1000.0	1000.0	1000.0	5.294E-08	5.292E-08	5.292E-08
A	8.0	1.11	4827.	0.	0.	1000.0	1000.0	1000.0	3.967E-08	3.965E-08	3.965E-08
A	10.0	.04	4827.	0.	0.	1000.0	1000.0	1000.0	3.172E-08	3.170E-08	3.170E-08
B	.4	.10	4827.	0.	0.	725.4	859.0	725.4	1.203E-06	1.202E-06	1.202E-06
B	1.0	.31	4827.	0.	0.	725.4	859.0	725.4	5.079E-07	5.075E-07	5.075E-07
B	2.0	.89	4827.	0.	0.	725.4	859.0	725.4	2.512E-07	2.510E-07	2.510E-07
B	3.0	1.20	4827.	0.	0.	725.4	859.0	725.4	1.693E-07	1.692E-07	1.692E-07
B	4.0	.67	4827.	0.	0.	725.4	859.0	725.4	1.277E-07	1.276E-07	1.276E-07
B	5.0	.49	4827.	0.	0.	725.4	859.0	725.4	1.016E-07	1.015E-07	1.015E-07
B	6.0	.27	4827.	0.	0.	725.4	859.0	725.4	8.496E-08	8.490E-08	8.490E-08
B	8.0	.18	4827.	0.	0.	725.4	859.0	725.4	6.366E-08	6.362E-08	6.362E-08
B	10.0	.04	4827.	0.	0.	725.4	859.0	725.4	5.090E-08	5.086E-08	5.086E-08
C	.4	.09	4827.	0.	0.	568.7	500.4	568.7	2.634E-06	2.629E-06	2.629E-06
C	1.0	.27	4827.	0.	0.	568.7	500.4	568.7	1.112E-06	1.110E-06	1.110E-06
C	2.0	1.07	4827.	0.	0.	568.7	500.4	568.7	5.499E-07	5.490E-07	5.490E-07
C	3.0	1.11	4827.	0.	0.	568.7	500.4	568.7	3.706E-07	3.700E-07	3.700E-07
C	4.0	.76	4827.	0.	0.	568.7	500.4	568.7	2.795E-07	2.791E-07	2.791E-07
C	5.0	.71	4827.	0.	0.	568.7	500.4	568.7	2.224E-07	2.220E-07	2.220E-07
C	6.0	.31	4827.	0.	0.	568.7	500.4	568.7	1.860E-07	1.857E-07	1.857E-07
C	8.0	.31	4827.	0.	0.	568.7	500.4	568.7	1.394E-07	1.392E-07	1.392E-07
D	.4	.49	4827.	0.	0.	221.3	158.9	221.3	2.131E-05	2.104E-05	2.104E-05
D	1.0	2.00	4827.	0.	0.	221.3	158.9	221.3	9.000E-06	8.885E-06	8.885E-06
D	2.0	4.66	4827.	0.	0.	221.3	158.9	221.3	4.450E-06	4.393E-06	4.393E-06
D	3.0	5.91	4827.	0.	0.	221.3	158.9	221.3	3.000E-06	2.962E-06	2.962E-06
D	4.0	3.06	4827.	0.	0.	221.3	158.9	221.3	2.262E-06	2.234E-06	2.234E-06
D	5.0	2.71	4827.	0.	0.	221.3	158.9	221.3	1.800E-06	1.777E-06	1.777E-06
D	6.0	1.82	4827.	0.	0.	221.3	158.9	221.3	1.506E-06	1.486E-06	1.486E-06
D	8.0	.44	4827.	0.	0.	221.3	158.9	221.3	1.128E-06	1.114E-06	1.114E-06
D	10.0	.04	4827.	0.	0.	221.3	158.9	221.3	9.020E-07	8.904E-07	8.904E-07
D	13.0	.04	4827.	0.	0.	221.3	158.9	221.3	6.947E-07	6.858E-07	6.858E-07

ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-77	Cont'd on page B-78
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

E	.4	.52	4827.	0.	0.	428.5	35.6	428.5	4.920E-05	4.777E-05	4.777E-05
E	1.0	2.00	4827.	0.	0.	428.5	35.6	428.5	2.077E-05	2.017E-05	2.017E-05
E	2.0	5.20	4827.	0.	0.	428.5	35.6	428.5	1.027E-05	9.974E-06	9.974E-06
E	3.0	4.31	4827.	0.	0.	428.5	35.6	428.5	6.924E-06	6.723E-06	6.723E-06
E	4.0	2.27	4827.	0.	0.	428.5	35.6	428.5	5.222E-06	5.070E-06	5.070E-06
E	5.0	1.11	4827.	0.	0.	428.5	35.6	428.5	4.154E-06	4.034E-06	4.034E-06
E	6.0	.49	4827.	0.	0.	428.5	35.6	428.5	3.475E-06	3.374E-06	3.374E-06
E	8.0	.36	4827.	0.	0.	428.5	35.6	428.5	2.604E-06	2.528E-06	2.528E-06
E	10.0	.13	4827.	0.	0.	428.5	35.6	428.5	2.082E-06	2.021E-06	2.021E-06
E	13.0	.04	4827.	0.	0.	428.5	35.6	428.5	1.603E-06	1.557E-06	1.557E-06
F	.4	1.05	4827.	0.	0.	696.0	11.2	696.0	9.625E-05	9.094E-05	9.094E-05
F	1.0	3.82	4827.	0.	0.	696.0	11.2	696.0	4.064E-05	3.839E-05	3.839E-05
F	2.0	7.46	4827.	0.	0.	696.0	11.2	696.0	2.010E-05	1.899E-05	1.899E-05
F	3.0	4.31	4827.	0.	0.	696.0	11.2	696.0	1.355E-05	1.280E-05	1.280E-05
F	4.0	.58	4827.	0.	0.	696.0	11.2	696.0	1.022E-05	9.652E-06	9.652E-06
F	5.0	.09	4827.	0.	0.	696.0	11.2	696.0	8.128E-06	7.679E-06	7.679E-06
F	6.0	.13	4827.	0.	0.	696.0	11.2	696.0	6.799E-06	6.423E-06	6.423E-06
G	.4	1.59	4827.	0.	0.	1000.0	3.5	1000.0	2.136E-04	1.891E-04	1.891E-04
G	1.0	4.66	4827.	0.	0.	1000.0	3.5	1000.0	9.021E-05	7.984E-05	7.984E-05
G	2.0	12.08	4827.	0.	0.	1000.0	3.5	1000.0	4.461E-05	3.948E-05	3.948E-05
G	3.0	3.95	4827.	0.	0.	1000.0	3.5	1000.0	3.007E-05	2.661E-05	2.661E-05
G	4.0	.36	4827.	0.	0.	1000.0	3.5	1000.0	2.268E-05	2.007E-05	2.007E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0   S SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:    C=   .5      A=  2861.      D=   70.0
 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   1.891E-04   9.094E-05   7.984E-05   4.777E-05   3.948E-05   3.839E-05   2.661E-05   2.104E-05   2.017E-05   2.007E-05
        1.591       2.639       7.302       7.820      19.901      23.721      27.673      28.161      30.160      30.515
       .11324      .18780      .51965      .55651     1.41618     1.68798     1.96927     2.00400     2.14623     2.17151
0   1.899E-05   1.280E-05   9.974E-06   9.652E-06   8.885E-06   7.679E-06   6.723E-06   6.423E-06   5.070E-06   4.393E-06
       37.977      42.285      47.481      48.059      50.057      50.146      54.454      54.588      56.853      61.516
      2.70248     3.00906     3.37884     3.41993     3.56215     3.56848     3.87505     3.88453     4.04572     4.37758
0   4.034E-06   3.374E-06   2.962E-06   2.629E-06   2.528E-06   2.234E-06   2.021E-06   1.777E-06   1.557E-06   1.486E-06
       62.627      63.115      69.022      69.114      69.470      72.534      72.668      75.377      75.421      77.242
      4.45659     4.49136     4.91171     4.91827     4.94355     5.16163     5.17111     5.36391     5.36707     5.49665
0   1.202E-06   1.114E-06   1.110E-06   8.904E-07   7.492E-07   6.858E-07   5.490E-07   5.075E-07   3.700E-07   3.163E-07
       77.345      77.789      78.055      78.100      78.504      78.548      79.614      79.925      81.035      82.456
      5.50394     5.53554     5.55451     5.55767     5.58642     5.58958     5.66543     5.68755     5.76657     5.86771
0   2.791E-07   2.510E-07   2.220E-07   1.857E-07   1.692E-07   1.564E-07   1.392E-07   1.276E-07   1.054E-07   1.015E-07
       83.211      84.100      84.810      85.121      86.320      89.563      89.874      90.540      93.205      93.693
      5.92143     5.98465     6.03521     6.05734     6.14267     6.37339     6.39552     6.44293     6.63256     6.66733
0   8.490E-08   7.952E-08   6.362E-08   6.326E-08   5.292E-08   5.086E-08   3.965E-08   3.170E-08
       93.960      96.314      96.491      98.090      98.801      98.845      99.956     100.000
      6.68629     6.85380     6.86644     6.98022     7.03079     7.03395     7.11297     7.11613
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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)=   1.686
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   2.700
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   3.559
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   3.872
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   4.908
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   5.158
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   5.360
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   5.493
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   6.976

0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   1  1     -8.57322 -13.80769  -1.71430
   1  2    -10.16758 -17.77680  -3.58355
   1  3     10.87178  22.81338  -6.19742
   1  4    -11.63119 -24.67657  -7.23005
   1  5    -11.90999 -24.84286  -7.32422
   1  6    -12.72980 -32.08663 -11.70420
   1  7    -13.01191 -32.79868 -12.14112
   1  8    -13.24063 -37.10030 -14.81144
   1  9    -13.41924 -55.03370 -26.02798
   1 10    -16.57596      NUMXQ(K)= 10

BACK EXTRAPOLATION FOR  1 PERCENTILE.

     2.391E-04            .071          1.000
     1.352E-04            .213          3.000
     1.017E-04            .356          5.000
     6.742E-05            .712         10.000
     5.217E-05           1.067         15.000
     4.313E-05           1.423         20.000
     3.558E-05           1.779         25.000
     2.719E-05           2.135         30.000
     2.153E-05           2.491         35.000
     1.651E-05           2.846         40.000
     1.196E-05           3.202         45.000
     8.913E-06           3.558         50.000
     6.500E-06           3.914         55.000
     4.829E-06           4.270         60.000
     3.658E-06           4.625         65.000
     2.735E-06           4.981         70.000
     1.831E-06           5.337         75.000
     9.446E-07           5.693         80.000
     4.281E-07           6.049         85.000
     2.011E-07           6.405         90.000
0    8.345E-05           0.5            7.03
0ANNUAL AVERAGE =   2.20E-06
0K=  1     FIVEXQ(K)= 8.345E-05     FIVEPR(K)= 7.026
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE SSW SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.63	4827.	0.	0.	1000.0	1000.0	1000.0	7.495E-07	7.492E-07	7.492E-07
A	1.0	2.20	4827.	0.	0.	1000.0	1000.0	1000.0	3.165E-07	3.163E-07	3.163E-07
A	2.0	3.39	4827.	0.	0.	1000.0	1000.0	1000.0	1.565E-07	1.564E-07	1.564E-07
A	3.0	2.60	4827.	0.	0.	1000.0	1000.0	1000.0	1.055E-07	1.054E-07	1.054E-07
A	4.0	2.09	4827.	0.	0.	1000.0	1000.0	1000.0	7.956E-08	7.952E-08	7.952E-08
A	5.0	1.58	4827.	0.	0.	1000.0	1000.0	1000.0	6.329E-08	6.326E-08	6.326E-08
A	6.0	.51	4827.	0.	0.	1000.0	1000.0	1000.0	5.294E-08	5.292E-08	5.292E-08
A	8.0	1.02	4827.	0.	0.	1000.0	1000.0	1000.0	3.967E-08	3.965E-08	3.965E-08
A	10.0	.06	4827.	0.	0.	1000.0	1000.0	1000.0	3.172E-08	3.170E-08	3.170E-08
A	13.0	.11	4827.	0.	0.	1000.0	1000.0	1000.0	2.443E-08	2.442E-08	2.442E-08
B	.4	.15	4827.	0.	0.	725.4	859.0	725.4	1.203E-06	1.202E-06	1.202E-06
B	1.0	.45	4827.	0.	0.	725.4	859.0	725.4	5.079E-07	5.075E-07	5.075E-07
B	2.0	.73	4827.	0.	0.	725.4	859.0	725.4	2.512E-07	2.510E-07	2.510E-07
B	3.0	1.02	4827.	0.	0.	725.4	859.0	725.4	1.693E-07	1.692E-07	1.692E-07
B	4.0	1.02	4827.	0.	0.	725.4	859.0	725.4	1.277E-07	1.276E-07	1.276E-07
B	5.0	.56	4827.	0.	0.	725.4	859.0	725.4	1.016E-07	1.015E-07	1.015E-07
B	6.0	.11	4827.	0.	0.	725.4	859.0	725.4	8.496E-08	8.490E-08	8.490E-08
B	8.0	.11	4827.	0.	0.	725.4	859.0	725.4	6.366E-08	6.362E-08	6.362E-08
B	13.0	.11	4827.	0.	0.	725.4	859.0	725.4	3.920E-08	3.917E-08	3.917E-08
C	.4	.20	4827.	0.	0.	568.7	500.4	568.7	2.634E-06	2.629E-06	2.629E-06
C	1.0	.56	4827.	0.	0.	568.7	500.4	568.7	1.112E-06	1.110E-06	1.110E-06
C	2.0	1.07	4827.	0.	0.	568.7	500.4	568.7	5.499E-07	5.490E-07	5.490E-07
C	3.0	1.02	4827.	0.	0.	568.7	500.4	568.7	3.706E-07	3.700E-07	3.700E-07
C	4.0	.85	4827.	0.	0.	568.7	500.4	568.7	2.795E-07	2.791E-07	2.791E-07
C	5.0	.62	4827.	0.	0.	568.7	500.4	568.7	2.224E-07	2.220E-07	2.220E-07
C	6.0	.17	4827.	0.	0.	568.7	500.4	568.7	1.860E-07	1.857E-07	1.857E-07
C	8.0	.11	4827.	0.	0.	568.7	500.4	568.7	1.394E-07	1.392E-07	1.392E-07
C	10.0	.11	4827.	0.	0.	568.7	500.4	568.7	1.114E-07	1.113E-07	1.113E-07
D	.4	.44	4827.	0.	0.	221.3	158.9	221.3	2.131E-05	2.104E-05	2.104E-05
D	1.0	1.81	4827.	0.	0.	221.3	158.9	221.3	9.000E-06	8.885E-06	8.885E-06
D	2.0	3.84	4827.	0.	0.	221.3	158.9	221.3	4.450E-06	4.393E-06	4.393E-06
D	3.0	4.12	4827.	0.	0.	221.3	158.9	221.3	3.000E-06	2.962E-06	2.962E-06
D	4.0	3.33	4827.	0.	0.	221.3	158.9	221.3	2.262E-06	2.234E-06	2.234E-06
D	5.0	1.81	4827.	0.	0.	221.3	158.9	221.3	1.800E-06	1.777E-06	1.777E-06
D	6.0	.85	4827.	0.	0.	221.3	158.9	221.3	1.506E-06	1.486E-06	1.486E-06
D	8.0	.68	4827.	0.	0.	221.3	158.9	221.3	1.128E-06	1.114E-06	1.114E-06
D	10.0	.45	4827.	0.	0.	221.3	158.9	221.3	9.020E-07	8.904E-07	8.904E-07
D	13.0	.06	4827.	0.	0.	221.3	158.9	221.3	6.947E-07	6.858E-07	6.858E-07

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

E	.4	.51	4827.	0.	0.	428.5	35.6	428.5	4.920E-05	4.777E-05	4.777E-05
E	1.0	1.98	4827.	0.	0.	428.5	35.6	428.5	2.077E-05	2.017E-05	2.017E-05
E	2.0	5.19	4827.	0.	0.	428.5	35.6	428.5	1.027E-05	9.974E-06	9.974E-06
E	3.0	4.46	4827.	0.	0.	428.5	35.6	428.5	6.924E-06	6.723E-06	6.723E-06
E	4.0	1.86	4827.	0.	0.	428.5	35.6	428.5	5.222E-06	5.070E-06	5.070E-06
E	5.0	.56	4827.	0.	0.	428.5	35.6	428.5	4.154E-06	4.034E-06	4.034E-06
E	6.0	.23	4827.	0.	0.	428.5	35.6	428.5	3.475E-06	3.374E-06	3.374E-06
E	8.0	.73	4827.	0.	0.	428.5	35.6	428.5	2.604E-06	2.528E-06	2.528E-06
E	10.0	.73	4827.	0.	0.	428.5	35.6	428.5	2.082E-06	2.021E-06	2.021E-06
F	.4	.98	4827.	0.	0.	696.0	11.2	696.0	9.625E-05	9.094E-05	9.094E-05
F	1.0	3.56	4827.	0.	0.	696.0	11.2	696.0	4.064E-05	3.839E-05	3.839E-05
F	2.0	7.96	4827.	0.	0.	696.0	11.2	696.0	2.010E-05	1.899E-05	1.899E-05
F	3.0	3.67	4827.	0.	0.	696.0	11.2	696.0	1.355E-05	1.280E-05	1.280E-05
F	4.0	.45	4827.	0.	0.	696.0	11.2	696.0	1.022E-05	9.652E-06	9.652E-06
F	5.0	.06	4827.	0.	0.	696.0	11.2	696.0	8.128E-06	7.679E-06	7.679E-06
G	.4	1.98	4827.	0.	0.	1000.0	3.5	1000.0	2.136E-04	1.891E-04	1.891E-04
G	1.0	5.81	4827.	0.	0.	1000.0	3.5	1000.0	9.021E-05	7.984E-05	7.984E-05
G	2.0	14.06	4827.	0.	0.	1000.0	3.5	1000.0	4.461E-05	3.948E-05	3.948E-05
G	3.0	4.23	4827.	0.	0.	1000.0	3.5	1000.0	3.007E-05	2.661E-05	2.661E-05
G	4.0	.45	4827.	0.	0.	1000.0	3.5	1000.0	2.268E-05	2.007E-05	2.007E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0 SSW SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:    C=   .5      A=  2861.      D=   70.0
 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   1.891E-04   9.094E-05   7.984E-05   4.777E-05   3.948E-05   3.839E-05   2.661E-05   2.104E-05   2.017E-05   2.007E-05
        1.984       2.960       8.774       9.286      23.342      26.898      31.132      31.573      33.549      34.000
       .11109      .16570      .49124      .51990     1.30688     1.50599     1.74303     1.76773     1.87835     1.90363
0   1.899E-05   1.280E-05   9.974E-06   9.652E-06   8.885E-06   7.679E-06   6.723E-06   5.070E-06   4.393E-06   4.034E-06
       41.960      45.629      50.822      51.274      53.080      53.137      57.596      59.459      63.298      63.862
      2.34927     2.55471     2.84548     2.87076     2.97190     2.97506     3.22475     3.32904     3.54396     3.57557
0   3.374E-06   2.962E-06   2.629E-06   2.528E-06   2.234E-06   2.021E-06   1.777E-06   1.486E-06   1.202E-06   1.114E-06
       64.088      68.209      68.404      69.138      72.468      73.202      75.008      75.855      76.004      76.681
      3.58821     3.81893     3.82986     3.87094     4.05742     4.09850     4.19964     4.24705     4.25538     4.29331
0   1.110E-06   8.904E-07   7.492E-07   6.858E-07   5.490E-07   5.075E-07   3.700E-07   3.163E-07   2.791E-07   2.510E-07
       77.246      77.698      78.323      78.380      79.452      79.904      80.920      83.122      83.968      84.702
      4.32491     4.35020     4.38523     4.38839     4.44845     4.47373     4.53062     4.65388     4.70129     4.74238
0   2.220E-07   1.857E-07   1.692E-07   1.564E-07   1.392E-07   1.276E-07   1.113E-07   1.054E-07   1.015E-07   8.490E-08
       85.323      85.492      86.509      89.896      90.008      91.025      91.137      93.734      94.299      94.413
      4.77714     4.78663     4.84352     5.03315     5.03947     5.09636     5.10268     5.24807     5.27967     5.28599
0   7.952E-08   6.362E-08   6.326E-08   5.292E-08   3.965E-08   3.917E-08   3.170E-08   2.442E-08
       96.500      96.613      98.194      98.702      99.718      99.831      99.887     100.000
      5.40293     5.40926     5.49775     5.52620     5.58309     5.58941     5.59257     5.59889
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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)=   1.504
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   2.347
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   2.969
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   3.222
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   3.541
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   4.054
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   4.196
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   4.244
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   4.321
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(11)=   5.399

0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   2  1      -8.57322 -14.05213  -1.79098
   2  2     -10.16758 -18.55566  -3.86734
   2  3     -10.87178 -25.73632  -7.48140
   2  4     -11.63119 -26.15022  -7.70093
   2  5     -11.90999 -30.41824 -10.00903
   2  6     -12.33539 -31.98439 -10.87590
   2  7     -13.01191 -37.80581 -14.21301
   2  8     -13.24063 -71.86451 -33.91882
   2  9     -13.41924 -72.24459 -34.13940
   2 10     -13.71102 -55.86605 -24.58670
   2 11     -16.34724      NUMXQ(K)= 11

BACK EXTRAPOLATION FOR  1 PERCENTILE.

      2.704E-04             .056          1.000
      1.509E-04             .168          3.000
      1.128E-04             .280          5.000
      7.421E-05             .560         10.000
      5.720E-05             .840         15.000
      4.718E-05            1.120         20.000
      4.043E-05            1.400         25.000
      3.244E-05            1.680         30.000
      2.545E-05            1.960         35.000
      2.053E-05            2.240         40.000
      1.519E-05            2.519         45.000
      1.081E-05            2.799         50.000
      7.873E-06            3.079         55.000
      5.596E-06            3.359         60.000
      3.853E-06            3.639         65.000
      2.660E-06            3.919         70.000
      1.778E-06            4.199         75.000
      7.388E-07            4.479         80.000
      3.627E-07            4.759         85.000
      1.840E-07            5.039         90.000
0     7.963E-05            0.5            8.93
0ANNUAL AVERAGE =   1.99E-06
0K=  2     FIVEXQ(K)= 7.963E-05     FIVEPR(K)= 8.930
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0            RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                 METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                        WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE             DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp  output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE  SW SECTOR.
```

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=1431.SQ.METERS	USED
A	.4	.71	4827.	0.	0.	1000.0	1000.0	1000.0	7.495E-07	7.492E-07	7.492E-07
A	1.0	2.50	4827.	0.	0.	1000.0	1000.0	1000.0	3.165E-07	3.163E-07	3.163E-07
A	2.0	4.25	4827.	0.	0.	1000.0	1000.0	1000.0	1.565E-07	1.564E-07	1.564E-07
A	3.0	3.42	4827.	0.	0.	1000.0	1000.0	1000.0	1.055E-07	1.054E-07	1.054E-07
A	4.0	1.58	4827.	0.	0.	1000.0	1000.0	1000.0	7.956E-08	7.952E-08	7.952E-08
A	5.0	.92	4827.	0.	0.	1000.0	1000.0	1000.0	6.329E-08	6.326E-08	6.326E-08
A	6.0	.42	4827.	0.	0.	1000.0	1000.0	1000.0	5.294E-08	5.292E-08	5.292E-08
A	8.0	.83	4827.	0.	0.	1000.0	1000.0	1000.0	3.967E-08	3.965E-08	3.965E-08
A	10.0	.17	4827.	0.	0.	1000.0	1000.0	1000.0	3.172E 08	3.170E-08	3.170E-08
B	.4	.03	4827.	0.	0.	725.4	859.0	725.4	1.203E-06	1.202E-06	1.202E-06
B	1.0	.08	4827.	0.	0.	725.4	859.0	725.4	5.079E-07	5.075E-07	5.075E-07
B	2.0	.92	4827.	0.	0.	725.4	859.0	725.4	2.512E-07	2.510E-07	2.510E-07
B	3.0	1.25	4827.	0.	0.	725.4	859.0	725.4	1.693E-07	1.692E-07	1.692E-07
B	4.0	.83	4827.	0.	0.	725.4	859.0	725.4	1.277E-07	1.276E-07	1.276E-07
B	5.0	.67	4827.	0.	0.	725.4	859.0	725.4	1.016E-07	1.015E-07	1.015E-07
B	6.0	.08	4827.	0.	0.	725.4	859.0	725.4	8.496E-08	8.490E-08	8.490E-08
B	8.0	.17	4827.	0.	0.	725.4	859.0	725.4	6.366E 08	6.362E-08	6.362E-08
C	.4	.23	4827.	0.	0.	568.7	500.4	568.7	2.634E-06	2.629E-06	2.629E-06
C	1.0	.67	4827.	0.	0.	568.7	500.4	568.7	1.112E-06	1.110E-06	1.110E-06
C	2.0	.92	4827.	0.	0.	568.7	500.4	568.7	5.499E-07	5.490E-07	5.490E-07
C	3.0	.92	4827.	0.	0.	568.7	500.4	568.7	3.706E-07	3.700E-07	3.700E-07
C	4.0	.25	4827.	0.	0.	568.7	500.4	568.7	2.795E-07	2.791E-07	2.791E-07
C	5.0	.42	4827.	0.	0.	568.7	500.4	568.7	2.224E-07	2.220E-07	2.220E-07
C	6.0	.25	4827.	0.	0.	568.7	500.4	568.7	1.860E-07	1.857E-07	1.857E-07
C	8.0	.17	4827.	0.	0.	568.7	500.4	568.7	1.394E-07	1.392E-07	1.392E-07
D	.4	.53	4827.	0.	0.	221.3	158.9	221.3	2.131E-05	2.104E-05	2.104E-05
D	1.0	2.17	4827.	0.	0.	221.3	158.9	221.3	9.000E-06	8.885E-06	8.885E-06
D	2.0	4.42	4827.	0.	0.	221.3	158.9	221.3	4.450E-06	4.393E-06	4.393E-06
D	3.0	4.50	4827.	0.	0.	221.3	158.9	221.3	3.000E-06	2.962E-06	2.962E-06
D	4.0	3.33	4827.	0.	0.	221.3	158.9	221.3	2.262E-06	2.234E-06	2.234E-06
D	5.0	2.83	4827.	0.	0.	221.3	158.9	221.3	1.800E-06	1.777E-06	1.777E-06
D	6.0	1.33	4827.	0.	0.	221.3	158.9	221.3	1.506E-06	1.486E-06	1.486E-06
D	8.0	.33	4827.	0.	0.	221.3	158.9	221.3	1.128E-06	1.114E-06	1.114E-06
D	10.0	.50	4827.	0.	0.	221.3	158.9	221.3	9.020E-07	8.904E-07	8.904E-07
D	13.0	.33	4827.	0.	0.	221.3	158.9	221.3	6.947E-07	6.858E-07	6.858E-07
D	18.0	.17	4827.	0.	0.	221.3	158.9	221.3	5.018E-07	4.954E-07	4.954E-07

E	.4	.50	4827.	0.	0.	428.5	35.6	428.5	4.920E-05	4.777E-05	4.777E-05
E	1.0	1.92	4827.	0.	0.	428.5	35.6	428.5	2.077E-05	2.017E-05	2.017E-05
E	2.0	5.25	4827.	0.	0.	428.5	35.6	428.5	1.027E-05	9.974E-06	9.974E-06
E	3.0	4.50	4827.	0.	0.	428.5	35.6	428.5	6.924E-06	6.723E-06	6.723E-06
E	4.0	3.83	4827.	0.	0.	428.5	35.6	428.5	5.222E-06	5.070E-06	5.070E-06
E	5.0	1.25	4827.	0.	0.	428.5	35.6	428.5	4.154E-06	4.034E-06	4.034E-06
E	6.0	.25	4827.	0.	0.	428.5	35.6	428.5	3.475E-06	3.374E-06	3.374E-06
E	8.0	.50	4827.	0.	0.	428.5	35.6	428.5	2.604E-06	2.528E-06	2.528E-06
E	10.0	.58	4827.	0.	0.	428.5	35.6	428.5	2.082E-06	2.021E-06	2.021E-06
E	13.0	.08	4827.	0.	0.	428.5	35.6	428.5	1.603E-06	1.557E-06	1.557E-06
F	.4	.98	4827.	0.	0.	696.0	11.2	696.0	9.625E-05	9.094E-05	9.094E-05
F	1.0	3.58	4827.	0.	0.	696.0	11.2	696.0	4.064E-05	3.839E-05	3.839E-05
F	2.0	5.83	4827.	0.	0.	696.0	11.2	696.0	2.010E-05	1.899E-05	1.899E-05
F	3.0	3.33	4827.	0.	0.	696.0	11.2	696.0	1.355E-05	1.280E-05	1.280E-05
F	4.0	1.83	4827.	0.	0.	696.0	11.2	696.0	1.022E-05	9.652E-06	9.652E-06
F	5.0	.25	4827.	0.	0.	696.0	11.2	696.0	8.128E-06	7.679E-06	7.679E-06
G	.4	1.79	4827.	0.	0.	1000.0	3.5	1000.0	2.136E-04	1.891E-04	1.891E-04
G	1.0	5.25	4827.	0.	0.	1000.0	3.5	1000.0	9.021E-05	7.984E-05	7.984E-05
G	2.0	8.83	4827.	0.	0.	1000.0	3.5	1000.0	4.461E-05	3.948E-05	3.948E-05
G	3.0	4.75	4827.	0.	0.	1000.0	3.5	1000.0	3.007E-05	2.661E-05	2.661E-05
G	4.0	1.58	4827.	0.	0.	1000.0	3.5	1000.0	2.268E-05	2.007E-05	2.007E-05
G	5.0	.25	4827.	0.	0.	1000.0	3.5	1000.0	1.804E-05	1.597E-05	1.597E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0           RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                       WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE            DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0  SW SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:    C=   .5      A=  2861.      D=   70.0
 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   1.891E-04   9.094E-05   7.984E-05   4.777E-05   3.948E-05   3.839E-05   2.661E-05   2.104E-05   2.017E-05   2.007E-05
        1.791       2.774       8.023       8.519      17.351      20.934      25.683      26.212      28.128      29.711
       .06795      .10522      .30434      .32317      .65819      .79410      .97425      .99431     1.06700     1.12705
0   1.899E-05   1.597E-05   1.280E-05   9.974E-06   9.652E-06   8.885E-06   7.679E-06   6.723E-06   5.070E-06   4.393E-06
       35.543      35.793      39.126      44.375      46.208      48.374      48.624      53.124      56.956      61.372
      1.34829     1.35777     1.48420     1.68331     1.75284     1.83502     1.84450     2.01517     2.16056     2.32807
0   4.034E-06   3.374E-06   2.962E-06   2.629E-06   2.528E-06   2.234E-06   2.021E-06   1.777E-06   1.557E-06   1.486E-06
       62.622      62.872      67.371      67.601      68.101      71.434      72.017      74.850      74.933      76.266
      2.37547     2.38496     2.55563     2.56437     2.58333     2.70975     2.73188     2.83933     2.84250     2.89306
0   1.202E-06   1.114E-06   1.110E-06   8.904E-07   7.492E-07   6.858E-07   5.490E-07   5.075E-07   4.954E-07   3.700E-07
       76.294      76.627      77.294      77.794      78.504      78.837      79.754      79.837      80.004      80.920
      2.89411     2.90675     2.93203     2.95100     2.97795     2.99059     3.02535     3.02852     3.03484     3.06960
0   3.163E-07   2.791E-07   2.510E-07   2.220E-07   1.857E-07   1.692E-07   1.564E-07   1.392E-07   1.276E-07   1.054E-07
       83.420      83.670      84.586      85.003      85.253      86.503      90.752      90.918      91.752      95.168
      3.16442     3.17390     3.20867     3.22447     3.23395     3.28136     3.44255     3.44887     3.48047     3.61006
0   1.015E-07   8.490E-08   7.952E-08   6.362E-08   6.326E-08   5.292E-08   3.965E-08   3.170E-08
       95.834      95.917      97.500      97.667      98.584      99.000      99.833     100.000
      3.63534     3.63850     3.69855     3.70487     3.73964     3.75544     3.78705     3.79337
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Cont'd on page B-88

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

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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)=    .304
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=    .793
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   1.347
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   1.833
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   2.326
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   2.553
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   2.707
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   2.837
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   2.890
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(11)=   3.632

0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   3  1      -8.57322 -14.57718  -1.87419
   3  2      -9.43545 -15.49635  -2.20923
   3  3     -10.16758 -18.67768  -3.52816
   3  4     -10.87178 -24.53923  -6.17751
   3  5     -11.63119 -26.52127  -7.12607
   3  6     -12.33539 -32.09314  -9.92501
   3  7     -12.72980 -34.51620 -11.16699
   3  8     -13.01191 -34.67773 -11.25087
   3  9     -13.24063 -54.72895 -21.77439
   3 10     -13.41924 -63.29005 -26.28696
   3 11     -16.10317     NUMXQ(K)= 11
                                                 BACK EXTRAPOLATION FOR  1 PERCENTILE.
     2.572E-04               .038              1.000
     1.423E-04               .114              3.000
     1.061E-04               .190              5.000
     6.793E-05               .379             10.000
     4.996E-05               .569             15.000
     3.983E-05               .759             20.000
     3.048E-05               .948             25.000
     2.392E-05              1.138             30.000
     1.939E-05              1.328             35.000
     1.425E-05              1.517             40.000
     1.065E-05              1.707             45.000
     8.069E-06              1.897             50.000
     6.096E-06              2.086             55.000
     4.703E-06              2.276             60.000
     3.448E-06              2.466             65.000
     2.464E-06              2.655             70.000
     1.743E-06              2.845             75.000
     8.550E-07              3.035             80.000
     4.213E-07              3.224             85.000
     2.147E-07              3.414             90.000
C    5.518E-05              0.5               13.18
0ANNUAL AVERAGE =    1.17E-06
0K=  3     FIVEXQ(K)= 5.518E-05     FIVEPR(K)=13.181
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT: 10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 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 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=1431.SQ.METERS	USED
A	.4	1.24	4827.	0.	0.	1000.0	1000.0	1000.0	7.495E-07	7.492E-07	7.492E-07
A	1.0	4.37	4827.	0.	0.	1000.0	1000.0	1000.0	3.165E-07	3.163E-07	3.163E-07
A	2.0	6.83	4827.	0.	0.	1000.0	1000.0	1000.0	1.565E-07	1.564E-07	1.564E-07
A	3.0	2.09	4827.	0.	0.	1000.0	1000.0	1000.0	1.055E-07	1.054E-07	1.054E-07
A	4.0	1.33	4827.	0.	0.	1000.0	1000.0	1000.0	7.956E-08	7.952E-08	7.952E-08
A	5.0	.38	4827.	0.	0.	1000.0	1000.0	1000.0	6.329E-08	6.326E-08	6.326E-08
A	6.0	.19	4827.	0.	0.	1000.0	1000.0	1000.0	5.294E-08	5.292E-08	5.292E-08
B	.4	.31	4827.	0.	0.	725.4	859.0	725.4	1.203E-06	1.202E-06	1.202E-06
B	1.0	.95	4827.	0.	0.	725.4	859.0	725.4	5.079E-07	5.075E-07	5.075E-07
B	2.0	.76	4827.	0.	0.	725.4	859.0	725.4	2.512E-07	2.510E-07	2.510E-07
B	3.0	.76	4827.	0.	0.	725.4	859.0	725.4	1.693E-07	1.692E-07	1.692E-07
B	4.0	.38	4827.	0.	0.	725.4	859.0	725.4	1.277E-07	1.276E-07	1.276E-07
B	5.0	.19	4827.	0.	0.	725.4	859.0	725.4	1.016E-07	1.015E-07	1.015E-07
B	6.0	.19	4827.	0.	0.	725.4	859.0	725.4	8.496E-08	8.490E-08	8.490E-08
B	8.0	.57	4827.	0.	0.	725.4	859.0	725.4	6.366E-08	6.362E-08	6.362E-08
C	.4	.33	4827.	0.	0.	568.7	500.4	568.7	2.634E-06	2.629E-06	2.629E-06
C	1.0	.95	4827.	0.	0.	568.7	500.4	568.7	1.112E-06	1.110E-06	1.110E-06
C	2.0	.76	4827.	0.	0.	568.7	500.4	568.7	5.499E-07	5.490E-07	5.490E-07
C	3.0	1.71	4827.	0.	0.	568.7	500.4	568.7	3.706E-07	3.700E-07	3.700E-07
C	4.0	.19	4827.	0.	0.	568.7	500.4	568.7	2.795E-07	2.791E-07	2.791E-07
D	.4	1.07	4827.	0.	0.	221.3	158.9	221.3	2.131E-05	2.104E-05	2.104E-05
D	1.0	4.37	4827.	0.	0.	221.3	158.9	221.3	9.000E-06	8.885E-06	8.885E-06
D	2.0	6.26	4827.	0.	0.	221.3	158.9	221.3	4.450E-06	4.393E-06	4.393E-06
D	3.0	4.75	4827.	0.	0.	221.3	158.9	221.3	3.000E-06	2.962E-06	2.962E-06
D	4.0	3.61	4827.	0.	0.	221.3	158.9	221.3	2.262E-06	2.234E-06	2.234E-06
D	5.0	1.14	4827.	0.	0.	221.3	158.9	221.3	1.800E-06	1.777E-06	1.777E-06
D	8.0	.38	4827.	0.	0.	221.3	158.9	221.3	1.128E-06	1.114E-06	1.114E-06

E	.4	1.28	4827.	0.	0.	428.5	35.6	428.5	4.920E-05	4.777E-05	4.777E-05
E	1.0	4.94	4827.	0.	0.	428.5	35.6	428.5	2.077E-05	2.017E-05	2.017E-05
E	2.0	5.70	4827.	0.	0.	428.5	35.6	428.5	1.027E-05	9.974E-06	9.974E-06
E	3.0	5.13	4827.	0.	0.	428.5	35.6	428.5	6.924E-06	6.723E-06	6.723E-06
E	4.0	1.52	4827.	0.	0.	428.5	35.6	428.5	5.222E-06	5.070E-06	5.070E-06
E	5.0	1.71	4827.	0.	0.	428.5	35.6	428.5	4.154E-06	4.034E-06	4.034E-06
E	6.0	.95	4827.	0.	0.	428.5	35.6	428.5	3.475E-06	3.374E-06	3.374E-06
E	8.0	.19	4827.	0.	0.	428.5	35.6	428.5	2.604E-06	2.528E-06	2.528E-06
F	.4	.94	4827.	0.	0.	696.0	11.2	696.0	9.625E-05	9.094E-05	9.094E-05
F	1.0	3.42	4827.	0.	0.	696.0	11.2	696.0	4.064E-05	3.839E-05	3.839E-05
F	2.0	5.70	4827.	0.	0.	696.0	11.2	696.0	2.010E-05	1.899E-05	1.899E-05
F	3.0	3.04	4827.	0.	0.	696.0	11.2	696.0	1.355E-05	1.280E-05	1.280E-05
F	4.0	1.90	4827.	0.	0.	696.0	11.2	696.0	1.022E-05	9.652E-06	9.652E-06
F	5.0	.57	4827.	0.	0.	696.0	11.2	696.0	8.128E-06	7.679E-06	7.679E-06
G	.4	1.81	4827.	0.	0.	1000.0	3.5	1000.0	2.136E-04	1.891E-04	1.891E-04
G	1.0	5.32	4827.	0.	0.	1000.0	3.5	1000.0	9.021E-05	7.984E-05	7.984E-05
G	2.0	5.51	4827.	0.	0.	1000.0	3.5	1000.0	4.461E-05	3.948E-05	3.948E-05
G	3.0	2.66	4827.	0.	0.	1000.0	3.5	1000.0	3.007E-05	2.661E-05	2.661E-05
G	4.0	1.14	4827.	0.	0.	1000.0	3.5	1000.0	2.268E-05	2.007E-05	2.007E-05
G	5.0	.38	4827.	0.	0.	1000.0	3.5	1000.0	1.804E-05	1.597E-05	1.597E-05
G	6.0	.19	4827.	0.	0.	1000.0	3.5	1000.0	1.509E-05	1.336E-05	1.336E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME: CGS                                 METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT: 10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA: MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS: input file: P96-99-F.inp  output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0 WSW SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0DESERT SIGMA VALUES USED. MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:  C=   .5     A=  2861.     D=    70.0
 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   1.891E-04  9.094E-05  7.984E-05  4.777E-05  3.948E-05  3.839E-05  2.661E-05  2.104E-05  2.017E-05  2.007E-05
        1.814      2.751      8.067      9.346     14.851     18.268     20.926     21.992     26.928     28.067
       .03020     .04580     .13430     .15559     .24725     .30414     .34838     .36613     .44831     .46727
0   1.899E-05  1.597E-05  1.336E-05  1.280E-05  9.974E-06  9.652E-06  8.885E-06  7.679E-06  6.723E-06  5.070E-06
       33.762     34.142     34.332     37.369     43.064     44.963     49.329     49.899     55.024     56.543
       .56209     .56841     .57157     .62214     .71695     .74856     .82125     .83073     .91607     .94135
0   4.393E-06  4.034E-06  3.374E-06  2.962E-06  2.629E-06  2.528E-06  2.234E-06  1.777E-06  1.202E-06  1.114E-06
       62.808     64.516     65.465     70.211     70.540     70.729     74.336     75.475     75.788     76.168
      1.04565    1.07410    1.08990    1.16891    1.17438    1.17754    1.23759    1.25655    1.26176    1.26808
0   1.110E-06  7.492E-07  5.490E-07  5.075E-07  3.700E-07  3.163E-07  2.791E-07  2.510E-07  1.692E-07  1.564E-07
       77.117     78.358     79.118     80.067     81.775     86.142     86.331     87.091     87.850     94.684
      1.28388    1.30454    1.31719    1.33299    1.36143    1.43413    1.43729    1.44993    1.46257    1.57635
0   1.276E-07  1.054E-07  1.015E-07  8.490E-08  7.952E-08  6.362E-08  6.326E-08  5.292E-08
       95.064     97.152     97.342     97.532     98.861     99.430     99.810    100.000
      1.58267    1.61744    1.62060    1.62376    1.64589    1.65537    1.66169    1.66485
```

Calculation No. NE-02-03-16

Prepared by / Date: Mohammed Abu-Shehadeh

Verified by/Date: Ted Messier

Revision No. 0

```
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)=    .134
                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 3)=    .304
                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 4)=    .561
                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 5)=    .820
                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 6)=    .915
                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 7)=   1.073
                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 8)=   1.168
                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 9)=   1.236
                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE(10)=   1.575
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   4  1      -8.57322 -15.48082  -2.01386
   4  2      -9.43545 -17.94689  -2.83537
   4  3     -10.16758 -19.44942  -3.38301
   4  4     -10.87178 -25.05645  -5.59441
   4  5     -11.63119 -28.24546  -6.92330
   4  6     -11.90999 -32.11650  -8.56392
   4  7     -12.42081 -34.48468  -9.59363
   4  8     -12.72980 -41.88872 -12.85873
   4  9     -13.01191 -75.93091 -28.01758
   4 10     -15.67072      NUMXQ(K)= 10
                                    BACK EXTRAPOLATION FOR  1 PERCENTILE.
      2.601E-04             .017             1.000
      1.429E-04             .050             3.000
      1.064E-04             .083             5.000
      6.621E-05             .166            10.000
      4.605E-05             .250            15.000
      3.470E-05             .333            20.000
      2.695E-05             .416            25.000
      2.182E-05             .499            30.000
      1.769E-05             .583            35.000
      1.358E-05             .666            40.000
      1.071E-05             .749            45.000
      8.585E-06             .832            50.000
      6.731E-06             .916            55.000
      5.098E-06             .999            60.000
      3.926E-06            1.082            65.000
      2.995E-06            1.165            70.000
      2.029E-06            1.249            75.000
      1.006E-06            1.332            80.000
      5.176E-07            1.415            85.000
      2.752E-07            1.498            90.000
0     2.179E-05             0.5              30.03
0ANNUAL AVERAGE =    4.85E-07
0K=  4      FIVEXQ(K)= 2.179E-05      FIVEPR(K)=30.033
```

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: 11/19/2003 TIME: 23: 4:56
/PLANT NAME: CGS METEOROLOGICAL INSTRUMENTATION
DATA PERIOD: JFD 1996-1999 WIND SENSORS HEIGHT: 10.0 METERS
TYPE OF RELEASE: GROUND LEVEL RELEASE DELTA-T HEIGHTS: 10 - 75 METERS
SOURCE OF DATA: MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
COMMENTS: input file: P96-99-F.inp output file: P96-99-F.out sigma=desert + P-G
PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE W SECTOR.

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=1431.SQ.METERS	USED
A	.4	2.01	4827.	0.	0.	1000.0	1000.0	1000.0	7.495E-07	7.492E-07	7.492E-07
A	1.0	7.09	4827.	0.	0.	1000.0	1000.0	1000.0	3.165E-07	3.163E-07	3.163E-07
A	2.0	7.87	4827.	0.	0.	1000.0	1000.0	1000.0	1.565E-07	1.564E-07	1.564E-07
A	3.0	2.62	4827.	0.	0.	1000.0	1000.0	1000.0	1.055E-07	1.054E-07	1.054E-07
A	4.0	1.31	4827.	0.	0.	1000.0	1000.0	1000.0	7.956E-08	7.952E-08	7.952E-08
A	5.0	1.05	4827.	0.	0.	1000.0	1000.0	1000.0	6.329E-08	6.326E-08	6.326E-08
B	.4	.61	4827.	0.	0.	725.4	859.0	725.4	1.203E-06	1.202E-06	1.202E-06
B	1.0	1.84	4827.	0.	0.	725.4	859.0	725.4	5.079E-07	5.075E-07	5.075E-07
B	2.0	1.57	4827.	0.	0.	725.4	859.0	725.4	2.512E-07	2.510E-07	2.510E-07
B	3.0	.79	4827.	0.	0.	725.4	859.0	725.4	1.693E-07	1.692E-07	1.692E-07
B	4.0	.52	4827.	0.	0.	725.4	859.0	725.4	1.277E-07	1.276E-07	1.276E-07
C	.4	.27	4827.	0.	0.	568.7	500.4	568.7	2.634E-06	2.629E-06	2.629E-06
C	1.0	.79	4827.	0.	0.	568.7	500.4	568.7	1.112E-06	1.110E-06	1.110E-06
C	2.0	1.57	4827.	0.	0.	568.7	500.4	568.7	5.499E-07	5.490E-07	5.490E-07
C	3.0	1.84	4827.	0.	0.	568.7	500.4	568.7	3.706E-07	3.700E-07	3.700E-07
C	4.0	.52	4827.	0.	0.	568.7	500.4	568.7	2.795E-07	2.791E-07	2.791E-07
D	.4	1.03	4827.	0.	0.	221.3	158.9	221.3	2.131E-05	2.104E-05	2.104E-05
D	1.0	4.20	4827.	0.	0.	221.3	158.9	221.3	9.000E-06	8.885E-06	8.885E-06
D	2.0	9.71	4827.	0.	0.	221.3	158.9	221.3	4.450E-06	4.393E-06	4.393E-06
D	3.0	6.04	4827.	0.	0.	221.3	158.9	221.3	3.000E-06	2.962E-06	2.962E-06
D	4.0	4.72	4827.	0.	0.	221.3	158.9	221.3	2.262E-06	2.234E-06	2.234E-06
D	5.0	1.31	4827.	0.	0.	221.3	158.9	221.3	1.800E-06	1.777E-06	1.777E-06

E	.4	1.50	4827.	0.	0.	428.5	35.6	428.5	4.920E-05	4.777E-05	4.777E-05
E	1.0	5.77	4827.	0.	0.	428.5	35.6	428.5	2.077E-05	2.017E-05	2.017E-05
E	2.0	5.77	4827.	0.	0.	428.5	35.6	428.5	1.027E-05	9.974E-06	9.974E-06
E	3.0	4.99	4827.	0.	0.	428.5	35.6	428.5	6.924E-06	6.723E-06	6.723E-06
E	4.0	1.31	4827.	0.	0.	428.5	35.6	428.5	5.222E-06	5.070E-06	5.070E-06
E	8.0	.26	4827.	0.	0.	428.5	35.6	428.5	2.604E-06	2.528E-06	2.528E-06
F	.4	1.30	4827.	0.	0.	696.0	11.2	696.0	9.625E-05	9.094E-05	9.094E-05
F	1.0	4.72	4827.	0.	0.	696.0	11.2	696.0	4.064E-05	3.839E-05	3.839E-05
F	2.0	3.67	4827.	0.	0.	696.0	11.2	696.0	2.010E-05	1.899E-05	1.899E-05
F	3.0	2.10	4827.	0.	0.	696.0	11.2	696.0	1.355E-05	1.280E-05	1.280E-05
F	4.0	.52	4827.	0.	0.	696.0	11.2	696.0	1.022E-05	9.652E-06	9.652E-06
G	.4	1.70	4827.	0.	0.	1000.0	3.5	1000.0	2.136E-04	1.891E-04	1.891E-04
G	1.0	4.99	4827.	0.	0.	1000.0	3.5	1000.0	9.021E-05	7.984E-05	7.984E-05
G	2.0	1.57	4827.	0.	0.	1000.0	3.5	1000.0	4.461E-05	3.948E-05	3.948E-05
G	3.0	.26	4827.	0.	0.	1000.0	3.5	1000.0	3.007E-05	2.661E-05	2.661E-05
G	4.0	.26	4827.	0.	0.	1000.0	3.5	1000.0	2.268E-05	2.007E-05	2.007E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:    CGS                              METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0   W SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:   C=   .5     A=  2861.     D=   70.0
 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   1.891E-04   9.094E-05   7.984E-05   4.777E-05   3.948E-05   3.839E-05   2.661E-05   2.104E-05   2.017E-05   2.007E-05
        1.702       2.997       7.983       9.479      11.054      15.778      16.040      17.066      22.839      23.102
       .02049      .03610      .09615      .11416      .13313      .19002      .19318      .20552      .27506      .27822
0   1.899E-05   1.280E-05   9.974E-06   9.652E-06   8.885E-06   6.723E-06   5.070E-06   4.393E-06   2.962E-06   2.629E-06
       26.776      28.875      34.649      35.174      39.373      44.359      45.671      55.381      61.417      61.689
       .32246      .34775      .41728      .42360      .47417      .53422      .55002      .66696      .73966      .74294
0   2.528E-06   2.234E-06   1.777E-06   1.202E-06   1.110E-06   7.492E-07   5.490E-07   5.075E-07   3.700E-07   3.163E-07
       61.952      66.676      67.988      68.593      69.381      71.395      72.969      74.806      76.643      83.729
       .74610      .80299      .81879      .82608      .83556      .85982      .87878      .90090      .92303     1.00836
0   2.791E-07   2.510E-07   1.692E-07   1.564E-07   1.276E-07   1.054E-07   7.952E-08   6.326E-08
       84.254      85.829      86.616      94.489      95.014      97.638      98.950     100.000
      1.01468     1.03365     1.04313     1.13795     1.14427     1.17587     1.19168     1.20432
```

```
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)=    .096
                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=    .190
                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=    .322
                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=    .474
                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=    .666
                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=    .802
                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   1.137
0  K  I    XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   5  1      -8.57322 -15.63189  -1.99745
   5  2      -9.43545 -20.37820  -3.52745
   5  3     -10.16758 -22.14254  -4.13697
   5  4     -10.87178 -26.80175  -5.84715
   5  5     -11.63119 -26.91788  -5.89191
   5  6     -12.33539 -37.32047 -10.09497
   5  7     -13.01191 -62.22779 -20.43861
   5  8     -15.67072      NUMXQ(K)=  8
                                              BACK EXTRAPOLATION FOR  1 PERCENTILE.
     2.492E-04              .012            1.000
     1.394E-04              .036            3.000
     1.048E-04              .060            5.000
     6.298E-05              .120           10.000
     4.060E-05              .181           15.000
     2.812E-05              .241           20.000
     2.085E-05              .301           25.000
     1.522E-05              .361           30.000
     1.124E-05              .422           35.000
     8.604E-06              .482           40.000
     6.765E-06              .542           45.000
     5.441E-06              .602           50.000
     4.458E-06              .662           55.000
     3.287E-06              .723           60.000
     2.453E-06              .783           65.000
     1.552E-06              .843           70.000
     9.225E-07              .903           75.000
     5.648E-07              .963           80.000
     3.550E-07             1.024           85.000
     2.283E-07             1.084           90.000
0    7.977E-06             0.5             41.52
0ANNUAL AVERAGE =    3.02E 07
0K=  5     FIVEXQ(K)= 7.977E-06     FIVEPR(K)=41.517
```

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE:  11/19/2003      TIME:  23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE WNW SECTOR.
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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=1431.SQ.METERS	USED
A	.4	1.48	4827.	0.	0.	1000.0	1000.0	1000.0	7.495E-07	7.492E-07	7.492E-07
A	1.0	5.19	4827.	0.	0.	1000.0	1000.0	1000.0	3.165E-07	3.163E-07	3.163E-07
A	2.0	8.10	4827.	0.	0.	1000.0	1000.0	1000.0	1.565E-07	1.564E-07	1.564E-07
A	3.0	6.23	4827.	0.	0.	1000.0	1000.0	1000.0	1.055E-07	1.054E-07	1.054E-07
A	4.C	1.87	4827.	0.	0.	1000.0	1000.0	1000.0	7.956E-08	7.952E-08	7.952E-08
A	5.0	.83	4827.	0.	0.	1000.0	1000.0	1000.0	6.329E-08	6.326E-08	6.326E-08
A	6.0	.21	4827.	0.	0.	1000.0	1000.0	1000.0	5.294E-08	5.292E-08	5.292E-08
B	.4	.34	4827.	0.	0.	725.4	859.0	725.4	1.203E-06	1.202E-06	1.202E-06
B	1.0	1.04	4827.	0.	0.	725.4	859.0	725.4	5.079E-07	5.075E-07	5.075E-07
B	2.0	2.28	4827.	0.	0.	725.4	859.0	725.4	2.512E-07	2.510E-07	2.510E-07
B	3.0	1.04	4827.	0.	0.	725.4	859.0	725.4	1.693E-07	1.692E-07	1.692E-07
B	4.0	1.45	4827.	0.	0.	725.4	859.0	725.4	1.277E-07	1.276E-07	1.276E-07
B	5.0	.42	4827.	0.	0.	725.4	859.0	725.4	1.016E-07	1.015E-07	1.015E-07
C	.4	.29	4827.	0.	0.	568.7	500.4	568.7	2.634E-06	2.629E-06	2.629E-06
C	1.0	.83	4827.	0.	0.	568.7	500.4	568.7	1.112E-06	1.110E-06	1.110E-06
C	2.0	.62	4827.	0.	0.	568.7	500.4	568.7	5.499E-07	5.490E-07	5.490E-07
C	3.0	.21	4827.	0.	0.	568.7	500.4	568.7	3.706E-07	3.700E-07	3.700E-07
C	4.0	.83	4827.	0.	0.	568.7	500.4	568.7	2.795E-07	2.791E-07	2.791E-07
C	5.0	.42	4827.	0.	0.	568.7	500.4	568.7	2.224E-07	2.220E-07	2.220E-07
D	.4	.66	4827.	0.	0.	221.3	158.9	221.3	2.131E-05	2.104E-05	2.104E-05
D	1.0	2.70	4827.	0.	0.	221.3	158.9	221.3	9.000E-06	8.885E-06	8.885E-06
D	2.0	6.64	4827.	0.	0.	221.3	158.9	221.3	4.450E-06	4.393E-06	4.393E-06
D	3.0	6.02	4827.	0.	0.	221.3	158.9	221.3	3.000E-06	2.962E-06	2.962E-06
D	4.0	5.40	4827.	0.	0.	221.3	158.9	221.3	2.262E-06	2.234E-06	2.234E-06
D	5.0	1.45	4827.	0.	0.	221.3	158.9	221.3	1.800E-06	1.777E-06	1.777E-06
D	6.0	1.04	4827.	0.	0.	221.3	158.9	221.3	1.506E-06	1.486E-06	1.486E-06
D	8.0	.21	4827.	0.	0.	221.3	158.9	221.3	1.128E-06	1.114E-06	1.114E-06

E	.4	.86	4827.	0.	0.	428.5	35.6	428.5	4.920E-05	4.777E-05	4.777E-05
E	1.0	3.32	4827.	0.	0.	428.5	35.6	428.5	2.077E-05	2.017E-05	2.017E-05
E	2.0	6.44	4827.	0.	0.	428.5	35.6	428.5	1.027E-05	9.974E-06	9.974E-06
E	3.0	4.15	4827.	0.	0.	428.5	35.6	428.5	6.924E-06	6.723E-06	6.723E-06
E	4.0	5.19	4827.	0.	0.	428.5	35.6	428.5	5.222E-06	5.070E-06	5.070E-06
E	5.0	2.49	4827.	0.	0.	428.5	35.6	428.5	4.154E-06	4.034E-06	4.034E-06
E	6.0	.42	4827.	0.	0.	428.5	35.6	428.5	3.475E-06	3.374E-06	3.374E-06
F	.4	.91	4827.	0.	0.	696.0	11.2	696.0	9.625E-05	9.094E-05	9.094E-05
F	1.0	3.32	4827.	0.	0.	696.0	11.2	696.0	4.064E-05	3.839E-05	3.839E-05
F	2.0	4.98	4827.	0.	0.	696.0	11.2	696.0	2.010E-05	1.899E-05	1.899E-05
F	3.0	2.08	4827.	0.	0.	696.0	11.2	696.0	1.355E-05	1.280E-05	1.280E-05
F	4.0	.83	4827.	0.	0.	696.0	11.2	696.0	1.022E-05	9.652E-06	9.652E-06
F	5.0	.42	4827.	0.	0.	696.0	11.2	696.0	8.128E-06	7.679E-06	7.679E-06
G	.4	1.42	4827.	0.	0.	1000.0	3.5	1000.0	2.136E-04	1.891E-04	1.891E-04
G	1.0	4.15	4827.	0.	0.	1000.0	3.5	1000.0	9.021E-05	7.984E-05	7.984E-05
G	2.0	1.25	4827.	0.	0.	1000.0	3.5	1000.0	4.461E-05	3.948E-05	3.948E-05

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003    TIME: 23: 4:56
/PLANT NAME:   CGS                                METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                       WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE            DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp  output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0 WNW SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:   C=   .5      A=  2861.     D=   70.0
 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   1.891E-04   9.094E-05   7.984E-05   4.777E-05   3.948E-05   3.839E-05   2.104E-05   2.017E-05   1.899E-05   1.280E-05
        1.417       2.328       6.480       7.341       8.587      11.908      12.567      15.889      20.872      22.948
       .02157      .03544      .09865      .11175      .13072      .18129      .19132      .24189      .31774      .34935
0   9.974E-06   9.652E-06   8.885E-06   7.679E-06   6.723E-06   5.070E-06   4.393E-06   4.034E-06   3.374E-06   2.962E-06
       29.384      30.214      32.913      33.328      37.481      42.671      49.315      51.806      52.221      58.242
       .44732      .45997      .50105      .50737      .57059      .64960      .75074      .78866      .79498      .88664
0   2.629E-06   2.234E-06   1.777E-06   1.486E-06   1.202E-06   1.114E-06   1.110E-06   7.492E-07   5.490E-07   5.075E-07
       58.529      63.927      65.380      66.418      66.760      66.968      67.798      69.274      69.896      70.934
       .89101      .97319      .99531     1.01111     1.01632     1.01948     1.03212     1.05458     1.06406     1.07987
0   3.700E-07   3.163E-07   2.791E-07   2.510E-07   2.220E-07   1.692E-07   1.564E-07   1.276E-07   1.054E-07   1.015E-07
       71.142      76.332      77.163      79.446      79.862      80.900      88.997      90.450      96.678      97.093
      1.08303     1.16204     1.17468     1.20945     1.21577     1.23157     1.35483     1.37696     1.47177     1.47810
0   7.952E-08   6.326E-08   5.292E-08
       98.962      99.792     100.000
      1.50654     1.51918     1.52234
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Cont'd on page B-100


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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)=    .099
                                                   HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=    .317
                                                   HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=    .788
                                                   HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=    .886
                                                   HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=    .972
                                                   HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   1.470
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   6  1     -8.57322 -15.70315  -2.02540
   6  2     -9.43545 -21.60352  -3.93210
   6  3    -10.87178 -24.30515  -4.92197
   6  4    -12.42081 -29.78536  -7.19163
   6  5    -12.72980 -32.05612  -8.14912
   6  6    -13.01191 -57.91115 -19.21262
   6  7    -16.06513      NUMXQ(K)=  7
                                                   BACK EXTRAPOLATION FOR  1 PERCENTILE.
     2.275E-04              .015             1.000
     1.251E-04              .046             3.000
     9.315E-05              .076             5.000
     4.769E-05              .152            10.000
     2.894E-05              .228            15.000
     2.006E-05              .304            20.000
     1.413E-05              .381            25.000
     1.042E-05              .457            30.000
     8.020E-06              .533            35.000
     6.369E-06              .609            40.000
     5.182E-06              .685            45.000
     4.298E-06              .761            50.000
     3.447E-06              .837            55.000
     2.707E-06              .913            60.000
     1.982E-06              .990            65.000
     1.159E-06             1.066            70.000
     7.006E-07             1.142            75.000
     4.356E-07             1.218            80.000
     2.777E-07             1.294            85.000
     1.810E-07             1.370            90.000
0    8.940E-06             0.5              32.84
0ANNUAL AVERAGE =    3.11E-07
0K=  6     FIVEXQ(K)= 8.940E-06     FIVEPR(K)=32.844
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:  CGS                                METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE  NW SECTOR.
```

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=1431.SQ.METERS	USED
A	.4	.53	4827.	0.	0.	1000.0	1000.0	1000.0	7.495E-07	7.492E-07	7.492E-07
A	1.0	1.86	4827.	0.	0.	1000.0	1000.0	1000.0	3.165E-07	3.163E-07	3.163E-07
A	2.0	5.18	4827.	0.	0.	1000.0	1000.0	1000.0	1.565E-07	1.564E-07	1.564E-07
A	3.0	3.32	4827.	0.	0.	1000.0	1000.0	1000.0	1.055E-07	1.054E-07	1.054E-07
A	4.0	2.92	4827.	0.	0.	1000.0	1000.0	1000.0	7.956E-08	7.952E-08	7.952E-08
A	5.0	1.46	4827.	0.	0.	1000.0	1000.0	1000.0	6.329E-08	6.326E-08	6.326E-08
A	6.0	.40	4827.	0.	0.	1000.0	1000.0	1000.0	5.294E-08	5.292E-08	5.292E-08
A	8.0	.07	4827.	0.	0.	1000.0	1000.0	1000.0	3.967E-08	3.965E-08	3.965E-08
B	.4	.13	4827.	0.	0.	725.4	859.0	725.4	1.203E-06	1.202E-06	1.202E-06
B	1.0	.40	4827.	0.	0.	725.4	859.0	725.4	5.079E-07	5.075E-07	5.075E-07
B	2.0	.80	4827.	0.	0.	725.4	859.0	725.4	2.512E-07	2.510E-07	2.510E-07
B	3.0	1.33	4827.	0.	0.	725.4	859.0	725.4	1.693E-07	1.692E-07	1.692E-07
B	4.0	.80	4827.	0.	0.	725.4	859.0	725.4	1.277E-07	1.276E-07	1.276E-07
B	5.0	.20	4827.	0.	0.	725.4	859.0	725.4	1.016E-07	1.015E-07	1.015E-07
B	6.0	.13	4827.	0.	0.	725.4	859.0	725.4	8.496E-08	8.490E-08	8.490E-08
B	8.0	.20	4827.	0.	0.	725.4	859.0	725.4	6.366E-08	6.362E-08	6.362E-08
C	.4	.11	4827.	0.	0.	568.7	500.4	568.7	2.634E-06	2.629E-06	2.629E-06
C	1.0	.33	4827.	0.	0.	568.7	500.4	568.7	1.112E-06	1.110E-06	1.110E-06
C	2.0	.53	4827.	0.	0.	568.7	500.4	568.7	5.499E-07	5.490E-07	5.490E-07
C	3.0	1.33	4827.	0.	0.	568.7	500.4	568.7	3.706E-07	3.700E-07	3.700E-07
C	4.0	.73	4827.	0.	0.	568.7	500.4	568.7	2.795E-07	2.791E-07	2.791E-07
C	5.0	.46	4827.	0.	0.	568.7	500.4	568.7	2.224E-07	2.220E-07	2.220E-07
C	6.0	.07	4827.	0.	0.	568.7	500.4	568.7	1.860E-07	1.857E-07	1.857E-07
C	8.0	.33	4827.	0.	0.	568.7	500.4	568.7	1.394E-07	1.392E-07	1.392E-07
D	.4	.44	4827.	0.	0.	221.3	158.9	221.3	2.131E-05	2.104E-05	2.104E-05
D	1.0	1.79	4827.	0.	0.	221.3	158.9	221.3	9.000E-06	8.885E-06	8.885E-06
D	2.0	4.32	4827.	0.	0.	221.3	158.9	221.3	4.450E-06	4.393E-06	4.393E-06
D	3.0	4.05	4827.	0.	0.	221.3	158.9	221.3	3.000E-06	2.962E-06	2.962E-06
D	4.0	4.58	4827.	0.	0.	221.3	158.9	221.3	2.262E-06	2.234E-06	2.234E-06
D	5.0	2.79	4827.	0.	0.	221.3	158.9	221.3	1.800E-06	1.777E-06	1.777E-06
D	6.0	1.06	4827.	0.	0.	221.3	158.9	221.3	1.506E-06	1.486E-06	1.486E-06
D	8.0	.27	4827.	0.	0.	221.3	158.9	221.3	1.128E-06	1.114E-06	1.114E-06
D	10.0	.07	4827.	0.	0.	221.3	158.9	221.3	9.020E-07	8.904E-07	8.904E-07

Cont'd on page B-102

Prepared by / Date:
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Verified by/Date:
Ted Messier

E	.4	.52	4827.	0.	0.	428.5	35.6	428.5	4.920E-05	4.777E-05	4.777E-05
E	1.0	1.99	4827.	0.	0.	428.5	35.6	428.5	2.077E-05	2.017E-05	2.017E-05
E	2.0	5.18	4827.	0.	0.	428.5	35.6	428.5	1.027E-05	9.974E-06	9.974E-06
E	3.0	6.04	4827.	0.	0.	428.5	35.6	428.5	6.924E-06	6.723E-06	6.723E-06
E	4.0	7.30	4827.	0.	0.	428.5	35.6	428.5	5.222E-06	5.070E-06	5.070E-06
E	5.0	5.18	4827.	0.	0.	428.5	35.6	428.5	4.154E-06	4.034E-06	4.034E-06
E	6.0	2.13	4827.	0.	0.	428.5	35.6	428.5	3.475E-06	3.374E-06	3.374E-06
E	8.0	1.46	4827.	0.	0.	428.5	35.6	428.5	2.604E-06	2.528E-06	2.528E-06
E	10.0	.07	4827.	0.	0.	428.5	35.6	428.5	2.082E-06	2.021E-06	2.021E-06
F	.4	.42	4827.	0.	0.	696.0	11.2	696.0	9.625E-05	9.094E-05	9.094E-05
F	1.0	1.53	4827.	0.	0.	696.0	11.2	696.0	4.064E-05	3.839E-05	3.839E-05
F	2.0	4.38	4827.	0.	0.	696.0	11.2	696.0	2.010E-05	1.899E-05	1.899E-05
F	3.0	3.65	4827.	0.	0.	696.0	11.2	696.0	1.355E-05	1.280E-05	1.280E-05
F	4.0	5.64	4827.	0.	0.	696.0	11.2	696.0	1.022E-05	9.652E-06	9.652E-06
F	5.0	2.32	4827.	0.	0.	696.0	11.2	696.0	8.128E-06	7.679E-06	7.679E-06
F	6.0	.60	4827.	0.	0.	696.0	11.2	696.0	6.799E-06	6.423E-06	6.423E-06
F	8.0	.27	4827.	0.	0.	696.0	11.2	696.0	5.094E-06	4.813E-06	4.813E-06
G	.4	.57	4827.	0.	0.	1000.0	3.5	1000.0	2.136E-04	1.891E-04	1.891E-04
G	1.0	1.66	4827.	0.	0.	1000.0	3.5	1000.0	9.021E-05	7.984E-05	7.984E-05
G	2.0	2.92	4827.	0.	0.	1000.0	3.5	1000.0	4.461E-05	3.948E-05	3.948E-05
G	3.0	2.39	4827.	0.	0.	1000.0	3.5	1000.0	3.007E-05	2.661E-05	2.661E-05
G	4.0	.60	4827.	0.	0.	1000.0	3.5	1000.0	2.268E-05	2.007E-05	2.007E-05
G	5.0	.20	4827.	0.	0.	1000.0	3.5	1000.0	1.804E-05	1.597E-05	1.597E-05

Cont'd on page B-103


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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0  NW SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:   C=   .5      A=  2861.      D=   70.0
 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   1.891E-04   9.094E-05   7.984E-05   4.777E-05   3.948E-05   3.839E-05   2.661E-05   2.104E-05   2.017E-05   2.007E-05
         .567        .985       2.646       3.162       6.084       7.611      10.002      10.439      12.432      13.029
       .02696      .04690      .12591      .15048      .28955      .36224      .47602      .49686      .59167      .62012
0   1.899E-05   1.597E-05   1.280E-05   9.974E-06   9.652E-06   8.885E-06   7.679E-06   6.723E-06   6.423E-06   5.070E-06
       17.412      17.611      21.264      26.444      32.088      33.881      36.205      42.248      42.846      50.151
       .82871      .83820     1.01203     1.25855     1.52720     1.61253     1.72315     2.01076     2.03921     2.38687
0   4.813E-06   4.393E-06   4.034E-06   3.374E-06   2.962E-06   2.629E-06   2.528E-06   2.234E-06   2.021E-06   1.777E-06
       50.416      54.733      59.913      62.038      66.088      66.203      67.664      72.246      72.313      75.102
      2.39951     2.60495     2.85147     2.95261     3.14540     3.15086     3.22040     3.43848     3.44164     3.57438
0   1.486E-06   1.202E-06   1.114E-06   1.110E-06   8.904E-07   7.492E-07   5.490E-07   5.075E-07   3.700E-07   3.163E-07
       76.164      76.296      76.561      76.893      76.960      77.488      78.019      78.418      79.746      81.605
      3.62495     3.63120     3.64384     3.65964     3.66280     3.68796     3.71324     3.73220     3.79542     3.88391
0   2.791E-07   2.510E-07   2.220E-07   1.857E-07   1.692E-07   1.564E-07   1.392E-07   1.276E-07   1.054E-07   1.015E-07
       82.336      83.133      83.598      83.664      84.992      90.172      90.504      91.301      94.621      94.820
      3.91868     3.95660     3.97873     3.98189     4.04510     4.29162     4.30743     4.34535     4.50338     4.51286
0   8.490E-08   7.952E-08   6.362E-08   6.326E-08   5.292E-08   3.965E-08
       94.953      97.875      98.074      99.535      99.934     100.000
      4.51918     4.65825     4.66773     4.73726     4.75622     4.75938
```

Calculation No. NE-02-03-16

Prepared by / Date: Mohammed Abu-Shehadeh | Verified by/Date: Ted Messier | Revision No. 0

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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)=   .126
 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   .362
 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   .828
 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=  1.525
 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=  2.009
 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=  2.849
 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=  3.435
 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=  3.571
 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=  4.655

0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   7  1      -8.57322 -15.36700  -1.96315
   7  2      -9.43545 -16.02541  -2.18107
   7  3     -10.16758 -16.70478  -2.43402
   7  4     -10.87178 -17.82875  -2.90303
   7  5     -11.54831 -18.56984  -3.24559
   7  6     -11.90999 -18.97035  -3.44077
   7  7     -12.42081 -25.94936  -7.10717
   7  8     -13.01191 -36.71158 -13.01937
   7  9     -13.24063 -58.60069 -25.16130
   7 10     -16.34724      NUMXQ(K)= 10
     1.392E-04              .048             1.000
     7.345E-05              .143             3.000
     5.182E-05              .238             5.000
     3.065E-05              .476            10.000
     2.166E-05              .714            15.000
     1.636E-05              .952            20.000
     1.281E-05             1.190            25.000
     1.043E-05             1.428            30.000
     8.624E-06             1.666            35.000
     7.233E-06             1.904            40.000
     6.143E-06             2.142            45.000
     5.274E-06             2.380            50.000
     4.584E-06             2.618            55.000
     4.016E-06             2.856            60.000
     3.126E-06             3.094            65.000
     2.471E-06             3.332            70.000
     1.791E-06             3.570            75.000
     8.587E-07             3.808            80.000
     4.240E-07             4.045            85.000
     2.164E-07             4.283            90.000
0    2.941E-05              0.5             10.51
0ANNUAL AVERAGE =    6.61E-07
0K=  7      FIVEXQ(K)= 2.941E-05      FIVEPR(K)=10.506
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE NNW SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.14	4827.	0.	0.	1000.0	1000.0	1000.0	7.495E-07	7.492E-07	7.492E-07
A	1.0	.50	4827.	0.	0.	1000.0	1000.0	1000.0	3.165E-07	3.163E-07	3.163E-07
A	2.0	1.77	4827.	0.	0.	1000.0	1000.0	1000.0	1.565E-07	1.564E-07	1.564E-07
A	3.0	2.43	4827.	0.	0.	1000.0	1000.0	1000.0	1.055E-07	1.054E-07	1.054E-07
A	4.0	2.58	4827.	0.	0.	1000.0	1000.0	1000.0	7.956E-08	7.952E-08	7.952E-08
A	5.0	1.12	4827.	0.	0.	1000.0	1000.0	1000.0	6.329E-08	6.326E-08	6.326E-08
A	6.0	.47	4827.	0.	0.	1000.0	1000.0	1000.0	5.294E-08	5.292E-08	5.292E-08
A	8.0	.22	4827.	0.	0.	1000.0	1000.0	1000.0	3.967E-08	3.965E-08	3.965E-08
A	10.0	.06	4827.	0.	0.	1000.0	1000.0	1000.0	3.172E-08	3.170E-08	3.170E-08
A	13.0	.03	4827.	0.	0.	1000.0	1000.0	1000.0	2.443E-08	2.442E-08	2.442E-08
B	.4	.06	4827.	0.	0.	725.4	859.0	725.4	1.203E-06	1.202E-06	1.202E-06
B	1.0	.19	4827.	0.	0.	725.4	859.0	725.4	5.079E-07	5.075E-07	5.075E-07
B	2.0	.25	4827.	0.	0.	725.4	859.0	725.4	2.512E-07	2.510E-07	2.510E-07
B	3.0	.75	4827.	0.	0.	725.4	859.0	725.4	1.693E-07	1.692E-07	1.692E-07
B	4.0	.84	4827.	0.	0.	725.4	859.0	725.4	1.277E-07	1.276E-07	1.276E-07
B	5.0	.50	4827.	0.	0.	725.4	859.0	725.4	1.016E-07	1.015E-07	1.015E-07
B	6.0	.19	4827.	0.	0.	725.4	859.0	725.4	8.496E-08	8.490E-08	8.490E-08
B	8.0	.12	4827.	0.	0.	725.4	859.0	725.4	6.366E-08	6.362E-08	6.362E-08
B	10.0	.03	4827.	0.	0.	725.4	859.0	725.4	5.090E-08	5.086E-08	5.086E-08
C	.4	.02	4827.	0.	0.	568.7	500.4	568.7	2.634E-06	2.629E-06	2.629E-06
C	1.0	.06	4827.	0.	0.	568.7	500.4	568.7	1.112E-06	1.110E-06	1.110E-06
C	2.0	.47	4827.	0.	0.	568.7	500.4	568.7	5.499E-07	5.490E-07	5.490E-07
C	3.0	.97	4827.	0.	0.	568.7	500.4	568.7	3.706E-07	3.700E-07	3.700E-07
C	4.0	.75	4827.	0.	0.	568.7	500.4	568.7	2.795E-07	2.791E-07	2.791E-07
C	5.0	.56	4827.	0.	0.	568.7	500.4	568.7	2.224E-07	2.220E-07	2.220E-07
C	6.0	.34	4827.	0.	0.	568.7	500.4	568.7	1.860E-07	1.857E-07	1.857E-07
C	8.0	.16	4827.	0.	0.	568.7	500.4	568.7	1.394E-07	1.392E-07	1.392E-07
D	.4	.17	4827.	0.	0.	221.3	158.9	221.3	2.131E-05	2.104E-05	2.104E-05
D	1.0	.72	4827.	0.	0.	221.3	158.9	221.3	9.000E-06	8.885E-06	8.885E-06
D	2.0	3.18	4827.	0.	0.	221.3	158.9	221.3	4.450E-06	4.393E-06	4.393E-06
D	3.0	3.95	4827.	0.	0.	221.3	158.9	221.3	3.000E-06	2.962E-06	2.962E-06
D	4.0	3.89	4827.	0.	0.	221.3	158.9	221.3	2.262E-06	2.234E-06	2.234E-06
D	5.0	2.99	4827.	0.	0.	221.3	158.9	221.3	1.800E-06	1.777E-06	1.777E-06
D	6.0	1.34	4827.	0.	0.	221.3	158.9	221.3	1.506E-06	1.486E-06	1.486E-06
D	8.0	1.18	4827.	0.	0.	221.3	158.9	221.3	1.128E-06	1.114E-06	1.114E-06
D	10.0	.09	4827.	0.	0.	221.3	158.9	221.3	9.020E-07	8.904E-07	8.904E-07

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

Revision No. 0

E	.4	.28	4827.	0.	0.	428.5	35.6	428.5	4.920E-05	4.777E-05	4.777E-05
E	1.0	1.09	4827.	0.	0.	428.5	35.6	428.5	2.077E-05	2.017E-05	2.017E-05
E	2.0	4.05	4827.	0.	0.	428.5	35.6	428.5	1.027E-05	9.974E-06	9.974E-06
E	3.0	5.36	4827.	0.	0.	428.5	35.6	428.5	6.924E-06	6.723E-06	6.723E 06
E	4.0	6.60	4827.	0.	0.	428.5	35.6	428.5	5.222E-06	5.070E-06	5.070E-06
E	5.0	5.17	4827.	0.	0.	428.5	35.6	428.5	4.154E-06	4.034E-06	4.034E-06
E	6.0	2.83	4827.	0.	0.	428.5	35.6	428.5	3.475E-06	3.374E-06	3.374E-06
E	8.0	2.21	4827.	0.	0.	428.5	35.6	428.5	2.604E-06	2.528E-06	2.528E-06
E	10.0	.09	4827.	0.	0.	428.5	35.6	428.5	2.082E-06	2.021E-06	2.021E-06
F	.4	.34	4827.	0.	0.	696.0	11.2	696.0	9.625E-05	9.094E-05	9.094E-05
F	1.0	1.25	4827.	0.	0.	696.0	11.2	696.0	4.064E-05	3.839E-05	3.839E-05
F	2.0	5.04	4827.	0.	0.	696.0	11.2	696.0	2.010E-05	1.899E-05	1.899E-05
F	3.0	5.95	4827.	0.	0.	696.0	11.2	696.0	1.355E-05	1.280E-05	1.280E-05
F	4.0	5.73	4827.	0.	0.	696.0	11.2	696.0	1.022E-05	9.652E-06	9.652E-06
F	5.0	4.08	4827.	0.	0.	696.0	11.2	696.0	8.128E-06	7.679E-06	7.679E-06
F	6.0	.90	4827.	0.	0.	696.0	11.2	696.0	6.799E-06	6.423E-06	6.423E-06
F	8.0	.65	4827.	0.	0.	696.0	11.2	696.0	5.094E-06	4.813E-06	4.813E-06
F	10.0	.06	4827.	0.	0.	696.0	11.2	696.0	4.073E-06	3.848E-06	3.848E-06
G	.4	.53	4827.	0.	0.	1000.0	3.5	1000.0	2.136E-04	1.891E-04	1.891E-04
G	1.0	1.56	4827.	0.	0.	1000.0	3.5	1000.0	9.021E-05	7.984E-05	7.984E-05
G	2.0	3.52	4827.	0.	0.	1000.0	3.5	1000.0	4.461E-05	3.948E-05	3.948E-05
G	3.0	4.86	4827.	0.	0.	1000.0	3.5	1000.0	3.007E-05	2.661E-05	2.661E-05
G	4.0	3.02	4827.	0.	0.	1000.0	3.5	1000.0	2.268E-05	2.007E-05	2.007E-05
G	5.0	1.34	4827.	0.	0.	1000.0	3.5	1000.0	1.804E-05	1.597E-05	1.597E-05
G	6.0	.31	4827.	0.	0.	1000.0	3.5	1000.0	1.509E-05	1.336E-05	1.336E-05
G	8.0	.06	4827.	0.	0.	1000.0	3.5	1000.0	1.131E-05	1.001E-05	1.001E-05
G	10.0	.03	4827.	0.	0.	1000.0	3.5	1000.0	9.041E-06	8.002E-06	8.002E-06

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0 NNW SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:   C=   .5     A=  2861.     D=   70.0
 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   1.891E-04   9.094E-05   7.984E-05   4.777E-05   3.948E-05   3.839E-05   2.661E-05   2.104E-05   2.017E-05   2.007E-05
         .531        .873       2.429       2.712       6.230       7.475      12.332      12.507      13.597      16.617
       .05392      .08860      .24663      .27529      .63243      .75886     1.25190     1.26965     1.38027     1.68685
0   1.899E-05   1.597E-05   1.336E-05   1.280E-05   1.001E-05   9.974E-06   9.652E-06   8.885E-06   8.002E-06   7.679E-06
       21.660      22.999      23.310      29.257      29.319      33.367      39.095      39.811      39.843      43.921
      2.19886     2.33476     2.36636     2.97003     2.97635     3.38722     3.96877     4.04146     4.04462     4.45865
0   6.723E-06   6.423E-06   5.070E-06   4.813E-06   4.393E-06   4.034E-06   3.846E-06   3.374E-06   2.962E-06   2.629E-06
       49.276      50.179      56.779      57.433      60.609      65.777      65.839      68.673      72.627      72.648
      5.00227     5.09392     5.76396     5.83033     6.15271     6.67736     6.68369     6.97130     7.37269     7.37487
0   2.528E-06   2.234E-06   2.021E-06   1.777E-06   1.486E-06   1.202E-06   1.114E-06   1.110E-06   8.904E-07   7.492E-07
       74.859      78.750      78.844      81.833      83.171      83.233      84.416      84.478      84.572      84.713
      7.59927     7.99434     8.00382     8.30723     8.44314     8.44939     8.56949     8.57581     8.58529     8.59967
0   5.490E-07   5.075E-07   3.700E-07   3.163E-07   2.791E-07   2.510E-07   2.220E-07   1.857E-07   1.692E-07   1.564E-07
       85.180      85.367      86.332      86.830      87.578      87.827      88.387      88.730      89.477      91.251
      8.64708     8.66604     8.76402     8.81458     8.89044     8.91572     8.97261     9.00738     9.08323     9.26338
0   1.392E-07   1.276E-07   1.054E-07   1.015E-07   8.490E-08   7.952E-08   6.362E-08   6.326E-08   5.292E-08   5.086E-08
       91.407      92.248      94.676      95.174      95.361      97.945      98.070      99.191      99.658      99.689
      9.27919     9.36452     9.61105     9.66161     9.68058     9.94290     9.95555    10.06933    10.11673    10.11989
0   3.965E-08   3.170E-08   2.442E-08
       99.907      99.969     100.000
     10.14202    10.14834    10.15150
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```
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)=    .246
                                                            HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   2.197
                                                            HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   3.965
                                                            HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   4.999
                                                            HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   6.673
                                                            HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   7.369
                                                            HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   7.991
                                                            HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   8.304
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   8  1      -8.57322 -14.73252  -1.88390
   8  2      -9.43545 -14.50262  -1.80213
   8  3     -10.87178 -16.11356  -2.60171
   8  4     -11.54831 -17.33238  -3.29631
   8  5     -11.90999 -17.72791  -3.53675
   8  6     -12.42081 -21.38906  -5.97661
   8  7     -12.72980 -22.20133  -6.53724
   8  8     -13.01191 -28.49446 -11.01409
   8  9     -13.24063       NUMXQ(K)=  9
      1.339E-04              .102              1.000
      7.057E-05              .305              3.000
      5.174E-05              .508              5.000
      3.298E-05             1.015             10.000
      2.487E-05             1.523             15.000
      2.016E-05             2.030             20.000
      1.621E-05             2.538             25.000
      1.318E-05             3.045             30.000
      1.102E-05             3.553             35.000
      9.320E-06             4.061             40.000
      7.763E-06             4.568             45.000
      6.557E-06             5.076             50.000
      5.556E-06             5.583             55.000
      4.762E 06             6.091             60.000
      4.122E-06             6.598             65.000
      3.325E-06             7.106             70.000
      2.649E-06             7.614             75.000
      2.034E-06             8.121             80.000
0     5.223E-05             0.5                4.93
0ANNUAL AVERAGE =    1.59E-06
0K=  8      FIVEXQ(K)= 5.223E-05     FIVEPR(K)= 4.925
```

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JPD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JPD FILES FOR 96-99
 COMMENTS:  input file: P96 99 F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE   N SECTOR.
```

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=1431.SQ.METERS	USED
A	.4	.20	4827.	0.	0.	1000.0	1000.0	1000.0	7.495E-07	7.492E-07	7.492E-07
A	1.0	.71	4827.	0.	0.	1000.0	1000.0	1000.0	3.165E-07	3.163E-07	3.163E-07
A	2.0	1.86	4827.	0.	0.	1000.0	1000.0	1000.0	1.565E-07	1.564E-07	1.564E-07
A	3.0	1.73	4827.	0.	0.	1000.0	1000.0	1000.0	1.055E-07	1.054E-07	1.054E-07
A	4.0	1.49	4827.	0.	0.	1000.0	1000.0	1000.0	7.956E-08	7.952E-08	7.952E-08
A	5.0	1.62	4827.	0.	0.	1000.0	1000.0	1000.0	6.329E-08	6.326E-08	6.326E-08
A	6.0	1.49	4827.	0.	0.	1000.0	1000.0	1000.0	5.294E-08	5.292E-08	5.292E-08
A	8.0	1.62	4827.	0.	0.	1000.0	1000.0	1000.0	3.967E-08	3.965E-08	3.965E-08
A	10.0	.52	4827.	0.	0.	1000.0	1000.0	1000.0	3.172E-08	3.170E-08	3.170E-08
A	13.0	.18	4827.	0.	0.	1000.0	1000.0	1000.0	2.443E-08	2.442E-08	2.442E-08
B	.4	.04	4827.	0.	0.	725.4	859.0	725.4	1.203E-06	1.202E-06	1.202E-06
B	1.0	.13	4827.	0.	0.	725.4	859.0	725.4	5.079E-07	5.075E-07	5.075E-07
B	2.0	.58	4827.	0.	0.	725.4	859.0	725.4	2.512E-07	2.510E-07	2.510E-07
B	3.0	.78	4827.	0.	0.	725.4	859.0	725.4	1.693E-07	1.692E-07	1.692E-07
B	4.0	.63	4827.	0.	0.	725.4	859.0	725.4	1.277E-07	1.276E-07	1.276E-07
B	5.0	.76	4827.	0.	0.	725.4	859.0	725.4	1.016E-07	1.015E-07	1.015E-07
B	6.0	.39	4827.	0.	0.	725.4	859.0	725.4	8.496E-08	8.490E-08	8.490E-08
B	8.0	.55	4827.	0.	0.	725.4	859.0	725.4	6.366E-08	6.362E-08	6.362E-08
B	10.0	.08	4827.	0.	0.	725.4	859.0	725.4	5.090E-08	5.086E-08	5.086E-08
C	.4	.05	4827.	0.	0.	568.7	500.4	568.7	2.634E-06	2.629E-06	2.629E-06
C	1.0	.16	4827.	0.	0.	568.7	500.4	568.7	1.112E-06	1.110E-06	1.110E-06
C	2.0	.37	4827.	0.	0.	568.7	500.4	568.7	5.499E-07	5.490E-07	5.490E-07
C	3.0	.68	4827.	0.	0.	568.7	500.4	568.7	3.706E-07	3.700E-07	3.700E-07
C	4.0	.76	4827.	0.	0.	568.7	500.4	568.7	2.795E-07	2.791E-07	2.791E-07
C	5.0	.52	4827.	0.	0.	568.7	500.4	568.7	2.224E-07	2.220E-07	2.220E-07
C	6.0	.52	4827.	0.	0.	568.7	500.4	568.7	1.860E-07	1.857E-07	1.857E-07
C	8.0	.39	4827.	0.	0.	568.7	500.4	568.7	1.394E-07	1.392E-07	1.392E-07
C	10.0	.16	4827.	0.	0.	568.7	500.4	568.7	1.114E-07	1.113E-07	1.113E-07
C	13.0	.05	4827.	0.	0.	568.7	500.4	568.7	8.583E-08	8.569E-08	8.569E-08
D	.4	.20	4827.	0.	0.	221.3	158.9	221.3	2.131E-05	2.104E-05	2.104E-05
D	1.0	.84	4827.	0.	0.	221.3	158.9	221.3	9.000E-06	8.885E-06	8.885E-06
D	2.0	2.67	4827.	0.	0.	221.3	158.9	221.3	4.450E-06	4.393E-06	4.393E-06
D	3.0	2.80	4827.	0.	0.	221.3	158.9	221.3	3.000E-06	2.962E-06	2.962E-06
D	4.0	3.30	4827.	0.	0.	221.3	158.9	221.3	2.262E-06	2.234E-06	2.234E-06
D	5.0	2.69	4827.	0.	0.	221.3	158.9	221.3	1.800E-06	1.777E-06	1.777E-06
D	6.0	1.88	4827.	0.	0.	221.3	158.9	221.3	1.506E-06	1.486E-06	1.486E-06
D	8.0	2.77	4827.	0.	0.	221.3	158.9	221.3	1.128E-06	1.114E-06	1.114E-06
D	10.0	1.02	4827.	0.	0.	221.3	158.9	221.3	9.020E-07	8.904E-07	8.904E-07
D	13.0	.34	4827.	0.	0.	221.3	158.9	221.3	6.947E-07	6.858E-07	6.858E-07
D	18.0	.05	4827.	0.	0.	221.3	158.9	221.3	5.018E-07	4.954E-07	4.954E-07

E	.4	.42	4827.	0.	0.	428.5	35.6	428.5	4.920E-05	4.777E-05	4.777E-05
E	1.0	1.62	4827.	0.	0.	428.5	35.6	428.5	2.077E-05	2.017E-05	2.017E-05
E	2.0	4.05	4827.	0.	0.	428.5	35.6	428.5	1.027E-05	9.974E-06	9.974E-06
E	3.0	4.00	4827.	0.	0.	428.5	35.6	428.5	6.924E-06	6.723E-06	6.723E-06
E	4.0	4.00	4827.	0.	0.	428.5	35.6	428.5	5.222E-06	5.070E-06	5.070E-06
E	5.0	4.58	4827.	0.	0.	428.5	35.6	428.5	4.154E-06	4.034E-06	4.034E-06
E	6.0	3.56	4827.	0.	0.	428.5	35.6	428.5	3.475E-06	3.374E-06	3.374E-06
E	8.0	3.50	4827.	0.	0.	428.5	35.6	428.5	2.604E-06	2.528E-06	2.528E-06
E	10.0	.63	4827.	0.	0.	428.5	35.6	428.5	2.082E-06	2.021E-06	2.021E-06
E	13.0	.21	4827.	0.	0.	428.5	35.6	428.5	1.603E-06	1.557E-06	1.557E-06
E	18.0	.05	4827.	0.	0.	428.5	35.6	428.5	1.158E-06	1.125E-06	1.125E-06
F	.4	.46	4827.	0.	0.	696.0	11.2	696.0	9.625E-05	9.094E-05	9.094E-05
F	1.0	1.67	4827.	0.	0.	696.0	11.2	696.0	4.064E-05	3.839E-05	3.839E-05
F	2.0	5.20	4827.	0.	0.	696.0	11.2	696.0	2.010E-05	1.899E-05	1.899E-05
F	3.0	6.07	4827.	0.	0.	696.0	11.2	696.0	1.355E-05	1.280E-05	1.280E-05
F	4.0	4.79	4827.	0.	0.	696.0	11.2	696.0	1.022E-05	9.652E-06	9.652E-06
F	5.0	2.46	4827.	0.	0.	696.0	11.2	696.0	8.128E-06	7.679E-06	7.679E-06
F	6.0	1.07	4827.	0.	0.	696.0	11.2	696.0	6.799E-06	6.423E-06	6.423E-06
F	8.0	.86	4827.	0.	0.	696.0	11.2	696.0	5.094E-06	4.813E-06	4.813E-06
F	10.0	.08	4827.	0.	0.	696.0	11.2	696.0	4.073E-06	3.848E-06	3.848E-06
F	13.0	.05	4827.	0.	0.	696.0	11.2	696.0	3.137E-06	2.964E-06	2.964E-06
G	.4	.49	4827.	0.	0.	1000.0	3.5	1000.0	2.136E-04	1.891E-04	1.891E-04
G	1.0	1.44	4827.	0.	0.	1000.0	3.5	1000.0	9.021E-05	7.984E-05	7.984E-05
G	2.0	3.37	4827.	0.	0.	1000.0	3.5	1000.0	4.461E-05	3.948E-05	3.948E-05
G	3.0	4.11	4827.	0.	0.	1000.0	3.5	1000.0	3.007E-05	2.661E-05	2.661E-05
G	4.0	2.59	4827.	0.	0.	1000.0	3.5	1000.0	2.268E-05	2.007E-05	2.007E-05
G	5.0	.71	4827.	0.	0.	1000.0	3.5	1000.0	1.804E-05	1.597E-05	1.597E-05
G	6.0	.24	4827.	0.	0.	1000.0	3.5	1000.0	1.509E-05	1.336E-05	1.336E-05
G	8.0	.08	4827.	0.	0.	1000.0	3.5	1000.0	1.131E 05	1.001E-05	1.001E-05
G	10.0	.05	4827.	0.	0.	1000.0	3.5	1000.0	9.041E-06	8.002E-06	8.002E-06

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0   N SECTOR     BOUNDARY DISTANCE = 4827.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:    C=   .5      A=  2861.      D=    70.0
 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   1.891E-04   9.094E-05   7.984E-05   4.777E-05   3.948E-05   3.839E-05   2.661E-05   2.104E-05   2.017E-05   2.007E-05
         .491        .950       2.388       2.809       6.182       7.856      11.962      12.167      13.788      16.377
       .05932      .11480      .28863      .33940      .74711      .94939     1.44560     1.47029     1.66625     1.97914
0   1.899E-05   1.597E-05   1.336E-05   1.280E-05   1.001E-05   9.974E-06   9.652E-06   8.885E-06   8.002E-06   7.679E-06
       21.582      22.288      22.523      28.591      28.669      32.723      37.509      38.346      38.398      40.857
      2.60809     2.69343     2.72187     3.45512     3.46460     3.95449     4.53287     4.63401     4.64033     4.93742
0   6.723E-06   6.423E-06   5.070E-06   4.813E-06   4.393E-06   4.034E-06   3.848E-06   3.374E-06   2.964E-06   2.962E-06
       44.858      45.931      49.932      50.795      53.463      58.040      58.118      61.675      61.727      64.526
      5.42099     5.55057     6.03414     6.13843     6.46081     7.01391     7.02339     7.45323     7.45955     7.79773
0   2.629E-06   2.528E-06   2.234E-06   2.021E-06   1.777E-06   1.557E-06   1.486E-06   1.202E-06   1.125E-06   1.114E-06
       64.580      68.084      71.380      72.007      74.701      74.910      76.794      76.837      76.889      79.661
      7.80428     8.22780     8.62603     8.70188     9.02742     9.05270     9.28026     9.28547     9.29179     9.62681
0   1.110E-06   8.904E-07   7.492E-07   6.858E-07   5.490E-07   5.075E-07   4.954E-07   3.700E-07   3.163E-07   2.791E-07
       79.818      80.838      81.039      81.379      81.745      81.876      81.928      82.608      83.314      84.073
      9.64577     9.76904     9.79329     9.83438     9.87863     9.89443     9.90075     9.98292    10.06826    10.15991
0   2.510E-07   2.220E-07   1.857E-07   1.692E-07   1.564E-07   1.392E-07   1.276E-07   1.113E-07   1.054E-07   1.015E-07
       84.648      85.171      85.694      86.479      88.336      88.728      89.356      89.513      91.239      91.997
     10.22945    10.29266    10.35587    10.45069    10.67509    10.72249    10.79835    10.81731    11.02591    11.11756
0   8.569E-08   8.490E-08   7.952E-08   6.362E-08   6.326E-08   5.292E-08   5.086E-08   3.965E-08   3.170E-08   2.442E-08
       92.049      92.442      93.932      94.482      96.103      97.594      97.672      99.294      99.817     100.000
     11.12388    11.17129    11.35144    11.41782    11.61377    11.79392    11.80340    11.99936    12.06257    12.08470
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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)=    .948
                                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   2.605
                                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   4.529
                                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   7.010
                                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   8.622
                                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   9.024
                                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   9.277
                                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   9.643
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   9  1      -8.57322 -14.34161  -1.77906
   9  2     -10.16758 -14.25735  -1.74314
   9  3     -10.87178 -16.12952  -2.70707
   9  4     -11.54831 -18.34420  -4.01574
   9  5     -12.42081 -20.29952  -5.34134
   9  6     -13.01191 -25.44657  -9.11380
   9  7     -13.24063 -28.78827 -11.60894
   9  8     -13.41924 -31.21796 -13.44420
   9  9     -13.71102      NUMXQ(K)=   9
     1.305E-04              .121            1.000
     7.021E-05              .363            3.000
     5.139E-05              .604            5.000
     3.274E-05             1.208           10.000
     2.476E-05             1.813           15.000
     2.010E-05             2.417           20.000
     1.596E-05             3.021           25.000
     1.279E-05             3.625           30.000
     1.055E-05             4.230           35.000
     8.530E-06             4.834           40.000
     6.774E-06             5.438           45.000
     5.485E-06             6.042           50.000
     4.512E-06             6.647           55.000
     3.676E-06             7.251           60.000
     2.929E-06             7.855           65.000
     2.365E-06             8.459           70.000
     1.732E-06             9.064           75.000
0    5.781E-05             0.5              4.14
0ANNUAL AVERAGE =    1.80E-06
0K=  9      FIVEXQ(K)= 5.781E-05       FIVEPR(K)= 4.137
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ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-112	Cont'd on page B-113
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: 11/19/2003 TIME: 23: 4:56
/PLANT NAME: CGS METEOROLOGICAL INSTRUMENTATION
DATA PERIOD: JFD 1996-1999 WIND SENSORS HEIGHT: 10.0 METERS
TYPE OF RELEASE: GROUND LEVEL RELEASE DELTA-T HEIGHTS: 10 - 75 METERS
SOURCE OF DATA: MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
COMMENTS: input file: P96-99-F.inp output file: P96-99-F.out sigma=desert + P-G
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 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=1431.SQ.METERS	USED
A	.4	.20	4827.	0.	0.	1000.0	1000.0	1000.0	7.495E-07	7.492E-07	7.492E-07
A	1.0	.69	4827.	0.	0.	1000.0	1000.0	1000.0	3.165E-07	3.163E-07	3.163E-07
A	2.0	1.78	4827.	0.	0.	1000.0	1000.0	1000.0	1.565E-07	1.564E-07	1.564E-07
A	3.0	1.24	4827.	0.	0.	1000.0	1000.0	1000.0	1.055E-07	1.054E-07	1.054E-07
A	4.0	1.24	4827.	0.	0.	1000.0	1000.0	1000.0	7.956E-08	7.952E-08	7.952E-08
A	5.0	1.35	4827.	0.	0.	1000.0	1000.0	1000.0	6.329E-08	6.326E-08	6.326E-08
A	6.0	.91	4827.	0.	0.	1000.0	1000.0	1000.0	5.294E-08	5.292E-08	5.292E-08
A	8.0	1.06	4827.	0.	0.	1000.0	1000.0	1000.0	3.967E-08	3.965E-08	3.965E-08
A	10.0	.18	4827.	0.	0.	1000.0	1000.0	1000.0	3.172E-08	3.170E-08	3.170E-08
A	13.0	.07	4827.	0.	0.	1000.0	1000.0	1000.0	2.443E-08	2.442E-08	2.442E-08
A	18.0	.04	4827.	0.	0.	1000.0	1000.0	1000.0	1.765E-08	1.764E-08	1.764E-08
B	.4	.06	4827.	0.	0.	725.4	859.0	725.4	1.203E-06	1.202E-06	1.202E-06
B	1.0	.18	4827.	0.	0.	725.4	859.0	725.4	5.079E-07	5.075E-07	5.075E-07
B	2.0	.66	4827.	0.	0.	725.4	859.0	725.4	2.512E-07	2.510E-07	2.510E-07
B	3.0	.29	4827.	0.	0.	725.4	859.0	725.4	1.693E-07	1.692E-07	1.692E-07
B	4.0	.55	4827.	0.	0.	725.4	859.0	725.4	1.277E-07	1.276E-07	1.276E-07
B	5.0	.55	4827.	0.	0.	725.4	859.0	725.4	1.016E-07	1.015E-07	1.015E-07
B	6.0	.47	4827.	0.	0.	725.4	859.0	725.4	8.496E-08	8.490E-08	8.490E-08
B	8.0	.69	4827.	0.	0.	725.4	859.0	725.4	6.366E-08	6.362E-08	6.362E-08
B	10.0	.29	4827.	0.	0.	725.4	859.0	725.4	5.090E-08	5.086E-08	5.086E-08
B	13.0	.15	4827.	0.	0.	725.4	859.0	725.4	3.920E-08	3.917E-08	3.917E-08
C	.4	.09	4827.	0.	0.	568.7	500.4	568.7	2.634E-06	2.629E-06	2.629E-06
C	1.0	.25	4827.	0.	0.	568.7	500.4	568.7	1.112E-06	1.110E-06	1.110E-06
C	2.0	.66	4827.	0.	0.	568.7	500.4	568.7	5.499E-07	5.490E-07	5.490E-07
C	3.0	.51	4827.	0.	0.	568.7	500.4	568.7	3.706E-07	3.700E-07	3.700E-07
C	4.0	.51	4827.	0.	0.	568.7	500.4	568.7	2.795E-07	2.791E-07	2.791E-07
C	5.0	.55	4827.	0.	0.	568.7	500.4	568.7	2.224E-07	2.220E-07	2.220E 07
C	6.0	.66	4827.	0.	0.	568.7	500.4	568.7	1.860E-07	1.857E-07	1.857E-07
C	8.0	.73	4827.	0.	0.	568.7	500.4	568.7	1.394E-07	1.392E-07	1.392E-07
C	10.0	.36	4827.	0.	0.	568.7	500.4	568.7	1.114E-07	1.113E-07	1.113E-07
C	13.0	.22	4827.	0.	0.	568.7	500.4	568.7	8.583E-08	8.569E-08	8.569E-08
D	.4	.17	4827.	0.	0.	221.3	158.9	221.3	2.131E-05	2.104E-05	2.104E-05
D	1.0	.69	4827.	0.	0.	221.3	158.9	221.3	9.000E-06	8.885E-06	8.885E-06
D	2.0	2.80	4827.	0.	0.	221.3	158.9	221.3	4.450E-06	4.393E-06	4.393E-06
D	3.0	2.44	4827.	0.	0.	221.3	158.9	221.3	3.000E-06	2.962E-06	2.962E-06
D	4.0	2.37	4827.	0.	0.	221.3	158.9	221.3	2.262E-06	2.234E-06	2.234E-06
D	5.0	3.24	4827.	0.	0.	221.3	158.9	221.3	1.800E-06	1.777E-06	1.777E-06
D	6.0	2.77	4827.	0.	0.	221.3	158.9	221.3	1.506E-06	1.486E-06	1.486E-06
D	8.0	4.26	4827.	0.	0.	221.3	158.9	221.3	1.128E-06	1.114E-06	1.114E-06
D	10.0	2.48	4827.	0.	0.	221.3	158.9	221.3	9.020E-07	8.904E-07	8.904E-07
D	13.0	1.38	4827.	0.	0.	221.3	158.9	221.3	6.947E-07	6.858E-07	6.858E-07
D	18.0	.25	4827.	0.	0.	221.3	158.9	221.3	5.018E-07	4.954E-07	4.954E-07
E	.4	.50	4827.	0.	0.	428.5	35.6	428.5	4.920E-05	4.777E-05	4.777E-05
E	1.0	1.93	4827.	0.	0.	428.5	35.6	428.5	2.077E-05	2.017E-05	2.017E-05
E	2.0	4.52	4827.	0.	0.	428.5	35.6	428.5	1.027E-05	9.974E-06	9.974E-06
E	3.0	3.31	4827.	0.	0.	428.5	35.6	428.5	6.924E-06	6.723E-06	6.723E-06
E	4.0	2.26	4827.	0.	0.	428.5	35.6	428.5	5.222E-06	5.070E-06	5.070E-06
E	5.0	2.88	4827.	0.	0.	428.5	35.6	428.5	4.154E-06	4.034E-06	4.034E-06
E	6.0	3.64	4827.	0.	0.	428.5	35.6	428.5	3.475E-06	3.374E-06	3.374E-06
E	8.0	5.97	4827.	0.	0.	428.5	35.6	428.5	2.604E-06	2.528E-06	2.528E-06
E	10.0	4.01	4827.	0.	0.	428.5	35.6	428.5	2.082E-06	2.021E-06	2.021E-06
E	13.0	1.53	4827.	0.	0.	428.5	35.6	428.5	1.603E-06	1.557E-06	1.557E-06
E	18.0	.29	4827.	0.	0.	428.5	35.6	428.5	1.158E-06	1.125E-06	1.125E-06
F	.4	.47	4827.	0.	0.	696.0	11.2	696.0	9.625E-05	9.094E-05	9.094E-05
F	1.0	1.71	4827.	0.	0.	696.0	11.2	696.0	4.064E-05	3.839E-05	3.839E-05
F	2.0	5.24	4827.	0.	0.	696.0	11.2	696.0	2.010E-05	1.899E-05	1.899E-05
F	3.0	4.48	4827.	0.	0.	696.0	11.2	696.0	1.355E-05	1.280E-05	1.280E-05
F	4.0	3.31	4827.	0.	0.	696.0	11.2	696.0	1.022E-05	9.652E-06	9.652E-06
F	5.0	1.38	4827.	0.	0.	696.0	11.2	696.0	8.128E-06	7.679E-06	7.679E-06
F	6.0	1.24	4827.	0.	0.	696.0	11.2	696.0	6.799E-06	6.423E-06	6.423E-06
F	8.0	.98	4827.	0.	0.	696.0	11.2	696.0	5.094E-06	4.813E-06	4.813E-06
F	10.0	.55	4827.	0.	0.	696.0	11.2	696.0	4.073E-06	3.848E-06	3.848E-06
F	13.0	.11	4827.	0.	0.	696.0	11.2	696.0	3.137E-06	2.964E-06	2.964E-06
G	.4	.55	4827.	0.	0.	1000.0	3.5	1000.0	2.136E-04	1.891E-04	1.891E-04
G	1.0	1.60	4827.	0.	0.	1000.0	3.5	1000.0	9.021E-05	7.984E-05	7.984E-05
G	2.0	3.86	4827.	0.	0.	1000.0	3.5	1000.0	4.461E-05	3.948E-05	3.948E-05
G	3.0	1.78	4827.	0.	0.	1000.0	3.5	1000.0	3.007E-05	2.661E-05	2.661E-05
G	4.0	1.27	4827.	0.	0.	1000.0	3.5	1000.0	2.268E-05	2.007E-05	2.007E-05
G	5.0	.29	4827.	0.	0.	1000.0	3.5	1000.0	1.804E-05	1.597E-05	1.597E-05
G	6.0	.22	4827.	0.	0.	1000.0	3.5	1000.0	1.509E-05	1.336E-05	1.336E-05
G	8.0	.04	4827.	0.	0.	1000.0	3.5	1000.0	1.131E-05	1.001E-05	1.001E-05
G	13.0	.04	4827.	0.	0.	1000.0	3.5	1000.0	6.963E-06	6.163E-06	6.163E-06

ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-113	Cont'd on page B-114
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0 NNE SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:   C=   .5      A=  2861.     D=   70.0
 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   1.891E-04   9.094E-05   7.984E-05   4.777E-05   3.948E-05   3.839E-05   2.661E-05   2.104E-05   2.017E-05   2.007E-05
         .547       1.016       2.619       3.119       6.979       8.691      10.476      10.645      12.575      13.850
       .04745      .08820      .22726      .27067      .60568      .75423      .90910      .92376     1.09127     1.20189
0   1.899E-05   1.597E-05   1.336E-05   1.280E-05   1.001E-05   9.974E-06   9.652E-06   8.885E-06   7.679E-06   6.723E-06
       19.094      19.386      19.604      24.084      24.120      28.636      31.950      32.642      34.026      37.341
      1.65701     1.68229     1.70126     2.09001     2.09317     2.48507     2.77269     2.83274     2.95284     3.24045
0   6.423E-06   6.163E-06   5.070E-06   4.813E-06   4.393E-06   4.034E-06   3.848E-06   3.374E-06   2.964E-06   2.962E-06
       38.579      38.615      40.873      41.857      44.661      47.538      48.084      51.726      51.836      54.276
      3.34791     3.35107     3.54702     3.63236     3.87572     4.12540     4.17281     4.48887     4.49835     4.71011
0   2.629E-06   2.528E-06   2.234E-06   2.021E-06   1.777E-06   1.557E-06   1.486E-06   1.202E-06   1.125E-06   1.114E-06
       54.364      60.337      62.704      66.710      69.952      71.481      74.249      74.309      74.601      78.862
      4.71775     5.23609     5.44152     5.78918     6.07047     6.20322     6.44342     6.44863     6.47391     6.84370
0   1.110E-06   8.904E-07   7.492E-07   6.858E-07   5.490E-07   5.075E-07   4.954E-07   3.700E-07   3.163E-07   2.791E-07
       79.117      81.593      81.790      83.174      83.830      84.012      84.267      84.776      85.468      85.978
      6.86582     7.08074     7.09781     7.21791     7.27480     7.29060     7.31272     7.35697     7.41702     7.46127
0   2.510E-07   2.220E-07   1.857E-07   1.692E-07   1.564E-07   1.392E-07   1.276E-07   1.113E-07   1.054E-07   1.015E-07
       86.634      87.180      87.836      88.127      89.912      90.640      91.186      91.551      92.789      93.335
      7.51816     7.56557     7.62246     7.64774     7.80261     7.86582     7.91323     7.94484     8.05229     8.09970
0   8.569E-08   8.490E-08   7.952E-08   6.362E-08   6.326E-08   5.292E-08   5.086E-08   3.965E-08   3.917E-08   3.170E-08
       93.554      94.027      95.265      95.957      97.305      98.215      98.507      99.563      99.709      99.891
      8.11867     8.15975     8.26721     8.32726     8.44420     8.52322     8.54850     8.64016     8.65280     8.66860
    2.442E-08   1.764E-08
       99.964     100.000
      8.67492     8.67809
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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)=    .753
                                                   HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   1.655
                                                   HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   2.770
                                                   HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   4.122
                                                   HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   5.232
                                                   HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   5.785
                                                   HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   6.067
                                                   HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   6.440
                                                   HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   6.862
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  10  1      -8.57322 -14.59846  -1.82283
  10  2     -10.16758 -15.87443  -2.34775
  10  3     -10.87178 -17.57376  -3.14525
  10  4     -11.54831 -20.88477  -4.87358
  10  5     -12.42081 -19.54039  -4.09948
  10  6     -12.88803 -20.19483  -4.50278
  10  7     -13.11173 -21.61479  -5.40546
  10  8     -13.24063 -22.36723  -5.89115
  10  9     -13.41924 -26.95746  -8.91325
  10 10     -13.71102     NUMXQ(K)= 10
     1.379E-04              .087              1.000
     7.449E-05              .260              3.000
     5.469E-05              .434              5.000
     3.404E-05              .868             10.000
     2.375E-05             1.302             15.000
     1.790E-05             1.736             20.000
     1.341E-05             2.170             25.000
     1.052E-05             2.603             30.000
     7.944E-06             3.037             35.000
     5.938E-06             3.471             40.000
     4.567E-06             3.905             45.000
     3.660E-06             4.339             50.000
     3.039E-06             4.773             55.000
     2.557E-06             5.207             60.000
     2.143E-06             5.641             65.000
     1.773E-06             6.075             70.000
     1.420E-06             6.509             75.000
0    5.005E-05             0.5                5.76
CANNUAL AVERAGE =    1.23E-06
CK= 10      FIVEXQ(K)= 5.005E-05      FIVEPR(K)= 5.762
```

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:  CGS                                METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE  NE SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.22	4827.	0.	0.	1000.0	1000.0	1000.0	7.495E-07	7.492E-07	7.492E-07
A	1.0	.76	4827.	0.	0.	1000.0	1000.0	1000.0	3.165E-07	3.163E-07	3.163E-07
A	2.0	1.68	4827.	0.	0.	1000.0	1000.0	1000.0	1.565E-07	1.564E-07	1.564E-07
A	3.0	1.25	4827.	0.	0.	1000.0	1000.0	1000.0	1.055E-07	1.054E-07	1.054E-07
A	4.0	1.33	4827.	0.	0.	1000.0	1000.0	1000.0	7.956E-08	7.952E-08	7.952E-08
A	5.0	1.25	4827.	0.	0.	1000.0	1000.0	1000.0	6.329E-08	6.326E-08	6.326E-08
A	6.0	.60	4827.	0.	0.	1000.0	1000.0	1000.0	5.294E-08	5.292E-08	5.292E-08
A	8.0	1.14	4827.	0.	0.	1000.0	1000.0	1000.0	3.967E-08	3.965E-08	3.965E-08
A	10.0	.60	4827.	0.	0.	1000.0	1000.0	1000.0	3.172E-08	3.170E-08	3.170E-08
A	13.0	.05	4827.	0.	0.	1000.0	1000.0	1000.0	2.443E-08	2.442E-08	2.442E-08
B	.4	.05	4827.	0.	0.	725.4	859.0	725.4	1.203E-06	1.202E-06	1.202E-06
B	1.0	.16	4827.	0.	0.	725.4	859.0	725.4	5.079E-07	5.075E-07	5.075E-07
B	2.0	.87	4827.	0.	0.	725.4	859.0	725.4	2.512E-07	2.510E-07	2.510E-07
B	3.0	.54	4827.	0.	0.	725.4	859.0	725.4	1.693E-07	1.692E-07	1.692E-07
B	4.0	.38	4827.	0.	0.	725.4	859.0	725.4	1.277E-07	1.276E-07	1.276E-07
B	5.0	.54	4827.	0.	0.	725.4	859.0	725.4	1.016E-07	1.015E-07	1.015E-07
B	6.0	.27	4827.	0.	0.	725.4	859.0	725.4	8.496E-08	8.490E-08	8.490E-08
B	8.0	.87	4827.	0.	0.	725.4	859.0	725.4	6.366E-08	6.362E-08	6.362E-08
B	10.0	.43	4827.	0.	0.	725.4	859.0	725.4	5.090E-08	5.086E-08	5.086E-08
B	13.0	.43	4827.	0.	0.	725.4	859.0	725.4	3.920E-08	3.917E-08	3.917E-08
C	.4	.13	4827.	0.	0.	568.7	500.4	568.7	2.634E-06	2.629E-06	2.629E-06
C	1.0	.38	4827.	0.	0.	568.7	500.4	568.7	1.112E-06	1.110E-06	1.110E-06
C	2.0	.49	4827.	0.	0.	568.7	500.4	568.7	5.499E-07	5.490E-07	5.490E-07
C	3.0	.49	4827.	0.	0.	568.7	500.4	568.7	3.706E-07	3.700E-07	3.700E-07
C	4.0	.76	4827.	0.	0.	568.7	500.4	568.7	2.795E-07	2.791E-07	2.791E-07
C	5.0	.81	4827.	0.	0.	568.7	500.4	568.7	2.224E-07	2.220E-07	2.220E-07
C	6.0	.38	4827.	0.	0.	568.7	500.4	568.7	1.860E-07	1.857E-07	1.857E-07
C	8.0	.92	4827.	0.	0.	568.7	500.4	568.7	1.394E-07	1.392E-07	1.392E-07
C	10.0	.70	4827.	0.	0.	568.7	500.4	568.7	1.114E-07	1.113E-07	1.113E-07
C	13.0	.16	4827.	0.	0.	568.7	500.4	568.7	8.583E-08	8.569E-08	8.569E-08
D	.4	.53	4827.	0.	0.	221.3	158.9	221.3	2.131E-05	2.104E-05	2.104E-05
D	1.0	2.17	4827.	0.	0.	221.3	158.9	221.3	9.000E-06	8.885E-06	8.885E-06
D	2.0	2.33	4827.	0.	0.	221.3	158.9	221.3	4.450E-06	4.393E-06	4.393E-06
D	3.0	2.87	4827.	0.	0.	221.3	158.9	221.3	3.000E-06	2.962E-06	2.962E-06
D	4.0	2.76	4827.	0.	0.	221.3	158.9	221.3	2.262E-06	2.234E-06	2.234E-06
D	5.0	2.44	4827.	0.	0.	221.3	158.9	221.3	1.800E-06	1.777E-06	1.777E-06
D	6.0	1.84	4827.	0.	0.	221.3	158.9	221.3	1.506E-06	1.486E-06	1.486E-06
D	8.0	3.47	4827.	0.	0.	221.3	158.9	221.3	1.128E-06	1.114E-06	1.114E-06
D	10.0	2.44	4827.	0.	0.	221.3	158.9	221.3	9.020E-07	8.904E-07	8.904E-07
D	13.0	1.73	4827.	0.	0.	221.3	158.9	221.3	6.947E-07	6.858E-07	6.858E-07
D	18.0	.27	4827.	0.	0.	221.3	158.9	221.3	5.018E-07	4.954E-07	4.954E-07
E	.4	.77	4827.	0.	0.	428.5	35.6	428.5	4.920E-05	4.777E-05	4.777E-05
E	1.0	2.98	4827.	0.	0.	428.5	35.6	428.5	2.077E-05	2.017E-05	2.017E-05
E	2.0	4.82	4827.	0.	0.	428.5	35.6	428.5	1.027E-05	9.974E-06	9.974E-06
E	3.0	3.90	4827.	0.	0.	428.5	35.6	428.5	6.924E-06	6.723E-06	6.723E-06
E	4.0	3.41	4827.	0.	0.	428.5	35.6	428.5	5.222E-06	5.070E-06	5.070E-06
E	5.0	2.82	4827.	0.	0.	428.5	35.6	428.5	4.154E-06	4.034E-06	4.034E-06
E	6.0	3.41	4827.	0.	0.	428.5	35.6	428.5	3.475E-06	3.374E-06	3.374E-06
E	8.0	3.85	4827.	0.	0.	428.5	35.6	428.5	2.604E-06	2.528E-06	2.528E-06
E	10.0	3.36	4827.	0.	0.	428.5	35.6	428.5	2.082E-06	2.021E-06	2.021E-06
E	13.0	1.41	4827.	0.	0.	428.5	35.6	428.5	1.603E-06	1.557E-06	1.557E-06
E	18.0	.27	4827.	0.	0.	428.5	35.6	428.5	1.158E-06	1.125E-06	1.125E-06
F	.4	.83	4827.	0.	0.	696.0	11.2	696.0	9.625E-05	9.094E-05	9.094E-05
F	1.0	3.03	4827.	0.	0.	696.0	11.2	696.0	4.064E-05	3.839E-05	3.839E-05
F	2.0	5.20	4827.	0.	0.	696.0	11.2	696.0	2.010E-05	1.899E-05	1.899E-05
F	3.0	3.52	4827.	0.	0.	696.0	11.2	696.0	1.355E-05	1.280E-05	1.280E-05
F	4.0	2.00	4827.	0.	0.	696.0	11.2	696.0	1.022E-05	9.652E-06	9.652E-06
F	5.0	.87	4827.	0.	0.	696.0	11.2	696.0	8.128E-06	7.679E-06	7.679E-06
F	6.0	.54	4827.	0.	0.	696.0	11.2	696.0	6.799E-06	6.423E-06	6.423E-06
F	8.0	.54	4827.	0.	0.	696.0	11.2	696.0	5.094E-06	4.813E-06	4.813E-06
F	10.0	.05	4827.	0.	0.	696.0	11.2	696.0	4.073E-06	3.848E-06	3.848E-06
F	13.0	.11	4827.	0.	0.	696.0	11.2	696.0	3.137E-06	2.964E-06	2.964E-06
G	.4	1.15	4827.	0.	0.	1000.0	3.5	1000.0	2.136E-04	1.891E-04	1.891E-04
G	1.0	3.36	4827.	0.	0.	1000.0	3.5	1000.0	9.021E-05	7.984E-05	7.984E-05
G	2.0	4.06	4827.	0.	0.	1000.0	3.5	1000.0	4.461E-05	3.948E-05	3.948E-05
G	3.0	1.41	4827.	0.	0.	1000.0	3.5	1000.0	3.007E-05	2.661E-05	2.661E-05
G	4.0	.81	4827.	0.	0.	1000.0	3.5	1000.0	2.268E-05	2.007E-05	2.007E-05
G	18.0	.05	4827.	0.	0.	1000.0	3.5	1000.0	5.030E-06	4.452E-06	4.452E-06

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0  NE SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:    C=   .5      A=  2861.     D=   70.0
 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   1.891E-04   9.094E-05   7.984E-05   4.777E-05   3.948E-05   3.839E-05   2.661E-05   2.104E-05   2.017E-05   2.007E-05
        1.146       1.978       5.337       6.109      10.172      13.206      14.614      15.143      18.123      18.935
       .06687      .11541      .31137      .35641      .59345      .77044      .85262      .88348     1.05731     1.10472
0   1.899E-05   1.280E-05   9.974E-06   9.652E-06   8.885E-06   7.679E-06   6.723E-06   6.423E-06   5.070E-06   4.813E-06
       24.136      27.657      32.479      34.483      36.650      37.517      41.417      41.959      45.372      45.914
      1.40814     1.61357     1.89486     2.01180     2.13822     2.18879     2.41635     2.44796     2.64707     2.67868
0   4.452E-06   4.393E-06   4.034E-06   3.848E-06   3.374E-06   2.964E-06   2.962E 36   2.629E-06   2.528E-06   2.234E-06
       45.968      48.297      51.115      51.169      54.582      54.690      57.561      57.692      61.539      64.301
      2.68184     2.81774     2.98209     2.98525     3.18437     3.19069     3.35820     3.36585     3.59025     3.75143
0   2.021E-06   1.777E-06   1.557E-06   1.486E-06   1.202E-06   1.125E-06   1.114E-06   1.110E-06   8.904E-07   7.492E-07
       67.660      70.098      71.506      73.348      73.402      73.673      77.140      77.519      79.957      80.172
      3.94739     4.08961     4.17179     4.27925     4.28237     4.29817     4.50045     4.52257     4.6648C     4.67738
0   6.858E-07   5.490E-07   5.075E-07   4.954E-07   3.700E-07   3.163E-07   2.791E-07   2.510E-07   2.220E-07   1.857E-07
       81.906      82.394      82.556      82.827      83.315      84.073      84.831      85.698      86.511      86.890
      4.77851     4.80696     4.81644     4.83224     4.86069     4.90494     4.94918     4.99975     5.04716     5.06929
0   1.692E-07   1.564E-07   1.392E-07   1.276E-07   1.113E-07   1.054E-07   1.015E-07   8.569E-08   8.490E-08   7.952E-08
       87.432      89.111      90.032      90.411      91.116      92.362      92.903      93.066      93.337      94.637
      5.10089     5.19887     5.25260     5.27472     5.31581     5.38850     5.42011     5.42959     5.44539     5.52124
0   6.362E-08   6.326E-08   5.292E-08   5.086E-08   3.965E-08   3.917E-08   3.170E-08   2.442E-08
       95.504      96.750      97.345      97.779      98.916      99.350      99.946     100.000
      5.57181     5.64451     5.67927     5.70456     5.77093     5.79621     5.83098     5.83414
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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)=    .311
                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=    .770
                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   1.407
                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   2.136
                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   2.414
                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   2.979
                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   3.944
                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   4.086
                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   4.276
                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(11)=   4.519
                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(12)=   4.661
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  11  1      -8.57322 -14.43160  -1.82612
  11  2      -9.43545 -15.83738  -2.33994
  11  3     -10.16758 -17.66461  -3.09404
  11  4     -10.87178 -20.73628  -4.49315
  11  5     -11.63119 -22.59565  -5.41070
  11  6     -11.90999 -22.98853  -5.60964
  11  7     -12.42081 -22.69910  -5.45600
  11  8     -13.11173 -26.88185  -7.83632
  11  9     -13.24063 -27.88965  -8.41527
  11 10     -13.41924 -32.60690 -11.15858
  11 11     -13.71102 -39.00584 -14.93734
  11 12     -13.93155      NUMXQ(K)= 12
                                         BACK EXTRAPOLATION FOR  1 PERCENTILE.
     2.031E-04              .058            1.000
     1.118E-04              .175            3.000
     8.302E-05              .292            5.000
     4.845E-05              .583           10.000
     3.324E-05              .875           15.000
     2.379E-05             1.167           20.000
     1.784E-05             1.459           25.000
     1.286E-05             1.750           30.000
     9.683E-06             2.042           35.000
     7.282E-06             2.334           40.000
     5.508E-06             2.625           45.000
     4.259E-06             2.917           50.000
     3.379E-06             3.209           55.000
     2.729E-06             3.500           60.000
     2.236E-06             3.792           65.000
     1.786E-06             4.084           70.000
     1.322E-06             4.376           75.000
0    5.495E-05             0.5              8.57
0ANNUAL AVERAGE =   1.19E-06
0K= 11     FIVEXQ(K)= 5.495E-05     FIVEPR(K)= 8.570
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE EXE SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.39	4827.	0.	0.	1000.0	1000.0	1000.0	7.495E-07	7.492E-07	7.492E-07
A	1.0	1.36	4827.	0.	0.	1000.0	1000.0	1000.0	3.165E-07	3.163E-07	3.163E-07
A	2.0	1.51	4827.	0.	0.	1000.0	1000.0	1000.0	1.565E-07	1.564E-07	1.564E-07
A	3.0	1.29	4827.	0.	0.	1000.0	1000.0	1000.0	1.055E-07	1.054E-07	1.054E-07
A	4.0	.91	4827.	0.	0.	1000.0	1000.0	1000.0	7.956E-08	7.952E-08	7.952E-08
A	5.0	.61	4827.	0.	0.	1000.0	1000.0	1000.0	6.329E-08	6.326E-08	6.326E-08
A	6.0	.30	4827.	0.	0.	1000.0	1000.0	1000.0	5.294E-08	5.292E-08	5.292E-08
A	8.0	.98	4827.	0.	0.	1000.0	1000.0	1000.0	3.967E-08	3.965E-08	3.965E-08
A	10.0	.61	4827.	0.	0.	1000.0	1000.0	1000.0	3.172E-08	3.170E-08	3.170E 08
A	13.0	.23	4827.	0.	0.	1000.0	1000.0	1000.0	2.443E-08	2.442E-08	2.442E-08
B	.4	.07	4827.	0.	0.	725.4	859.0	725.4	1.203E-06	1.202E-06	1.202E-06
B	1.0	.23	4827.	0.	0.	725.4	859.0	725.4	5.079E-07	5.075E-07	5.075E-07
B	2.0	.68	4827.	0.	0.	725.4	859.0	725.4	2.512E-07	2.510E-07	2.510E-07
B	3.0	.38	4827.	0.	0.	725.4	859.0	725.4	1.693E-07	1.692E-07	1.692E-07
B	4.0	.45	4827.	0.	0.	725.4	859.0	725.4	1.277E-07	1.276E-07	1.276E-07
B	5.0	.30	4827.	0.	0.	725.4	859.0	725.4	1.016E-07	1.015E-07	1.015E-07
B	8.0	.15	4827.	0.	0.	725.4	859.0	725.4	6.366E-08	6.362E-08	6.362E-08
B	10.0	.30	4827.	0.	0.	725.4	859.0	725.4	5.090E-08	5.086E-08	5.086E-08
C	.4	.08	4827.	0.	0.	568.7	500.4	568.7	2.634E-06	2.629E-06	2.629E-06
C	1.0	.23	4827.	0.	0.	568.7	500.4	568.7	1.112E-06	1.110E-06	1.110E-06
C	2.0	1.06	4827.	0.	0.	568.7	500.4	568.7	5.499E-07	5.490E-07	5.490E-07
C	3.0	.45	4827.	0.	0.	568.7	500.4	568.7	3.706E-07	3.700E-07	3.700E-07
C	4.0	.53	4827.	0.	0.	568.7	500.4	568.7	2.795E-07	2.791E-07	2.791E-07
C	5.0	.83	4827.	0.	0.	568.7	500.4	568.7	2.224E-07	2.220E-07	2.220E-07
C	6.0	.38	4827.	0.	0.	568.7	500.4	568.7	1.860E-07	1.857E-07	1.857E-07
C	8.0	.68	4827.	0.	0.	568.7	500.4	568.7	1.394E-07	1.392E-07	1.392E-07
C	10.0	1.06	4827.	0.	0.	568.7	500.4	568.7	1.114E-07	1.113E-07	1.113E-07
C	13.0	.08	4827.	0.	0.	568.7	500.4	568.7	8.583E-08	8.569E-08	8.569E-08
D	.4	.46	4827.	0.	0.	221.3	158.9	221.3	2.131E-05	2.104E-05	2.104E-05
D	1.0	1.89	4827.	0.	0.	221.3	158.9	221.3	9.000E-06	8.885E-06	8.885E-06
D	2.0	2.95	4827.	0.	0.	221.3	158.9	221.3	4.450E-06	4.393E-06	4.393E-06
D	3.0	3.55	4827.	0.	0.	221.3	158.9	221.3	3.000E-06	2.962E-06	2.962E-06
D	4.0	1.89	4827.	0.	0.	221.3	158.9	221.3	2.262E-06	2.234E-06	2.234E-06
D	5.0	1.29	4827.	0.	0.	221.3	158.9	221.3	1.800E-06	1.777E-06	1.777E-06
D	6.0	1.97	4827.	0.	0.	221.3	158.9	221.3	1.506E-06	1.486E-06	1.486E-06
D	8.0	3.71	4827.	0.	0.	221.3	158.9	221.3	1.128E-06	1.114E-06	1.114E-06
D	10.0	3.18	4827.	0.	0.	221.3	158.9	221.3	9.020E-07	8.904E-07	8.904E-07
D	13.0	.83	4827.	0.	0.	221.3	158.9	221.3	6.947E-07	6.858E-07	6.858E-07

E	.4	1.02	4827.	0.	0.	428.5	35.6	428.5	4.920E-05	4.777E-05	4.777E-05
E	1.0	3.93	4827.	0.	0.	428.5	35.6	428.5	2.077E-05	2.017E-05	2.017E-05
E	2.0	7.34	4827.	0.	0.	428.5	35.6	428.5	1.027E-05	9.974E-06	9.974E-06
E	3.0	5.22	4827.	0.	0.	428.5	35.6	428.5	6.924E-06	6.723E-06	6.723E-06
E	4.0	3.40	4827.	0.	0.	428.5	35.6	428.5	5.222E-06	5.070E-06	5.070E-06
E	5.0	2.57	4827.	0.	0.	428.5	35.6	428.5	4.154E-06	4.034E-06	4.034E-06
E	6.0	2.50	4827.	0.	0.	428.5	35.6	428.5	3.475E-06	3.374E-06	3.374E-06
E	8.0	2.87	4827.	0.	0.	428.5	35.6	428.5	2.604E-06	2.528E-06	2.528E-06
E	10.0	.91	4827.	0.	0.	428.5	35.6	428.5	2.082E-06	2.021E-06	2.021E-06
E	13.0	.45	4827.	0.	0.	428.5	35.6	428.5	1.603E-06	1.557E-06	1.557E-06
F	.4	1.37	4827.	0.	0.	696.0	11.2	696.0	9.625E-05	9.094E-05	9.094E-05
F	1.0	4.99	4827.	0.	0.	696.0	11.2	696.0	4.064E-05	3.839E-05	3.839E-05
F	2.0	6.35	4827.	0.	0.	696.0	11.2	696.0	2.010E-05	1.899E-05	1.899E-05
F	3.0	4.39	4827.	0.	0.	696.0	11.2	696.0	1.355E-05	1.280E-05	1.280E-05
F	4.0	2.12	4827.	0.	0.	696.0	11.2	696.0	1.022E-05	9.652E-06	9.652E-06
F	5.0	1.21	4827.	0.	0.	696.0	11.2	696.0	8.128E-06	7.679E-06	7.679E-06
F	6.0	.38	4827.	0.	0.	696.0	11.2	696.0	6.799E-06	6.423E-06	6.423E-06
F	8.0	.38	4827.	0.	0.	696.0	11.2	696.0	5.094E-06	4.813E-06	4.813E-06
F	13.0	.08	4827.	0.	0.	696.0	11.2	696.0	3.137E-06	2.964E-06	2.964E-06
G	.4	1.47	4827.	0.	0.	1000.0	3.5	1000.0	2.136E-04	1.891E-04	1.891E-04
G	1.0	4.31	4827.	0.	0.	1000.0	3.5	1000.0	9.021E-05	7.984E-05	7.984E-05
G	2.0	2.87	4827.	0.	0.	1000.0	3.5	1000.0	4.461E-05	3.948E-05	3.948E-05
G	3.0	1.21	4827.	0.	0.	1000.0	3.5	1000.0	3.007E-05	2.661E-05	2.661E-05
G	4.0	.45	4827.	0.	0.	1000.0	3.5	1000.0	2.268E-05	2.007E-05	2.007E-05
G	5.0	.30	4827.	0.	0.	1000.0	3.5	1000.0	1.804E-05	1.597E-05	1.597E-05
G	6.0	.08	4827.	0.	0.	1000.0	3.5	1000.0	1.509E-05	1.336E-05	1.336E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0 ENE SECTOR       BOUNDARY DISTANCE = 4827.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:    C=   .5     A=  2861.     D=   70.0
 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   1.891E-04   9.094E-05   7.984E-05   4.777E-05   3.948E-05   3.839E-05   2.661E-05   2.104E-05   2.017E-05   2.007E-05
        1.471       2.840       7.151       8.170      11.044      16.035      17.245      17.707      21.639      22.093
       .06147      .11869      .29884      .34143      .46153      .67012      .72069      .73998      .90433      .92330
0   1.899E-05   1.597E-05   1.336E-05   1.280E-05   9.974E-06   9.652E-06   8.885E-06   7.679E-06   6.723E-06   6.423E-06
       28.446      28.748      28.824      33.210      40.546      42.664      44.554      45.764      50.983      51.361
      1.18878     1.20143     1.20459     1.38790     1.69447     1.78297     1.86198     1.91255     2.13063     2.14643
0   5.070E-06   4.813E-06   4.393E-06   4.034E-06   3.374E-06   2.964E-06   2.962E-06   2.629E-06   2.528E-06   2.234E-06
       54.764      55.142      58.092      60.663      63.159      63.234      66.789      66.867      69.741      71.632
      2.28866     2.30446     2.42772     2.53518     2.63948     2.64264     2.79119     2.79446     2.91456     2.99358
0   2.021E-06   1.777E-06   1.557E-06   1.486E-06   1.202E-06   1.114E-06   1.110E-06   8.904E-07   7.492E-07   6.858E-07
       72.539      73.825      74.279      76.245      76.320      80.026      80.252      83.429      83.816      84.648
      3.03151     3.08523     3.10420     3.18637     3.18950     3.34436     3.35385     3.48659     3.50276     3.53753
0   5.490E-07   5.075E-07   3.700E-07   3.163E-07   2.791E-07   2.510E-07   2.220E-07   1.857E-07   1.692E-07   1.564E-07
       85.706      85.933      86.387      87.748      88.278      88.958      89.790      90.168      90.547      92.059
      3.58177     3.59126     3.61022     3.66711     3.68923     3.71768     3.75244     3.76825     3.78405     3.84726
0   1.392E-07   1.276E-07   1.113E-07   1.054E-07   1.015E-07   8.569E-08   7.952E-08   6.362E-08   6.326E-08   5.292E-08
       92.740      93.194      94.252      95.538      95.841      95.916      96.824      96.975      97.580      97.882
      3.87571     3.89467     3.93892     3.99265     4.00529     4.00845     4.04638     4.05270     4.07798     4.09062
0   5.086E-08   3.965E-08   3.170E-08   2.442E-08
       98.185      99.168      99.773     100.000
      4.10327     4.14435     4.16964     4.17912
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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)=   .299
                                                HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 3)=   .669
                                                HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 4)=  1.187
                                                HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 5)=  1.781
                                                HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 6)=  1.860
                                                HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 7)=  2.128
                                                HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 8)=  2.533
                                                HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 9)=  2.788
                                                HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE(10)=  2.912
                                                HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE(11)=  2.991
                                                HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE(12)=  3.483
                                                HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE(13)=  4.002
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  12  1      -8.57322 -14.34584  -1.78597
  12  2      -9.43545 -16.72586  -2.65162
  12  3     -10.16758 -18.37782  -3.31953
  12  4     -10.87178 -20.43606  -4.22978
  12  5     -11.54831 -21.40772  -4.69220
  12  6     -11.63119 -22.07070  -5.01040
  12  7     -11.90999 -26.00114  -6.94856
  12  8     -12.42081 -26.94587  -7.43194
  12  9     -12.72980 -28.73422  -8.36686
  12 10     -12.88803 -32.83082 -10.52989
  12 11     -13.01191 -38.42793 -13.50366
  12 12     -13.93155 -75.88050 -34.14944
  12 13     -16.10317      NUMXQ(K)= 13
                                                BACK EXTRAPOLATION FOR  1 PERCENTILE.
     2.296E-04             .042            1.000
     1.301E-04             .125            3.000
     9.809E-05             .209            5.000
     5.936E-05             .418           10.000
     4.089E-05             .627           15.000
     2.944E-05             .836           20.000
     2.235E-05            1.045           25.000
     1.741E-05            1.254           30.000
     1.350E-05            1.463           35.000
     1.078E-05            1.672           40.000
     8.705E-06            1.881           45.000
     7.002E-06            2.090           50.000
     5.389E-06            2.299           55.000
     4.168E-06            2.507           60.000
     3.233E-06            2.716           65.000
     2.485E-06            2.925           70.000
     1.697E-06            3.134           75.000
     1.150E-06            3.343           80.000
     6.670E-07            3.552           85.000
     2.735E-07            3.761           90.000
0    5.044E-05            0.5             11.96
0ANNUAL AVERAGE =    1.04E-06
0K= 12      FIVEXQ(K)= 5.044E-05       FIVEPR(K)=-11.964
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                       WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE            DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-P.inp   output file: P96-99-P.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE   E SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.28	4827.	0.	0.	1000.0	1000.0	1000.0	7.495E-07	7.492E-07	7.492E-07
A	1.0	1.00	4827.	0.	0.	1000.0	1000.0	1000.0	3.165E-07	3.163E-07	3.163E-07
A	2.0	2.00	4827.	0.	0.	1000.0	1000.0	1000.0	1.565E-07	1.564E-07	1.564E-07
A	3.0	.60	4827.	0.	0.	1000.0	1000.0	1000.0	1.055E-07	1.054E-07	1.054E-07
A	4.0	.73	4827.	0.	0.	1000.0	1000.0	1000.0	7.956E-08	7.952E-08	7.952E-08
A	5.0	.53	4827.	0.	0.	1000.0	1000.0	1000.0	6.329E-08	6.326E-08	6.326E-08
A	6.0	.33	4827.	0.	0.	1000.0	1000.0	1000.0	5.294E-08	5.292E-08	5.292E-08
A	8.0	.60	4827.	0.	0.	1000.0	1000.0	1000.0	3.967E-08	3.965E-08	3.965E-08
A	10.0	.47	4827.	0.	0.	1000.0	1000.0	1000.0	3.172E-08	3.170E-08	3.170E-08
A	13.0	.20	4827.	0.	0.	1000.0	1000.0	1000.0	2.443E-08	2.442E-08	2.442E-08
B	.4	.09	4827.	0.	0.	725.4	859.0	725.4	1.203E-06	1.202E-06	1.202E-06
B	1.0	.27	4827.	0.	0.	725.4	859.0	725.4	5.079E-07	5.075E-07	5.075E-07
B	2.0	.60	4827.	0.	0.	725.4	859.0	725.4	2.512E-07	2.510E-07	2.510E-07
B	3.0	.33	4827.	0.	0.	725.4	859.0	725.4	1.693E-07	1.692E-07	1.692E-07
B	4.0	.40	4827.	0.	0.	725.4	859.0	725.4	1.277E-07	1.276E-07	1.276E-07
B	5.0	.40	4827.	0.	0.	725.4	859.0	725.4	1.016E-07	1.015E-07	1.015E-07
B	6.0	.60	4827.	0.	0.	725.4	859.0	725.4	8.496E-08	8.490E-08	8.490E-08
B	8.0	.67	4827.	0.	0.	725.4	859.0	725.4	6.366E-08	6.362E-08	6.362E-08
B	10.0	.07	4827.	0.	0.	725.4	859.0	725.4	5.090E-08	5.086E-08	5.086E-08
B	13.0	.27	4827.	0.	0.	725.4	859.0	725.4	3.920E-08	3.917E-08	3.917E-08
C	.4	.07	4827.	0.	0.	568.7	500.4	568.7	2.634E-06	2.629E-06	2.629E-06
C	1.0	.20	4827.	0.	0.	568.7	500.4	568.7	1.112E-06	1.110E-06	1.110E-06
C	2.0	.47	4827.	0.	0.	568.7	500.4	568.7	5.499E-07	5.490E-07	5.490E-07
C	3.0	.60	4827.	0.	0.	568.7	500.4	568.7	3.706E-07	3.700E-07	3.700E-07
C	4.0	.53	4827.	0.	0.	568.7	500.4	568.7	2.795E-07	2.791E-07	2.791E-07
C	5.0	.47	4827.	0.	0.	568.7	500.4	568.7	2.224E-07	2.220E-07	2.220E-07
C	6.0	.47	4827.	0.	0.	568.7	500.4	568.7	1.860E-07	1.857E-07	1.857E-07
C	8.0	.67	4827.	0.	0.	568.7	500.4	568.7	1.394E-07	1.392E-07	1.392E-07
C	10.0	.27	4827.	0.	0.	568.7	500.4	568.7	1.114E-07	1.113E-07	1.113E-07
C	13.0	.07	4827.	0.	0.	568.7	500.4	568.7	8.583E-08	8.569E-08	8.569E-08
D	.4	.57	4827.	0.	0.	221.3	158.9	221.3	2.131E-05	2.104E-05	2.104E-05
D	1.0	2.33	4827.	0.	0.	221.3	158.9	221.3	9.000E-06	8.885E-06	8.885E-06
D	2.0	3.33	4827.	0.	0.	221.3	158.9	221.3	4.450E-06	4.393E-06	4.393E-06
D	3.0	1.93	4827.	0.	0.	221.3	158.9	221.3	3.000E-06	2.962E-06	2.962E-06
D	4.0	2.13	4827.	0.	0.	221.3	158.9	221.3	2.262E-06	2.234E-06	2.234E-06
D	5.0	2.67	4827.	0.	0.	221.3	158.9	221.3	1.800E-06	1.777E-06	1.777E-06
D	6.0	1.93	4827.	0.	0.	221.3	158.9	221.3	1.506E-06	1.486E-06	1.486E-06
D	8.0	2.27	4827.	0.	0.	221.3	158.9	221.3	1.128E-06	1.114E-06	1.114E-06
D	10.0	1.20	4827.	0.	0.	221.3	158.9	221.3	9.020E-07	8.904E-07	8.904E-07
D	13.0	.33	4827.	0.	0.	221.3	158.9	221.3	6.947E-07	6.858E-07	6.858E-07
D	18.0	.13	4827.	0.	0.	221.3	158.9	221.3	5.018E-07	4.954E-07	4.954E-07
E	.4	1.07	4827.	0.	0.	428.5	35.6	428.5	4.920E-05	4.777E-05	4.777E-05
E	1.0	4.13	4827.	0.	0.	428.5	35.6	428.5	2.077E-05	2.017E-05	2.017E-05
E	2.0	6.53	4827.	0.	0.	428.5	35.6	428.5	1.027E-05	9.974E-06	9.974E-06
E	3.0	5.40	4827.	0.	0.	428.5	35.6	428.5	6.924E-06	6.723E-06	6.723E-06
E	4.0	5.73	4827.	0.	0.	428.5	35.6	428.5	5.222E-06	5.070E-06	5.070E-06
E	5.0	2.87	4827.	0.	0.	428.5	35.6	428.5	4.154E-06	4.034E-06	4.034E-06
E	6.0	2.87	4827.	0.	0.	428.5	35.6	428.5	3.475E-06	3.374E-06	3.374E-06
E	8.0	2.73	4827.	0.	0.	428.5	35.6	428.5	2.604E-06	2.528E-06	2.528E-06
E	10.0	.80	4827.	0.	0.	428.5	35.6	428.5	2.082E-06	2.021E-06	2.021E-06
E	13.0	.40	4827.	0.	0.	428.5	35.6	428.5	1.603E-06	1.557E-06	1.557E-06
F	.4	1.37	4827.	0.	0.	696.0	11.2	696.0	9.625E-05	9.094E-05	9.094E-05
F	1.0	5.00	4827.	0.	0.	696.0	11.2	696.0	4.064E-05	3.839E-05	3.839E-05
F	2.0	6.80	4827.	0.	0.	696.0	11.2	696.0	2.010E-05	1.899E-05	1.899E-05
F	3.0	3.47	4827.	0.	0.	696.0	11.2	696.0	1.355E-05	1.280E-05	1.280E-05
F	4.0	3.00	4827.	0.	0.	696.0	11.2	696.0	1.022E-05	9.652E-06	9.652E-06
F	5.0	2.13	4827.	0.	0.	696.0	11.2	696.0	8.128E-06	7.679E-06	7.679E-06
F	6.0	1.07	4827.	0.	0.	696.0	11.2	696.0	6.799E-06	6.423E-06	6.423E-06
F	8.0	.13	4827.	0.	0.	696.0	11.2	696.0	5.094E-06	4.813E-06	4.813E-06
F	10.0	.07	4827.	0.	0.	696.0	11.2	696.0	4.073E-06	3.848E-06	3.848E-06
G	.4	1.41	4827.	0.	0.	1000.0	3.5	1000.0	2.136E-04	1.891E-04	1.891E-04
G	1.0	4.13	4827.	0.	0.	1000.0	3.5	1000.0	9.021E-05	7.984E-05	7.984E 05
G	2.0	3.60	4827.	0.	0.	1000.0	3.5	1000.0	4.461E-05	3.948E-05	3.948E-05
G	3.0	1.00	4827.	0.	0.	1000.0	3.5	1000.0	3.007E-05	2.661E-05	2.661E-05
G	4.0	.87	4827.	0.	0.	1000.0	3.5	1000.0	2.268E-05	2.007E-05	2.007E-05
G	5.0	.33	4827.	0.	0.	1000.0	3.5	1000.0	1.804E-05	1.597E-05	1.597E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0            RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                 METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                        WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE             DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-P.inp   output file: P96-99-P.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0   E SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:    C=    .5      A=  2861.      D=   70.0
 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   1.891E-04   9.094E-05   7.984E-05   4.777E-05   3.948E-05   3.839E-05   2.661E-05   2.104E-05   2.017E-05   2.007E-05
        1.410       2.782       6.915       7.986      11.587      16.587      17.587      18.156      22.290      23.157
       .06687      .13188      .32784      .37861      .54928      .78632      .83373      .86074     1.05670     1.09778
0   1.899E-05   1.597E-05   1.280E-05   9.974E-06   9.652E-06   8.885E-06   7.679E-06   6.723E-06   6.423E-06   5.070E-06
       29.957      30.290      33.757      40.290      43.290      45.624      47.757      53.157      54.224      59.958
      1.42016     1.43596     1.60031     1.91005     2.05227     2.16289     2.26403     2.52003     2.57060     2.84241
0   4.813E-06   4.393E-06   4.034E-06   3.848E-06   3.374E 06   2.962E-06   2.629E-06   2.528E-06   2.234E-06   2.021E-06
       60.091      63.424      66.291      66.358      69.225      71.158      71.227      73.960      76.094      76.894
      2.84873     3.00676     3.14266     3.14582     3.28173     3.37338     3.37666     3.50624     3.60738     3.64531
0   1.777E-06   1.557E-06   1.486E-06   1.202E-06   1.114E-06   1.110E-06   8.904E-07   7.492E-07   6.858E-07   5.490E-07
       79.561      79.961      81.894      81.982      84.249      84.449      85.649      85.933      86.266      86.733
      3.77173     3.79069     3.88235     3.88652     3.99398     4.00346     4.06035     4.07382     4.08962     4.11175
0   5.075E-07   4.954E-07   3.700E-07   3.163E-07   2.791E-07   2.510E-07   2.220E-07   1.857E-07   1.692E-07   1.564E-07
       87.000      87.133      87.733      88.733      89.266      89.866      90.333      90.800      91.133      93.133
      4.12439     4.13071     4.15916     4.20657     4.23185     4.26030     4.28242     4.30454     4.32035     4.41516
0   1.392E-07   1.276E-07   1.113E-07   1.054E-07   1.015E-07   8.569E-08   8.490E-08   7.952E-08   6.362E-08   6.326E-08
       93.800      94.200      94.467      95.067      95.467      95.533      96.133      96.867      97.533      98.067
      4.44677     4.46573     4.47837     4.50682     4.52578     4.52894     4.55739     4.59215     4.62376     4.64904
0   5.292E-08   5.086E-08   3.965E-08   3.917E-08   3.170E-08   2.442E-08
       98.400      98.467      99.067      99.333      99.800     100.000
      4.66485     4.66801     4.69645     4.70909     4.73122     4.74070
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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)=    .327
                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=    .785
                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   1.419
                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   2.517
                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   3.140
                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   3.279
                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   3.604
                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   3.768
                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   3.879
                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(11)=   4.000
                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(12)=   4.057
0  K  I   XQSAVE(K,I)  XQINT(K,I)  XQSLOP(K,I)
  13  1      -8.57322  -14.22795   -1.76264
  13  2      -9.43545  -15.99860   -2.41387
  13  3     -10.16758  -17.77814   -3.15054
  13  4     -10.87178  -20.55067   -4.41532
  13  5     -11.90999  -22.28706   -5.30260
  13  6     -12.42081  -29.62188   -9.24469
  13  7     -12.59942  -30.37227   -9.65221
  13  8     -13.01191  -33.19906  -11.22389
  13  9     -13.24063  -37.10111  -13.41826
  13 10     -13.41924  -49.62372  -20.51362
  13 11     -13.71102  -72.55437  -33.61180
  13 12     -13.93155     NUMXQ(K)=  12
                                                     BACK EXTRAPOLATION FOR  1 PERCENTILE.
     2.246E-04             .047             1.000
     1.275E-04             .142             3.000
     9.617E-05             .237             5.000
     5.914E-05             .474            10.000
     4.192E-05             .711            15.000
     3.090E-05             .948            20.000
     2.369E-05            1.185            25.000
     1.894E-05            1.422            30.000
     1.445E-05            1.659            35.000
     1.138E-05            1.896            40.000
     9.175E-06            2.133            45.000
     7.544E-06            2.370            50.000
     6.221E-06            2.607            55.000
     5.092E-06            2.844            60.000
     4.225E-06            3.081            65.000
     3.215E-06            3.318            70.000
     2.380E-06            3.556            75.000
     1.718E-06            3.793            80.000
     1.003E-06            4.030            85.000
0    5.658E-05            0.5              10.55
0ANNUAL AVERAGE =   1.19E-06
0K= 13     FIVEXQ(K)= 5.658E-05     FIVEPR(K)=10.547
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Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003    TIME: 23: 4:56
/PLANT NAME:  CGS                                METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:   10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-P.inp   output file: P96-99-P.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE ESE SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.24	4827.	0.	0.	1000.0	1000.0	1000.0	7.495E-07	7.492E-07	7.492E-07
A	1.0	.84	4827.	0.	0.	1000.0	1000.0	1000.0	3.165E-07	3.163E-07	3.163E-07
A	2.0	1.19	4827.	0.	0.	1000.0	1000.0	1000.0	1.565E-07	1.564E-07	1.564E-07
A	3.0	.65	4827.	0.	0.	1000.0	1000.0	1000.0	1.055E-07	1.054E-07	1.054E-07
A	4.0	.19	4827.	0.	0.	1000.0	1000.0	1000.0	7.956E-08	7.952E-08	7.952E-08
A	5.0	.23	4827.	0.	0.	1000.0	1000.0	1000.0	6.329E-08	6.326E-08	6.326E-08
A	6.0	.23	4827.	0.	0.	1000.0	1000.0	1000.0	5.294E-08	5.292E-08	5.292E-08
A	8.0	.42	4827.	0.	0.	1000.0	1000.0	1000.0	3.967E-08	3.965E-08	3.965E-08
A	10.0	.23	4827.	0.	0.	1000.0	1000.0	1000.0	3.172E-08	3.170E-08	3.170E-08
A	13.0	.27	4827.	0.	0.	1000.0	1000.0	1000.0	2.443E-08	2.442E-08	2.442E-08
B	.4	.04	4827.	0.	0.	725.4	859.0	725.4	1.203E-06	1.202E-06	1.202E-06
B	1.0	.11	4827.	0.	0.	725.4	859.0	725.4	5.079E-07	5.075E-07	5.075E-07
B	2.0	.31	4827.	0.	0.	725.4	859.0	725.4	2.512E-07	2.510E-07	2.510E-07
B	3.0	.27	4827.	0.	0.	725.4	859.0	725.4	1.693E-07	1.692E-07	1.692E-07
B	4.0	.27	4827.	0.	0.	725.4	859.0	725.4	1.277E-07	1.276E-07	1.276E-07
B	5.0	.23	4827.	0.	0.	725.4	859.0	725.4	1.016E-07	1.015E-07	1.015E-07
B	6.0	.27	4827.	0.	0.	725.4	859.0	725.4	8.496E-08	8.490E-08	8.490E-08
B	8.0	.19	4827.	0.	0.	725.4	859.0	725.4	6.366E-08	6.362E 08	6.362E-08
B	10.0	.08	4827.	0.	0.	725.4	859.0	725.4	5.090E-08	5.086E-08	5.086E-08
B	13.0	.15	4827.	0.	0.	725.4	859.0	725.4	3.920E-08	3.917E-08	3.917E-08
C	.4	.04	4827.	0.	0.	568.7	500.4	568.7	2.634E-06	2.629E-06	2.629E-06
C	1.0	.11	4827.	0.	0.	568.7	500.4	568.7	1.112E-06	1.110E-06	1.110E-06
C	2.0	.34	4827.	0.	0.	568.7	500.4	568.7	5.499E-07	5.490E-07	5.490E-07
C	3.0	.46	4827.	0.	0.	568.7	500.4	568.7	3.706E-07	3.700E-07	3.700E-07
C	4.0	.11	4827.	0.	0.	568.7	500.4	568.7	2.795E-07	2.791E-07	2.791E-07
C	5.0	.27	4827.	0.	0.	568.7	500.4	568.7	2.224E-07	2.220E-07	2.220E-07
C	6.0	.27	4827.	0.	0.	568.7	500.4	568.7	1.860E-07	1.857E-07	1.857E-07
C	8.0	.19	4827.	0.	0.	568.7	500.4	568.7	1.394E-07	1.392E-07	1.392E-07
C	10.0	.34	4827.	0.	0.	568.7	500.4	568.7	1.114E-07	1.113E-07	1.113E-07
C	13.0	.31	4827.	0.	0.	568.7	500.4	568.7	8.583E-08	8.569E-08	8.569E-08
D	.4	.36	4827.	0.	0.	221.3	158.9	221.3	2.131E-05	2.104E-05	2.104E-05
D	1.0	1.49	4827.	0.	0.	221.3	158.9	221.3	9.000E-06	8.885E-06	8.885E-06
D	2.0	1.91	4827.	0.	0.	221.3	158.9	221.3	4.450E-06	4.393E-06	4.393E-06
D	3.0	2.45	4827.	0.	0.	221.3	158.9	221.3	3.000E-06	2.962E-06	2.962E-06
D	4.0	2.45	4827.	0.	0.	221.3	158.9	221.3	2.262E-06	2.234E-06	2.234E-06
D	5.0	1.80	4827.	0.	0.	221.3	158.9	221.3	1.800E-06	1.777E-06	1.777E-06
D	6.0	2.07	4827.	0.	0.	221.3	158.9	221.3	1.506E-06	1.486E-06	1.486E-06
D	8.0	3.94	4827.	0.	0.	221.3	158.9	221.3	1.128E-06	1.114E-06	1.114E-06
D	10.0	1.95	4827.	0.	0.	221.3	158.9	221.3	9.020E-07	8.904E-07	8.904E-07
D	13.0	.69	4827.	0.	0.	221.3	158.9	221.3	6.947E-07	6.858E-07	6.858E-07
D	18.0	.08	4827.	0.	0.	221.3	158.9	221.3	5.018E-07	4.954E-07	4.954E-07
E	.4	.89	4827.	0.	0.	428.5	35.6	428.5	4.920E-05	4.777E-05	4.777E-05
E	1.0	3.44	4827.	0.	0.	428.5	35.6	428.5	2.077E-05	2.017E-05	2.017E-05
E	2.0	5.40	4827.	0.	0.	428.5	35.6	428.5	1.027E-05	9.974E-06	9.974E-06
E	3.0	5.82	4827.	0.	0.	428.5	35.6	428.5	6.924E-06	6.723E-06	6.723E-06
E	4.0	5.51	4827.	0.	0.	428.5	35.6	428.5	5.222E-06	5.070E-06	5.070E-06
E	5.0	6.16	4827.	0.	0.	428.5	35.6	428.5	4.154E-06	4.034E-06	4.034E-06
E	6.0	5.36	4827.	0.	0.	428.5	35.6	428.5	3.475E-06	3.374E-06	3.374E-06
E	8.0	5.78	4827.	0.	0.	428.5	35.6	428.5	2.604E-06	2.528E-06	2.528E-06
E	10.0	2.45	4827.	0.	0.	428.5	35.6	428.5	2.082E-06	2.021E-06	2.021E-06
E	13.0	.77	4827.	0.	0.	428.5	35.6	428.5	1.603E-06	1.557E-06	1.557E-06
E	18.0	.08	4827.	0.	0.	428.5	35.6	428.5	1.158E-06	1.125E-06	1.125E-06
F	.4	.85	4827.	0.	0.	696.0	11.2	696.0	9.625E-05	9.094E-05	9.094E-05
F	1.0	3.10	4827.	0.	0.	696.0	11.2	696.0	4.064E-05	3.839E-05	3.839E-05
F	2.0	5.36	4827.	0.	0.	696.0	11.2	696.0	2.010E-05	1.899E-05	1.899E-05
F	3.0	3.87	4827.	0.	0.	696.0	11.2	696.0	1.355E-05	1.280E-05	1.280E-05
F	4.0	3.94	4827.	0.	0.	696.0	11.2	696.0	1.022E-05	9.652E-06	9.652E-06
F	5.0	2.07	4827.	0.	0.	696.0	11.2	696.0	8.128E-06	7.679E-06	7.679E-06
F	6.0	1.07	4827.	0.	0.	696.0	11.2	696.0	6.799E-06	6.423E-06	6.423E-06
F	8.0	.54	4827.	0.	0.	696.0	11.2	696.0	5.094E-06	4.813E-06	4.813E 06
G	.4	.86	4827.	0.	0.	1000.0	3.5	1000.0	2.136E-04	1.891E-04	1.891E-04
G	1.0	2.53	4827.	0.	0.	1000.0	3.5	1000.0	9.021E-05	7.984E-05	7.984E-05
G	2.0	3.71	4827.	0.	0.	1000.0	3.5	1000.0	4.461E-05	3.948E-05	3.948E-05
G	3.0	1.68	4827.	0.	0.	1000.0	3.5	1000.0	3.007E-05	2.661E-05	2.661E-05
G	4.0	.54	4827.	0.	0.	1000.0	3.5	1000.0	2.268E-05	2.007E-05	2.007E-05
G	5.0	.19	4827.	0.	0.	1000.0	3.5	1000.0	1.804E-05	1.597E-05	1.597E-05

Cont'd on page B-127

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003    TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0 ESE SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:   C=   .5      A=  2861.      D=   70.0
 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   1.891E-04   9.094E-05   7.984E-05   4.777E-05   3.948E-05   3.839E-05   2.661E-05   3.104E-05   2.017E-05   2.007E-05
         .862       1.712       4.238       5.131       8.843      11.943      13.627      13.992      17.436      17.972
       .07118      .14140      .35000      .42370      .73027      .98628     1.12534     1.15544     1.43989     1.48414
0   1.899E-05   1.597E-05   1.280E-05   9.974E-06   9.652E-06   8.885E-06   7.679E-06   6.723E-06   6.423E-06   5.070E-06
       23.330      23.521      27.387      32.783      36.725      38.218      40.285      46.102      47.174      52.685
      1.92661     1.94242     2.26163     2.70727     3.03281     3.15607     3.32674     3.80715     3.89564     4.35076
0   4.813E-06   4.393E-06   4.034E-06   3.374E-06   2.962E-06   2.629E-06   2.528E-06   2.234E-06   2.021E-06   1.777E-06
       53.221      55.134      61.296      66.654      69.104      69.143      74.922      77.372      79.821      81.620
      4.39501     4.55304     5.06189     5.50436     5.70664     5.70992     6.18716     6.38944     6.59171     6.74026
0   1.557E-06   1.486E-06   1.202E-06   1.125E-06   1.114E-06   1.110E-06   8.904E-07   7.492E-07   6.858E-07   5.490E-07
       82.386      84.452      84.490      84.567      88.509      88.623      90.575      90.815      91.504      91.848
      6.80347     6.97414     6.97726     6.98359     7.30912     7.31860     7.47979     7.49956     7.55645     7.58489
0   5.075E-07   4.954E-07   3.700E-07   3.163E-07   2.791E-07   2.510E-07   2.220E-07   1.857E-07   1.692E-07   1.564E-07
       91.963      92.039      92.499      93.341      93.455      93.762      94.030      94.297      94.565      95.752
      7.59437     7.60069     7.63862     7.70815     7.71764     7.74292     7.76504     7.78717     7.80929     7.90727
0   1.392E-07   1.276E-07   1.113E-07   1.054E-07   1.015E-07   8.569E-08   8.490E-08   7.952E-08   6.362E-08   6.326E-08
       95.943      96.211      96.555      97.206      97.436      97.742      98.010      98.201      98.393      98.622
      7.92307     7.94519     7.97364     8.02737     8.04633     8.07162     8.09374     8.10954     8.12535     8.14431
0   5.292E-08   5.086E-08   3.965E-08   3.917E-08   3.170E-08   2.442E-08
       98.852      98.928      99.349      99.502      99.732     100.000
      8.16327     8.16959     8.20436     8.21700     8.23597     8.25809
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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)=   .350
                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   .985
                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=  1.925
                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=  3.030
                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=  3.804
                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=  5.058
                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=  5.501
                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=  6.183
                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=  6.588
                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(11)=  6.970
                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(12)=  7.315
                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(13)=  7.476
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  14  1      -8.57322 -14.15417  -1.74947
  14  2      -9.43545 -14.84173  -2.00438
  14  3     -10.16758 -16.42638  -2.68391
  14  4     -10.87178 -18.11974  -3.50213
  14  5     -11.54831 -18.16952  -3.52865
  14  6     -11.90999 -18.63843  -3.79299
  14  7     -12.42081 -19.54508  -4.34609
  14  8     -12.59942 -20.47383  -4.92723
  14  9     -12.88803 -23.53201  -6.91362
  14 10     -13.11173 -28.98304 -10.53026
  14 11     -13.41924 -30.48745 -11.54812
  14 12     -13.71102 -41.54215 -19.15767
  14 13     -13.93155       NUMXQ(K)= 13
      1.753E-04               .083              1.000
      9.731E-05               .248              3.000
      7.144E-05               .413              5.000
      4.381E-05               .826             10.000
      3.043E-05              1.239             15.000
      2.246E-05              1.652             20.000
      1.718E-05              2.065             25.000
      1.313E-05              2.477             30.000
      1.040E-05              2.890             35.000
      8.441E-06              3.303             40.000
      6.992E-06              3.716             45.000
      5.829E-06              4.129             50.000
      4.916E-06              4.542             55.000
      4.196E-06              4.955             60.000
      3.561E-06              5.368             65.000
      2.993E-06              5.781             70.000
      2.519E-06              6.194             75.000
      1.997E-06              6.606             80.000
      1.430E-06              7.019             85.000
      9.499E-07              7.432             90.000
 0    6.265E-05              0.5                 6.05
 0ANNUAL AVERAGE =    1.54E-06
 0K= 14    FIVEXQ(K)= 6.265E-05     FIVEPR(K)= 6.055
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ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-128	Cont'd on page B-129
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE  SE SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.21	4827.	0.	0.	1000.0	1000.0	1000.0	7.495E-07	7.492E-07	7.492E-07
A	1.0	.73	4827.	0.	0.	1000.0	1000.0	1000.0	3.165E-07	3.163E-07	3.163E-07
A	2.0	1.42	4827.	0.	0.	1000.0	1000.0	1000.0	1.565E-07	1.564E-07	1.564E-07
A	3.0	.78	4827.	0.	0.	1000.0	1000.0	1000.0	1.055E-07	1.054E-07	1.054E-07
A	4.0	.55	4827.	0.	0.	1000.0	1000.0	1000.0	7.956E-08	7.952E-08	7.952E-08
A	5.0	.12	4827.	0.	0.	1000.0	1000.0	1000.0	6.329E-08	6.326E-08	6.326E-08
A	6.0	.15	4827.	0.	0.	1000.0	1000.0	1000.0	5.294E-08	5.292E-08	5.292E-08
A	8.0	.17	4827.	0.	0.	1000.0	1000.0	1000.0	3.967E-08	3.965E-08	3.965E-08
A	10.0	.12	4827.	0.	0.	1000.0	1000.0	1000.0	3.172E-08	3.170E-08	3.170E-08
A	13.0	.09	4827.	0.	0.	1000.0	1000.0	1000.0	2.443E-08	2.442E-08	2.442E-08
B	.4	.08	4827.	0.	0.	725.4	859.0	725.4	1.203E-06	1.202E-06	1.202E-06
B	1.0	.23	4827.	0.	0.	725.4	859.0	725.4	5.079E-07	5.075E-07	5.075E-07
B	2.0	.35	4827.	0.	0.	725.4	859.0	725.4	2.512E-07	2.510E-07	2.510E-07
B	3.0	.26	4827.	0.	0.	725.4	859.0	725.4	1.693E-07	1.692E-07	1.692E-07
B	4.0	.35	4827.	0.	0.	725.4	859.0	725.4	1.277E-07	1.276E-07	1.276E-07
B	5.0	.15	4827.	0.	0.	725.4	859.0	725.4	1.016E-07	1.015E-07	1.015E-07
B	6.0	.12	4827.	0.	0.	725.4	859.0	725.4	8.496E-08	8.490E-08	8.490E-08
B	8.0	.06	4827.	0.	0.	725.4	859.0	725.4	6.366E-08	6.362E-08	6.362E-08
B	10.0	.03	4827.	0.	0.	725.4	859.0	725.4	5.090E-08	5.086E-08	5.086E-08
C	.4	.03	4827.	0.	0.	568.7	500.4	568.7	2.634E-06	2.629E-06	2.629E-06
C	1.0	.09	4827.	0.	0.	568.7	500.4	568.7	1.112E-06	1.110E-06	1.110E-06
C	2.0	.46	4827.	0.	0.	568.7	500.4	568.7	5.499E-07	5.490E-07	5.490E-07
C	3.0	.49	4827.	0.	0.	568.7	500.4	568.7	3.706E-07	3.700E-07	3.700E-07
C	4.0	.20	4827.	0.	0.	568.7	500.4	568.7	2.795E-07	2.791E-07	2.791E-07
C	5.0	.20	4827.	0.	0.	568.7	500.4	568.7	2.224E-07	2.220E-07	2.220E-07
C	6.0	.12	4827.	0.	0.	568.7	500.4	568.7	1.860E-07	1.857E-07	1.857E-07
C	8.0	.09	4827.	0.	0.	568.7	500.4	568.7	1.394E-07	1.392E-07	1.392E-07
C	10.0	.20	4827.	0.	0.	568.7	500.4	568.7	1.114E-07	1.113E-07	1.113E-07
D	.4	.26	4827.	0.	0.	221.3	158.9	221.3	2.131E-05	2.104E-05	2.104E-05
D	1.0	1.05	4827.	0.	0.	221.3	158.9	221.3	9.000E-06	8.885E-06	8.885E-06
D	2.0	4.33	4827.	0.	0.	221.3	158.9	221.3	4.450E-06	4.393E-06	4.393E-06
D	3.0	4.30	4827.	0.	0.	221.3	158.9	221.3	3.000E-06	2.962E-06	2.962E-06
D	4.0	3.81	4827.	0.	0.	221.3	158.9	221.3	2.262E 06	2.234E-06	2.234E-06
D	5.0	2.85	4827.	0.	0.	221.3	158.9	221.3	1.800E-06	1.777E-06	1.777E-06
D	6.0	2.12	4827.	0.	0.	221.3	158.9	221.3	1.506E-06	1.486E-06	1.486E-06
D	8.0	1.48	4827.	0.	0.	221.3	158.9	221.3	1.128E-06	1.114E-06	1.114E-06
D	10.0	.81	4827.	0.	0.	221.3	158.9	221.3	9.020E-07	8.904E-07	8.904E-07
D	13.0	.46	4827.	0.	0.	221.3	158.9	221.3	6.947E-07	6.858E-07	6.858E-07
D	18.0	.06	4827.	0.	3.	221.3	158.9	221.3	5.018E-07	4.954E-07	4.954E-07

Cont'd on page B-130

E	.4	.60	4827.	0.	0.	428.5	35.6	428.5	4.920E-05	4.777E-05	4.777E-05
E	1.0	2.32	4827.	0.	0.	428.5	35.6	428.5	2.077E-05	2.017E-05	2.017E-05
E	2.0	5.99	4827.	0.	0.	428.5	35.6	428.5	1.027E-05	9.974E-06	9.974E-06
E	3.0	7.00	4827.	0.	0.	428.5	35.6	428.5	6.924E-06	6.723E-06	6.723E-06
E	4.0	5.61	4827.	0.	0.	428.5	35.6	428.5	5.222E-06	5.070E-06	5.070E-06
E	5.0	4.48	4827.	0.	0.	428.5	35.6	428.5	4.154E-06	4.034E-06	4.034E-06
E	6.0	3.57	4827.	0.	0.	428.5	35.6	428.5	3.475E-06	3.374E-06	3.374E-06
E	8.0	3.25	4827.	0.	0.	428.5	35.6	428.5	2.604E-06	2.528E-06	2.528E-06
E	10.0	.90	4827.	0.	0.	428.5	35.6	428.5	2.082E-06	2.021E-06	2.021E-06
E	13.0	.29	4827.	0.	0.	428.5	35.6	428.5	1.603E-06	1.557E-06	1.557E-06
F	.4	.77	4827.	0.	0.	696.0	11.2	696.0	9.625E-05	9.094E-05	9.094E-05
F	1.0	2.79	4827.	0.	0.	696.0	11.2	696.0	4.064E-05	3.839E-05	3.839E-05
F	2.0	6.74	4827.	0.	0.	696.0	11.2	696.0	2.010E-05	1.899E-05	1.899E-05
F	3.0	4.71	4827.	0.	0.	696.0	11.2	696.0	1.355E-05	1.280E-05	1.280E-05
F	4.0	4.07	4827.	0.	0.	696.0	11.2	696.0	2.022E-05	9.652E-06	9.652E-06
F	5.0	1.48	4827.	0.	0.	696.0	11.2	696.0	8.128E-06	7.679E-06	7.679E-06
F	6.0	.58	4827.	0.	0.	696.0	11.2	696.0	6.799E-06	6.423E-06	6.423E-06
F	8.0	.06	4827.	0.	0.	696.0	11.2	696.0	5.094E-06	4.813E-06	4.813E-06
G	.4	.86	4827.	0.	0.	1000.0	3.5	1000.0	2.136E-04	1.891E-04	1.891E-04
G	1.0	2.53	4827.	0.	0.	1000.0	3.5	1000.0	9.021E-05	7.984E-05	7.984E-05
G	2.0	6.13	4827.	0.	0.	1000.0	3.5	1000.0	4.461E-05	3.948E-05	3.948E-05
G	3.0	3.63	4827.	0.	0.	1000.0	3.5	1000.0	3.007E-05	2.661E-05	2.661E-05
G	4.0	2.03	4827.	0.	0.	1000.0	3.5	1000.0	2.268E-05	2.007E-05	2.007E-05
G	5.0	.17	4827.	0.	0.	1000.0	3.5	1000.0	1.804E-05	1.597E-05	1.597E-05
G	6.0	.06	4827.	0.	0.	1000.0	3.5	1000.0	1.509E-05	1.336E-05	1.336E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0  SE SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:    C=   .5     A=  2861.     D=   70.0
 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   1.891E-04   9.094E-05   7.984E-05   4.777E-05   3.948E-05   3.839E-05   2.661E-05   2.104E-05   2.017E-05   2.007E-05
         .863       1.628       4.156       4.758      10.890      13.679      17.312      17.567      19.892      21.926
       .09383      .17705      .45202      .51753     1.18441     1.48783     1.88289     1.91068     2.16352     2.38476
0   1.899E-05   1.597E-05   1.336E-05   1.280E-05   9.974E-06   9.652E-06   8.885E-06   7.679E-06   6.723E-06   6.423E-06
       28.667      28.842      28.900      33.607      39.594      43.662      44.708      46.190      53.193      53.774
      3.11801     3.13697     3.14329     3.65530     4.30638     4.74885     4.86263     5.02382     5.78552     5.84873
0   5.070E-06   4.813E-06   4.393E-06   4.034E-06   3.374E-06   2.962E-06   2.629E-06   2.528E-06   2.234E-06   2.021E-06
       59.382      59.441      63.770      68.245      71.820      76.120      76.150      79.405      83.212      84.112
      6.45872     6.46504     6.93596     7.42269     7.81143     8.27920     8.28247     8.63646     9.05049     9.14847
0   1.777E-06   1.557E-06   1.486E-06   1.202E-06   1.114E-06   1.110E-06   8.904E-07   7.492E-07   6.858E-07   5.490E-07
       86.960      87.251      89.372      89.449      90.931      91.018      91.831      92.038      92.503      92.968
      9.45820     9.48981     9.72053     9.72886     9.89005     9.89953     9.98803    10.01048    10.06105    10.11162
0   5.075E-07   4.954E-07   3.700E-07   3.163E-07   2.791E-07   2.510E-07   2.220E-07   1.857E-07   1.692E-07   1.564E-07
       93.200      93.258      93.752      94.479      94.682      95.031      95.234      95.351      95.612      97.036
     10.13691    10.14323    10.19696    10.27597    10.29809    10.33602    10.35814    10.37079    10.39923    10.55410
0   1.392E-07   1.276E-07   1.113E-07   1.054E-07   1.015E-07   8.490E-08   7.952E-08   6.362E-08   6.326E-08   5.292E-08
       97.123      97.472      97.675      98.460      98.605      98.721      99.274      99.332      99.448      99.593
     10.56358    10.60151    10.62363    10.70897    10.72477    10.73741    10.79746    10.80378    10.81642    10.83223
0   5.086E-08   3.965E-08   3.170E-08   2.442E-08
       99.622      99.797      99.913     100.000
     10.83539    10.85435    10.86699    10.87648
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Cont'd on page B-132

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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)=   1.486
                                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   3.115
                                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   4.745
                                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   5.782
                                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   7.419
                                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   8.276
                                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   9.047
                                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   9.455
                                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   9.717
                                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(11)=   9.896
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  15  1     -8.57322 -13.87180  -1.70406
  15  2    -10.16758 -15.11160  -2.27441
  15  3    -10.87178 -17.37024  -3.48603
  15  4    -11.54831 -17.79426  -3.73992
  15  5    -11.90999 -18.18507  -3.98831
  15  6    -12.42081 -20.05307  -5.28079
  15  7    -12.72980 -20.72868  -5.76798
  15  8    -13.01191 -25.44484  -9.29311
  15  9    -13.24063 -28.44781 -11.57978
  15 10    -13.41924 -50.00460 -28.18966
  15 11    -13.71102      NUMXQ(K)= 11
     1.755E-04              .109              1.000
     9.748E-05              .326              3.000
     7.253E-05              .544              5.000
     4.721E-05             1.088             10.000
     3.532E-05             1.631             15.000
     2.702E-05             2.175             20.000
     2.177E-05             2.719             25.000
     1.769E-05             3.263             30.000
     1.386E-05             3.807             35.000
     1.116E-05             4.351             40.000
     9.142E-06             4.894             45.000
     7.542E-06             5.438             50.000
     6.288E-06             5.982             55.000
     5.271E-06             6.526             60.000
     4.468E-06             7.070             65.000
     3.757E-06             7.614             70.000
     3.090E-06             8.157             75.000
     2.532E-06             8.701             80.000
     2.001E-06             9.245             85.000
     1.329E-06             9.789             90.000
0    7.623E-05             0.5                4.60
0ANNUAL AVERAGE =   2.29E-06
0K= 15      FIVEXQ(K)= 7.623E-05      FIVEPR(K)= 4.597
```

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: 11/19/2003 TIME: 23: 4:56
/PLANT NAME: CGS METEOROLOGICAL INSTRUMENTATION
DATA PERIOD: JFD 1996-1999 WIND SENSORS HEIGHT: 10.0 METERS
TYPE OF RELEASE: GROUND LEVEL RELEASE DELTA-T HEIGHTS: 10 - 75 METERS
SOURCE OF DATA: MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
COMMENTS: input file: P96-99-F.inp output file: P96-99-F.out sigma-desert + P-G
PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE SSE SECTOR.

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=1431.SQ.METERS	USED
A	.4	.25	4827.	0.	0.	1000.0	1000.0	1000.0	7.495E-07	7.492E-07	7.492E-07
A	1.0	.89	4827.	0.	0.	1000.0	1000.0	1000.0	3.165E-07	3.163E-07	3.163E-07
A	2.0	2.82	4827.	0.	0.	1000.0	1000.0	1000.0	1.565E-07	1.564E-07	1.564E-07
A	3.0	1.79	4827.	0.	0.	1000.0	1000.0	1000.0	1.055E-07	1.054E-07	1.054E-07
A	4.0	.89	4827.	0.	0.	1000.0	1000.0	1000.0	7.956E-08	7.952E-08	7.952E-08
A	5.0	1.03	4827.	0.	0.	1000.0	1000.0	1000.0	6.329E-08	6.326E-08	6.326E-08
A	6.0	.56	4827.	0.	0.	1000.0	1000.0	1000.0	5.294E-08	5.292E-08	5.292E-08
A	8.0	.36	4827.	0.	0.	1000.0	1000.0	1000.0	3.967E-08	3.965E-08	3.965E-08
A	13.0	.03	4827.	0.	0.	1000.0	1000.0	1000.0	2.443E-08	2.442E-08	2.442E-08
A	18.0	.03	4827.	0.	0.	1000.0	1000.0	1000.0	1.765E-08	1.764E-08	1.764E-08
B	.4	.13	4827.	0.	0.	725.4	859.0	725.4	1.203E-06	1.202E-06	1.202E-06
B	1.0	.40	4827.	0.	0.	725.4	859.0	725.4	5.079E-07	5.075E-07	5.075E-07
B	2.0	.66	4827.	0.	0.	725.4	859.0	725.4	2.512E-07	2.510E-07	2.510E-07
B	3.0	.73	4827.	0.	0.	725.4	859.0	725.4	1.693E-07	1.692E-07	1.692E-07
B	4.0	.33	4827.	0.	0.	725.4	859.0	725.4	1.277E-07	1.276E-07	1.276E-07
B	5.0	.27	4827.	0.	0.	725.4	859.0	725.4	1.016E-07	1.015E-07	1.015E-07
B	6.0	.10	4827.	0.	0.	725.4	859.0	725.4	8.496E-08	8.490E-08	8.490E-08
B	8.0	.13	4827.	0.	0.	725.4	859.0	725.4	6.366E-08	6.362E-08	6.362E-08
C	.4	.07	4827.	0.	0.	568.7	500.4	568.7	2.634E-06	2.629E-06	2.629E-06
C	1.0	.20	4827.	0.	0.	568.7	500.4	568.7	1.112E-06	1.110E-06	1.110E-06
C	2.0	.56	4827.	0.	0.	568.7	500.4	568.7	5.499E-07	5.490E-07	5.490E-07
C	3.0	.83	4827.	0.	0.	568.7	500.4	568.7	3.706E-07	3.700E-07	3.700E-07
C	4.0	.53	4827.	0.	0.	568.7	500.4	568.7	2.795E-07	2.791E-07	2.791E-07
C	5.0	.36	4827.	0.	0.	568.7	500.4	568.7	2.224E-07	2.220E-07	2.220E-07
C	6.0	.23	4827.	0.	0.	568.7	500.4	568.7	1.860E-07	1.857E-07	1.857E-07
C	8.0	.30	4827.	0.	0.	568.7	500.4	568.7	1.394E-07	1.392E-07	1.392E-07
C	10.0	.03	4827.	0.	0.	568.7	500.4	568.7	1.114E-07	1.113E-07	1.113E-07
C	13.0	.03	4827.	0.	0.	568.7	500.4	568.7	8.583E-08	8.569E-08	8.569E-08
D	.4	.32	4827.	0.	0.	221.3	158.9	221.3	2.131E-05	2.104E-05	2.104E-05
D	1.0	1.33	4827.	0.	0.	221.3	158.9	221.3	9.000E-06	8.885E-06	8.885E-06
D	2.0	4.24	4827.	0.	0.	221.3	158.9	221.3	4.450E-06	4.393E-06	4.393E-06
D	3.0	4.77	4827.	0.	0.	221.3	158.9	221.3	3.000E-06	2.962E-06	2.962E-06
D	4.0	4.27	4827.	0.	0.	221.3	158.9	221.3	2.262E-06	2.234E-06	2.234E-06
D	5.0	2.78	4827.	0.	0.	221.3	158.9	221.3	1.800E-06	1.777E-06	1.777E-06
D	6.0	1.56	4827.	0.	0.	221.3	158.9	221.3	1.506E-06	1.486E-06	1.486E-06
D	8.0	1.62	4827.	0.	0.	221.3	158.9	221.3	1.128E-06	1.114E-06	1.114E-06
D	10.0	.50	4827.	0.	0.	221.3	158.9	221.3	9.020E-07	8.904E-07	8.904E-07
D	13.0	.10	4827.	0.	0.	221.3	158.9	221.3	6.947E-07	6.858E-07	6.858E-07
D	18.0	.10	4827.	0.	0.	221.3	158.9	221.3	5.018E-07	4.954E-07	4.954E-07

ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-133	Cont'd on page B-134
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

E	.4	.47	4827.	0.	0.	428.5	35.6	428.5	4.920E-05	4.777E-05	4.777E-05
E	1.0	1.82	4827.	0.	0.	428.5	35.6	428.5	2.077E-05	2.017E-05	2.017E-05
E	2.0	7.09	4827.	0.	0.	428.5	35.6	428.5	1.027E-05	9.974E-06	9.974E-06
E	3.0	5.67	4827.	0.	0.	428.5	35.6	428.5	6.924E-06	6.723E-06	6.723E-06
E	4.0	4.34	4827.	0.	0.	428.5	35.6	428.5	5.222E-06	5.070E-06	5.070E-06
E	5.0	2.45	4827.	0.	0.	428.5	35.6	428.5	4.154E-06	4.034E-06	4.034E-06
E	6.0	1.13	4827.	0.	0.	428.5	35.6	428.5	3.475E-06	3.374E-06	3.374E-06
E	8.0	1.89	4827.	0.	0.	428.5	35.6	428.5	2.604E-06	2.528E-06	2.528E-06
E	10.0	.70	4827.	0.	0.	428.5	35.6	428.5	2.082E-06	2.021E-06	2.021E-06
E	13.0	.13	4827.	0.	0.	428.5	35.6	428.5	1.603E-06	1.557E-06	1.557E-06
F	.4	.75	4827.	0.	0.	696.0	11.2	696.0	9.625E-05	9.094E-05	9.094E-05
F	1.0	2.75	4827.	0.	0.	696.0	11.2	696.0	4.064E-05	3.839E-05	3.839E-05
F	2.0	7.02	4827.	0.	0.	696.0	11.2	696.0	2.010E-05	1.899E-05	1.899E-05
F	3.0	5.53	4827.	0.	0.	696.0	11.2	696.0	1.355E-05	1.280E-05	1.280E-05
F	4.0	1.86	4827.	0.	0.	696.0	11.2	696.0	1.022E-05	9.652E-06	9.652E-06
F	5.0	.76	4827.	0.	0.	696.0	11.2	696.0	8.128E-06	7.679E-06	7.679E-06
F	6.0	.13	4827.	0.	0.	696.0	11.2	696.0	6.799E-06	6.423E-06	6.423E-06
F	8.0	.13	4827.	0.	0.	696.0	11.2	696.0	5.094E-06	4.813E-06	4.813E-06
G	.4	1.40	4827.	0.	0.	1000.0	3.5	1000.0	2.136E-04	1.891E-04	1.891E-04
G	1.0	4.11	4827.	0.	0.	1000.0	3.5	1000.0	9.021E-05	7.984E-05	7.984E-05
G	2.0	8.35	4827.	0.	0.	1000.0	3.5	1000.0	4.461E-05	3.948E-05	3.948E-05
G	3.0	4.24	4827.	0.	0.	1000.0	3.5	1000.0	3.007E-05	2.661E-05	2.661E-05
G	4.0	1.06	4827.	0.	0.	1000.0	3.5	1000.0	2.268E-05	2.007E-05	2.007E-05
G	5.0	.03	4827.	0.	0.	1000.0	3.5	1000.0	1.804E-05	1.597E-05	1.597E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                       WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE            DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96 99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0 SSE SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:    C=    .5      A=  2861.      D=    70.0
 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   1.891E-04   9.094E-05   7.984E-05   4.777E-05   3.948E-05   3.839E-05   2.661E-05   2.104E-05   2.017E-05   2.007E-05
        1.402       2.157       6.265       6.738      15.088      17.839      22.080      22.404      24.226      25.287
       .13373      .20569      .59760      .64264     1.43910     1.70142     2.10597     2.13684     2.31067     2.41181
0   1.899E-05   1.597E-05   1.280E-05   9.974E-06   9.652E-06   8.885E-06   7.679E-06   6.723E-06   6.423E-06   5.070E-06
       32.312      32.345      37.878      44.970      46.825      48.151      48.913      54.579      54.712      59.053
      3.08185     3.08501     3.61282     4.28918     4.46617     4.59259     4.66529     5.20574     5.21838     5.63242
0   4.813E-06   4.393E-06   4.034E-06   3.374E-06   2.962E-06   2.629E-06   2.528E-06   2.234E-06   2.021E-06   1.777E-06
       59.185      63.427      65.879      67.006      71.777      71.846      73.735      78.010      78.705      81.489
      5.64506     6.04961     6.28349     6.39095     6.84607     6.85262     7.03278     7.44049     7.50686     7.77235
0   1.557E-06   1.486E-06   1.202E-06   1.114E-06   1.110E-06   8.904E-07   7.492E-07   6.858E-07   5.490E-07   5.075E-07
       81.621      83.179      83.310      84.934      85.132      85.629      85.884      85.983      86.546      86.944
      7.78499     7.93353     7.94603     8.10090     8.11986     8.16727     8.19153     8.20101     8.25474     8.29267
0   4.954E-07   3.700E-07   3.163E-07   2.791E-07   2.510E-07   2.220E-07   1.857E-07   1.692E-07   1.564E-07   1.392E-07
       87.044      87.872      88.767      89.297      89.960      90.324      90.556      91.285      94.102      94.400
      8.30215     8.38116     8.46650     8.51707     8.58028     8.61504     8.63717     8.70670     8.97535     9.00379
0   1.276E-07   1.113E-07   1.054E-07   1.015E-07   8.569E-08   8.490E-08   7.952E-08   6.362E-08   6.326E-08   5.292E-08
       94.731      94.764      96.554      96.819      96.852      96.951      97.846      97.979      99.006      99.569
      9.03540     9.03856     9.20923     9.23451     9.23767     9.24715     9.33249     9.34513     9.44311     9.49684
0   3.965E-08   2.442E-08   1.764E-08
       99.934      99.967     100.000
      9.53160     9.53476     9.53792
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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)=   .597
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=  1.700
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=  3.079
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=  4.463
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=  5.202
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=  6.280
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=  7.437
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=  7.769
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=  7.930
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(11)=  8.116

0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  16  1     -8.57322 -13.86655  -1.76259
  16  2     -9.43545 -14.10932  -1.85916
  16  3    -10.16758 -16.11916  -2.80711
  16  4    -10.87178 -18.31249  -3.98045
  16  5    -11.54831 -19.87894  -4.90224
  16  6    -11.90999 -20.75716  -5.44249
  16  7    -12.42081 -22.74505  -6.74031
  16  8    -13.01191 -27.24272  -9.85499
  16  9    -13.24063 -36.30701 -16.23465
  16 10    -13.41924 -46.30325 -23.32514
  16 11    -13.71102      NUMXQ(K)= 11
                                              BACK EXTRAPOLATION FOR  1 PERCENTILE.
      2.261E-04              .095            1.000
      1.240E-04              .286            3.000
      9.170E-05              .477            5.000
      5.826E-05              .954           10.000
      4.365E-05             1.431           15.000
      3.370E-05             1.908           20.000
      2.595E-05             2.384           25.000
      2.081E-05             2.861           30.000
      1.647E-05             3.338           35.000
      1.294E-05             3.815           40.000
      1.040E-05             4.292           45.000
      8.279E-06             4.769           50.000
      6.587E-06             5.246           55.000
      5.212E-06             5.723           60.000
      4.186E-06             6.200           65.000
      3.271E-06             6.677           70.000
      2.568E-06             7.153           75.000
      1.958E-06             7.630           80.000
      1.132E-06             8.107           85.000
0     8.910E-05             0.5              5.24
0ANNUAL AVERAGE =   2.55E-06
0K= 16     FIVEXQ(K)= 8.910E-05     FIVEPR(K)= 5.242
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE ALL SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.35	4827.	0.	0.	1000.0	1000.0	1000.0	7.495E-07	7.492E-07	7.492E-07
A	1.0	1.22	4827.	0.	0.	1000.0	1000.0	1000.0	3.165E-07	3.163E-07	3.163E-07
A	2.0	2.50	4827.	0.	0.	1000.0	1000.0	1000.0	1.565E-07	1.564E-07	1.564E-07
A	3.0	1.81	4827.	0.	0.	1000.0	1000.0	1000.0	1.055E-07	1.054E-07	1.054E-07
A	4.0	1.41	4827.	0.	0.	1000.0	1000.0	1000.0	7.956E-08	7.952E-08	7.952E-08
A	5.0	1.02	4827.	0.	0.	1000.0	1000.0	1000.0	6.329E-08	6.326E-08	6.326E-08
A	6.0	.58	4827.	0.	0.	1000.0	1000.0	1000.0	5.294E-08	5.292E-08	5.292E-08
A	8.0	.70	4827.	0.	0.	1000.0	1000.0	1000.0	3.967E-08	3.965E-08	3.965E-08
A	10.0	.21	4827.	0.	0.	1000.0	1000.0	1000.0	3.172E-08	3.170E-08	3.170E-08
A	13.0	.09	4827.	0.	0.	1000.0	1000.0	1000.0	2.443E-08	2.442E-08	2.442E-08
A	18.0	.01	4827.	0.	0.	1000.0	1000.0	1000.0	1.765E-08	1.764E-08	1.764E-08
B	.4	.09	4827.	0.	0.	725.4	859.0	725.4	1.203E-06	1.202E-06	1.202E-06
B	1.0	.28	4827.	0.	0.	725.4	859.0	725.4	5.079E-07	5.075E-07	5.075E-07
B	2.0	.63	4827.	0.	0.	725.4	859.0	725.4	2.512E-07	2.510E-07	2.510E-07
B	3.0	.67	4827.	0.	0.	725.4	859.0	725.4	1.693E-07	1.692E-07	1.692E-07
B	4.0	.57	4827.	0.	0.	725.4	859.0	725.4	1.277E-07	1.276E-07	1.276E-07
B	5.0	.42	4827.	0.	0.	725.4	859.0	725.4	1.016E-07	1.015E-07	1.015E-07
B	6.0	.23	4827.	0.	0.	725.4	859.0	725.4	8.496E-08	8.490E-08	8.490E-08
B	8.0	.31	4827.	0.	0.	725.4	859.0	725.4	6.366E-08	6.362E-08	6.362E-08
B	10.0	.09	4827.	0.	0.	725.4	859.0	725.4	5.090E-08	5.086E-08	5.086E-08
B	13.0	.07	4827.	0.	0.	725.4	859.0	725.4	3.920E-08	3.917E-08	3.917E-08
C	.4	.09	4827.	0.	0.	568.7	500.4	568.7	2.634E-06	2.629E-06	2.629E-06
C	1.0	.26	4827.	0.	0.	568.7	500.4	568.7	1.112E-06	1.110E-06	1.110E-06
C	2.0	.61	4827.	0.	0.	568.7	500.4	568.7	5.499E-07	5.490E-07	5.490E-07
C	3.0	.76	4827.	0.	0.	568.7	500.4	568.7	3.706E-07	3.700E-07	3.700E-07
C	4.0	.55	4827.	0.	0.	568.7	500.4	568.7	2.795E-07	2.791E-07	2.791E-07
C	5.0	.48	4827.	0.	0.	568.7	500.4	568.7	2.224E-07	2.220E-07	2.220E-07
C	6.0	.32	4827.	0.	0.	568.7	500.4	568.7	1.860E-07	1.857E-07	1.857E-07
C	8.0	.34	4827.	0.	0.	568.7	500.4	568.7	1.394E-07	1.392E-07	1.392E-07
C	10.0	.21	4827.	0.	0.	568.7	500.4	568.7	1.114E-07	1.113E-07	1.113E-07
C	13.0	.07	4827.	0.	0.	568.7	500.4	568.7	8.583E-08	8.569E-08	8.569E-08
D	.4	.36	4827.	0.	0.	221.3	158.9	221.3	2.131E-05	2.104E-05	2.104E-05
D	1.0	1.49	4827.	0.	0.	221.3	158.9	221.3	9.000E-06	8.885E-06	8.885E-06
D	2.0	3.58	4827.	0.	0.	221.3	158.9	221.3	4.450E-06	4.393E-06	4.393E-06
D	3.0	3.74	4827.	0.	0.	221.3	158.9	221.3	3.000E-06	2.962E-06	2.962E-06
D	4.0	3.31	4827.	0.	0.	221.3	158.9	221.3	2.262E-06	2.234E-06	2.234E-06
D	5.0	2.55	4827.	0.	0.	221.3	158.9	221.3	1.800E-06	1.777E-06	1.777E-06
D	6.0	1.73	4827.	0.	0.	221.3	158.9	221.3	1.506E-06	1.486E-06	1.486E-06
D	8.0	2.04	4827.	0.	0.	221.3	158.9	221.3	1.128E-06	1.114E-06	1.114E-06
D	10.0	1.03	4827.	0.	0.	221.3	158.9	221.3	9.020E-07	8.904E-07	8.904E-07
D	13.0	.45	4827.	0.	0.	221.3	158.9	221.3	6.947E-07	6.858E-07	6.858E-07
D	18.0	.08	4827.	0.	0.	221.3	158.9	221.3	5.018E 07	4.954E-07	4.954E-07
E	.4	.61	4827.	0.	0.	428.5	35.6	428.5	4.920E-05	4.777E-05	4.777E-05
E	1.0	2.34	4827.	0.	0.	428.5	35.6	428.5	2.077E-05	2.017E-05	2.017E-05
E	2.0	5.33	4827.	0.	0.	428.5	35.6	428.5	1.027E-05	9.974E-06	9.974E-06
E	3.0	5.02	4827.	0.	0.	428.5	35.6	428.5	6.924E-06	6.723E-06	6.723E-06
E	4.0	4.32	4827.	0.	0.	428.5	35.6	428.5	5.222E-06	5.070E-06	5.070E-06
E	5.0	3.44	4827.	0.	0.	428.5	35.6	428.5	4.154E-06	4.034E-06	4.034E-06
E	6.0	2.59	4827.	0.	0.	428.5	35.6	428.5	3.475E-06	3.374E-06	3.374E-06
E	8.0	2.81	4827.	0.	0.	428.5	35.6	428.5	2.604E-06	2.528E-06	2.528E-06
E	10.0	1.15	4827.	0.	0.	428.5	35.6	428.5	2.082E-06	2.021E-06	2.021E-06
E	13.0	.39	4827.	0.	0.	428.5	35.6	428.5	1.603E-06	1.557E-06	1.557E-06
E	18.0	.05	4827.	0.	0.	428.5	35.6	428.5	1.158E-06	1.125E-06	1.125E-06
F	.4	.76	4827.	0.	0.	696.0	11.2	696.0	9.625E-05	9.094E-05	9.094E-05
F	1.0	2.77	4827.	0.	0.	696.0	11.2	696.0	4.064E-05	3.839E-05	3.839E-05
F	2.0	5.95	4827.	0.	0.	696.0	11.2	696.0	2.010E-05	1.899E-05	1.899E-05
F	3.0	4.56	4827.	0.	0.	696.0	11.2	696.0	1.355E-05	1.280E-05	1.280E-05
F	4.0	3.20	4827.	0.	0.	696.0	11.2	696.0	1.022E-05	9.652E-06	9.652E-06
F	5.0	1.58	4827.	0.	0.	696.0	11.2	696.0	8.128E-06	7.679E-06	7.679E-06
F	6.0	.63	4827.	0.	0.	696.0	11.2	696.0	6.799E-06	6.423E-06	6.423E-06
F	8.0	.39	4827.	0.	0.	696.0	11.2	696.0	5.094E-06	4.813E-06	4.813E-06
F	10.0	.07	4827.	0.	0.	696.0	11.2	696.0	4.073E-06	3.848E-06	3.848E-06
F	13.0	.03	4827.	0.	0.	696.0	11.2	696.0	3.137E-06	2.964E-06	2.964E-06
G	.4	1.05	4827.	0.	0.	1000.0	3.5	1000.0	2.136E-04	1.891E-04	1.891E-04
G	1.0	3.07	4827.	0.	0.	1000.0	3.5	1000.0	9.021E-05	7.984E-05	7.984E-05
G	2.0	5.65	4827.	0.	0.	1000.0	3.5	1000.0	4.461E-05	3.948E-05	3.948E-05
G	3.0	3.12	4827.	0.	0.	1000.0	3.5	1000.0	3.007E-05	2.661E-05	2.661E-05
G	4.0	1.37	4827.	0.	0.	1000.0	3.5	1000.0	2.268E-05	2.007E-05	2.007E-05
G	5.0	.34	4827.	0.	0.	1000.0	3.5	1000.0	1.804E-05	1.597E-05	1.597E-05
G	6.0	.09	4827.	0.	0.	1000.0	3.5	1000.0	1.509E-05	1.336E-05	1.336E-05
G	8.0	.02	4827.	0.	0.	1000.0	3.5	1000.0	1.131E-05	1.001E-05	1.001E-05
G	10.0	.01	4827.	0.	0.	1000.0	3.5	1000.0	9.041E-06	8.002E-06	8.002E-06
G	13.0	.00	4827.	0.	0.	1000.0	3.5	1000.0	6.963E-06	6.163E-06	6.163E-06
G	18.0	.00	4827.	0.	0.	1000.0	3.5	1000.0	5.030E-06	4.452E-06	4.452E-06

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1USNRC COMPUTER CODE PAVAN, VERSION 2.0               RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:    CGS                                    METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                            WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE                 DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
 DIRECTION-INDEPENDENT (S.R.P 2.3.4) MODEL.
 MINIMUM BOUNDARY DISTANCE = 4827.0 METERS.
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED:    C=    .5      A=  2861.      D=    70.0
 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   1.891E-04   9.094E-05   7.984E-05   4.777E-05   3.948E-05   3.839E-05   2.661E-05   2.104E-05   2.017E-05   2.007E-05
        1.046       1.805       4.870       5.477      11.125      13.891      17.013      17.377      19.719      21.084
      1.04614     1.80468     4.87042     5.47724    11.12516    13.89064    17.01327    17.37674    19.71871    21.08407
0   1.899E-05   1.597E-05   1.336E-05   1.280E-05   1.001E-05   9.974E-06   9.652E-06   8.885E-06   8.002E-06   7.679E-06
       27.039      27.377      27.468      32.026      32.045      37.377      40.572      42.062      42.070      43.654
     27.03856    27.37674    27.46839    32.02592    32.04488    37.37674    40.57206    42.06068    42.07016    43.65360
0   6.723E-06   6.423E-06   6.163E-06   5.070E-06   4.813E-06   4.452E-06   4.393E-06   4.034E-06   3.848E-06   3.374E-06
       48.676      49.305      49.308      53.628      54.014      54.017      57.598      61.033      61.103      63.695
     48.67572    49.30468    49.30784    53.62832    54.01391    54.01707    57.59798    61.03351    61.10304    63.69469
0   2.964E-06   2.962E-06   2.629E-06   2.528E-06   2.234E-06   2.021E-06   1.777E-06   1.557E-06   1.486E-06   1.202E-06
       63.720      67.462      67.551      70.363      73.676      74.823      77.370      77.762      79.491      79.583
     63.71998    67.46207    67.55057    70.36346    73.67573    74.82301    77.37042    77.76233    79.49115    79.58281
0   1.125E-06   1.114E-06   1.110E-06   8.904E-07   7.492E-07   6.858E-07   5.490E-07   5.075E-07   4.954E-07   3.700E-07
       79.637      81.672      81.928      82.955      83.303      83.752      84.365      84.643      84.722      85.480
     79.63654    81.67194    81.92795    82.95513    83.30280    83.75159    84.36475    84.64288    84.72189    85.48042
0   3.163E-07   2.791E-07   2.510E-07   2.220E-07   1.857E-07   1.692E-07   1.564E-07   1.392E-07   1.276E-07   1.113E-07
       86.704      87.257      87.886      88.366      88.682      89.352      91.849      92.193      92.762      92.971
     86.70356    87.25666    87.88561    88.36602    88.63208    89.35211    91.84895    92.19345    92.76235    92.97095
0   1.054E-07   1.015E-07   8.569E-08   8.490E-08   7.952E-08   6.362E-08   6.326E-08   5.292E-08   5.086E-08   3.965E-08
       94.782      95.205      95.275      95.509      96.918      97.225      98.243      98.821      98.913      99.618
     94.78194    95.20546    95.27499    95.50887    96.91848    97.22505    98.24275    98.82114    98.91280    99.61760
    3.917E-08   3.170E-08   2.442E-08   1.764E-08
       99.687      99.899      99.994     100.000
     99.68713    99.89889    99.99371   100.00000
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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)=  13.890
                                                          BACK EXTRAPOLATION FOR  1 PERCENTILE.
      1.933E-04          1.000           1.000
      1.082E-04          3.000           3.000
      7.960E-05          5.000           5.000
      4.959E-05         10.000          10.000
      3.571E-05         15.000          15.000
      2.673E-05         20.000          20.000
      2.085E-05         25.000          25.000
      1.621E-05         30.000          30.000
      1.259E-05         35.000          35.000
      9.914E-06         40.000          40.000
      7.911E-06         45.000          45.000
      6.369E-06         50.000          50.000
      5.190E-06         55.000          55.000
      4.214E-06         60.000          60.000
      3.383E-06         65.000          65.000
      2.681E-06         70.000          70.000
      2.062E-06         75.000          75.000
      1.450E-06         80.000          80.000
      1.111E-06         85.000          85.000
      7.952E-07         90.000          90.000
0     7.960E-05          5.0             5.00
 OK= 17     FIVEXQ(K)= 7.960E-05     FIVEPR(K)= 5.000
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0            RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                 METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                        WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE             DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0FIVE PERCENT OVERALL SITE LIMIT
0DESERT SIGMA VALUES USED.  MEANDER IS INCLUDED IN THESE VALUES- RG 1.145 MEANDER FACTORS ARE NOT USED.
 BUILDING WAKE CREDIT ALLOWED;   C=   .5     A=  2861.     D=   70.0
 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   1.891E-04   9.094E-05   7.984E-05   4.777E-05   3.948E-05   3.839E-05   2.661E-05   2.104E-05   2.017E-05   2.007E-05
        1.046       1.805       4.870       5.477      11.125      13.891      17.013      17.377      19.719      21.084
      1.04614     1.80468     4.87042     5.47724    11.12516    13.89065    17.01328    17.37674    19.71871    21.08406
0   1.899E-05   1.597E-05   1.336E-05   1.280E-05   1.001E-05   9.974E-06   9.652E-06   8.885E-06   8.002E-06   7.679E-06
       27.039      27.377      27.468      32.026      32.045      37.377      40.572      42.061      42.070      43.654
     27.03856    27.37673    27.46839    32.02591    32.04487    37.37673    40.57205    42.06067    42.07016    43.65360
0   6.723E-06   6.423E-06   6.163E-06   5.070E-06   4.813E-06   4.452E-06   4.393E-06   4.034E-06   3.848E-06   3.374E-06
       48.676      49.305      49.308      53.628      54.014      54.017      57.598      61.033      61.103      63.695
     48.67572    49.30468    49.30784    53.62832    54.01390    54.01707    57.59798    61.03350    61.10304    63.69470
0   2.964E-06   2.962E-06   2.629E-06   2.528E-06   2.234E-06   2.021E-06   1.777E-06   1.557E-06   1.486E-06   1.202E-06
       63.720      67.462      67.551      70.363      73.676      74.823      77.370      77.762      79.491      79.583
     63.71999    67.46210    67.55061    70.36349    73.67577    74.82304    77.37045    77.76237    79.49120    79.58288
0   1.125E-06   1.114E-06   1.110E-06   8.904E-07   7.492E-07   6.858E-07   5.490E-07   5.075E-07   4.954E-07   3.700E-07
       79.637      81.672      81.928      82.955      83.303      83.752      84.365      84.643      84.722      85.480
     79.63661    81.67202    81.92805    82.95523    83.30287    83.75166    84.36481    84.64294    84.72198    85.48051
0   3.163E-07   2.791E-07   2.510E-07   2.220E-07   1.857E-07   1.692E-07   1.564E-07   1.392E-07   1.276E-07   1.113E-07
       86.704      87.257      87.886      88.366      88.682      89.352      91.849      92.194      92.762      92.971
     86.70366    87.25677    87.88571    88.36613    88.68219    89.35223    91.84906    92.19356    92.76248    92.97108
0   1.054E-07   1.015E-07   8.569E-08   8.490E-08   7.952E-08   6.362E-08   6.326E-08   5.292E-08   5.086E-08   3.965E-08
       94.782      95.206      95.275      95.509      96.919      97.225      98.243      98.821      98.913      99.618
     94.78208    95.20561    95.27515    95.50903    96.91864    97.22523    98.24293    98.82130    98.91296    99.61777
    3.917E-08   3.170E-08   2.442E-08   1.764E-08
       99.687      99.899      99.994     100.000
     99.68730    99.89906    99.99389   100.00020
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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)=  13.890
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  18  1     -8.57322 -11.58064  -1.30202
  18  2    -10.16758 -11.77999  -1.48571
  18  3    -10.87178 -11.98011  -1.81307
  18  4    -11.54831 -11.96838  -1.76382
  18  5    -11.90999 -11.96404  -1.63269
  18  6    -12.42081 -11.95272  -1.67316
  18  7    -13.01191 -11.78294  -1.94135
  18  8    -13.24063 -11.39187  -2.46218
  18  9    -13.41924 -12.29836  -1.36127
  18 10    -17.52805      NUMXQ(K)= 10
                                                               BACK EXTRAPOLATION FOR  1 PERCENTILE.
      1.933E-04            1.000            1.000
      1.082E-04            3.000            3.000
      7.960E-05            5.000            5.000
      4.959E-05           10.000           10.000
      3.571E-05           15.000           15.000
      2.673E-05           20.000           20.000
      2.085E-05           25.000           25.000
      1.621E-05           30.000           30.000
      1.259E-05           35.000           35.000
      9.914E-06           40.000           40.000
      7.911E-06           45.000           45.000
      6.369E-06           50.000           50.000
      5.190E-06           55.000           55.000
      4.214E-06           60.000           60.000
      3.383E-06           65.000           65.000
      2.681E-06           70.000           70.000
      2.062E-06           75.000           75.000
      1.450E-06           80.000           80.000
      1.112E-06           85.000           85.000
      7.964E-07           90.000           90.000
0     7.960E-05            5.0              5.00
0K= 18      FIVEXQ(K)= 7.960E-05     FIVEPR(K)= 5.000
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Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

Revision No. 0

0	K	HIGHPR	PR	GRNDVT(K)
	1	-2.61446	.44684	7.11613
	2	-1.73187	4.16481	5.59889
	3	-2.80200	.25394	3.79337
	4	-3.05637	.11203	1.66485
	5	-3.15711	.07968	1.20432
	6	-3.14873	.08200	1.52234
	7	-3.07734	.10443	4.75939
	8	-2.87001	.20523	10.15150
	9	-2.81942	.24056	12.08469
	10	-2.89262	.19103	8.67808
	11	-2.79603	.25868	5.83414
	12	-2.81087	.24705	4.17912
	13	-2.78119	.27080	4.74070
	14	-2.75996	.28905	8.25809
	15	-2.66780	.38176	10.87648
	16	-2.57624	.49942	9.53793

0	K	HOURS(K)	TOTHRS
	1	39.14354	39.14354
	2	364.83730	403.98080
	3	22.24511	426.22600
	4	9.81356	436.03950
	5	6.97992	443.01940
	6	7.18303	450.20250
	7	9.14836	459.35080
	8	17.97821	477.32900
	9	21.07291	498.40190
	10	16.73396	515.13590
	11	22.66021	537.79610
	12	21.64152	559.43770
	13	23.72224	583.15990
	14	25.32102	608.48100
	15	33.44181	641.92280
	16	43.74879	685.67160

O K	FIVEXQ	SVANN	SLTIME	TIMINT	I	TIME	XQT
1	8.345E 05	2.201E-06	-.4336	-9.0907			
					1	8.0	-9.99229
					2	16.0	-10.29282
					3	72.0	-10.94495
					4	624.0	-11.88124
2	7.963E-05	1.988E-06	-.4401	-9.1331			
					1	8.0	-10.04825
					2	16.0	-10.35331
					3	72.0	-11.01525
					4	624.0	-11.96563
3	5.518E-05	1.168E-06	-.4598	-9.4862			
					1	8.0	-10.44221
					2	16.0	-10.76088
					3	72.0	-11.45239
					4	624.0	-12.44522
4	2.179E-05	4.847E-07	-.4539	-10.4194			
					1	8.0	-11.36320
					2	16.0	-11.67780
					3	72.0	-12.36047
					4	624.0	-13.34061
5	7.977E-06	3.015E-07	-.3906	-11.4682			
					1	8.0	-12.28046
					2	16.0	-12.55123
					3	72.0	-13.13877
					4	624.0	-13.98234
6	8.940E-06	3.111E-07	-.4005	-11.3474			
					1	8.0	-12.18022
					2	16.0	-12.45783
					3	72.0	-13.06023
					4	624.0	-13.92512
7	2.941E-05	6.609E-07	-.4527	-10.1204			
					1	8.0	-11.06168
					2	16.0	-11.37543
					3	72.0	-12.05625
					4	624.0	-13.03375
8	5.223E-05	1.589E-06	-.4165	-9.5712			
					1	8.0	-10.43729
					2	16.0	-10.72598
					3	72.0	-11.35243
					4	624.0	-12.25185
9	5.781E-05	1.803E-06	-.4135	-9.4717			
					1	8.0	-10.33163
					2	16.0	-10.61827
					3	72.0	-11.24026
					4	624.0	-12.13329
10	5.005E-05	1.226E-06	-.4424	-9.5958			
					1	8.0	-10.51566
					2	16.0	-10.82228
					3	72.0	-11.48763
					4	624.0	-12.44290
11	5.495E-05	1.191E-06	-.4569	-9.4924			
					1	8.0	-10.44258
					2	16.0	-10.75930
					3	72.0	-11.44655
					4	624.0	-12.43328
12	5.044E-05	1.040E-06	-.4629	-9.5738			
					1	8.0	-10.53635
					2	16.0	-10.85719
					3	72.0	-11.55338
					4	624.0	-12.55294
13	5.658E-05	1.192E-06	-.4603	-9.4608			
					1	8.0	-10.41804
					2	16.0	-10.73711
					3	72.0	-11.42946
					4	624.0	-12.42351
14	6.265E-05	1.537E-06	-.4422	-9.3715			
					1	8.0	-10.29095
					2	16.0	-10.59743
					3	72.0	-11.26249
					4	624.0	-12.21735
15	7.621E-05	2.290E-06	-.4180	-9.1920			
					1	8.0	-10.06123
					2	16.0	-10.35098
					3	72.0	-10.97970
					4	624.0	-11.88240
16	8.910E-05	2.549E-06	-.4238	-9.0319			
					1	8.0	-9.91329
					2	16.0	-10.20708
					3	72.0	-10.84458
					4	624.0	-11.75987
17	7.960E-05	2.549E-06	-.4104	-9.1541			
					1	8.0	-10.00747
					2	16.0	-10.29193
					3	72.0	-10.90919
					4	624.0	-11.79542
18	7.960E-05	2.549E-06	-.4104	-9.1541			
					1	8.0	-10.00747
					2	16.0	-10.29193
					3	72.0	-10.90919
					4	624.0	-11.79542

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: 11/19/2003 TIME: 23: 4:56
/PLANT NAME: CGS METEOROLOGICAL INSTRUMENTATION
DATA PERIOD: JFD 1996-1999 WIND SENSORS HEIGHT: 10.0 METERS
TYPE OF RELEASE: GROUND LEVEL RELEASE DELTA-T HEIGHTS: 10 - 75 METERS
SOURCE OF DATA: MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
COMMENTS: input file: P96-99-F.inp output file: P96-99-F.out sigma=desert + P-G
PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0 RELATIVE CONCENTRATION (X/Q) VALUES (SEC/CUBIC METER) VERSUS AVERAGING TIME

DOWNWIND SECTOR	DISTANCE (METERS)	0-2 HOURS	0-8 HOURS	8-24 HOURS	1-4 DAYS	4-30 DAYS	ANNUAL AVERAGE	HOURS PER YEAR MAX 0-2 HR X/Q IS EXCEEDED IN SECTOR	DOWNWIND SECTOR
S	4827.	8.35E-05	4.58E-05	3.39E-05	1.76E-05	6.92E-06	2.20E-06	39.1	S
SSW	4827.	7.96E-05	4.33E-05	3.19E-05	1.64E-05	6.36E-06	1.99E-06	364.8	SSW
SW	4827.	5.52E-05	2.92E-05	2.12E-05	1.C6E-C5	3.94E-06	1.17E-C6	22.2	SW
WSW	4827.	2.18E-05	1.16E-05	8.48E-06	4.28E-06	1.61E-06	4.85E-07	9.8	WSW
W	4827.	7.98E-06	4.64E-06	3.54E-06	1.97E-06	8.46E-07	3.02E-07	7.0	W
WNW	4827.	8.94E-06	5.13E-06	3.89E-06	2.13E-06	8.96E-07	3.11E-07	7.2	WNW
NW	4827.	2.94E 05	1.57E-05	1.15E-05	5.81E-06	2.29E-06	6.61E-07	9.2	NW
NNW	4827.	5.22E-05	2.93E-05	2.20E-05	1.17E-05	4.78E-06	1.59E-06	18.0	NNW
N	4827.	5.78E-05	3.26E-05	2.45E-05	1.31E-05	5.38E-06	1.80E-06	21.1	N
NNE	4827.	5.01E-05	2.71E-05	1.99E-05	1.03E-05	3.95E-06	1.23E-06	16.7	NNE
NE	4827.	5.49E-05	2.92E-05	2.12E-05	1.07E-05	3.98E-06	1.19E-06	22.7	NE
ENE	4827.	5.04E-05	2.66E-05	1.93E-05	9.60E-06	3.53E-06	1.04E-06	21.6	ENE
E	4827.	5.66E-05	2.99E-05	2.17E-05	1.09E-05	4.02E-06	1.19E-06	23.7	E
ESE	4827.	6.26E-05	3.39E-05	2.50E-05	1.28E-05	4.94E-06	1.54E-06	25.3	ESE
SE	4827.	7.62E-05	4.27E-05	3.20E-05	1.70E-05	6.91E-06	2.29E-06	33.4	SE
SSE	4827.	8.91E-05	4.95E-05	3.69E-05	1.95E-05	7.81E-06	2.55E-06	43.7	SSE
MAX X/Q		8.91E-05				TOTAL HOURS AROUND SITE:		685.7	
SRP 2.3.4	4827.	7.96E-05	4.51E-05	3.39E-05	1.83E-05	7.54E-06	2.55E-06		
SITE LIMIT		7.96E-C5	4.51E-05	3.39E-05	1.83E-05	7.54E-06	2.55E-06		

0THE FIVE-PERCENT-FOR-THE-ENTIRE-SITE X/Q 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.

ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-144	Cont'd on page B-145
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE   S SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.40	1950.	0.	0.	342.4	1000.0	342.4	2.189E-06	2.186E-06	2.186E-06
A	1.0	1.42	1950.	0.	0.	342.4	1000.0	342.4	9.244E-07	9.231E-07	9.231E-07
A	2.0	3.24	1950.	0.	0.	342.4	1000.0	342.4	4.571E-07	4.565E-07	4.565E-07
A	3.0	2.66	1950.	0.	0.	342.4	1000.0	342.4	3.081E-07	3.077E-07	3.077E-07
A	4.0	2.35	1950.	0.	0.	342.4	1000.0	342.4	2.324E-07	2.321E-07	2.321E-07
A	5.0	1.60	1950.	0.	0.	342.4	1000.0	342.4	1.849E-07	1.846E-07	1.846E-07
A	6.0	.71	1950.	0.	0.	342.4	1000.0	342.4	1.546E-07	1.544E-07	1.544E-07
A	8.0	1.11	1950.	0.	0.	342.4	1000.0	342.4	1.159E-07	1.157E-07	1.157E-07
A	10.0	.04	1950.	0.	0.	342.4	1000.0	342.4	9.264E-08	9.252E-08	9.252E-08
B	.4	.10	1950.	0.	0.	257.5	227.3	257.5	1.281E-05	1.271E-05	1.271E-05
B	1.0	.31	1950.	0.	0.	257.5	227.3	257.5	5.407E-06	5.365E-06	5.365E-06
B	2.0	.89	1950.	0.	0.	257.5	227.3	257.5	2.674E-06	2.653E-06	2.653E-06
B	3.0	1.20	1950.	0.	0.	257.5	227.3	257.5	1.802E-06	1.788E-06	1.788E-06
B	4.0	.67	1950.	0.	0.	257.5	227.3	257.5	1.359E-06	1.349E-06	1.349E-06
B	5.0	.49	1950.	0.	0.	257.5	227.3	257.5	1.081E-06	1.073E-06	1.073E-06
B	6.0	.27	1950.	0.	0.	257.5	227.3	257.5	9.045E-07	8.975E-07	8.975E-07
B	8.0	.18	1950.	0.	0.	257.5	227.3	257.5	6.777E-07	6.725E-07	6.725E-07
B	10.0	.04	1950.	0.	0.	257.5	227.3	257.5	5.419E-07	5.377E-07	5.377E-07
C	.4	.09	1950.	0.	0.	195.5	112.3	195.5	3.414E-05	3.345E-05	3.345E-05
C	1.0	.27	1950.	0.	0.	195.5	112.3	195.5	1.442E-05	1.412E-05	1.412E-05
C	2.0	1.07	1950.	0.	0.	195.5	112.3	195.5	7.129E-06	6.984E-06	6.984E-06
C	3.0	1.11	1950.	0.	0.	195.5	112.3	195.5	4.805E-06	4.708E-06	4.708E-06
C	4.0	.76	1950.	0.	0.	195.5	112.3	195.5	3.624E-06	3.551E-06	3.551E-06
C	5.0	.71	1950.	0.	0.	195.5	112.3	195.5	2.883E-06	2.825E-06	2.825E-06
C	6.0	.31	1950.	0.	0.	195.5	112.3	195.5	2.412E-06	2.363E-06	2.363E-06
C	8.0	.31	1950.	0.	0.	195.5	112.3	195.5	1.807E-06	1.770E-06	1.770E-06
D	.4	.49	1950.	0.	0.	137.7	49.8	199.2	7.552E-05	1.025E-04	7.552E-05
D	1.0	2.00	1950.	0.	0.	137.7	49.8	199.2	3.189E-05	4.328E-05	3.189E-05
D	2.0	4.66	1950.	0.	0.	137.7	49.8	197.9	1.587E-05	2.140E-05	1.587E-05
D	3.0	5.91	1950.	0.	0.	137.7	49.8	171.1	1.238E-05	1.443E-05	1.238E-05
D	4.0	3.06	1950.	0.	0.	137.7	49.8	155.6	1.026E-05	1.088E-05	1.026E-05
D	5.0	2.71	1950.	0.	0.	137.7	49.8	144.9	8.768E-06	8.655E-06	8.655E-06
D	6.0	1.82	1950.	0.	0.	137.7	49.8	137.7	7.720E-06	7.239E-06	7.239E-06
D	8.0	.44	1950.	0.	0.	137.7	49.8	137.7	5.785E-06	5.424E-06	5.424E-06
D	10.0	.04	1950.	0.	0.	137.7	49.8	137.7	4.625E-06	4.337E-06	4.337E-06
D	13.0	.04	1950.	0.	0.	137.7	49.8	137.7	3.562E-06	3.340E-06	3.340E-06

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

Revision No. 0

E	.4	.52	1950.	0.	0.	97.9	33.8	185.5	1.194E-04	1.989E-04	1.194E-04
E	1.0	2.00	1950.	0.	0.	97.9	33.8	185.5	5.043E-05	8.399E-05	5.043E-05
E	2.0	5.20	1950.	0.	0.	97.9	33.8	183.3	2.523E-05	4.153E-05	2.523E-05
E	3.0	4.31	1950.	0.	0.	97.9	33.8	141.2	2.208E-05	2.800E-05	2.208E-05
E	4.0	2.27	1950.	0.	0.	97.9	33.8	119.8	1.963E-05	2.111E-05	1.963E-05
E	5.0	1.11	1950.	0.	0.	97.9	33.8	106.3	1.759E-05	1.680E-05	1.680E-05
E	6.0	.49	1950.	0.	0.	97.9	33.8	97.9	1.598E-05	1.405E-05	1.405E-05
E	8.0	.36	1950.	0.	0.	97.9	33.8	97.9	1.197E-05	1.053E-05	1.053E-05
E	10.0	.13	1950.	0.	0.	97.9	33.8	97.9	9.574E-06	8.417E-06	8.417E-06
E	13.0	.04	1950.	0.	0.	97.9	33.8	97.9	7.374E-06	6.483E-06	6.483E-06
F	.4	1.05	1950.	0.	0.	67.6	22.0	158.2	2.155E-04	3.862E-04	2.155E-04
F	1.0	3.82	1950.	0.	0.	67.6	22.0	158.2	9.099E-05	1.631E-04	9.099E-05
F	2.0	7.46	1950.	0.	0.	67.6	22.0	155.7	4.573E-05	8.064E-05	4.573E-05
F	3.0	4.31	1950.	0.	0.	67.6	22.0	109.3	4.391E-05	5.436E-05	4.391E-05
F	4.0	.58	1950.	0.	0.	67.6	22.0	87.7	4.125E-05	4.100E-05	4.100E-05
F	5.0	.09	1950.	0.	0.	67.6	22.0	75.1	3.834E-05	3.261E-05	3.261E-05
F	6.0	.13	1950.	0.	0.	67.6	22.0	67.6	3.564E-05	2.728E-05	2.728E-05
G	.4	1.59	1950.	0.	0.	46.6	14.3	150.9	3.478E-04	6.684E-04	3.478E-04
G	1.0	4.66	1950.	0.	0.	46.6	14.3	150.9	1.468E-04	2.822E-04	1.468E-04
G	2.0	12.08	1950.	0.	0.	46.6	14.3	147.5	7.429E-05	1.396E-04	7.429E-05
G	3.0	3.95	1950.	0.	0.	46.6	14.3	89.8	8.229E-05	9.408E-05	8.229E-05
G	4.0	.36	1950.	0.	0.	46.6	14.3	66.2	8.420E-05	7.095E-05	7.095E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0   S SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0LATERAL 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=   .5      A=  2861.      D=   70.0
 CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.
CBELOW 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   3.478E-04   2.155E-04   1.468E-04   1.194E-04   9.099E-05   8.229E-05   7.552E-05   7.429E-05   7.095E-05   5.043E-05
        1.591       2.639       7.302       7.820      11.640      15.593      16.081      28.161      28.517      30.515
       .11324      .18780      .51965      .55651      .82831     1.10960     1.14433     2.00400     2.02928     2.17151
0   4.573E-05   4.391E-05   4.100E-05   3.345E-05   3.261E-05   3.189E-05   2.728E-05   2.523E-05   2.208E-05   1.963E-05
       37.977      42.285      42.862      42.955      43.043      45.042      45.175      50.372      54.680      56.945
      2.70248     3.00906     3.05014     3.05670     3.06302     3.20525     3.21473     3.58451     3.89109     4.05228
0   1.680E-05   1.587E-05   1.412E-05   1.405E-05   1.271E-05   1.238E-05   1.053E-05   1.026E-05   8.655E-06   8.417E-06
       58.055      62.719      62.985      63.474      63.576      69.483      69.839      72.903      75.612      75.746
      4.13129     4.46315     4.48211     4.51688     4.52417     4.94452     4.96981     5.18788     5.38068     5.39016
0   7.239E-06   6.984E-06   6.483E-06   5.424E-06   5.365E-06   4.708E-06   4.337E-06   3.551E-06   3.340E-06   2.825E-06
       77.567      78.633      78.677      79.121      79.432      80.542      80.587      81.342      81.386      82.097
      5.51974     5.59560     5.59876     5.63036     5.65249     5.73150     5.73466     5.78839     5.79155     5.84212
0   2.653E-06   2.363E-06   2.186E-06   1.788E-06   1.770E-06   1.349E-06   1.073E-06   9.231E-07   8.975E-07   6.725E-07
       82.985      83.296      83.700      84.899      85.210      85.876      86.365      87.786      88.053      88.230
      5.90533     5.92745     5.95620     6.04154     6.06366     6.11107     6.14583     6.24697     6.26593     6.27858
0   5.377E-07   4.565E-07   3.077E-07   2.321E-07   1.846E-07   1.544E-07   1.157E-07   9.252E-08
       88.275      91.517      94.182      96.536      98.135      98.845      99.956     100.000
      6.28174     6.51246     6.70209     6.86960     6.98338     7.03395     7.11296     7.11613
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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)=  2.002
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 3)=  3.006
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 4)=  3.888
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 5)=  4.961
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 6)=  5.184
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 7)=  5.377
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 8)=  5.592
 HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 9)=  6.980
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   1  1      -7.96393 -12.67721  -1.54358
   1  2      -9.50758 -15.73073  -3.03071
   1  3     -10.03335 -21.17132  -5.92482
   1  4     -10.72076 -19.73659  -5.11142
   1  5     -11.29960 -24.52737  -8.01384
   1  6      11.48682 -26.99376  -9.52951
   1  7     -11.65737 -29.48782 -11.07924
   1  8     -11.87188 -63.13766 -32.24272
   1  9     -15.50492     NUMXQ(K)=  9
                                                BACK EXTRAPOLATION FOR  1 PERCENTILE.
      4.295E-04             .071          1.000
      2.572E-04             .213          3.000
      1.990E-04             .356          5.000
      1.374E-04             .712         10.000
      1.091E-04            1.067         15.000
      9.191E-05            1.423         20.000
      8.009E-05            1.779         25.000
      6.860E-05            2.135         30.000
      5.632E-05            2.491         35.000
      4.728E-05            2.846         40.000
      3.729E-05            3.202         45.000
      2.815E-05            3.558         50.000
      2.178E-05            3.914         55.000
      1.770E-05            4.270         60.000
      1.458E-05            4.625         65.000
      1.203E-05            4.981         70.000
      8.991E-06            5.337         75.000
      5.297E-06            5.693         80.000
      1.988E-06            6.049         85.000
      7.794E-07            6.405         90.000
0     1.665E-04            0.5           7.03
0ANNUAL AVERAGE =    3.82E-06
0K=  1    FIVEXQ(K)= 1.665E-04     FIVEPR(K)= 7.026
```

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp  output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE SSW SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.63	1950.	0.	0.	342.4	1000.0	342.4	2.189E-06	2.186E-06	2.186E-06
A	1.0	2.20	1950.	0.	0.	342.4	1000.0	342.4	9.244E-07	9.231E-07	9.231E-07
A	2.0	3.39	1950.	0.	0.	342.4	1000.0	342.4	4.571E-07	4.565E-07	4.565E-07
A	3.0	2.60	1950.	0.	0.	342.4	1000.0	342.4	3.081E-07	3.077E-07	3.077E-07
A	4.0	2.09	1950.	0.	0.	342.4	1000.0	342.4	2.324E-07	2.321E-07	2.321E-07
A	5.0	1.58	1950.	0.	0.	342.4	1000.0	342.4	1.849E-07	1.846E-07	1.846E-07
A	6.0	.51	1950.	0.	0.	342.4	1000.0	342.4	1.546E-07	1.544E-07	1.544E-07
A	8.0	1.02	1950.	0.	0.	342.4	1000.0	342.4	1.159E-07	1.157E-07	1.157E-07
A	10.0	.06	1950.	0.	0.	342.4	1000.0	342.4	9.264E 08	9.252E-08	9.252E-08
A	13.0	.11	1950.	0.	0.	342.4	1000.0	342.4	7.135E-08	7.125E-08	7.125E-08
B	.4	.15	1950.	0.	0.	257.5	227.3	257.5	1.281E-05	1.271E-05	1.271E-05
B	1.0	.45	1950.	0.	0.	257.5	227.3	257.5	5.407E-06	5.365E-06	5.365E-06
B	2.0	.73	1950.	0.	0.	257.5	227.3	257.5	2.674E-06	2.653E-06	2.653E-06
B	3.0	1.02	1950.	0.	0.	257.5	227.3	257.5	1.802E-06	1.788E-06	1.788E-06
B	4.0	1.02	1950.	0.	0.	257.5	227.3	257.5	1.359E-06	1.349E-06	1.349E-06
B	5.0	.56	1950.	0.	0.	257.5	227.3	257.5	1.081E-06	1.073E-06	1.073E-06
B	6.0	.11	1950.	0.	0.	257.5	227.3	257.5	9.045E-07	8.975E-07	8.975E-07
B	8.0	.11	1950.	0.	0.	257.5	227.3	257.5	6.777E-07	6.725E-07	6.725E-07
B	13.0	.11	1950.	0.	0.	257.5	227.3	257.5	4.173E-07	4.141E-07	4.141E-07
C	.4	.20	1950.	0.	0.	195.5	112.3	195.5	3.414E-05	3.345E-05	3.345E-05
C	1.0	.56	1950.	0.	0.	195.5	112.3	195.5	1.442E-05	1.412E-05	1.412E-05
C	2.0	1.07	1950.	0.	0.	195.5	112.3	195.5	7.129E-06	6.984E-06	6.984E-06
C	3.0	1.02	1950.	0.	0.	195.5	112.3	195.5	4.805E-06	4.708E-06	4.708E-06
C	4.0	.85	1950.	0.	0.	195.5	112.3	195.5	3.624E-06	3.551E-06	3.551E-06
C	5.0	.62	1950.	0.	0.	195.5	112.3	195.5	2.883E-06	2.825E-06	2.825E-06
C	6.0	.17	1950.	0.	0.	195.5	112.3	195.5	2.412E-06	2.363E-06	2.363E-06
C	8.0	.11	1950.	0.	0.	195.5	112.3	195.5	1.807E-06	1.770E-06	1.770E-06
C	10.0	.11	1950.	0.	0.	195.5	112.3	195.5	1.445E-06	1.415E-06	1.415E-06
D	.4	.44	1950.	0.	0.	137.7	49.8	199.2	7.552E-05	1.025E-04	7.552E-05
D	1.0	1.81	1950.	0.	0.	137.7	49.8	199.2	3.189E-05	4.328E-05	3.189E-05
D	2.0	3.84	1950.	0.	0.	137.7	49.8	197.9	1.587E-05	2.140E-05	1.587E-05
D	3.0	4.12	1950.	0.	0.	137.7	49.8	171.1	1.238E-05	1.443E-05	1.238E-05
D	4.0	3.33	1950.	0.	0.	137.7	49.8	155.6	1.026E-05	1.088E-05	1.026E-05
D	5.0	1.81	1950.	0.	0.	137.7	49.8	144.9	8.768E-06	8.655E-06	8.655E-06
D	6.0	.85	1950.	0.	0.	137.7	49.8	137.7	7.720E-06	7.239E-06	7.239E-06
D	8.0	.68	1950.	0.	0.	137.7	49.8	137.7	5.785E-06	5.424E-06	5.424E-06
D	10.0	.45	1950.	0.	0.	137.7	49.8	137.7	4.625E-06	4.337E-06	4.337E-06
D	13.0	.06	1950.	0.	0.	137.7	49.8	137.7	3.562E-06	3.340E-06	3.340E-06

E	.4	.51	1950.	0.	0.	97.9	33.8	185.5	1.194E-04	1.989E-04	1.194E-04
E	1.0	1.98	1950.	0.	0.	97.9	33.8	185.5	5.043E-05	8.399E-05	5.043E-05
E	2.0	5.19	1950.	0.	0.	97.9	33.8	183.3	2.523E-05	4.153E-05	2.523E-05
E	3.0	4.46	1950.	0.	0.	97.9	33.8	141.2	2.208E-05	2.800E-05	2.208E-05
E	4.0	1.86	1950.	0.	0.	97.9	33.8	119.8	1.963E-05	2.111E-05	1.963E-05
E	5.0	.56	1950.	0.	0.	97.9	33.8	106.3	1.759E-05	1.680E-05	1.680E-05
E	6.0	.23	1950.	0.	0.	97.9	33.8	97.9	1.598E-05	1.405E-05	1.405E-05
E	8.0	.73	1950.	0.	0.	97.9	33.8	97.9	1.197E-05	1.053E-05	1.053E-05
E	10.0	.73	1950.	0.	0.	97.9	33.8	97.9	9.574E-06	8.417E-06	8.417E-06
F	.4	.98	1950.	0.	0.	67.6	22.0	158.2	2.155E-04	3.862E-04	2.155E-04
F	1.0	3.56	1950.	0.	0.	67.6	22.0	158.2	9.099E-05	1.631E-04	9.099E-05
F	2.0	7.96	1950.	0.	0.	67.6	22.0	155.7	4.573E-05	8.064E-05	4.573E-05
F	3.0	3.67	1950.	0.	0.	67.6	22.0	109.3	4.391E-05	5.436E-05	4.391E-05
F	4.0	.45	1950.	0.	0.	67.6	22.0	87.7	4.125E-05	4.100E-05	4.100E-05
F	5.0	.06	1950.	0.	0.	67.6	22.0	75.1	3.834E-05	3.261E-05	3.261E-05
G	.4	1.98	1950.	0.	0.	46.6	14.3	150.9	3.478E-04	6.684E-04	3.478E-04
G	1.0	5.81	1950.	0.	0.	46.6	14.3	150.9	1.468E-04	2.822E-04	1.468E-04
G	2.0	14.06	1950.	0.	0.	46.6	14.3	147.5	7.429E-05	1.396E-04	7.429E-05
G	3.0	4.23	1950.	0.	0.	46.6	14.3	89.8	8.229E-05	9.408E-05	8.229E-05
G	4.0	.45	1950.	0.	0.	46.6	14.3	66.2	8.420E-05	7.095E-05	7.095E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE:  11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATONE JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99 F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0 SSW SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0LATERAL 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=   .5    A=  2861.    D=   70.0
 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   3.478E-04   2.155E-04   1.468E-04   1.194E-04   9.099E-05   8.229E-05   7.552E-05   7.429E-05   7.095E-05   5.043E-05
        1.984       2.960       8.774       9.286      12.842      17.076      17.517      31.573      32.024      34.000
       .11109      .16570      .49124      .51990      .71901      .95606      .98075     1.76773     1.79301     1.90363
0   4.573E-05   4.391E-05   4.100E-05   3.345E-05   3.261E-05   3.189E-05   2.523E-05   2.208E-05   1.963E-05   1.680E-05
       41.960      45.629      46.080      46.276      46.332      48.138      53.332      57.791      59.654      60.219
      2.34927     2.55471     2.57999     2.59092     2.59408     2.69522     2.98599     3.23567     3.33997     3.37158
0   1.587E-05   1.412E-05   1.405E-05   1.271E-05   1.238E-05   1.053E-05   1.026E-05   8.655E-06   8.417E-06   7.239E-06
       64.057      64.622      64.848      64.996      69.117      69.851      73.182      74.988      75.722      76.569
      3.58649     3.61810     3.63074     3.63907     3.86979     3.91088     4.09735     4.19849     4.23958     4.28699
0   6.984E-06   5.424E-06   5.365E-06   4.708E-06   4.337E-06   3.551E-06   3.340E-06   2.825E-06   2.653E-06   2.363E-06
       77.641      78.319      78.770      79.786      80.238      81.085      81.141      81.762      82.496      82.665
      4.34704     4.38496     4.41025     4.46714     4.49242     4.53983     4.54299     4.57776     4.61885     4.62833
0   2.186E-06   1.788E-06   1.770E-06   1.415E-06   1.349E-06   1.073E-06   9.231E-07   8.975E-07   6.725E-07   4.565E-07
       83.291      84.307      84.420      84.533      85.549      86.113      88.315      88.428      88.541      91.928
      4.66336     4.72025     4.72658     4.73290     4.78979     4.82139     4.94465     4.95097     4.95730     5.14693
0   4.141E-07   3.077E-07   2.321E-07   1.846E-07   1.544E-07   1.157E-07   9.252E-08   7.125E-08
       92.041      94.637      96.726      98.307      98.815      99.831      99.887     100.000
      5.15325     5.29864     5.41558     5.50407     5.53252     5.58941     5.59257     5.59889
```

Calculation No. NE-02-03-16

Prepared by / Date: Mohammed Abu-Shehadeh

Verified by/Date: Ted Messier

Revision No. 0

```
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)=   1.766
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   2.552
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   3.233
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   4.094
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   4.236
                                                  HANDCHECK GRAPH:  SLOPE LT  1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   4.344
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   4.464
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   2  1      -7.96393 -12.91155  -1.61730
   2  2      -9.50758 -16.71203  -3.42300
   2  3     -10.03335 -22.99545  -6.64342
   2  4     -10.72076 -23.85565  -7.10899
   2  5     -11.48682 -33.10474 -12.42491
   2  6     -11.68521 -39.00649 -15.84836
   2  7     -11.87188 -64.26140 -30.59885
   2  8     -12.26630      NUMXQ(K)=  8
                                                  BACK EXTRAPOLATION FOR  1 PERCENTILE.
      4.803E-04              .056            1.000
      2.836E-04              .168            3.000
      2.181E-04              .280            5.000
      1.494E-04              .560           10.000
      1.181E-04              .840           15.000
      9.928E-05             1.120           20.000
      8.636E-05             1.400           25.000
      7.681E-05             1.680           30.000
      6.431E-05             1.960           35.000
      5.318E-05             2.240           40.000
      4.481E-05             2.519           45.000
      3.376E-05             2.799           50.000
      2.556E-05             3.079           55.000
      1.959E-05             3.359           60.000
      1.514E-05             3.639           65.000
      1.189E-05             3.919           70.000
      8.901E-06             4.199           75.000
0     1.593E-04             0.5              8.93
0ANNUAL AVERAGE =    3.23E-06
0K=  2     FIVEXQ(K)= 1.593E-04     FIVEPR(K)= 8.930
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Cont'd on page B-153

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE  SW SECTOR.
```

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=1431.SQ.METERS	USED
A	.4	.71	1950.	0.	0.	342.4	1000.0	342.4	2.189E-06	2.186E-06	2.186E-06
A	1.0	2.50	1950.	0.	0.	342.4	1000.0	342.4	9.244E 07	9.231E-07	9.231E-07
A	2.0	4.25	1950.	0.	0.	342.4	1000.0	342.4	4.571E-07	4.565E-07	4.565E-07
A	3.0	3.42	1950.	0.	0.	342.4	1000.0	342.4	3.081E-07	3.077E-07	3.077E-07
A	4.0	1.58	1950.	0.	0.	342.4	1000.0	342.4	2.324E-07	2.321E-07	2.321E-07
A	5.0	.92	1950.	0.	0.	342.4	1000.0	342.4	1.849E-07	1.846E-07	1.846E-07
A	6.0	.42	1950.	0.	0.	342.4	1000.0	342.4	1.546E-07	1.544E-07	1.544E-07
A	8.0	.83	1950.	0.	0.	342.4	1000.0	342.4	1.159E-07	1.157E-07	1.157E-07
A	10.0	.17	1950.	0.	0.	342.4	1000.0	342.4	9.264E-08	9.252E-08	9.252E-08
B	.4	.03	1950.	0.	0.	257.5	227.3	257.5	1.281E-05	1.271E-05	1.271E-05
B	1.0	.08	1950.	0.	0.	257.5	227.3	257.5	5.407E-06	5.365E-06	5.365E-06
B	2.0	.92	1950.	0.	0.	257.5	227.3	257.5	2.674E-06	2.653E-06	2.653E-06
B	3.0	1.25	1950.	0.	0.	257.5	227.3	257.5	1.802E-06	1.788E-06	1.788E-06
B	4.0	.83	1950.	0.	0.	257.5	227.3	257.5	1.359E-06	1.349E-06	1.349E-06
B	5.0	.67	1950.	0.	0.	257.5	227.3	257.5	1.081E-06	1.073E-06	1.073E-06
B	6.0	.08	1950.	0.	0.	257.5	227.3	257.5	9.045E-07	8.975E-07	8.975E-07
B	8.0	.17	1950.	0.	0.	257.5	227.3	257.5	6.777E-07	6.725E-07	6.725E-07
C	.4	.23	1950.	0.	0.	195.5	112.3	195.5	3.414E-05	3.345E 05	3.345E 05
C	1.0	.67	1950.	0.	0.	195.5	112.3	195.5	1.442E-05	1.412E-05	1.412E-05
C	2.0	.92	1950.	0.	0.	195.5	112.3	195.5	7.129E-06	6.984E-06	6.984E-06
C	3.0	.92	1950.	0.	0.	195.5	112.3	195.5	4.805E-06	4.708E-06	4.708E-06
C	4.0	.25	1950.	0.	0.	195.5	112.3	195.5	3.624E-06	3.551E-06	3.551E-06
C	5.0	.42	1950.	0.	0.	195.5	112.3	195.5	2.883E-06	2.825E-06	2.825E-06
C	6.0	.25	1950.	0.	0.	195.5	112.3	195.5	2.412E-06	2.363E-06	2.363E-06
C	8.0	.17	1950.	0.	0.	195.5	112.3	195.5	1.807E-06	1.770E-06	1.770E-06
D	.4	.53	1950.	0.	0.	137.7	49.8	199.2	7.552E-05	1.025E-04	7.552E-05
D	1.0	2.17	1950.	0.	0.	137.7	49.8	199.2	3.189E-05	4.328E-05	3.189E-05
D	2.0	4.42	1950.	0.	0.	137.7	49.8	197.9	1.587E-05	2.140E-05	1.587E-05
D	3.0	4.50	1950.	0.	0.	137.7	49.8	171.1	1.238E-05	1.443E-05	1.238E-05
D	4.0	3.33	1950.	0.	0.	137.7	49.8	155.6	1.026E-05	1.088E-05	1.026E-05
D	5.0	2.83	1950.	0.	0.	137.7	49.8	144.9	8.768E-06	8.655E-06	8.655E-06
D	6.0	1.33	1950.	0.	0.	137.7	49.8	137.7	7.720E-06	7.239E-06	7.239E-06
D	8.0	.33	1950.	0.	0.	137.7	49.8	137.7	5.785E-06	5.424E-06	5.424E-06
D	10.0	.50	1950.	0.	0.	137.7	49.8	137.7	4.625E-06	4.337E 06	4.337E-06
D	13.0	.33	1950.	0.	0.	137.7	49.8	137.7	3.562E-06	3.340E-06	3.340E-06
D	18.0	.17	1950.	0.	0.	137.7	49.8	137.7	2.573E-06	2.413E-06	2.413E-06

E	.4	.50	1950.	0.	0.	97.9	33.8	185.5	1.194E-04	1.989E-04	1.194E-04
E	1.0	1.92	1950.	0.	0.	97.9	33.8	185.5	5.043E-05	8.399E-05	5.043E-05
E	2.0	5.25	1950.	0.	0.	97.9	33.8	183.3	2.523E-05	4.153E-05	2.523E-05
E	3.0	4.50	1950.	0.	0.	97.9	33.8	141.2	2.208E-05	2.800E-05	2.208E-05
E	4.0	3.83	1950.	0.	0.	97.9	33.8	119.8	1.963E-05	2.111E-05	1.963E-05
E	5.0	1.25	1950.	0.	0.	97.9	33.8	106.3	1.759E-05	1.680E-05	1.680E-05
E	6.0	.25	1950.	0.	0.	97.9	33.8	97.9	1.598E-05	1.405E-05	1.405E-05
E	8.0	.50	1950.	0.	0.	97.9	33.8	97.9	1.197E-05	1.053E-05	1.053E-05
E	10.0	.58	1950.	0.	0.	97.9	33.8	97.9	9.574E-06	8.417E-06	8.417E-06
E	13.0	.08	1950.	0.	0.	97.9	33.8	97.9	7.374E-06	6.483E-06	6.483E-06
F	.4	.98	1950.	0.	0.	67.6	22.0	158.2	2.155E-04	3.862E-04	2.155E-04
F	1.0	3.58	1950.	0.	0.	67.6	22.0	158.2	9.099E-05	1.631E-04	9.099E-05
F	2.0	5.83	1950.	0.	0.	67.6	22.0	155.7	4.573E-05	8.064E-05	4.573E-05
F	3.0	3.33	1950.	0.	0.	67.6	22.0	109.3	4.391E-05	5.436E-05	4.391E-05
F	4.0	1.83	1950.	0.	0.	67.6	22.0	87.7	4.125E-05	4.100E-05	4.100E-05
F	5.0	.25	1950.	0.	0.	67.6	22.0	75.1	3.834E-05	3.261E-05	3.261E-05
G	.4	1.79	1950.	0.	0.	46.6	14.3	150.9	3.478E-04	6.684E-04	3.478E-04
G	1.0	5.25	1950.	0.	0.	46.6	14.3	150.9	1.468E-04	2.822E-04	1.468E-04
G	2.0	8.83	1950.	0.	0.	46.6	14.3	147.5	7.429E-05	1.396E-04	7.429E-05
G	3.0	4.75	1950.	0.	0.	46.6	14.3	89.8	8.229E-05	9.408E-05	8.229E-05
G	4.0	1.58	1950.	0.	0.	46.6	14.3	66.2	8.420E-05	7.095E-05	7.095E-05
G	5.0	.25	1950.	0.	0.	46.6	14.3	53.6	8.270E-05	5.645E-05	5.645E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0           RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                       WIND SENSORS HEIGHT: 10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE            DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0  SW SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0LATERAL 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=   .5     A=  2861.     D=   70.0
 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   3.478E-04   2.155E-04   1.468E-04   1.194E-04   9.099E-05   8.229E-05   7.552E-05   7.429E-05   7.095E-05   5.645E-05
        1.791       2.774       8.023       8.519      12.102      16.851      17.380      26.212      27.795      28.045
       .06795      .10522      .30434      .32317      .45908      .63923      .65929      .99431     1.05436     1.06384
0   5.043E-05   4.573E-05   4.391E-05   4.100E-05   3.345E-05   3.261E-05   3.189E-05   2.523E-05   2.208E-05   1.963E-05
       29.961      35.793      39.126      40.959      41.189      41.439      43.606      48.855      53.354      57.187
      1.13654     1.35777     1.48420     1.55373     1.56247     1.57195     1.65413     1.85324     2.02391     2.16930
0   1.680E-05   1.587E-05   1.412E-05   1.405E-05   1.271E-05   1.238E-05   1.053E-05   1.026E-05   8.655E-06   8.417E-06
       58.436      62.852      63.519      63.769      63.796      68.295      68.795      72.128      74.961      75.544
      2.21670     2.38421     2.40950     2.41898     2.42002     2.59069     2.60966     2.73608     2.84354     2.86566
0   7.239E-06   6.984E-06   6.483E-06   5.424E-06   5.365E-06   4.708E-06   4.337E-06   3.551E-06   3.340E-06   2.825E-06
       76.877      77.794      77.877      78.210      78.293      79.210      79.710      79.960      80.293      80.710
      2.91623     2.95100     2.95416     2.96680     2.96996     3.00473     3.02369     3.03317     3.04581     3.06162
0   2.653E-06   2.413E-06   2.363E-06   2.186E-06   1.788E-06   1.770E-06   1.349E 06   1.073E-06   9.231E-07   8.975E-07
       81.626      81.793      82.043      82.753      84.003      84.170      85.003      85.669      88.169      88.252
      3.09638     3.10270     3.11218     3.13913     3.18654     3.19286     3.22447     3.24975     3.34457     3.34773
0   6.725E-07   4.565E-07   3.077E-07   2.321E-07   1.846E-07   1.544E-07   1.157E-07   9.252E-08
       88.419      92.668      96.084      97.667      98.584      99.000      99.833     100.000
      3.35405     3.51524     3.64482     3.70487     3.73964     3.75544     3.78705     3.79337
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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)=    .993
                                         HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   1.053
                                         HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   1.483
                                         HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   1.552
                                         HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   2.382
                                         HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   2.588
                                         HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   2.733
                                         HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   2.863
                                         HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   2.948
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   3  1      -7.96393 -13.61820  -1.76503
   3  2      -9.50758 -14.35369  -2.08084
   3  3      -9.55350 -17.93104  -3.63158
   3  4     -10.03335 -18.25548  -3.78077
   3  5     -10.10203 -21.73169  -5.39269
   3  6     -11.05090 -24.92677  -7.00588
   3  7     -11.29960 -26.73028  -7.93308
   3  8     -11.48682 -30.38708  -9.83617
   3  9     -11.68521 -39.26055 -14.50313
   3 10     -11.87188     NUMXQ(K)= 10
                                         BACK EXTRAPOLATION FOR  1 PERCENTILE.
      4.647E-04               .038            1.000
      2.661E-04               .114            3.000
      2.018E-04               .190            5.000
      1.357E-04               .379           10.000
      1.062E-04               .569           15.000
      8.858E-05               .759           20.000
      7.664E-05               .948           25.000
      6.386E-05              1.138           30.000
      5.147E-05              1.328           35.000
      4.248E-05              1.517           40.000
      3.345E-05              1.707           45.000
      2.655E-05              1.897           50.000
      2.148E-05              2.086           55.000
      1.765E-05              2.276           60.000
      1.436E-05              2.466           65.000
      1.138E-05              2.655           70.000
      8.683E-06              2.845           75.000
0     1.149E-04              0.5             13.18
0ANNUAL AVERAGE =   2.01E-06
0K=  3     FIVEXQ(K)= 1.149E-04      FIVEPR(K)=13.281
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Cont'd on page B-157


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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE WSW SECTOR.
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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=1431.SQ.METERS	USED
A	.4	1.24	1950.	0.	0.	342.4	1000.0	342.4	2.189E-06	2.186E-06	2.186E-06
A	1.0	4.37	1950.	0.	0.	342.4	1000.0	342.4	9.244E-07	9.231E-07	9.231E-07
A	2.0	6.83	1950.	0.	0.	342.4	1000.0	342.4	4.571E-07	4.565E 07	4.565E-07
A	3.0	2.09	1950.	0.	0.	342.4	1000.0	342.4	3.081E-07	3.077E-07	3.077E-07
A	4.0	1.33	1950.	0.	0.	342.4	1000.0	342.4	2.324E-07	2.321E-07	2.321E-07
A	5.0	.38	1950.	0.	0.	342.4	1000.0	342.4	1.849E-07	1.846E-07	1.846E-07
A	6.0	.19	1950.	0.	0.	342.4	1000.0	342.4	1.546E-07	1.544E-07	1.544E-07
B	.4	.31	1950.	0.	0.	257.5	227.3	257.5	1.281E-05	1.271E-05	1.271E-05
B	1.0	.95	1950.	0.	0.	257.5	227.3	257.5	5.407E-06	5.365E-06	5.365E-06
B	2.0	.76	1950.	0.	0.	257.5	227.3	257.5	2.674E-06	2.653E-06	2.653E-06
B	3.0	.76	1950.	0.	0.	257.5	227.3	257.5	1.802E-06	1.788E-06	1.788E-06
B	4.0	.38	1950.	0.	0.	257.5	227.3	257.5	1.359E-06	1.349E-06	1.349E-06
B	5.0	.19	1950.	0.	0.	257.5	227.3	257.5	1.081E-06	1.073E-06	1.073E-06
B	6.0	.19	1950.	0.	0.	257.5	227.3	257.5	9.045E-07	8.975E-07	8.975E-07
B	8.0	.57	1950.	0.	0.	257.5	227.3	257.5	6.777E-07	6.725E-07	6.725E-07
C	.4	.33	1950.	0.	0.	195.5	112.3	195.5	3.414E-05	3.345E-05	3.345E-05
C	1.0	.95	1950.	0.	0.	195.5	112.3	195.5	1.442E-05	1.412E-05	1.412E-05
C	2.0	.76	1950.	0.	0.	195.5	112.3	195.5	7.129E-06	6.984E-06	6.984E-06
C	3.0	1.71	1950.	0.	0.	195.5	112.3	195.5	4.805E-06	4.708E-06	4.708E-06
C	4.0	.19	1950.	0.	0.	195.5	112.3	195.5	3.624E-06	3.551E-06	3.551E-06
D	.4	1.07	1950.	0.	0.	137.7	49.8	199.2	7.552E-05	1.025E-04	7.552E-05
D	1.0	4.37	1950.	0.	0.	137.7	49.8	199.2	3.189E-05	4.328E-05	3.189E-05
D	2.0	6.26	1950.	0.	0.	137.7	49.8	197.9	1.587E-05	2.140E-05	1.587E-05
D	3.0	4.75	1950.	0.	0.	137.7	49.8	171.1	1.238E-05	1.443E-05	1.238E-05
D	4.0	3.61	1950.	0.	0.	137.7	49.8	155.6	1.026E-05	1.088E-05	1.026E-05
D	5.0	1.14	1950.	0.	0.	137.7	49.8	144.9	8.768E-06	8.655E-06	8.655E-06
D	8.0	.38	1950.	0.	0.	137.7	49.8	137.7	5.785E-06	5.424E-06	5.424E-06

ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-157	Cont'd on page B-158
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

E	.4	1.28	1950.	0.	0.	97.9	33.8	185.5	1.194E-04	1.989E-04	1.194E-04
E	1.0	4.94	1950.	0.	0.	97.9	33.8	185.5	5.043E-05	8.399E-05	5.043E-05
E	2.0	5.70	1950.	0.	0.	97.9	33.8	183.3	2.523E-05	4.153E-05	2.523E-05
E	3.0	5.13	1950.	0.	0.	97.9	33.8	141.2	2.208E-05	2.800E-05	2.208E-05
E	4.0	1.52	1950.	0.	0.	97.9	33.8	119.8	1.963E-05	2.111E-05	1.963E-05
E	5.0	1.71	1950.	0.	0.	97.9	33.8	106.3	1.759E-05	1.680E-05	1.680E-05
E	6.0	.95	1950.	0.	0.	97.9	33.8	97.9	1.598E-05	1.405E-05	1.405E-05
E	8.0	.19	1950.	0.	0.	97.9	33.8	97.9	1.197E-05	1.053E-05	1.053E-05
F	.4	.94	1950.	0.	0.	67.6	22.0	158.2	2.155E-04	3.862E-04	2.155E-04
F	1.0	3.42	1950.	0.	0.	67.6	22.0	158.2	9.099E-05	1.631E-04	9.099E-05
F	2.0	5.70	1950.	0.	0.	67.6	22.0	155.7	4.573E-05	8.064E-05	4.573E-05
F	3.0	3.04	1950.	0.	0.	67.6	22.0	109.3	4.391E-05	5.436E-05	4.391E-05
F	4.0	1.90	1950.	0.	0.	67.6	22.0	87.7	4.125E-05	4.100E-05	4.100E-05
F	5.0	.57	1950.	0.	0.	67.6	22.0	75.1	3.834E-05	3.261E-05	3.261E-05
G	.4	1.81	1950.	0.	0.	46.6	14.3	150.9	3.478E-04	6.684E-04	3.478E-04
G	1.0	5.32	1950.	0.	0.	46.6	14.3	150.9	1.468E-04	2.822E-04	1.468E-04
G	2.0	5.51	1950.	0.	0.	46.6	14.3	147.5	7.429E-05	1.396E-04	7.429E-05
G	3.0	2.66	1950.	0.	0.	46.6	14.3	89.8	8.229E-05	9.408E-05	8.229E-05
G	4.0	1.14	1950.	0.	0.	46.6	14.3	66.2	8.420E-05	7.095E-05	7.095E-05
G	5.0	.38	1950.	0.	0.	46.6	14.3	53.6	8.270E-05	5.645E-05	5.645E-05
G	6.0	.19	1950.	0.	0.	46.6	14.3	46.6	7.950E-05	4.721E-05	4.721E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0         RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                              METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JPD 1996-1999                     WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE          DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JPD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp  output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0 WSW SECTOR     BOUNDARY DISTANCE = 1950.0 METERS
0LATERAL 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=   .5     A=  2861.     D=   70.0
 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   3.478E-04   2.155E-04   1.468E-04   1.194E-04   9.099E-05   8.229E-05   7.552E-05   7.429E-05   7.095E-05   5.645E-05
        1.814       2.751       8.067       9.346      12.763      15.420      16.487      21.992      23.131      23.511
       .03020      .04580      .13430      .15559      .21248      .25673      .27448      .36613      .38510      .39142
0   5.043E-05   4.721E-05   4.573E-05   4.391E-05   4.100E-05   3.345E-05   3.261E-05   3.189E-05   2.523E-05   2.208E-05
       28.447      28.636      34.332      37.369      39.267      39.596      40.165      44.531      50.227      55.352
       .47359      .47675      .57157      .62214      .65374      .65921      .66869      .74138      .83620      .92153
0   1.963E-05   1.680E-05   1.587E-05   1.412E-05   1.405E-05   1.271E 05   1.238E-05   1.053E-05   1.026E-05   8.655E-06
       56.871      58.580      64.844      65.794      66.743      67.056      71.802      71.991      75.598      76.737
       .94682      .97526     1.07956     1.09536     1.11117     1.11637     1.19539     1.19855     1.25863     1.27756
0   6.984E-06   5.424E-06   5.365E-06   4.708E-06   3.551E-06   2.653E-06   2.186E-06   1.788E-06   1.349E-06   1.073E-06
       77.497      77.876      78.826      80.534      80.724      81.483      82.725      83.484      83.864      84.053
      1.29020     1.29653     1.31233     1.34077     1.34393     1.35658     1.37724     1.38988     1.39620     1.39936
0   9.231E-07   8.975E-07   6.725E-07   4.565E-07   3.077E-07   2.321E-07   1.846E-07   1.544E-07
       88.420      88.610      89.179      96.013      98.102      99.430      99.810     100.000
      1.47205     1.47522     1.48470     1.59848     1.63324     1.65537     1.66169     1.66485
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```
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)=    .134
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=    .366
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=    .385
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=    .621
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=    .653
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=    .920
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   1.078
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   1.194
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   1.257

0  K  I    XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   4  1       -7.96393 -14.87153  -2.01386
   4  2       -8.82616 -15.22473  -2.13152
   4  3       -9.50758 -16.78037  -2.71151
   4  4       -9.55350 -17.28087  -2.89930
   4  5      -10.03335 -19.78457  -3.90088
   4  6      -10.10203 -22.40215  -4.95544
   4  7      -10.72076 -23.83062  -5.56142
   4  8      -11.05090 -25.75231  -6.39769
   4  9      -11.29960 -32.60155  -9.42961
   4 10      -11.48682      NUMXQ(K)= 10
                                                      BACK EXTRAPOLATION FOR  1 PERCENTILE.
      4.784E-04              .017              1.000
      2.629E-04              .050              3.000
      1.957E-04              .083              5.000
      1.276E-04              .166             10.000
      9.708E-05              .250             15.000
      7.946E-05              .333             20.000
      6.576E-05              .416             25.000
      5.487E-05              .499             30.000
      4.695E-05              .583             35.000
      3.968E-05              .666             40.000
      3.217E-05              .749             45.000
      2.659E-05              .832             50.000
      2.234E-05              .916             55.000
      1.868E-05              .999             60.000
      1.578E-05             1.082             65.000
      1.317E-05             1.165             70.000
      1.057E-05             1.249             75.000
0     5.481E-05             0.5               30.03
0ANNUAL AVERAGE =    9.65E-07
0K=  4      FIVEXQ(K)= 5.481E-05     FIVEPR(K)=30.033
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Cont'd on page B-161


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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE   W SECTOR.
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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=1431.SQ.METERS	USED
A	.4	2.01	1950.	0.	0.	342.4	1000.0	342.4	2.189E-06	2.186E-06	2.186E-06
A	1.0	7.09	1950.	0.	0.	342.4	1000.0	342.4	9.244E-C7	9.231E-07	9.231E-07
A	2.0	7.87	1950.	0.	0.	342.4	1000.0	342.4	4.571E-07	4.565E-07	4.565E-07
A	3.0	2.62	1950.	0.	0.	342.4	1000.0	342.4	3.081E-07	3.077E-07	3.077E-07
A	4.0	1.31	1950.	0.	0.	342.4	1000.0	342.4	2.324E-07	2.321E-07	2.321E-07
A	5.0	1.05	1950.	0.	0.	342.4	1000.0	342.4	1.849E-07	1.846E 07	1.846E 07
B	.4	.61	1950.	0.	0.	257.5	227.3	257.5	1.281E-05	1.271E-05	1.271E-05
B	1.0	1.84	1950.	0.	0.	257.5	227.3	257.5	5.407E-C6	5.365E-06	5.365E-06
B	2.0	1.57	1950.	0.	0.	257.5	227.3	257.5	2.674E-06	2.653E-06	2.653E-C6
B	3.0	.79	1950.	0.	0.	257.5	227.3	257.5	1.802E-C6	1.788E-06	1.788E-06
B	4.0	.52	1950.	0.	0.	257.5	227.3	257.5	1.359E-06	1.349E-06	1.349E-06
C	.4	.27	1950.	0.	0.	195.5	112.3	195.5	3.414E-05	3.345E-05	3.345E-05
C	1.0	.79	1950.	0.	0.	195.5	112.3	195.5	1.442E-05	1.412E-05	1.412E-05
C	2.0	1.57	1950.	0.	0.	195.5	112.3	195.5	7.129E-06	6.984E-06	6.984E-06
C	3.0	1.84	1950.	0.	0.	195.5	112.3	195.5	4.805E-06	4.708E-06	4.708E-06
C	4.0	.52	1950.	0.	0.	195.5	112.3	195.5	3.624E-06	3.551E-06	3.551E-06
D	.4	1.03	1950.	0.	0.	137.7	49.8	199.2	7.552E-05	1.025E-04	7.552E-05
D	1.0	4.20	1950.	0.	0.	137.7	49.8	199.2	3.189E-05	4.328E-05	3.189E-05
D	2.0	9.71	1950.	0.	0.	137.7	49.8	197.9	1.587E-05	2.140E-05	1.587E-05
D	3.0	6.04	1950.	0.	0.	137.7	49.8	171.1	1.238E-05	1.443E-05	1.238E-05
D	4.0	4.72	1950.	0.	0.	137.7	49.8	155.6	1.026E-05	1.088E-05	1.026E-05
D	5.0	1.31	1950.	0.	0.	137.7	49.8	144.9	8.768E-06	8.655E-06	8.655E-06

E	.4	1.50	1950.	0.	0.	97.9	33.8	185.5	1.194E-04	1.989E-04	1.194E-04
E	1.0	5.77	1950.	0.	0.	97.9	33.8	185.5	5.043E-05	8.399E-05	5.043E-05
E	2.0	5.77	1950.	0.	0.	97.9	33.8	183.3	2.523E-05	4.153E-05	2.523E-05
E	3.0	4.99	1950.	0.	0.	97.9	33.8	141.2	2.208E-05	2.800E-05	2.208E-05
E	4.0	1.31	1950.	0.	0.	97.9	33.8	119.8	1.963E-05	2.111E-05	1.963E-05
E	8.0	.26	1950.	0.	0.	97.9	33.8	97.9	1.197E-05	1.053E-05	1.053E-05
F	.4	1.30	1950.	0.	0.	67.6	22.0	158.2	2.155E-04	3.862E-04	2.155E-04
F	1.0	4.72	1950.	0.	0.	67.6	22.0	158.2	9.099E-05	1.631E-04	9.099E-05
F	2.0	3.67	1950.	0.	0.	67.6	22.0	155.7	4.573E-05	8.064E-05	4.573E-05
F	3.0	2.10	1950.	0.	0.	67.6	22.0	109.3	4.391E-05	5.436E-05	4.391E-05
F	4.0	.52	1950.	0.	0.	67.6	22.0	87.7	4.125E-05	4.100E-05	4.100E-05
G	.4	1.70	1950.	0.	0.	46.6	14.3	150.9	3.478E-04	6.684E-04	3.478E-04
G	1.0	4.99	1950.	0.	0.	46.6	14.3	150.9	1.468E-04	2.822E-04	1.468E-04
G	2.0	1.57	1950.	0.	0.	46.6	14.3	147.5	7.429E-05	1.396E-04	7.429E-05
G	3.0	.26	1950.	0.	0.	46.6	14.3	89.8	8.229E-05	9.408E-05	8.229E-05
G	4.0	.26	1950.	0.	0.	46.6	14.3	66.2	8.420E-05	7.095E-05	7.095E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0   W SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0LATERAL 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=   .5     A=  2861.     D=   70.0
 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   3.478E-04   2.155E-04   1.468E-04   1.194E-04   9.099E-05   8.229E-05   7.552E-05   7.429E-05   7.095E-05   5.043E-05
        1.702       2.997       7.983       9.479      14.203      14.466      15.491      17.066      17.328      23.102
       .02049      .03610      .09615      .11416      .17105      .17421      .18656      .20552      .20868      .27822
0   4.573E-05   4.391E-05   4.100E-05   3.345E-05   3.189E-05   2.523E-05   2.208E-05   1.963E-05   1.587E-05   1.412E-05
       26.776      28.875      29.400      29.672      33.871      39.645      44.631      45.943      55.653      56.441
       .32246      .34775      .35407      .35735      .40792      .47745      .53750      .55330      .67024      .67972
0   1.271E-05   1.238E-05   1.053E-05   1.026E-05   8.655E-06   6.984E-06   5.365E-06   4.708E-06   3.551E-06   2.653E-06
       57.046      63.082      63.344      68.068      69.381      70.955      72.792      74.629      75.154      76.729
       .68701      .75971      .76287      .81976      .83556      .85452      .87665      .89877      .90509      .92406
0   2.186E-06   1.788E-06   1.349E-06   9.231E-07   4.565E-07   3.077E-07   2.321E-07   1.846E-07
       78.743      79.530      80.055      87.141      95.014      97.638      98.950     100.000
       .94831      .95779      .96411     1.04945     1.14427     1.17587     1.19168     1.20432
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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)=   .096
                                                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   .171
                                                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   .347
                                                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   .669
                                                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   .759
                                                    HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   .819
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   5  1      -7.96393 -15.02260  -1.99745
   5  2      -8.82616 -17.32492  -2.73962
   5  3      -9.30480 -18.65569  -3.19420
   5  4     -10.03335 -22.18037  -4.49994
   5  5      11.05090 -24.68784  -5.51377
   5  6     -11.29960 -27.70098  -6.75469
   5  7     -11.48682      NUMXQ(K)=  7
                                                    BACK EXTRAPOLATION FOR  1 PERCENTILE.
    4.582E-04              .012             1.000
    2.563E-04              .036             3.000
    1.926E-04              .060             5.000
    1.221E-04              .120            10.000
    8.617E-05              .181            15.000
    6.442E-05              .241            20.000
    5.112E-05              .301            25.000
    4.146E-05              .361            30.000
    3.283E-05              .422            35.000
    2.673E-05              .482            40.000
    2.225E-05              .542            45.000
    1.884E-05              .602            50.000
    1.618E-05              .662            55.000
    1.368E-05              .723            60.000
    1.150E-05              .783            65.000
    2.523E-05              0.5              41.52
0ANNUAL AVERAGE =   6.80E-07
0K=  5     FIVEXQ(K)= 2.523E-05     FIVEPR(K)=41.517
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE CF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE WNW SECTOR.
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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=1431.SQ.METERS	USED
A	.4	1.48	1950.	0.	0.	342.4	1000.0	342.4	2.189E-06	2.186E-06	2.186E-06
A	1.0	5.19	1950.	0.	0.	342.4	1000.0	342.4	9.244E-07	9.231E-07	9.231E-07
A	2.0	8.10	1950.	0.	0.	342.4	1000.0	342.4	4.571E-07	4.565E-07	4.565E-07
A	3.0	6.23	1950.	0.	0.	342.4	1000.0	342.4	3.081E-07	3.077E-07	3.077E-07
A	4.0	1.87	1950.	0.	0.	342.4	1000.0	342.4	2.324E-07	2.321E-07	2.321E-07
A	5.0	.83	1950.	0.	0.	342.4	1000.0	342.4	1.849E-07	1.846E-07	1.846E-07
A	6.0	.21	1950.	0.	0.	342.4	1000.0	342.4	1.546E-07	1.544E-07	1.544E-07
B	.4	.34	1950.	0.	0.	257.5	227.3	257.5	1.281E-05	1.271E-05	1.271E-05
B	1.0	1.04	1950.	0.	0.	257.5	227.3	257.5	5.407E-06	5.365E-06	5.365E-06
B	2.0	2.28	1950.	0.	0.	257.5	227.3	257.5	2.674E-06	2.653E-06	2.653E-06
B	3.0	1.04	1950.	0.	0.	257.5	227.3	257.5	1.802E-06	1.788E-06	1.788E-06
B	4.0	1.45	1950.	0.	0.	257.5	227.3	257.5	1.359E-06	1.349E-06	1.349E-06
B	5.0	.42	1950.	0.	0.	257.5	227.3	257.5	1.081E-06	1.073E-06	1.073E-06
C	.4	.29	1950.	0.	0.	195.5	112.3	195.5	3.414E-05	3.345E-05	3.345E-05
C	1.0	.83	1950.	0.	0.	195.5	112.3	195.5	1.442E-05	1.412E-05	1.412E-05
C	2.0	.62	1950.	0.	0.	195.5	112.3	195.5	7.129E-06	6.984E-06	6.984E-06
C	3.0	.21	1950.	0.	0.	195.5	112.3	195.5	4.805E-06	4.708E-06	4.708E-06
C	4.0	.83	1950.	0.	0.	195.5	112.3	195.5	3.624E-06	3.551E-06	3.551E-06
C	5.0	.42	1950.	0.	0.	195.5	112.3	195.5	2.883E-06	2.825E-06	2.825E-06
D	.4	.66	1950.	0.	0.	137.7	49.8	199.2	7.552E-05	1.025E-04	7.552E-05
D	1.0	2.70	1950.	0.	0.	137.7	49.8	199.2	3.189E-05	4.328E-05	3.189E-05
D	2.0	6.64	1950.	0.	0.	137.7	49.8	197.9	1.587E-05	2.140E-05	1.587E 05
D	3.0	6.02	1950.	0.	0.	137.7	49.8	171.1	1.238E-05	1.443E-05	1.238E-05
D	4.0	5.40	1950.	0.	0.	137.7	49.8	155.6	1.026E-05	1.088E-05	1.026E-05
D	5.0	1.45	1950.	0.	0.	137.7	49.8	144.9	8.768E-06	8.655E-06	8.655E-06
D	6.0	1.04	1950.	0.	0.	137.7	49.8	137.7	7.720E-06	7.239E-06	7.239E-06
D	8.0	.21	1950.	0.	0.	137.7	49.8	137.7	5.785E-06	5.424E-06	5.424E-06

Cont'd on page B-166

E	.4	.86	1950.	0.	0.	97.9	33.8	185.5	1.194E-04	1.989E-04	1.194E-04
E	1.0	3.32	1950.	0.	0.	97.9	33.8	185.5	5.043E-05	8.399E-05	5.043E-05
E	2.0	6.44	1950.	0.	0.	97.9	33.8	183.3	2.523E-05	4.153E-05	2.523E-05
E	3.0	4.15	1950.	0.	0.	97.9	33.8	141.2	2.208E-05	2.800E-05	2.208E-05
E	4.0	5.19	1950.	0.	0.	97.9	33.8	119.8	1.963E-05	2.111E-05	1.963E-05
E	5.0	2.49	1950.	0.	0.	97.9	33.8	106.3	1.759E-05	1.680E-05	1.680E-05
E	6.0	.42	1950.	0.	0.	97.9	33.8	97.9	1.598E-05	1.405E-05	1.405E-05
F	.4	.91	1950.	0.	0.	67.6	22.0	158.2	2.155E-04	3.862E-04	2.155E-04
F	1.0	3.32	1950.	0.	0.	67.6	22.0	158.2	9.099E-05	1.631E-04	9.099E-05
F	2.0	4.98	1950.	0.	0.	67.6	22.0	155.7	4.573E-05	8.064E-05	4.573E-05
F	3.0	2.08	1950.	0.	0.	67.6	22.0	109.3	4.391E-05	5.436E-05	4.391E-05
F	4.0	.83	1950.	0.	0.	67.6	22.0	87.7	4.125E-05	4.100E-05	4.100E-05
F	5.0	.42	1950.	0.	0.	67.6	22.0	75.1	3.834E-05	3.261E-05	3.261E-05
G	.4	1.42	1950.	0.	0.	46.6	14.3	150.9	3.478E-04	6.684E-04	3.478E-04
G	1.0	4.15	1950.	0.	0.	46.6	14.3	150.9	1.468E-04	2.822E-04	1.468E-04
G	2.0	1.25	1950.	0.	0.	46.6	14.3	147.5	7.429E-05	1.396E-04	7.429E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003    TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:   10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp  output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0 WNW SECTOR     BOUNDARY DISTANCE = 1950.0 METERS
0LATERAL 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=   .5     A= 2861.     D=   70.0
 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   3.478E-04   2.155E-04   1.468E-04   1.194E-04   9.099E-05   7.552E-05   7.429E-05   5.043E-05   4.573E-05   4.391E-05
        1.417       2.328       6.480       7.341      10.663      11.322      12.567      15.889      20.872      22.948
       .02157      .03544      .09865      .11175      .16232      .17236      .19132      .24189      .31774      .34935
0   4.100E-05   3.345E-05   3.261E-05   3.189E-05   2.523E-05   2.208E 05   1.963E-05   1.680E-05   1.587E-05   1.412E-05
       23.778      24.065      24.481      27.180      33.626      37.768      42.958      45.449      52.093      52.923
       .36199      .36636      .37268      .41377      .51174      .57496      .65397      .69190      .79303      .80568
0   1.405E-05   1.271E-05   1.238E-05   1.026E-05   8.655E-06   7.239E-06   6.984E-06   5.424E-06   5.365E-06   4.708E-06
       53.339      53.681      59.701      65.099      66.553      67.591      68.213      68.421      69.459      69.667
       .81200      .81720      .90886      .99104     1.01316     1.02896     1.03844     1.04160     1.05741     1.06057
0   3.551E-06   2.825E-06   2.653E-06   2.186E-06   1.788E-06   1.349E-06   1.073E-06   9.231E-07   4.565E-07   1.077E-07
       70.497      70.912      73.196      74.671      75.709      77.163      77.578      82.768      90.865      97.093
      1.07321     1.07953     1.11430     1.13676     1.15256     1.17468     1.18100     1.26002     1.38328     1.47810
0   2.321E-07   1.846E-07   1.544E-07
       98.962      99.792     100.000
      1.50654     1.51918     1.52234
```

```
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)=    .099
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=    .349
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=    .792
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=    .908
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=    .990
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   6  1      -7.96393 -15.09386  -2.02540
   6  2      -8.82616 -18.24312  -3.04308
   6  3     -10.03335 -19.65499  -3.56641
   6  4     -11.05090 -23.02378  -4.96278
   6  5     -11.29960 -25.00951  -5.80333
   6  6     -11.48682     NUMXQ(K)=  6
                                                  BACK EXTRAPOLATION FOR  1 PERCENTILE.
      4.185E-04             .015            1.000
      2.300E-04             .046            3.000
      1.713E-04             .076            5.000
      9.855E-05             .152           10.000
      6.695E-05             .228           15.000
      5.042E-05             .304           20.000
      3.965E-05             .381           25.000
      3.180E-05             .457           30.000
      2.631E-05             .533           35.000
      2.226E-05             .609           40.000
      1.917E-05             .685           45.000
      1.674E-05             .761           50.000
      1.438E-05             .837           55.000
      1.225E-05             .913           60.000
      1.030E-05             .990           65.000
      2.846E-05             0.5            32.84
 NNUAL AVERAGE =    6.872E-07
 .=  6      FIVEXQ(K)= 2.846E-05      FIVEPR(K)=32.844
```

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: 11/19/2003 TIME: 23: 4:56
/PLANT NAME: CGS METEOROLOGICAL INSTRUMENTATION
DATA PERIOD: JFD 1996-1999 WIND SENSORS HEIGHT: 10.0 METERS
TYPE OF RELEASE: GROUND LEVEL RELEASE DELTA-T HEIGHTS: 10 - 75 METERS
SOURCE OF DATA: MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
COMMENTS: input file: P96-99-F.inp output file: P96-99-F.out sigma-desert + P-G
PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE NW SECTOR.

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=1431.SQ.METERS	USED
A	.4	.53	1950.	0.	0.	342.4	1000.0	342.4	2.189E-06	2.186E-06	2.186E-06
A	1.0	1.86	1950.	0.	0.	342.4	1000.0	342.4	9.244E-07	9.231E-07	9.231E-07
A	2.0	5.18	1950.	0.	0.	342.4	1000.0	342.4	4.571E-07	4.565E-07	4.565E-07
A	3.0	3.32	1950.	0.	0.	342.4	1000.0	342.4	3.081E-07	3.077E-07	3.077E-07
A	4.0	2.92	1950.	0.	0.	342.4	1000.0	342.4	2.324E-07	2.321E-07	2.321E-07
A	5.0	1.46	1950.	0.	0.	342.4	1000.0	342.4	1.849E-07	1.846E-07	1.846E-07
A	6.0	.40	1950.	0.	0.	342.4	1000.0	342.4	1.546E-07	1.544E-07	1.544E-07
A	8.0	.07	1950.	0.	0.	342.4	1000.0	342.4	1.159E-07	1.157E-07	1.157E-07
B	.4	.13	1950.	0.	0.	257.5	227.3	257.5	1.281E-05	1.271E-05	1.271E-05
B	1.0	.40	1950.	0.	0.	257.5	227.3	257.5	5.407E-06	5.365E-06	5.365E-06
B	2.0	.80	1950.	0.	0.	257.5	227.3	257.5	2.674E-06	2.653E-06	2.653E-06
B	3.0	1.33	1950.	0.	0.	257.5	227.3	257.5	1.802E-06	1.788E-06	1.788E-06
B	4.0	.80	1950.	0.	0.	257.5	227.3	257.5	1.359E-06	1.349E-06	1.349E-06
B	5.0	.20	1950.	0.	0.	257.5	227.3	257.5	1.081E-06	1.073E-06	1.073E-06
B	6.0	.13	1950.	0.	0.	257.5	227.3	257.5	9.045E-07	8.975E-07	8.975E-07
B	8.0	.20	1950.	0.	0.	257.5	227.3	257.5	6.777E-07	6.725E-07	6.725E-07
C	.4	.11	1950.	0.	0.	195.5	112.3	195.5	3.414E-05	3.345E-05	3.345E-05
C	1.0	.33	1950.	0.	0.	195.5	112.3	195.5	1.442E-05	1.412E-05	1.412E-05
C	2.0	.53	1950.	0.	0.	195.5	112.3	195.5	7.129E-06	6.984E-06	6.984E-06
C	3.0	1.33	1950.	0.	0.	195.5	112.3	195.5	4.805E-06	4.708E-06	4.708E-06
C	4.0	.73	1950.	0.	0.	195.5	112.3	195.5	3.624E-06	3.551E-06	3.551E-06
C	5.0	.46	1950.	0.	0.	195.5	112.3	195.5	2.883E-06	2.825E-06	2.825E-06
C	6.0	.07	1950.	0.	0.	195.5	112.3	195.5	2.412E-06	2.363E-06	2.363E-06
C	8.0	.33	1950.	0.	0.	195.5	112.3	195.5	1.807E-06	1.770E-06	1.770E-06
D	.4	.44	1950.	0.	0.	137.7	49.8	199.2	7.552E-05	1.025E-04	7.552E-05
D	1.0	1.79	1950.	0.	0.	137.7	49.8	199.2	3.189E-05	4.328E-05	3.189E-05
D	2.0	4.32	1950.	0.	0.	137.7	49.8	197.9	1.587E-05	2.140E-05	1.587E-05
D	3.0	4.05	1950.	0.	0.	137.7	49.8	171.1	1.238E-05	1.443E-05	1.238E-05
D	4.0	4.58	1950.	0.	0.	137.7	49.8	155.6	1.026E-05	1.088E-05	1.026E-05
D	5.0	2.79	1950.	0.	0.	137.7	49.8	144.9	8.768E-06	8.655E-06	8.655E-06
D	6.0	1.06	1950.	0.	0.	137.7	49.8	137.7	7.720E-06	7.239E-06	7.239E-06
D	8.0	.27	1950.	0.	0.	137.7	49.8	137.7	5.785E-06	5.424E-06	5.424E-06
D	10.0	.07	1950.	0.	0.	137.7	49.8	137.7	4.625E-06	4.337E-06	4.337E-06

E	.4	.52	1950.	0.	0.	97.9	33.8	185.5	1.194E-04	1.989E-04	1.194E-04
E	1.0	1.99	1950.	0.	0.	97.9	33.8	185.5	5.043E-05	8.399E-05	5.043E-05
E	2.0	5.18	1950.	0.	0.	97.9	33.8	183.3	2.523E-05	4.153E-05	2.523E-05
E	3.0	6.04	1950.	0.	0.	97.9	33.8	141.2	2.208E-05	2.800E-05	2.208E-05
E	4.0	7.30	1950.	0.	0.	97.9	33.8	119.8	1.963E-05	2.111E-05	1.963E-05
E	5.0	5.18	1950.	0.	0.	97.9	33.8	106.3	1.759E-05	1.680E-05	1.680E-05
E	6.0	2.13	1950.	0.	0.	97.9	33.8	97.9	1.598E-05	1.405E-05	1.405E-05
E	8.0	1.46	1950.	0.	0.	97.9	33.8	97.9	1.197E-05	1.053E-05	1.053E-05
E	10.0	.07	1950.	0.	0.	97.9	33.8	97.9	9.574E-06	8.417E-06	8.417E-06
F	.4	.42	1950.	0.	0.	67.6	22.0	158.2	2.155E-04	3.862E-04	2.155E-04
F	1.0	1.53	1950.	0.	0.	67.6	22.0	158.2	9.099E-05	1.631E-04	9.099E-05
F	2.0	4.38	1950.	0.	0.	67.6	22.0	155.7	4.573E-05	8.064E-05	4.573E-05
F	3.0	3.65	1950.	0.	0.	67.6	22.0	109.3	4.391E-05	5.436E-05	4.391E-05
F	4.0	5.64	1950.	0.	0.	67.6	22.0	87.7	4.125E-05	4.100E-05	4.100E-05
F	5.0	2.32	1950.	0.	0.	67.6	22.0	75.1	3.834E-05	3.261E-05	3.261E-05
F	6.0	.60	1950.	0.	0.	67.6	22.0	67.6	3.564E-05	2.728E-05	2.728E-05
F	8.0	.27	1950.	0.	0.	67.6	22.0	67.6	2.671E-05	2.044E-05	2.044E-05
G	.4	.57	1950.	0.	0.	46.6	14.3	150.9	3.478E-04	6.684E-04	3.478E-04
G	1.0	1.66	1950.	0.	0.	46.6	14.3	150.9	1.468E-04	2.822E-04	1.468E-04
G	2.0	2.92	1950.	0.	0.	46.6	14.3	147.5	7.429E-05	1.396E-04	7.429E-05
G	3.0	2.39	1950.	0.	0.	46.6	14.3	89.8	8.229E-05	9.408E-05	8.229E-05
G	4.0	.60	1950.	0.	0.	46.6	14.3	66.2	8.420E-05	7.095E-05	7.095E-05
G	5.0	.20	1950.	0.	0.	46.6	14.3	53.6	8.270E-05	5.645E-05	5.645E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0         RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                              METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                     WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE          DELTA-T HEIGHTS:     10   75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0  NW SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0LATERAL 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=   .5      A=  2861.      D=   70.0
 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   3.478E-04   2.155E-04   1.468E-04   1.194E-04   9.099E-05   8.229E-05   7.552E-05   7.429E-05   7.095E-05   5.645E-05
         .567        .985       2.646       3.162       4.689       7.080       7.518      10.439      11.037      11.236
       .02696      .04690      .12591      .15048      .22318      .33696      .35779      .49686      .52530      .53478
0   5.043E-05   4.573E-05   4.391E-05   4.100E-05   3.345E-05   3.261E-05   3.189E-05   2.728E-05   2.523E-05   2.208E-05
       13.229      17.611      21.264      26.908      27.023      29.347      31.140      31.738      36.918      42.961
       .62960      .83820     1.01203     1.28067     1.28614     1.39676     1.48209     1.51054     1.75706     2.04467
0   2.044E-05   1.963E-05   1.680E-05   1.587E-05   1.412E-05   1.405E-05   1.271E-05   1.238E-05   1.053E-05   1.026E-05
       43.226      50.531      55.711      60.027      60.359      62.484      62.616      66.667      68.127      72.710
      2.05731     2.40497     2.65150     2.85693     2.87274     2.97387     2.98012     3.17292     3.24245     3.46053
0   8.655E-06   8.417E-06   7.239E-06   6.984E-06   5.424E-06   5.365E-06   4.708E-06   4.337E-06   3.551E-06   2.825E-06
       75.499      75.565      76.628      77.159      77.424      77.823      79.151      79.217      79.948      80.413
      3.59327     3.59643     3.64700     3.67228     3.68493     3.70389     3.76710     3.77026     3.80503     3.82715
0   2.653E-06   2.363E-06   2.186E-06   1.788E-06   1.770E-06   1.349E-06   1.073E-06   9.231E-07   8.975E-07   6.725E-07
       81.210      81.276      81.805      83.133      83.465      84.262      84.461      86.320      86.453      86.652
      3.86508     3.86824     3.89339     3.95660     3.97241     4.01033     4.01981     4.10831     4.11463     4.12411
0   4.565E-07   3.077E-07   2.321E-07   1.846E-07   1.544E-07   1.157E-07
       91.832      95.152      98.074      99.535      99.934     100.000
      4.37064     4.52866     4.66773     4.73726     4.75622     4.75938
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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)=    .496
                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 3)=   1.279
                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 4)=   2.403
                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 5)=   2.854
                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 6)=   3.457
                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 7)=   3.590
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   7  1      -7.96393 -14.01906  -1.74971
   7  2      -9.50758 -13.93807  -1.71830
   7  3     -10.10203 -16.53574  -2.88189
   7  4     -10.83848 -16.49431  -2.86093
   7  5     -11.05090 -20.78323  -5.11509
   7  6     -11.48682 -29.63779  -9.98706
   7  7     -11.65737     NUMXQ(K)=  7
     2.647E-04             .048              1.000
     1.508E-04             .143              3.000
     1.140E-04             .238              5.000
     7.624E-05             .476             10.000
     5.964E-05             .714             15.000
     4.976E-05             .952             20.000
     4.304E-05            1.190             25.000
     3.627E-05            1.428             30.000
     3.040E-05            1.666             35.000
     2.600E-05            1.904             40.000
     2.260E-05            2.142             45.000
     1.989E-05            2.380             50.000
     1.769E-05            2.618             55.000
     1.588E-05            2.856             60.000
     1.327E-05            3.094             65.000
     1.120E-05            3.332             70.000
     8.920E-06            3.570             75.000
0    7.401E-05            0.5               10.51
0ANNUAL AVERAGE =    1.57E-06
0K=  7     FIVEXQ(K)= 7.401E-05      FIVEPR(K)=10.506
```

Calculation No. NE-02-03-16

Prepared by / Date: Mohammed Abu-Shehadeh

Verified by/Date: Ted Messier

Revision No. 0

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE NNW SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.14	1950.	0.	0.	342.4	1000.0	342.4	2.189E-06	2.186E-06	2.186E-06
A	1.0	.50	1950.	0.	0.	342.4	1000.0	342.4	9.244E-07	9.231E-07	9.231E-07
A	2.0	1.77	1950.	0.	0.	342.4	1000.0	342.4	4.571E-07	4.565E-07	4.565E-07
A	3.0	2.43	1950.	0.	0.	342.4	1000.0	342.4	3.081E-07	3.077E-07	3.077E-07
A	4.0	2.58	1950.	0.	0.	342.4	1000.0	342.4	2.324E-07	2.321E-07	2.321E-07
A	5.0	1.12	1950.	0.	0.	342.4	1000.0	342.4	1.849E-07	1.846E-07	1.846E-07
A	6.0	.47	1950.	0.	0.	342.4	1000.0	342.4	1.546E-07	1.544E-07	1.544E-07
A	8.0	.22	1950.	0.	0.	342.4	1000.0	342.4	1.159E-07	1.157E-07	1.157E-07
A	10.0	.06	1950.	0.	0.	342.4	1000.0	342.4	9.264E-08	9.252E-08	9.252E-08
A	13.0	.03	1950.	0.	0.	342.4	1000.0	342.4	7.135E-08	7.125E-08	7.125E-08
B	.4	.06	1950.	0.	0.	257.5	227.3	257.5	1.281E-05	1.271E-05	1.271E-05
B	1.0	.19	1950.	0.	0.	257.5	227.3	257.5	5.407E-06	5.365E-06	5.365E-06
B	2.0	.25	1950.	0.	0.	257.5	227.3	257.5	2.674E-06	2.653E-06	2.653E-06
B	3.0	.75	1950.	0.	0.	257.5	227.3	257.5	1.802E-06	1.788E-06	1.788E-06
B	4.0	.84	1950.	0.	0.	257.5	227.3	257.5	1.359E-06	1.349E-06	1.349E-06
B	5.0	.50	1950.	0.	0.	257.5	227.3	257.5	1.081E-06	1.073E-06	1.073E-06
B	6.0	.19	1950.	0.	0.	257.5	227.3	257.5	9.045E-07	8.975E-07	8.975E-07
B	8.0	.12	1950.	0.	0.	257.5	227.3	257.5	6.777E-07	6.725E-07	6.725E-07
B	10.0	.03	1950.	0.	0.	257.5	227.3	257.5	5.419E-07	5.377E-07	5.377E-07
C	.4	.02	1950.	0.	0.	195.5	112.3	195.5	3.414E-05	3.345E-05	3.345E-05
C	1.0	.06	1950.	0.	0.	195.5	112.3	195.5	1.442E-05	1.412E-05	1.412E-05
C	2.0	.47	1950.	0.	0.	195.5	112.3	195.5	7.129E-06	6.984E-06	6.984E-06
C	3.0	.97	1950.	0.	0.	195.5	112.3	195.5	4.805E-06	4.708E-06	4.708E-06
C	4.0	.75	1950.	0.	0.	195.5	112.3	195.5	3.624E-06	3.551E-06	3.551E-06
C	5.0	.56	1950.	0.	0.	195.5	112.3	195.5	2.883E-06	2.825E-06	2.825E-06
C	6.0	.34	1950.	0.	0.	195.5	112.3	195.5	2.412E-06	2.363E-06	2.363E-06
C	8.0	.16	1950.	0.	0.	195.5	112.3	195.5	1.807E-06	1.770E-06	1.770E-06
D	.4	.17	1950.	0.	0.	137.7	49.8	199.2	7.552E-05	1.025E-04	7.552E-05
D	1.0	.72	1950.	0.	0.	137.7	49.8	199.2	3.189E-05	4.328E-05	3.189E-05
D	2.0	3.18	1950.	0.	0.	137.7	49.8	197.9	1.587E-05	2.140E-05	1.587E-05
D	3.0	3.95	1950.	0.	0.	137.7	49.8	171.1	1.238E-05	1.443E-05	1.238E-05
D	4.0	3.89	1950.	0.	0.	137.7	49.8	155.6	1.026E-05	1.088E-05	1.026E-05
D	5.0	2.99	1950.	0.	0.	137.7	49.8	144.9	8.768E-06	8.655E-06	8.655E-06
D	6.0	1.34	1950.	0.	0.	137.7	49.8	137.7	7.720E-06	7.239E-06	7.239E-06
D	8.0	1.18	1950.	0.	0.	137.7	49.8	137.7	5.785E-06	5.424E-06	5.424E-06
D	10.0	.09	1950.	0.	0.	137.7	49.8	137.7	4.625E-06	4.337E-06	4.337E-06

E	.4	.28	1950.	0.	0.	97.9	33.8	185.5	1.194E-04	1.989E-04	1.194E-04
E	1.0	1.09	1950.	0.	0.	97.9	33.8	185.5	5.043E-05	8.399E-05	5.043E-05
E	2.0	4.05	1950.	0.	0.	97.9	33.8	183.3	2.523E-05	4.253E-05	2.523E-05
E	3.0	5.36	1950.	0.	0.	97.9	33.8	141.2	2.208E-05	2.800E-05	2.208E-05
E	4.0	6.60	1950.	0.	0.	97.9	33.8	119.8	1.963E-05	2.111E-05	1.963E-05
E	5.0	5.27	1950.	0.	0.	97.9	33.8	106.3	1.759E-05	1.680E-05	1.680E-05
E	6.0	2.83	1950.	0.	0.	97.9	33.8	97.9	1.598E-05	1.405E-05	1.405E-05
E	8.0	2.21	1950.	0.	0.	97.9	33.8	97.9	1.197E-05	1.053E-05	1.053E-05
E	10.0	.09	1950.	0.	0.	97.9	33.8	97.9	9.574E-06	8.417E-06	8.417E-06
F	.4	.34	1950.	0.	0.	67.6	22.0	158.2	2.155E-04	3.862E-04	2.155E-04
F	1.0	1.25	1950.	0.	0.	67.6	22.0	158.2	9.099E-05	1.631E-04	9.099E-05
F	2.0	5.04	1950.	0.	0.	67.6	22.0	155.7	4.573E-05	8.064E-05	4.573E-05
F	3.0	5.95	1950.	0.	0.	67.6	22.0	109.3	4.391E-05	5.436E-05	4.391E-05
F	4.0	5.73	1950.	0.	0.	67.6	22.0	87.7	4.125E-05	4.100E-05	4.100E-05
F	5.0	4.08	1950.	0.	0.	67.6	22.0	75.1	3.834E-05	3.261E-05	3.261E-05
F	6.0	.90	1950.	0.	0.	67.6	22.0	67.6	3.564E-05	2.728E-05	2.728E-05
F	8.0	.65	1950.	0.	0.	67.6	22.0	67.6	2.671E-05	2.044E-05	2.044E-05
F	10.0	.06	1950.	0.	0.	67.6	22.0	67.6	2.135E-05	1.634E-05	1.634E-05
G	.4	.53	1950.	0.	0.	46.6	14.3	150.9	3.478E-04	6.684E-04	3.478E-04
G	1.0	1.56	1950.	0.	0.	46.6	14.3	150.9	1.468E-04	2.822E-04	1.468E-04
G	2.0	3.52	1950.	0.	0.	46.6	14.3	147.5	7.429E-05	1.396E-04	7.429E-05
G	3.0	4.86	1950.	0.	0.	46.6	14.3	89.8	8.229E-05	9.408E-05	8.229E-05
G	4.0	3.02	1950.	0.	0.	46.6	14.3	66.2	8.420E-05	7.095E-05	7.095E-05
G	5.0	1.34	1950.	0.	0.	46.6	14.3	53.6	8.270E-05	5.645E-05	5.645E-05
G	6.0	.31	1950.	0.	0.	46.6	14.3	46.6	7.950E-05	4.721E-05	4.721E-05
G	8.0	.06	1950.	0.	0.	46.6	14.3	46.6	5.957E-05	3.538E-05	3.538E-05
G	10.0	.03	1950.	0.	0.	46.6	14.3	46.6	4.763E-05	2.829E-05	2.829E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METECROLOGICAL INSTRUMENTATION
 CATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT: 10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SCURCE OF DATA:  MET CATA TAKEN FROM FRAMATOME JFD PILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp  output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0 NNW SECTOR     BOUNDARY DISTANCE = 1950.0 METERS
0LATERAL PLUME MEANDER/BUILDING WAKE CREDIT ALLOWED
 AS A FUNCTION OF DCWNWIND DISTANCE.
 MEANDER CREDIT IS FOR WINDSPEEDS LESS THAN 6 MPS.
 BUILDING WAKE CREDIT ALLOWED:   C=   .5      A=  2861.     D=   70.0
 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   3.478E-04   2.155E-04   1.468E-04   1.194E-04   9.099E-05   8.229E-05   7.552E-05   7.429E-05   7.095E-05   5.645E-05
         .531        .873       2.429       2.712       3.957       8.814       8.989      12.507      15.527      16.866
       .05392      .08860      .24663      .27529      .40171      .89476      .91251     1.26965     1.57623     1.71213
0   5.043E-05   4.721E-05   4.573E-05   4.391E-05   4.100E-05   3.538E-05   3.345E-05   3.261E-05   3.189E-05   2.829E-05
       17.955      18.267      23.310      29.257      34.986      35.048      35.069      39.148      39.864      39.895
      1.82275     1.85435     2.36636     2.97003     3.55157     3.55789     3.56008     3.97411     4.04681     4.04997
0   2.728E-05   2.523E-05   2.208E-05   2.044E-05   1.963E-05   1.680E-05   1.634E-05   1.587E-05   1.412E-05   1.405E-05
       40.798      44.846      50.201      50.854      57.455      62.623      62.685      65.861      65.923      68.756
      4.14162     4.55249     5.09611     5.16248     5.83252     6.35717     6.36349     6.68587     6.69219     6.97980
0   1.271E-05   1.238E-05   1.053E-05   1.026E-05   8.655E-06   8.417E-06   7.239E-06   6.984E-06   5.424E-06   5.365E-06
       68.818      72.772      74.982      78.874      81.863      81.956      83.295      83.762      84.945      85.132
      6.98605     7.38744     7.61184     8.00691     8.31032     8.31981     8.45571     8.50312     8.62322     8.64218
0   4.708E-06   4.337E-06   3.551E-06   2.825E-06   2.653E-06   2.363E-06   2.186E-06   1.788E-06   1.770E-06   1.349E-06
       86.097      86.191      86.938      87.498      87.747      88.090      88.231      88.979      89.134      89.975
      8.74016     8.74964     8.82550     8.88239     8.90767     8.94244     8.95681     9.03266     9.04847     9.13380
0   1.073E-06   9.231E-07   8.975E-07   6.725E-07   5.377E-07   4.565E-07   3.077E-07   2.321E-07   1.846E-07   1.544E-07
       90.473      90.971      91.158      91.283      91.314      93.088      95.517      98.101      99.222      99.689
      9.18437     9.23494     9.25390     9.26654     9.26970     9.44986     9.69638     9.95871    10.07249    10.11989
0   1.157E-07   9.252E-08   7.125E-08
       99.907      99.969     100.000
     10.14202    10.14834    10.15150
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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)=   1.574
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   3.548
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   5.092
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   5.829
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   6.682
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   8.003
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   8.307
0  K  I    XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   8  1      -7.96393 -12.60986  -1.42101
   8  2      -9.55350 -12.97170  -1.58925
   8  3     -10.10203 -16.68478  -3.64558
   8  4     -10.72076 -13.61057  -1.76643
   8  5     -10.83848 -15.64077  -3.06011
   8  6     -11.05090 -17.93018  -4.58649
   8  7     -11.48682 -23.39418  -8.47585
   8  8     -11.65737     NUMXQ(K)=  8
      2.680E-04              .102              1.000
      1.646E-04              .305              3.000
      1.289E-04              .508              5.000
      9.038E-05             1.015             10.000
      7.235E-05             1.523             15.000
      6.025E-05             2.030             20.000
      5.189E-05             2.538             25.000
      4.574E-05             3.045             30.000
      4.097E-05             3.553             35.000
      3.275E-05             4.061             40.000
      2.676E-05             4.568             45.000
      2.224E-05             5.076             50.000
      2.040E-05             5.583             55.000
      1.836E-05             6.091             60.000
      1.621E-05             6.598             65.000
      1.373E-05             7.106             70.000
      1.162E-05             7.614             75.000
      9.620E-06             8.121             80.000
0     1.299E-04             0.5                4.93
0ANNUAL AVERAGE =   3.24E-06
0K=  8      FIVEXQ(K)= 1.299E-04     FIVEPR(K)= 4.925
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ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-176	Cont'd on page B-177
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: 11/19/2003 TIME: 23: 4:56
/PLANT NAME: CGS METEOROLOGICAL INSTRUMENTATION
DATA PERIOD: JFD 1996-1999 WIND SENSORS HEIGHT: 10.0 METERS
TYPE OF RELEASE: GROUND LEVEL RELEASE DELTA-T HEIGHTS: 10 - 75 METERS
SOURCE OF DATA: MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
COMMENTS: input file: P96-99-F.inp output file: P96-99-F.out sigma=desert + P-G
PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE N SECTOR.

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=1431.SQ.METERS	USED
A	.4	.20	1950.	0.	0.	342.4	1000.0	342.4	2.189E-06	2.186E-06	2.186E-06
A	1.0	.71	1950.	0.	0.	342.4	1000.0	342.4	9.244E-07	9.231E-07	9.231E-07
A	2.0	1.86	1950.	0.	0.	342.4	1000.0	342.4	4.571E-07	4.565E-07	4.565E-07
A	3.0	1.73	1950.	0.	0.	342.4	1000.0	342.4	3.081E-07	3.077E-07	3.077E-07
A	4.0	1.49	1950.	0.	0.	342.4	1000.0	342.4	2.324E-07	2.321E-07	2.321E-07
A	5.0	1.62	1950.	0.	0.	342.4	1000.0	342.4	1.849E-07	1.846E-07	1.846E-07
A	6.0	1.49	1950.	0.	0.	342.4	1000.0	342.4	1.546E-07	1.544E-07	1.544E-07
A	8.0	1.62	1950.	0.	0.	342.4	1000.0	342.4	1.159E-07	1.157E-07	1.157E-07
A	10.0	.52	1950.	0.	0.	342.4	1000.0	342.4	9.264E-08	9.252E-08	9.252E-08
A	13.0	.18	1950.	0.	0.	342.4	1000.0	342.4	7.135E-08	7.125E-08	7.125E-08
B	.4	.04	1950.	0.	0.	257.5	227.3	257.5	1.281E-05	1.271E-05	1.271E-05
B	1.0	.13	1950.	0.	0.	257.5	227.3	257.5	5.407E-06	5.365E-06	5.365E-06
B	2.0	.58	1950.	0.	0.	257.5	227.3	257.5	2.674E-06	2.653E-06	2.653E-06
B	3.0	.78	1950.	0.	0.	257.5	227.3	257.5	1.802E-06	1.788E-06	1.788E-06
B	4.0	.63	1950.	0.	0.	257.5	227.3	257.5	1.359E-06	1.349E-06	1.349E-06
B	5.0	.76	1950.	0.	0.	257.5	227.3	257.5	1.081E-06	1.073E-06	1.073E-06
B	6.0	.39	1950.	0.	0.	257.5	227.3	257.5	9.045E-07	8.975E-07	8.975E-07
B	8.0	.55	1950.	0.	0.	257.5	227.3	257.5	6.777E-07	6.725E-07	6.725E-07
B	10.0	.08	1950.	0.	0.	257.5	227.3	257.5	5.419E-07	5.377E-07	5.377E-07
C	.4	.05	1950.	0.	0.	195.5	112.3	195.5	3.414E-05	3.345E-05	3.345E-05
C	1.0	.16	1950.	0.	0.	195.5	112.3	195.5	1.442E-05	1.412E-05	1.412E-05
C	2.0	.37	1950.	0.	0.	195.5	112.3	195.5	7.129E-06	6.984E-06	6.984E-06
C	3.0	.68	1950.	0.	0.	195.5	112.3	195.5	4.805E-06	4.708E-06	4.708E-06
C	4.0	.76	1950.	0.	0.	195.5	112.3	195.5	3.624E-06	3.551E-06	3.551E-06
C	5.0	.52	1950.	0.	0.	195.5	112.3	195.5	2.883E-06	2.825E-06	2.825E-06
C	6.0	.52	1950.	0.	0.	195.5	112.3	195.5	2.412E-06	2.363E-06	2.363E-06
C	8.0	.39	1950.	0.	0.	195.5	112.3	195.5	1.807E-06	1.770E-06	1.770E-06
C	10.0	.16	1950.	0.	0.	195.5	112.3	195.5	1.445E-06	1.415E-06	1.415E-06
C	13.0	.05	1950.	0.	0.	195.5	112.3	195.5	1.113E-06	1.090E-06	1.090E-06
D	.4	.20	1950.	0.	0.	137.7	49.8	199.2	7.552E-05	1.025E-04	7.552E-05
D	1.0	.84	1950.	0.	0.	137.7	49.8	199.2	3.189E-05	4.328E-05	3.189E-05
D	2.0	2.67	1950.	0.	0.	137.7	49.8	197.9	1.587E-05	2.140E-05	1.587E-05
D	3.0	2.80	1950.	0.	0.	137.7	49.8	171.1	1.238E-05	1.443E-05	1.238E-05
D	4.0	3.30	1950.	0.	0.	137.7	49.8	155.6	1.026E-05	1.088E-05	1.026E-05
D	5.0	2.69	1950.	0.	0.	137.7	49.8	144.9	8.768E-06	8.655E-06	8.655E-06
D	6.0	1.88	1950.	0.	0.	137.7	49.8	137.7	7.720E-06	7.239E-06	7.239E-06
D	8.0	2.77	1950.	0.	0.	137.7	49.8	137.7	5.785E-06	5.424E-06	5.424E-06
D	10.0	1.02	1950.	0.	0.	137.7	49.8	137.7	4.625E-06	4.337E-06	4.337E-06
D	13.0	.34	1950.	0.	0.	137.7	49.8	137.7	3.562E-06	3.340E-06	3.340E-06
D	18.0	.05	1950.	0.	0.	137.7	49.8	137.7	2.573E-06	2.413E-06	2.413E-06

Calculation No. NE-02-03-16

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

Revision No. 0

E	.4	.42	1950.	0.	0.	97.9	33.8	185.5	1.194E-04	1.989E-04	1.194E-04
E	1.0	1.62	1950.	0.	0.	97.9	33.8	185.5	5.043E-05	8.399E-05	5.043E-05
E	2.0	4.05	1950.	0.	0.	97.9	33.8	183.3	2.523E-05	4.153E-05	2.523E-05
E	3.0	4.00	1950.	0.	0.	97.9	33.8	141.2	2.208E-05	2.800E-05	2.208E-05
E	4.0	4.00	1950.	0.	0.	97.9	33.8	119.8	1.963E-05	2.111E-05	1.963E-05
E	5.0	4.58	1950.	0.	0.	97.9	33.8	106.3	1.759E-05	1.680E-05	1.680E-05
E	6.0	3.56	1950.	0.	0.	97.9	33.8	97.9	1.598E-05	1.405E-05	1.405E-05
E	8.0	3.50	1950.	0.	0.	97.9	33.8	97.9	1.197E-05	1.053E-05	1.053E-05
E	10.0	.63	1950.	0.	0.	97.9	33.8	97.9	9.574E-06	8.417E-06	8.417E-06
E	13.0	.21	1950.	0.	0.	97.9	33.8	97.9	7.374E-06	6.483E-06	6.483E-06
E	18.0	.05	1950.	0.	0.	97.9	33.8	97.9	5.327E-06	4.683E-06	4.683E 06
F	.4	.46	1950.	0.	0.	67.6	22.0	158.2	2.155E-04	3.862E-04	2.155E-04
F	1.0	1.67	1950.	0.	0.	67.6	22.0	158.2	9.099E-05	1.631E-04	9.099E-05
F	2.0	5.20	1950.	0.	0.	67.6	22.0	155.7	4.573E-05	8.064E-05	4.573E-05
F	3.0	6.07	1950.	0.	0.	67.6	22.0	109.3	4.391E-05	5.436E-05	4.391E-05
F	4.0	4.79	1950.	0.	0.	67.6	22.0	87.7	4.125E-05	4.100E-05	4.100E-05
F	5.0	2.46	1950.	0.	0.	67.6	22.0	75.1	3.834E-05	3.261E-05	3.261E-05
F	6.0	1.07	1950.	0.	0.	67.6	22.0	67.6	3.564E-05	2.728E-05	2.728E-05
F	8.0	.86	1950.	0.	0.	67.6	22.0	67.6	2.671E-05	2.044E-05	2.044E-05
F	10.0	.08	1950.	0.	0.	67.6	22.0	67.6	2.135E-05	1.634E-05	1.634E-05
F	13.0	.05	1950.	0.	0.	67.6	22.0	67.6	1.645E-05	1.259E-05	1.259E-05
G	.4	.49	1950.	0.	0.	46.6	14.3	150.9	3.478E-04	6.684E-04	3.478E-04
G	1.0	1.44	1950.	0.	0.	46.6	14.3	150.9	1.468E-04	2.822E-04	1.468E-04
G	2.0	3.37	1950.	0.	0.	46.6	14.3	147.5	7.429E-05	1.396E-04	7.429E-05
G	3.0	4.11	1950.	0.	0.	46.6	14.3	89.8	8.229E-05	9.408E-05	8.229E-05
G	4.0	2.59	1950.	0.	0.	46.6	14.3	66.2	8.420E-05	7.095E-05	7.095E-05
G	5.0	.71	1950.	0.	0.	46.6	14.3	53.6	8.270E-05	5.645E-05	5.645E-05
G	6.0	.24	1950.	0.	0.	46.6	14.3	46.6	7.950E-05	4.721E-05	4.721E-05
G	8.0	.08	1950.	0.	0.	46.6	14.3	46.6	5.957E-05	3.538E-05	3.538E-05
G	10.0	.05	1950.	0.	0.	46.6	14.3	46.6	4.763E-05	2.829E-05	2.829E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0   N SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0LATERAL 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=   .5      A=  2861.     D=   70.0
 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   3.478E-04   2.155E-04   1.468E-04   1.194E-04   9.099E-05   8.229E-05   7.552E-05   7.429E-05   7.095E-05   5.645E-05
         .491        .950       2.388       2.809       4.482       8.588       8.793      12.167      14.756      15.462
       .05932      .11480      .28863      .33940      .54168     1.03789     1.06258     1.47029     1.78319     1.86852
0   5.043E-05   4.721E-05   4.573E-05   4.391E-05   4.100E-05   3.538E-05   3.345E-05   3.261E-05   3.189E-05   2.829E-05
       17.083      17.319      22.523      28.591      33.377      33.455      33.510      35.968      36.805      36.857
      2.06448     2.09292     2.72187     3.45512     4.03350     4.04298     4.04954     4.34663     4.44777     4.45409
0   2.728E-05   2.523E-05   2.208E-05   2.044E-05   1.963E-05   1.680E-05   1.634E-05   1.587E-05   1.412E-05   1.405E-05
       37.930      41.983      45.985      46.848      50.849      55.426      55.505      58.172      58.329      61.886
      4.58367     5.07356     5.55713     5.66142     6.14499     6.69809     6.70757     7.02994     7.04891     7.47874
0   1.271E-05   1.259E-05   1.238E-05   1.053E-05   1.026E-05   8.655E-06   8.417E-06   7.239E-06   6.984E-06   6.483E-06
       61.929      61.981      64.780      68.284      71.580      74.274      74.901      76.784      77.150      77.360
      7.48395     7.49027     7.82845     8.25197     8.65020     8.97574     9.05159     9.27915     9.32340     9.34868
0   5.424E-06   5.365E-06   4.708E-06   4.683E-06   4.337E-06   3.551E-06   3.340E-06   2.825E-06   2.653E-06   2.413E-06
       80.132      80.263      80.943      80.995      82.015      82.773      83.113      83.637      84.212      84.264
      9.68370     9.69950     9.78168     9.78800     9.91126    10.00292    10.04400    10.10721    10.17675    10.18307
0   2.363E-06   2.186E-06   1.788E-06   1.770E-06   1.415E-06   1.349E-06   1.090E-06   1.073E-06   9.231E-07   8.975E-07
       84.787      84.988      85.773      86.165      86.322      86.949      87.002      87.760      88.466      88.859
     10.24628    10.27054    10.36535    10.41276    10.43172    10.50758    10.51390    10.60555    10.69089    10.73830
0   6.725E-07   5.377E-07   4.565E-07   3.077E-07   2.321E-07   1.846E-07   1.544E-07   1.157E-07   9.252E-08   7.125E-08
       89.408      89.486      91.343      93.069      94.560      96.182      97.672      99.294      99.817     100.000
     10.80467    10.81415    11.03855    11.24715    11.42730    11.62325    11.80340    11.99936    12.06257    12.08470
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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)=   1.781
                                                                      HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   4.030
                                                                      HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   5.553
                                                                      HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   6.141
                                                                      HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   7.026
                                                                      HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   7.475
                                                                      HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   8.647
                                                                      HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   9.048
                                                                      HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   9.276
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   9  1      -7.96393 -12.48020  -1.39288
   9  2      -9.55350 -12.80949  -1.54960
   9  3     -10.10203 -17.13169  -4.02338
   9  4     -10.72076 -14.44365  -2.33642
   9  5     -10.83848 -15.57631  -3.07046
   9  6     -11.05090 -16.57543  -3.74837
   9  7     -11.17289  16.93943  -4.00091
   9  8     -11.48682 -22.28249  -7.92144
   9  9     -11.68521 -26.26519 -10.89850
   9 10     -11.83598      NUMXQ(K)= 10
     2.601E-04              .121             1.000
     1.601E-04              .363             3.000
     1.254E-04              .604             5.000
     8.789E-05             1.208            10.000
     7.022E-05             1.813            15.000
     5.833E-05             2.417            20.000
     5.022E-05             3.021            25.000
     4.424E-05             3.625            30.000
     3.750E-05             4.230            35.000
     2.904E-05             4.834            40.000
     2.305E-05             5.438            45.000
     2.002E-05             6.042            50.000
     1.736E-05             6.647            55.000
     1.494E-05             7.251            60.000
     1.265E-05             7.855            65.000
     1.078E-05             8.459            70.000
     8.351E-06             9.064            75.000
0    1.375E-04             0.5               4.14
0ANNUAL AVERAGE =    3.81E-06
0K=  9      FIVEXQ(K)= 1.375E-04     FIVEPR(K)= 4.137
```

Calculation No. NE-02-03-16

Prepared by / Date: Mohammed Abu-Shehadeh

Verified by/Date: Ted Messier

Revision No. 0

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0              RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                   METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                          WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE               DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE NNE SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.20	1950.	0.	0.	342.4	1000.0	342.4	2.189E-06	2.186E-06	2.186E-06
A	1.0	.69	1950.	0.	0.	342.4	1000.0	342.4	9.244E-07	9.231E-07	9.231E-07
A	2.0	1.78	1950.	0.	0.	342.4	1000.0	342.4	4.571E-07	4.565E-07	4.565E-07
A	3.0	1.24	1950.	0.	0.	342.4	1000.0	342.4	3.081E-07	3.077E-07	3.077E-07
A	4.0	1.24	1950.	0.	0.	342.4	1000.0	342.4	2.324E-07	2.321E-07	2.321E-07
A	5.0	1.35	1950.	0.	0.	342.4	1000.0	342.4	1.849E-07	1.846E-07	1.846E-07
A	6.0	.91	1950.	0.	0.	342.4	1000.0	342.4	1.546E-07	1.544E-07	1.544E-07
A	8.0	1.06	1950.	0.	0.	342.4	1000.0	342.4	1.159E-07	1.157E-07	1.157E-07
A	10.0	.18	1950.	0.	0.	342.4	1000.0	342.4	9.264E-08	9.252E-08	9.252E-08
A	13.0	.07	1950.	0.	0.	342.4	1000.0	342.4	7.135E-08	7.125E-08	7.125E-08
A	18.0	.04	1950.	0.	0.	342.4	1000.0	342.4	5.154E-08	5.148E-08	5.148E-08
B	.4	.06	1950.	0.	0.	257.5	227.3	257.5	1.281E-05	1.271E-05	1.271E-05
B	1.0	.18	1950.	0.	0.	257.5	227.3	257.5	5.407E-06	5.365E-06	5.365E-06
B	2.0	.66	1950.	0.	0.	257.5	227.3	257.5	2.674E-06	2.653E-06	2.653E-06
B	3.0	.29	1950.	0.	0.	257.5	227.3	257.5	1.802E-06	1.788E-06	1.788E-06
B	4.0	.55	1950.	0.	0.	257.5	227.3	257.5	1.359E-06	1.349E-06	1.349E-06
B	5.0	.55	1950.	0.	0.	257.5	227.3	257.5	1.081E-06	1.073E-06	1.073E-06
B	6.0	.47	1950.	0.	0.	257.5	227.3	257.5	9.045E-07	8.975E-07	8.975E-07
B	8.0	.69	1950.	0.	0.	257.5	227.3	257.5	6.777E-07	6.725E-07	6.725E-07
B	10.0	.29	1950.	0.	0.	257.5	227.3	257.5	5.419E-07	5.377E-07	5.377E-07
B	13.0	.15	1950.	0.	0.	257.5	227.3	257.5	4.173E-07	4.141E-07	4.141E-07
C	.4	.09	1950.	0.	0.	195.5	112.3	195.5	3.414E-05	3.345E-05	3.345E-05
C	1.0	.25	1950.	0.	0.	195.5	112.3	195.5	1.442E-05	1.412E-05	1.412E-05
C	2.0	.66	1950.	0.	0.	195.5	112.3	195.5	7.129E-06	6.984E-06	6.984E-06
C	3.0	.51	1950.	0.	0.	195.5	112.3	195.5	4.805E-06	4.708E-06	4.708E-06
C	4.0	.51	1950.	0.	0.	195.5	112.3	195.5	3.624E-06	3.551E-06	3.551E-06
C	5.0	.55	1950.	0.	0.	195.5	112.3	195.5	2.883E-06	2.825E-06	2.825E-06
C	6.0	.66	1950.	0.	0.	195.5	112.3	195.5	2.412E-06	2.363E-06	2.363E-06
C	8.0	.73	1950.	0.	0.	195.5	112.3	195.5	1.807E-06	1.770E-06	1.770E-06
C	10.0	.36	1950.	0.	0.	195.5	112.3	195.5	1.445E-06	1.415E-06	1.415E-06
C	13.0	.22	1950.	0.	0.	195.5	112.3	195.5	1.113E-06	1.090E-06	1.090E-06
D	.4	.17	1950.	0.	0.	137.7	49.8	199.2	7.552E-05	1.025E-04	7.552E-05
D	1.0	.69	1950.	0.	0.	137.7	49.8	199.2	3.189E-05	4.328E-05	3.189E-05
D	2.0	2.80	1950.	0.	0.	137.7	49.8	197.9	1.587E-05	2.140E-05	1.587E-05
D	3.0	2.44	1950.	0.	0.	137.7	49.8	171.1	1.238E-05	1.443E-05	1.238E-05
D	4.0	2.37	1950.	0.	0.	137.7	49.8	155.6	1.026E-05	1.088E-05	1.026E-05
D	5.0	3.24	1950.	0.	0.	137.7	49.8	144.9	8.768E-06	8.655E-06	8.655E-06
D	6.0	2.77	1950.	0.	0.	137.7	49.8	137.7	7.720E-06	7.239E-06	7.239E-06
D	8.0	4.26	1950.	0.	0.	137.7	49.8	137.7	5.785E-06	5.424E-06	5.424E-06
D	10.0	2.48	1950.	0.	0.	137.7	49.8	137.7	4.625E-06	4.337E-06	4.337E-06
D	13.0	1.38	1950.	0.	0.	137.7	49.8	137.7	3.562E-06	3.340E-06	3.340E-06
D	18.0	.25	1950.	0.	0.	137.7	49.8	137.7	2.573E-06	2.413E-06	2.413E-06
E	.4	.50	1950.	0.	0.	97.9	33.8	185.5	1.194E-04	1.989E-04	1.194E-04
E	1.0	1.93	1950.	0.	0.	97.9	33.8	185.5	5.043E-05	8.399E-05	5.043E-05
E	2.0	4.52	1950.	0.	0.	97.9	33.8	183.3	2.523E-05	4.153E-05	2.523E-05
E	3.0	3.31	1950.	0.	0.	97.9	33.8	141.2	2.208E-05	2.800E-05	2.208E-05
E	4.0	2.26	1950.	0.	0.	97.9	33.8	119.8	1.963E-05	2.111E-05	1.963E-05
E	5.0	2.88	1950.	0.	0.	97.9	33.8	106.3	1.759E-05	1.680E-05	1.680E-05
E	6.0	3.64	1950.	0.	0.	97.9	33.8	97.9	1.598E-05	1.405E-05	1.405E-05
E	8.0	5.97	1950.	0.	0.	97.9	33.8	97.9	1.197E-05	1.053E-05	1.053E-05
E	10.0	4.01	1950.	0.	0.	97.9	33.8	97.9	9.574E-06	8.417E-06	8.417E-06
E	13.0	1.53	1950.	0.	0.	97.9	33.8	97.9	7.374E-06	6.483E-06	6.483E-06
E	18.0	.29	1950.	0.	0.	97.9	33.8	97.9	5.327E-06	4.683E-06	4.683E-06
F	.4	.47	1950.	0.	0.	67.6	22.0	158.2	2.155E-04	3.862E-04	2.155E-04
F	1.0	1.71	1950.	0.	0.	67.6	22.0	158.2	9.099E-05	1.631E-04	9.099E-05
F	2.0	5.24	1950.	0.	0.	67.6	22.0	155.7	4.573E-05	8.064E-05	4.573E-05
F	3.0	4.48	1950.	0.	0.	67.6	22.0	109.3	4.391E-05	5.436E-05	4.391E-05
F	4.0	3.31	1950.	0.	0.	67.6	22.0	87.7	4.125E-05	4.100E-05	4.100E-05
F	5.0	1.38	1950.	0.	0.	67.6	22.0	75.1	3.834E-05	3.261E-05	3.261E-05
F	6.0	1.24	1950.	0.	0.	67.6	22.0	67.6	3.564E-05	2.728E-05	2.728E-05
F	8.0	.98	1950.	0.	0.	67.6	22.0	67.6	2.671E-05	2.044E-05	2.044E-05
F	10.0	.55	1950.	0.	0.	67.6	22.0	67.6	2.135E-05	1.634E-05	1.634E-05
F	13.0	.11	1950.	0.	0.	67.6	22.0	67.6	1.645E-05	1.259E-05	1.259E-05
G	.4	.55	1950.	0.	0.	46.6	14.3	150.9	3.478E-04	6.684E-04	3.478E-04
G	1.0	1.60	1950.	0.	0.	46.6	14.3	150.9	1.468E-04	2.822E-04	1.468E-04
G	2.0	3.86	1950.	0.	0.	46.6	14.3	147.5	7.429E-05	1.396E-04	7.429E-05
G	3.0	1.78	1950.	0.	0.	46.6	14.3	89.8	8.229E-05	9.408E-05	8.229E-05
G	4.0	1.27	1950.	0.	0.	46.6	14.3	66.2	8.420E-05	7.095E-05	7.095E-05
G	5.0	.29	1950.	0.	0.	46.6	14.3	53.6	8.270E-05	5.645E-05	5.645E-05
G	6.0	.22	1950.	0.	0.	46.6	14.3	46.6	7.950E-05	4.721E-05	4.721E-05
G	8.0	.04	1950.	0.	0.	46.6	14.3	46.6	5.957E-05	3.538E-05	3.538E-05
G	13.0	.04	1950.	0.	0.	46.6	14.3	46.6	3.668E-05	2.178E-05	2.178E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0 NNE SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0LATERAL 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=   .5      A=  2861.      D=    70.0
 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   3.478E-04   2.155E-04   1.468E-04   1.194E-04   9.099E-05   8.229E-05   7.552E-05   7.429E-05   7.095E-05   5.645E-05
         .547       1.016       2.619       3.119       4.831       6.615       6.784      10.645      11.919      12.211
       .04745      .08820      .22726      .27067      .41921      .57408      .58874      .92376     1.03438     1.05966
0   5.043E-05   4.721E-05   4.573E-05   4.391E-05   4.100E-05   3.538E-05   3.345E-05   3.261E-05   3.189E-05   2.728E-05
       14.141      14.360      19.604      24.084      27.398      27.434      27.522      28.906      29.598      30.837
      1.22717     1.24614     1.70126     2.09001     2.37762     2.38078     2.38842     2.50853     2.56858     2.67604
0   2.523E-05   2.208E-05   2.178E-05   2.044E-05   1.963E-05   1.680E-05   1.634E-05   1.587E-05   1.412E-05   1.405E-05
       35.353      38.667      38.703      39.687      41.945      44.822      45.368      48.173      48.428      52.070
      3.06794     3.35555     3.35872     3.44405     3.64000     3.88969     3.93710     4.18046     4.20258     4.51864
0   1.271E-05   1.259E-05   1.238E-05   1.053E-05   1.026E-05   8.655E-06   8.417E-06   7.239E-06   6.984E-06   6.483E-06
       52.130      52.239      54.679      60.652      63.019      66.261      70.267      73.035      73.690      75.220
      4.52385     4.53333     4.74509     5.26342     5.46885     5.75014     6.09780     6.33801     6.39490     6.52764
0   5.424E-06   5.365E-06   4.708E-06   4.683E-06   4.337E-06   3.551E-06   3.340E-06   2.825E-06   2.653E-06   2.413E-06
       79.481      79.663      80.173      80.464      82.941      83.451      84.835      85.381      86.037      86.292
      6.89742     6.91323     6.95748     6.98276     7.19768     7.24193     7.36203     7.40944     7.46633     7.48845
0   2.363E-06   2.186E-06   1.788E-06   1.770E-06   1.415E-06   1.349E-06   1.090E-06   1.073E-06   9.231E-07   8.975E-07
       86.947      87.144      87.435      88.164      88.528      89.074      89.293      89.839      90.531      91.004
      7.54534     7.56241     7.58769     7.65090     7.68251     7.72992     7.74888     7.79629     7.85634     7.89743
0   6.725E-07   5.377E-07   4.565E-07   4.141E-07   3.077E-07   2.321E-07   1.846E-07   1.544E-07   1.157E-07   9.252E-08
       91.696      91.988      93.772      93.918      95.156      96.394      97.742      98.652      99.709      99.891
      7.95748     7.98276     8.13763     8.15027     8.25773     8.36519     8.48213     8.56114     8.65280     8.66860
    7.125E-08   5.148E-08
       99.964     100.000
      8.67492     8.67809
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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)=   1.033
                                                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   2.375
                                                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   3.352
                                                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   3.637
                                                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   4.177
                                                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   4.515
                                                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   5.465
                                                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   6.094
                                                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   6.894
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  10  1      -7.96393 -13.26395  -1.60343
  10  2      -9.55350 -13.37341  -1.65073
  10  3     -10.10203 -18.25259  -4.11275
  10  4     -10.72076 -16.57011  -3.19403
  10  5     -10.83848 -16.79641  -3.32014
  10  6     -11.05090 -16.80416  -3.32462
  10  7     -11.17289 -16.92332  -3.39497
  10  8     -11.48682 -17.32593  -3.64639
  10  9     -11.68521 -22.44506  -6.95560
  10 10     -12.12459     NUMXQ(K)= 10
      2.635E-04               .087            1.000
      1.532E-04               .260            3.000
      1.168E-04               .434            5.000
      7.880E-05               .868           10.000
      6.137E-05              1.302           15.000
      5.084E-05              1.736           20.000
      4.369E-05              2.170           25.000
      3.495E-05              2.603           30.000
      2.651E-05              3.037           35.000
      2.103E-05              3.471           40.000
      1.763E-05              3.905           45.000
      1.498E-05              4.339           50.000
      1.286E-05              4.773           55.000
      1.114E-05              5.207           60.000
      9.706E-06              5.641           65.000
      8.477E-06              6.075           70.000
      6.682E-06              6.509           75.000
0     1.080E-04              0.5              5.76
0ANNUAL AVERAGE =    2.67E-06
0K= 10     FIVEXQ(K)= 1.080E-04     FIVEPR(K)= 5.762
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE  NE SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.22	1950.	0.	0.	342.4	1000.0	342.4	2.189E-06	2.186E-06	2.186E-06
A	1.0	.76	1950.	0.	0.	342.4	1000.0	342.4	9.244E-07	9.231E-07	9.231E-07
A	2.0	1.68	1950.	0.	0.	342.4	1000.0	342.4	4.571E-07	4.565E-07	4.565E-07
A	3.0	1.25	1950.	0.	0.	342.4	1000.0	342.4	3.081E-07	3.077E-07	3.077E-07
A	4.0	1.30	1950.	0.	0.	342.4	1000.0	342.4	2.324E-07	2.321E-07	2.321E-07
A	5.0	1.25	1950.	0.	0.	342.4	1000.0	342.4	1.849E-07	1.846E-07	1.846E-07
A	6.0	.60	1950.	0.	0.	342.4	1000.0	342.4	1.546E-07	1.544E-07	1.544E-07
A	8.0	1.24	1950.	0.	0.	342.4	1000.0	342.4	1.159E-07	1.157E-07	1.157E-07
A	10.0	.60	1950.	0.	0.	342.4	1000.0	342.4	9.264E-08	9.252E-08	9.252E-08
A	13.0	.05	1950.	0.	0.	342.4	1000.0	342.4	7.135E-08	7.125E-08	7.125E-08
B	.4	.05	1950.	0.	0.	257.5	227.3	257.5	1.281E-05	1.271E-05	1.271E-05
B	1.0	.16	1950.	0.	0.	257.5	227.3	257.5	5.407E-06	5.365E-06	5.365E-06
B	2.0	.87	1950.	0.	0.	257.5	227.3	257.5	2.674E-06	2.653E-06	2.653E-06
B	3.0	.54	1950.	0.	0.	257.5	227.3	257.5	1.802E-06	1.788E-06	1.788E-06
B	4.0	.38	1950.	0.	0.	257.5	227.3	257.5	1.359E-06	1.349E-06	1.349E-06
B	5.0	.54	1950.	0.	0.	257.5	227.3	257.5	1.081E-06	1.073E-06	1.073E-06
B	6.0	.27	1950.	0.	0.	257.5	227.3	257.5	9.045E-07	8.975E-07	8.975E-07
B	8.0	.87	1950.	0.	0.	257.5	227.3	257.5	6.777E-07	6.725E-07	6.725E-07
B	10.0	.43	1950.	0.	0.	257.5	227.3	257.5	5.419E-07	5.377E-07	5.377E-07
B	13.0	.43	1950.	0.	0.	257.5	227.3	257.5	4.173E-07	4.141E-07	4.141E-07
C	.4	.13	1950.	0.	0.	195.5	112.3	195.5	3.414E-05	3.345E-05	3.345E-05
C	1.0	.38	1950.	0.	0.	195.5	112.3	195.5	1.442E-05	1.412E-05	1.412E-05
C	2.0	.49	1950.	0.	0.	195.5	112.3	195.5	7.129E-06	6.984E-06	6.984E-06
C	3.0	.49	1950.	0.	0.	195.5	112.3	195.5	4.805E-06	4.708E-06	4.708E-06
C	4.0	.76	1950.	0.	0.	195.5	112.3	195.5	3.624E-06	3.551E 06	3.551E 06
C	5.0	.81	1950.	0.	0.	195.5	112.3	195.5	2.883E-06	2.825E-06	2.825E-06
C	6.0	.38	1950.	0.	0.	195.5	112.3	195.5	2.412E-06	2.363E-06	2.363E-06
C	8.0	.92	1950.	0.	0.	195.5	112.3	195.5	1.807E-06	1.770E-06	1.770E-06
C	10.0	.70	1950.	0.	0.	195.5	112.3	195.5	1.445E-06	1.415E-06	1.415E-06
C	13.0	.16	1950.	0.	0.	195.5	112.3	195.5	1.113E-06	1.090E-06	1.090E-06
D	.4	.53	1950.	0.	0.	137.7	49.8	199.2	7.552E-05	1.025E-04	7.552E-05
D	1.0	2.17	1950.	0.	0.	137.7	49.8	199.2	3.189E-05	4.328E-05	3.189E-05
D	2.0	2.33	1950.	0.	0.	137.7	49.8	197.9	1.587E-05	2.140E-05	1.587E-05
D	3.0	2.87	1950.	0.	0.	137.7	49.8	171.1	1.238E-05	1.443E-05	1.238E-05
D	4.0	2.76	1950.	0.	0.	137.7	49.8	155.6	1.026E-05	1.088E-05	1.026E-05
D	5.0	2.44	1950.	0.	0.	137.7	49.8	144.9	8.768E-06	8.655E-06	8.655E-06
D	6.0	1.84	1950.	0.	0.	137.7	49.8	137.7	7.720E-06	7.239E-06	7.239E-06
D	8.0	3.47	1950.	0.	0.	137.7	49.8	137.7	5.785E-06	5.424E-06	5.424E-06
D	10.0	2.44	1950.	0.	0.	137.7	49.8	137.7	4.625E-06	4.337E-06	4.337E-06
D	13.0	1.73	1950.	0.	0.	137.7	49.8	137.7	3.562E-06	3.340E-06	3.340E-06
D	18.0	.27	1950.	0.	0.	137.7	49.8	137.7	2.573E-06	2.413E-06	2.413E-06
E	.4	.77	1950.	0.	0.	97.9	33.8	185.5	1.194E-04	1.989E-04	1.194E-04
E	1.0	2.98	1950.	0.	0.	97.9	33.8	185.5	5.043E-05	8.399E-05	5.043E-05
E	2.0	4.82	1950.	0.	0.	97.9	33.8	183.3	2.523E-05	4.153E-05	2.523E-05
E	3.0	3.90	1950.	0.	0.	97.9	33.8	141.2	2.208E-05	2.800E-05	2.208E-05
E	4.0	3.41	1950.	0.	0.	97.9	33.8	119.8	1.963E-05	2.111E-05	1.963E-05
E	5.0	2.82	1950.	0.	0.	97.9	33.8	106.3	1.759E-05	1.680E-05	1.680E-05
E	6.0	3.41	1950.	0.	0.	97.9	33.8	97.9	1.598E-05	1.405E-05	1.405E-05
E	8.0	3.85	1950.	0.	0.	97.9	33.8	97.9	1.197E-05	1.053E-05	1.053E-05
E	10.0	3.36	1950.	0.	0.	97.9	33.8	97.9	9.574E-06	8.417E-06	8.417E-06
E	13.0	1.41	1950.	0.	0.	97.9	33.8	97.9	7.374E-06	6.483E-06	6.483E-06
E	18.0	.27	1950.	0.	0.	97.9	33.8	97.9	5.327E-06	4.683E-06	4.683E-06
F	.4	.83	1950.	0.	0.	67.6	22.0	158.2	2.155E-04	3.862E-04	2.155E-04
F	1.0	3.03	1950.	0.	0.	67.6	22.0	158.2	9.099E-05	1.631E-04	9.099E-05
F	2.0	5.20	1950.	0.	0.	67.6	22.0	155.7	4.573E-05	8.064E-05	4.573E-05
F	3.0	3.52	1950.	0.	0.	67.6	22.0	109.3	4.391E-05	5.436E-05	4.391E-05
F	4.0	2.00	1950.	0.	0.	67.6	22.0	87.7	4.125E-05	4.100E-05	4.100E-05
F	5.0	.87	1950.	0.	0.	67.6	22.0	75.1	3.834E-05	3.261E-05	3.261E-05
F	6.0	.54	1950.	0.	0.	67.6	22.0	67.6	3.564E-05	2.728E-05	2.728E-05
F	8.0	.54	1950.	0.	0.	67.6	22.0	67.6	2.671E-05	2.044E-05	2.044E-05
F	10.0	.05	1950.	0.	0.	67.6	22.0	67.6	2.135E-05	1.634E-05	1.634E-05
F	13.0	.11	1950.	0.	0.	67.6	22.0	67.6	1.645E-05	1.259E-05	1.259E-05
G	.4	1.15	1950.	0.	0.	46.6	14.3	150.9	3.478E-04	6.684E-04	3.478E-04
G	1.0	3.36	1950.	0.	0.	46.6	14.3	150.9	1.468E-04	2.822E-04	1.468E-04
G	2.0	4.06	1950.	0.	0.	46.6	14.3	147.5	7.429E-05	1.396E-04	7.429E-05
G	3.0	1.41	1950.	0.	0.	46.6	14.3	89.8	8.229E-05	9.408E-05	8.229E-05
G	4.0	.81	1950.	0.	0.	46.6	14.3	66.2	8.420E-05	7.095E-05	7.095E-05
G	18.0	.05	1950.	0.	0.	46.6	14.3	46.6	2.650E-05	1.574E-05	1.574E-05

Prepared by / Date: Mohammed Abu-Shehadeh

Verified by/Date: Ted Messier

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0         RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                              METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                     WIND SENSORS HEIGHT: 10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE          DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0  NE SECTOR     BOUNDARY DISTANCE = 1950.0 METERS
0LATERAL 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=   .5     A=  2861.     D=   70.0
 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   3.478E-04   2.155E-04   1.468E-04   1.194E-04   9.099E-05   8.229E-05   7.552E-05   7.429E-05   7.095E-05   5.043E-05
        1.146       1.978       5.337       6.109       9.143      10.551      11.080      15.143      15.956      18.935
       .06687      .11541      .31137      .35641      .53340      .61557      .64644      .88348      .93089     1.10472
0   4.573E-05   4.391E-05   4.100E-05   3.345E-05   3.261E-05   3.189E-05   2.728E-05   2.523E-05   2.208E-05   2.044E-05
       24.136      27.657      29.662      29.793      30.660      32.827      33.368      38.190      42.090      42.632
      1.40814     1.61357     1.73051     1.73816     1.78873     1.91515     1.94676     2.22805     2.45561     2.48721
0   1.963E-05   1.680E-05   1.634E-05   1.587E-05   1.574E-05   1.412E-05   1.405E-05   1.271E-05   1.259E-05   1.238E-05
       46.045      48.862      48.916      51.246      51.300      51.679      55.092      55.145      55.254      58.125
      2.68633     2.85068     2.85384     2.98974     2.99290     3.01502     3.21414     3.21726     3.22359     3.39110
0   1.053E-05   1.026E-05   8.655E-06   8.417E-06   7.239E-06   6.984E-06   6.483E-06   5.424E-06   5.365E-06   4.708E-06
       61.971      64.734      67.172      70.531      72.373      72.860      74.269      77.736      77.898      78.386
      3.61549     3.77668     3.91891     4.11486     4.22232     4.25077     4.33294     4.53522     4.54470     4.57314
0   4.683E-06   4.337E-06   3.551E-06   3.340E-06   2.825E-06   2.653E-06   2.413E-06   2.363E-06   2.186E-06   1.788E-06
       78.657      81.095      81.853      83.587      84.399      85.266      85.537      85.916      86.132      86.673
      4.58895     4.73117     4.77542     4.87656     4.92396     4.97453     4.99034     5.01246     5.02504     5.05664
0   1.770E-06   1.415E-06   1.349E-06   1.090E-06   1.073E-06   9.231E-07   8.975E-07   6.725E-07   5.377E-07   4.565E-07
       87.594      88.299      88.678      88.840      89.382      90.140      90.411      91.278      91.711      93.391
      5.11037     5.15146     5.17358     5.18307     5.21467     5.25892     5.27472     5.32529     5.35057     5.44855
0   4.141E-07   3.077E-07   2.321E-07   1.846E-07   1.544E-07   1.157E-07   9.252E-08   7.125E-08
       93.824      95.070      96.370      97.616      98.212      99.350      99.946     100.000
      5.47384     5.54653     5.62238     5.69508     5.72984     5.79621     5.83098     5.83414
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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 SEC/CUBIC METER	WITH RESPECT TO THE TOTAL TIME	WHEN THE WIND BLOWS INTO THIS SECTOR ONLY

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE(2)= .311
HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE(3)= .882
HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE(4)= 1.612
HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE(5)= 1.729
HANDCHECK GRAPH: SLOPE LT 1.0 FOR LOW PERCENTAGES. XSAVE(6)= 2.684
HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE(7)= 3.211
HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE(8)= 3.773
HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE(9)= 4.111
HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE(10)= 4.532
HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE(11)= 4.728

0 K	I	XQSAVE(K,I)	XQINT(K,I)	XQSLOP(K,I)
11	1	-7.96393	-13.82232	-1.82612
11	2	-8.82616	-13.96152	-1.87700
11	3	-9.50758	-14.89846	-2.27185
11	4	-10.03335	-15.25933	-2.44036
11	5	-10.10203	-18.56647	-4.00526
11	6	-10.83848	-19.02328	-4.24202
11	7	-11.17289	-19.12908	-4.29918
11	8	-11.48682	-20.36734	-4.99577
11	9	-11.68521	-28.34707	-9.58738
11	10	-12.12459	-30.86035	-11.07271
11	11	-12.34829	NUMXQ(K)= 11	

BACK EXTRAPOLATION FOR 1 PERCENTILE.

	3.735E-04	.058	1.000
	2.056E-04	.175	3.000
	1.527E-04	.292	5.000
	9.836E-05	.583	10.000
	7.478E-05	.875	15.000
	5.858E-05	1.167	20.000
	4.810E-05	1.459	25.000
	4.025E-05	1.750	30.000
	3.126E-05	2.042	35.000
	2.498E-05	2.334	40.000
	2.042E-05	2.625	45.000
	1.686E-05	2.917	50.000
	1.409E-05	3.209	55.000
	1.191E-05	3.500	60.000
	1.017E-05	3.792	65.000
	8.567E-06	4.084	70.000
	6.384E-06	4.376	75.000
	4.661E-06	4.667	80.000
0	1.088E-04	0.5	8.57

0ANNUAL AVERAGE = 2.44E-06
0K= 11 FIVEXQ(K)= 1.088E-04 FIVEPR(K)= 8.570

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003    TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE ENE SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.39	1950.	0.	0.	342.4	1000.0	342.4	2.189E-06	2.186E-06	2.186E-06
A	1.0	1.36	1950.	0.	0.	342.4	1000.0	342.4	9.244E-07	9.231E-07	9.231E-07
A	2.0	1.51	1950.	0.	0.	342.4	1000.0	342.4	4.571E-07	4.565E-07	4.565E-07
A	3.0	1.29	1950.	0.	0.	342.4	1000.0	342.4	3.081E-07	3.077E-07	3.077E-07
A	4.0	.91	1950.	0.	0.	342.4	1000.0	342.4	2.324E-07	2.321E-07	2.321E-07
A	5.0	.61	1950.	0.	0.	342.4	1000.0	342.4	1.849E-07	1.846E-07	1.846E-07
A	6.0	.30	1950.	0.	0.	342.4	1000.0	342.4	1.546E-07	1.544E-07	1.544E-07
A	8.0	.98	1950.	0.	0.	342.4	1000.0	342.4	1.159E-07	1.157E-07	1.157E-07
A	10.0	.61	1950.	0.	0.	342.4	1000.0	342.4	9.264E-08	9.252E-08	9.252E-08
A	13.0	.23	1950.	0.	0.	342.4	1000.0	342.4	7.135E-08	7.125E-08	7.125E-08
B	.4	.07	1950.	0.	0.	257.5	227.3	257.5	1.281E-05	1.271E-05	1.271E-05
B	1.0	.23	1950.	0.	0.	257.5	227.3	257.5	5.407E-06	5.365E-06	5.365E-06
B	2.0	.68	1950.	0.	0.	257.5	227.3	257.5	2.674E-06	2.653E-06	2.653E-06
B	3.0	.38	1950.	0.	0.	257.5	227.3	257.5	1.802E-06	1.788E-06	1.788E-06
B	4.0	.45	1950.	0.	0.	257.5	227.3	257.5	1.359E-06	1.349E-06	1.349E-06
B	5.0	.30	1950.	0.	0.	257.5	227.3	257.5	1.081E-06	1.073E-06	1.073E-06
B	8.0	.15	1950.	0.	0.	257.5	227.3	257.5	6.777E-07	6.725E-07	6.725E-07
B	10.0	.30	1950.	0.	0.	257.5	227.3	257.5	5.419E-07	5.377E-07	5.377E-07
C	.4	.08	1950.	0.	0.	195.5	112.3	195.5	3.414E-05	3.345E-05	3.345E-05
C	1.0	.23	1950.	0.	0.	195.5	112.3	195.5	1.442E-05	1.412E-05	1.412E-05
C	2.0	1.06	1950.	0.	0.	195.5	112.3	195.5	7.129E-06	6.984E-06	6.984E-06
C	3.0	.45	1950.	0.	0.	195.5	112.3	195.5	4.805E-06	4.708E-06	4.708E-06
C	4.0	.53	1950.	0.	0.	195.5	112.3	195.5	3.624E-06	3.551E-06	3.551E-06
C	5.0	.83	1950.	0.	0.	195.5	112.3	195.5	2.883E-06	2.825E-06	2.825E-06
C	6.0	.38	1950.	0.	0.	195.5	112.3	195.5	2.412E-06	2.363E-06	2.363E-06
C	8.0	.68	1950.	0.	0.	195.5	112.3	195.5	1.807E-06	1.770E-06	1.770E-06
C	10.0	1.06	1950.	0.	0.	195.5	112.3	195.5	1.445E-06	1.415E-06	1.415E-06
C	13.0	.08	1950.	0.	0.	195.5	112.3	195.5	1.113E-06	1.090E-06	1.090E-06
D	.4	.46	1950.	0.	0.	137.7	49.8	199.2	7.552E-05	1.025E-04	7.552E-05
D	1.0	1.89	1950.	0.	0.	137.7	49.8	199.2	3.189E-05	4.328E-05	3.189E-05
D	2.0	2.95	1950.	0.	0.	137.7	49.8	197.9	1.587E-05	2.140E-05	1.587E-05
D	3.0	3.55	1950.	0.	0.	137.7	49.8	171.1	1.238E-05	1.443E-05	1.238E-05
D	4.0	1.89	1950.	0.	0.	137.7	49.8	155.6	1.026E-05	1.088E-05	1.026E-05
D	5.0	1.29	1950.	0.	0.	137.7	49.8	144.9	8.768E-06	8.655E-06	8.655E-06
D	6.0	1.97	1950.	0.	0.	137.7	49.8	137.7	7.720E-06	7.239E-06	7.239E-06
D	8.0	3.71	1950.	0.	0.	137.7	49.8	137.7	5.785E-06	5.424E-06	5.424E-06
D	10.0	3.18	1950.	0.	0.	137.7	49.8	137.7	4.625E-06	4.337E-06	4.337E-06
D	13.0	.83	1950.	0.	0.	137.7	49.8	137.7	3.562E-06	3.340E-06	3.340E-06

E	.4	1.02	1950.	0.	0.	97.9	33.8	185.5	1.194E-04	1.989E-04	1.194E-04
E	1.0	3.93	1950.	0.	0.	97.9	33.8	185.5	5.043E-05	8.399E-05	5.043E-05
E	2.0	7.34	1950.	0.	0.	97.9	33.8	183.3	2.523E-05	4.153E-05	2.523E-05
E	3.0	5.22	1950.	0.	0.	97.9	33.8	141.2	2.208E-05	2.800E-05	2.208E-05
E	4.0	3.40	1950.	0.	0.	97.9	33.8	119.8	1.963E-05	2.111E-05	1.963E-05
E	5.0	2.57	1950.	0.	0.	97.9	33.8	106.3	1.759E-05	1.680E-05	1.680E-05
E	6.0	2.50	1950.	0.	0.	97.9	33.8	97.9	1.598E-05	1.405E-05	1.405E-05
E	8.0	2.87	1950.	0.	0.	97.9	33.8	97.9	1.197E-05	1.053E-05	1.053E-05
E	10.0	.91	1950.	0.	0.	97.9	33.8	97.9	9.574E-06	8.417E-06	8.417E-06
E	13.0	.45	1950.	0.	0.	97.9	33.8	97.9	7.374E-06	6.483E-06	6.483E-06
F	.4	1.37	1950.	0.	0.	67.6	22.0	158.2	2.155E-04	3.862E-04	2.155E-04
F	1.0	4.99	1950.	0.	0.	67.6	22.0	158.2	9.099E-05	1.631E-04	9.099E-05
F	2.0	6.35	1950.	0.	0.	67.6	22.0	155.7	4.573E-05	8.064E-05	4.573E-05
F	3.0	4.39	1950.	0.	0.	67.6	22.0	109.3	4.391E-05	5.436E-05	4.391E-05
F	4.0	2.12	1950.	0.	0.	67.6	22.0	87.7	4.125E-05	4.100E-05	4.100E-05
F	5.0	1.21	1950.	0.	0.	67.6	22.0	75.1	3.834E-05	3.261E-05	3.261E-05
F	6.0	.38	1950.	0.	0.	67.6	22.0	67.6	3.564E-05	2.728E-05	2.728E-05
F	8.0	.38	1950.	0.	0.	67.6	22.0	67.6	2.671E-05	2.044E-05	2.044E-05
F	13.0	.08	1950.	0.	0.	67.6	22.0	67.6	1.645E-05	1.259E-05	1.259E-05
G	.4	1.47	1950.	0.	0.	46.6	14.3	150.9	3.478E-04	6.684E-04	3.478E-04
G	1.0	4.31	1950.	0.	0.	46.6	14.3	150.9	1.468E-04	2.822E-04	1.468E-04
G	2.0	2.87	1950.	0.	0.	46.6	14.3	147.5	7.429E-05	1.396E-04	7.429E-05
G	3.0	1.21	1950.	0.	0.	46.6	14.3	89.8	8.229E-05	9.408E-05	8.229E-05
G	4.0	.45	1950.	0.	0.	46.6	14.3	66.2	8.420E-05	7.095E-05	7.095E-05
G	5.0	.30	1950.	0.	0.	46.6	14.3	53.6	8.270E-05	5.645E-05	5.645E-05
G	6.0	.08	1950.	0.	0.	46.6	14.3	46.6	7.950E-05	4.721E-05	4.721E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0              RUN DATE: 11/19/2003     TIME:  23: 4:56
/PLANT NAME:    CGS                                  METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                          WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE               DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0 ENE SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0LATERAL 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=   .5     A=  2861.      D=   70.0
 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   3.478E-04   2.155E-04   1.468E-04   1.194E-04   9.099E-05   8.229E-05   7.532E-05   7.429E-05   7.095E-05   5.645E-05
        1.471       2.840       7.151       8.170      13.161      14.371      14.833      17.707      18.160      18.463
       .06147      .11869      .29884      .34143      .55002      .60059      .61988      .73998      .75895      .77159
0   5.043E-05   4.721E-05   4.573E-05   4.391E-05   4.100E-05   3.345E-05   3.261E-05   3.189E-05   2.728E-05   2.523E-05
       22.396      22.471      28.824      33.210      35.328      35.406      36.616      38.507      38.885      46.221
       .93594      .93910     1.20459     1.38790     1.47639     1.47967     1.53024     1.60925     1.62506     1.93163
0   2.208E-05   2.044E-05   1.963E-05   1.680E-05   1.587E-05   1.412E-05   1.405E-05   1.271E-05   1.259E-05   1.238E-05
       51.439      51.817      55.221      57.792      60.741      60.968      63.464      63.539      63.614      67.169
      2.14971     2.16551     2.30774     2.41520     2.53846     2.54794     2.65224     2.65536     2.65852     2.80707
0   1.053E-05   1.026E-05   8.655E-06   8.417E-06   7.219E-06   6.984E-06   6.483E-06   5.424E-06   5.365E-06   4.708E-06
       70.043      71.933      73.219      74.127      76.093      77.152      77.606      81.311      81.538      81.992
      2.92717     3.00618     3.05991     3.09784     3.18002     3.22426     3.24323     3.39809     3.40758     3.42654
0   4.337E-06   3.551E-06   3.340E-06   2.825E-06   2.653E-06   2.363E-06   2.186E-06   1.788E-06   1.770E-06   1.415E-06
       85.168      85.698      86.530      87.361      88.042      88.420      88.807      89.185      89.866      90.925
      3.55928     3.58141     3.61617     3.65094     3.67938     3.69519     3.71136     3.72716     3.75560     3.79985
0   1.349E-06   1.090E-06   1.073E-06   9.231E-07   6.725E-07   5.377E-07   4.565E-07   3.077E-07   2.321E-07   1.846E-07
       91.379      91.454      91.757      93.118      93.269      93.572      95.084      96.370      97.277      97.882
      3.81882     3.82198     3.83462     3.89151     3.89783     3.91047     3.97368     4.02741     4.06534     4.09062
0   1.544E-07   1.157E-07   9.252E-08   7.125E-08
       98.185      99.168      99.773     100.000
      4.10327     4.14435     4.16964     4.17912
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Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

Revision No. 0

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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)=    .299
                                       HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=    .739
                                       HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   1.386
                                       HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   1.475
                                       HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   2.305
                                       HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   2.536
                                       HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   2.804
                                       HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   3.003
                                       HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   3.556
                                       HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(11)=   3.676
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  12  1     -7.96393 -13.73655  -1.78597
  12  2     -8.82616 -14.83578  -2.18577
  12  3     -9.50758 -14.92596  -2.22277
  12  4    -10.03335 -16.24856  -2.82364
  12  5    -10.10203 -18.89100  -4.03755
  12  6    -10.83848 -21.28527  -5.23804
  12  7    -11.05090 -22.22259  -5.71777
  12  8    -11.29960 -23.19934  -6.22906
  12  9    -11.48682 -32.91046 -11.39371
  12 10    -12.34829 -70.98909 -32.49347
  12 11    -12.83980      NUMXQ(K)= 11
                                       BACK EXTRAPOLATION FOR  1 PERCENTILE.
     4.223E-04              .042             1.000
     2.392E-04              .125             3.000
     1.804E-04              .209             5.000
     1.150E-04              .418            10.000
     8.458E-05              .627            15.000
     6.731E-05              .836            20.000
     5.597E-05             1.045            25.000
     4.795E-05             1.254            30.000
     4.142E-05             1.463            35.000
     3.357E-05             1.672            40.000
     2.768E-05             1.881            45.000
     2.322E-05             2.090            50.000
     1.976E-05             2.299            55.000
     1.632E-05             2.507            60.000
     1.343E-05             2.716            65.000
     1.106E-05             2.925            70.000
     8.315E-06             3.134            75.000
     5.987E-06             3.343            80.000
     4.382E-06             3.552            85.000
0    1.006E-04             0.5              11.96
0ANNUAL AVERAGE =    2.14E-06
0K= 12      FIVEXQ(K)= 1.006E-04     FIVEPR(K)=11.964
```

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 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 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=1431.SQ.METERS	USED
A	.4	.28	1950.	0.	0.	342.4	1000.0	342.4	2.189E-06	2.186E-06	2.186E-06
A	1.0	1.00	1950.	0.	0.	342.4	1000.0	342.4	9.244E-07	9.231E-07	9.231E-07
A	2.0	2.00	1950.	0.	0.	342.4	1000.0	342.4	4.571E-07	4.565E-07	4.565E-07
A	3.0	.60	1950.	0.	0.	342.4	1000.0	342.4	3.081E-07	3.077E-07	3.077E-07
A	4.0	.73	1950.	0.	0.	342.4	1000.0	342.4	2.324E-07	2.321E-07	2.321E-07
A	5.0	.53	1950.	0.	0.	342.4	1000.0	342.4	1.849E-07	1.846E-07	1.846E-07
A	6.0	.33	1950.	0.	0.	342.4	1000.0	342.4	1.546E-07	1.544E-07	1.544E-07
A	8.0	.60	1950.	0.	0.	342.4	1000.0	342.4	1.159E-07	1.157E-07	1.157E-07
A	10.0	.47	1950.	0.	0.	342.4	1000.0	342.4	9.264E-08	9.252E-08	9.252E-08
A	13.0	.20	1950.	0.	0.	342.4	1000.0	342.4	7.135E-08	7.125E-08	7.125E-08
B	.4	.09	1950.	0.	0.	257.5	227.3	257.5	1.281E-05	1.271E-05	1.271E-05
B	1.0	.27	1950.	0.	0.	257.5	227.3	257.5	5.407E-06	5.365E-06	5.365E-06
B	2.0	.60	1950.	0.	0.	257.5	227.3	257.5	2.674E-06	2.653E-06	2.653E-06
B	3.0	.33	1950.	0.	0.	257.5	227.3	257.5	1.802E-06	1.788E-06	1.788E-06
B	4.0	.40	1950.	0.	0.	257.5	227.3	257.5	1.359E-06	1.349E-06	1.349E-06
B	5.0	.40	1950.	0.	0.	257.5	227.3	257.5	1.081E-06	1.073E-06	1.073E-06
B	6.0	.60	1950.	0.	0.	257.5	227.3	257.5	9.045E-07	8.975E-07	8.975E-07
B	8.0	.67	1950.	0.	0.	257.5	227.3	257.5	6.777E-07	6.725E-07	6.725E-07
B	10.0	.07	1950.	0.	0.	257.5	227.3	257.5	5.419E-07	5.377E-07	5.377E-07
B	13.0	.27	1950.	0.	0.	257.5	227.3	257.5	4.173E-07	4.141E-07	4.141E-07
C	.4	.07	1950.	0.	0.	195.5	112.3	195.5	3.414E-05	3.345E-05	3.345E-05
C	1.0	.20	1950.	0.	0.	195.5	112.3	195.5	1.442E-05	1.412E-05	1.412E-05
C	2.0	.47	1950.	0.	0.	195.5	112.3	195.5	7.129E-06	6.984E-06	6.984E-06
C	3.0	.60	1950.	0.	0.	195.5	112.3	195.5	4.805E-06	4.708E-06	4.708E-06
C	4.0	.53	1950.	0.	0.	195.5	112.3	195.5	3.624E-06	3.551E-06	3.551E-06
C	5.0	.47	1950.	0.	0.	195.5	112.3	195.5	2.883E-06	2.825E-06	2.825E-06
C	6.0	.47	1950.	0.	0.	195.5	112.3	195.5	2.412E-06	2.363E-06	2.363E-06
C	8.0	.67	1950.	0.	0.	195.5	112.3	195.5	1.807E-06	1.770E-06	1.770E-06
C	10.0	.27	1950.	0.	0.	195.5	112.3	195.5	1.445E-06	1.415E-06	1.415E-06
C	13.0	.07	1950.	0.	0.	195.5	112.3	195.5	1.113E-06	1.090E-06	1.090E-06
D	.4	.57	1950.	0.	0.	137.7	49.8	199.2	7.552E-05	1.025E-04	7.552E-05
D	1.0	2.33	1950.	0.	0.	137.7	49.8	199.2	3.189E-05	4.328E-05	3.189E-05
D	2.0	3.33	1950.	0.	0.	137.7	49.8	197.9	1.587E-05	2.140E-05	1.587E-05
D	3.0	1.93	1950.	0.	0.	137.7	49.8	171.1	1.238E-05	1.443E-05	1.238E-05
D	4.0	2.13	1950.	0.	0.	137.7	49.8	155.6	1.026E-05	1.088E-05	1.026E-05
D	5.0	2.67	1950.	0.	0.	137.7	49.8	144.9	8.768E-06	8.655E-06	8.655E-06
D	6.0	1.93	1950.	0.	0.	137.7	49.8	137.7	7.720E-06	7.239E-06	7.239E-06
D	8.0	2.27	1950.	0.	0.	137.7	49.8	137.7	5.785E-06	5.424E-06	5.424E-06
D	10.0	1.20	1950.	0.	0.	137.7	49.8	137.7	4.625E-06	4.337E-06	4.337E-06
D	13.0	.33	1950.	0.	0.	137.7	49.8	137.7	3.562E-06	3.340E-06	3.340E-06
D	18.0	.13	1950.	0.	0.	137.7	49.8	137.7	2.573E-06	2.413E-06	2.413E-06
E	.4	1.07	1950.	0.	0.	97.9	33.8	185.5	1.194E-04	1.989E-04	1.194E-04
E	1.0	4.13	1950.	0.	0.	97.9	33.8	185.5	5.043E-05	8.399E-05	5.043E-05
E	2.0	6.53	1950.	0.	0.	97.9	33.8	183.3	2.523E-05	4.153E-05	2.523E-05
E	3.0	5.40	1950.	0.	0.	97.9	33.8	141.2	2.208E-05	2.800E-05	2.208E-05
E	4.0	5.73	1950.	0.	0.	97.9	33.8	119.8	1.963E-05	2.111E-05	1.963E-05
E	5.0	2.87	1950.	0.	0.	97.9	33.8	106.3	1.759E-05	1.680E-05	1.680E-05
E	6.0	2.87	1950.	0.	0.	97.9	33.8	97.9	1.598E-05	1.405E-05	1.405E-05
E	8.0	2.73	1950.	0.	0.	97.9	33.8	97.9	1.197E-05	1.053E-05	1.053E-05
E	10.0	.80	1950.	0.	0.	97.9	33.8	97.9	9.574E-06	8.417E-06	8.417E-06
E	13.0	.40	1950.	0.	0.	97.9	33.8	97.9	7.374E-06	6.483E-06	6.483E-06
F	.4	1.37	1950.	0.	0.	67.6	22.0	158.2	2.155E-04	3.862E-04	2.155E-04
F	1.0	5.00	1950.	0.	0.	67.6	22.0	158.2	9.099E-05	1.631E-04	9.099E-05
F	2.0	6.80	1950.	0.	0.	67.6	22.0	155.7	4.573E-05	8.064E-05	4.573E-05
F	3.0	3.47	1950.	0.	0.	67.6	22.0	109.3	4.391E-05	5.436E-05	4.391E-05
F	4.0	3.00	1950.	0.	0.	67.6	22.0	87.7	4.125E-05	4.100E-05	4.100E-05
F	5.0	2.13	1950.	0.	0.	67.6	22.0	75.1	3.834E-05	3.261E-05	3.261E-05
F	6.0	1.07	1950.	0.	0.	67.6	22.0	67.6	3.564E-05	2.728E-05	2.728E-05
F	8.0	.13	1950.	0.	0.	67.6	22.0	67.6	2.671E-05	2.044E-05	2.044E-05
F	10.0	.07	1950.	0.	0.	67.6	22.0	67.6	2.135E-05	1.634E-05	1.634E-05
G	.4	1.41	1950.	0.	0.	46.6	14.3	150.9	3.478E-04	6.684E-04	3.478E-04
G	1.0	4.23	1950.	0.	0.	46.6	14.3	150.9	1.468E-04	2.822E-04	1.468E-04
G	2.0	3.60	1950.	0.	0.	46.6	14.3	147.5	7.429E-05	1.396E-04	7.429E-05
G	3.0	1.00	1950.	0.	0.	46.6	14.3	89.8	8.229E-05	9.408E-05	8.229E-05
G	4.0	.87	1950.	0.	0.	46.6	14.3	66.2	8.420E-05	7.095E-05	7.095E-05
G	5.0	.33	1950.	0.	0.	46.6	14.3	53.6	8.270E-05	5.645E-05	5.645E-05

ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-191	Cont'd on page B-192
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

Cont'd on page B-192

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE:  11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
OSITE EXCLUSION BOUNDARY CALCULATIONS:
0   E SECTOR     BOUNDARY DISTANCE = 1950.0 METERS
CLATERAL 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=   .5    A=  2861.    D=   70.0
 CORRECTION FACTORS USED IN THE ANNUAL AVERAGE CALCULATIONS.
CBELOW 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 NORMALIZZD TO THIS SECTOR.
 THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.
0   3.478E-04   2.155E-04   1.468E-04   1.194E-04   9.099E-05   8.229E-05   7.552E-05   7.429E-05   7.095E-05   5.645E-05
        1.410       2.782       6.915       7.986      12.987      13.987      14.556      18.156      19.023      19.356
       .06687      .13188      .32784      .37861      .61565      .66306      .69007      .86074      .90183      .91763
0   5.043E-05   4.573E-05   4.391E-05   4.100E-05   3.345E-05   3.261E-05   3.189E-05   2.728E-05   2.523E-05   2.208E-05
       23.490      30.290      33.757      36.757      36.826      38.959      41.293      42.360      48.893      54.293
      1.11359     1.43596     1.60031     1.74254     1.74581     1.84695     1.95757     2.00814     2.31787     2.57388
0   2.044E-05   1.963E-05   1.680E-05   1.634E-05   1.587E-05   1.412E-05   1.405E-05   1.271E-05   1.238E-05   1.053E-05
       54.427      60.160      63.027      63.093      66.427      66.627      69.494      69.582      71.515      74.248
      2.58020     2.85201     2.98791     2.99107     3.14910     3.15858     3.29449     3.29865     3.39031     3.51989
0   1.026E-05   8.655E-06   8.417E-06   7.239E-06   6.984E-06   6.483E-06   5.424E-06   5.365E-06   4.708E-06   4.337E-06
       76.382      79.048      79.849      81.782      82.249      82.649      84.915      85.182      85.782      86.982
      3.62103     3.74745     3.78538     3.87703     3.89916     3.91812     4.02558     4.03822     4.06667     4.12356
0   3.551E-06   3.340E-06   2.825E-06   2.653E-06   2.413E-06   2.363E-06   2.186E-06   1.788E-06   1.770E-06   1.415E-06
       87.515      87.849      88.315      88.915      89.049      89.515      89.800      90.133      90.800      91.066
      4.14884     4.16465     4.18677     4.21521     4.22154     4.24366     4.25713     4.27294     4.30454     4.31719
0   1.349E-06   1.090E-06   1.073E-06   9.231E-07   8.975E-07   6.725E-07   5.377E-07   4.565E-07   4.141E-07   3.077E-07
       91.466      91.533      91.933      92.933      93.533      94.200      94.267      96.267      96.533      97.133
      4.33615     4.33931     4.35827     4.40568     4.43413     4.46573     4.46889     4.56371     4.57635     4.60480
0   2.321E-07   1.846E-07   1.544E-07   1.157E-07   9.252E-08   7.125E-08
       97.867      98.400      98.733      99.333      99.800     100.000
      4.63956     4.66485     4.68065     4.70909     4.73122     4.74070
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Cont'd on page B-193


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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)=    .327
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=    .860
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   1.741
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   2.849
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   3.146
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   3.291
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   3.618
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   3.782
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   3.896
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(11)=   4.035

0  K  I    XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  13  1      -7.96393 -13.61866  -1.76264
  13  2      -8.82616 -14.33346  -2.02554
  13  3      -9.50758 -14.71473  -2.18556
  13  4     -10.10203 -17.60688  -3.55591
  13  5     -10.83848 -20.09266  -4.86186
  13  6     -11.05090 -22.31064  -6.05449
  13  7     -11.17289 -24.69171  -7.34884
  13  8     -11.48682 -29.03314  -9.76495
  13  9     -11.68521 -35.98671 -13.67904
  13 10     -11.87188 -40.48720 -16.23192
  13 11     -12.13560     NUMXQ(K)= 11
                                                  BACK EXTRAPOLATION FOR  1 PERCENTILE.
      4.131E-04                .047              1.000
      2.345E-04                .142              3.000
      1.769E-04                .237              5.000
      1.141E-04                .474             10.000
      8.552E-05                .711             15.000
      6.869E-05                .948             20.000
      5.713E-05               1.185             25.000
      4.894E-05               1.422             30.000
      4.280E-05               1.659             35.000
      3.627E-05               1.896             40.000
      3.050E-05               2.133             45.000
      2.606E-05               2.370             50.000
      2.254E-05               2.607             55.000
      1.971E-05               2.844             60.000
      1.663E-05               3.081             65.000
      1.372E-05               3.318             70.000
      1.091E-05               3.556             75.000
      8.318E-06               3.793             80.000
      5.452E-06               4.030             85.000
0     1.100E-04               0.5               10.55
0ANNUAL AVERAGE =    2.47E-06
0K= 13     FIVEXQ(K)= 1.100E-04      FIVEPR(K)=10.547
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Calculation No. NE-02-03-16

Prepared by / Date: Mohammed Abu-Shehadeh

Verified by/Date: Ted Messier

Revision No. 0

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                       WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE            DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp  output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE ESE SECTOR.
```

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=1431.SQ.METERS	USED
A	.4	.24	1950.	0.	0.	342.4	1000.0	342.4	2.189E-06	2.186E-06	2.186E-06
A	1.0	.84	1950.	0.	0.	342.4	1000.0	342.4	9.244E-07	9.231E-07	9.231E-07
A	2.0	1.29	1950.	0.	0.	342.4	1000.0	342.4	4.571E-07	4.565E-07	4.565E-07
A	3.0	.65	1950.	0.	0.	342.4	1000.0	342.4	3.081E-07	3.077E-07	3.077E-07
A	4.0	.19	1950.	0.	0.	342.4	1000.0	342.4	2.324E-07	2.321E-07	2.321E-07
A	5.0	.23	1950.	0.	0.	342.4	1000.0	342.4	1.849E-07	1.846E-07	1.846E-07
A	6.0	.23	1950.	0.	0.	342.4	1000.0	342.4	1.546E-07	1.544E-07	1.544E-07
A	8.0	.42	1950.	0.	0.	342.4	1000.0	342.4	1.159E-07	1.157E-07	1.157E-07
A	10.0	.23	1950.	0.	0.	342.4	1000.0	342.4	9.264E-08	9.252E-08	9.252E-08
A	13.0	.27	1950.	0.	0.	342.4	1000.0	342.4	7.135E-08	7.125E-08	7.125E-08
B	.4	.04	1950.	0.	0.	257.5	227.3	257.5	1.281E-05	1.271E-05	1.271E-05
B	1.0	.11	1950.	0.	0.	257.5	227.3	257.5	5.407E-06	5.365E-06	5.365E-06
B	2.0	.31	1950.	0.	0.	257.5	227.3	257.5	2.674E-06	2.653E-06	2.653E-06
B	3.0	.27	1950.	0.	0.	257.5	227.3	257.5	1.802E-06	1.788E-06	1.788E-06
B	4.0	.27	1950.	0.	0.	257.5	227.3	257.5	1.359E-06	1.349E-06	1.349E-06
B	5.0	.23	1950.	0.	0.	257.5	227.3	257.5	1.081E-06	1.073E-06	1.073E-06
B	6.0	.27	1950.	0.	0.	257.5	227.3	257.5	9.045E-07	8.975E-07	8.975E-07
B	8.0	.19	1950.	0.	0.	257.5	227.3	257.5	6.777E-07	6.725E-07	6.725E-07
B	10.0	.08	1950.	0.	0.	257.5	227.3	257.5	5.419E-07	5.377E-07	5.377E-07
B	13.0	.15	1950.	0.	0.	257.5	227.3	257.5	4.173E-07	4.141E-07	4.141E-07
C	.4	.04	1950.	0.	0.	195.5	112.3	195.5	3.414E-05	3.345E-05	3.345E-05
C	1.0	.11	1950.	0.	0.	195.5	112.3	195.5	1.442E-05	1.412E-05	1.412E-05
C	2.0	.34	1950.	0.	0.	195.5	112.3	195.5	7.129E-06	6.984E-06	6.984E-06
C	3.0	.46	1950.	0.	0.	195.5	112.3	195.5	4.805E-06	4.708E-06	4.708E-06
C	4.0	.11	1950.	0.	0.	195.5	112.3	195.5	3.624E-06	3.551E-06	3.551E-06
C	5.0	.27	1950.	0.	0.	195.5	112.3	195.5	2.883E-06	2.825E-06	2.825E-06
C	6.0	.27	1950.	0.	0.	195.5	112.3	195.5	2.412E-06	2.363E-06	2.363E-06
C	8.0	.19	1950.	0.	0.	195.5	112.3	195.5	1.807E-06	1.770E-06	1.770E-06
C	10.0	.34	1950.	0.	0.	195.5	112.3	195.5	1.445E-06	1.415E-06	1.415E-06
C	13.0	.31	1950.	0.	0.	195.5	112.3	195.5	1.113E-06	1.090E-06	1.090E-06
D	.4	.36	1950.	0.	0.	137.7	49.8	199.2	7.552E-05	1.025E-04	7.552E-05
D	1.0	1.49	1950.	0.	0.	137.7	49.8	199.2	3.189E-05	4.328E-05	3.189E-05
D	2.0	1.91	1950.	0.	0.	137.7	49.8	197.9	1.587E-05	2.140E-05	1.587E-05
D	3.0	2.45	1950.	0.	0.	137.7	49.8	171.1	1.238E-05	1.443E-05	1.238E-05
D	4.0	2.45	1950.	0.	0.	137.7	49.8	155.6	1.026E-05	1.088E-05	1.026E-05
D	5.0	1.80	1950.	0.	0.	137.7	49.8	144.9	8.768E-06	8.655E-06	8.655E-06
D	6.0	2.07	1950.	0.	0.	137.7	49.8	137.7	7.720E-06	7.239E-06	7.239E-06
D	8.0	3.94	1950.	0.	0.	137.7	49.8	137.7	5.785E-06	5.424E-06	5.424E-06
D	10.0	1.95	1950.	0.	0.	137.7	49.8	137.7	4.625E-06	4.337E-06	4.337E-06
D	13.0	.69	1950.	0.	0.	137.7	49.8	137.7	3.562E-06	3.340E-06	3.340E-06
D	18.0	.08	1950.	0.	0.	137.7	49.8	137.7	2.573E-06	2.413E-06	2.413E-06
E	.4	.89	1950.	0.	0.	97.9	33.8	185.5	1.194E-04	1.989E-04	1.194E-04
E	1.0	3.44	1950.	0.	0.	97.9	33.8	185.5	5.043E-05	8.399E-05	5.043E-05
E	2.0	5.40	1950.	0.	0.	97.9	33.8	183.3	2.523E-05	4.153E-05	2.523E-05
E	3.0	5.82	1950.	0.	0.	97.9	33.8	141.2	2.208E-05	2.800E-05	2.208E-05
E	4.0	5.51	1950.	0.	0.	97.9	33.8	119.8	1.963E-05	2.111E-05	1.963E-05
E	5.0	6.16	1950.	0.	0.	97.9	33.8	106.3	1.759E-05	1.680E-05	1.680E-05
E	6.0	5.36	1950.	0.	0.	97.9	33.8	97.9	1.598E-05	1.405E-05	1.405E-05
E	8.0	5.78	1950.	0.	0.	97.9	33.8	97.9	1.197E-05	1.053E-05	1.053E-05
E	10.0	2.45	1950.	0.	0.	97.9	33.8	97.9	9.574E-06	8.417E-06	8.417E-06
E	13.0	.77	1950.	0.	0.	97.9	33.8	97.9	7.374E-06	6.483E-06	6.483E-06
E	18.0	.08	1950.	0.	0.	97.9	33.8	97.9	5.327E-06	4.683E-06	4.683E-06
F	.4	.85	1950.	0.	0.	67.6	22.0	158.2	2.155E-04	3.862E-04	2.155E-04
F	1.0	3.10	1950.	0.	0.	67.6	22.0	158.2	9.099E-05	1.631E-04	9.099E-05
F	2.0	5.36	1950.	0.	0.	67.6	22.0	155.7	4.573E-05	8.064E-05	4.573E-05
F	3.0	3.87	1950.	0.	0.	67.6	22.0	109.3	4.391E-05	5.436E-05	4.391E-05
F	4.0	3.94	1950.	0.	0.	67.6	22.0	87.7	4.125E-05	4.100E-05	4.100E-05
F	5.0	2.07	1950.	0.	0.	67.6	22.0	75.1	3.834E-05	3.261E-05	3.261E-05
F	6.0	1.07	1950.	0.	0.	67.6	22.0	67.6	3.564E-05	2.728E-05	2.728E-05
F	8.0	.54	1950.	0.	0.	67.6	22.0	67.6	2.671E-05	2.044E-05	2.044E-05
G	.4	.86	1950.	0.	0.	46.6	14.3	150.9	3.478E-04	6.684E-04	3.478E-04
G	1.0	2.53	1950.	0.	0.	46.6	14.3	150.9	1.468E-04	2.822E-04	1.468E-04
G	2.0	3.71	1950.	0.	0.	46.6	14.3	147.5	7.429E-05	1.396E-04	7.429E-05
G	3.0	1.68	1950.	0.	0.	46.6	14.3	89.8	8.229E-05	9.408E-05	8.229E-05
G	4.0	.54	1950.	0.	0.	46.6	14.3	66.2	8.420E-05	7.095E-05	7.095E-05
G	5.0	.19	1950.	0.	0.	46.6	14.3	53.6	8.270E-05	5.645E-05	5.645E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0 ESE SECTOR     BOUNDARY DISTANCE = 1950.0 METERS
0LATERAL 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=   .5     A=  2861.     D=   70.0
 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   3.478E-04   2.155E-04   1.468E-04   1.194E-04   9.099E-05   8.229E-05   7.552E-05   7.429E-05   7.095E-05   5.645E-05
         .862       1.712       4.238       5.131       8.231       9.915      10.279      13.992      14.527      14.719
       .07118      .14140      .35000      .42370      .67970      .81877      .84887     1.15544     1.19969     1.21549
0   5.043E-05   4.573E-05   4.391E-05   4.100E-05   3.345E-05   3.261E-05   3.189E-05   2.728E-05   2.523E-05   2.208E-05
       18.163      23.521      27.387      31.329      31.369      33.435      34.928      36.000      41.396      47.213
      1.49994     1.94242     2.26163     2.58717     2.59045     2.76112     2.88438     2.97288     3.41851     3.89892
0   2.044E-05   1.963E-05   1.680E-05   1.587E-05   1.412E 05   1.405E-05   1.271E-05   1.238E-05   1.053E-05   1.026E-05
       47.749      53.260      59.422      61.336      61.451      66.809      66.847      69.296      75.075      77.524
      3.94317     4.39829     4.90714     5.06516     5.07465     5.51712     5.52025     5.72252     6.19977     6.40204
0   8.655E-06   8.417E-06   7.239E-06   6.984E-06   6.483E-06   5.424E-06   5.365E-06   4.708E-06   4.683E-06   4.337E-06
       79.323      81.773      83.839      84.184      84.949      88.891      89.006      89.465      89.542      91.494
      6.55059     6.75287     6.92354     6.95198     7.01519     7.34073     7.35021     7.38814     7.39446     7.55565
0   3.551E-06   3.340E-06   2.825E-06   2.653E-06   2.413E-06   2.363E-06   2.186E-06   1.788E-06   1.770E-06   1.415E-06
       91.609      92.298      92.565      92.872      92.948      93.216      93.455      93.723      93.915      94.259
      7.56513     7.62202     7.64414     7.66943     7.67575     7.69787     7.71764     7.73976     7.75556     7.78401
0   1.349E-06   1.090E-06   1.073E 06   9.231E-07   8.975E-07   6.725E-07   5.377E-07   4.565E-07   4.141E-07   3.077E-07
       94.527      94.833      95.063      95.905      96.173      96.364      96.441      97.627      97.780      98.431
      7.80613     7.83142     7.85038     7.91991     7.94204     7.95784     7.96416     8.06214     8.07478     8.12851
0   2.321E-07   1.846E-07   1.544E-07   1.157E-07   9.252E-08   7.125E-08
       98.622      98.852      99.081      99.502      99.732     100.000
      8.14431     8.16327     8.18224     8.21700     8.23597     8.25809
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Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

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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)= 1.154
HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 3)= 2.585
HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 4)= 4.903
HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 5)= 5.513
HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 6)= 6.398
HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 7)= 6.749
HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 8)= 7.337
HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 9)= 7.552

0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  14  1      -7.96393 -13.32810  -1.68151
  14  2      -9.50758 -13.64578  -1.82133
  14  3     -10.10203 -16.05955  -3.06190
  14  4     -10.99428 -16.15178  -3.11765
  14  5     -11.17289 -17.87401  -4.19607
  14  6     -11.48682 -22.49471  -7.23166
  14  7     -11.68521 -26.74901 -10.07782
  14  8     -12.12459 -33.38115 -14.64808
  14  9     -12.34829     NUMXQ(K)=  9
     3.234E-04              .083            1.000
     1.836E-04              .248            3.000
     1.383E-04              .413            5.000
     9.177E-05              .826           10.000
     7.076E-05             1.239           15.000
     5.757E-05             1.652           20.000
     4.877E-05             2.065           25.000
     4.241E-05             2.477           30.000
     3.538E-05             2.890           35.000
     2.952E-05             3.303           40.000
     2.507E-05             3.716           45.000
     2.159E-05             4.129           50.000
     1.882E-05             4.542           55.000
     1.655E-05             4.955           60.000
     1.466E-05             5.368           65.000
     1.275E-05             5.781           70.000
     1.102E-05             6.194           75.000
     9.135E-06             6.606           80.000
     6.873E-06             7.019           85.000
     4.928E-06             7.432           90.000
0    1.239E-04             0.5              6.05
0ANNUAL AVERAGE =   3.37E-06
0K= 14     FIVEXQ(K)= 1.239E-04     FIVEPR(K)= 6.055
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0            RUN DATE: 11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                                 METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                        WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE             DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE  SE SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.21	1950.	0.	0.	342.4	1000.0	342.4	2.189E 06	2.186E 06	2.186E-06
A	1.0	.73	1950.	0.	0.	342.4	1000.0	342.4	9.244E-07	9.231E-07	9.231E-07
A	2.0	1.42	1950.	0.	0.	342.4	1000.0	342.4	4.571E-07	4.565E-07	4.565E-07
A	3.0	.78	1950.	0.	0.	342.4	1000.0	342.4	3.081E-07	3.077E-07	3.077E-07
A	4.0	.55	1950.	0.	0.	342.4	1000.0	342.4	2.324E-07	2.321E-07	2.321E-07
A	5.0	.12	1950.	0.	0.	342.4	1000.0	342.4	1.849E-07	1.846E-07	1.846E-07
A	6.0	.15	1950.	0.	0.	342.4	1000.0	342.4	1.546E-07	1.544E-07	1.544E-07
A	8.0	.17	1950.	0.	0.	342.4	1000.0	342.4	1.159E-07	1.157E-07	1.157E-07
A	10.0	.12	1950.	0.	0.	342.4	1000.0	342.4	9.264E-08	9.252E-08	9.252E-08
A	13.0	.09	1950.	0.	0.	342.4	1000.0	342.4	7.135E-08	7.125E-08	7.125E-08
B	.4	.08	1950.	0.	0.	257.5	227.3	257.5	1.281E-05	1.271E-05	1.271E-05
B	1.0	.23	1950.	0.	0.	257.5	227.3	257.5	5.407E-06	5.365E-06	5.365E-06
B	2.0	.35	1950.	0.	0.	257.5	227.3	257.5	2.674E-06	2.653E-06	2.653E-06
B	3.0	.26	1950.	0.	0.	257.5	227.3	257.5	1.802E-06	1.788E-06	1.788E-06
B	4.0	.35	1950.	0.	0.	257.5	227.3	257.5	1.359E-06	1.349E-06	1.349E-06
B	5.0	.15	1950.	0.	0.	257.5	227.3	257.5	1.081E-06	1.073E-06	1.073E-06
B	6.0	.12	1950.	0.	0.	257.5	227.3	257.5	9.045E-07	8.975E-07	8.975E-07
B	8.0	.06	1950.	0.	0.	257.5	227.3	257.5	6.777E-07	6.725E-07	6.725E-07
B	10.0	.03	1950.	0.	0.	257.5	227.3	257.5	5.419E-07	5.377E-07	5.377E-07
C	.4	.03	1950.	0.	0.	195.5	112.3	195.5	3.414E-05	3.345E-05	3.345E-05
C	1.0	.09	1950.	0.	0.	195.5	112.3	195.5	1.442E-05	1.412E-05	1.412E-05
C	2.0	.46	1950.	0.	0.	195.5	112.3	195.5	7.129E-06	6.984E-06	6.984E-06
C	3.0	.49	1950.	0.	0.	195.5	112.3	195.5	4.805E-06	4.708E-06	4.708E-06
C	4.0	.20	1950.	0.	0.	195.5	112.3	195.5	3.624E-06	3.551E-06	3.551E-06
C	5.0	.20	1950.	0.	0.	195.5	112.3	195.5	2.883E-06	2.825E-06	2.825E-06
C	6.0	.12	1950.	0.	0.	195.5	112.3	195.5	2.412E-06	2.363E-06	2.363E-06
C	8.0	.09	1950.	0.	0.	195.5	112.3	195.5	1.807E-06	1.770E-06	1.770E-06
C	10.0	.20	1950.	0.	0.	195.5	112.3	195.5	1.445E-06	1.415E-06	1.415E-06
D	.4	.26	1950.	0.	0.	137.7	49.8	199.2	7.552E-05	1.025E-04	7.552E-05
D	1.0	1.05	1950.	0.	0.	137.7	49.8	199.2	3.189E-05	4.328E-05	3.189E-05
D	2.0	4.33	1950.	0.	0.	137.7	49.8	197.9	1.587E-05	2.140E-05	1.587E-05
D	3.0	4.30	1950.	0.	0.	137.7	49.8	171.1	1.238E-05	1.443E-05	1.238E-05
D	4.0	3.81	1950.	0.	0.	137.7	49.8	155.6	1.026E-05	1.088E-05	1.026E-05
D	5.0	2.85	1950.	0.	0.	137.7	49.8	144.9	8.768E-06	8.655E-06	8.655E-06
D	6.0	2.12	1950.	0.	0.	137.7	49.8	137.7	7.720E-06	7.239E-06	7.239E-06
D	8.0	1.48	1950.	0.	0.	137.7	49.8	137.7	5.785E-06	5.424E-06	5.424E-06
D	10.0	.81	1950.	0.	0.	137.7	49.8	137.7	4.625E-06	4.337E-06	4.337E-06
D	13.0	.46	1950.	0.	0.	137.7	49.8	137.7	3.562E-06	3.340E-06	3.340E-06
D	18.0	.06	1950.	0.	0.	137.7	49.8	137.7	2.573E-06	2.413E-06	2.413E-06

E	.4	.60	1950.	0.	0.	97.9	33.8	185.5	1.194E-04	1.989E-04	1.194E-04
E	1.0	2.32	1950.	0.	0.	97.9	33.8	185.5	5.043E-05	8.399E-05	5.043E-05
E	2.0	5.99	1950.	0.	0.	97.9	33.8	183.3	2.523E-05	4.153E-05	2.523E-05
E	3.0	7.00	1950.	0.	0.	97.9	33.8	141.2	2.208E-05	2.800E-05	2.208E-05
E	4.0	5.61	1950.	0.	0.	97.9	33.8	119.8	1.963E-05	2.111E-05	1.963E-05
E	5.0	4.48	1950.	0.	0.	97.9	33.8	106.3	1.759E-05	1.680E-05	1.680E-05
E	6.0	3.57	1950.	0.	0.	97.9	33.8	97.9	1.598E-05	1.405E-05	1.405E-05
E	8.0	3.25	1950.	0.	0.	97.9	33.8	97.9	1.197E-05	1.053E-05	1.053E-05
E	10.0	.90	1950.	0.	0.	97.9	33.8	97.9	9.574E-06	8.417E-06	8.417E-06
E	13.0	.29	1950.	0.	0.	97.9	33.8	97.9	7.374E-06	6.483E-06	6.483E-06
F	.4	.77	1950.	0.	0.	67.6	22.0	158.2	2.155E-04	3.862E-04	2.155E-04
F	1.0	2.79	1950.	0.	0.	67.6	22.0	158.2	9.099E-05	1.631E-04	9.099E-05
F	2.0	6.74	1950.	0.	0.	67.6	22.0	155.7	4.573E-05	8.064E-05	4.573E-05
F	3.0	4.71	1950.	0.	0.	67.6	22.0	109.3	4.391E-05	5.436E-05	4.391E-05
F	4.0	4.07	1950.	0.	0.	67.6	22.0	87.7	4.125E-05	4.100E-05	4.100E-05
F	5.0	1.48	1950.	0.	0.	67.6	22.0	75.1	3.834E-05	3.261E-05	3.261E-05
F	6.0	.58	1950.	0.	0.	67.6	22.0	67.6	3.564E-05	2.728E-05	2.728E-05
F	8.0	.06	1950.	0.	0.	67.6	22.0	67.6	2.671E-05	2.044E-05	2.044E-05
G	.4	.86	1950.	0.	0.	46.6	14.3	150.9	3.478E-04	6.684E-04	3.478E-04
G	1.0	2.53	1950.	0.	0.	46.6	14.3	150.9	1.468E-04	2.822E-04	1.468E-04
G	2.0	6.13	1950.	0.	0.	46.6	14.3	147.5	7.429E-05	1.396E-04	7.429E-05
G	3.0	3.63	1950.	0.	0.	46.6	14.3	89.8	8.229E-05	9.408E-05	8.229E-05
G	4.0	2.03	1950.	0.	0.	46.6	14.3	66.2	8.420E-05	7.095E-05	7.095E-05
G	5.0	.17	1950.	0.	0.	46.6	14.3	53.6	8.270E-05	5.645E-05	5.645E-05
G	6.0	.06	1950.	0.	0.	46.6	14.3	46.6	7.950E-05	4.721E-05	4.721E-05

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0            RUN DATE:  11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                                 METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                        WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE             DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96 99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0  SE SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0LATERAL 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=   .5      A=  2861.      D=   70.0
 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   3.478E-04   2.155E-04   1.468E-04   1.194E-04   9.099E-05   8.229E-05   7.552E-05   7.429E-05   7.095E-05   5.645E-05
         .863       1.628       4.156       4.758       7.548      11.180      11.436      17.567      19.601      19.776
       .09383      .17705      .45202      .51753      .82095     1.21602     1.24380     1.91068     2.13191     2.15088
0   5.043E-05   4.721E-05   4.573E-05   4.391E-05   4.100E-05   3.345E-05   3.261E-05   3.189E-05   2.728E-05   2.523E-05
       22.100      22.158      28.900      33.607      37.676      37.706      39.188      40.234      40.815      46.801
      2.40372     2.41004     3.14329     3.65530     4.09778     4.10106     4.26225     4.37603     4.43924     5.09031
0   2.208E-05   2.044E-05   1.963E-05   1.680E-05   1.587E-05   1.412E-05   1.405E-05   1.271E-05   1.238E-05   1.053E-05
       53.804      53.862      59.471      63.946      68.275      68.363      71.937      72.013      76.314      79.569
      5.85201     5.85833     6.46831     6.95504     7.42596     7.43544     7.82419     7.83252     8.30029     8.65427
0   1.026E-05   8.655E-06   8.417E-06   7.239E-06   6.984E-06   6.483E-06   5.424E-06   5.365E-06   4.708E-06   4.337E-06
       83.375      86.223      87.124      89.245      89.710      90.001      91.483      91.715      92.209      93.023
      9.06830     9.37804     9.47602     9.70674     9.75730     9.78891     9.95010     9.97538    10.02911    10.11761
0   3.551E-06   3.340E-06   2.825E-06   2.653E-06   2.413E-06   2.363E-06   2.186E-06   1.788E-06   1.770E-06   1.415E-06
       93.226      93.691      93.895      94.243      94.301      94.418      94.624      94.886      94.973      95.176
     10.13973    10.19030    10.21242    10.25035    10.25667    10.26931    10.29177    10.32022    10.32970    10.35182
0   1.349E-06   1.073E-06   9.231E-07   8.975E-07   6.725E-07   5.377E-07   4.565E-07   3.077E-07   2.321E-07   1.846E-07
       95.525      95.670      96.397      96.513      96.571      96.600      98.024      98.809      99.361      99.477
     10.38975    10.40555    10.48457    10.49721    10.50353    10.50669    10.66156    10.74689    10.80694    10.81959
0   1.544E-07   1.157E-07   9.252E-08   7.125E-08
       99.622      99.797      99.913     100.000
     10.83539    10.85435    10.86699    10.87648
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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)=   2.130
 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   4.094
 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   6.464
 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   7.422
 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   9.065
 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   9.473
 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   9.704

0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  15  1      -7.96393 -12.53315  -1.46949
  15  2      -9.55350 -13.41764  -1.90570
  15  3     -10.10203 -15.84968  -3.30356
  15  4     -10.83848 -15.32267  -2.95614
  15  5     -11.05090 -16.86840  -4.02581
  15  6     -11.48682 -22.27758  -8.07225
  15  7     -11.68521 -26.27136 -11.11584
  15  8     -11.83598      NUMXQ(K)=  8
     3.261E-04                .109              1.000
     1.964E-04                .326              3.000
     1.522E-04                .544              5.000
     1.051E-04               1.088             10.000
     8.332E-05               1.631             15.000
     6.982E-05               2.175             20.000
     5.825E-05               2.719             25.000
     4.999E-05               3.263             30.000
     4.375E-05               3.807             35.000
     3.736E-05               4.351             40.000
     3.103E-05               4.894             45.000
     2.618E-05               5.438             50.000
     2.238E-05               5.982             55.000
     1.937E-05               6.526             60.000
     1.713E-05               7.070             65.000
     1.505E-05               7.614             70.000
     1.297E-05               8.157             75.000
     1.125E-05               8.701             80.000
     9.411E-06               9.245             85.000
0    1.589E-04               0.5                4.60
0ANNUAL AVERAGE =    4.63E-06
0K= 15      FIVEXQ(K)= 1.589E-04      FIVEPR(K)= 4.597
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0            RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                 METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                        WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE             DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE SSE SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.25	1950.	0.	0.	342.4	1000.0	342.4	2.189E-06	2.186E-06	2.186E-06
A	1.0	.89	1950.	0.	0.	342.4	1000.0	342.4	9.244E-07	9.231E-07	9.231E-07
A	2.0	2.82	1950.	0.	0.	342.4	1000.0	342.4	4.571E-07	4.565E-07	4.565E-07
A	3.0	1.79	1950.	0.	0.	342.4	1000.0	342.4	3.081E-07	3.077E-07	3.077E-07
A	4.0	.89	1950.	0.	0.	342.4	1000.0	342.4	2.324E-07	2.321E-07	2.321E-07
A	5.0	1.03	1950.	0.	0.	342.4	1000.0	342.4	1.849E-07	1.846E-07	1.846E-07
A	6.0	.56	1950.	0.	0.	342.4	1000.0	342.4	1.546E-07	1.544E-07	1.544E-07
A	8.0	.36	1950.	0.	0.	342.4	1000.0	342.4	1.159E-07	1.157E-07	1.157E-07
A	13.0	.03	1950.	0.	0.	342.4	1000.0	342.4	7.135E-08	7.125E-08	7.125E-08
A	18.0	.03	1950.	0.	0.	342.4	1000.0	342.4	5.154E-08	5.148E-08	5.148E-08
B	.4	.13	1950.	0.	0.	257.5	227.3	257.5	1.281E-05	1.271E-05	1.271E-05
B	1.0	.40	1950.	0.	0.	257.5	227.3	257.5	5.407E-06	5.365E-06	5.365E-06
B	2.0	.66	1950.	0.	0.	257.5	227.3	257.5	2.674E-06	2.653E-06	2.653E-06
B	3.0	.73	1950.	0.	0.	257.5	227.3	257.5	1.802E-06	1.788E-06	1.788E-06
B	4.0	.33	1950.	0.	0.	257.5	227.3	257.5	1.359E-06	1.349E-06	1.349E-06
B	5.0	.27	1950.	0.	0.	257.5	227.3	257.5	1.081E-06	1.073E-06	1.073E-06
B	6.0	.10	1950.	0.	0.	257.5	227.3	257.5	9.045E-07	8.975E-07	8.975E-07
B	8.0	.13	1950.	0.	0.	257.5	227.3	257.5	6.777E-07	6.725E-07	6.725E-07
C	.4	.07	1950.	0.	0.	195.5	112.3	195.5	3.414E-05	3.345E-05	3.345E-05
C	1.0	.20	1950.	0.	0.	195.5	112.3	195.5	1.442E-05	1.412E-05	1.412E-05
C	2.0	.56	1950.	0.	0.	195.5	112.3	195.5	7.129E-06	6.984E-06	6.984E-06
C	3.0	.83	1950.	0.	0.	195.5	112.3	195.5	4.805E-06	4.708E-06	4.708E-06
C	4.0	.53	1950.	0.	0.	195.5	112.3	195.5	3.624E-06	3.551E-06	3.551E-06
C	5.0	.36	1950.	0.	0.	195.5	112.3	195.5	2.883E-06	2.825E-06	2.825E-06
C	6.0	.23	1950.	0.	0.	195.5	112.3	195.5	2.412E-06	2.363E-06	2.363E-06
C	8.0	.30	1950.	0.	0.	195.5	112.3	195.5	1.807E-06	1.770E-06	1.770E-06
C	10.0	.03	1950.	0.	0.	195.5	112.3	195.5	1.445E-06	1.415E-06	1.415E-06
C	13.0	.03	1950.	0.	0.	195.5	112.3	195.5	1.113E-06	1.090E-06	1.090E-06
D	.4	.32	1950.	0.	0.	137.7	49.8	199.2	7.552E-05	1.025E-04	7.552E-05
D	1.0	1.33	1950.	0.	0.	137.7	49.8	199.2	3.189E-05	4.328E-05	3.189E-05
D	2.0	4.24	1950.	0.	0.	137.7	49.8	197.9	1.587E-05	2.140E-05	1.587E-05
D	3.0	4.77	1950.	0.	0.	137.7	49.8	171.1	1.238E-05	1.443E-05	1.238E-05
D	4.0	4.27	1950.	0.	0.	137.7	49.8	155.6	1.026E-05	1.088E-05	1.026E-05
D	5.0	2.78	1950.	0.	0.	137.7	49.8	144.9	8.768E-06	8.655E-06	8.655E-06
D	6.0	1.56	1950.	0.	0.	137.7	49.8	137.7	7.720E-06	7.239E-06	7.239E-06
D	8.0	1.62	1950.	0.	0.	137.7	49.8	137.7	5.785E-06	5.424E-06	5.424E-06
D	10.0	.50	1950.	0.	0.	137.7	49.8	137.7	4.625E-06	4.337E-06	4.337E-06
D	13.0	.10	1950.	0.	0.	137.7	49.8	137.7	3.562E-06	3.340E-06	3.340E-06
D	18.0	.10	1950.	0.	0.	137.7	49.8	137.7	2.573E-06	2.413E-06	2.413E-06

E	.4	.47	1950.	0.	0.	97.9	33.8	185.5	1.194E-04	1.989E-04	1.194E-04
E	1.0	1.82	1950.	0.	C.	97.9	33.8	185.5	5.043E-05	8.399E-05	5.043E-05
E	2.0	7.09	1950.	0.	0.	97.9	33.8	183.3	2.523E-05	4.153E-05	2.523E-05
E	3.0	5.67	1950.	0.	0.	97.9	33.8	141.2	2.208E-05	2.800E-05	2.208E-05
E	4.0	4.34	1950.	0.	0.	97.9	33.8	119.8	1.963E-05	2.111E-05	1.963E-05
E	5.0	2.45	1950.	0.	0.	97.9	33.8	106.3	1.759E-05	1.680E-05	1.680E-05
E	6.0	1.13	1950.	0.	0.	97.9	33.8	97.9	1.598E-05	1.405E-05	1.405E-05
E	8.0	1.89	1950.	0.	0.	97.9	33.8	97.9	1.197E-05	1.053E-05	1.053E-05
E	10.0	.70	1950.	0.	0.	97.9	33.8	97.9	9.574E-06	8.417E-06	8.417E-06
E	13.0	.13	1950.	0.	0.	97.9	33.8	97.9	7.374E-06	6.483E-06	6.483E-06
F	.4	.75	1950.	0.	0.	67.6	22.0	158.2	2.155E-04	3.862E-04	2.155E-04
F	1.0	2.75	1950.	0.	0.	67.6	22.0	158.2	9.099E-05	1.631E-04	9.099E-05
F	2.0	7.02	1950.	0.	0.	67.6	22.0	155.7	4.573E-05	8.064E-05	4.573E-05
F	3.0	5.53	1950.	0.	0.	67.6	22.0	109.3	4.391E-05	5.436E-05	4.391E-05
F	4.0	1.86	1950.	0.	0.	67.6	22.0	87.7	4.125E-05	4.100E-05	4.100E-05
F	5.0	.76	1950.	0.	0.	67.6	22.0	75.1	3.834E-05	3.261E-05	3.261E-05
F	6.0	.13	1950.	0.	0.	67.6	22.0	67.6	3.564E-05	2.728E-05	2.728E-05
F	8.0	.13	1950.	0.	0.	67.6	22.0	67.6	2.671E-05	2.044E-05	2.044E-05
G	.4	1.40	1950.	0.	0.	46.6	14.3	150.9	3.478E-04	6.684E-04	3.478E-04
G	1.0	4.11	1950.	0.	0.	46.6	14.3	150.9	1.468E-04	2.822E-04	1.468E-04
G	2.0	8.35	1950.	0.	0.	46.6	14.3	147.5	7.429E-05	1.396E-04	7.429E-05
G	3.0	4.24	1950.	0.	0.	46.6	14.3	89.8	8.229E-05	9.408E-05	8.229E 05
G	4.0	1.06	1950.	0.	0.	46.6	14.3	66.2	8.420E-05	7.095E-05	7.095E-05
G	5.0	.03	1950.	0.	0.	46.6	14.3	53.6	8.270E-05	5.645E-05	5.645E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0           RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                       WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE            DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0 SSE SECTOR      BOUNDARY DISTANCE = 1950.0 METERS
0LATERAL 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=    .5     A=  2861.      D=    70.0
 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   3.478E-04   2.155E-04   1.468E-04   1.194E-04   9.099E-05   8.229E-05   7.552E-05   7.429E-05   7.095E-05   5.645E-05
        1.402       2.157       6.265       6.738       9.488      13.730      14.053      22.404      23.464      23.497
       .13373      .20569      .59760      .64264      .90496     1.30951     1.34038     2.13684     2.23798     2.24114
0   5.043E-05   4.573E-05   4.391E-05   4.100E-05   3.345E-05   3.261E-05   3.189E-05   2.728E-05   2.523E-05   2.208E-05
       25.320      32.345      37.878      39.734      39.803      40.565      41.890      42.023      49.114      54.781
      2.41497     3.08501     3.61282     3.78981     3.79637     3.86906     3.99548     4.00812     4.68448     5.22494
0   2.044E-05   1.963E-05   1.680E-05   1.587E-05   1.412E-05   1.405E-05   1.271E-05   1.238E-05   1.053E-05   1.026E-05
       54.913      59.254      61.706      65.948      66.147      67.273      67.404      72.176      74.065      78.339
      5.23758     5.65161     5.88549     6.29005     6.30901     6.41647     6.42897     6.88409     7.06424     7.47195
0   8.655E-06   8.417E-06   7.239E-06   6.984E-06   6.483E-06   5.424E-06   5.365E-06   4.708E-06   4.337E-06   3.551E-06
       81.123      81.819      83.376      83.939      84.072      85.696      86.093      86.922      87.419      87.949
      7.73744     7.80381     7.95235     8.00608     8.01873     8.17359     8.21152     8.29053     8.33794     8.38851
0   3.340E-06   2.825E-06   2.653E-06   2.413E-06   2.363E-06   2.186E-06   1.788E-06   1.770E-06   1.415E-06   1.349E-06
       88.048      88.413      89.076      89.175      89.407      89.661      90.390      90.689      90.722      91.053
      8.39799     8.43276     8.49597     8.50545     8.52758     8.55183     8.62136     8.64981     8.65297     8.68458
0   1.090E-06   1.073E-06   9.231E-07   8.975E-07   6.725E-07   4.565E-07   3.077E-07   2.321E-07   1.846E-07   1.544E-07
       91.086      91.351      92.246      92.345      92.478      95.295      97.084      97.979      99.006      99.569
      8.68774     8.71302     8.79835     8.80784     8.82048     9.08913     9.25980     9.34513     9.44311     9.49684
0   1.157E-07   7.125E-08   5.148E-08
       99.934      99.967     100.000
      9.53160     9.53476     9.53792
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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)=   2.135
                                                             HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   3.610
                                                             HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   3.787
                                                             HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   5.648
                                                             HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   6.286
                                                             HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   7.468
                                                             HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   7.800
                                                             HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   8.002
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  16  1      -7.96393 -12.71156  -1.58088
  16  2      -9.50758 -14.16464  -2.29784
  16  3     -10.03335 -15.67476  -3.13777
  16  4     -10.10203 -16.95105  -3.85640
  16  5     -10.83848 -17.08991  -3.94401
  16  6     -11.05090 -18.51706  -4.87606
  16  7     -11.48682 -23.85025  -8.57508
  16  8     -11.68521 -30.96316 -13.58894
  16  9     -11.87188      NUMXQ(K)=  9
                                                             BACK EXTRAPOLATION FOR  1 PERCENTILE.
     4.082E-04              .095            1.000
     2.382E-04              .286            3.000
     1.817E-04              .477            5.000
     1.228E-04              .954           10.000
     9.605E-05             1.431           15.000
     8.001E-05             1.908           20.000
     6.681E-05             2.384           25.000
     5.578E-05             2.861           30.000
     4.767E-05             3.338           35.000
     4.051E-05             3.815           40.000
     3.280E-05             4.292           45.000
     2.703E-05             4.769           50.000
     2.262E-05             5.246           55.000
     1.915E-05             5.723           60.000
     1.634E-05             6.200           65.000
     1.368E-05             6.677           70.000
     1.148E-05             7.153           75.000
     9.330E-06             7.630           80.000
0    1.771E-04             0.5              5.24
0ANNUAL AVERAGE =    4.59E-06
0K= 16     FIVEXQ(K)= 1.771E-04     FIVEPR(K)= 5.242
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ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-204	Cont'd on page B-205
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: 11/19/2003 TIME: 23: 4:56
/PLANT NAME: CGS METEOROLOGICAL INSTRUMENTATION
DATA PERIOD: JFD 1996-1999 WIND SENSORS HEIGHT: 10.0 METERS
TYPE OF RELEASE: GROUND LEVEL RELEASE DELTA-T HEIGHTS: 10 - 75 METERS
SOURCE OF DATA: MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
COMMENTS: input file: P96-99-F.inp output file: P96-99-F.out sigma=desert + P-G
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 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=1431.SQ.METERS	USED
A	.4	.35	1950.	0.	0.	342.4	1000.0	342.4	2.189E-06	2.186E-06	2.186E-06
A	1.0	1.22	1950.	0.	0.	342.4	1000.0	342.4	9.244E-07	9.231E-07	9.231E-07
A	2.0	2.50	1950.	0.	0.	342.4	1000.0	342.4	4.571E-07	4.565E-07	4.565E-07
A	3.0	1.81	1950.	0.	0.	342.4	1000.0	342.4	3.081E-07	3.077E-07	3.077E-07
A	4.0	1.41	1950.	0.	0.	342.4	1000.0	342.4	2.324E-07	2.321E-07	2.321E-07
A	5.0	1.02	1950.	0.	0.	342.4	1000.0	342.4	1.849E-07	1.846E-07	1.846E-07
A	6.0	.58	1950.	0.	0.	342.4	1000.0	342.4	1.546E-07	1.544E-07	1.544E-07
A	8.0	.70	1950.	0.	0.	342.4	1000.0	342.4	1.159E-07	1.157E-07	1.157E-07
A	10.0	.21	1950.	0.	0.	342.4	1000.0	342.4	9.264E-08	9.252E-08	9.252E-08
A	13.0	.09	1950.	0.	0.	342.4	1000.0	342.4	7.135E-08	7.125E-08	7.125E-08
A	18.0	.01	1950.	0.	0.	342.4	1000.0	342.4	5.154E-08	5.148E-08	5.148E-08
B	.4	.09	1950.	0.	0.	257.5	227.3	257.5	1.281E-05	1.271E-05	1.271E-05
B	1.0	.28	1950.	0.	0.	257.5	227.3	257.5	5.407E-06	5.365E-06	5.365E-06
B	2.0	.63	1950.	0.	0.	257.5	227.3	257.5	2.674E-06	2.653E-06	2.653E-06
B	3.0	.67	1950.	0.	0.	257.5	227.3	257.5	1.802E-06	1.788E-06	1.788E-06
B	4.0	.57	1950.	0.	0.	257.5	227.3	257.5	1.359E-06	1.349E-06	1.349E-06
B	5.0	.42	1950.	0.	0.	257.5	227.3	257.5	1.081E-06	1.073E-06	1.073E-06
B	6.0	.23	1950.	0.	0.	257.5	227.3	257.5	9.045E-07	8.975E-07	8.975E-07
B	8.0	.31	1950.	0.	0.	257.5	227.3	257.5	6.777E-07	6.725E-07	6.725E-07
B	10.0	.09	1950.	0.	0.	257.5	227.3	257.5	5.419E-07	5.377E-07	5.377E-07
B	13.0	.07	1950.	0.	0.	257.5	227.3	257.5	4.173E-07	4.141E-07	4.141E-07
C	.4	.09	1950.	0.	0.	195.5	112.3	195.5	3.414E-05	3.345E-05	3.345E-05
C	1.0	.26	1950.	0.	0.	195.5	112.3	195.5	1.442E-05	1.412E-05	1.412E-05
C	2.0	.61	1950.	0.	0.	195.5	112.3	195.5	7.129E-06	6.984E-06	6.984E-06
C	3.0	.76	1950.	0.	0.	195.5	112.3	195.5	4.805E-06	4.708E-06	4.708E-06
C	4.0	.55	1950.	0.	0.	195.5	112.3	195.5	3.624E-06	3.551E-06	3.551E-06
C	5.0	.48	1950.	0.	0.	195.5	112.3	195.5	2.883E-06	2.825E-06	2.825E-06
C	6.0	.32	1950.	0.	0.	195.5	112.3	195.5	2.412E-06	2.363E-06	2.363E-06
C	8.0	.34	1950.	0.	0.	195.5	112.3	195.5	1.807E-06	1.770E-06	1.770E-06
C	10.0	.21	1950.	0.	0.	195.5	112.3	195.5	1.445E-06	1.415E-06	1.415E-06
C	13.0	.07	1950.	0.	0.	195.5	112.3	195.5	1.113E-06	1.090E-06	1.090E-06
D	.4	.36	1950.	0.	0.	137.7	49.8	137.7	1.093E-04	1.025E-04	1.025E-04
D	1.0	1.49	1950.	0.	0.	137.7	49.8	137.7	4.615E-05	4.328E-05	4.328E-05
D	2.0	3.58	1950.	0.	0.	137.7	49.8	137.7	2.282E-05	2.140E-05	2.140E-05
D	3.0	3.74	1950.	0.	0.	137.7	49.8	137.7	1.538E-05	1.443E-05	1.443E-05
D	4.0	3.31	1950.	0.	0.	137.7	49.8	137.7	1.160E-05	1.088E-05	1.088E-05
D	5.0	2.55	1950.	0.	0.	137.7	49.8	137.7	9.230E-06	8.655E-06	8.655E-06
D	6.0	1.73	1950.	0.	0.	137.7	49.8	137.7	7.720E-06	7.239E-06	7.239E-06
D	8.0	2.04	1950.	0.	0.	137.7	49.8	137.7	5.785E-06	5.424E-06	5.424E-06
D	10.0	1.03	1950.	0.	0.	137.7	49.8	137.7	4.625E-06	4.337E-06	4.337E-06
D	13.0	.45	1950.	0.	0.	137.7	49.8	137.7	3.562E-06	3.340E-06	3.340E-06
D	18.0	.08	1950.	0.	0.	137.7	49.8	137.7	2.573E-06	2.413E-06	2.413E-06
E	.4	.61	1950.	0.	0.	97.9	33.8	97.9	2.263E-04	1.989E-04	1.989E-04
E	1.0	2.34	1950.	0.	0.	97.9	33.8	97.9	9.553E-05	8.399E-05	8.399E-05
E	2.0	5.33	1950.	0.	0.	97.9	33.8	97.9	4.724E-05	4.153E-05	4.153E-05
E	3.0	5.02	1950.	0.	0.	97.9	33.8	97.9	3.184E-05	2.800E-05	2.800E-05
E	4.0	4.32	1950.	0.	0.	97.9	33.8	97.9	2.402E-05	2.111E-05	2.111E-05
E	5.0	3.44	1950.	0.	0.	97.9	33.8	97.9	1.911E-05	1.680E-05	1.680E-05
E	6.0	2.59	1950.	0.	0.	97.9	33.8	97.9	1.598E-05	1.405E-05	1.405E-05
E	8.0	2.81	1950.	0.	0.	97.9	33.8	97.9	1.197E-05	1.053E-05	1.053E-05
E	10.0	1.15	1950.	0.	0.	97.9	33.8	97.9	9.574E-06	8.417E-06	8.417E-06
E	13.0	.39	1950.	0.	0.	97.9	33.8	97.9	7.374E-06	6.483E-06	6.483E-06
E	18.0	.05	1950.	0.	0.	97.9	33.8	97.9	5.327E-06	4.683E-06	4.683E-06
F	.4	.76	1950.	0.	0.	67.6	22.0	67.6	5.046E-04	3.862E-04	3.862E-04
F	1.0	2.77	1950.	0.	0.	67.6	22.0	67.6	2.131E-04	1.631E-04	1.631E-04
F	2.0	5.95	1950.	0.	0.	67.6	22.0	67.6	1.054E-04	8.064E-05	8.064E-05
F	3.0	4.56	1950.	0.	0.	67.6	22.0	67.6	7.102E-05	5.436E-05	5.436E-05
F	4.0	3.20	1950.	0.	0.	67.6	22.0	67.6	5.356E-05	4.100E-05	4.100E-05
F	5.0	1.58	1950.	0.	0.	67.6	22.0	67.6	4.261E-05	3.261E-05	3.261E-05
F	6.0	.63	1950.	0.	0.	67.6	22.0	67.6	3.564E-05	2.728E-05	2.728E-05
F	8.0	.39	1950.	0.	0.	67.6	22.0	67.6	2.671E-05	2.044E-05	2.044E-05
F	10.0	.07	1950.	0.	0.	67.6	22.0	67.6	2.135E-05	1.634E-05	1.634E-05
F	13.0	.03	1950.	0.	0.	67.6	22.0	67.6	1.645E-05	1.259E-05	1.259E-05
G	.4	1.05	1950.	0.	0.	46.6	14.3	46.6	1.126E-03	6.684E-04	6.684E-04
G	1.0	3.07	1950.	0.	0.	46.6	14.3	46.6	4.752E-04	2.822E-04	2.822E-04
G	2.0	5.65	1950.	0.	0.	46.6	14.3	46.6	2.350E-04	1.396E-04	1.396E-04
G	3.0	3.12	1950.	0.	0.	46.6	14.3	46.6	1.584E-04	9.408E-05	9.408E-05
G	4.0	1.37	1950.	0.	0.	46.6	14.3	46.6	1.195E-04	7.095E-05	7.095E-05
G	5.0	.34	1950.	0.	0.	46.6	14.3	46.6	9.504E-05	5.645E-05	5.645E-05
G	6.0	.09	1950.	0.	0.	46.6	14.3	46.6	7.950E-05	4.721E-05	4.721E-05
G	8.0	.02	1950.	0.	0.	46.6	14.3	46.6	5.957E-05	3.538E-05	3.538E-05
G	10.0	.01	1950.	0.	0.	46.6	14.3	46.6	4.763E-05	2.829E-05	2.829E-05
G	13.0	.00	1950.	0.	0.	46.6	14.3	46.6	3.668E-05	2.178E-05	2.178E-05
G	18.0	.00	1950.	0.	0.	46.6	14.3	46.6	2.650E-05	1.574E-05	1.574E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
 DIRECTION-INDEPENDENT (S.R.P 2.3.4) MODEL.
 MINIMUM BOUNDARY DISTANCE = 1950.0 METERS.
 BUILDING WAKE CREDIT ALLOWED:   C=   .5     A=  2861.     D=   70.0
 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   6.684E-04   3.862E-04   2.822E-04   1.989E-04   1.631E-04   1.396E-04   1.025E-04   9.408E-05   8.399E-05   8.064E-05
        1.046       1.805       4.870       5.477       8.243      13.891      14.254      17.377      19.719      25.673
      1.04614     1.80468     4.87042     5.47724     8.24273    13.89064    14.25411    17.37674    19.71871    25.67320
0   7.095E-05   5.645E-05   5.436E-05   4.721E-05   4.328E-05   4.153E-05   4.100E-05   3.538E-05   3.345E-05   3.261E-05
       27.039      27.377      31.934      32.026      33.515      38.846      42.042      42.061      42.149      43.733
     27.03856    27.37674    31.93426    32.02592    33.51454    38.84639    42.04172    42.06068    42.14918    43.73262
0   2.829E-05   2.800E-05   2.728E-05   2.178E-05   2.140E-05   2.111E-05   2.044E-05   1.680E-05   1.634E-05   1.574E-05
       43.742      48.764      49.393      49.396      52.977      57.298      57.683      61.119      61.188      61.192
     43.74210    48.76422    49.39317    49.39634    52.97725    57.29773    57.68332    61.11884    61.18837    61.19154
0   1.443E-05   1.412E-05   1.405E-05   1.271E-05   1.259E-05   1.088E-05   1.053E-05   8.655E-06   8.417E-06   7.239E-06
       64.934      65.190      67.781      67.873      67.898      71.210      74.023      76.571      77.718      79.447
     64.93363    65.18964    67.78129    67.87295    67.89823    71.21049    74.02339    76.57080    77.71809    79.44691
0   6.984E-06   6.483E-06   5.424E-06   5.365E-06   4.708E-06   4.683E-06   4.337E-06   3.551E-06   3.340E-06   2.825E-06
       80.060      80.452      82.487      82.765      83.524      83.578      84.605      85.158      85.607      86.087
     80.06037    80.45197    82.48737    82.76550    83.52403    83.57776    84.60494    85.15804    85.60684    86.08725
0   2.653E-06   2.413E-06   2.363E-06   2.186E-06   1.788E-06   1.770E-06   1.415E-06   1.349E-06   1.090E-06   1.073E-06
       86.716      86.795      87.111      87.459      88.129      88.473      88.682      89.251      89.320      89.744
     86.71620    86.79522    87.11127    87.45894    88.12897    88.47347    88.68207    89.25097    89.32050    89.74402
0   9.231E 07   8.975E-07   6.725E-07   5.377E-07   4.565E-07   4.141E-07   3.077E-07   2.321E-07   1.846E-07   1.544E-07
       90.967      91.201      91.508      91.599      94.096      94.166      95.977      97.386      98.404      98.982
     90.96716    91.20103    91.50761    91.59927    94.09611    94.16564    95.97664    97.38625    98.40395    98.98233
0   1.157E-07   9.252E-08   7.125E-08   5.148E-08
       99.687      99.899      99.994     100.000
     99.68713    99.89889    99.99371   100.00000
```

Prepared by / Date: Mohammed Abu-Shehadeh

Verified by/Date: Ted Messier

```
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

                                                                BACK EXTRAPOLATION FOR  1 PERCENTILE.
     6.831E-04              1.000              1.000
     3.868E-04              3.000              3.000
     2.861E-04              5.000              5.000
     1.799E-04             10.000             10.000
     1.315E-04             15.000             15.000
     1.026E-04             20.000             20.000
     8.284E-05             25.000             25.000
     6.649E-05             30.000             30.000
     5.401E-05             35.000             35.000
     4.434E-05             40.000             40.000
     3.601E-05             45.000             45.000
     2.900E-05             50.000             50.000
     2.335E-05             55.000             55.000
     1.907E-05             60.000             60.000
     1.571E-05             65.000             65.000
     1.272E-05             70.000             70.000
     9.941E-06             75.000             75.000
     7.446E-06             80.000             80.000
     5.500E-06             85.000             85.000
     3.757E-06             90.000             90.000
0    2.861E-04              5.0                5.00
0K= 17     FIVEXQ(K)= 2.861E-04     FIVEPR(K)= 5.000
```

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0           RUN DATE: 11/19/2003    TIME: 23: 4:56
/PLANT NAME:   CGS                                METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                       WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE            DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: F96-99-F.inp  output file: F96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0SITE EXCLUSION BOUNDARY CALCULATIONS:
0FIVE PERCENT OVERALL SITE LIMIT
 BUILDING WAKE CREDIT ALLOWED:   C=   .5     A=  2861.     D=   70.0
 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  3.478E-04  2.155E-04  1.468E-04  1.194E-04  9.099E-05  8.229E-05  7.552E-05  7.429E-05  7.095E-05  5.645E-05
       1.046      1.805      4.870      5.477      8.243     11.365     11.729     17.377     18.742     19.080
     1.04614    1.80468    4.87042    5.47724    8.24273   11.36536   11.72882   17.37674   18.74210   19.08027
0  5.043E-05  4.721E-05  4.573E-05  4.391E-05  4.100E-05  3.538E-05  3.345E-05  3.261E-05  3.189E-05  2.829E-05
      21.422     21.514     27.468     32.026     35.221     35.240     35.329     36.912     38.401     38.410
    21.42224   21.51390   27.46839   32.02591   35.22122   35.24019   35.32868   36.91212   38.40075   38.41023
0  2.728E-05  2.523E-05  2.208E-05  2.178E-05  2.044E-05  1.963E-05  1.680E-05  1.634E-05  1.587E-05  1.574E-05
      39.039     44.371     49.393     49.396     49.782     54.102     57.538     57.607     61.188     62.192
    39.03918   44.37104   49.39317   49.39633   49.78191   54.10239   57.53792   57.60746   61.18837   61.19153
0  1.412E-05  1.405E-05  1.271E-05  1.259E-05  1.238E-05  1.053E-05  1.026E-05  8.655E-06  8.417E-06  7.239E-06
      61.448     64.039     64.131     64.156     67.898     70.711     74.023     76.571     77.718     79.447
    61.44754   64.03921   64.13089   64.15618   67.89830   70.71119   74.02346   76.57087   77.71815   79.44698
0  6.984E-06  6.483E-06  5.424E-06  5.365E-06  4.708E-06  4.683E-06  4.337E-06  3.551E-06  3.340E-06  2.825E-06
      80.060     80.452     82.487     82.766     83.524     83.578     84.605     85.158     85.607     86.087
    80.06013   80.45204   82.48745   82.76558   83.52412   83.57785   84.60503   85.15814   85.60693   86.08735
0  2.653E-06  2.413E-06  2.363E-06  2.186E-06  1.788E-06  1.770E-06  1.415E-06  1.349E-06  1.090E-06  1.073E-06
      86.716     86.795     87.111     87.459     88.129     88.474     88.682     89.251     89.321     89.744
    86.71629   86.79533   87.11139   87.45903   88.12907   88.47356   88.68217   89.25109   89.32063   89.74416
0  9.231E-07  8.975E-07  6.725E-07  5.377E-07  4.565E-07  4.141E-07  3.077E-07  2.321E-07  1.846E-07  1.544E-07
      90.967     91.201     91.508     91.599     94.096     94.166     95.977     97.386     98.404     98.982
    90.96730   91.20119   91.50777   91.59943   94.09626   94.16579   95.97679   97.38640   98.40410   98.98248
0  1.157E-07  9.252E-08  7.125E-08  5.148E-08
      99.687     99.899     99.994    100.000
    99.68729   99.89905   99.99387  100.00020
```

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

```
0             X/O 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  K   I    XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)        HANDCHECK GRAPH;  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 2)=  18.745
  18   1      -7.96393 -10.54503  -1.11745
  18   2      -9.55350 -10.51085  -1.07893
  18   3     -10.10203 -10.74656  -1.70101
  18   4     -10.72076 -10.73590   -.99812
  18   5     -10.83848 -10.72788  -1.17342
  18   6     -11.05090 -10.70719  -1.21108
  18   7     -11.48682 -10.41120  -1.67087
  18   8     -11.68521  10.50336  -1.55001
  18   9     -16.45701      NUMXQ(K)=   9

      3.544E-04                                                     BACK EXTRAPOLATION FOR  1 PERCENTILE.
      2.154E-04              1.000              1.000
      1.655E-04              3.000              3.000
      1.102E-04              5.000              5.000
      8.382E-05             10.000             10.000
      6.753E-05             15.000             15.000
      5.638E-05             20.000             20.000
      4.794E-05             25.000             25.000
      4.126E-05             30.000             30.000
      3.309E-05             35.000             35.000
      2.663E-05             40.000             40.000
      2.175E-05             45.000             45.000
      1.912E-05             50.000             50.000
      1.646E-05             55.000             55.000
      1.404E-05             60.000             60.000
      1.187E-05             65.000             65.000
      9.755E-06             70.000             70.000
      7.448E-06             75.000             75.000
      5.505E-06             80.000             80.000
      3.764E-06             85.000             85.000
0     1.655E-04             90.000             90.000
0K= 18      PIVEXQ(K)= 1.655E-04    5.0         5.00
                                   PIVEPR(K)= 5.000
```

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

0	K	HIGHPR	PR	GRNDVT(K)
	1	-2.61617	.44461	7.11613
	2	-1.70583	4.40194	5.59889
	3	-2.82112	.23929	3.79337
	4	-3.09489	.09845	1.66485
	5	-3.19595	.06969	1.20432
	6	-3.18703	.07189	1.52234
	7	-3.07492	.10529	4.75939
	8	-2.79449	.25991	10.15150
	9	-2.75784	.29092	12.08469
	10	-2.88451	.19602	8.67808
	11	-2.83851	.22663	5.83414
	12	-2.85430	.21566	4.17912
	13	-2.82520	.23626	4.74070
	14	-2.78871	.26460	8.25809
	15	-2.65010	.40234	10.87648
	16	-2.57624	.49942	9.53793

0	K	HOURS(K)	TOTHRS
	1	38.94827	38.94827
	2	385.61000	424.55820
	3	20.96170	445.51990
	4	8.62413	454.14410
	5	6.10482	460.24890
	6	6.29645	466.54530
	7	9.22302	475.76840
	8	22.76829	498.53670
	9	25.48497	524.02160
	10	17.17099	541.19260
	11	19.85268	561.04520
	12	18.89195	579.93720
	13	20.69645	600.63370
	14	23.17869	623.81240
	15	35.24527	659.05760
	16	43.74879	702.80640

Cont'd on page B-211

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

0 K	FIVEXQ	SVANN	SLTIME	TIMINT	I	TIME	XQT
1	1.665E-04	3.815E-06	-.4503	-8.3883			
					1	8.0	-9.32477
					2	16.0	-9.63691
					3	72.0	-10.31424
					4	624.0	-11.28672
2	1.593E-04	3.234E-06	-.4647	-8.4229			
					1	8.0	-9.38926
					2	16.0	-9.71140
					3	72.0	-10.41041
					4	624.0	-11.41402
3	1.149E-04	2.012E-06	-.4825	-8.7366			
					1	8.0	-9.73992
					2	16.0	-10.07434
					3	72.0	-10.80002
					4	624.0	-11.84191
4	5.481E-05	9.654E-07	-.4817	-9.4777			
					1	8.0	-10.47938
					2	16.0	-10.81327
					3	72.0	-11.53779
					4	624.0	-12.57802
5	2.523E-05	6.801E-07	-.4309	-10.2888			
					1	8.0	-11.18489
					2	16.0	-11.48361
					3	72.0	-12.13179
					4	624.0	-13.06241
6	2.846E-05	6.873E-07	-.4440	-10.1593			
					1	8.0	-11.08265
					2	16.0	-11.39044
					3	72.0	-12.05833
					4	624.0	-13.01724
7	7.401E-05	1.572E-06	-.4593	-9.1929			
					1	8.0	-10.14810
					2	16.0	-10.46649
					3	72.0	-11.15737
					4	624.0	-12.14931
8	1.299E-04	3.236E-06	-.4403	-8.6438			
					1	8.0	-9.55940
					2	16.0	-9.86460
					3	72.0	-10.52687
					4	624.0	-11.47773
9	1.375E 04	3.809E-06	-.4277	-8.5954			
					1	8.0	-9.48471
					2	16.0	-9.78117
					3	72.0	-10.42445
					4	624.0	-11.34805

```
10 1.080E-04 2.665E-06    -.4415    -8.8271
                                              1     8.0    -9.74520
                                              2    16.0   -10.05123
                                              3    72.0   -10.71529
                                              4   624.0   -11.66871
11 1.088E-04 2.437E-06    -.4530    -8.8119
                                              1     8.0    -9.75396
                                              2    16.0   -10.06798
                                              3    72.0   -10.74938
                                              4   624.0   -11.72770
12 1.006E-04 2.136E-06    -.4594    -8.8863
                                              1     8.0    -9.84150
                                              2    16.0   -10.15990
                                              3    72.0   -10.85080
                                              4   624.0   -11.84276
13 1.100E-04 2.473E-06    -.4526    -8.8015
                                              1     8.0    -9.74258
                                              2    16.0   -10.05627
                                              3    72.0   -10.73696
                                              4   624.0   -11.71426
14 1.239E-04 3.370E-06    -.4299    -8.6982
                                              1     8.0    -9.59207
                                              2    16.0    -9.89004
                                              3    72.0   -10.53662
                                              4   624.0   -11.46495
15 1.589E-04 4.635E-06    -.4215    -8.4552
                                              1     8.0    -9.33176
                                              2    16.0    -9.62394
                                              3    72.0   -10.25796
                                              4   624.0   -11.16825
16 1.771E-04 4.594E-06    -.4355    -8.3370
                                              1     8.0    -9.24261
                                              2    16.0    -9.54449
                                              3    72.0   -10.19955
                                              4   624.0   -11.14005
17 2.861E-04 4.635E-06    -.4917    -7.8182
                                              1     8.0    -8.84064
                                              2    16.0    -9.18146
                                              3    72.0    -9.92102
                                              4   624.0   -10.98285
18 1.655E-04 4.635E-06    -.4264    -8.4110
                                              1     8.0    -9.29770
                                              2    16.0    -9.59326
                                              3    72.0   -10.23459
                                              4   624.0   -11.15539
```

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

Revision No. 0

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                       WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE            DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: F96-99-F.inp   output file: F96-99-F.out  sigma=desert + P-G
 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
```

DOWNWIND SECTOR	DISTANCE (METERS)	0-2 HOURS	0-8 HOURS	8-24 HOURS	1-4 DAYS	4-30 DAYS	ANNUAL AVERAGE	HOURS PER YEAR MAX 0-2 HR X/Q IS EXCEEDED IN SECTOR	DOWNWIND SECTOR
S	1950.	1.67E-04	8.92E-05	6.53E-C5	3.32E-05	1.25E-05	3.82E-06	38.9	S
SSW	1950.	1.59E-04	8.36E-05	6.06E-05	3.01E-05	1.10E-05	3.23E-06	385.6	SSW
SW	1950.	1.15E-04	5.89E-05	4.21E-C5	2.04E-05	7.20E-06	2.01E-06	21.0	SW
WSW	1950.	5.48E-05	2.81E-05	2.01E-C5	9.75E-06	3.45E-06	9.65E-07	8.6	WSW
W	1950.	2.52E-05	1.39E-05	1.03E-C5	5.39E-06	2.12E-06	6.80E-07	6.1	W
WNW	1950.	2.85E-05	1.54E-C5	1.13E-C5	5.8CE-06	2.22E-06	6.87E-07	6.3	WNW
NW	1950.	7.40E-05	3.92E-05	2.85E-05	1.43E-05	5.29E-06	1.57E-06	9.2	NW
NNW	1950.	1.3CE-04	7.05E-05	5.20E-05	2.68E-05	1.04E-05	3.24E-06	22.8	NNW
N	1950.	1.38E-04	7.60E-05	5.65E-05	2.97E-05	1.18E-05	3.81E 06	25.5	N
NNE	1950.	1.08E-04	5.86E-05	4.31E-05	2.22E-05	8.56E-06	2.67E-06	17.2	NNE
NE	1950.	1.09E-04	5.81E-05	4.24E-05	2.15E-05	8.07E-C6	2.44E-06	19.9	NE
ENE	1950.	1.01E-04	5.32E-05	3.87E-05	1.94E-05	7.19E-06	2.14E-C6	18.9	ENE
E	1950.	1.10E-04	5.87E-05	4.29E-05	2.17E-05	8.18E-06	2.47E-06	20.7	E
ESE	1950.	1.24E-04	6.83E-05	5.07E-05	2.65E-05	1.05E-05	3.37E-06	23.2	ESE
SE	1950.	1.59E-04	8.86E-05	6.61E-05	3.51E-05	1.41E-05	4.63E-06	35.2	SE
SSE	1950.	1.77E-04	9.68E-05	7.16E-05	3.72E-05	1.45E-05	4.59E-06	43.7	SSE
MAX X/Q		1.77E-04				TOTAL HOURS AROUND SITE:		702.8	
SRP 2.3.4	1950.	2.86E-04	1.45E-04	1.03E-04	4.91E-05	1.70E-05	4.63E-06		
SITE LIMIT		1.65E-04	9.16E-05	6.82E-05	3.59E-05	1.43E-05	4.63E-06		

```
0THE FIVE-PERCENT-FOR-THE-ENTIRE-SITE X/Q 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: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE   S SECTOR.
```

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=1431.SQ.METERS	USED
A	.4	.40	4827.	0.	0.	776.2	1000.0	776.2	9.656E-07	9.651E-07	9.651E-07
A	1.0	1.42	4827.	0.	0.	776.2	1000.0	776.2	4.077E-07	4.075E-07	4.075E-07
A	2.0	3.24	4827.	0.	0.	776.2	1000.0	776.2	2.016E-07	2.015E-07	2.015E-07
A	3.0	2.66	4827.	0.	0.	776.2	1000.0	776.2	1.359E-07	1.358E-07	1.358E-07
A	4.0	2.35	4827.	0.	0.	776.2	1000.0	776.2	1.025E-07	1.024E-07	1.024E-07
A	5.0	1.60	4827.	0.	0.	776.2	1000.0	776.2	8.154E-08	8.149E-08	8.149E-08
A	6.0	.71	4827.	0.	0.	776.2	1000.0	776.2	6.820E-08	6.816E-08	6.816E-08
A	8.0	1.11	4827.	0.	0.	776.2	1000.0	776.2	5.111E-08	5.108E-08	5.108E-08
A	10.0	.04	4827.	0.	0.	776.2	1000.0	776.2	4.086E-08	4.084E-08	4.084E-08
B	.4	.10	4827.	0.	0.	583.7	611.6	583.7	2.099E-06	2.097E-06	2.097E-06
B	1.0	.31	4827.	0.	0.	583.7	611.6	583.7	8.864E-07	8.853E-07	8.853E-07
B	2.0	.89	4827.	0.	0.	583.7	611.6	583.7	4.383E-07	4.378E-07	4.378E-07
B	3.0	1.20	4827.	0.	0.	583.7	611.6	583.7	2.955E-07	2.951E-07	2.951E-07
B	4.0	.67	4827.	0.	0.	583.7	611.6	583.7	2.228E-07	2.226E-07	2.226E-07
B	5.0	.49	4827.	0.	0.	583.7	611.6	583.7	1.773E-07	1.771E-07	1.771E-07
B	6.0	.27	4827.	0.	0.	583.7	611.6	583.7	1.483E-07	1.481E-07	1.481E-07
B	8.0	.18	4827.	0.	0.	583.7	611.6	583.7	1.111E-07	1.110E-07	1.110E-07
B	10.0	.04	4827.	0.	0.	583.7	611.6	583.7	8.884E-08	8.873E-08	8.873E-08
C	.4	.09	4827.	0.	0.	443.3	256.4	443.3	6.595E-06	6.569E-06	6.569E-06
C	1.0	.27	4827.	0.	0.	443.3	256.4	443.3	2.784E-06	2.773E-06	2.773E-06
C	2.0	1.07	4827.	0.	0.	443.3	256.4	443.3	1.377E-06	1.371E-06	1.371E-06
C	3.0	1.11	4827.	0.	0.	443.3	256.4	443.3	9.282E-07	9.245E-07	9.245E-07
C	4.0	.76	4827.	0.	0.	443.3	256.4	443.3	7.000E-07	6.972E-07	6.972E-07
C	5.0	.71	4827.	0.	0.	443.3	256.4	443.3	5.569E-07	5.547E-07	5.547E-07
C	6.0	.31	4827.	0.	0.	443.3	256.4	443.3	4.658E-07	4.639E-07	4.639E-07
C	8.0	.31	4827.	0.	0.	443.3	256.4	443.3	3.490E-07	3.476E-07	3.476E-07
D	.4	.49	4827.	0.	0.	312.1	87.3	373.7	2.298E-05	2.706E-05	2.298E-05
D	1.0	2.00	4827.	0.	0.	312.1	87.3	373.7	9.704E-06	1.143E-05	9.704E-06
D	2.0	4.66	4827.	0.	0.	312.1	87.3	372.4	4.816E-06	5.651E-06	4.816E-06
D	3.0	5.91	4827.	0.	0.	312.1	87.3	345.6	3.498E-06	3.809E-06	3.498E-06
D	4.0	3.06	4827.	0.	0.	312.1	87.3	330.1	2.762E-06	2.873E-06	2.762E-06
D	5.0	2.71	4827.	0.	0.	312.1	87.3	319.4	2.271E-06	2.285E-06	2.271E-06
D	6.0	1.82	4827.	0.	0.	312.1	87.3	312.1	1.944E-06	1.912E-06	1.912E-06
D	8.0	.44	4827.	0.	0.	312.1	87.3	312.1	1.456E-06	1.432E-06	1.432E-06
D	10.0	.04	4827.	0.	0.	312.1	87.3	312.1	1.164E-06	1.145E-06	1.145E-06
D	13.0	.04	4827.	0.	0.	312.1	87.3	312.1	8.968E-07	8.820E-07	8.820E-07

ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-214	Cont'd on page B-215
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

E	.4	.52	4827.	0.	0.	222.0	55.4	309.5	4.368E-05	5.874E-05	4.368E-05
E	1.0	2.00	4827.	0.	0.	222.0	55.4	309.5	1.844E-05	2.480E-05	1.844E-05
E	2.0	5.20	4827.	0.	0.	222.0	55.4	307.3	9.185E-06	1.226E-05	9.185E-06
E	3.0	4.31	4827.	0.	0.	222.0	55.4	265.2	7.174E-06	8.267E-06	7.174E-06
E	4.0	2.27	4827.	0.	0.	222.0	55.4	243.8	5.885E-06	6.235E-06	5.885E-06
E	5.0	1.11	4827.	0.	0.	222.0	55.4	230.4	4.955E-06	4.960E-06	4.955E-06
E	6.0	.49	4827.	0.	0.	222.0	55.4	222.0	4.302E-06	4.149E-06	4.149E-06
E	8.0	.36	4827.	0.	0.	222.0	55.4	222.0	3.224E-06	3.109E-06	3.109E-06
E	10.0	.13	4827.	0.	0.	222.0	55.4	222.0	2.577E-06	2.486E-06	2.486E-06
E	13.0	.04	4827.	0.	0.	222.0	55.4	222.0	1.985E-06	1.914E-06	1.914E-06
F	.4	1.05	4827.	0.	0.	153.2	34.5	243.9	8.912E-05	1.306E-04	8.912E-05
F	1.0	3.82	4827.	0.	0.	153.2	34.5	243.9	3.763E-05	5.514E-05	3.763E-05
F	2.0	7.46	4827.	0.	0.	153.2	34.5	241.3	1.880E-05	2.727E-05	1.880E-05
F	3.0	4.31	4827.	0.	0.	153.2	34.5	194.9	1.569E-05	1.838E-05	1.569E-05
F	4.0	.58	4827.	0.	0.	153.2	34.5	173.4	1.331E-05	1.386E-05	1.331E-05
F	5.0	.09	4827.	0.	0.	153.2	34.5	160.7	1.142E-05	1.103E-05	1.103E-05
F	6.0	.13	4827.	0.	0.	153.2	34.5	153.2	1.002E-05	9.225E-06	9.225E-06
G	.4	1.59	4827.	0.	0.	105.7	21.5	210.1	1.663E-04	2.751E-04	1.663E-04
G	1.0	4.66	4827.	0.	0.	105.7	21.5	210.1	7.022E-05	1.162E-04	7.022E-05
G	2.0	12.08	4827.	0.	0.	105.7	21.5	206.7	3.530E-05	5.745E-05	3.530E-05
G	3.0	3.95	4827.	0.	0.	105.7	21.5	148.9	3.302E-05	3.872E-05	3.302E-05
G	4.0	.36	4827.	0.	0.	105.7	21.5	125.3	2.960E-05	2.921E-05	2.921E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0            RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                  METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                         WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE              DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0   S SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0LATERAL 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=   .5     A=  2861.     D=   70.0
 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   1.663E-04   8.912E-05   7.022E-05   4.368E-05   3.763E-05   3.530E-05   3.302E-05   2.921E-05   2.298E-05   1.880E-05
        1.591       2.639       7.302       7.820      11.640      23.721      27.673      28.029      28.517      35.978
       .11324      .18780      .51965      .55651      .82831     1.68798     1.96927     1.99456     2.02928     2.56026
0   1.844E-05   1.569E-05   1.331E-05   1.103E-05   9.704E-06   9.225E-06   9.185E-06   7.174E-06   6.569E-06   5.885E-06
       37.977      42.285      42.862      42.951      44.950      45.083      50.280      54.588      54.680      56.945
      2.70248     3.00906     3.05014     3.05647     3.19869     3.20817     3.57796     3.88453     3.89109     4.05228
0   4.955E-06   4.816E-06   4.149E-06   3.498E-06   3.109E-06   2.773E-06   2.762E-06   2.486E-06   2.271E-06   2.097E-06
       58.055      62.719      63.207      69.114      69.470      69.736      72.801      72.934      75.643      75.746
      4.13129     4.46315     4.49791     4.91827     4.94355     4.96252     5.18059     5.19008     5.38287     5.39016
0   1.914E-06   1.912E-06   1.432E-06   1.371E-06   1.145E-06   9.651E-07   9.245E-07   8.853E-07   8.820E-07   6.972E-07
       75.790      77.611      78.055      79.121      79.166      79.570      80.680      80.991      81.035      81.790
      5.39332     5.52290     5.55451     5.63036     5.63352     5.66227     5.74128     5.76341     5.76657     5.82030
0   5.547E-07   4.639E-07   4.378E-07   4.075E-07   3.476E-07   2.951E-07   2.226E-07   2.015E-07   1.771E-07   1.481E-07
       82.501      82.812      83.700      85.121      85.432      86.631      87.298      90.540      91.028      91.295
      5.87087     5.89299     5.95620     6.05734     6.07946     6.16480     6.21221     6.44293     6.47769     6.49666
0   1.358E-07   1.110E-07   1.024E-07   8.873E-08   8.149E-08   6.816E-08   5.108E-08   4.084E-08
       93.960      94.137      96.491      96.536      98.135      98.845      99.956     100.000
      6.68629     6.69893     6.86644     6.86960     6.98338     7.03395     7.11297     7.11613
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Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

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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)=   1.967
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   3.006
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   3.881
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   4.460
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   4.915
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   5.177
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   5.379
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   5.519
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   6.980

0  K  I    XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   1  1       -8.70159 -13.67355  -1.62833
   1  2      -10.31825 -18.80425  -4.11827
   1  3      -11.06239 -23.82999  -6.79170
   1  4      -11.84509 -22.67129  -6.13508
   1  5      -12.24366 -23.93048  -6.87592
   1  6      -12.56327 -28.03181  -9.35678
   1  7      -12.79953 -29.76929 -10.42406
   1  8      -12.99534 -34.85218 -13.58279
   1  9      -13.16756 -55.44002 -26.47858
   1 10      -16.32274      NUMXQ(K)= 10
                                                    BACK EXTRAPOLATION FOR  1 PERCENTILE.
      2.078E-04               .071            1.000
      1.210E-04               .213            3.000
      9.230E-05               .356            5.000
      6.244E-05               .712           10.000
      4.895E-05              1.067           15.000
      4.086E-05              1.423           20.000
      3.534E-05              1.779           25.000
      2.877E-05              2.135           30.000
      2.201E-05              2.491           35.000
      1.735E-05              2.846           40.000
      1.301E-05              3.202           45.000
      9.426E-06              3.558           50.000
      7.022E-06              3.914           55.000
      5.475E-06              4.270           60.000
      4.284E-06              4.625           65.000
      3.302E-06              4.981           70.000
      2.373E-06              5.337           75.000
      1.283E-06              5.693           80.000
      5.737E-07              6.049           85.000
      2.659E-07              6.405           90.000
0     7.647E-05              0.5              7.03
0ANNUAL AVERAGE =    6.01E-07
0K=  1     FIVEXQ(K)= 7.647E-05     FIVEPR(K)= 7.026
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE SSW SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.63	4827.	0.	0.	776.2	1000.0	776.2	9.656E-07	9.651E-07	9.651E-07
A	1.0	2.20	4827.	0.	0.	776.2	1000.0	776.2	4.077E-07	4.075E-07	4.075E-07
A	2.0	3.39	4827.	0.	0.	776.2	1000.0	776.2	2.016E-07	2.015E-07	2.015E-07
A	3.0	2.60	4827.	0.	0.	776.2	1000.0	776.2	1.359E-07	1.358E-07	1.358E-07
A	4.0	2.09	4827.	0.	0.	776.2	1000.0	776.2	1.025E-07	1.024E-07	1.024E-07
A	5.0	1.58	4827.	0.	0.	776.2	1000.0	776.2	8.154E-08	8.149E-08	8.149E-08
A	6.0	.51	4827.	0.	0.	776.2	1000.0	776.2	6.820E-08	6.816E-08	6.816E-08
A	8.0	1.02	4827.	0.	0.	776.2	1000.0	776.2	5.111E-08	5.108E-08	5.108E-08
A	10.0	.06	4827.	0.	0.	776.2	1000.0	776.2	4.086E-08	4.084E-08	4.084E-08
A	13.0	.11	4827.	0.	0.	776.2	1000.0	776.2	3.147E-08	3.145E-08	3.145E-08
B	.4	.15	4827.	0.	0.	583.7	611.6	583.7	2.099E-06	2.097E-06	2.097E-06
B	1.0	.45	4827.	0.	0.	583.7	611.6	583.7	8.864E-07	8.853E-07	8.853E-07
B	2.0	.73	4827.	0.	0.	583.7	611.6	583.7	4.383E-07	4.378E-07	4.378E-07
B	3.0	1.02	4827.	0.	0.	583.7	611.6	583.7	2.955E-07	2.951E-07	2.951E-07
B	4.0	1.02	4827.	0.	0.	583.7	611.6	583.7	2.228E-07	2.226E-07	2.226E-07
B	5.0	.56	4827.	0.	0.	583.7	611.6	583.7	1.773E-07	1.771E-07	1.771E-07
B	6.0	.11	4827.	0.	0.	583.7	611.6	583.7	1.483E-07	1.481E-07	1.481E-07
B	8.0	.11	4827.	0.	0.	583.7	611.6	583.7	1.111E-07	1.110E-07	1.110E-07
B	13.0	.11	4827.	0.	0.	583.7	611.6	583.7	6.842E-08	6.833E-08	6.833E-08
C	.4	.20	4827.	0.	0.	443.3	256.4	443.3	6.595E-06	6.569E-06	6.569E-06
C	1.0	.56	4827.	0.	0.	443.3	256.4	443.3	2.784E-06	2.773E-06	2.773E-06
C	2.0	1.07	4827.	0.	0.	443.3	256.4	443.3	1.377E-06	1.371E-06	1.371E-06
C	3.0	1.02	4827.	0.	0.	443.3	256.4	443.3	9.282E-07	9.245E-07	9.245E-07
C	4.0	.85	4827.	0.	0.	443.3	256.4	443.3	7.000E-07	6.972E-07	6.972E-07
C	5.0	.62	4827.	0.	0.	443.3	256.4	443.3	5.569E-07	5.547E-07	5.547E-07
C	6.0	.17	4827.	0.	0.	443.3	256.4	443.3	4.658E-07	4.639E-07	4.639E-07
C	8.0	.11	4827.	0.	0.	443.3	256.4	443.3	3.490E-07	3.476E-07	3.476E-07
C	10.0	.11	4827.	0.	0.	443.3	256.4	443.3	2.791E-07	2.780E-07	2.780E-07
D	.4	.44	4827.	0.	0.	312.1	87.3	373.7	2.298E-05	2.706E-05	2.298E-05
D	1.0	1.81	4827.	0.	0.	312.1	87.3	373.7	9.704E-06	1.143E-05	9.704E-06
D	2.0	3.84	4827.	0.	0.	312.1	87.3	372.4	4.816E-06	5.651E-06	4.816E-06
D	3.0	4.12	4827.	0.	0.	312.1	87.3	345.6	3.498E-06	3.809E-06	3.498E-06
D	4.0	3.33	4827.	0.	0.	312.1	87.3	330.1	2.762E-06	2.873E 06	2.762E-06
D	5.0	1.81	4827.	0.	0.	312.1	87.3	319.4	2.271E-06	2.285E-06	2.271E-06
D	6.0	.85	4827.	0.	0.	312.1	87.3	312.1	1.944E-06	1.912E-06	1.912E-06
D	8.0	.68	4827.	0.	0.	312.1	87.3	312.1	1.456E-06	1.432E-06	1.432E-06
D	10.0	.45	4827.	0.	0.	312.1	87.3	312.1	1.164E-06	1.145E-06	1.145E-06
D	13.0	.06	4827.	0.	0.	312.1	87.3	312.1	8.968E-07	8.820E-07	8.820E-07

E	.4	.51	4827.	0.	0.	222.0	55.4	309.5	4.368E-05	5.874E-05	4.368E-05
E	1.0	1.98	4827.	0.	0.	222.0	55.4	309.5	1.844E-05	2.480E-05	1.844E-05
E	2.0	5.19	4827.	0.	0.	222.0	55.4	307.3	9.185E-06	1.226E-05	9.185E-06
E	3.0	4.46	4827.	0.	0.	222.0	55.4	265.2	7.174E-06	8.267E-06	7.174E-06
E	4.0	1.86	4827.	0.	0.	222.0	55.4	243.8	5.885E-06	6.235E-06	5.885E-06
E	5.0	.56	4827.	0.	0.	222.0	55.4	230.4	4.955E-06	4.960E-06	4.955E-06
E	6.0	.23	4827.	0.	0.	222.0	55.4	222.0	4.302E-06	4.149E-06	4.149E-06
E	8.0	.73	4827.	0.	0.	222.0	55.4	222.0	3.224E-06	3.109E-06	3.109E-06
E	10.0	.73	4827.	0.	0.	222.0	55.4	222.0	2.577E-06	2.486E-06	2.486E-06
F	.4	.98	4827.	0.	0.	153.2	34.5	243.9	8.912E-05	1.306E-04	8.912E-05
F	1.0	3.56	4827.	0.	0.	153.2	34.5	243.9	3.763E-05	5.514E-05	3.763E-05
F	2.0	7.96	4827.	0.	0.	153.2	34.5	241.3	1.880E-05	3.727E-05	1.880E-05
F	3.0	3.67	4827.	0.	0.	153.2	34.5	194.9	1.569E-05	1.838E-05	1.569E-05
F	4.0	.45	4827.	0.	0.	153.2	34.5	173.4	1.331E-05	1.386E-05	1.331E-05
F	5.0	.06	4827.	0.	0.	153.2	34.5	160.7	1.142E-05	1.103E-05	1.103E-05
G	.4	1.98	4827.	0.	0.	105.7	21.5	210.1	1.663E-04	2.751E-04	1.663E-04
G	1.0	5.81	4827.	0.	0.	105.7	21.5	210.1	7.022E-05	1.162E-04	7.022E-05
G	2.0	14.06	4827.	0.	0.	105.7	21.5	206.7	3.530E-05	5.745E-05	3.530E-05
G	3.0	4.23	4827.	0.	0.	105.7	21.5	148.9	3.302E-05	3.872E-05	3.302E-05
G	4.0	.45	4827.	0.	0.	105.7	21.5	125.3	2.960E-05	2.921E-05	2.921E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE:  11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0 SSW SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0LATERAL 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=    .5     A=  2861.     D=    70.0
 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   1.663E-04   8.912E-05   7.022E-05   4.368E-05   3.763E-05   3.530E-05   3.302E-05   2.921E-05   2.298E-05   1.880E-05
        1.984       2.960       8.774       9.286      12.842      26.898      31.132      31.583      32.024      39.984
       .11109      .16570      .49124      .51990      .71901     1.50599     1.74304     1.76832     1.79301     2.23865
0   1.844E-05   1.569E-05   1.331E-05   1.103E-05   9.704E-06   9.185E-06   7.174E-06   6.569E-06   5.885E-06   4.955E-06
       41.960      45.629      46.080      46.137      47.943      53.137      57.596      57.791      59.654      60.219
      2.34927     2.55471     2.57999     2.58315     2.68429     2.97506     3.22475     3.23567     3.33997     3.37157
0   4.816E-06   4.149E-06   3.498E-06   3.109E-06   2.773E-06   2.762E-06   2.486E-06   2.271E-06   2.097E-06   1.912E-06
       64.057      64.283      68.404      69.138      69.702      73.033      73.767      75.573      75.722      76.569
      3.58649     3.59913     3.82986     3.87094     3.90255     4.08902     4.13011     4.23125     4.23958     4.28699
0   1.432E-06   1.371E-06   1.145E-06   9.651E-07   9.245E-07   8.853E-07   8.820E-07   6.972E-07   5.547E-07   4.639E-07
       77.246      78.319      78.770      79.396      80.412      80.864      80.920      81.767      82.388      82.557
      4.32491     4.38496     4.41025     4.44529     4.50218     4.52746     4.53062     4.57803     4.61279     4.62228
0   4.378E-07   4.075E-07   3.476E-07   2.951E-07   2.780E-07   2.226E-07   2.015E-07   1.771E-07   1.481E-07   1.358E-07
       83.291      85.492      85.605      86.621      86.734      87.750      91.137      91.702      91.815      94.412
      4.66336     4.78663     4.79295     4.84984     4.85616     4.91305     5.10268     5.13429     5.14061     5.28599
0   1.110E-07   1.024E-07   8.149E-08   6.833E-08   6.816E-08   5.108E-08   4.084E-08   3.145E-08
       94.524      96.613      98.194      98.307      98.815      99.831      99.887     100.000
      5.29232     5.40926     5.49775     5.50407     5.53252     5.58941     5.59257     5.59889
```

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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)=   1.741
                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   2.552
                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   3.222
                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   3.583
                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   4.086
                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   4.228
                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   4.284
                                 HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   5.405
0  K  I    XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   2  1     -8.70159 -13.91434  -1.70398
   2  2    -10.31825 -20.17688  -4.67142
   2  3    -11.06239 -26.04000  -7.67642
   2  4    -11.84509 -27.22375  -8.31658
   2  5    -12.24366 -28.82149  -9.20361
   2  6    -12.79953 -34.11397 -12.24380
   2  7    -12.99534 -61.30417 -28.00768
   2  8    -13.16756 -58.09748 -26.14191
   2  9    -16.09403        NUMXQ(K)=  9
                                 BACK EXTRAPOLATION FOR  1 PERCENTILE.
      2.337E-04             .056             1.000
      1.342E-04             .168             3.000
      1.017E-04             .280             5.000
      6.830E-05             .560            10.000
      5.332E-05             .840            15.000
      4.439E-05            1.120            20.000
      3.833E-05            1.400            25.000
      3.388E-05            1.680            30.000
      2.641E-05            1.960            35.000
      2.038E-05            2.240            40.000
      1.613E-05            2.519            45.000
      1.158E-05            2.799            50.000
      8.397E-06            3.079            55.000
      6.160E-06            3.359            60.000
      4.529E-06            3.639            65.000
      3.311E-06            3.919            70.000
      2.372E-06            4.199            75.000
      1.112E-06            4.479            80.000
      5.221E-07            4.759            85.000
      2.537E-07            5.039            90.000
0     7.304E-05            0.5               8.93
0ANNUAL AVERAGE =    5.08E-07
0K=  2      FIVEXQ(K)= 7.304E-05      FIVEPR(K)= 8.930
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE  SW SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.71	4827.	0.	0.	776.2	1000.0	776.2	9.656E-07	9.651E-07	9.651E-07
A	1.0	2.50	4827.	0.	0.	776.2	1000.0	776.2	4.077E-07	4.075E-07	4.075E-07
A	2.0	4.25	4827.	0.	0.	776.2	1000.0	776.2	2.016E-07	2.015E-07	2.015E-07
A	3.0	3.42	4827.	0.	0.	776.2	1000.0	776.2	1.359E-07	1.358E-07	1.358E-07
A	4.0	1.58	4827.	0.	0.	776.2	1000.0	776.2	1.025E-07	1.024E-07	1.024E-07
A	5.0	.92	4827.	0.	0.	776.2	1000.0	776.2	8.154E-08	8.149E-08	8.149E-08
A	6.0	.42	4827.	0.	0.	776.2	1000.0	776.2	6.820E-08	6.816E-08	6.816E-08
A	8.0	.83	4827.	0.	0.	776.2	1000.0	776.2	5.111E-08	5.108E-08	5.108E-08
A	10.0	.17	4827.	0.	0.	776.2	1000.0	776.2	4.086E-08	4.084E-08	4.084E-08
B	.4	.03	4827.	0.	0.	583.7	611.6	583.7	2.099E-06	2.097E-06	2.097E-06
B	1.0	.08	4827.	0.	0.	583.7	611.6	583.7	8.864E-07	8.853E-07	8.853E-07
B	2.0	.92	4827.	0.	0.	583.7	611.6	583.7	4.383E-07	4.378E-07	4.378E-07
B	3.0	1.25	4827.	0.	0.	583.7	611.6	583.7	2.955E-07	2.951E-07	2.951E-07
B	4.0	.83	4827.	0.	0.	583.7	611.6	583.7	2.228E-07	2.226E-07	2.226E-07
B	5.0	.67	4827.	0.	0.	583.7	611.6	583.7	1.773E-07	1.771E-07	1.771E-07
B	6.0	.08	4827.	0.	0.	583.7	611.6	583.7	1.483E-07	1.481E-07	1.481E-07
B	8.0	.17	4827.	0.	0.	583.7	611.6	583.7	1.111E-07	1.110E-07	1.110E-07
C	.4	.23	4827.	0.	0.	443.3	256.4	443.3	6.595E-06	6.569E-06	6.569E-06
C	1.0	.67	4827.	0.	0.	443.3	256.4	443.3	2.784E-06	2.773E-06	2.773E-06
C	2.0	.92	4827.	0.	0.	443.3	256.4	443.3	1.377E-06	1.371E-06	1.371E-06
C	3.0	.92	4827.	0.	0.	443.3	256.4	443.3	9.282E-07	9.245E-07	9.245E-07
C	4.0	.25	4827.	0.	0.	443.3	256.4	443.3	7.000E-07	6.972E-07	6.972E-07
C	5.0	.42	4827.	0.	0.	443.3	256.4	443.3	5.569E-07	5.547E-07	5.547E-07
C	6.0	.25	4827.	0.	0.	443.3	256.4	443.3	4.658E-07	4.639E-07	4.639E-07
C	8.0	.17	4827.	0.	0.	443.3	256.4	443.3	3.490E-07	3.476E-07	3.476E-07
D	.4	.53	4827.	0.	0.	312.1	87.3	373.7	2.298E-05	2.706E-05	2.298E-05
D	1.0	2.17	4827.	0.	0.	312.1	87.3	373.7	9.704E-06	1.143E-05	9.704E-06
D	2.0	4.42	4827.	0.	0.	312.1	87.3	372.4	4.816E-06	5.651E-06	4.816E-06
D	3.0	4.50	4827.	0.	0.	312.1	87.3	345.6	3.498E-06	3.809E-06	3.498E-06
D	4.0	3.33	4827.	0.	0.	312.1	87.3	330.1	2.762E-06	2.873E-06	2.762E-06
D	5.0	2.83	4827.	0.	0.	312.1	87.3	319.4	2.271E-06	2.285E-06	2.271E-06
D	6.0	1.33	4827.	0.	0.	312.1	87.3	312.1	1.944E-06	1.912E-06	1.912E-06
D	8.0	.33	4827.	0.	0.	312.1	87.3	312.1	1.456E-06	1.432E-06	1.432E-06
D	10.0	.50	4827.	0.	0.	312.1	87.3	312.1	1.164E-06	1.145E-06	1.145E-06
D	13.0	.33	4827.	0.	0.	312.1	87.3	312.1	8.968E-07	8.820E-07	8.820E-07
D	18.0	.17	4827.	0.	0.	312.1	87.3	312.1	6.479E-07	6.372E-07	6.372E-07

Cont'd on page B-223

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

E	.4	.50	4827.	0.	0.	222.0	55.4	309.5	4.368E-05	5.874E-05	4.368E-05
E	1.0	1.92	4827.	0.	0.	222.0	55.4	309.5	1.844E-05	2.480E-05	1.844E-05
E	2.0	5.25	4827.	0.	0.	222.0	55.4	307.3	9.185E-06	1.226E-05	9.185E-06
E	3.0	4.50	4827.	0.	0.	222.0	55.4	265.2	7.174E-06	8.267E-06	7.174E-06
E	4.0	3.83	4827.	0.	0.	222.0	55.4	243.8	5.885E-06	6.235E-06	5.885E-06
E	5.0	1.25	4827.	0.	0.	222.0	55.4	230.4	4.955E-06	4.960E-06	4.955E-06
E	6.0	.25	4827.	0.	0.	222.0	55.4	222.0	4.302E-06	4.149E-06	4.149E-06
E	8.0	.50	4827.	0.	0.	222.0	55.4	222.0	3.224E-06	3.109E-06	3.109E-06
E	10.0	.58	4827.	0.	0.	222.0	55.4	222.0	2.577E-06	2.486E-06	2.486E-06
E	13.0	.08	4827.	0.	0.	222.0	55.4	222.0	1.985E-06	1.914E-06	1.914E-06
F	.4	.98	4827.	0.	0.	153.2	34.5	243.9	8.912E-05	1.306E-04	8.912E-05
F	1.0	3.58	4827.	0.	0.	153.2	34.5	243.9	3.763E-05	5.514E-05	3.763E-05
F	2.0	5.83	4827.	0.	0.	153.2	34.5	241.3	1.880E-05	2.727E-05	1.880E-05
F	3.0	3.33	4827.	0.	0.	153.2	34.5	194.9	1.569E-05	1.838E-05	1.569E-05
F	4.0	1.83	4827.	0.	0.	153.2	34.5	173.4	1.331E-05	1.386E-05	1.331E-05
F	5.0	.25	4827.	0.	0.	153.2	34.5	160.7	1.142E-05	1.103E-05	1.103E-05
G	.4	1.79	4827.	0.	0.	105.7	21.5	210.1	1.663E-04	2.751E-04	1.663E-04
G	1.0	5.25	4827.	0.	0.	105.7	21.5	210.1	7.022E-05	1.162E-04	7.022E-05
G	2.0	8.83	4827.	0.	0.	105.7	21.5	206.7	3.530E-05	5.745E-05	3.530E-05
G	3.0	4.75	4827.	0.	0.	105.7	21.5	148.9	3.302E-05	3.872E-05	3.302E-05
G	4.0	1.58	4827.	0.	0.	105.7	21.5	125.3	2.960E-05	2.921E-05	2.921E-05
G	5.0	.25	4827.	0.	0.	105.7	21.5	112.7	2.618E-05	2.323E-05	2.323E-05

Prepared by / Date: Mohammed Abu-Shehadeh

Verified by/Date: Ted Messler

Revision No. 0

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0            RUN DATE:  11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                                 METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                        WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE             DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0  SW SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0LATERAL 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=   .5     A=  2861.     D=   70.0
 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   1.663E-04   8.912E-05   7.022E-05   4.368E-05   3.763E-05   3.530E-05   3.302E-05   2.921E-05   2.323E-05   2.298E-05
        1.791       2.774       8.023       8.519      12.102      20.934      25.683      27.266      27.516      28.045
       .06795      .10522      .30434      .32317      .45908      .79410      .97425     1.03430     1.04378     1.06384
0   1.880E-05   1.844E-05   1.569E-05   1.331E-05   1.103E-05   9.704E-06   9.185E-06   7.174E-06   6.569E-06   5.885E-06
       33.877      35.793      39.126      40.959      41.209      43.375      48.624      53.124      53.354      57.187
      1.28508     1.35777     1.48420     1.55373     1.56321     1.64539     1.84450     2.01517     2.02391     2.16930
0   4.955E-06   4.816E-06   4.149E-06   3.498E-06   3.109E-06   2.773E-06   2.762E-06   2.486E-06   2.271E-06   2.097E-06
       58.436      62.852      63.102      67.601      68.101      68.768      72.100      72.684      75.516      75.544
      2.21671     2.38421     2.39370     2.56437     2.58333     2.60861     2.73504     2.75716     2.86462     2.86566
0   1.914E-06   1.912E-06   1.432E-06   1.371E-06   1.145E-06   9.651E-07   9.245E-07   8.853E-07   8.820E-07   6.972E-07
       75.627      76.960      77.294      78.210      78.710      79.421      80.337      80.420      80.754      81.004
      2.86882     2.91939     2.93203     2.96680     2.98576     3.01271     3.04748     3.05064     3.06328     3.07276
0   6.372E-07   5.547E-07   4.639E-07   4.378E-07   4.075E-07   3.476E-07   2.951E-07   2.226E-07   2.015E-07   1.771E-07
       81.170      81.587      81.837      82.753      85.253      85.419      86.669      87.502      91.752      92.418
      3.07908     3.09489     3.10437     3.13913     3.23395     3.24027     3.28768     3.31929     3.48047     3.50576
0   1.481E-07   1.358E-07   1.110E-07   1.024E-07   8.149E-08   6.816E-08   5.108E-08   4.084E-08
       92.501      95.917      96.084      97.667      98.584      99.000      99.833     100.000
      3.50892     3.63850     3.64482     3.70487     3.73964     3.75544     3.78705     3.79337
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ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-224	Cont'd on page B-225
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

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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)=    .973
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   1.356
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   1.483
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   2.382
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   2.732
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   2.862
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   2.917
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   3.635

0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   3  1      -8.70159 -14.67543  -1.86479
   3  2     -10.31825 -21.05147  -4.59361
   3  3     -10.90090 -21.09893  -4.61508
   3  4     -11.06239 -24.29605  -6.08521
   3  5     -12.24366 -30.92509  -9.43219
   3  6     -12.79953 -31.45024  -9.70547
   3  7     -12.99534 -52.45142 -20.75002
   3  8     -13.16756 -63.98021 -26.83961
   3  9     -15.81192      NUMXQ(K)=  9
                                                  BACK EXTRAPOLATION FOR  1 PERCENTILE.
      2.259E-04              .038            1.000
      1.254E-04              .114            3.000
      9.360E-05              .190            5.000
      6.154E-05              .379           10.000
      4.748E-05              .569           15.000
      3.921E-05              .759           20.000
      3.365E-05              .948           25.000
      2.522E-05             1.138           30.000
      1.920E-05             1.328           35.000
      1.488E-05             1.517           40.000
      1.117E-05             1.707           45.000
      8.606E-06             1.897           50.000
      6.774E-06             2.086           55.000
      5.427E-06             2.276           60.000
      4.208E-06             2.466           65.000
      3.117E-06             2.655           70.000
      2.338E-06             2.845           75.000
      1.205E-06             3.035           80.000
      5.871E-07             3.224           85.000
      2.949E-07             3.414           90.000
0     5.164E-05             0.5             13.18
OANNUAL AVERAGE =    3.16E-07
0K=  3      FIVEXQ(K)= 5.164E-05       FIVEPR(K)=13.181
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0            RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                 METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                        WIND SENSORS HEIGHT: 10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE             DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp  output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE WSW SECTOR.
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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=1431.SQ.METERS	USED
A	.4	1.24	4827.	0.	0.	776.2	1000.0	776.2	9.656E-07	9.651E-07	9.651E-07
A	1.0	4.37	4827.	0.	0.	776.2	1000.0	776.2	4.077E-07	4.075E-07	4.075E-07
A	2.0	6.83	4827.	0.	0.	776.2	1000.0	776.2	2.016E-07	2.015E-07	2.015E-07
A	3.0	2.09	4827.	0.	0.	776.2	1000.0	776.2	1.359E-07	1.358E-07	1.358E-07
A	4.0	1.33	4827.	0.	0.	776.2	1000.0	776.2	1.025E-07	1.024E-07	1.024E-07
A	5.0	.38	4827.	0.	0.	776.2	1000.0	776.2	8.154E-08	8.149E-08	8.149E-08
A	6.0	.19	4827.	0.	0.	776.2	1000.0	776.2	6.820E-08	6.816E-08	6.816E-08
B	.4	.31	4827.	0.	0.	583.7	611.6	583.7	2.099E-06	2.097E-06	2.097E-06
B	1.0	.95	4827.	0.	0.	583.7	611.6	583.7	8.864E-07	8.853E-07	8.853E-07
B	2.0	.76	4827.	0.	0.	583.7	611.6	583.7	4.383E-07	4.378E-07	4.378E-07
B	3.0	.76	4827.	0.	0.	583.7	611.6	583.7	2.955E-07	2.951E-07	2.951E-07
B	4.0	.38	4827.	0.	0.	583.7	611.6	583.7	2.228E-07	2.226E-07	2.226E-07
B	5.0	.19	4827.	0.	0.	583.7	611.6	583.7	1.773E-07	1.771E-07	1.771E-07
B	6.0	.19	4827.	0.	0.	583.7	611.6	583.7	1.483E-07	1.481E-07	1.481E-07
B	8.0	.57	4827.	0.	0.	583.7	611.6	583.7	1.111E-07	1.110E-07	1.110E-07
C	.4	.33	4827.	0.	0.	443.3	256.4	443.3	6.595E-06	6.569E-06	6.569E-06
C	1.0	.95	4827.	0.	0.	443.3	256.4	443.3	2.784E-06	2.773E-06	2.773E-06
C	2.0	.76	4827.	0.	0.	443.3	256.4	443.3	1.377E-06	1.371E-06	1.371E-06
C	3.0	1.71	4827.	0.	0.	443.3	256.4	443.3	9.282E-07	9.245E-07	9.245E-07
C	4.0	.19	4827.	0.	0.	443.3	256.4	443.3	7.000E-07	6.972E-07	6.972E-07
D	.4	1.07	4827.	0.	0.	312.1	87.3	373.7	2.298E-05	2.706E-05	2.298E-05
D	1.0	4.37	4827.	0.	0.	312.1	87.3	373.7	9.704E-06	1.143E-05	9.704E-06
D	2.0	6.26	4827.	0.	0.	312.1	87.3	372.4	4.816E-06	5.651E-06	4.816E-06
D	3.0	4.75	4827.	0.	0.	312.1	87.3	345.6	3.498E-06	3.809E-06	3.498E-06
D	4.0	3.61	4827.	0.	0.	312.1	87.3	330.1	2.762E-06	2.873E-06	2.762E-06
D	5.0	1.14	4827.	0.	0.	312.1	87.3	319.4	2.271E-06	2.285E-06	2.271E-06
D	8.0	.38	4827.	0.	0.	312.1	87.3	312.1	1.456E-06	1.432E-06	1.432E-06

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

E	.4	1.28	4827.	0.	0.	222.0	55.4	309.5	4.368E-05	5.874E-05	4.368E-05
E	1.0	4.94	4827.	0.	0.	222.0	55.4	309.5	1.844E-05	2.480E-05	1.844E-05
E	2.0	5.70	4827.	0.	0.	222.0	55.4	307.3	9.185E-06	1.226E-05	9.185E-06
E	3.0	5.13	4827.	0.	0.	222.0	55.4	265.2	7.174E-06	8.267E-06	7.174E-06
E	4.0	1.52	4827.	0.	0.	222.0	55.4	243.8	5.885E-06	6.235E-06	5.885E-06
E	5.0	1.71	4827.	0.	0.	222.0	55.4	230.4	4.955E-06	4.960E-06	4.955E-06
E	6.0	.95	4827.	0.	0.	222.0	55.4	222.0	4.302E-06	4.149E-06	4.149E-06
E	8.0	.19	4827.	0.	0.	222.0	55.4	222.0	3.224E-06	3.109E-06	3.109E-06
F	.4	.94	4827.	0.	0.	153.2	34.5	243.9	8.912E-05	1.306E-04	8.912E-05
F	1.0	3.42	4827.	0.	0.	153.2	34.5	243.9	3.763E-05	5.514E-05	3.763E-05
F	2.0	5.70	4827.	0.	0.	153.2	34.5	241.3	1.880E-05	2.727E-05	1.880E-05
F	3.0	3.04	4827.	0.	0.	153.2	34.5	194.9	1.569E-05	1.838E-05	1.569E-05
F	4.0	1.90	4827.	0.	0.	153.2	34.5	173.4	1.331E-05	1.386E-05	1.331E-05
F	5.0	.57	4827.	0.	0.	153.2	34.5	160.7	1.142E-05	1.103E-05	1.103E-05
G	.4	1.81	4827.	0.	0.	105.7	21.5	210.1	1.663E-04	2.751E-04	1.663E-04
G	1.0	5.32	4827.	0.	0.	105.7	21.5	210.1	7.022E-05	1.162E-04	7.022E-05
G	2.0	5.51	4827.	0.	0.	105.7	21.5	206.7	3.530E-05	5.745E-05	3.530E-05
G	3.0	2.66	4827.	0.	0.	105.7	21.5	148.9	3.302E-05	3.872E-05	3.302E-05
G	4.0	1.14	4827.	0.	0.	105.7	21.5	125.3	2.960E-05	2.921E-05	2.921E-05
G	5.0	.38	4827.	0.	0.	105.7	21.5	112.7	2.618E-05	2.323E-05	2.323E-05
G	6.0	.19	4827.	0.	0.	105.7	21.5	105.7	2.333E-05	1.943E-05	1.943E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.C          RUN DATE: 11/19/2003    TIME:  23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0 WSW SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0LATERAL 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=   .5     A=  2861.     D=   70.0
 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   1.663E-04   8.912E-05   7.022E-05   4.368E-05   3.763E-05   3.530E-05   3.302E-05   2.921E-05   2.323E-05   2.298E-05
        1.814       2.751       8.067       9.346      12.763      18.268      20.926      22.065      22.445      23.511
       .03020      .04580      .13430      .15559      .21248      .30414      .34838      .36735      .37367      .39142
0   1.943E-05   1.880E-05   1.844E-05   1.569E-05   1.331E-05   1.103E-05   9.704E-06   9.185E-06   7.174E-06   6.569E-06
       23.701      29.396      34.332      37.369      39.267      39.837      44.203      49.899      55.024      55.352
       .39458      .48939      .57157      .62214      .65374      .66322      .73592      .83073      .91607      .92153
0   5.885E-06   4.955E-06   4.816E-06   4.149E-06   3.498E-06   3.109E-06   2.773E-06   2.762E-06   2.271E-06   2.097E-06
       56.871      58.580      64.844      65.794      70.540      70.729      71.679      75.286      76.425      76.737
       .94682      .97526     1.07956     1.09536     1.17438     1.17754     1.19334     1.25339     1.27235     1.27756
0   1.432E-06   1.371E-06   9.651E-07   9.245E-07   8.853E-07   6.972E-07   4.378E-07   4.075E-07   2.951E-07   2.226E-07
       77.117      77.876      79.118      80.826      81.775      81.965      82.725      87.091      87.850      88.230
      1.28388     1.29653     1.31719     1.34563     1.36143     1.36460     1.37724     1.44993     1.46257     1.46889
0   2.015E-07   1.771E-07   1.481E-07   1.358E-07   1.110E-07   1.024E-07   8.149E-08   6.816E-08
       95.064      95.254      95.444      97.532      98.102      99.430      99.810     100.000
      1.58267     1.58583     1.58900     1.62376     1.63324     1.65537     1.66169     1.66485
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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)=   .134
                                                HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   .348
                                                HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   .571
                                                HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   .830
                                                HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=  1.078
                                                HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=  1.252
                                                HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=  1.581
0  K  I    XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   4  1       -8.70159 -15.60919  -2.01386
   4  2       -9.56381 -17.03544  -2.48898
   4  3      -10.31825 -19.61563  -3.44505
   4  4      -10.90090 -24.05205  -5.19882
   4  5      -11.59799 -27.44037  -6.61324
   4  6      -12.24366 -34.60416  -9.73074
   4  7      -12.79953 -76.84576 -28.58188
   4  8      -15.41750      NUMXQ(K)=  8
                                                BACK EXTRAPOLATION FOR  1 PERCENTILE.
      2.288E-04               .017             1.000
      1.257E-04               .050             3.000
      9.360E-05               .083             5.000
      5.958E-05               .166            10.000
      4.332E-05               .250            15.000
      3.428E-05               .333            20.000
      2.688E-05               .416            25.000
      2.168E-05               .499            30.000
      1.780E-05               .583            35.000
      1.392E-05               .666            40.000
      1.117E-05               .749            45.000
      9.139E-06               .832            50.000
      7.244E-06               .916            55.000
      5.844E-06               .999            60.000
      4.773E-06              1.082            65.000
      3.627E-06              1.165            70.000
      2.802E-06              1.249            75.000
      1.408E-06              1.332            80.000
      7.150E-07              1.415            85.000
      3.753E-07              1.498            90.000
0     2.165E-05              0.5              30.03
0ANNUAL AVERAGE =    1.50E-07
0K=  4      FIVEXQ(K)= 2.165E-05      FIVEPR(K)=30.033
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0            RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                 METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                        WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE             DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE   W SECTOR.
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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=1431.SQ.METERS	USED
A	.4	2.01	4827.	0.	0.	776.2	1000.0	776.2	9.656E-07	9.651E-07	9.651E-07
A	1.0	7.09	4827.	0.	0.	776.2	1000.0	776.2	4.077E-07	4.075E-07	4.075E-07
A	2.0	7.87	4827.	0.	0.	776.2	1000.0	776.2	2.016E-07	2.015E-07	2.015E-07
A	3.0	2.62	4827.	0.	0.	776.2	1000.0	776.2	1.359E-07	1.358E-07	1.358E-07
A	4.0	1.31	4827.	0.	0.	776.2	1000.0	776.2	1.025E-07	1.024E-07	1.024E-07
A	5.0	1.05	4827.	0.	0.	776.2	1000.0	776.2	8.154E-08	8.149E-08	8.149E-08
B	.4	.61	4827.	0.	0.	583.7	611.6	583.7	2.099E-06	2.097E-06	2.097E-06
B	1.0	1.84	4827.	0.	0.	583.7	611.6	583.7	8.864E-07	8.853E-07	8.853E-07
B	2.0	1.57	4827.	0.	0.	583.7	611.6	583.7	4.383E-07	4.378E-07	4.378E-07
B	3.0	.79	4827.	0.	0.	583.7	611.6	583.7	2.955E-07	2.951E-07	2.951E-07
B	4.0	.52	4827.	0.	0.	583.7	611.6	583.7	2.228E-07	2.226E-07	2.226E-07
C	.4	.27	4827.	0.	0.	443.3	256.4	443.3	6.595E-06	6.569E-06	6.569E-06
C	1.0	.79	4827.	0.	0.	443.3	256.4	443.3	2.784E-06	2.773E-06	2.773E-06
C	2.0	1.57	4827.	0.	0.	443.3	256.4	443.3	1.377E-06	1.371E-06	1.371E-06
C	3.0	1.84	4827.	0.	0.	443.3	256.4	443.3	9.282E-07	9.245E-07	9.245E-07
C	4.0	.52	4827.	0.	0.	443.3	256.4	443.3	7.000E-07	6.972E-07	6.972E-07
D	.4	1.03	4827.	0.	0.	312.1	87.3	373.7	2.298E-05	2.706E-05	2.298E-05
D	1.0	4.20	4827.	0.	0.	312.1	87.3	373.7	9.704E-06	1.143E-05	9.704E-06
D	2.0	9.71	4827.	0.	0.	312.1	87.3	372.4	4.816E-06	5.651E-06	4.816E-06
D	3.0	6.04	4827.	C.	0.	312.1	87.3	345.6	3.498E-06	3.809E-06	3.498E-06
D	4.0	4.72	4827.	0.	0.	312.1	87.3	330.1	2.762E-06	2.873E-06	2.762E-06
D	5.0	1.31	4827.	0.	0.	312.1	87.3	319.4	2.271E-06	2.285E-06	2.271E-06

Cont'd on page B-231

E	.4	1.50	4827.	0.	0.	222.0	55.4	309.5	4.368E-05	5.874E-05	4.368E-05
E	1.0	5.77	4827.	0.	0.	222.0	55.4	309.5	1.844E-05	2.480E-05	1.844E-05
E	2.0	5.77	4827.	0.	0.	222.0	55.4	307.3	9.185E-06	1.226E-05	9.185E-06
E	3.0	4.99	4827.	0.	0.	222.0	55.4	265.2	7.174E-06	8.267E-06	7.174E-06
E	4.0	1.31	4827.	0.	0.	222.0	55.4	243.8	5.885E-06	6.235E-06	5.885E-06
E	8.0	.26	4827.	0.	0.	222.0	55.4	222.0	3.224E-06	3.109E-06	3.109E-06
F	.4	1.30	4827.	0.	0.	153.2	34.5	243.9	8.912E-05	1.306E-04	8.912E-05
F	1.0	4.72	4827.	0.	0.	153.2	34.5	243.9	3.763E-05	5.514E-05	3.763E-05
F	2.0	3.67	4827.	0.	0.	153.2	34.5	241.3	1.880E-05	2.727E-05	1.880E-05
F	3.0	2.10	4827.	0.	0.	153.2	34.5	194.9	1.569E-05	1.838E-05	1.569E-05
F	4.0	.52	4827.	0.	0.	153.2	34.5	173.4	1.331E-05	1.386E-05	1.331E-05
G	.4	1.70	4827.	0.	0.	105.7	21.5	210.1	1.663E-04	2.751E-04	1.663E-04
G	1.0	4.99	4827.	0.	0.	105.7	21.5	210.1	7.022E-05	1.162E-04	7.022E-05
G	2.0	1.57	4827.	0.	0.	105.7	21.5	206.7	3.530E-05	5.745E-05	3.530E-05
G	3.0	.26	4827.	0.	0.	105.7	21.5	148.9	3.302E-05	3.872E-05	3.302E-05
G	4.0	.26	4827.	0.	0.	105.7	21.5	125.3	2.960E-05	2.921E-05	2.921E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0   W SECTOR       BOUNDARY DISTANCE = 4827.0 METERS
0LATERAL 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=   .5      A=  2861.     D=   70.0
 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   1.663E-04   8.912E-05   7.022E-05   4.368E-05   3.763E-05   3.530E-05   3.302E-05   2.921E-05   2.298E-05   1.880E-05
        1.702       2.997       7.983       9.479      14.203      15.778      16.040      16.303      17.328      21.002
       .02049      .03610      .09615      .11416      .17105      .19002      .19318      .19634      .20868      .25293
0   1.844E-05   1.569E-05   1.331E-05   9.704E-06   9.185E-06   7.174E-06   6.569E-06   5.885E-06   4.816E-06   3.498E-06
       26.776      28.875      29.400      33.599      39.373      44.359      44.631      45.943      55.653      61.689
       .32246      .34775      .35407      .40464      .47417      .53422      .53750      .55330      .67024      .74294
0   3.109E-06   2.773E-06   2.762E-06   2.271E-06   2.097E-06   1.371E-06   9.651E-07   9.245E-07   8.853E-07   6.972E-07
       61.952      62.739      67.463      68.775      69.381      70.955      72.969      74.806      76.643      77.168
       .74610      .75558      .81247      .82827      .83556      .85452      .87878      .90090      .92303      .92935
0   4.378E-07   4.075E-07   2.952E-07   2.226E-07   2.015E-07   1.358E-07   1.024E-07   8.149E-08
       78.743      85.829      86.616      87.141      95.014      97.638      98.950     100.000
       .94831     1.03365     1.04313     1.04945     1.14427     1.17587     1.19168     1.20432
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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)=     .096
                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=     .190
                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=     .322
                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=     .669
                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=     .812
                                        HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=    1.143
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   5  1      -8.70159 -15.76025   -1.99745
   5  2      -9.56381 -19.84515   -3.31424
   5  3     -10.25170 -21.29144   -3.81389
   5  4     -10.90090 -25.46692   -5.34651
   5  5     -12.24366 -32.00969   -7.99192
   5  6     -12.79953 -61.99572  -20.46689
   5  7     -15.41750      NUMXQ(K)=  7
                                        BACK EXTRAPOLATION FOR  1 PERCENTILE.
      2.191E-04              .012             1.000
      1.226E-04              .036             3.000
      9.213E-05              .060             5.000
      5.619E-05              .120            10.000
      3.720E-05              .181            15.000
      2.649E-05              .241            20.000
      2.010E-05              .301            25.000
      1.507E-05              .361            30.000
      1.142E-05              .422            35.000
      8.945E-06              .482            40.000
      7.192E-06              .542            45.000
      5.902E-06              .602            50.000
      4.925E-06              .662            55.000
      3.881E-06              .723            60.000
      3.078E-06              .783            65.000
      2.094E-06              .843            70.000
      1.244E-06              .903            75.000
      7.611E-07              .963            80.000
      4.780E-07             1.024            85.000
      3.073E-07             1.084            90.000
0     8.352E-06              0.5              41.52
0ANNUAL AVERAGE =   1.06E-07
0K=  5     FIVEXQ(K)= 8.352E-06     FIVEPR(K)=41.517
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Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE WNW SECTOR.
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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=1431.SQ.METERS	USED
A	.4	1.48	4827.	0.	0.	776.2	1000.0	776.2	9.656E-07	9.651E-07	9.651E-07
A	1.0	5.19	4827.	0.	0.	776.2	1000.0	776.2	4.077E-07	4.075E-07	4.075E-07
A	2.0	8.10	4827.	0.	0.	776.2	1000.0	776.2	2.016E-07	2.015E-07	2.015E-07
A	3.0	6.23	4827.	0.	0.	776.2	1000.0	776.2	1.359E-07	1.358E-07	1.358E-07
A	4.0	1.87	4827.	0.	0.	776.2	1000.0	776.2	1.025E-07	1.024E-07	1.024E-07
A	5.0	.83	4827.	0.	0.	776.2	1000.0	776.2	8.154E-08	8.149E-08	8.149E-08
A	6.0	.21	4827.	0.	0.	776.2	1000.0	776.2	6.820E-08	6.816E-08	6.816E-08
B	.4	.34	4827.	0.	0.	583.7	611.6	583.7	2.099E-06	2.097E-06	2.097E-06
B	1.0	1.04	4827.	0.	0.	583.7	611.6	583.7	8.864E-07	8.853E-07	8.853E-07
B	2.0	2.28	4827.	0.	0.	583.7	611.6	583.7	4.383E-07	4.378E-07	4.378E-07
B	3.0	1.04	4827.	0.	0.	583.7	611.6	583.7	2.955E-07	2.951E-07	2.951E-07
B	4.0	1.45	4827.	0.	0.	583.7	611.6	583.7	2.228E-07	2.226E-07	2.226E-07
B	5.0	.42	4827.	0.	0.	583.7	611.6	583.7	1.773E-07	1.771E-07	1.771E-07
C	.4	.29	4827.	0.	0.	443.3	256.4	443.3	6.595E-06	6.569E-06	6.569E-06
C	1.0	.83	4827.	0.	0.	443.3	256.4	443.3	2.784E-06	2.773E-06	2.773E-06
C	2.0	.62	4827.	0.	0.	443.3	256.4	443.3	1.377E-06	1.371E-06	1.371E-06
C	3.0	.21	4827.	0.	0.	443.3	256.4	443.3	9.282E-07	9.245E-07	9.245E-07
C	4.0	.83	4827.	0.	0.	443.3	256.4	443.3	7.000E-07	6.972E-07	6.972E-07
C	5.0	.42	4827.	0.	0.	443.3	256.4	443.3	5.569E-07	5.547E-07	5.547E-07
D	.4	.66	4827.	0.	0.	312.1	87.3	373.7	2.298E-05	2.706E-05	2.298E-05
D	1.0	2.70	4827.	0.	0.	312.1	87.3	373.7	9.704E-06	1.143E-05	9.704E-06
D	2.0	6.64	4827.	0.	0.	312.1	87.3	372.4	4.816E-06	5.651E-06	4.816E-06
D	3.0	6.02	4827.	0.	0.	312.1	87.3	345.6	3.498E-06	3.809E-06	3.498E-06
D	4.0	5.40	4827.	0.	0.	312.1	87.3	330.1	2.762E-06	2.873E-06	2.762E-06
D	5.0	1.45	4827.	0.	0.	312.1	87.3	319.4	2.271E-06	2.285E-06	2.271E-06
D	6.0	1.04	4827.	0.	0.	312.1	87.3	312.1	1.944E-06	1.912E-06	1.912E-06
D	8.0	.21	4827.	0.	0.	312.1	87.3	312.1	1.456E-06	1.432E-06	1.432E-06

Cont'd on page B-235

E	.4	.86	4827.	0.	0.	222.0	55.4	309.5	4.368E-05	5.874E-05	4.368E-05
E	1.0	3.32	4827.	0.	0.	222.0	55.4	309.5	1.844E-05	2.480E-05	1.844E-05
E	2.0	6.44	4827.	0.	0.	222.0	55.4	307.3	9.185E-06	1.226E-05	9.185E-06
E	3.0	4.15	4827.	0.	0.	222.0	55.4	265.2	7.174E-06	8.267E-06	7.174E-06
E	4.0	5.19	4827.	0.	0.	222.0	55.4	243.8	5.885E-06	6.235E-06	5.885E-06
E	5.0	2.49	4827.	0.	0.	222.0	55.4	230.4	4.955E-06	4.960E-06	4.955E-06
E	6.0	.42	4827.	0.	0.	222.0	55.4	222.0	4.302E-06	4.149E-06	4.149E-06
F	.4	.91	4827.	0.	0.	153.2	34.5	243.9	8.912E-05	1.306E-04	8.912E-05
F	1.0	3.32	4827.	0.	0.	153.2	34.5	241.9	3.763E-05	5.514E-05	3.763E-05
F	2.0	4.98	4827.	0.	0.	153.2	34.5	241.3	1.880E-05	2.727E-05	1.880E-05
F	3.0	2.08	4827.	0.	0.	153.2	34.5	194.9	1.569E-05	1.838E-05	1.569E-05
F	4.0	.83	4827.	0.	0.	153.2	34.5	173.4	1.331E-05	1.386E-05	1.331E-05
F	5.0	.42	4827.	0.	0.	153.2	34.5	160.7	1.142E-05	1.103E-05	1.103E-05
G	.4	1.42	4827.	0.	0.	105.7	21.5	210.1	1.663E-04	2.751E-04	1.663E-04
G	1.0	4.15	4827.	0.	0.	105.7	21.5	210.1	7.022E-05	1.162E-04	7.022E-05
G	2.0	1.25	4827.	0.	0.	105.7	21.5	206.7	3.530E-05	5.745E-05	3.530E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0 WNW SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0LATERAL 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=   .5     A=  2861.     D=   70.0
 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   1.663E-04   8.912E-05   7.022E-05   4.368E-05   3.763E-05   3.530E-05   2.298E-05   1.880E-05   1.844E-05   1.569E-05
        1.417       2.328       6.480       7.341      10.663      11.908      12.567      17.550      20.872      22.948
       .02157      .03544      .09865      .11175      .16232      .18129      .19132      .26717      .31774      .34935
0   1.331E-05   1.103E-05   9.704E-06   9.185E-06   7.174E-06   6.569E-06   5.885E-06   4.955E-06   4.816E-06   4.249E-06
       23.778      24.194      26.893      33.328      37.481      37.768      42.958      45.449      52.093      52.508
       .36199      .36831      .40940      .50737      .57059      .57496      .65397      .69190      .79303      .79935
0   3.498E-06   2.773E-06   2.762E-06   2.271E-06   2.097E-06   1.912E-06   1.432E-06   1.371E-06   9.651E-07   9.245E-07
       58.529      59.359      64.757      66.211      66.553      67.591      67.798      68.421      69.896      70.104
       .89101      .90365      .98583     1.00795     1.01316     1.02896     1.03212     1.04160     1.06406     1.06722
0   8.853E-07   6.972E-07   5.547E-07   4.378E-07   4.075E-07   2.951E-07   2.226E-07   2.015E-07   1.771E-07   1.358E-07
       71.142      71.972      72.388      74.671      79.862      80.900      82.353      90.450      90.865      97.093
      1.08303     1.09567     1.10199     1.13676     1.21577     1.23157     1.25370     1.37696     1.38328     1.47810
0   1.024E-07   8.149E-08   6.816E-08
       98.962      99.792     100.000
      1.50654     1.51918     1.52234
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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)=    .099
                                                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=    .317
                                                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=    .507
                                                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=    .792
                                                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=    .985
                                                                         HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   1.476
0  K  I    XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   6  1       -8.70159 -15.83152  -2.02540
   6  2       -9.56381 -20.89109  -3.66039
   6  3      -10.90090 -22.93495  -4.40926
   6  4      -11.59799 -22.06310  -4.07018
   6  5      -12.24366 -28.92343  -6.91379
   6  6      -12.79953 -57.89676 -19.33731
   6  7      -15.81192      NUMXQ(K)=  7
                                                                         BACK EXTRAPOLATION FOR  1 PERCENTILE.
      2.001E-04                .015              1.000
      1.100E-04                .046              3.000
      8.193E-05                .076              5.000
      4.347E-05                .152             10.000
      2.730E-05                .228             15.000
      1.941E-05                .304             20.000
      1.415E-05                .381             25.000
      1.078E-05                .457             30.000
      8.571E-06                .533             35.000
      7.083E-06                .609             40.000
      5.972E-06                .685             45.000
      5.117E-06                .761             50.000
      4.198E-06                .837             55.000
      3.362E-06                .913             60.000
      2.688E-06                .990             65.000
      1.567E-06               1.066             70.000
      9.441E-07               1.142             75.000
      5.852E-07               1.218             80.000
      3.720E-07               1.294             85.000
      2.418E-07               1.370             90.000
0     9.392E-06               0.5               32.84
0ANNUAL AVERAGE =   1.07E-07
0K=  6      FIVEXQ(K)= 9.392E-06      FIVEPR(K)=32.844
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003    TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE  NW SECTOR.
```

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=1431.SQ.METERS	USED
A	.4	.53	4827.	0.	0.	776.2	1000.0	776.2	9.656E-07	9.651E-07	9.651E-07
A	1.0	1.86	4827.	0.	0.	776.2	1000.0	776.2	4.077E-07	4.075E-07	4.075E-07
A	2.0	5.18	4827.	0.	0.	776.2	1000.0	776.2	2.016E-07	2.015E-07	2.015E-07
A	3.0	3.32	4827.	0.	0.	776.2	1000.0	776.2	1.359E-07	1.358E-07	1.358E-07
A	4.0	2.92	4827.	0.	0.	776.2	1000.0	776.2	1.025E-07	1.024E-07	1.024E-07
A	5.0	1.46	4827.	0.	0.	776.2	1000.0	776.2	8.154E-08	8.149E-08	8.149E-08
A	6.0	.40	4827.	0.	0.	776.2	1000.0	776.2	6.820E-08	6.816E-08	6.816E-08
A	8.0	.07	4827.	0.	0.	776.2	1000.0	776.2	5.111E-08	5.108E-08	5.108E-08
B	.4	.13	4827.	0.	0.	583.7	611.6	583.7	2.099E-06	2.097E-06	2.097E-06
B	1.0	.40	4827.	0.	0.	583.7	611.6	583.7	8.864E-07	8.853E-07	8.853E-07
B	2.0	.80	4827.	0.	0.	583.7	611.6	583.7	4.383E-07	4.378E-07	4.378E-07
B	3.0	1.33	4827.	0.	0.	583.7	611.6	583.7	2.955E-07	2.951E-07	2.951E-07
B	4.0	.80	4827.	0.	0.	583.7	611.6	583.7	2.228E-07	2.226E-07	2.226E-07
B	5.0	.20	4827.	0.	0.	583.7	611.6	583.7	1.773E-07	1.771E-07	1.771E-07
B	6.0	.13	4827.	0.	0.	583.7	611.6	583.7	1.483E-07	1.481E-07	1.481E-07
B	8.0	.20	4827.	0.	0.	583.7	611.6	583.7	1.111E-07	1.110E-07	1.110E-07
C	.4	.11	4827.	0.	0.	443.3	256.4	443.3	6.595E-06	6.569E-06	6.569E-06
C	1.0	.33	4827.	0.	0.	443.3	256.4	443.3	2.784E-06	2.773E-06	2.773E-06
C	2.0	.53	4827.	0.	0.	443.3	256.4	443.3	1.377E-06	1.371E-06	1.371E-06
C	3.0	1.33	4827.	0.	0.	443.3	256.4	443.3	9.282E-07	9.245E-07	9.245E-07
C	4.0	.73	4827.	0.	0.	443.3	256.4	443.3	7.000E-07	6.972E-07	6.972E-07
C	5.0	.46	4827.	0.	0.	443.3	256.4	443.3	5.569E-07	5.547E-07	5.547E-07
C	6.0	.07	4827.	0.	0.	443.3	256.4	443.3	4.658E-07	4.639E-07	4.639E-07
C	8.0	.33	4827.	0.	0.	443.3	256.4	443.3	3.490E-07	3.476E-07	3.476E-07
D	.4	.44	4827.	0.	0.	312.1	87.3	373.7	2.298E-05	2.706E-05	2.298E-05
D	1.0	1.79	4827.	0.	0.	312.1	87.3	373.7	9.704E-06	1.143E-05	9.704E-06
D	2.0	4.32	4827.	0.	0.	312.1	87.3	372.4	4.816E-06	5.651E-06	4.816E-06
D	3.0	4.05	4827.	0.	0.	312.1	87.3	345.6	3.498E-06	3.809E-06	3.498E-06
D	4.0	4.58	4827.	0.	0.	312.1	87.3	330.1	2.762E-06	2.873E-06	2.762E-06
D	5.0	2.79	4827.	0.	0.	312.1	87.3	319.4	2.271E-06	2.285E-06	2.271E-06
D	6.0	1.06	4827.	0.	0.	312.1	87.3	312.1	1.944E-06	1.912E-06	1.912E-06
D	8.0	.27	4827.	0.	0.	312.1	87.3	312.1	1.456E-06	1.432E-06	1.432E-06
D	10.0	.07	4827.	0.	0.	312.1	87.3	312.1	1.164E-06	1.145E-06	1.145E-06

E	.4	.52	4827.	0.	0.	222.0	55.4	309.5	4.368E-05	5.874E-05	4.368E-05
E	1.0	1.99	4827.	0.	0.	222.0	55.4	309.5	1.844E-05	2.480E-05	1.844E-05
E	2.0	5.18	4827.	0.	0.	222.0	55.4	307.3	9.185E-06	1.226E-05	9.185E-06
E	3.0	6.04	4827.	0.	0.	222.0	55.4	265.2	7.174E-06	8.267E-06	7.174E-06
E	4.0	7.30	4827.	0.	0.	222.0	55.4	243.8	5.885E-06	6.235E-06	5.885E-06
E	5.0	5.18	4827.	0.	0.	222.0	55.4	230.4	4.955E-06	4.960E-06	4.955E-06
E	6.0	2.13	4827.	0.	0.	222.0	55.4	222.0	4.302E-06	4.149E-06	4.149E-06
E	8.0	1.46	4827.	0.	0.	222.0	55.4	222.0	3.224E-06	3.109E-06	3.109E-06
E	10.0	.07	4827.	0.	0.	222.0	55.4	222.0	2.577E-06	2.486E-06	2.486E-06
F	.4	.42	4827.	0.	0.	153.2	34.5	243.9	8.912E-05	1.306E-04	8.912E-05
F	1.0	1.53	4827.	0.	0.	153.2	34.5	243.9	3.763E-05	5.514E-05	3.763E-05
F	2.0	4.38	4827.	0.	0.	153.2	34.5	241.3	1.880E-05	2.727E-05	1.880E-05
F	3.0	3.65	4827.	0.	0.	153.2	34.5	194.9	1.569E-05	1.838E-05	1.569E-05
F	4.0	5.64	4827.	0.	0.	153.2	34.5	173.4	1.331E-05	1.386E-05	1.331E-05
F	5.0	2.32	4827.	0.	0.	153.2	34.5	160.7	1.142E-05	1.103E-05	1.103E-05
F	6.0	.60	4827.	0.	0.	153.2	34.5	153.2	1.002E-05	9.225E-06	9.225E-06
F	8.0	.27	4827.	0.	0.	153.2	34.5	153.2	7.508E-06	6.912E-06	6.912E-06
G	.4	.57	4827.	0.	0.	105.7	21.5	210.1	1.663E-04	2.751E-04	1.663E-04
G	1.0	1.66	4827.	0.	0.	105.7	21.5	210.1	7.022E-05	1.162E-04	7.022E-05
G	2.0	2.92	4827.	0.	0.	105.7	21.5	206.7	3.530E-05	5.745E-05	3.530E-05
G	3.0	2.39	4827.	0.	0.	105.7	21.5	148.9	3.302E-05	3.872E-05	3.302E-05
G	4.0	.60	4827.	0.	0.	105.7	21.5	125.3	2.960E-05	2.921E-05	2.921E-05
G	5.0	.20	4827.	0.	0.	105.7	21.5	112.7	2.618E-05	2.323E-05	2.323E-05

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE:  11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0  NW SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0LATERAL 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=   .5     A=  2861.     D=   70.0
 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   1.663E-04   8.912E-05   7.022E-05   4.368E-05   3.763E-05   3.530E-05   3.302E-05   2.921E-05   2.323E-05   2.298E-05
         .567        .985       2.646       3.162       4.689       7.611      10.002      10.599      10.799      11.236
       .02696      .04690      .12591      .15048      .22318      .36224      .47602      .50447      .51395      .53478
0   1.880E-05   1.844E-05   1.569E-05   1.331E-05   1.103E-05   9.704E-06   9.225E-06   9.185E-06   7.174E-06   6.912E-06
       15.619      17.611      21.264      26.908      29.233      31.026      31.623      36.803      42.846      43.112
       .74338      .83820     1.01203     1.28067     1.39129     1.47663     1.50507     1.75160     2.03921     2.05185
0   6.569E-06   5.885E-06   4.955E-06   4.816E-06   4.149E-06   3.498E-06   3.109E-06   2.773E-06   2.762E-06   2.486E-06
       43.226      50.531      55.711      60.027      62.152      66.203      67.664      67.996      72.578      72.645
      2.05731     2.40497     2.65150     2.85693     2.95807     3.15086     3.22040     3.23620     3.45428     3.45744
0   2.271E-06   2.097E-06   1.912E-06   1.432E-06   1.371E-06   1.145E-06   9.651E-07   9.245E-07   8.853E-07   6.972E-07
       75.434      75.565      76.628      76.893      77.424      77.491      78.019      79.347      79.746      80.476
      3.59018     3.59643     3.64700     3.65964     3.68493     3.68809     3.71324     3.77645     3.79542     3.83018
0   5.547E-07   4.639E-07   4.378E-07   4.075E-07   3.476E-07   2.951E-07   2.226E-07   2.015E-07   1.771E-07   1.481E-07
       80.941      81.008      81.805      83.664      83.996      85.324      86.121      91.301      91.500      91.633
      3.85231     3.85547     3.89339     3.98189     3.99769     4.06090     4.09883     4.34535     4.35483     4.36115
0   1.358E-07   1.110E-07   1.024E-07   8.149E-08   6.816E-08   5.108E-08
       94.953      95.152      98.074      99.535      99.934     100.000
      4.51918     4.52866     4.66773     4.73726     4.75622     4.75938
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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)=   .475
                                                HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 3)=  1.279
                                                HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 4)=  1.750
                                                HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 5)=  2.854
                                                HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 6)=  3.451
                                                HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 7)=  3.587

0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   7  1      -8.70159  15.15206  -1.86366
   7  2     -10.31825 -16.85376  -2.52027
   7  3     -11.22735 -17.89834  -2.98817
   7  4     -11.59799 -18.21423  -3.13799
   7  5     -12.24366 -24.77412  -6.58572
   7  6     -12.79953 -33.14164 -11.18764
   7  7     -12.99534      NUMXQ(K)=  7
      1.244E-04              .048              1.000
      6.831E-05              .143              3.000
      5.070E-05              .238              5.000
      3.303E-05              .476             10.000
      2.306E-05              .714             15.000
      1.768E-05              .952             20.000
      1.429E-05             1.190             25.000
      1.172E-05             1.428             30.000
      9.758E-06             1.666             35.000
      8.257E-06             1.904             40.000
      7.086E-06             2.142             45.000
      6.165E-06             2.380             50.000
      5.425E-06             2.618             55.000
      4.819E-06             2.856             60.000
      3.823E-06             3.094             65.000
      3.075E-06             3.332             70.000
      2.339E-06             3.570             75.000
0     3.164E-05             0.5               10.51
0ANNUAL AVERAGE =    2.46E-07
0K=  7     FIVEXQ(K)= 3.164E-05      FIVEPR(K)=10.506
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: 11/19/2003 TIME: 23: 4:56
/PLANT NAME: CGS METEOROLOGICAL INSTRUMENTATION
DATA PERIOD: JFD 1996-1999 WIND SENSORS HEIGHT: 10.0 METERS
TYPE OF RELEASE: GROUND LEVEL RELEASE DELTA-T HEIGHTS: 10 - 75 METERS
SOURCE OF DATA: MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
COMMENTS: input file: P96-99-P.inp output file: P96-99-P.out sigma=desert + P-G
PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE NNW SECTOR.

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=1431.SQ.METERS	USED
A	.4	.14	4827.	0.	0.	776.2	1000.0	776.2	9.656E-07	9.651E-07	9.651E-07
A	1.0	.50	4827.	0.	0.	776.2	1000.0	776.2	4.077E-07	4.075E-07	4.075E-07
A	2.0	1.77	4827.	0.	0.	776.2	1000.0	776.2	2.016E-07	2.015E-07	2.015E-07
A	3.0	2.43	4827.	0.	0.	776.2	1000.0	776.2	1.359E-07	1.358E-07	1.358E-07
A	4.0	2.58	4827.	0.	0.	776.2	1000.0	776.2	1.025E-07	1.024E-07	1.024E-07
A	5.0	1.12	4827.	0.	0.	776.2	1000.0	776.2	8.154E-08	8.149E-08	8.149E-08
A	6.0	.47	4827.	0.	0.	776.2	1000.0	776.2	6.820E-08	6.816E-08	6.816E-08
A	8.0	.22	4827.	0.	0.	776.2	1000.0	776.2	5.111E-08	5.108E-08	5.108E-08
A	10.0	.06	4827.	0.	0.	776.2	1000.0	776.2	4.086E-08	4.084E-08	4.084E-08
A	13.0	.03	4827.	0.	0.	776.2	1000.0	776.2	3.147E-08	3.145E-08	3.145E-08
B	.4	.06	4827.	0.	0.	583.7	611.6	583.7	2.099E-06	2.097E-06	2.097E-06
B	1.0	.19	4827.	0.	0.	583.7	611.6	583.7	8.864E-07	8.853E-07	8.853E-07
B	2.0	.25	4827.	0.	0.	583.7	611.6	583.7	4.383E-07	4.378E-07	4.378E-07
B	3.0	.75	4827.	0.	0.	583.7	611.6	583.7	2.955E-07	2.951E-07	2.951E-07
B	4.0	.84	4827.	0.	0.	583.7	611.6	583.7	2.228E-07	2.226E-07	2.226E-07
B	5.0	.50	4827.	0.	0.	583.7	611.6	583.7	1.773E-07	1.771E-07	1.771E-07
B	6.0	.19	4827.	0.	0.	583.7	611.6	583.7	1.483E-07	1.481E-07	1.481E-07
B	8.0	.12	4827.	0.	0.	583.7	611.6	583.7	1.111E-07	1.110E-07	1.110E-07
B	10.0	.03	4827.	0.	0.	583.7	611.6	583.7	8.884E-08	8.873E-08	8.873E-08
C	.4	.02	4827.	0.	0.	443.3	256.4	443.3	6.595E-06	6.569E-06	6.569E-06
C	1.0	.06	4827.	0.	0.	443.3	256.4	443.3	2.784E-06	2.773E-06	2.773E-06
C	2.0	.47	4827.	0.	0.	443.3	256.4	443.3	1.377E-06	1.371E-06	1.371E-06
C	3.0	.97	4827.	0.	0.	443.3	256.4	443.3	9.282E-07	9.245E-07	9.245E-07
C	4.0	.75	4827.	0.	0.	443.3	256.4	443.3	7.000E-07	6.972E-07	6.972E-07
C	5.0	.56	4827.	0.	0.	443.3	256.4	443.3	5.569E-07	5.547E-07	5.547E-07
C	6.0	.34	4827.	0.	0.	443.3	256.4	443.3	4.658E-07	4.639E-07	4.639E-07
C	8.0	.16	4827.	0.	0.	443.3	256.4	443.3	3.490E-07	3.476E-07	3.476E-07
D	.4	.17	4827.	0.	0.	312.1	87.3	373.7	2.298E-05	2.706E-05	2.298E-05
D	1.0	.72	4827.	0.	0.	312.1	87.3	373.7	9.704E-06	1.143E-05	9.704E-06
D	2.0	3.18	4827.	0.	0.	312.1	87.3	372.4	4.816E-06	5.651E-06	4.816E-06
D	3.0	3.95	4827.	0.	0.	312.1	87.3	345.6	3.498E-06	3.809E-06	3.498E-06
D	4.0	3.89	4827.	0.	0.	312.1	87.3	330.1	2.762E-06	2.873E-06	2.762E-06
D	5.0	2.99	4827.	0.	0.	312.1	87.3	319.4	2.271E-06	2.285E-06	2.271E-06
D	6.0	1.34	4827.	0.	0.	312.1	87.3	312.1	1.944E-06	1.912E-06	1.912E-06
D	8.0	1.18	4827.	0.	0.	312.1	87.3	312.1	1.456E-06	1.432E-06	1.432E-06
D	10.0	.09	4827.	0.	0.	312.1	87.3	312.1	1.164E-06	1.145E-06	1.145E-06

ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-242	Cont'd on page B-243
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

E	.4	.28	4827.	0.	0.	222.0	55.4	309.5	4.368E-05	5.874E-05	4.368E-05
E	1.0	1.09	4827.	0.	0.	222.0	55.4	309.5	1.844E-05	2.480E-05	1.844E-05
E	2.0	4.05	4827.	0.	0.	222.0	55.4	307.3	9.185E-06	1.226E-05	9.185E-06
E	3.0	5.36	4827.	0.	0.	223.0	55.4	265.2	7.174E-06	8.267E-06	7.174E-06
E	4.0	6.60	4827.	0.	0.	222.0	55.4	243.8	5.885E-06	6.235E-06	5.885E-06
E	5.0	5.17	4827.	0.	0.	222.0	55.4	230.4	4.955E-06	4.960E-06	4.955E-06
E	6.0	2.83	4827.	0.	0.	222.0	55.4	222.0	4.302E-06	4.149E-06	4.149E-06
E	8.0	2.21	4827.	0.	0.	222.0	55.4	222.0	3.224E-06	3.109E-06	3.109E-06
E	10.0	.09	4827.	0.	0.	222.0	55.4	222.0	2.577E-06	2.486E-06	2.486E-06
F	.4	.34	4827.	0.	0.	153.2	34.5	243.9	8.912E-05	1.306E-04	8.912E-05
F	1.0	1.25	4827.	0.	0.	153.2	34.5	243.9	3.763E-05	5.514E-05	3.763E-05
F	2.0	5.04	4827.	0.	0.	153.2	34.5	241.3	1.880E-05	2.727E-05	1.880E-05
F	3.0	5.95	4827.	0.	0.	153.2	34.5	194.9	1.569E-05	1.838E-05	1.569E-05
F	4.0	5.73	4827.	0.	0.	153.2	34.5	173.4	1.331E-05	1.386E-05	1.331E-05
F	5.0	4.08	4827.	0.	0.	153.2	34.5	160.7	1.142E-05	1.103E-05	1.103E-05
F	6.0	.90	4827.	0.	0.	153.2	34.5	153.2	1.002E-05	9.225E-06	9.225E-06
F	8.0	.65	4827.	0.	0.	153.2	34.5	153.2	7.508E-06	6.912E-06	6.912E-06
F	10.0	.06	4827.	0.	0.	153.2	34.5	153.2	6.003E-06	5.526E-06	5.526E-06
G	.4	.53	4827.	0.	0.	105.7	21.5	210.1	1.663E-04	2.751E-04	1.663E-04
G	1.0	1.56	4827.	0.	0.	105.7	21.5	210.1	7.022E-05	1.162E-04	7.022E-05
G	2.0	3.52	4827.	0.	0.	105.7	21.5	206.7	3.530E-05	5.745E-05	3.530E-05
G	3.0	4.86	4827.	0.	0.	105.7	21.5	148.9	3.302E-05	3.872E-05	3.302E-05
G	4.0	3.02	4827.	0.	0.	105.7	21.5	125.3	2.960E-05	2.921E-05	2.921E-05
G	5.0	1.34	4827.	0.	0.	105.7	21.5	112.7	2.618E-05	2.323E-05	2.323E-05
G	6.0	.31	4827.	0.	0.	105.7	21.5	105.7	2.333E-05	1.943E-05	1.943E-05
G	8.0	.06	4827.	0.	0.	105.7	21.5	105.7	1.748E-05	1.456E-05	1.456E-05
G	10.0	.03	4827.	0.	0.	105.7	21.5	105.7	1.398E-05	1.164E-05	1.164E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0             RUN DATE: 11/19/2003    TIME: 23: 4:56
/PLANT NAME:   CGS                                  METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                         WIND SENSORS HEIGHT: 10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE              DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0 NNW SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0LATERAL 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=   .5     A=  2861.     D=   70.0
 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   1.663E-04   8.912E-05   7.022E-05   4.368E-05   3.763E-05   3.530E-05   3.302E-05   2.921E-05   2.323E-05   2.298E-05
         .531        .873       2.429       2.712       3.957       7.475      12.332      15.352      16.691      16.866
       .05392      .08860      .24663      .27529      .40171      .75886     1.25190     1.55848     1.69438     1.71213
0   1.943E-05   1.880E-05   1.844E-05   1.569E-05   1.456E-05   1.331E-05   1.164E-05   1.103E-05   9.704E-06   9.225E-06
       17.177      22.221      23.310      29.257      29.319      35.048      35.079      39.158      39.874      40.777
      1.74374     2.25575     2.36636     2.97003     2.97635     3.55789     3.56106     3.97509     4.04778     4.13944
0   9.185E-06   7.174E-06   6.912E-06   6.569E-06   5.885E-06   5.526E-06   4.955E-06   4.816E-06   4.149E-06   3.498E-06
       44.824      50.179      50.833      50.854      57.455      57.517      62.685      65.861      68.694      72.648
      4.55031     5.09393     5.16030     5.16248     5.83252     5.83884     6.36349     6.68587     6.97348     7.37487
0   3.109E-06   2.773E-06   2.762E-06   2.486E-06   2.271E-06   2.097E-06   1.912E-06   1.432E-06   1.371E-06   1.145E-06
       74.859      74.921      78.813      78.906      81.895      81.956      83.295      84.478      84.945      85.039
      7.59927     7.60559     8.00066     8.01014     8.31356     8.31982     8.45571     8.57581     8.62322     8.63270
0   9.651E-07   9.245E-07   8.853E-07   6.972E-07   5.547E-07   4.639E-07   4.378E-07   4.075E-07   3.476E-07   2.951E-07
       85.180      86.145      86.332      87.079      87.640      87.982      88.231      88.730      88.885      89.632
      8.64708     8.74505     8.76402     8.83987     8.89676     8.93153     8.95681     9.00738     9.02318     9.09904
0   2.226E-07   2.015E-07   1.771E-07   1.481E-07   1.358E-07   1.110E-07   1.024E-07   8.873E-08   8.149E-08   6.816E-08
       90.473      92.248      92.746      92.933      95.361      95.486      98.070      98.101      99.222      99.689
      9.18437     9.36452     9.41509     9.43405     9.68058     9.69322     9.95555     9.95871    10.07249    10.11989
0   5.108E-08   4.084E-08   3.145E-08
       99.907      99.969     100.000
     10.14202    10.14834    10.15150
```

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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)=    1.557
                                                                HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=    3.555
                                                                HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=    4.547
                                                                HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=    6.682
                                                                HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=    7.997
                                                                HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=    8.310
0  K  I    XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   8  1       -8.70159 -13.80653  -1.56141
   8  2      -10.44116 -15.27612  -2.24324
   8  3      -11.22735 -17.07552  -3.24021
   8  4      -11.59799 -17.32508  -3.38784
   8  5      -12.24366 -21.05485  -5.87451
   8  6      -12.79953 -26.05875  -9.43530
   8  7      -12.99534      NUMXQ(K)=  7
     1.249E-04              .102              1.000
     7.313E-05              .305              3.000
     5.589E-05              .508              5.000
     3.783E-05             1.015             10.000
     2.963E-05             1.523             15.000
     2.295E-05             2.030             20.000
     1.859E-05             2.538             25.000
     1.556E-05             3.045             30.000
     1.332E-05             3.553             35.000
     1.093E-05             4.061             40.000
     9.127E-06             4.568             45.000
     7.686E-06             5.076             50.000
     6.559E-06             5.583             55.000
     5.658E-06             6.091             60.000
     4.927E-06             6.598             65.000
     3.998E-06             7.106             70.000
     3.228E-06             7.614             75.000
     2.560E-06             8.121             80.000
0    5.635E-05             0.5                4.93
0ANNUAL AVERAGE =    5.13E-07
0K=  8     FIVEXQ(K)= 5.635E-05     FIVEPR(K)= 4.925
```

APPENDIX B

 | Cont'd on page B-246

Calculation No. NE-02-03-16

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

Revision No. 0

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0             RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                                   METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                          WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE               DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE   N SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.20	4827.	0.	0.	776.2	1000.0	776.2	9.656E-07	9.651E-07	9.651E-07
A	1.0	.71	4827.	0.	0.	776.2	1000.0	776.2	4.077E-07	4.075E-07	4.075E-07
A	2.0	1.86	4827.	0.	0.	776.2	1000.0	776.2	2.016E-07	2.015E-07	2.015E-07
A	3.0	1.73	4827.	0.	0.	776.2	1000.0	776.2	1.359E-07	1.358E-07	1.358E-07
A	4.0	1.49	4827.	0.	0.	776.2	1000.0	776.2	1.025E-07	1.024E-07	1.024E-07
A	5.0	1.62	4827.	0.	0.	776.2	1000.0	776.2	8.154E-08	8.149E-08	8.149E-08
A	6.0	1.49	4827.	0.	0.	776.2	1000.0	776.2	6.820E-08	6.816E-08	6.816E-08
A	8.0	1.62	4827.	0.	0.	776.2	1000.0	776.2	5.111E-08	5.108E-08	5.108E-08
A	10.0	.52	4827.	0.	0.	776.2	1000.0	776.2	4.086E-08	4.084E-08	4.084E-08
A	13.0	.18	4827.	0.	0.	776.2	1000.0	776.2	3.147E-08	3.145E-08	3.145E-08
B	.4	.04	4827.	0.	0.	583.7	611.6	583.7	2.099E-06	2.097E-06	2.097E-06
B	1.0	.13	4827.	0.	0.	583.7	611.6	583.7	8.864E-07	8.853E-07	8.853E-07
B	2.0	.58	4827.	0.	0.	583.7	611.6	583.7	4.383E-07	4.378E-07	4.378E-07
B	3.0	.78	4827.	0.	0.	583.7	611.6	583.7	2.955E-07	2.951E-07	2.951E-07
B	4.0	.63	4827.	0.	0.	583.7	611.6	583.7	2.228E-07	2.226E-07	2.226E-07
B	5.0	.76	4827.	0.	0.	583.7	611.6	583.7	1.773E-07	1.771E-07	1.771E-07
B	6.0	.39	4827.	0.	0.	583.7	611.6	583.7	1.483E-07	1.481E-07	1.481E-07
B	8.0	.55	4827.	0.	0.	583.7	611.6	583.7	1.111E-07	1.110E-07	1.110E-07
B	10.0	.08	4827.	0.	0.	583.7	611.6	583.7	8.884E-08	8.873E-08	8.873E-08
C	.4	.05	4827.	0.	0.	443.3	256.4	443.3	6.595E-06	6.569E-06	6.569E-06
C	1.0	.16	4827.	0.	0.	443.3	256.4	443.3	2.784E-06	2.773E-06	2.773E-06
C	2.0	.37	4827.	0.	0.	443.3	256.4	443.3	1.377E-06	1.371E-06	1.371E-06
C	3.0	.68	4827.	0.	0.	443.3	256.4	443.3	9.282E-07	9.245E-07	9.245E-07
C	4.0	.76	4827.	0.	0.	443.3	256.4	443.3	7.000E-07	6.972E-07	6.972E-07
C	5.0	.52	4827.	0.	0.	443.3	256.4	443.3	5.569E-07	5.547E-07	5.547E-07
C	6.0	.52	4827.	0.	0.	443.3	256.4	443.3	4.658E-07	4.639E-07	4.639E-07
C	8.0	.39	4827.	0.	0.	443.3	256.4	443.3	3.490E-07	3.476E-07	3.476E-07
C	10.0	.16	4827.	0.	0.	443.3	256.4	443.3	2.791E-07	2.780E-07	2.780E-07
C	13.0	.05	4827.	0.	0.	443.3	256.4	443.3	2.149E-07	2.141E-07	2.141E-07
D	.4	.20	4827.	0.	0.	312.1	87.3	373.7	2.298E-05	2.706E-05	2.298E-05
D	1.0	.84	4827.	0.	0.	312.1	87.3	373.7	9.704E-06	1.143E-05	9.704E-06
D	2.0	2.67	4827.	0.	0.	312.1	87.3	372.4	4.816E-06	5.651E-06	4.816E-06
D	3.0	2.80	4827.	0.	0.	312.1	87.3	345.6	3.498E-06	3.809E-06	3.498E-06
D	4.0	3.30	4827.	0.	0.	312.1	87.3	330.1	2.762E-06	2.873E-06	2.762E-06
D	5.0	2.69	4827.	0.	0.	312.1	87.3	319.4	2.271E-06	2.285E-06	2.271E-06
D	6.0	1.88	4827.	0.	0.	312.1	87.3	312.1	1.944E-06	1.912E-06	1.912E-06
D	8.0	2.77	4827.	0.	0.	312.1	87.3	312.1	1.456E-06	1.432E-06	1.432E-06
D	10.0	1.02	4827.	0.	0.	312.1	87.3	312.1	1.164E-06	1.145E-06	1.145E-06
D	13.0	.34	4827.	0.	0.	312.1	87.3	312.1	8.968E-07	8.820E-07	8.820E-07
D	18.0	.05	4827.	0.	0.	312.1	87.3	312.1	6.479E-07	6.372E-07	6.372E-07

ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-246	Cont'd on page B-247
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

E	.4	.42	4827.	0.	0.	222.0	55.4	309.5	4.368E-05	5.874E-05	4.368E-05
E	1.0	1.62	4827.	0.	0.	222.0	55.4	309.5	1.844E-05	2.480E-05	1.844E-05
E	2.0	4.05	4827.	0.	0.	222.0	55.4	307.3	9.185E-06	1.226E-05	9.185E-06
E	3.0	4.00	4827.	0.	0.	222.0	55.4	265.2	7.174E-06	8.267E-06	7.174E-06
E	4.0	4.00	4827.	0.	0.	222.0	55.4	243.8	5.885E-06	6.235E-06	5.885E-06
E	5.0	4.58	4827.	0.	0.	222.0	55.4	230.4	4.955E-06	4.960E-06	4.955E-06
E	6.0	3.56	4827.	0.	0.	222.0	55.4	222.0	4.302E-06	4.149E-06	4.149E-06
E	8.0	3.50	4827.	0.	0.	222.0	55.4	222.0	3.224E-06	3.109E-06	3.109E-06
E	10.0	.63	4827.	0.	0.	222.0	55.4	222.0	2.577E-06	2.486E-06	2.486E-06
E	13.0	.21	4827.	0.	0.	222.0	55.4	222.0	1.985E-06	1.914E-06	1.914E-06
E	18.0	.05	4827.	0.	0.	222.0	55.4	222.0	1.434E-06	1.383E-06	1.383E-06
F	.4	.46	4827.	0.	0.	153.2	34.5	243.9	8.912E-05	1.306E-04	8.912E-05
F	1.0	1.67	4827.	0.	0.	153.2	34.5	243.9	3.763E-05	5.514E-05	3.763E-05
F	2.0	5.20	4827.	0.	0.	153.2	34.5	241.3	1.880E-05	2.727E-05	1.880E-05
F	3.0	6.07	4827.	0.	0.	153.2	34.5	194.9	1.569E-05	1.838E-05	1.569E-05
F	4.0	4.79	4827.	0.	0.	153.2	34.5	173.4	1.331E-05	1.386E-05	1.331E-05
F	5.0	2.46	4827.	0.	0.	153.2	34.5	160.7	1.142E-05	1.103E-05	1.103E-05
F	6.0	1.07	4827.	0.	0.	153.2	34.5	153.2	1.002E-05	9.225E-06	9.225E-06
F	8.0	.86	4827.	0.	0.	153.2	34.5	153.2	7.508E-06	6.912E-06	6.912E-06
F	10.0	.08	4827.	0.	0.	153.2	34.5	153.2	6.003E 06	5.526E-06	5.526E-06
F	13.0	.05	4827.	0.	0.	153.2	34.5	153.2	4.623E-06	4.256E-06	4.256E-06
G	.4	.49	4827.	0.	0.	105.7	21.5	210.1	1.663E-04	2.751E-04	1.663E-04
G	1.0	1.44	4827.	0.	0.	105.7	21.5	210.1	7.022E-05	1.162E-04	7.022E-05
G	2.0	3.37	4827.	0.	0.	105.7	21.5	206.7	3.530E-05	5.745E-05	3.530E-05
G	3.0	4.11	4827.	0.	0.	105.7	21.5	148.9	3.302E-05	3.872E-05	3.302E-05
G	4.0	2.59	4827.	0.	0.	105.7	21.5	125.3	2.960E-05	2.921E-05	2.921E-05
G	5.0	.71	4827.	0.	0.	105.7	21.5	112.7	2.618E-05	2.323E-05	2.323E-05
G	6.0	.24	4827.	0.	0.	105.7	21.5	105.7	2.333E-05	1.943E-05	1.943E-05
G	8.0	.08	4827.	0.	0.	105.7	21.5	105.7	1.748E-05	1.456E-05	1.456E-05
G	10.0	.05	4827.	0.	0.	105.7	21.5	105.7	1.398E-05	1.164E-05	1.164E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:    CGS                              METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0   N SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0LATERAL 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=   .5     A=  2861.     D=   70.0
 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 FREQUEKCY NORMALIZED TO THIS SECTOR.
 THE THIRD NUMBER IS THE FREQUENCY WITH RESPECT TO ALL TIME.
0   1.663E-04   8.912E-05   7.022E-05   4.368E-05   3.763E-05   3.530E-05   3.302E-05   2.921E-05   2.323E-05   2.298E-05
         .491        .950       2.388       2.809       4.482       7.856      11.962      14.551      15.258      15.462
       .05932      .11480      .28863      .33940      .54168      .94939     1.44560     1.75849     1.84383     1.86852
0   1.943E-05   1.880E-05   1.844E-05   1.569E-05   1.456E-05   1.332E-05   1.164E-05   1.103E-05   9.704E-06   9.225E-06
       15.697      20.902      22.523      28.591      28.669      33.455      33.508      35.966      36.803      37.875
      1.89697     2.52592     2.72187     3.45512     3.46460     4.04298     4.04931     4.34640     4.44754     4.57712
0   9.185E-06   7.174E-06   6.912E-06   6.569E-06   5.885E-06   5.526E-06   4.955E-06   4.816E-06   4.256E-06   4.149E-06
       41.929      45.931      46.794      46.848      50.849      50.928      55.505      58.172      58.225      61.781
      5.06701     5.55057     5.65487     5.66142     6.14499     6.15447     6.70757     7.02994     7.03627     7.46610
0   3.498E-06   3.109E-06   2.773E-06   2.762E-06   2.486E-06   2.271E-06   2.097E-06   1.914E-06   1.912E-06   1.432E-06
       64.580      68.084      68.241      71.537      72.164      74.858      74.901      75.110      76.994      79.766
      7.80428     8.22780     8.24676     8.64499     8.72084     9.04638     9.05159     9.07687     9.30443     9.63945
0   1.383E-06   1.371E-06   1.145E-06   9.651E-07   9.245E-07   8.853E-07   8.820E-07   6.972E-07   6.372E-07   5.547E-07
       79.818      80.184      81.204      81.405      82.085      82.216      82.556      83.314      83.366      83.890
      9.64577     9.69002     9.81328     9.83754     9.91971     9.93551     9.97660    10.06826    10.07458    10.13779
0   4.639E-07   4.378E-07   4.075E-07   3.476E-07   2.951E-07   2.780E-07   2.226E-07   2.141E-07   2.015E-07   1.771E-07
       84.413      84.988      85.694      86.086      86.871      87.028      87.656      87.708      89.565      90.323
     10.20100    10.27053    10.35587    10.40328    10.49809    10.51706    10.59291    10.59923    10.82363    10.91529
0   1.481E-07   1.358E-07   1.110E-07   1.024E-07   8.873E-08   8.149E-08   6.816E-08   5.108E-08   4.084E-08   3.145E-08
       90.716      92.442      92.991      94.482      94.560      96.182      97.672      99.294      99.817     100.000
     10.96270    11.17129    11.23766    11.41782    11.42730    11.62325    11.80340    11.99936    12.06257    12.08469
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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)=   1.444
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   1.757
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   3.452
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   4.040
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   5.063
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   7.026
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   7.462
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   8.641
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   9.043
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(11)=   9.301
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
   9  1      -8.70159 -13.65953  -1.52910
   9  2     -10.31825 -13.74879  -1.56995
   9  3     -10.44116 -14.97499  -2.15196
   9  4     -11.06239 -15.22524  -2.28960
   9  5     -11.22735 -17.25525  -3.45219
   9  6     -11.59799 -18.01471  -3.91563
   9  7     -12.24366 -19.18521  -4.70980
   9  8     -12.39272 -19.81652  -5.14755
   9  9     -12.79953 -21.45289  -7.81513
   9 10     -12.99534 -27.69752 -10.98722
   9 11     -13.16756      NUMXQ(K)= 11
      1.209E-04              .121              1.000
      7.098E-05              .363              3.000
      5.428E-05              .604              5.000
      3.674E-05             1.208             10.000
      2.844E-05             1.813             15.000
      2.198E-05             2.417             20.000
      1.785E-05             3.021             25.000
      1.493E-05             3.625             30.000
      1.237E-05             4.230             35.000
      9.937E-06             4.834             40.000
      8.020E-06             5.438             45.000
      6.528E-06             6.042             50.000
      5.397E-06             6.647             55.000
      4.462E-06             7.251             60.000
      3.609E-06             7.855             65.000
      2.936E-06             8.459             70.000
      2.245E-06             9.064             75.000
0     6.006E-05              0.5               4.14
0ANNUAL AVERAGE =    6.05E-07
0K=  9      FIVEXQ(K)= 6.006E-05      FIVEPR(K)= 4.137
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE NNE SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.20	4827.	0.	0.	776.2	1000.0	776.2	9.656E-07	9.651E-07	9.651E-07
A	1.0	.69	4827.	0.	0.	776.2	1000.0	776.2	4.077E-07	4.075E-07	4.075E-07
A	2.0	1.78	4827.	0.	0.	776.2	1000.0	776.2	2.016E-07	2.015E-07	2.015E-07
A	3.0	1.24	4827.	0.	0.	776.2	1000.0	776.2	1.359E-07	1.358E-07	1.358E-07
A	4.0	1.24	4827.	0.	0.	776.2	1000.0	776.2	1.025E-07	1.024E-07	1.024E-07
A	5.0	1.35	4827.	0.	0.	776.2	1000.0	776.2	8.154E-08	8.149E-08	8.149E-08
A	6.0	.91	4827.	0.	0.	776.2	1000.0	776.2	6.82CE-08	6.816E-08	6.816E-08
A	8.0	1.06	4827.	0.	0.	776.2	1000.0	776.2	5.111E-08	5.108E-08	5.108E-08
A	10.0	.18	4827.	0.	0.	776.2	1000.0	776.2	4.086E-08	4.084E-08	4.084E-08
A	13.0	.07	4827.	0.	0.	776.2	1000.0	776.2	3.147E-08	3.145E-08	3.145E-08
A	18.0	.04	4827.	0.	C.	776.2	1000.0	776.2	2.273E-08	2.272E-08	2.272E-08
B	.4	.06	4827.	0.	0.	583.7	611.6	583.7	2.099E-06	2.097E-06	2.097E-06
B	1.0	.18	4827.	0.	0.	583.7	611.6	583.7	8.864E-07	8.853E-07	8.853E-07
B	2.0	.66	4827.	0.	0.	583.7	611.6	583.7	4.383E-07	4.378E-07	4.378E-07
B	3.0	.29	4827.	0.	0.	583.7	611.6	583.7	2.955E-07	2.951E-07	2.951E-07
B	4.0	.55	4827.	0.	0.	583.7	611.6	583.7	2.228E-07	2.226E-07	2.226E-07
B	5.0	.55	4827.	0.	0.	583.7	611.6	583.7	1.773E-07	1.771E-07	1.771E-07
B	6.0	.47	4827.	0.	0.	583.7	611.6	583.7	1.483E-07	1.481E-07	1.481E-07
B	8.0	.69	4827.	0.	0.	583.7	611.6	583.7	1.111E-07	1.110E-07	1.110E-07
B	10.0	.29	4827.	0.	0.	583.7	611.6	583.7	8.884E-08	8.873E-08	8.873E-08
B	13.0	.15	4827.	0.	0.	583.7	611.6	583.7	6.842E-08	6.833E-08	6.833E-08
C	.4	.09	4827.	0.	0.	443.3	256.4	443.3	6.595E-06	6.569E-06	6.569E-06
C	1.0	.25	4827.	0.	0.	443.3	256.4	443.3	2.784E-06	2.773E-06	2.773E-06
C	2.0	.66	4827.	0.	C.	443.3	256.4	443.3	1.377E-06	1.371E-06	1.371E-06
C	3.0	.51	4827.	0.	C.	443.3	256.4	443.3	9.282E-07	9.245E-07	9.245E-07
C	4.0	.51	4827.	0.	0.	443.3	256.4	443.3	7.000E-07	6.972E-07	6.972E-07
C	5.0	.55	4827.	0.	0.	443.3	256.4	443.3	5.569E-07	5.547E-07	5.547E-07
C	6.0	.66	4827.	0.	0.	443.3	256.4	443.3	4.658E-07	4.639E-07	4.639E-07
C	8.0	.73	4827.	0.	0.	443.3	256.4	443.3	3.490E-07	3.476E-07	3.476E-07
C	10.0	.36	4827.	0.	0.	443.3	256.4	443.3	2.791E-07	2.780E-07	2.780E-07
C	13.0	.22	4827.	0.	0.	443.3	256.4	443.3	2.149E-07	2.141E-07	2.141E-07
D	.4	.17	4827.	0.	0.	312.1	87.3	373.7	2.298E-05	2.706E-05	2.298E-05
D	1.0	.69	4827.	0.	0.	312.1	87.3	373.7	9.704E-06	1.143E-05	9.704E-06
D	2.0	2.80	4827.	0.	0.	312.1	87.3	372.4	4.816E-06	5.651E-06	4.816E-06
D	3.0	2.44	4827.	0.	0.	312.1	87.3	345.6	3.498E-06	3.809E-06	3.498E-06
D	4.0	2.37	4827.	0.	0.	312.1	87.3	330.1	2.762E-06	2.873E-06	2.762E-06
D	5.0	3.24	4827.	0.	0.	312.1	87.3	319.4	2.271E-06	2.285E-06	2.271E-06
D	6.0	2.77	4827.	0.	0.	312.1	87.3	312.1	1.944E-06	1.912E-06	1.912E-06
D	8.0	4.26	4827.	0.	0.	312.1	87.3	312.1	1.456E-06	1.432E-06	1.432E-06
D	10.0	2.48	4827.	0.	0.	312.1	87.3	312.1	1.164E-06	1.145E-06	1.145E-06
D	13.0	1.38	4827.	0.	0.	312.1	87.3	312.1	8.968E-07	8.820E-07	8.820E-07
D	18.0	.25	4827.	0.	0.	312.1	87.3	312.1	6.479E-07	6.372E-07	6.372E-07
E	.4	.50	4827.	0.	0.	222.0	55.4	309.5	4.368E-05	5.874E-05	4.368E-05
E	1.0	1.93	4827.	0.	0.	222.0	55.4	309.5	1.844E-05	2.480E-05	1.844E-05
E	2.0	4.52	4827.	0.	0.	222.0	55.4	307.3	9.185E-C6	1.226E-05	9.185E-06
E	3.0	3.31	4827.	0.	0.	222.0	55.4	265.2	7.174E-06	8.267E-06	7.174E-06
E	4.0	2.26	4827.	0.	0.	222.0	55.4	243.8	5.885E-06	6.235E-06	5.885E-06
E	5.0	2.88	4827.	0.	0.	222.0	55.4	230.4	4.955E-06	4.960E-06	4.955E-06
E	6.0	3.64	4827.	0.	0.	222.0	55.4	222.0	4.302E-06	4.149E-06	4.149E-06
E	8.0	5.97	4827.	0.	0.	222.0	55.4	222.0	3.224E-06	3.109E-06	3.109E-06
E	10.0	4.01	4827.	0.	0.	222.0	55.4	222.0	2.577E-06	2.486E-06	2.486E-06
E	13.0	1.53	4827.	0.	0.	222.0	55.4	222.0	1.985E-06	1.914E-06	1.914E-06
E	18.0	.29	4827.	0.	0.	222.0	55.4	222.0	1.434E-06	1.383E-06	1.383E-06
F	.4	.47	4827.	0.	0.	153.2	34.5	243.9	8.912E-05	1.306E-04	8.912E-05
F	1.0	1.71	4827.	0.	0.	153.2	34.5	243.9	3.763E-05	5.514E-05	3.763E-05
F	2.0	5.24	4827.	0.	0.	153.2	34.5	241.3	1.880E-05	2.727E-05	1.880E-05
F	3.0	4.48	4827.	0.	0.	153.2	34.5	194.9	1.569E-05	1.838E-05	1.569E-05
F	4.0	3.31	4827.	0.	0.	153.2	34.5	173.4	1.331E-05	1.386E-05	1.331E-05
F	5.0	1.38	4827.	0.	0.	153.2	34.5	160.7	1.142E-05	1.103E-05	1.103E-05
F	6.0	1.24	4827.	0.	0.	153.2	34.5	153.2	1.002E-05	9.225E-06	9.225E-06
F	8.0	.98	4827.	0.	0.	153.2	34.5	153.2	7.508E-06	6.912E-06	6.912E-06
F	10.0	.55	4827.	0.	0.	153.2	34.5	153.2	6.003E-06	5.526E-06	5.526E-06
F	13.0	.11	4827.	0.	0.	153.2	34.5	153.2	4.623E-06	4.256E-06	4.256E-06
G	.4	.55	4827.	0.	0.	105.7	21.5	210.1	1.663E-04	2.751E-04	1.663E-04
G	1.0	1.60	4827.	0.	0.	105.7	21.5	210.1	7.022E-05	1.162E-04	7.022E-05
G	2.0	3.86	4827.	0.	0.	105.7	21.5	206.7	3.530E-05	5.745E-05	3.530E-05
G	3.0	1.78	4827.	0.	0.	105.7	21.5	148.9	3.302E-05	3.872E-05	3.302E-05
G	4.0	1.27	4827.	0.	0.	105.7	21.5	125.3	2.960E-05	2.921E-05	2.921E-05
G	5.0	.29	4827.	0.	0.	105.7	21.5	112.7	2.618E-05	2.323E-05	2.323E-05
G	6.0	.22	4827.	0.	0.	105.7	21.5	105.7	2.333E-05	1.943E-05	1.943E-05
G	8.0	.04	4827.	0.	0.	105.7	21.5	105.7	1.748E-05	1.456E-05	1.456E-05
G	13.0	.04	4827.	0.	0.	105.7	21.5	105.7	1.077E-05	8.967E-06	8.967E-06

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0 NNE SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0LATERAL 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=   .5    A=  2861.     D=   70.0
 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   1.663E-04  8.912E-05  7.022E-05  4.368E-05  3.763E-05  3.530E-05  3.302E-05  2.921E-05  2.323E-05  2.298E-05
         .547      1.016      2.619      3.119      4.831      8.691     10.476     11.750     12.042     12.211
       .04745     .08820     .22726     .27067     .41921     .75423     .90910    1.01972    1.04500    1.05966
0   1.943E-05  1.880E-05  1.844E-05  1.569E-05  1.456E-05  1.331E-05  1.103E-05  9.704E-06  9.225E-06  9.185E-06
       12.429     17.674     19.604     24.084     24.120     27.434     28.818     29.510     30.749     35.265
      1.07863    1.53375    1.70126    2.09001    2.09317    2.38078    2.50088    2.56093    2.66839    3.06030
0   8.967E-06  7.174E-06  6.912E-06  6.569E-06  5.885E-06  5.526E-06  4.955E-06  4.816E-06  4.256E-06  4.149E-06
       35.301     38.615     39.599     39.687     41.945     42.491     45.368     48.173     48.282     51.924
      3.06346    3.35107    3.43640    3.44405    3.64000    3.68741    3.93710    4.18046    4.18994    4.50600
0   3.498E-06  3.109E-06  2.773E-06  2.762E-06  2.486E-06  2.271E-06  2.097E-06  1.914E-06  1.912E-06  1.432E-06
       54.364     60.337     60.592     62.959     66.965     70.207     70.267     71.796     74.564     78.825
      4.72775    5.23609    5.25821    5.46365    5.81131    6.09260    6.09780    6.23055    6.47075    6.84054
0   1.383E-06  1.371E-06  1.145E-06  9.651E-07  9.245E-07  8.853E-07  8.820E-07  6.972E-07  6.372E-07  5.547E-07
       79.117     79.772     82.249     82.446     82.955     83.138     84.522     85.031     85.286     85.833
      6.86582    6.92271    7.13763    7.15470    7.19894    7.21475    7.33485    7.37910    7.40122    7.44863
0   4.639E-07  4.378E-07  4.075E-07  3.476E-07  2.951E-07  2.780E-07  2.226E-07  2.141E-07  2.015E-07  1.771E-07
       86.488     87.144     87.836     88.564     88.856     89.220     89.766     89.985     91.769     92.315
      7.50552    7.56241    7.62246    7.68567    7.71095    7.74256    7.78997    7.80893    7.96380    8.01121
0   1.481E-07  1.358E-07  1.110E-07  1.024E-07  8.873E-08  8.149E-08  6.833E-08  6.816E-08  5.108E-08  4.084E-08
       92.789     94.027     94.719     95.957     96.249     97.596     97.742     98.652     99.709     99.891
      8.05229    8.15975    8.21980    8.32726    8.35255    8.46949    8.48213    8.56114    8.65280    8.66860
0   3.145E-08  2.272E-08
       99.964    100.000
      8.67492    8.67809
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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)=   .908
                                                                  HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 3)=  2.088
                                                                  HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 4)=  2.378
                                                                  HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 5)=  3.057
                                                                  HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 6)=  4.177
                                                                  HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 7)=  5.232
                                                                  HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 8)=  6.089
                                                                  HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE( 9)=  6.467
                                                                  HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE(10)=  6.919
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  10  1      -8.70159 -14.36771  -1.71419
  10  2     -10.31825 -15.70429  -2.27997
  10  3     -11.06239 -17.19932  -3.01429
  10  4     -11.22735 -17.97683  -3.40673
  10  5     -11.59799 -20.11668  -4.54956
  10  6     -12.24366 -19.27148  -4.06115
  10  7     -12.68134 -19.44238  -4.16646
  10  8     -12.99534 -21.69081  -5.61953
  10  9     -13.16756 -27.61725  -9.52693
  10 10     -13.49964       NUMXQ(K)= 10
     1.236E-04                 .087              1.000
     6.925E-05                 .260              3.000
     5.180E-05                 .434              5.000
     3.401E-05                 .868             10.000
     2.421E-05                1.302             15.000
     1.867E-05                1.736             20.000
     1.497E-05                2.170             25.000
     1.168E-05                2.603             30.000
     9.289E-06                3.037             35.000
     7.107E-06                3.471             40.000
     5.562E-06                3.905             45.000
     4.485E-06                4.339             50.000
     3.731E-06                4.773             55.000
     3.143E-06                5.207             60.000
     2.668E-06                5.641             65.000
     2.285E-06                6.075             70.000
     1.858E-06                6.509             75.000
0    4.765E-05                0.5                5.76
0ANNUAL AVERAGE =    4.21E-07
0K= 10      FIVEXQ(K)= 4.765E-05     FIVEPR(K)= 5.762
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Cont'd on page B-253


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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0           RUN DATE: 11/19/2003    TIME: 23: 4:56
/PLANT NAME: CGS                                  METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                       WIND SENSORS HEIGHT: 10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE            DELTA-T HEIGHTS:   10 - 75 METERS
 SOURCE OF DATA: MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS: input file: P96-99-F.inp  output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE  NE SECTOR.
```

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=1431.SQ.METERS	USED
A	.4	.22	4827.	0.	0.	776.2	1000.0	776.2	9.656E-07	9.651E-07	9.651E-07
A	1.0	.76	4827.	0.	0.	776.2	1000.0	776.2	4.077E-07	4.075E-07	4.075E-07
A	2.0	1.68	4827.	0.	0.	776.2	1000.0	776.2	2.016E-07	2.015E-07	2.015E-07
A	3.0	1.25	4827.	0.	0.	776.2	1000.0	776.2	1.359E-07	1.358E-07	1.358E-07
A	4.0	1.30	4827.	0.	0.	776.2	1000.0	776.2	1.025E-07	1.024E-07	1.024E-07
A	5.0	1.25	4827.	0.	0.	776.2	1000.0	776.2	8.154E-08	8.149E-08	8.149E-08
A	6.0	.60	4827.	0.	0.	776.2	1000.0	776.2	6.820E-08	6.816E-08	6.816E-08
A	8.0	1.14	4827.	0.	0.	776.2	1000.0	776.2	5.111E-08	5.108E-08	5.108E-08
A	10.0	.60	4827.	0.	0.	776.2	1000.0	776.2	4.086E-08	4.084E-08	4.084E-08
A	13.0	.05	4827.	0.	0.	776.2	1000.0	776.2	3.147E-08	3.145E-08	3.145E-08
B	.4	.05	4827.	0.	0.	583.7	611.6	583.7	2.099E-06	2.097E-06	2.097E-06
B	1.0	.16	4827.	0.	0.	583.7	611.6	583.7	8.864E-07	8.853E-07	8.853E-07
B	2.0	.87	4827.	0.	0.	583.7	611.6	583.7	4.383E-07	4.378E-07	4.378E-07
B	3.0	.54	4827.	0.	0.	583.7	611.6	583.7	2.955E-07	2.951E-07	2.951E-07
B	4.0	.38	4827.	0.	0.	583.7	611.6	583.7	2.228E-07	2.226E-07	2.226E-07
B	5.0	.54	4827.	0.	0.	583.7	611.6	583.7	1.773E-07	1.771E-07	1.771E-07
B	6.0	.27	4827.	0.	0.	583.7	611.6	583.7	1.483E-07	1.481E-07	1.481E-07
B	8.0	.87	4827.	0.	0.	583.7	611.6	583.7	1.111E-07	1.110E-07	1.110E-07
B	10.0	.43	4827.	0.	0.	583.7	611.6	583.7	8.884E-08	8.873E-08	8.873E-08
B	13.0	.43	4827.	0.	0.	583.7	611.6	583.7	6.842E-08	6.833E-08	6.833E-08
C	.4	.13	4827.	0.	0.	443.3	256.4	443.3	6.595E-06	6.569E-06	6.569E-06
C	1.0	.38	4827.	0.	0.	443.3	256.4	443.3	2.784E-06	2.773E-06	2.773E-06
C	2.0	.49	4827.	0.	0.	443.3	256.4	443.3	1.377E-06	1.371E-06	1.371E-06
C	3.0	.49	4827.	0.	0.	443.3	256.4	443.3	9.282E-07	9.245E-07	9.245E-07
C	4.0	.76	4827.	0.	0.	443.3	256.4	443.3	7.000E-07	6.972E-07	6.972E-07
C	5.0	.81	4827.	0.	0.	443.3	256.4	443.3	5.569E-07	5.547E-07	5.547E-07
C	6.0	.38	4827.	0.	0.	443.3	256.4	443.3	4.658E 07	4.639E-07	4.639E-07
C	8.0	.92	4827.	0.	0.	443.3	256.4	443.3	3.490E-07	3.476E-07	3.476E-07
C	10.0	.70	4827.	0.	0.	443.3	256.4	443.3	2.791E-07	2.780E-07	2.780E-07
C	13.0	.16	4827.	0.	0.	443.3	256.4	443.3	2.149E-07	2.141E-07	2.141E-07
D	.4	.53	4827.	0.	0.	312.1	87.3	373.7	2.298E-05	2.706E-05	2.298E-05
D	1.0	2.17	4827.	0.	0.	312.1	87.3	373.7	9.704E-06	1.143E-05	9.704E-06
D	2.0	2.33	4827.	0.	0.	312.1	87.3	372.4	4.816E-06	5.651E-06	4.816E-06
D	3.0	2.87	4827.	0.	0.	312.1	87.3	345.6	3.498E-06	3.809E-06	3.498E-06
D	4.0	2.76	4827.	0.	0.	312.1	87.3	330.1	2.762E-06	2.873E-06	2.762E-06
D	5.0	2.44	4827.	0.	0.	312.1	87.3	319.4	2.271E-06	2.285E-06	2.271E-06
D	6.0	1.84	4827.	0.	0.	312.1	87.3	312.1	1.944E-06	1.912E-06	1.912E-06
D	8.0	3.47	4827.	0.	0.	312.1	87.3	312.1	1.456E-06	1.432E-06	1.432E-06
D	10.0	2.44	4827.	0.	0.	312.1	87.3	312.1	1.164E-06	1.145E-06	1.145E-06
D	13.0	1.73	4827.	0.	0.	312.1	87.3	312.1	8.968E-07	8.820E-07	8.820E-07
D	18.0	.27	4827.	0.	0.	312.1	87.3	312.1	6.479E-07	6.372E-07	6.372E-07
E	.4	.77	4827.	0.	0.	222.0	55.4	309.5	4.368E-05	5.874E-05	4.368E-05
E	1.0	2.98	4827.	0.	0.	222.0	55.4	309.5	1.844E-05	2.480E-05	1.844E-05
E	2.0	4.82	4827.	0.	0.	222.0	55.4	307.3	9.185E-06	1.226E-05	9.185E-06
E	3.0	3.90	4827.	0.	0.	222.0	55.4	265.2	7.174E-06	8.267E-06	7.174E-06
E	4.0	3.41	4827.	C.	0.	222.0	55.4	243.8	5.885E-06	6.235E-06	5.885E-06
E	5.0	2.82	4827.	0.	0.	222.0	55.4	230.4	4.955E-06	4.960E-06	4.955E-06
E	6.0	3.41	4827.	0.	0.	222.0	55.4	222.0	4.302E-06	4.149E-06	4.149E-06
E	8.0	3.85	4827.	0.	0.	222.0	55.4	222.0	3.224E-06	3.109E-06	3.109E-06
E	10.0	3.36	4827.	0.	0.	222.0	55.4	222.0	2.577E-06	2.486E-06	2.486E-06
E	13.0	1.41	4827.	0.	0.	222.0	55.4	222.0	1.985E-06	1.914E-06	1.914E-06
E	18.0	.27	4827.	0.	0.	222.0	55.4	222.0	1.434E-06	1.383E-06	1.383E-06
F	.4	.83	4827.	0.	0.	153.2	34.5	243.9	8.912E-05	1.306E-04	8.912E-05
F	1.0	3.03	4827.	0.	0.	153.2	34.5	243.9	3.763E-05	5.514E-05	3.763E-05
F	2.0	5.20	4827.	0.	0.	153.2	34.5	241.3	1.880E-05	2.727E-05	1.880E-05
F	3.0	3.52	4827.	0.	0.	153.2	34.5	194.9	1.569E-05	1.838E-05	1.569E-05
F	4.0	2.00	4827.	0.	0.	153.2	34.5	173.4	1.331E-05	1.386E-05	1.331E-05
F	5.0	.87	4827.	0.	0.	153.2	34.5	160.7	1.142E-05	1.103E-05	1.103E-05
F	6.0	.54	4827.	0.	0.	153.2	34.5	153.2	1.002E-05	9.225E-06	9.225E-06
F	8.0	.54	4827.	0.	0.	153.2	34.5	153.2	7.508E-06	6.912E-06	6.912E-06
F	10.0	.05	4827.	0.	0.	153.2	34.5	153.2	6.003E-06	5.526E-06	5.526E-06
F	13.0	.11	4827.	0.	0.	153.2	34.5	153.2	4.623E-06	4.256E-06	4.256E-06
G	.4	1.15	4827.	0.	0.	105.7	21.5	210.1	1.663E-04	2.751E-04	1.663E-04
G	1.0	3.36	4827.	0.	0.	105.7	21.5	210.1	7.022E-05	1.162E-04	7.022E-05
G	2.0	4.06	4827.	0.	0.	105.7	21.5	206.7	3.530E-05	5.745E-05	3.530E-05
G	3.0	1.41	4827.	0.	0.	105.7	21.5	148.9	3.302E-05	3.872E-05	3.302E-05
G	4.0	.81	4827.	0.	0.	105.7	21.5	125.3	2.960E-05	2.921E-05	2.921E-05
G	18.0	.05	4827.	0.	0.	105.7	21.5	105.7	7.778E-06	6.478E-06	6.478E-06

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:  CGS                                METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT: 10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0  NE SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0LATERAL 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=   .5     A=  2861.     D=    70.0
 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   1.663E-04   8.912E-05   7.022E-05   4.368E-05   3.763E-05   3.530E-05   3.302E-05   2.921E-05   2.298E-05   1.880E-05
        1.146       1.978       5.337       6.109       9.143      13.206      14.614      15.427      15.956      21.157
       .06687      .11541      .31137      .35641      .53340      .77044      .85262      .90002      .93089     1.23431
0   1.844E-05   1.569E-05   1.331E-05   1.103E-05   9.704E-06   9.225E-06   9.185E-06   7.174E-06   6.912E-06   6.569E-06
       24.136      27.657      29.662      30.529      32.696      33.237      38.059      41.959      42.501      42.632
      1.40814     1.61357     1.73051     1.78108     1.90750     1.93911     2.22040     2.44796     2.47956     2.48721
0   6.478E-06   5.885E-06   5.526E-06   4.955E-06   4.816E-06   4.256E-06   4.149E-06   3.498E-06   3.109E-06   2.773E-06
       42.686      46.099      46.153      48.970      51.300      51.408      54.821      57.692      61.539      61.918
      2.49037     2.68949     2.69265     2.85700     2.99290     2.99922     3.19834     3.36585     3.59025     3.61237
0   2.762E-06   2.486E-06   2.271E-06   2.097E-06   1.914E-06   1.912E-06   1.432E-06   1.383E-06   1.372E-06   1.145E-06
       64.681      68.039      70.477      70.531      71.939      73.781      77.248      77.519      78.007      80.444
      3.77356     3.96951     4.11174     4.11486     4.19704     4.30450     4.50677     4.52257     4.55102     4.69324
0   9.651E-07   9.245E-07   8.853E-07   8.820E-07   6.972E-07   6.372E-07   5.547E-07   4.639E-07   4.378E-07   4.075E-07
       80.660      81.148      81.310      83.044      83.802      84.073      84.886      85.265      86.132      86.890
      4.70582     4.73427     4.74375     4.84489     4.88913     4.90494     4.95235     4.97447     5.02504     5.06929
0   3.476E-07   2.951E-07   2.780E-07   2.226E-07   2.141E-07   2.015E-07   1.771E-07   1.481E-07   1.358E-07   1.110E-07
       87.811      88.353      89.057      89.436      89.599      91.278      91.820      92.091      93.337      94.203
      5.12302     5.15462     5.19571     5.21783     5.22731     5.32529     5.35690     5.37270     5.44539     5.49596
0   1.024E-07   8.873E-08   8.149E-08   6.833E-08   6.816E-08   5.108E-08   4.084E-08   3.145E-08
       95.504      95.937      97.183      97.616      98.212      99.350      99.946     100.000
      5.57181     5.59710     5.66979     5.69508     5.72984     5.79621     5.83098     5.83414
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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)=    .311
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=    .852
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   1.612
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   2.218
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   2.990
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   3.195
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   3.966
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   4.108
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   4.301
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(11)=   4.690

0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  11  1     -8.70159 -14.55997  -1.82612
  11  2     -9.56381 -15.46239  -2.15596
  11  3    -10.31825 -17.57912  -3.04310
  11  4    -11.06239 -19.82988  -4.09414
  11  5    -11.59799 -21.70890  -5.02867
  11  6    -12.24366 -21.77691  -5.06480
  11  7    -12.39272 -22.05901  -5.21705
  11  8    -12.90504 -22.58126  -5.51469
  11  9    -12.99534 -26.93493  -8.01932
  11 10    -13.16756 -34.59140 -12.47912
  11 11    -13.67987      NUMXQ(K)= 11
                                          BACK EXTRAPOLATION FOR  1 PERCENTILE.
      1.786E-04             .058             1.000
      9.834E-05             .175             3.000
      7.302E-05             .292             5.000
      4.432E-05             .583            10.000
      3.207E-05             .875            15.000
      2.308E-05            1.167            20.000
      1.773E-05            1.459            25.000
      1.372E-05            1.750            30.000
      1.060E-05            2.042            35.000
      8.265E-06            2.334            40.000
      6.418E-06            2.625            45.000
      5.097E-06            2.917            50.000
      4.117E-06            3.209            55.000
      3.357E-06            3.500            60.000
      2.775E-06            3.792            65.000
      2.311E-06            4.084            70.000
      1.736E-06            4.376            75.000
      1.184E-06            4.667            80.000
0     4.977E-05            0.5               8.57
0ANNUAL AVERAGE =    3.84E-07
0K= 11      FIVEXQ(K)= 4.977E-05      FIVEPR(K)= 8.570
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Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

Revision No. 0

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT: 10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE ENE SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.39	4827.	0.	0.	776.2	1000.0	776.2	9.656E-07	9.651E-07	9.651E-07
A	1.0	1.36	4827.	0.	0.	776.2	1000.0	776.2	4.077E-07	4.075E-07	4.075E-07
A	2.0	1.51	4827.	0.	0.	776.2	1000.0	776.2	2.016E-07	2.015E-07	2.015E-07
A	3.0	1.29	4827.	0.	0.	776.2	1000.0	776.2	1.359E-07	1.358E-07	1.358E-07
A	4.0	.91	4827.	0.	0.	776.2	1000.0	776.2	1.025E-07	1.024E-07	1.024E-07
A	5.0	.61	4827.	0.	0.	776.2	1000.0	776.2	8.154E-08	8.149E-08	8.149E-08
A	6.0	.30	4827.	0.	0.	776.2	1000.0	776.2	6.820E-08	6.816E-08	6.816E-08
A	8.0	.98	4827.	0.	0.	776.2	1000.0	776.2	5.111E-08	5.108E-08	5.108E-08
A	10.0	.61	4827.	0.	0.	776.2	1000.0	776.2	4.086E-08	4.084E-08	4.084E-08
A	13.0	.23	4827.	0.	0.	776.2	1000.0	776.2	3.147E-08	3.145E-08	3.245E-08
B	.4	.07	4827.	0.	0.	583.7	611.6	583.7	2.099E-06	2.097E-06	2.097E-06
B	1.0	.23	4827.	0.	0.	583.7	611.6	583.7	8.864E-07	8.853E-07	8.853E-07
B	2.0	.68	4827.	0.	0.	583.7	611.6	583.7	4.383E-07	4.378E-07	4.378E-07
B	3.0	.38	4827.	0.	0.	583.7	611.6	583.7	2.955E-07	2.951E-07	2.951E-07
B	4.0	.45	4827.	0.	0.	583.7	611.6	583.7	2.228E-07	2.226E-07	2.226E-07
B	5.0	.30	4827.	0.	0.	583.7	611.6	583.7	1.773E-07	1.771E-07	1.771E-07
B	8.0	.15	4827.	0.	0.	583.7	611.6	583.7	1.111E-07	1.110E-07	1.110E-07
B	10.0	.30	4827.	0.	0.	583.7	611.6	583.7	8.884E-08	8.873E-08	8.873E-08
C	.4	.08	4827.	0.	0.	443.3	256.4	443.3	6.595E-06	6.569E-06	6.569E-06
C	1.0	.23	4827.	0.	0.	443.3	256.4	443.3	2.784E-06	2.773E-06	2.773E-06
C	2.0	1.06	4827.	0.	0.	443.3	256.4	443.3	1.377E-06	1.371E-06	1.371E-06
C	3.0	.45	4827.	0.	0.	443.3	256.4	443.3	9.282E-07	9.245E-07	9.245E-07
C	4.0	.53	4827.	0.	0.	443.3	256.4	443.3	7.000E-07	6.972E-07	6.972E-07
C	5.0	.83	4827.	0.	0.	443.3	256.4	443.3	5.569E-07	5.547E-07	5.547E-07
C	6.0	.38	4827.	0.	0.	443.3	256.4	443.3	4.658E-07	4.639E-07	4.639E-07
C	8.0	.68	4827.	0.	0.	443.3	256.4	443.3	3.490E-07	3.476E-07	3.476E-07
C	10.0	1.06	4827.	0.	0.	443.3	256.4	443.3	2.791E-07	2.780E-07	2.780E-07
C	13.0	.08	4827.	0.	0.	443.3	256.4	443.3	2.149E-07	2.141E-07	2.141E-07
D	.4	.46	4827.	0.	0.	312.1	87.3	373.7	2.298E-05	2.706E-05	2.298E-05
D	1.0	1.89	4827.	0.	0.	312.1	87.3	373.7	9.704E-06	1.143E-05	9.704E-06
D	2.0	2.95	4827.	0.	0.	312.1	87.3	372.4	4.816E-06	5.651E-06	4.816E-06
D	3.0	3.55	4827.	0.	0.	312.1	87.3	345.6	3.498E-06	3.809E-06	3.498E-06
D	4.0	1.89	4827.	0.	0.	312.1	87.3	330.1	2.762E-06	2.873E-06	2.762E-06
D	5.0	1.29	4827.	0.	0.	312.1	87.3	319.4	2.271E-06	2.285E-06	2.271E-06
D	6.0	1.97	4827.	0.	0.	312.1	87.3	312.1	1.944E-06	1.912E-06	1.912E-06
D	8.0	3.71	4827.	0.	0.	312.1	87.3	312.1	1.456E-06	1.432E-06	1.432E-06
D	10.0	3.18	4827.	0.	0.	312.1	87.3	312.1	1.164E-06	1.145E-06	1.145E-06
D	13.0	.83	4827.	0.	0.	312.1	87.3	312.1	8.968E-07	8.820E-07	8.820E-07

E	.4	1.02	4827.	0.	0.	222.0	55.4	309.5	4.368E-05	5.874E-05	4.368E-05
E	1.0	3.93	4827.	0.	0.	222.0	55.4	309.5	1.844E-05	2.480E-05	1.844E-05
E	2.0	7.34	4827.	0.	0.	222.0	55.4	307.3	9.185E-06	1.226E-05	9.185E-06
E	3.0	5.22	4827.	0.	0.	222.0	55.4	265.2	7.174E-06	8.267E-06	7.174E-06
E	4.0	3.40	4827.	0.	0.	222.0	55.4	243.8	5.885E-06	6.235E-06	5.885E-06
E	5.0	2.57	4827.	0.	0.	222.0	55.4	230.4	4.955E-06	4.960E-06	4.955E-06
E	6.0	2.50	4827.	0.	0.	222.0	55.4	222.0	4.302E-06	4.149E-06	4.149E-06
E	8.0	2.87	4827.	0.	0.	222.0	55.4	222.0	3.224E-06	3.109E-06	3.109E-06
E	10.0	.91	4827.	0.	0.	222.0	55.4	222.0	2.577E-06	2.486E-06	2.486E-06
E	13.0	.45	4827.	0.	0.	222.0	55.4	222.0	1.985E-06	1.914E-06	1.914E-06
F	.4	1.37	4827.	0.	0.	153.2	34.5	243.9	8.912E-05	1.306E-04	8.912E-05
F	1.0	4.99	4827.	0.	0.	153.2	34.5	243.9	3.763E-05	5.514E-05	3.763E-05
F	2.0	6.35	4827.	0.	0.	153.2	34.5	241.3	1.880E-05	2.727E-05	1.880E-05
F	3.0	4.39	4827.	0.	0.	153.2	34.5	194.9	1.569E-05	1.838E-05	1.569E-05
F	4.0	2.12	4827.	0.	0.	153.2	34.5	173.4	1.331E-05	1.386E-05	1.331E-05
F	5.0	1.21	4827.	0.	0.	153.2	34.5	160.7	1.142E-05	1.103E-05	1.103E-05
F	6.0	.38	4827.	0.	0.	153.2	34.5	153.2	1.002E-05	9.225E-06	9.225E-06
F	8.0	.38	4827.	0.	0.	153.2	34.5	153.2	7.508E-06	6.912E-06	6.912E-06
F	13.0	.08	4827.	0.	0.	153.2	34.5	153.2	4.623E-06	4.256E-06	4.256E-06
G	.4	1.47	4827.	0.	0.	105.7	21.5	210.1	1.663E-04	2.751E-04	1.663E-04
G	1.0	4.31	4827.	0.	0.	105.7	21.5	210.1	7.022E-05	1.162E-04	7.022E-05
G	2.0	2.87	4827.	0.	0.	105.7	21.5	206.7	3.530E-05	5.745E-05	3.530E-05
G	3.0	1.21	4827.	0.	0.	105.7	21.5	148.9	3.302E-05	3.872E-05	3.302E-05
G	4.0	.45	4827.	0.	0.	105.7	21.5	125.3	2.960E-05	2.921E-05	2.921E-05
G	5.0	.30	4827.	0.	0.	105.7	21.5	112.7	2.618E-05	2.323E-05	2.323E-05
G	6.0	.08	4827.	0.	0.	105.7	21.5	105.7	2.333E-05	1.943E-05	1.943E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003    TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT: 10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0 ENE SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0LATERAL 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=   .5      A=  2861.     D=   70.0
 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   1.663E-04   8.912E-05   7.022E-05   4.368E-05   3.763E-05   3.530E-05   3.302E-05   2.921E-05   2.323E-05   2.298E-05
        1.471       2.840       7.151       8.170      13.161      16.035      17.245      17.699      18.001      18.463
       .06147      .11869      .29884      .34143      .55002      .67012      .72069      .73966      .75230      .77159
0   1.943E-05   1.880E-05   1.844E-05   1.569E-05   1.331E-05   1.103E-05   9.704E-06   9.225E-06   9.185E-06   7.174E-06
       18.539      24.891      28.824      33.210      35.328      36.538      38.429      38.807      46.143      51.361
       .77475     1.04024     1.20459     1.38790     1.47639     1.52696     1.60598     1.62178     1.92835     2.14643
0   6.912E-06   6.569E-06   5.885E-06   4.955E-06   4.816E-06   4.256E-06   4.149E-06   3.498E-06   3.109E-06   2.773E-06
       51.739      51.817      55.221      57.792      60.741      60.817      63.313      66.867      69.741      69.968
      2.16223     2.16551     2.30774     2.41520     2.53846     2.54162     2.64592     2.79446     2.91456     2.92405
0   2.762E-06   2.486E-06   2.271E-06   2.097E-06   1.914E-06   1.912E-06   1.432E-06   1.371E-06   1.145E-06   9.651E-07
       71.859      72.766      74.052      74.327      74.580      76.547      80.252      81.311      84.488      84.875
      3.00306     3.04099     3.09472     3.09784     3.11680     3.19898     3.35385     3.39809     3.53084     3.54701
0   9.245E-07   8.853E-07   8.820E-07   6.972E-07   5.547E-07   4.639E-07   4.378E-07   4.075E-07   3.476E-07   2.951E-07
       85.328      85.555      86.387      86.916      87.748      88.127      88.807      90.168      90.849      91.227
      3.56597     3.57545     3.61022     3.63234     3.66711     3.68291     3.71136     3.76825     3.79669     3.81249
0   2.780E-07   2.226E-07   2.141E-07   2.025E-07   1.771E-07   1.358E-07   1.110E-07   1.024E-07   8.873E-08   8.149E-08
       92.286      92.740      92.815      94.328      94.631      95.916      96.067      96.975      97.277      97.882
      3.85674     3.87571     3.87887     3.94208     3.95472     4.00845     4.01477     4.05270     4.06534     4.09062
0   6.816E-08   5.108E-08   4.084E-08   3.145E-08
       98.185      99.168      99.773     100.000
      4.10327     4.14435     4.16964     4.17912
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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)=    .299
                                                            HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=    .669
                                                            HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=    .720
                                                            HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   1.386
                                                            HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   1.926
                                                            HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   2.144
                                                            HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   2.536
                                                            HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   2.912
                                                            HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   3.000
                                                            HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(11)=   3.528
                                                            HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(12)=   3.607
0  K  I    XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  12  1       -8.70159 -14.47420  -1.78597
  12  2       -9.56381 -16.41356  -2.49134
  12  3      -10.25170 -16.55641  -2.54909
  12  4      -10.31825 -17.71880  -3.02408
  12  5      -11.06239 -19.99923  -4.06011
  12  6      -11.59799 -23.12030  -5.56844
  12  7      -11.84509 -23.21418  -5.61481
  12  8      -12.24366 -26.51204  -7.30268
  12  9      -12.68134 -29.69201  -8.98172
  12 10      -12.79953 -35.66097 -12.15541
  12 11      -13.67987 -60.39758 -25.83460
  12 12      -13.94104      NUMXQ(K)= 12
                                                            BACK EXTRAPOLATION FOR  1 PERCENTILE.
     2.019E-04               .042            1.000
     1.144E-04               .125            3.000
     8.627E-05               .209            5.000
     5.315E-05               .418           10.000
     3.745E-05               .627           15.000
     2.806E-05               .836           20.000
     2.183E-05              1.045           25.000
     1.769E-05              1.254           30.000
     1.443E-05              1.463           35.000
     1.163E-05              1.672           40.000
     9.576E-06              1.882           45.000
     7.635E-06              2.090           50.000
     6.105E-06              2.299           55.000
     4.960E-06              2.507           60.000
     3.890E-06              2.716           65.000
     3.064E-06              2.925           70.000
     2.194E-06              3.134           75.000
     1.545E-06              3.343           80.000
     1.067E-06              3.552           85.000
0    4.561E-05              0.5             11.96
0ANNUAL AVERAGE =   3.40E-07
CK= 12     FIVEXQ(K)= 4.561E-05     FIVEPR(K)=11.964
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: 11/19/2003 TIME: 23: 4:56
/PLANT NAME: CGS METEOROLOGICAL INSTRUMENTATION
DATA PERIOD: JFD 1996-1999 WIND SENSORS HEIGHT: 10.0 METERS
TYPE OF RELEASE: GROUND LEVEL RELEASE DELTA-T HEIGHTS: 10 - 75 METERS
SOURCE OF DATA: MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
COMMENTS: input file: P96-99-F.inp output file: P96-99-F.out sigma=desert + P-G
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 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=1431.SQ.METERS	USED
A	.4	.28	4827.	0.	0.	776.2	1000.0	776.2	9.656E-07	9.651E-07	9.651E-07
A	1.0	1.00	4827.	0.	0.	776.2	1000.0	776.2	4.077E-07	4.075E-07	4.075E-07
A	2.0	2.00	4827.	0.	0.	776.2	1000.0	776.2	2.016E-07	2.015E-07	2.015E-07
A	3.0	.60	4827.	0.	0.	776.2	1000.0	776.2	1.359E-07	1.358E-07	1.358E-07
A	4.0	.73	4827.	0.	0.	776.2	1000.0	776.2	1.025E-07	1.024E-07	1.024E-07
A	5.0	.53	4827.	0.	0.	776.2	1000.0	776.2	8.154E-08	8.149E-08	8.149E-08
A	6.0	.33	4827.	0.	0.	776.2	1000.0	776.2	6.820E-08	6.816E-08	6.816E-08
A	8.0	.60	4827.	0.	0.	776.2	1000.0	776.2	5.111E-08	5.108E-08	5.108E-08
A	10.0	.47	4827.	0.	0.	776.2	1000.0	776.2	4.086E-08	4.084E-08	4.084E-08
A	13.0	.20	4827.	0.	0.	776.2	1000.0	776.2	3.147E-08	3.145E-08	3.145E-08
B	.4	.09	4827.	0.	0.	583.7	611.6	583.7	2.099E-06	2.097E-06	2.097E-06
B	1.0	.27	4827.	0.	0.	583.7	611.6	583.7	8.864E-07	8.853E-07	8.853E-07
B	2.0	.60	4827.	0.	0.	583.7	611.6	583.7	4.383E-07	4.378E-07	4.378E-07
B	3.0	.33	4827.	0.	0.	583.7	611.6	583.7	2.955E-07	2.951E-07	2.951E-07
B	4.0	.40	4827.	0.	0.	583.7	611.6	583.7	2.228E-07	2.226E-07	2.226E-07
B	5.0	.40	4827.	0.	0.	583.7	611.6	583.7	1.773E-07	1.771E-07	1.771E-07
B	6.0	.60	4827.	0.	0.	583.7	611.6	583.7	1.483E-07	1.481E-07	1.481E-07
B	8.0	.67	4827.	0.	0.	583.7	611.6	583.7	1.111E-07	1.110E-07	1.110E-07
B	10.0	.07	4827.	0.	0.	583.7	611.6	583.7	8.884E-08	8.873E-08	8.873E-08
B	13.0	.27	4827.	0.	0.	583.7	611.6	583.7	6.842E-08	6.833E-08	6.833E-08
C	.4	.07	4827.	0.	0.	443.3	256.4	443.3	6.595E-06	6.569E-06	6.569E-06
C	1.0	.20	4827.	0.	0.	443.3	256.4	443.3	2.784E-06	2.773E-06	2.773E-06
C	2.0	.47	4827.	0.	0.	443.3	256.4	443.3	1.377E-06	1.371E-06	1.371E-06
C	3.0	.60	4827.	0.	0.	443.3	256.4	443.3	9.282E-07	9.245E-07	9.245E-07
C	4.0	.53	4827.	0.	0.	443.3	256.4	443.3	7.000E-07	6.972E-07	6.972E-07
C	5.0	.47	4827.	0.	0.	443.3	256.4	443.3	5.569E-07	5.547E-07	5.547E-07
C	6.0	.47	4827.	0.	0.	443.3	256.4	443.3	4.658E-07	4.639E-07	4.639E-07
C	8.0	.67	4827.	0.	0.	443.3	256.4	443.3	3.490E-07	3.476E-07	3.476E-07
C	10.0	.27	4827.	0.	0.	443.3	256.4	443.3	2.791E-07	2.780E-07	2.780E-07
C	13.0	.07	4827.	0.	0.	443.3	256.4	443.3	2.149E-07	2.141E-07	2.141E-07
D	.4	.57	4827.	0.	0.	312.1	87.3	373.7	2.298E-05	2.706E-05	2.298E-05
D	1.0	2.33	4827.	0.	0.	312.1	87.3	373.7	9.704E-06	1.143E-05	9.704E-06
D	2.0	3.33	4827.	0.	0.	312.1	87.3	372.4	4.816E-06	5.651E-06	4.816E-06
D	3.0	1.93	4827.	0.	0.	312.1	87.3	345.6	3.498E-06	3.809E-06	3.498E-06
D	4.0	2.13	4827.	0.	0.	312.1	87.3	330.1	2.762E-06	2.873E-06	2.762E-06
D	5.0	2.67	4827.	0.	0.	312.1	87.3	319.4	2.271E-06	2.285E-06	2.271E-06
D	6.0	1.93	4827.	0.	0.	312.1	87.3	312.1	1.944E-06	1.912E-06	1.912E-06
D	8.0	2.27	4827.	0.	0.	312.1	87.3	312.1	1.456E-06	1.432E-06	1.432E-06
D	10.0	1.20	4827.	0.	0.	312.1	87.3	312.1	1.164E-06	1.145E-06	1.145E-06
D	13.0	.33	4827.	0.	0.	312.1	87.3	312.1	8.968E-07	8.820E-07	8.820E-07
D	18.0	.13	4827.	0.	0.	312.1	87.3	312.1	6.479E-07	6.372E-07	6.372E-07
E	.4	1.07	4827.	0.	0.	222.0	55.4	309.5	4.368E-05	5.874E-05	4.368E-05
E	1.0	4.13	4827.	0.	0.	222.0	55.4	309.5	1.844E-05	2.480E-05	1.844E-05
E	2.0	6.53	4827.	0.	0.	222.0	55.4	307.3	9.185E-06	1.226E-05	9.185E-06
E	3.0	5.40	4827.	0.	0.	222.0	55.4	265.2	7.174E-06	8.267E-06	7.174E-06
E	4.0	5.73	4827.	0.	0.	222.0	55.4	243.8	5.885E-06	6.235E-06	5.885E-06
E	5.0	2.87	4827.	0.	0.	222.0	55.4	230.4	4.955E-06	4.960E-06	4.955E-06
E	6.0	2.87	4827.	0.	0.	222.0	55.4	222.0	4.302E-06	4.149E-06	4.149E-06
E	8.0	2.73	4827.	0.	0.	222.0	55.4	222.0	3.224E-06	3.109E-06	3.109E-06
E	10.0	.80	4827.	0.	0.	222.0	55.4	222.0	2.577E-06	2.486E-06	2.486E-06
E	13.0	.40	4827.	0.	0.	222.0	55.4	222.0	1.985E-06	1.914E-06	1.914E-06
F	.4	1.37	4827.	0.	0.	153.2	34.5	243.9	8.912E-05	1.306E-04	8.912E-05
F	1.0	5.00	4827.	0.	0.	153.2	34.5	243.9	3.763E-05	5.514E-05	3.763E-05
F	2.0	6.80	4827.	0.	0.	153.2	34.5	241.3	1.880E-05	2.727E-05	1.880E-05
F	3.0	3.47	4827.	0.	0.	153.2	34.5	194.9	1.569E-05	1.838E-05	1.569E-05
F	4.0	3.00	4827.	0.	0.	153.2	34.5	173.4	1.331E-05	1.386E-05	1.331E-05
F	5.0	2.13	4827.	0.	0.	153.2	34.5	160.7	1.142E-05	1.103E-05	1.103E-05
F	6.0	1.07	4827.	0.	0.	153.2	34.5	153.2	1.002E-05	9.225E-06	9.225E-06
F	8.0	.13	4827.	0.	0.	153.2	34.5	153.2	7.508E-06	6.912E-06	6.912E-06
F	10.0	.07	4827.	0.	0.	153.2	34.5	153.2	6.003E-06	5.526E-06	5.526E-06
G	.4	1.41	4827.	0.	0.	105.7	21.5	210.1	1.663E-04	2.751E-04	1.663E-04
G	1.0	4.13	4827.	0.	0.	105.7	21.5	210.1	7.022E-05	1.162E-04	7.022E-05
G	2.0	3.60	4827.	0.	0.	105.7	21.5	206.7	3.530E-05	5.745E-05	3.530E-05
G	3.0	1.00	4827.	0.	0.	105.7	21.5	148.9	3.302E-05	3.872E-05	3.302E-05
G	4.0	.87	4827.	0.	0.	105.7	21.5	125.3	2.960E-05	2.921E-05	2.921E-05
G	5.0	.33	4827.	0.	0.	105.7	21.5	112.7	2.618E-05	2.323E-05	2.323E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003    TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0   E SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0LATERAL 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=   .5     A=  2861.     D=   70.0
 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   1.663E-04   8.912E-05   7.022E-05   4.368E-05   3.763E-05   3.530E-05   3.302E-05   2.921E-05   2.323E-05   2.298E-05
        1.410       2.782       6.915       7.986      12.987      16.587      17.587      18.453      18.787      19.356
       .06687      .13188      .32784      .37861      .61565      .78632      .83373      .87482      .89062      .91763
0   1.880E-05   1.844E-05   1.569E-05   1.331E-05   1.103E-05   9.704E-06   9.225E-06   9.185E-06   7.174E-06   6.912E-06
       26.157      30.290      33.757      36.757      38.890      41.224      42.290      48.824      54.224      54.357
      1.24031     1.43596     1.60031     1.74254     1.84367     1.95429     2.00486     2.31463     2.57060     2.57692
0   6.569E-06   5.885E-06   5.526E-06   4.955E-06   4.816E-06   4.149E-06   3.498E-06   3.109E-06   2.773E-06   2.762E-06
       54.427      60.160      60.327      63.093      66.427      69.294      71.227      73.960      74.160      76.294
      2.58020     2.85201     2.85517     2.99107     3.14910     3.28501     3.37666     3.50624     3.51573     3.61686
0   2.486E-06   2.271E-06   2.097E-06   1.914E-06   1.912E-06   1.432E-06   1.371E-06   1.145E-06   9.651E-07   9.245E-07
       77.094      79.761      79.849      80.249      82.182      84.449      84.915      86.115      86.400      87.000
      3.65479     3.78121     3.78538     3.80434     3.89600     4.00346     4.02558     4.08247     4.09595     4.12439
0   8.853E-07   8.820E-07   6.972E-07   6.372E-07   5.547E-07   4.639E-07   4.378E-07   4.075E-07   3.476E-07   2.951E-07
       87.266      87.600      88.133      88.266      88.733      89.200      89.800      90.800      91.466      91.800
      4.13703     4.15284     4.17812     4.18444     4.20657     4.22869     4.25713     4.30454     4.33615     4.35195
0   2.780E-07   2.226E-07   2.141E-07   2.015E-07   1.771E-07   1.481E-07   1.358E-07   1.110E-07   1.024E-07   8.873E-08
       92.066      92.466      92.533      94.533      94.933      95.533      96.133      96.800      97.533      97.600
      4.36459     4.38356     4.38672     4.48153     4.50050     4.52894     4.55739     4.58899     4.62376     4.62692
0   8.149E-08   6.833E-08   6.816E-08   5.108E-08   4.084E-08   3.145E-08
       98.133      98.400      98.733      99.333      99.800     100.000
      4.65220     4.66485     4.68065     4.70909     4.73122     4.74070
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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)=    .327
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=    .785
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   1.434
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   2.312
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   3.146
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   3.282
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   3.614
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   3.778
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   3.893
HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(11)=   4.022

0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  13  1     -8.70159 -14.35632  -1.76264
  13  2     -9.56381 -15.73026  -2.26797
  13  3    -10.25170 -17.13386  -2.84901
  13  4    -10.90090 -18.73757  -3.58205
  13  5    -11.59799 -21.24350  -4.83931
  13  6    -12.24366 -26.94424  -7.90467
  13  7    -12.39272 -29.61439  -9.35514
  13  8    -12.79953 -30.10732  -9.62940
  13  9    -12.99534 -35.20751 -12.49942
  13 10    -13.16756 -51.78399 -21.90036
  13 11    -13.49964     NUMXQ(K)= 11
                                                   BACK EXTRAPOLATION FOR  1 PERCENTILE.
      1.975E-04             .047            1.000
      1.121E-04             .142            3.000
      8.459E-05             .237            5.000
      5.297E-05             .474           10.000
      3.833E-05             .711           15.000
      2.900E-05             .948           20.000
      2.281E-05            1.185           25.000
      1.864E-05            1.422           30.000
      1.501E-05            1.659           35.000
      1.236E-05            1.896           40.000
      1.038E-05            2.133           45.000
      8.747E-06            2.370           50.000
      7.182E-06            2.607           55.000
      5.983E-06            2.844           60.000
      5.045E-06            3.081           65.000
      3.976E-06            3.318           70.000
      2.971E-06            3.556           75.000
      2.232E-06            3.793           80.000
0     5.081E-05             0.5            10.55
0ANNUAL AVERAGE =   3.94E-07
0K= 13      FIVEXQ(K)= 5.081E-05     FIVEPR(K)=10.547
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0 RUN DATE: 11/19/2003 TIME: 23: 4:56
/PLANT NAME: CGS METEOROLOGICAL INSTRUMENTATION
DATA PERIOD: JFD 1996-1999 WIND SENSORS HEIGHT: 10.0 METERS
TYPE OF RELEASE: GROUND LEVEL RELEASE DELTA-T HEIGHTS: 10 - 75 METERS
SOURCE OF DATA: MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
COMMENTS: input file: P96-99-F.inp output file: P96-99-F.out sigma=desert + P-G
PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE ESE SECTOR.

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=1431.SQ.METERS	USED
A	.4	.24	4827.	0.	0.	776.2	1000.0	776.2	9.656E-07	9.651E-07	9.651E-07
A	1.0	.84	4827.	0.	0.	776.2	1000.0	776.2	4.077E-07	4.075E-07	4.075E-07
A	2.0	1.19	4827.	0.	0.	776.2	1000.0	776.2	2.016E-07	2.015E-07	2.015E-07
A	3.0	.65	4827.	0.	0.	776.2	1000.0	776.2	1.359E-07	1.358E-07	1.358E-07
A	4.0	.19	4827.	0.	0.	776.2	1000.0	776.2	1.025E-07	1.024E-07	1.024E-07
A	5.0	.23	4827.	0.	0.	776.2	1000.0	776.2	8.154E-08	8.149E-08	8.149E-08
A	6.0	.23	4827.	0.	0.	776.2	1000.0	776.2	6.820E-08	6.816E-08	6.816E-08
A	8.0	.42	4827.	0.	0.	776.2	1000.0	776.2	5.111E-08	5.108E-08	5.108E-08
A	10.0	.23	4827.	0.	0.	776.2	1000.0	776.2	4.086E-08	4.084E-08	4.084E-08
A	13.0	.27	4827.	0.	0.	776.2	1000.0	776.2	3.147E-08	3.145E-08	3.145E-08
B	.4	.04	4827.	0.	0.	583.7	611.6	583.7	2.099E-06	2.097E-06	2.097E-06
B	1.0	.11	4827.	0.	0.	583.7	611.6	583.7	8.864E-07	8.853E-07	8.853E-07
B	2.0	.31	4827.	0.	0.	583.7	611.6	583.7	4.383E-07	4.378E-07	4.378E-07
B	3.0	.27	4827.	0.	0.	583.7	611.6	583.7	2.955E-07	2.951E-07	2.951E-07
B	4.0	.27	4827.	0.	0.	583.7	611.6	583.7	2.228E-07	2.226E-07	2.226E-07
B	5.0	.23	4827.	0.	0.	583.7	611.6	583.7	1.773E-07	1.771E-07	1.771E-07
B	6.0	.27	4827.	0.	0.	583.7	611.6	583.7	1.483E-07	1.481E-07	1.481E-07
B	8.0	.19	4827.	0.	0.	583.7	611.6	583.7	1.111E-07	1.110E-07	1.110E-07
B	10.0	.08	4827.	0.	0.	583.7	611.6	583.7	8.884E-08	8.873E-08	8.873E-08
B	13.0	.15	4827.	0.	0.	583.7	611.6	583.7	6.842E-08	6.833E-08	6.833E-08
C	.4	.04	4827.	0.	0.	443.3	256.4	443.3	6.595E-06	6.569E-06	6.569E-06
C	1.0	.11	4827.	0.	0.	443.3	256.4	443.3	2.784E-06	2.773E-06	2.773E-06
C	2.0	.34	4827.	0.	0.	443.3	256.4	443.3	1.377E-06	1.371E-06	1.371E-06
C	3.0	.46	4827.	0.	0.	443.3	256.4	443.3	9.282E-07	9.245E-07	9.245E-07
C	4.0	.11	4827.	0.	0.	443.3	256.4	443.3	7.000E-07	6.972E-07	6.972E-07
C	5.0	.27	4827.	0.	0.	443.3	256.4	443.3	5.569E-07	5.547E-07	5.547E-07
C	6.0	.27	4827.	0.	0.	443.3	256.4	443.3	4.658E-07	4.639E-07	4.639E-07
C	8.0	.19	4827.	0.	0.	443.3	256.4	443.3	3.490E-07	3.476E-07	3.476E-07
C	10.0	.34	4827.	0.	0.	443.3	256.4	443.3	2.791E-07	2.780E-07	2.780E-07
C	13.0	.31	4827.	0.	0.	443.3	256.4	443.3	2.149E-07	2.141E-07	2.141E-07
D	.4	.36	4827.	0.	0.	312.1	87.3	373.7	2.298E-05	2.706E-05	2.298E-05
D	1.0	1.49	4827.	0.	0.	312.1	87.3	373.7	9.704E-06	1.143E-05	9.704E-06
D	2.0	1.91	4827.	0.	0.	312.1	87.3	372.4	4.816E-06	5.651E-06	4.816E-06
D	3.0	2.45	4827.	0.	0.	312.1	87.3	345.6	3.498E-06	3.809E-06	3.498E-06
D	4.0	2.45	4827.	0.	0.	312.1	87.3	330.1	2.762E-06	2.873E-06	2.762E-06
D	5.0	1.80	4827.	0.	0.	312.1	87.3	319.4	2.271E-06	2.285E-06	2.271E-06
D	6.0	2.07	4827.	0.	0.	312.1	87.3	312.1	1.944E-06	1.912E-06	1.912E-06
D	8.0	3.94	4827.	0.	0.	312.1	87.3	312.1	1.456E-06	1.432E-06	1.432E-06
D	10.0	1.95	4827.	0.	0.	312.1	87.3	312.1	1.164E-06	1.145E-06	1.145E-06
D	13.0	.69	4827.	0.	0.	312.1	87.3	312.1	8.968E-07	8.820E-07	8.820E-07
D	18.0	.08	4827.	0.	0.	312.1	87.3	312.1	6.479E-07	6.372E-07	6.372E-07
E	.4	.89	4827.	0.	0.	222.0	55.4	309.5	4.368E-05	5.874E-05	4.368E-05
E	1.0	3.44	4827.	0.	0.	222.0	55.4	309.5	1.844E-05	2.480E-05	1.844E-05
E	2.0	5.40	4827.	0.	0.	222.0	55.4	307.3	9.185E-06	1.226E-05	9.185E-06
E	3.0	.5.82	4827.	0.	0.	222.0	55.4	265.2	7.174E-06	8.267E-06	7.174E-06
E	4.0	5.51	4827.	0.	0.	222.0	55.4	243.8	5.885E-06	6.235E-06	5.885E-06
E	5.0	6.16	4827.	0.	0.	222.0	55.4	230.4	4.955E-06	4.960E-06	4.955E-06
E	6.0	5.36	4827.	0.	0.	222.0	55.4	222.0	4.302E-06	4.149E-06	4.149E-06
E	8.0	5.78	4827.	0.	0.	222.0	55.4	222.0	3.224E-06	3.109E-06	3.109E-06
E	10.0	2.45	4827.	0.	0.	222.0	55.4	222.0	2.577E-06	2.486E-06	2.486E-06
E	13.0	.77	4827.	0.	0.	222.0	55.4	222.0	1.985E-06	1.914E-06	1.914E-06
E	18.0	.08	4827.	0.	0.	222.0	55.4	222.0	1.434E-06	1.383E-06	1.383E-06
F	.4	.85	4827.	0.	0.	153.2	34.5	243.9	8.912E-05	1.306E-04	8.912E-05
F	1.0	3.10	4827.	0.	0.	153.2	34.5	243.9	3.763E-05	5.514E-05	3.763E-05
F	2.0	5.36	4827.	0.	0.	153.2	34.5	241.3	1.880E-05	2.727E-05	1.880E-05
F	3.0	3.87	4827.	0.	0.	153.2	34.5	194.9	1.569E-05	1.838E-05	1.569E-05
F	4.0	3.94	4827.	0.	0.	153.2	34.5	173.4	1.331E-05	1.386E-05	1.331E-05
F	5.0	2.07	4827.	0.	0.	153.2	34.5	160.7	1.142E-05	1.103E-05	1.103E-05
F	6.0	1.07	4827.	0.	0.	153.2	34.5	153.2	1.002E-05	9.225E-06	9.225E-06
F	8.0	.54	4827.	0.	0.	153.2	34.5	153.2	7.508E-06	6.912E-06	6.912E-06
G	.4	.86	4827.	0.	0.	105.7	21.5	210.1	1.663E-04	2.751E-04	1.663E-04
G	1.0	2.53	4827.	0.	0.	105.7	21.5	210.1	7.022E-05	1.162E-04	7.022E-05
G	2.0	3.71	4827.	0.	0.	105.7	21.5	206.7	3.530E-05	5.745E-05	3.530E-05
G	3.0	1.68	4827.	0.	0.	105.7	21.5	148.9	3.302E-05	3.872E-05	3.302E-05
G	4.0	.54	4827.	0.	0.	105.7	21.5	125.3	2.960E-05	2.921E-05	2.921E-05
G	5.0	.19	4827.	0.	0.	105.7	21.5	112.7	2.618E-05	2.323E-05	2.323E-05

ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-263	Cont'd on page B-264
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0         RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                              METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                     WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE          DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0 ESE SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0LATERAL 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=   .5     A=  2861.     D=   70.0
 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   1.663E-04   8.912E-05   7.022E-05   4.368E-05   3.763E-05   3.530E-05   3.302E-05   2.921E-05   2.323E-05   2.298E-05
         .862       1.712       4.238       5.131       8.231      11.943      13.627      14.163      14.354      14.719
       .07118      .14140      .35000      .42370      .67970      .98628     1.12534     1.16959     1.18539     1.21549
0   1.880E-05   1.844E-05   1.569E-05   1.331E-05   1.103E-05   9.704E-06   9.225E-06   9.185E-06   7.174E-06   6.912E-06
       20.077      23.521      27.387      31.329      33.396      34.888      35.960      41.356      47.174      47.709
      1.65797     1.94242     2.26163     2.58717     2.75784     2.88110     2.96960     3.41524     3.89564     3.93989
0   6.569E-06   5.885E-06   4.955E-06   4.816E-06   4.149E-06   3.498E-06   3.109E-06   2.773E-06   2.762E-06   2.486E-06
       47.749      53.260      59.422      61.336      66.694      69.143      74.922      75.037      77.487      79.936
      3.94317     4.39829     4.90714     5.06516     5.50764     5.70992     6.18716     6.19664     6.39892     6.60119
0   2.271E-06   2.097E-06   1.914E-06   1.912E-06   1.432E-06   1.383E-06   1.371E-06   1.145E-06   9.651E-07   9.245E-07
       81.735      81.773      82.538      84.605      88.547      88.623      88.968      90.920      91.159      91.618
      6.74974     6.75286     6.81608     6.98675     7.31228     7.31860     7.34705     7.50824     7.52800     7.56593
0   8.853E-07   8.820E-07   6.972E-07   6.372E-07   5.547E-07   4.639E-07   4.378E-07   4.075E-07   3.476E-07   2.951E-07
       91.733      92.422      92.537      92.613      92.881      93.149      93.455      94.297      94.489      94.757
      7.57541     7.63230     7.64178     7.64810     7.67023     7.69235     7.71764     7.78717     7.80297     7.82509
0   2.780E-07   2.226E-07   2.141E-07   2.015E-07   1.771E-07   1.481E-07   1.358E-07   1.110E-07   1.024E-07   8.873E-08
       95.131      95.369      95.675      96.862      97.091      97.359      98.010      98.201      98.393      98.469
      7.85354     7.87566     7.90095     7.99892     8.01789     8.04001     8.09374     8.10954     8.12535     8.13167
0   8.149E-08   6.833E-08   6.816E-08   5.108E-08   4.084E-08   3.145E-08
       98.699      98.852      99.081      99.502      99.732     100.000
      8.15063     8.16327     8.18224     8.21700     8.23597     8.25809
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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)=    .350
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   1.124
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   2.259
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   2.585
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   3.412
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   5.061
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   5.504
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   6.183
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   6.597
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(11)=   6.746
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(12)=   6.983
                                                  HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(13)=   7.308
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  14  1      -8.70159  14.28253  -1.74947
  14  2      -9.56381 -14.46610  -1.81753
  14  3     -10.31825 -16.40026  -2.66505
  14  4     -11.06239 -16.83578  -2.88249
  14  5     -11.22735 -17.12420  -3.03072
  14  6     -11.59799 -17.97996  -3.50004
  14  7     -12.24366 -18.19128  -3.62898
  14  8     -12.39272 -20.30543  -4.95210
  14  9     -12.68134 -23.08734  -6.75905
  14 10     -12.90504 -24.75322  -7.86486
  14 11     -12.99534 -27.36180  -9.60975
  14 12     -13.16756 -31.02700 -12.09115
  14 13     -13.45617      NUMXQ(K)= 13
      1.542E-04              .083              1.000
      8.559E-05              .248              3.000
      6.349E-05              .413              5.000
      4.075E-05              .826             10.000
      2.994E-05             1.239             15.000
      2.214E-05             1.652             20.000
      1.737E-05             2.065             25.000
      1.404E-05             2.477             30.000
      1.150E-05             2.890             35.000
      9.612E-06             3.303             40.000
      8.030E-06             3.716             45.000
      6.771E-06             4.129             50.000
      5.786E-06             4.542             55.000
      4.999E-06             4.955             60.000
      4.344E-06             5.368             65.000
      3.683E-06             5.781             70.000
      3.098E-06             6.194             75.000
      2.477E-06             6.606             80.000
      1.856E-06             7.019             85.000
0     5.636E-05             0.5                6.05
0ANNUAL AVERAGE =    5.36E-07
0K= 14      FIVEXQ(K)= 5.636E-05      FIVEPR(K)= 6.055
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Calculation No. NE-02-03-16

Prepared by / Date: Mohammed Abu-Shehadeh

Verified by/Date: Ted Messier

Revision No. 0

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: F96-99-F.inp   output file: F96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE  SE SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.21	4827.	0.	0.	776.2	1000.0	776.2	9.656E-07	9.651E-07	9.651E-07
A	1.0	.73	4827.	0.	0.	776.2	1000.0	776.2	4.077E-07	4.075E-07	4.075E-07
A	2.0	1.42	4827.	0.	0.	776.2	1000.0	776.2	2.016E-07	2.015E-07	2.015E-07
A	3.0	.78	4827.	0.	0.	776.2	1000.0	776.2	1.359E-07	1.358E-07	1.358E-07
A	4.0	.55	4827.	0.	0.	776.2	1000.0	776.2	1.025E-07	1.024E-07	1.024E-07
A	5.0	.12	4827.	0.	0.	776.2	1000.0	776.2	8.154E-08	8.149E-08	8.149E-08
A	6.0	.15	4827.	0.	0.	776.2	1000.0	776.2	6.820E-08	6.816E-08	6.816E-08
A	8.0	.17	4827.	0.	0.	776.2	1000.0	776.2	5.111E-08	5.108E-08	5.108E-08
A	10.0	.12	4827.	0.	0.	776.2	1000.0	776.2	4.086E-08	4.084E-08	4.084E-08
A	13.0	.09	4827.	0.	0.	776.2	1000.0	776.2	3.147E-08	3.145E-08	3.145E-08
B	.4	.08	4827.	0.	0.	583.7	611.6	583.7	2.099E-06	2.097E-06	2.097E-06
B	1.0	.23	4827.	0.	0.	583.7	611.6	583.7	8.864E-07	8.853E-07	8.853E-07
B	2.0	.35	4827.	0.	0.	583.7	611.6	583.7	4.383E-07	4.378E-07	4.378E-07
B	3.0	.26	4827.	0.	0.	583.7	611.6	583.7	2.955E-07	2.951E-07	2.951E-07
B	4.0	.35	4827.	0.	0.	583.7	611.6	583.7	2.228E-07	2.226E-07	2.226E-07
B	5.0	.15	4827.	0.	0.	583.7	611.6	583.7	1.773E-07	1.771E-07	1.771E-07
B	6.3	.12	4827.	0.	0.	583.7	611.6	583.7	1.483E-07	1.481E-07	1.481E-07
B	8.0	.06	4827.	0.	0.	583.7	611.6	583.7	1.111E-07	1.110E-07	1.110E-07
B	10.0	.03	4827.	0.	0.	583.7	611.6	583.7	8.884E-08	8.873E-08	8.873E-08
C	.4	.03	4827.	0.	0.	443.3	256.4	443.3	6.595E-06	6.569E-06	6.569E-06
C	1.0	.09	4827.	0.	0.	443.3	256.4	443.3	2.784E-06	2.773E-06	2.773E-06
C	2.0	.46	4827.	0.	0.	443.3	256.4	443.3	1.377E-06	1.371E-06	1.371E-06
C	3.0	.49	4827.	0.	0.	443.3	256.4	443.3	9.282E-07	9.245E-07	9.245E-07
C	4.0	.20	4827.	0.	0.	443.3	256.4	443.3	7.000E-07	6.972E-07	6.972E-07
C	5.0	.20	4827.	0.	0.	443.3	256.4	443.3	5.569E-07	5.547E-07	5.547E-07
C	6.0	.12	4827.	0.	0.	443.3	256.4	443.3	4.658E-07	4.639E-07	4.639E-07
C	8.0	.09	4827.	0.	0.	443.3	256.4	443.3	3.490E-07	3.476E-07	3.476E-07
C	10.0	.20	4827.	0.	0.	443.3	256.4	443.3	2.791E-07	2.780E-07	2.780E-07
D	.4	.26	4827.	0.	0.	312.1	87.3	373.7	2.298E-05	2.706E-05	2.298E-05
D	1.0	1.05	4827.	0.	0.	312.1	87.3	373.7	9.704E-06	1.143E-05	9.704E-06
D	2.0	4.33	4827.	0.	0.	312.1	87.3	372.4	4.816E-06	5.651E-06	4.816E-06
D	3.0	4.30	4827.	0.	0.	312.1	87.3	345.6	3.498E-06	3.809E-06	3.498E-06
D	4.0	3.81	4827.	0.	0.	312.1	87.3	330.1	2.762E-06	2.873E-06	2.762E-06
D	5.0	2.85	4827.	0.	0.	312.1	87.3	319.4	2.271E-06	2.285E-06	2.271E-06
D	6.0	2.12	4827.	0.	0.	312.1	87.3	312.1	1.944E-06	1.912E-06	1.912E-06
D	8.0	1.48	4827.	0.	0.	312.1	87.3	312.1	1.456E-06	1.432E-06	1.432E-06
D	10.0	.81	4827.	0.	0.	312.1	87.3	312.1	1.164E-06	1.145E-06	1.145E-06
D	13.0	.46	4827.	0.	0.	312.1	87.3	312.1	8.968E-07	8.820E-07	8.820E-07
D	18.0	.06	4827.	0.	0.	312.1	87.3	312.1	6.479E-07	6.372E-07	6.372E-07

Cont'd on page B-267

E	.4	.60	4827.	0.	0.	222.0	55.4	309.5	4.368E-05	5.874E-05	4.368E-05
E	1.0	2.32	4827.	0.	0.	222.0	55.4	309.5	1.844E-05	2.480E-05	1.844E-05
E	2.0	5.99	4827.	0.	0.	222.0	55.4	307.3	9.185E-06	1.226E-05	9.185E-06
E	3.0	7.00	4827.	0.	0.	222.0	55.4	265.2	7.174E-06	8.267E-06	7.174E-06
E	4.0	5.61	4827.	0.	0.	222.0	55.4	243.8	5.885E-06	6.235E-06	5.885E-06
E	5.0	4.48	4827.	0.	0.	222.0	55.4	230.4	4.955E-06	4.960E-06	4.955E-06
E	6.0	3.57	4827.	0.	0.	222.0	55.4	222.0	4.302E-06	4.149E-06	4.149E-06
E	8.0	3.25	4827.	0.	0.	222.0	55.4	222.0	3.224E-06	3.109E-06	3.109E-06
E	10.0	.90	4827.	0.	0.	222.0	55.4	222.0	2.577E-06	2.486E-06	2.486E-06
E	13.0	.29	4827.	0.	0.	222.0	55.4	222.0	1.985E-06	1.914E-06	1.914E-06
F	.4	.77	4827.	0.	0.	153.2	34.5	243.9	8.912E-05	1.306E-04	8.912E-05
F	1.0	2.79	4827.	0.	0.	153.2	34.5	243.9	3.763E-05	5.514E-05	3.763E-05
F	2.0	6.74	4827.	0.	0.	153.2	34.5	241.3	1.880E-05	2.727E-05	1.880E-05
F	3.0	4.71	4827.	0.	0.	153.2	34.5	194.9	1.569E-05	1.838E-05	1.569E-05
F	4.0	4.07	4827.	0.	0.	153.2	34.5	173.4	1.331E-05	1.386E-05	1.331E-05
F	5.0	1.48	4827.	0.	0.	153.2	34.5	160.7	1.142E-05	1.103E-05	1.103E-05
F	6.0	.58	4827.	0.	0.	153.2	34.5	153.2	1.002E-05	9.225E-06	9.225E-06
F	8.0	.06	4827.	0.	0.	153.2	34.5	153.2	7.508E-06	6.912E-06	6.912E-06
G	.4	.86	4827.	0.	0.	105.7	21.5	210.1	1.663E-04	2.751E-04	1.663E-04
G	1.0	2.53	4827.	0.	0.	105.7	21.5	210.1	7.022E-05	1.162E-04	7.022E-05
G	2.0	6.13	4827.	0.	0.	105.7	21.5	206.7	3.530E-05	5.745E-05	3.530E-05
G	3.0	3.63	4827.	0.	0.	105.7	21.5	148.9	3.302E-05	3.872E-05	3.302E-05
G	4.0	2.03	4827.	0.	0.	105.7	21.5	125.3	2.960E-05	2.921E-05	2.921E-05
G	5.0	.17	4827.	0.	0.	105.7	21.5	112.7	2.618E-05	2.323E-05	2.323E-05
G	6.0	.06	4827.	0.	0.	105.7	21.5	105.7	2.333E-05	1.943E-05	1.943E-05

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0         RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                              METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                     WIND SENSORS HEIGHT: 10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE          DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0  SE SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0LATERAL 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=   .5    A= 2861.    D=   70.0
 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   1.663E-04   8.912E-05   7.022E-05   4.368E-05   3.763E-05   3.510E-05   3.302E-05   2.921E-05   2.323E-05   2.298E-05
         .863       1.628       4.156       4.758       7.548      13.679      17.312      19.346      19.520      19.776
       .09383      .17705      .45202      .51753      .82095     1.48783     1.88289     2.10413     2.12310     2.15088
0   1.943E-05   1.880E-05   1.844E-05   1.569E-05   1.331E-05   1.103E-05   9.704E-06   9.225E-06   9.185E-06   7.174E-06
       19.834      26.575      28.900      33.607      37.676      39.158      40.204      40.785      46.771      53.774
      2.15720     2.89045     3.14329     3.65530     4.09778     4.25897     4.37275     4.43596     5.08703     5.84873
0   6.912E-06   6.569E-06   5.885E-06   4.955E-06   4.816E-06   4.149E-06   3.498E-06   3.109E-06   2.773E-06   2.762E-06
       53.832      53.862      59.471      63.946      68.275      71.850      76.150      79.405      79.492      83.299
      5.85505     5.85833     6.46831     6.95504     7.42596     7.81471     8.28247     8.63646     8.64594     9.05997
0   2.486E-06   2.271E-06   2.097E-06   1.914E-06   1.912E-06   1.432E-06   1.371E-06   1.145E-06   9.651E-07   9.245E-07
       84.200      87.047      87.124      87.415      89.536      91.018      91.483      92.296      92.503      92.997
      9.15795     9.46768     9.47602     9.50762     9.73834     9.89953     9.95010    10.03860    10.06105    10.11478
0   8.853E-07   8.820E-07   6.972E-07   6.372E-07   5.547E-07   4.639E-07   4.378E-07   4.075E-07   3.476E-07   2.951E-07
       93.229      93.694      93.898      93.956      94.159      94.275      94.624      95.351      95.438      95.699
     10.14007    10.19064    10.21276    10.21908    10.24120    10.25385    10.29177    10.37079    10.38027    10.40871
0   2.780E-07   2.226E-07   2.015E-07   1.771E-07   1.481E-07   1.358E-07   1.110E-07   1.024E-07   8.873E-08   8.149E-08
       95.903      96.251      97.675      97.821      97.937      98.721      98.780      99.332      99.361      99.477
     10.43084    10.46876    10.62363    10.63943    10.65207    10.73741    10.74373    10.80378    10.80694    10.81959
0   6.816E-08   5.108E-08   4.084E-08   3.145E-08
       99.622      99.797      99.913     100.000
     10.83539    10.85435    10.86699    10.87648
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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)=   1.881
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   3.652
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   4.094
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   5.845
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   7.422
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   9.057
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   9.464
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   9.735
                                                              HANDCHECK GRAPH:  SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE(10)=   9.947
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  15  1      -8.70159 -13.58017  -1.56899
  15  2     -10.31825 -15.71947  -2.59799
  15  3      11.06239 -16.67007  -3.12829
  15  4     -11.22735 -17.47928  -3.59340
  15  5     -11.84509 -16.93096  -3.24369
  15  6     -12.24366 -19.69707  -5.15788
  15  7     -12.79953 -23.44738  -7.96231
  15  8     -12.99534 -27.21613 -10.83331
  15  9     -13.16756 -48.42676 -27.18954
  15 10     -13.49964      NUMXQ(K)= 10
     1.553E-04                .109              1.000
     9.036E-05                .326              3.000
     6.883E-05                .544              5.000
     4.635E-05               1.088             10.000
     3.617E-05               1.631             15.000
     2.828E-05               2.175             20.000
     2.209E-05               2.719             25.000
     1.793E-05               3.263             30.000
     1.480E-05               3.807             35.000
     1.203E-05               4.351             40.000
     9.828E-06               4.894             45.000
     8.170E-06               5.438             50.000
     6.915E-06               5.982             55.000
     5.991E-06               6.526             60.000
     5.237E-06               7.070             65.000
     4.498E-06               7.614             70.000
     3.716E-06               8.157             75.000
     3.099E-06               8.701             80.000
     2.525E-06               9.245             85.000
     1.765E-06               9.789             90.000
0    7.205E-05               0.5                4.60
0ANNUAL AVERAGE =    7.35E-07
0K= 15      FIVEXQ(K)= 7.205E-05      FIVEPR(K)= 4.597
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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0            RUN DATE: 11/19/2003     TIME:  23: 4:56
/PLANT NAME:   CGS                                  METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                         WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE              DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE SSE SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.25	4827.	0.	0.	776.2	1000.0	776.2	9.656E-07	9.651E-07	9.651E-07
A	1.0	.89	4827.	0.	0.	776.2	1000.0	776.2	4.077E-07	4.075E-07	4.075E-07
A	2.0	2.82	4827.	0.	0.	776.2	1000.0	776.2	2.016E-07	2.015E-07	2.015E-07
A	3.0	1.79	4827.	0.	0.	776.2	1000.0	776.2	1.359E-07	1.358E-07	1.358E-07
A	4.0	.89	4827.	0.	0.	776.2	1000.0	776.2	1.025E-07	1.024E-07	1.024E-07
A	5.0	1.03	4827.	0.	0.	776.2	1000.0	776.2	8.154E-08	8.149E-08	8.149E-08
A	6.0	.56	4827.	0.	0.	776.2	1000.0	776.2	6.820E-08	6.816E-08	6.816E-08
A	8.0	.36	4827.	0.	0.	776.2	1000.0	776.2	5.111E-08	5.108E-08	5.108E-08
A	13.0	.03	4827.	0.	0.	776.2	1000.0	776.2	3.147E-08	3.145E-08	3.145E-08
A	18.0	.03	4827.	0.	0.	776.2	1000.0	776.2	2.273E-08	2.272E-08	2.272E-08
B	.4	.13	4827.	0.	0.	583.7	611.6	583.7	2.099E-06	2.097E-06	2.097E-06
B	1.0	.40	4827.	0.	0.	583.7	611.6	583.7	8.864E-07	8.853E-07	8.853E-07
B	2.0	.66	4827.	0.	0.	583.7	611.6	583.7	4.383E-07	4.378E-07	4.378E-07
B	3.0	.73	4827.	0.	0.	583.7	611.6	583.7	2.955E-07	2.951E-07	2.951E-07
B	4.0	.33	4827.	0.	0.	583.7	611.6	583.7	2.228E-07	2.226E-07	2.226E-07
B	5.0	.27	4827.	0.	0.	583.7	611.6	583.7	1.773E-07	1.771E-07	1.771E-07
B	6.0	.10	4827.	0.	0.	583.7	611.6	583.7	1.483E-07	1.481E-07	1.481E-07
B	8.0	.13	4827.	0.	0.	583.7	611.6	583.7	1.111E-07	1.110E-07	1.110E-07
C	.4	.07	4827.	0.	0.	443.3	256.4	443.3	6.595E-06	6.569E-06	6.569E-06
C	1.0	.20	4827.	0.	0.	443.3	256.4	443.3	2.784E-06	2.773E-06	2.773E-06
C	2.0	.56	4827.	0.	0.	443.3	256.4	443.3	1.377E-06	1.371E-06	1.371E-06
C	3.0	.83	4827.	0.	0.	443.3	256.4	443.3	9.282E-07	9.245E-07	9.245E-07
C	4.0	.53	4827.	0.	0.	443.3	256.4	443.3	7.000E-07	6.972E-07	6.972E-07
C	5.0	.36	4827.	0.	0.	443.3	256.4	443.3	5.569E-07	5.547E-07	5.547E-07
C	6.0	.23	4827.	0.	0.	443.3	256.4	443.3	4.658E-07	4.639E-07	4.639E-07
C	8.0	.30	4827.	0.	0.	443.3	256.4	443.3	3.490E-07	3.476E-07	3.476E-07
C	10.0	.03	4827.	0.	0.	443.3	256.4	443.3	2.791E-07	2.780E-07	2.780E-07
C	13.0	.03	4827.	0.	0.	443.3	256.4	443.3	2.149E-07	2.141E-07	2.141E-07
D	.4	.32	4827.	0.	0.	312.1	87.3	373.7	2.298E-05	2.706E-05	2.298E-05
D	1.0	1.33	4827.	0.	0.	312.1	87.3	373.7	9.704E-06	1.143E-05	9.704E-06
D	2.0	4.24	4827.	0.	0.	312.1	87.3	372.4	4.816E-06	5.651E-06	4.816E-06
D	3.0	4.77	4827.	0.	0.	312.1	87.3	345.6	3.498E-06	3.809E-06	3.498E-06
D	4.0	4.27	4827.	0.	0.	312.1	87.3	330.1	2.762E-06	2.873E-06	2.762E-06
D	5.0	2.78	4827.	0.	0.	312.1	87.3	319.4	2.271E-06	2.285E-06	2.271E-06
D	6.0	1.56	4827.	0.	0.	312.1	87.3	312.1	1.944E-06	1.912E-06	1.912E-06
D	8.0	1.62	4827.	0.	0.	312.1	87.3	312.1	1.456E-06	1.432E-06	1.432E-06
D	10.0	.50	4827.	0.	0.	312.1	87.3	312.1	1.164E-06	1.145E-06	1.145E-06
D	13.0	.10	4827.	0.	0.	312.1	87.3	312.1	8.968E-07	8.820E-07	8.820E-07
D	18.0	.10	4827.	0.	0.	312.1	87.3	312.1	6.479E-07	6.372E-07	6.372E-07

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

E	.4	.47	4827.	0.	0.	222.0	55.4	309.5	4.368E-05	5.874E-05	4.368E-05
E	1.0	1.82	4827.	0.	0.	222.0	55.4	309.5	1.844E-05	3.480E-05	1.844E-05
E	2.0	7.09	4827.	0.	0.	222.0	55.4	307.3	9.185E-06	1.226E-05	9.185E-06
E	3.0	5.67	4827.	0.	0.	222.0	55.4	265.2	7.174E-06	8.267E-06	7.174E-06
E	4.0	4.34	4827.	0.	0.	222.0	55.4	243.8	5.885E-06	6.235E-06	5.885E-06
E	5.0	2.45	4827.	0.	0.	222.0	55.4	230.4	4.955E-06	4.960E-06	4.955E-06
E	6.0	1.13	4827.	0.	0.	222.0	55.4	222.0	4.302E-06	4.149E-06	4.149E-06
E	8.0	1.89	4827.	0.	0.	222.0	55.4	222.0	3.224E-06	3.109E-06	3.109E-06
E	10.0	.70	4827.	0.	0.	222.0	55.4	222.0	2.577E-06	2.486E-06	2.486E-06
E	13.0	.13	4827.	0.	0.	222.0	55.4	222.0	1.985E-06	1.914E-06	1.914E-06
F	.4	.75	4827.	0.	0.	153.2	34.5	243.9	8.912E-05	1.306E-04	8.912E-05
F	1.0	2.75	4827.	0.	0.	153.2	34.5	243.9	3.763E-05	5.514E-05	3.763E-05
F	2.0	7.02	4827.	0.	0.	153.2	34.5	241.3	1.880E-05	2.727E-05	1.880E-05
F	3.0	5.53	4827.	0.	0.	153.2	34.5	194.9	1.569E-05	1.838E-05	1.569E-05
F	4.0	1.86	4827.	0.	0.	153.2	34.5	173.4	1.331E-05	1.386E-05	1.331E-05
F	5.0	.76	4827.	0.	0.	153.2	34.5	160.7	1.142E-05	1.103E-05	1.103E-05
F	6.0	.23	4827.	0.	0.	153.2	34.5	153.2	1.002E-05	9.225E-06	9.225E-06
F	8.0	.23	4827.	0.	0.	153.2	34.5	153.2	7.508E-06	6.912E-06	6.912E-06
G	.4	1.40	4827.	0.	0.	105.7	21.5	210.1	1.663E-04	2.751E-04	1.663E-04
G	1.0	4.11	4827.	0.	0.	105.7	21.5	210.1	7.022E-05	1.162E-04	7.022E-05
G	2.0	8.35	4827.	0.	0.	105.7	21.5	206.7	3.530E-05	5.745E-05	3.530E-05
G	3.0	4.24	4827.	0.	0.	105.7	21.5	148.9	3.302E-05	3.872E-05	3.302E-05
G	4.0	1.06	4827.	0.	0.	105.7	21.5	125.3	2.960E-05	2.921E-05	2.921E-05
G	5.0	.03	4827.	0.	0.	105.7	21.5	112.7	2.618E-05	2.323E-05	2.323E-05

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003    TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0 SSE SECTOR      BOUNDARY DISTANCE = 4827.0 METERS
0LATERAL 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=   .5     A=  2861.     D=   70.0
 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   1.663E-04   8.912E-05   7.022E-05   4.368E-05   3.763E-05   3.530E-05   3.302E-05   2.921E-05   2.323E-05   2.298E-05
        1.402       2.157       6.265       6.738       9.488      17.839      22.080      23.140      23.174      23.497
       .13373      .20569      .59760      .64264      .90496     1.70142     2.10597     2.20711     2.21027     2.24114
0   1.880E-05   1.844E-05   1.569E-05   1.331E-05   1.103E-05   9.704E-06   9.225E-06   9.185E-06   7.174E-06   6.912E-06
       30.522      32.345      37.878      39.734      40.496      41.822      41.954      49.046      54.712      54.844
      2.91118     3.08501     3.61282     3.78981     3.86250     3.98893     4.00157     4.67793     5.21838     5.23103
0   6.569E-06   5.885E-06   4.955E-06   4.816E-06   4.149E-06   3.498E-06   3.109E-06   2.773E-06   2.762E-06   2.486E-06
       54.913      59.254      61.706      65.948      67.074      71.846      73.735      73.934      78.208      78.904
      5.23758     5.65161     5.88550     6.29005     6.39751     6.85263     7.03278     7.05174     7.45945     7.52582
0   2.271E-06   2.097E-06   1.914E-06   1.912E-06   1.432E-06   1.371E-06   1.145E-06   9.651E-07   9.245E-07   8.853E-07
       81.688      81.819      81.951      83.509      85.132      85.696      86.193      86.447      87.276      87.673
      7.79131     7.80383     7.81645     7.96500     8.11987     8.17359     8.22100     8.24526     8.32427     8.36220
0   8.820E-07   6.972E-07   6.372E-07   5.547E-07   4.639E-07   4.378E-07   4.075E-07   3.476E-07   2.951E-07   2.780E-07
       87.773      88.303      88.402      88.767      88.999      89.661      90.556      90.854      91.583      91.616
      8.37168     8.42225     8.43173     8.46650     8.48862     8.55183     8.63717     8.66561     8.73514     8.73831
0   2.226E-07   2.141E-07   2.015E-07   1.771E-07   1.481E-07   1.358E-07   1.110E-07   1.024E-07   8.149E-08   6.816E-08
       91.948      91.981      94.798      95.063      95.162      96.951      97.084      97.979      99.006      99.569
      8.76991     8.77307     9.04172     9.06700     9.07648     9.24715     9.25980     9.34513     9.44311     9.49684
0   5.108E-08   3.145E-08   2.272E-08
       99.934      99.967     100.000
      9.53160     9.53476     9.53792
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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)=   2.104
                                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 3)=   3.610
                                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 4)=   4.674
                                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 5)=   6.286
                                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 6)=   7.456
                                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 7)=   7.788
                                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 8)=   7.961
                                                    HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES.  XSAVE( 9)=   8.170
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  16  1     -8.70159 -13.70485  -1.66600
  16  2    -10.31825 -16.75862  -3.16826
  16  3    -11.06239 -19.04603  -4.44053
  16  4    -11.59799 -19.01051  -4.41935
  16  5    -12.24366 -21.85960  -6.28006
  16  6    -12.79953 -24.99485  -8.45329
  16  7    -12.99534 -33.66739 -14.56283
  16  8    -13.16756 -46.68195 -23.80821
  16  9    -13.49964      NUMXQ(K)=  9
                                                    BACK EXTRAPOLATION FOR  1 PERCENTILE.
      1.969E-04            .095           1.000
      1.116E-04            .286           3.000
      8.392E-05            .477           5.000
      5.551E-05            .954          10.000
      4.286E-05           1.431          15.000
      3.535E-05           1.908          20.000
      2.799E-05           2.384          25.000
      2.182E-05           2.861          30.000
      1.757E-05           3.338          35.000
      1.405E-05           3.815          40.000
      1.101E-05           4.292          45.000
      8.817E-06           4.769          50.000
      7.188E-06           5.246          55.000
      5.944E-06           5.723          60.000
      4.975E-06           6.200          65.000
      3.975E-06           6.677          70.000
      3.173E-06           7.153          75.000
      2.495E-06           7.630          80.000
      1.523E-06           8.107          85.000
0     8.167E-05           0.5             5.24
0ANNUAL AVERAGE =    7.24E-07
CK= 16     FIVEXQ(K)= 8.167E 05     FIVEPR(K)= 5.242
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Cont'd on page B-274

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:     10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0PARAMETER VALUES FOR THE CHI/Q CALCULATIONS FOR THE ALL SECTOR.
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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=1431.SQ.METERS	USED
A	.4	.35	4827.	0.	0.	776.2	1000.0	776.2	9.656E-07	9.651E-07	9.651E-07
A	1.0	1.22	4827.	0.	0.	776.2	1000.0	776.2	4.077E-07	4.075E-07	4.075E-07
A	2.0	2.50	4827.	0.	0.	776.2	1000.0	776.2	2.016E-07	2.015E-07	2.015E-07
A	3.0	1.81	4827.	0.	0.	776.2	1000.0	776.2	1.359E-07	1.358E-07	1.358E-07
A	4.0	1.41	4827.	0.	0.	776.2	1000.0	776.2	1.025E-07	1.024E-07	1.024E-07
A	5.0	1.02	4827.	0.	0.	776.2	1000.0	776.2	8.154E-08	8.149E-08	8.149E-08
A	6.0	.58	4827.	0.	0.	776.2	1000.0	776.2	6.820E-08	6.816E-08	6.816E-08
A	8.0	.70	4827.	0.	0.	776.2	1000.0	776.2	5.111E-08	5.108E-08	5.108E-08
A	10.0	.21	4827.	0.	0.	776.2	1000.0	776.2	4.086E-08	4.084E-08	4.084E-08
A	13.0	.09	4827.	0.	0.	776.2	1000.0	776.2	3.147E-08	3.145E-08	3.145E-08
A	18.0	.01	4827.	0.	0.	776.2	1000.0	776.2	2.273E-08	2.272E-08	2.272E-08
B	.4	.09	4827.	0.	0.	583.7	611.6	583.7	2.099E-06	2.097E-06	2.097E-06
B	1.0	.28	4827.	0.	0.	583.7	611.6	583.7	8.864E-07	8.853E-07	8.853E-07
B	2.0	.63	4827.	0.	0.	583.7	611.6	583.7	4.383E-07	4.378E-07	4.378E-07
B	3.0	.67	4827.	0.	0.	583.7	611.6	583.7	2.955E-07	2.951E-07	2.951E-07
B	4.0	.57	4827.	0.	0.	583.7	611.6	583.7	2.228E-07	2.226E-07	2.226E-07
B	5.0	.42	4827.	0.	0.	583.7	611.6	583.7	1.773E-07	1.771E-07	1.771E-07
B	6.0	.23	4827.	0.	0.	583.7	611.6	583.7	1.483E-07	1.481E-07	1.481E-07
B	8.0	.31	4827.	0.	0.	583.7	611.6	583.7	1.111E-07	1.110E-07	1.110E-07
B	10.0	.09	4827.	0.	0.	583.7	611.6	583.7	8.884E-08	8.873E-08	8.873E-08
B	13.0	.07	4827.	0.	0.	583.7	611.6	583.7	6.842E-08	6.833E-08	6.833E-08
C	.4	.09	4827.	0.	0.	443.3	256.4	443.3	6.595E-06	6.569E-06	6.569E-06
C	1.0	.26	4827.	0.	0.	443.3	256.4	443.3	2.784E-06	2.773E-06	2.773E-06
C	2.0	.61	4827.	0.	0.	443.3	256.4	443.3	1.377E-06	1.371E-06	1.371E-06
C	3.0	.76	4827.	0.	0.	443.3	256.4	443.3	9.282E-07	9.245E-07	9.245E-07
C	4.0	.55	4827.	0.	0.	443.3	256.4	443.3	7.000E-07	6.972E-07	6.972E-07
C	5.0	.48	4827.	0.	0.	443.3	256.4	443.3	5.569E-07	5.547E-07	5.547E-07
C	6.0	.32	4827.	0.	0.	443.3	256.4	443.3	4.658E-07	4.639E-07	4.639E-07
C	8.0	.34	4827.	0.	0.	443.3	256.4	443.3	3.490E-07	3.476E-07	3.476E-07
C	10.0	.21	4827.	0.	0.	443.3	256.4	443.3	2.791E-07	2.780E-07	2.780E-07
C	13.0	.07	4827.	0.	0.	443.3	256.4	443.3	2.149E-07	2.141E-07	2.141E-07
D	.4	.36	4827.	0.	0.	312.1	87.3	312.1	2.752E-05	2.706E-05	2.706E-05
D	1.0	1.49	4827.	0.	0.	312.1	87.3	312.1	1.162E-05	1.143E-05	1.143E-05
D	2.0	3.58	4827.	0.	0.	312.1	87.3	312.1	5.745E-06	5.651E-06	5.651E-06
D	3.0	3.74	4827.	0.	0.	312.1	87.3	312.1	3.873E-06	3.809E-06	3.809E-06
D	4.0	3.31	4827.	0.	0.	312.1	87.3	312.1	2.921E-06	2.873E-06	2.873E-06
D	5.0	2.55	4827.	0.	0.	312.1	87.3	312.1	2.324E-06	2.285E-06	2.285E-06
D	6.0	1.73	4827.	0.	0.	312.1	87.3	312.1	1.944E-06	1.912E-06	1.912E-06
D	8.0	2.04	4827.	0.	0.	312.1	87.3	312.1	1.456E-06	1.432E-06	1.432E-06
D	10.0	1.03	4827.	0.	0.	312.1	87.3	312.1	1.164E-06	1.145E-06	1.145E-06
D	13.0	.45	4827.	0.	0.	312.1	87.3	312.1	8.968E-07	8.820E-07	8.820E-07
D	18.0	.08	4827.	0.	0.	312.1	87.3	312.1	6.479E-07	6.372E-07	6.372E-07
E	.4	.61	4827.	0.	0.	222.0	55.4	222.0	6.091E-05	5.874E-05	5.874E-05
E	1.0	2.34	4827.	0.	0.	222.0	55.4	222.0	2.572E-05	2.480E-05	2.480E-05
E	2.0	5.33	4827.	0.	0.	222.0	55.4	222.0	1.272E-05	1.226E-05	1.226E-05
E	3.0	5.02	4827.	0.	0.	222.0	55.4	222.0	8.572E-06	8.267E-06	8.267E-06
E	4.0	4.32	4827.	0.	0.	222.0	55.4	222.0	6.465E-06	6.235E-06	6.235E-06
E	5.0	3.44	4827.	0.	0.	222.0	55.4	222.0	5.143E-06	4.960E-06	4.960E-06
E	6.0	2.59	4827.	0.	0.	222.0	55.4	222.0	4.302E-06	4.149E-06	4.149E-06
E	8.0	2.81	4827.	0.	0.	222.0	55.4	222.0	3.224E-06	3.109E-06	3.109E-06
E	10.0	1.15	4827.	0.	0.	222.0	55.4	222.0	2.577E-06	2.486E-06	2.486E-06
E	13.0	.39	4827.	0.	0.	222.0	55.4	222.0	1.985E-06	1.914E-06	1.914E-06
E	18.0	.05	4827.	0.	0.	222.0	55.4	222.0	1.434E-06	1.383E-06	1.383E-06
F	.4	.76	4827.	0.	0.	153.2	34.5	153.2	1.419E-04	1.306E-04	1.306E-04
F	1.0	2.77	4827.	0.	0.	153.2	34.5	153.2	5.989E-05	5.514E-05	5.514E-05
F	2.0	5.95	4827.	0.	0.	153.2	34.5	153.2	2.962E-05	2.727E-05	2.727E-05
F	3.0	4.56	4827.	0.	0.	153.2	34.5	153.2	1.996E-05	1.838E-05	1.838E-05
F	4.0	3.20	4827.	0.	0.	153.2	34.5	153.2	1.506E-05	1.386E-05	1.386E-05
F	5.0	1.58	4827.	0.	0.	153.2	34.5	153.2	1.198E-05	1.103E-05	1.103E-05
F	6.0	.63	4827.	0.	0.	153.2	34.5	153.2	1.002E-05	9.225E-06	9.225E-06
F	8.0	.39	4827.	0.	0.	153.2	34.5	153.2	7.508E-06	6.912E-06	6.912E-06
F	10.0	.07	4827.	0.	0.	153.2	34.5	153.2	6.003E-06	5.526E-06	5.526E-06

ENERGY NORTHWEST People·Vision·Solutions	APPENDIX B	Page No. B-274	Cont'd on page B-275
		Calculation No. NE-02-03-16	
Prepared by / Date: Mohammed Abu-Shehadeh	Verified by/Date: Ted Messier	Revision No. 0	

P	13.0	.03	4827.	0.	0.	153.2	34.5	153.2	4.623E-06	4.256E-06	4.256E-06
G	.4	1.05	4827.	0.	0.	105.7	21.5	105.7	3.304E-04	2.751E-04	2.751E-04
G	1.0	3.07	4827.	0.	0.	105.7	21.5	105.7	1.395E-04	1.162E-04	1.162E-04
G	2.0	5.65	4827.	0.	0.	105.7	21.5	105.7	6.898E-05	5.745E-05	5.745E-05
G	3.0	3.12	4827.	0.	0.	105.7	21.5	105.7	4.650E-05	3.872E-05	3.872E-05
G	4.0	1.37	4827.	0.	0.	105.7	21.5	105.7	3.507E-05	2.921E-05	2.921E-05
G	5.0	.34	4827.	0.	0.	105.7	21.5	105.7	2.790E-05	2.323E-05	2.323E-05
G	6.0	.09	4827.	0.	0.	105.7	21.5	105.7	2.333E-05	1.943E-05	1.943E-05
G	8.0	.02	4827.	0.	0.	105.7	21.5	105.7	1.748E-05	1.456E-05	1.456E-05
G	10.0	.01	4827.	0.	0.	105.7	21.5	105.7	1.398E-05	1.164E-05	1.164E-05
G	13.0	.00	4827.	0.	0.	105.7	21.5	105.7	1.077E-05	8.967E-06	8.967E-06
G	18.0	.00	4827.	0.	0.	105.7	21.5	105.7	7.778E-06	6.478E-06	6.478E-06

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0           RUN DATE: 11/19/2003    TIME: 23: 4:56
/PLANT NAME:   CGS                                 METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                        WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE             DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
 DIRECTION-INDEPENDENT (S.R.P 2.3.4) MODEL.
 MINIMUM BOUNDARY DISTANCE = 4827.0 METERS.
 BUILDING WAKE CREDIT ALLOWED:   C=   .5     A=  2861.     D=   70.0
 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   2.751E-04   1.306E-04   1.162E-04   5.874E-05   5.745E-05   5.514E-05   3.872E-05   2.921E-05   2.727E-05   2.706E-05
        2.046       1.805       4.870       5.477      11.125      13.891      17.013      18.379      24.333      24.697
      1.04614     1.80468     4.87042     5.47724    11.12516    13.89064    17.01327    18.37863    24.33312    24.69659
0   2.480E-05   2.323E-05   1.943E-05   1.838E-05   1.456E-05   1.386E-05   1.226E-05   1.164E-05   1.143E-05   1.103E-05
       27.039      27.377      27.468      32.026      32.045      35.240      40.572      40.582      42.070      43.654
     27.03856    27.37674    27.46839    32.02592    32.04488    35.24020    40.57206    40.58154    42.07016    43.65360
0   9.225E-06   8.967E-06   8.267E-06   6.912E-06   6.569E-06   6.478E-06   6.235E-06   5.651E-06   5.526E-06   4.960E-06
       44.283      44.286      49.308      49.693      49.782      49.785      54.106      57.686      57.756      61.192
     44.28255    44.28572    49.30784    49.69343    49.78193    49.78509    54.10557    57.68648    57.75601    61.19154
0   4.256E-06   4.149E-06   3.809E-06   3.109E-06   2.873E-06   2.773E-06   2.486E-06   2.285E-06   2.097E-06   1.914E-06
       61.217      63.808      67.551      70.363      73.676      73.932      75.079      77.626      77.718      78.110
     61.21682    63.80848    67.55058    70.36347    73.67574    73.93174    75.07903    77.62643    77.71809    78.11000
0   1.912E-06   1.432E-06   1.383E-06   1.371E-06   1.145E-06   9.651E-07   9.245E-07   8.853E-07   8.820E-07   6.972E-07
       79.839      81.874      81.928      82.541      83.568      83.916      84.674      84.953      85.401      85.954
     79.83882    81.87423    81.92796    82.54111    83.56829    83.91595    84.67448    84.95261    85.40141    85.95451
0   6.372E-07   5.547E-07   4.639E-07   4.378E-07   4.075E-07   3.476E-07   2.951E-07   2.780E-07   2.226E-07   2.141E-07
       86.034      86.514      86.830      87.459      88.682      89.027      89.697      89.905      90.474      90.544
     86.03353    86.51394    86.82999    87.45895    88.68208    89.02658    89.69662    89.90521    90.47411    90.54365
0   2.015E-07   1.771E-07   1.481E-07   1.358E-07   1.110E-07   1.024E-07   8.873E-08   8.149E-08   6.833E-08   6.816E-08
       93.040      93.464      93.698      95.509      95.815      97.225      97.317      98.334      98.404      98.982
     93.04049    93.46400    93.69788    95.50888    95.81545    97.22506    97.31672    98.33442    98.40395    98.98234
    5.108E-08   4.084E-08   3.145E-08   2.272E-08
       99.687      99.899      99.994     100.000
     99.68714    99.89890    99.99371   100.00000
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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

HANDCHECK GRAPH: SLOPE LT -1.0 FOR LOW PERCENTAGES. XSAVE(2)= 13.890
BACK EXTRAPOLATION FOR 1 PERCENTILE.

	CHI/Q SEC/CUBIC METER	WITH RESPECT TO THE TOTAL TIME	WHEN THE WIND BLOWS INTO THIS SECTOR ONLY
	2.813E-04	1.000	1.000
	1.568E-04	3.000	3.000
	1.150E-04	5.000	5.000
	7.136E-05	10.000	10.000
	5.078E-05	15.000	15.000
	3.656E-05	20.000	20.000
	2.757E-05	25.000	25.000
	2.121E-05	30.000	30.000
	1.652E-05	35.000	35.000
	1.304E-05	40.000	40.000
	1.034E-05	45.000	45.000
	8.153E-06	50.000	50.000
	6.429E-06	55.000	55.000
	5.186E-06	60.000	60.000
	4.243E-06	65.000	65.000
	3.414E-06	70.000	70.000
	2.667E-06	75.000	75.000
	2.038E-06	80.000	80.000
	1.553E-06	85.000	85.000
	1.104E-06	90.000	90.000
0	1.150E-04	5.0	5.00

0K= 17 FIVEXQ(K)= 1.150E-04 FIVEPR(K)= 5.000

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1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT: 10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma-desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0LOW POPULATION ZONE CALCULATIONS:
0FIVE PERCENT OVERALL SITE LIMIT
 BUILDING WAKE CREDIT ALLOWED:    C=   .5     A= 2861.     D=   70.0
 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   1.663E-04  8.912E-05  7.022E-05  4.368E-05  3.763E-05  3.530E-05  3.302E-05  2.921E-05  2.323E-05  2.298E-05
        1.046      1.805      4.870      5.477      8.243     13.891     17.013     18.379     18.717     19.080
      1.04614    1.80468    4.87042    5.47724    8.24273   13.89065   17.01328   18.37864   18.71681   19.08027
0   1.943E-05  1.880E-05  1.844E-05  1.569E-05  1.456E-05  1.331E-05  1.164E-05  1.103E-05  9.704E-06  9.225E-06
       19.172     25.126     27.468     32.026     32.045     35.240     35.250     36.833     38.322     38.951
     19.17193   25.12642   27.46839   32.02591   32.04487   35.24019   35.24967   36.83311   38.32174   38.95069
0   9.185E-06  8.967E-06  7.174E-06  6.912E-06  6.569E-06  6.478E-06  5.885E-06  5.526E-06  4.955E-06  4.816E-06
       44.283     44.286     49.308     49.693     49.782     49.785     54.106     54.175     57.611     61.192
     44.28255   44.28571   49.30784   49.69342   49.78191   49.78508   54.10556   54.17509   57.61062   61.19153
0   4.256E-06  4.149E-06  3.498E-06  3.109E-06  2.773E-06  2.762E-06  2.486E-06  2.271E-06  2.097E-06  1.914E-06
       61.217     63.808     67.551     70.363     70.619     73.932     75.079     77.626     77.718     78.110
     61.21682   63.80848   67.55060   70.36349   70.61951   73.93179   75.07906   77.62647   77.71815   78.11007
0   1.912E-06  1.432E-06  1.383E-06  1.371E-06  1.145E-06  9.651E-07  9.245E-07  8.853E-07  8.820E-07  6.972E-07
       79.839     81.874     81.928     82.541     83.568     83.916     84.675     84.953     85.401     85.955
     79.83890   81.87431   81.92804   82.54119   83.56837   83.91602   84.67455   84.95268   85.40147   85.95458
0   6.372E-07  5.547E-07  4.639E-07  4.378E-07  4.075E-07  3.476E-07  2.951E-07  2.780E-07  2.226E-07  2.141E-07
       86.034     86.514     86.830     87.459     88.682     89.027     89.697     89.905     90.474     90.544
     86.03362   86.51403   86.83009   87.45904   88.68218   89.02668   89.69672   89.90532   90.47424   90.54378
0   2.015E-07  1.771E-07  1.481E-07  1.358E-07  1.110E-07  1.024E-07  8.873E-08  8.149E-08  6.833E-08  6.816E-08
       93.041     93.464     93.698     95.509     95.816     97.225     97.317     98.335     98.404     98.982
     93.04061   93.46414   93.69803   95.50903   95.81561   97.22522   97.31687   98.33457   98.40411   98.98248
0   5.108E-08  4.084E-08  3.145E-08  2.272E-08
       99.687     99.899     99.994    100.000
     99.68729   99.89906   99.99388  100.00020
```

```
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)=  17.015
0  K  I   XQSAVE(K,I)  XQINT(K,I) XQSLOP(K,I)
  18  1      -8.70159 -11.45492  -1.19201
  18  2     -10.31825 -11.77526  -1.52795
  18  3     -11.06219 -11.83590  -1.65794
  18  4     -11.59799 -11.81478  -1.51074
  18  5     -12.24366 -11.80168  -1.55691
  18  6     -12.79953 -11.74034  -1.65260
  18  7     -12.99534 -11.94083  -1.38860
  18  8     -17.27483      NUMXQ(K)=  8
                                                  BACK EXTRAPOLATION FOR  1 PERCENTILE.
      1.697E-04              1.000              1.000
      9.979E-05              3.000              3.000
      7.532E-05              5.000              5.000
      4.883E 05             10.000             10.000
      3.645E-05             15.000             15.000
      2.783E-05             20.000             20.000
      2.155E-05             25.000             25.000
      1.713E-05             30.000             30.000
      1.370E-05             35.000             35.000
      1.101E-05             40.000             40.000
      8.937E-06             45.000             45.000
      7.394E-06             50.000             50.000
      6.218E-06             55.000             55.000
      5.046E-06             60.000             60.000
      4.115E-06             65.000             65.000
      3.314E-06             70.000             70.000
      2.614E-06             75.000             75.000
      2.026E-06             80.000             80.000
      1.546E-06             85.000             85.000
      1.100E-06             90.000             90.000
0     7.532E-05              5.0                5.00
0K= 18     FIVEXQ(K)= 7.532E-05      FIVEPR(K)= 5.000
```

0	K	HIGHPR	PR	GRNDVT(K)
	1	-2.61661	.44404	7.11613
	2	-1.71313	4.33443	5.59889
	3	-2.82209	.23857	3.79337
	4	-3.07684	.10461	1.66485
	5	-3.17775	.07422	1.20432
	6	-3.16909	.07647	1.52234
	7	-3.07900	.10386	4.75939
	8	-2.81393	.24471	10.15150
	9	-2.77724	.27412	12.08469
	10	-2.89051	.19231	8.67808
	11	-2.81861	.24117	5.83414
	12	-2.83395	.22988	4.17912
	13	-2.80459	.25191	4.74070
	14	-2.78353	.26886	8.25809
	15	-2.65606	.39530	10.87648
	16	-2.57624	.49942	9.53793

0	K	HOURS(K)	TOTHRS
	1	38.89814	38.89814
	2	379.69570	418.59380
	3	20.89852	439.49240
	4	9.16350	448.65590
	5	6.50165	455.15750
	6	6.69849	461.85600
	7	9.09771	470.95370
	8	21.43632	492.39000
	9	24.01254	516.40260
	10	16.84674	533.24930
	11	21.12617	554.37550
	12	20.13777	574.51320
	13	22.06758	596.58080
	14	23.55254	620.13340
	15	34.62811	654.76150
	16	43.74879	698.51030

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier

Revision No. 0

0 K	FIVEXQ	SVANN	SLTIME	TIMINT	I	TIME	XQT
1	7.647E-05	6.008E-07	-.5780	-9.0780			
					1	8.0	-10.27984
					2	16.0	-10.68046
					3	72.0	-11.54980
					4	624.0	-12.79794
2	7.304E-05	5.082E-07	-.5925	-9.1138			
					1	8.0	-10.34582
					2	16.0	-10.75649
					3	72.0	-11.64760
					4	624.0	-12.92701
3	5.164E-05	3.158E-07	-.6078	-9.4500			
					1	8.0	-10.71394
					2	16.0	-11.13526
					3	72.0	-12.04950
					4	624.0	-13.36212
4	2.165E-05	1.501E-07	-.5929	-10.3294			
					1	8.0	-11.56231
					2	16.0	-11.97328
					3	72.0	-12.86505
					4	624.0	-14.14541
5	8.352E-06	1.056E-07	-.5212	-11.3318			
					1	8.0	-12.41562
					2	16.0	-12.77690
					3	72.0	-13.56087
					4	624.0	-14.68644
6	9.392E-06	1.071E-07	-.5336	-11.2058			
					1	8.0	-12.31535
					2	16.0	-12.68519
					3	72.0	-13.48774
					4	624.0	-14.63999
7	3.164E-05	2.461E-07	-.5792	-9.9595			
					1	8.0	-11.16386
					2	16.0	-11.56532
					3	72.0	-12.43644
					4	624.0	-13.68716
8	5.635E-05	5.126E-07	-.5605	-9.3955			
					1	8.0	-10.56099
					2	16.0	-10.94950
					3	72.0	-11.79253
					4	624.0	-13.00292
9	6.006E-05	6.050E-07	-.5483	-9.3401			
					1	8.0	-10.48037
					2	16.0	-10.86045
					3	72.0	-11.68520
					4	624.0	-12.86933

Prepared by / Date:
Mohammed Abu-Shehadeh

Verified by/Date:
Ted Messier


```
10 4.765E-05 4.214E-07    -.5639    -9.5607
                                              1    8.0   -10.73326
                                              2   16.0   -11.12411
                                              3   72.0   -11.97223
                                              4  624.0   -13.18991
11 4.977E-05 3.836E-07    -.5803    -9.5059
                                              1    8.0   -10.71255
                                              2   16.0   -11.11476
                                              3   72.0   -11.98753
                                              4  624.0   -13.24062
12 4.561E-05 3.402E-07    -.5842    -9.5903
                                              1    8.0   -10.80515
                                              2   16.0   -11.21008
                                              3   72.0   -12.08875
                                              4  624.0   -13.35031
13 5.081E-05 3.939E-07    -.5796    -9.4857
                                              1    8.0   -10.69089
                                              2   16.0   -11.09260
                                              3   72.0   -11.96430
                                              4  624.0   -13.21585
14 5.636E-05 5.362E-07    -.5552    -9.3989
                                              1    8.0   -10.55334
                                              2   16.0   -10.93814
                                              3   72.0   -11.77314
                                              4  624.0   -12.97199
15 7.205E-05 7.353E-07    -.5468    -9.1591
                                              1    8.0   -10.29611
                                              2   16.0   -10.67512
                                              3   72.0   -11.49755
                                              4  624.0   -12.67835
16 8.167E-05 7.239E-07    -.5636    -9.0222
                                              1    8.0   -10.19414
                                              2   16.0   -10.58479
                                              3   72.0   -11.43247
                                              4  624.0   -12.64953
17 1.150E-04 7.353E-07    -.6026    -8.6529
                                              1    8.0    -9.90591
                                              2   16.0   -10.32357
                                              3   72.0   -11.22985
                                              4  624.0   -12.53105
18 7.532E-05 7.353E-07    -.5521    -9.1111
                                              1    8.0   -10.25915
                                              2   16.0   -10.64182
                                              3   72.0   -11.47219
                                              4  624.0   -12.66440
```

```
10 4.765E-05 4.214E-07    -.5639    -9.5607
                                           1    8.0   -10.73326
                                           2   16.0   -11.12411
                                           3   72.0   -11.97223
                                           4  624.0   -13.18991
11 4.977E-05 3.836E-07    -.5803    -9.5059
                                           1    8.0   -10.71255
                                           2   16.0   -11.11476
                                           3   72.0   -11.98753
                                           4  624.0   -13.24062
12 4.561E-05 3.402E-07    -.5842    -9.5903
                                           1    8.0   -10.80515
                                           2   16.0   -11.21008
                                           3   72.0   -12.08875
                                           4  624.0   -13.35031
13 5.081E-05 3.939E-07    -.5796    -9.4857
                                           1    8.0   -10.69089
                                           2   16.0   -11.09260
                                           3   72.0   -11.96430
                                           4  624.0   -13.21585
14 5.636E-05 5.362E-07    -.5552    -9.3989
                                           1    8.0   -10.55334
                                           2   16.0   -10.93814
                                           3   72.0   -11.77314
                                           4  624.0   -12.97199
15 7.205E-05 7.353E-07    -.5468    -9.1591
                                           1    8.0   -10.29611
                                           2   16.0   -10.67512
                                           3   72.0   -11.49755
                                           4  624.0   -12.67835
16 8.167E-05 7.239E-07    -.5636    -9.0222
                                           1    8.0   -10.19414
                                           2   16.0   -10.58479
                                           3   72.0   -11.43247
                                           4  624.0   -12.64953
17 1.150E-04 7.353E-07    -.6026    -8.6529
                                           1    8.0    -9.90591
                                           2   16.0   -10.32357
                                           3   72.0   -11.22985
                                           4  624.0   -12.53105
18 7.532E-05 7.353E-07    -.5521    -9.1111
                                           1    8.0   -10.25915
                                           2   16.0   -10.64182
                                           3   72.0   -11.47219
                                           4  624.0   -12.66440
```

```
1USNRC COMPUTER CODE-PAVAN, VERSION 2.0          RUN DATE: 11/19/2003     TIME: 23: 4:56
/PLANT NAME:   CGS                               METEOROLOGICAL INSTRUMENTATION
 DATA PERIOD: JFD 1996-1999                      WIND SENSORS HEIGHT:  10.0 METERS
 TYPE OF RELEASE: GROUND LEVEL RELEASE           DELTA-T HEIGHTS:    10 - 75 METERS
 SOURCE OF DATA:  MET DATA TAKEN FROM FRAMATOME JFD FILES FOR 96-99
 COMMENTS:  input file: P96-99-F.inp   output file: P96-99-F.out  sigma=desert + P-G
 PROGRAM: PAVAN, 10/76, 8/79 REVISION, IMPLEMENTATION OF REGULATORY GUIDE 1.145
0                               RELATIVE CONCENTRATION (X/Q) VALUES (SEC/CUBIC METER)
```

DOWNWIND SECTOR	DISTANCE (METERS)	0-2 HOURS	0-8 HOURS	8-24 HOURS	1-4 DAYS	4-30 DAYS	ANNUAL AVERAGE	HOURS PER YEAR MAX 0-2 HR X/Q IS EXCEEDED IN SECTOR	DOWNWIND SECTOR
S	4827.	7.65E-05	3.43E-05	2.30E-05	9.64E-06	2.77E-06	6.01E-07	38.9	S
SSW	4827.	7.30E-05	3.21E-05	2.13E-05	8.74E-06	2.43E-06	5.08E-07	379.7	SSW
SW	4827.	5.16E-05	2.22E-05	1.46E-05	5.85E-06	1.57E-06	3.16E-07	20.9	SW
WSW	4827.	2.17E-05	9.52E-06	6.31E-06	2.59E-06	7.19E-07	1.50E-07	9.2	WSW
W	4827.	8.35E-06	4.05E-06	2.83E-06	1.29E-06	4.19E-07	1.06E-07	6.5	W
WNW	4827.	9.39E-06	4.48E-06	3.10E-06	1.39E-06	4.38E-07	1.07E-07	6.7	WNW
NW	4827.	3.16E-05	1.42E-05	9.49E-06	3.97E-06	1.14E-06	2.46E-07	9.1	NW
NNW	4827.	5.63E-05	2.59E-05	1.76E-05	7.56E-06	2.25E-06	5.13E-07	21.4	NNW
N	4827.	6.01E-05	2.81E-05	1.92E-05	8.42E-06	2.58E-06	6.05E-07	24.0	N
NNE	4827.	4.77E-05	2.18E-05	1.48E 05	6.32E-06	1.87E-06	4.21E-07	16.8	NNE
NE	4827.	4.98E-05	2.23E-05	1.49E-05	6.22E-06	1.78E-06	3.84E-07	21.1	NE
ENE	4827.	4.56E-05	2.03E-05	1.35E-05	5.62E-06	1.59E-06	3.40E-07	20.1	ENE
E	4827.	5.08E-05	2.28E-05	1.52E-05	6.37E-06	1.82E-06	3.94E-07	22.1	E
ESE	4827.	5.64E-05	2.61E-05	1.78E-05	7.71E-06	2.32E-06	5.36E-07	23.6	ESE
SE	4827.	7.21E-05	3.38E-05	2.31E-05	1.02E-05	3.12E-06	7.35E-07	34.6	SE
SSE	4827.	8.17E-05	3.74E-05	2.53E-05	1.08E-05	3.21E-06	7.24E-07	43.7	SSE
MAX X/Q		8.17E-05					TOTAL HOURS AROUND SITE:	698.5	
SRP 2.3.4	4827.	1.15E-04	4.99E-05	3.28E-05	1.33E-05	3.61E-06	7.35E-07		
SITE LIMIT		7.53E-05	3.50E-05	2.39E-05	1.04E-05	3.16E-06	7.35E-07		

```
OTHE FIVE-PERCENT-FOR-THE-ENTIRE-SITE X/Q 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.
```

ENERGY NORTHWEST
People·Vision·Solutions

DMS REFERENCE DOCUMENT INDEX SHEET

EC Number

Primary Document Identification	Document Type	Document Sub-Type	Document Number	Sheet Number	Document Revision	

	Input References						Output References					
	ADD	DELETE	Type	Subtype	Doc Number	Sheet No	ADD	DELETE	Type	Subtype	Doc Number	Sheet No
1	☐	☐					☐	☐				
2	☐	☐					☐	☐				
3	☐	☐					☐	☐				
4	☐	☐					☐	☐				
5	☐	☐					☐	☐				
6	☐	☐					☐	☐				
7	☐	☐					☐	☐				
8	☐	☐					☐	☐				
9	☐	☐					☐	☐				
10	☐	☐					☐	☐				
11	☐	☐					☐	☐				
12	☐	☐					☐	☐				
13	☐	☐					☐	☐				
14	☐	☐					☐	☐				
15	☐	☐					☐	☐				
16	☐	☐					☐	☐				
17	☐	☐					☐	☐				
18	☐	☐					☐	☐				
19	☐	☐					☐	☐				
20	☐	☐					☐	☐				

Note:

Note:

ENERGY NORTHWEST People·Vision·Solutions	CALCULATION COVER SHEET	BDC/PDC Page

Equipment Piece No.	Project Columbia	Page 1.0 — Cont'd on Page 1.1
Containment	Discipline Nuclear	Calculation No. NE-02-03-15
		Quality Class 1
	Remarks Non-Proprietary Version	

TITLE/SUBJECT/PURPOSE

Title/Subject
POST-LOCA SUPPRESSION POOL pH

Purpose
The purpose of this calculation is to determine the pH of the Columbia Generating Station containment water pool as a function of time following a DBA-LOCA during the initial phase of the accident prior to the addition of sodium pentaborate via the SLC system (Part A), and out to 30 days after the addition of sodium pentaborate (Part B).

CALCULATION REVISION RECORD

REV NO.	STATUS/ F,P, OR S	REVISION DESCRIPTION	INITIATING DOCUMENTS	TRANSMITTAL NO.
0	F	ORIGINAL ISSUANCE	PDC 2406 2406	

PERFORMANCE/VERIFICATION RECORD

REV NO.	PERFORMED BY/DATE	VERIFIED BY/DATE	APPROVED BY/DATE
0	J. Metcalf [signature] 7/21/04	R. Hobbins [signature] 7/23/04	R. Hobbins [signature] 7/23/04

* Study Calculations shall be used only for the purpose of evaluating alternate design options or assisting the engineer in performing assessments.

ENERGY NORTHWEST People·Vision·Solutions	CALCULATION INDEX	Page No. 1.1	Cont'd on page 1.2
		Calculation No. NE-02-03-15	
		Revision No. 0	

APPENDICES:

ENERGY NORTHWEST People·Vision·Solutions	VERIFICATION CHECKLIST	Page No. 1.2	Cont'd on page 1.3
		Calculation No. NE-02-03-15	
		Revision No. 0	

Calculation/CMR NE-02-03-15 Revision 0
was verified using the following methods:

☒ Checklist Below ☐ Alternate Calculation(s)

Checklist Item	**Verifier Initials**
Clear statement of purpose of analysis	RRH
Methodology is clearly stated, sufficiently detailed, and appropriate for the proposed application	RRH
Does the analysis/calculation methodology (including criteria and assumptions) differ from that described in the Plant or ISFSI FSAR or NRC Safety Evaluation Report, or are the results of the analysis/calculation as described in the Plant or ISFSI FSAR or NRC Safety Evaluation Report affected? ☒ Yes ☐ No PTL # 205293	LSW
If Yes, ensure that the requirements of 10 CFR 50.59 and/or 10 CFR 72.48 have been processed in accordance with SWP-LIC-02	LSW
Does the analysis/calculation result require revising any existing output interface document as identified in DES-4-1, Attachment 7.3? ☒ Yes ☐ No	LSW
If Yes, ensure that the appropriate actions are taken to revise the output interface documents per DES-4-1, section 3.1.8 (i.e., document change is initiated in accordance with applicable procedures)	LSW
Logical consistency of analysis	LSW
• Completeness of documenting references	RRH
• Completeness of input	RRH
• Accuracy of input data	RRH
• Consistency of input data with approved criteria	RRH
• Completeness in stating assumptions	RRH
• Validity of assumptions	RRH
• Calculation sufficiently detailed	RRH
• Arithmetical accuracy	RRH
• Physical units specified and correctly used	RRH
• Reasonableness of output conclusion	RRH
Supervisor independency check (if acting as Verifier)	NA
- Did not specify analysis approach - Did not rule out specific analysis options - Did not establish analysis inputs	NA
If a computer program was used:	LSW
- Is the program appropriate for the proposed application? YES - Have the program error notices been reviewed to determine if they pose any limitations for this application? NA - Is the program name, revision number, and date of run inscribed on the output? YES - Is the program identified on the Calculation Method Form? YES If so, is it listed in Chapter 10 of the Engineering Standards Manual? NA	RRH
Other elements considered:	

If separate Verifiers were used for validating these functions or a portion of these functions, each sign and initial below.

Based on the foregoing, the Calculation/CMR is adequate for the purpose intended.

Verifier Signature(s)/Date	Verifier Initials
RRHobbins 7/23/04	RRH
LSWOOSLEY [signature] 8/2/04	LSW

ENERGY NORTHWEST People·Vision·Solutions	CALCULATION REFERENCE LIST	Page No. 1.3	Cont'd on page 1.31
		Calculation No. NE-02-03-15	
Prepared by / Date: JSH 7/21/04	RR Hobbins Verified by/Date: 7/23/04	Revision No. 0	

NO	AUTHOR	ISSUE DATE/ EDITION OR REV.	TITLE	DOCUMENT NO.
1	Polestar Applied Technology, Inc.	February 16, 2000	STARpH Code Description and Validation and Verification Report	PSAT C107.02, Revision 4
2	Polestar Applied Technology, Inc.	Revision 0	Dose Calculation Data Base	NE-02-04-01
3	E. C. Beahm, et al.	December, 1992	Iodine Evolution and pH Control	NUREG/CR-5950
4	Arakawa, et al	1986	Radiat. Phys. Chem., Vol. 27, pp. 157-163	
5	Polestar Applied Technology, Inc.	April, 1996	Calculation of Fraction of Containment Aerosol Deposited in Water (Perry)	PSAT 04202H.12
6	US Nuclear Regulatory Commission	July 2000	Alternative Radiological Source Terms For Evaluating Design Basis Accidents At Nuclear Power Reactors	RG 1.183
7	R. R. Hobbins	October 23, 1997	Chemical Forms of Iodine and Cesium in the Reactor Coolant System	Polestar Applied Technology, Inc., Proprietary Memorandum
8	R. R. Hobbins	April, 2001	Effect of Boric Acid on Cesium Chemistry and pH	Polestar Applied Technology, Inc., Proprietary Memorandum
9	R. R. Hobbins	October 31, 1998	Behavior of Sodium Pentaborate Introduced into a Hot Core	Polestar Applied Technology, Inc., Proprietary Memorandum
10	D. R. Lide, CRC Press	77th Edition, 1996	Handbook of Chemistry and Physics	
11	K. Denbigh, Cambridge University Press	1957	The Principles of Chemical Equilibrium	
12	E. C. Beahm, et al.	April 1992	Iodine Chemical Forms in LWR Severe Accidents	NUREG/CR-5732, ORNL
13	Energy Northwest	November 1998	Columbia Generating Station Final Safety Analysis Report, Figure 6.2-9, Suppression Pool Temperature Response, Long-Term Response – Original Rated Power	Amendment 53

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NO	AUTHOR	ISSUE DATE/ EDITION OR REV.	TITLE	DOCUMENT NO.
14	Hill and Petrucci, Prentice-Hall, Inc.	2002	General Chemistry, Third Edition	
15	R. Sher	October 15, 2001	Energy Split 7.xls 1	Polestar Applied Technology, Inc.
16	R. Sher	October 12, 2001	EnergyDeposition.xls	Polestar Applied Technology, Inc.
17	J. Wing	September, 1984	Post-Accident Gas Generation from Radiolysis of Organic Materials	NUREG-1081
18	R. R. Hobbins	September 11, 2000	Effect of Temperature on the Dissociation Constant of a Weak Acid	Polestar Applied Technology, Inc., Proprietary Memorandum
19	C. F. Bonilla, McGraw-Hill	1957	Nuclear Engineering	
20	Robert M. Bernero	May 16, 1984	Enclosure 4 to "Memorandum for February 7-8 NRC/IDCOR Attendees, Summary of NRC/IDCOR Meeting on Fission Product Release and Transport"	
21	J. R. Lamarsh, Addison-Wesley	1983	Introduction to Nuclear Engineering, Second Edition	

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The below listed output interface calculations and/or documents are impacted by the current revision of the subject calculation. The listed output interfaces require revision as a result of this calculation. The documents have been revised, or the revision deferred with Manager approval, as indicated below.

AFFECTED DOCUMENT NO.	CHANGED BY (e.g., BDC, SCN, CMR, Rev.)	CHANGED DEFERRED (e.g., RFTS, LETTER NO.)	DEPT. MANAGER *
FSAR 15.6.5	PDC 2406		

* Required for deferred changes only.

Discussion of Results

Part A

In the short-term following a DBA-LOCA, the pH of water inside the Columbia Generating Station containment (suppression pool, vessel, and other bodies assumed well-mixed) will be increased from an initial value of 5.3 to a value above 7 due to the addition of fission product cesium. Depending on the form of the fission product cesium (e.g., CsOH or $CsBO_2$), the pH will eventually drop below 7 as HNO_3 (from radiolysis of water) and HCl (from radiolysis of cable) are added to the water. The pH is expected to remain above 7 for sufficient time to permit injection and mixing of the Standby Liquid Control (SLC) sodium pentaborate (see Justification for Assumption 4).

Part B

In the long-term (30 days), the pH of the containment water decreases from a peak of ~8.4 as shown in the following table (assuming all sodium pentaborate in the SLC system is injected but no credit for fission product cesium):

pH results vs. time

Time	pH
18h	8.3
45h	8.2
76h	8.1
112h	8.0
160h	7.9
210h	7.8
275h	7.7
360h	7.6
480h	7.5
600h	7.4
720h	7.3

If as little as 95% of the sodium pentaborate is injected and/or mixes with the containment water, the containment water pH will remain greater than 7 for 30 days.

Conclusions

Part A

The pH of the containment water pool in the Columbia Generating Station will remain above 7 for approximately 8 hours after the release of radioactivity into the containment following a DBA-LOCA without sodium pentaborate credit assuming cesium is released in the form of CsOH. Therefore, there will be sufficient time to inject the sodium pentaborate from the SLC system and to have the sodium pentaborate mix with the containment water.

Part B

The pH of the containment water pool in the Columbia Generating Station decreases from 8.4 to 7.3 over 30 days following the release of fission products into the containment for a DBA-LOCA given the addition of all SLCS sodium pentaborate. Only 95% of the total boron available is necessary to maintain pH ≥ 7 for 30 days.

REV BAR.

Analysis Method (Check appropriate boxes)

☐ Manual (As required, document source of equations in Reference List)

☒ Computer ☐ Main Frame ☒ Personal

☐ In-House Program
☐ Computer Service Bureau Program

☐ BCS ☐ CDC ☐ PCC ☐ OTHER ________

☒ Verified Program: Code name/Revision STARpH, Version 1.04

☐ Unverified Program: ________

Approach/Methodology

Methodology

There are two parts to this analysis. The first part (Part A) deals with the determination of the short-term pH (prior to injection and mixing of the sodium pentaborate injected by the SLC system). In this part, fission product cesium is credited to be in the form of hydroxide in terms of its effect on maintaining suppression pool pH above 7. The second part (Part B) deals with the determination of the long-term pH (up to 30 days post-accident), crediting the injected sodium pentaborate but not crediting fission produce cesium (except for the minor effect of neutralizing the initial pool pH and fission product HI).

In completing both Parts A and B of the analysis, Steps 1 through 3 are employed. Step 4 is used only for Part B.

1. Calculate the [HNO_3] concentration in the water pool as function of time after reactor scram using the Radiolysis of Water model of the STARpH 1.04 code (Reference 1).
2. Calculate the [HCl] concentration in the water pool as a function of time using the Radiolysis of Cable model of the STARpH 1.04 code (Reference 1).
3. Manually calculate the [H^+] concentration added to the pool as a function of time from the results of the two previous calculations.
4. Calculate the pH of the water pool considering the concentration of sodium pentaborate in the pool and [H^+] additions as a function of time using the Add Acid model of the STARpH 1.04 code (Reference 1).

In both Parts A and B, the following chemical reactions in containment water are considered (in the presence of radiation):

- [H^+] + [NO_3^-] is produced by the radiolysis of water containing dissolved nitrogen, but the exact mechanism is not known (per Section 2.2.4 of Reference 3).
- 2[H_2O] + 2[Cl_2] → 2[H+] + 2[Cl-] + 2[HOCl] → 4[H+] + 4[Cl-] + [O_2] (from chlorine gas being released from radiolysis of fire retardant cable insulation in the containment atmosphere and then dissolving in the water)

In Part A, the following additional chemical reactions are considered:

- [HXX] → [H+] + [XX-] (from initial pool pH, where HXX is any acid that may be present)
- [HI] → [H+] + [I-] (from fission product iodine being released in the form of HI)
- [CsOH] → [Cs+] + [OH-] (from fission product cesium being released in the form of CsOH)

In Part B, the following additional chemical reaction is considered:

- [Na_2O-$5B_2O_3$-$10H_2O$] → 2[$NaBO_2$] + 8[HBO_2] + 6[H_2O] ↔ 2[Na+] + 8[H+] + 10[BO_2-] + 6[H_2O] (from injected sodium pentaborate which mixes with recirculated water from the containment)

NOTE THAT THE EQUATIONS REPRESENTING THE METHODOLOGY DESCRIBED IN THIS SECTION ARE PRESENTED AS THEY ARE USED IN THE CALCULATION SECTION.

REV BAR.

Design Inputs

Items 1-4, and 6-14 are from Reference 2 (Item numbers are stated). Other items are as noted.

1. Reactor power = 3556 MWt (Item 1.1)
2. Volume of water in wetwell = 137,262 ft^3 (Item 3.3)
3. RCS inventory = 6.59E5 lbm (Item 8.22)
4. Pool initial pH = 5.3 (Item 6.1)
5. Fission product inventory, see Assumption 1
6. Mass of jacket = 1.673E6 g of Hypalon, 0.798E6 g of Neoprene (Item 6.2)
7. Density of jacket = 1.55 g/cm^3 for Hypalon, 1.42 g/cm^3 for Neoprene (Reference 30 of Reference 2 and Reference 17)
8. Thickness of jacket = 0.107 cm for Hypalon, 0.106 cm for Neoprene (Item 6.3)
9. Cable OD = 2.980 cm for Hypalon, 0.589 cm for Neoprene (Item 6.3)
10. Drywell free volume = 200,540 ft^3 (Item 3.1)
11. Wetwell free volume = 144,184 ft^3 (Item 3.2)
12. Mass of sodium pentaborate available for injection = 4,062.8 lbm (Item 6.4)
13. Chemical formula for sodium pentaborate = $Na_2O \cdot 5B_2O_3 \cdot 10H_2O$ (Item 6.5)
14. Boron enrichment in sodium pentaborate is natural (Item 6.5)
15. G-factor for Hypalon = 2.1 molecules/100 eV (Reference 3)
16. G-factor for Neoprene = 3.5 molecules/100 eV (Reference 4)

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Assumption 3: The SLCS is actuated and the sodium pentaborate is injected and mixed with the pool within ~8 hours of accident initiation.

Justification: A core damage event large enough to release the substantial quantities of fission products in the time frame considered for the alternative source term in Reference 6 will be very evident to the operators (e.g., radiation level in the drywell, pressure and temperature in the drywell, hydrogen level in the drywell) within minutes of the initiating event. Thus it is reasonable to assume for purposes of this calculation that the Columbia EOPs and SAMGs provide for SLCS actuation within a few hours of accident initiation.

If SLCS injection is into the pool (i.e., into the reactor vessel with the vessel communicating with the pool as in a recirculation line break), significant mixing will occur quickly, on the order of a few hours based on an RHR/drywell spray flow rate of ~7450 gpm and a pool volume of ~1E6 gallons per Reference 2 (about 0.5 pool volume/hour).

REV BAR.

If the reactor vessel is not immediately communicating with the pool, some additional hours might be required before the operators flood the vessel up to the break to assure communication with the pool or inject sodium pentaborate to the pool via alternate paths.

Assumption 4: The unbuffered pH of the pool should remain above 7 for a period of time sufficient to accommodate injection and mixing even if some fission product cesium appears in forms other than CsOH (the form assumed by default in STARpH).

Justification:

Proprietary Information Deleted

Assumption 6: Injected sodium pentaborate will remain effective in controlling pool pH even if it is sprayed onto hot surfaces.

Justification:

Proprietary Information Deleted

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Assumption 7: The G value for HNO_3 production by the radiolysis of water containing dissolved nitrogen used in the STARpH 1.04 code is 0.007 molecules per 100 eV absorbed (Reference 3, Equation 1).

Justification:

Proprietary Information Deleted

Assumption 8: Beta radiation from activity deposited directly on cables may be ignored.

Justification:

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Assumption 9: HNO_3 generation in the core may be ignored.

Justification:

Proprietary Information Deleted

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Assumption 10: Sequestering of the injected sodium pentaborate within the reactor vessel does not have to be assumed in the pH analysis.

Justification: The SLC injects boron solution via the HPCS line to the top of the core region. The AST DBA-LOCA analysis assumes an ECCS system recovery after sufficient core damage has occurred. For a DBA-LOCA of the recirculation piping, water level is recovered at least to the top of the jet pumps providing water to 2/3 core height and circulation via the bypass region to the break area. For a break high in the vessel, such as the MSLB inside containment, the operators are instructed to flood the vessel, permitting ECCS flow to communicate through the break, to the downcomers, and to the suppression pool. Mixing in the suppression pool is promoted by the ECCS system suction points being approximately 17 feet below the downcomer outlets. Therefore, the warmer water from the vessel tends to rise while the suction is from the cooler, heavier water in the bottom establishing circulation and mixing in the suppression pool.

Assumption 11: The SLC system is adequately qualified and suitably redundant as a system to be credited in DBA-LOCA dose analysis.

Justification: Equipment Qualification

Based on the ability of the fission product cesium to maintain suppression pool pH above 7 for a period of ~8 hours, it is judged that the SLC system will have completed its DBA-LOCA safety function within that time.

The active components of the SLC system are being qualified to DBA-LOCA with seismic qualification [Reference Columbia MEL]. The system is being qualified to operate 24 hours in a LOCA environment.

Suitable Redundancy

At the time of this calculation, the NRC guidance on the requirements for SLC to be credited in a DBA-LOCA is a draft document to Vermont Yankee. ENW has evaluated these requirements and found SLC meets the draft requirements. A submittal position on the use of SLC will be provided. Since the requirements and submittal position are draft, no reference is provided. Any change to the acceptability of the SLC system upon NRC review may impact this analysis.

REV BAR.

Calculation

Computations Common to Parts A and B

Calculation of [HNO_3] in water pool as a function of time

The Radiolysis of Water model in the STARpH 1.04 code (Reference 1) calculates the nitric acid concentration, [HNO_3], in the containment water pool generated by radiolysis.

Inputs to the Radiolysis of Water model are: reactor power = 3556 MWt, initial pH = 5.3, fraction of aerosol in water = 0.90 (Assumption 2), water pool volume = 4.18E6 L (calculated below), and core inventory of fission products (in Table 1 below)

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Table 1. Fission product inventory

Group Title	Elements in Group	Core Inventory (Kg)
I	I, Br	32.7
Cs	Cs, Rb	359
Te	Te, Sb, Se	68.9
Sr	Sr	94.3
Ba	Ba	158
Ru	Ru, Rh, Mo, Tc, Pd	981
Ce	Ce	1,342
La	La, Zr, Nd, Eu, Nb, Pm, Pr, Sm, Y	1,243

Total containment water volume = water volume of wetwell + RCS volume

Water volume of wetwell = 137,262 ft^3 • 2.83E1 L/ft^3 = 3.88E6 L

RCS volume = 6.59E5 lbm / 61.7 lbm/ft^3 • 2.83E1 L/ft^3 = 3.0E5 L

where 61.7 lbm/ft^3 = density of water in the suppression pool at 120 F (a representative value from Reference 13).

Total containment water volume = 3.88E6 L + 3.0E5 L = 4.18E6 L

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The output of the calculation with the Radiolysis of Water model in the form of [HNO_3] as a function of time is provided as Appendix A, Exhibit 1. The time-dependent gamma and beta power added to the pool is shown on Figure F-1 of Appendix F expressed as % of full core power. The integrated 30-day absorbed energy in the containment water (contributing to [HNO_3]) is 261 full-power seconds.

Calculation of [HCl] in water pool as a function of time

The concentration of HCl in the water pool as a result of radiolysis of electrical cable insulation is calculated using the Radiolysis of Cable model of the STARpH 1.04 code (Reference 1). The inputs to the Radiolysis of Cable model are: reactor power = 3556 MWt, water pool volume = 4.18E6 L (calculated above), aerosol fraction in pool = 0.90 (Assumption 2), equivalent mass of Hypalon jacketing = 6,615 lbm (calculated below), containment free volume = 9.76E9 cm^3 (calculated below), **Proprietary Information Deleted**

REV BAR.

Containment free volume = free volume of wetwell + free volume of drywell

$= 144{,}184 \text{ ft}^3 + 200{,}540 \text{ ft}^3$

$= 344{,}724 \text{ ft}^3 \cdot (12 \text{ in/ft})^3 \cdot (2.54 \text{ cm/in})^3$

$= 9.76E9 \text{ cm}^3$

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Proprietary Information Deleted

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The output of the calculation with the Radiolysis of Cable model in the form of [HCl] as a function of time is provided as Appendix B, Exhibit 2. The time-dependent power absorbed in the cable insulation jacket material (in Rads/hr) is presented in Appendix F, Table F-1. The integrated value over 30 days is 6.1E8 Rads.

<u>Calculation of $[H^+]$ added to the pool</u>

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REV BAR.

Table 2. Calculation of [H^+] added to pool (all values in mol/L)

	1	2	3	4	5
Time	[HNO_3]	Net [OH^-]	[HCl]	[H^+] Added	Net [H^+] Added
1h	5.79E-06	1.17E-04	1.99E-05	2.57E-05	-9.71E-05
2h	7.95E-06	1.15E-04	3.75E-05	4.54E-05	-7.75E-05
5h	1.24E-05	1.11E-04	8.05E-05	9.29E-05	-3.05E-05
12h	1.97E-05	1.03E-04	0.000153	1.73E-04	5.00E-05
1d	2.94E-05	9.37E-05	0.000243	2.72E-04	1.49E-04
3d	5.67E-05	6.63E-05	0.000489	5.46E-04	4.23E-04
10d	1.07E-04	1.56E-05	0.000818	9.25E-04	8.02E-04
20d	1.40E-04	-1.70E-05	0.000933	1.07E-03	9.50E-04
30d	1.61E-04	-3.80E-05	0.000967	1.13E-03	1.00E-03

Part A – Short-Term pH Calculation

In the short-term, one is interested only in suppression pool pH without injection of sodium pentaborate. Observing Table 2 Column 5 "Net [H^+] Added" (the result of subtracting Column 2 from Column 3), one can see that the [H^+] ions exceed the [OH^-] ions (from fission product cesium) sometime between 5 hours and 12 hours (see Assumption 4 for a further discussion of the impact of fission product cesium on short-term pH).

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Based on Assumption 3, effective boron buffering is assumed to begin by ~8 hours. Thus, for times up to ~8 hours, the pH may be determined from the Net [H^+] Added column in Table 2 (Column 5), keeping in mind that negative values correspond to positive values of [OH^-] ions.

Part B – Long-Term pH Calculation

Calculation of pH of the water pool

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The concentration of B is calculated as follows:

- The mass of sodium pentaborate in the SLCS is 4,062.8 lbm, or

  454 g/lbm • 4,062.8 lbm = 1.84E6 g.

- The molecular weight of sodium pentaborate ($Na_2O \cdot 5B_2O_3 \cdot 10H_2O$) with boron of natural enrichment is:

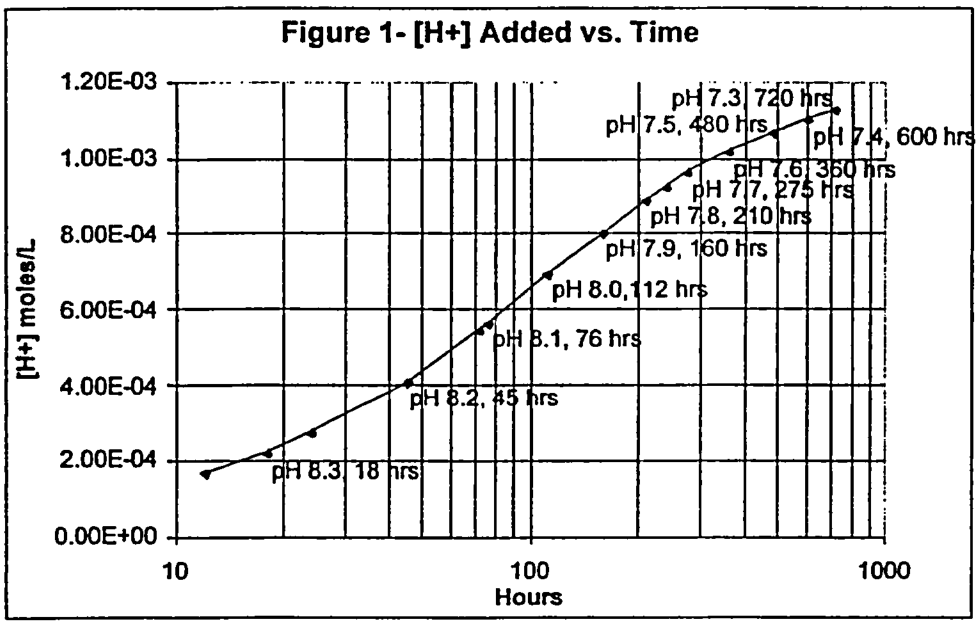
  2 x 22.990 + 10 x 10.811 + 20 x 1.008 + 26 x 15.999 = 590 g/mol

- The moles of sodium pentaborate present are 1.84E6 g/590 g/mol = 3.12E3 mol.

- There are 10 moles of B per mole of sodium pentaborate, so there are 3.12E3 x 10 = 3.12E4 mol of B.

Therefore, the concentration of B is 3.12E4 mol/4.18E6 L = 7.46E-3 mol/L

In Part B, the **(Proprietary Information Deleted)**
pH is obtained by **(Proprietary Information Deleted)** Appendix C, Exhibit 3. Figure 1 presents the results.



<u>Calculation of fraction of total boron necessary to maintain pH ≥ 7</u>

The Add Acid model was run in an iterative fashion to determine the fraction of total boron necessary to maintain pH ≥ 7 over 30 days. Appendix D, Exhibit 4 is the STARpH result. It was found that 95% of the total boron available (i.e, a boron concentration = C1 on Appendix D, Exhibit 4 of 7.08E-3 mol/L) is necessary to maintain pH ≥ 7 with the 30 day $[H^+]$ Added from Table 2 (1.13E-3 mol/L).

Results and Conclusions

The pH of the containment water pool in the Columbia Generating Station decreases from 8.4 to 7.3 over 30 days following the release of fission products into the containment in a DBA-LOCA with core damage. However, 95% of the total boron available is necessary to maintain pH ≥ 7 for 30 days.

Exhibit 1: Radiolysis of Water Input and Output

Input:

	A	B	C	D	E	F	G	H	I	J	K
1	Th Power MW	Pool Vol L	Initial pH	FP	Std FP Inv kg	Adj FP Inv kg	FP Rel Fract	FP In Cont kg	Fract In Pool	FP In Pool kg	BurnupMWd/t
2	3556	4.18E+06	5.3	I	16.6	32.7	0.3	9.81	0.9	8.829	33000
3	BWR			Cs	230.3	359	0.25	89.75		80.775	
4				Te	34.9	68.9	0.05	3.445		3.1005	
5	Version 1.04			Sr	62.7	94.3	0.02	1.886		1.6974	
6				Ba	105	158	0.02	3.16		2.844	
7				Ru	584	981	0.0025	2.4525		2.20725	
8				Ce	992	1342	0.0005	0.671		0.6039	
9				La	836.6	1243	0 0002	0.2486		0.22374	

Output:

		M	N				
1		HI M/L	[H+] Initial				
2		8.2165E-07	5.01187E-06				
	AZ	BA	BB	BC	BD	BE	BF
1	[OH-] at 1h	[H+] at 1h	Corr. [H+]	ABS [H+]	pH at 1h	Test pH = 7	HNO3 M/L 1h
2	0.000117264	8.5277E-11	8.52774E-11	8.52774E-11	10.0691659	10.0691659	5.79432E-06
3	2h	2h			2h		2h
4	0.000115107	8 6876E-11	8 68757E-11	8.68757E-11	10 06110149	10 06110149	7.95171E-06
5	5h	5h			5h		5h
6	0.000110661	9 0366E-11	9.03662E-11	9 03662E-11	10.0439939	10.0439939	1.23978E-05
7	12h	12h			12h		12h
8	0 000103364	9 6745E-11	9 67452E-11	9.67452E-11	10 01437036	10.01437036	1.96944E-05
9	1d	1d			1d		1d
10	9.368E-05	1.0675E-10	1.06746E-10	1.06746E-10	9 971646862	9.971646862	2.93786E-05
11	3d	3d			3d		3d
12	6.63488E-05	1.5072E-10	1.50719E-10	1.50719E-10	9.821833109	9.821833109	5.67098E-05
13	10d	10d			10d		10d
14	1.5635E-05	6.3959E-10	6.3959E-10	6.3959E-10	9.194098417	9.194098417	0.000107424
15	20d	20d			20d		20d
16	-1.68531E-05	-5.9336E-10	-1.68531E-05	1.68531E-05	4.773319894	4.773319894	0 000139912
17	30d	30d			30d		30d
18	-3.7987E-05	-2.6325E-10	-3.7987E-05	3.7987E-05	4.420365377	4.420365377	0.000161046

Cont'd on page B-1

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Appendix B

Exhibit 2: Radiolysis of Cable Input and Output

Input:

	A	B	C	D	E	F	G	H	I
1	Th Power, MW	Cont Vol, cm3	Pool Vol, L	Insulation, lb	Th Power, W	Fract In Pool	1-Gamma Leakage	R-Gamma	R-Beta
2	3556	9.76E+09	4.18E+06	6615	3556000000	0.9	1.0	1.49E-15	2.75E-15

3
4 **Hypalon**
5
6 **Version 1.04**

Output:

	AK	AL	AM	AN
1	HCl P Hyp M 1h	HCl P Hyp M/L 1h	HCl B Hyp M 1h	HCl B Hyp M/L 1h
2	99.7220932	2.3857E-05	83.36787	1.9944E-05
3	2h	2h	2h	2h
4	187.953562	4.4965E-05	156.565317	3.7456E-05
5	5h	5h	5h	5h
6	406.949443	9.7356E-05	336.547189	8.0514E-05
7	12h	12h	12h	12h
8	774.573999	0.0001853	637.474402	0.00015251
9	1d	1d	1d	1d
10	1242.66894	0.00029729	1016.50319	0.00024318
11	3d	3d	3d	3d
12	2508.07922	0.00060002	2044.08457	0.00048902
13	10d	10d	10d	10d
14	4133.38366	0.00098885	3418.30829	0.00081778
15	20d	20d	20d	20d
16	4609.24853	0.00110269	3899.42425	0.00093288
17	30d	30d	30d	30d
18	4775.58668	0.00114248	4040.14634	0.00096654

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Exhibit 3: Add Acid Input and Output - Base Case

Input: A–D; Output: O–Q

	A	B	C	D	O	P	Q
	Add Ac 1.04 pH	[H+]	C1	K1	db	SUMdb	Acid Added
56	8.6	2.51E-09	0.00746	9E-10	0.00033376	0.0056565	-0.00055484
57	8.5	3.16E-09	0.00746	9E-10	0.00029642	0.00595292	-0.00025842
58	8.4	3.98E-09	0.00746	9E-10	0.00025842	0.00621134	0
59	8.3	5.01E-09	0.00746	9E-10	0.00022179	0.00643313	0.00022179
60	8.2	6.31E-09	0.00746	9E-10	0.00018769	0.00662081	0.00040947
61	8.1	7.94E-09	0.00746	9E-10	0.00015711	0.00677792	0.00056658
62	8	1.00E-08	0.00746	9E-10	0.00013014	0.00690806	0.00069672
63	7.9	1.26E-08	0.00746	9E-10	0.0001069	0.00701496	0.00080362
64	7.8	1.58E-08	0.00746	9E-10	8.7599E-05	0.00710256	0.00089122
65	7.7	2.00E-08	0.00746	9E-10	7.0797E-05	0.00717336	0.00096202
66	7.6	2.51E-08	0.00746	9E-10	5.7412E-05	0.00723077	0.00101943
67	7.5	3.16E-08	0.00746	9E-10	4.6259E-05	0.00727703	0.00106569
68	7.4	3.98E-08	0.00746	9E-10	3.7151E-05	0.00731418	0.00110284
69	7.3	5.01E-08	0.00746	9E-10	2.9783E-05	0.00734396	0.00113262
70	7.2	6.31E-08	0.00746	9E-10	2.382E-05	0.00736778	0.00115644
71	7.1	7.94E-08	0.00746	9E-10	1.904E-05	0.00738682	0.00117548
72	7	1.00E-07	0.00746	9E-10	1.5188E-05	0.00740201	0.00119067

Exhibit 4: Add Acid Input and Output - Reduced Boron Case

Input: / Output:

	A	B	C	D	O	P	Q
	Add Ac 1.04 pH	[H+]	C1	K1	db	SUMdb	Acid Added
56	8.6	2.51E-09	0.00708	9E-10	0.00031676	0.00536837	-0.00052657
57	8.5	3.16E-09	0.00708	9E-10	0.00028132	0.00564969	-0.00024525
58	8.4	3.98E-09	0.00708	9E-10	0.00024525	0.00589494	0
59	8.3	5.01E-09	0.00708	9E-10	0.00021049	0.00610543	0.00021049
60	8.2	6.31E-09	0.00708	9E-10	0.00017813	0.00628356	0.00038862
61	8.1	7.94E-09	0.00708	9E-10	0.0001491	0.00643266	0.00053772
62	8	1.00E-08	0.00708	9E-10	0.00012351	0.00655618	0.00066123
63	7.9	1.26E-08	0.00708	9E-10	0.00010145	0.00665763	0.00076269
64	7.8	1.58E-08	0.00708	9E-10	8.3137E-05	0.00674077	0.00084583
65	7.7	2.00E-08	0.00708	9E-10	6.719E-05	0.00680796	0.00091302
66	7.6	2.51E-08	0.00708	9E-10	5.4487E-05	0.00686245	0.0009675
67	7.5	3.16E-08	0.00708	9E-10	4.3903E-05	0.00690635	0.00101141
68	7.4	3.98E-08	0.00708	9E-10	3.5259E-05	0.00694161	0.00104666
69	7.3	5.01E-08	0.00708	9E-10	2.8266E-05	0.00696987	0.00107493
70	7.2	6.31E-08	0.00708	9E-10	2.2607E-05	0.00699248	0.00109754
71	7.1	7.94E-08	0.00708	9E-10	1.807E-05	0.00701055	0.00111561
72	7	1.00E-07	0.00708	9E-10	1.4414E-05	0.00702496	0.00113002

ENERGY NORTHWEST People·Vision·Solutions	Appendix E	Page No. E-1	Cont'd on page E-2
		Calculation No. NE-02-03-15	
Prepared by / Date: JSM 7/21/04	RR Hobbs Verified by/Date: 7/23/04	Revision No. 0	

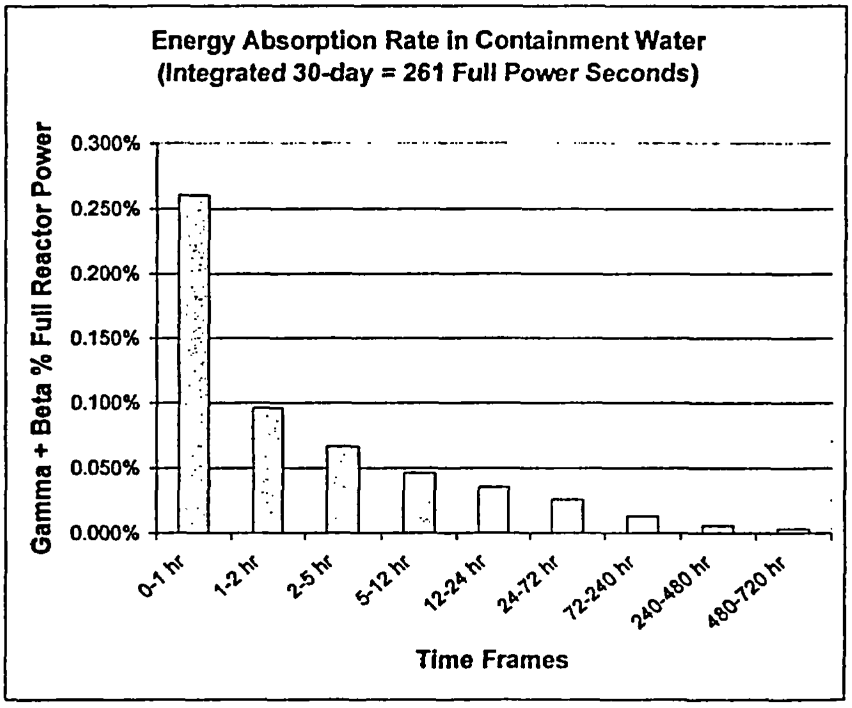
Proprietary Information Deleted

Proprietary Information Deleted

Gamma + Beta Power Added to Containment Water and Insulation Jacket Material

The combined gamma and beta power added to the containment water by activity deposited in the water is shown as a function of time in Figure F-1 **(Proprietary Information Deleted)**

Figure F-1



The radiation dose rate (rads/hour) for exposure of cable insulation jacket material to radiation in the gas space of the containment is shown in the following table individually for gamma and beta radiation. The corresponding integrated radiation exposure (gamma and beta radiation combined) over 30 days is 6.1E8 rads.

Table F-1
Energy Absorption Rate in Cable Insulation Jacket Material

Time Interval	Gamma Rads/hr	Beta Rads/hr
0-1 hr	6.54E+06	6.10E+06
1-2 hr	5.73E+06	5.37E+06
2-5 hr	4.74E+06	4.36E+06
5-12 hr	3.41E+06	3.11E+06
12-24 hr	2.50E+06	2.29E+06
24-72 hr	1.67E+06	1.58E+06
72-240 hr	6.01E+05	6.40E+05
240-480 hr	1.44E+05	1.60E+05
480-720 hr	4.18E+04	4.72E+04

Proprietary Information Deleted

ENERGY NORTHWEST People·Vision·Solutions	CALCULATION COVER SHEET ORIGINAL	BDC/PDC Page PDC 2406

Equipment Piece No.	Project: Columbia	Page: 1.0	Cont'd on Page: 1.1
Secondary Containment	Discipline: Nuclear	Calculation No.: **NE-02-01-05**	
39.0 Standby Gas Treatment System		Quality Class: I	
	Remarks		

TITLE/SUBJECT/PURPOSE

Title/Subject

Secondary Containment Drawdown

Purpose

The purpose of this calculation is to determine the time required to reach 0.25" W.G. Vacuum ("drawdown") in secondary containment during post-Loss Of Coolant Accident (LOCA) conditions with a Loss Of Offsite Power (LOOP) under the design weather conditions using a single train of Standby. Gas Treatment System (SGTS).

CALCULATION REVISION RECORD

REV NO.	STATUS/ F,P, OR S	REVISION DESCRIPTION	INITIATING DOCUMENTS	TRANSMITTAL NO.
0	F	Initial Issue	PER 297-1003	19187
1	F	REPLACE WS129-PR-02 + CALC-001 PAGES OF	PDC 2406	

PERFORMANCE/VERIFICATION RECORD

REV NO.	PERFORMED BY/DATE	VERIFIED BY/DATE	APPROVED BY/DATE
0	D. Maley / 09-08-2004 [signature] 9/8/04	LS Woosley [signature] 9/8/04	LC Linik [signature] 13 Sep 04
1	D MALEY / 09/29/2004 [signature]	LS WOOSLEY [signature] 9/29/04	SH BIAN [signature] 9-30-04

- Study Calculations shall be used only for the purpose of evaluating alternate design options or assisting the engineer in performing assessments.

ENERGY NORTHWEST People·Vision·Solutions	CALCULATION INDEX	Page No. 1.1	Cont'd on page 1.2
		Calculation No. NE-02-01-05	
		Revision No. 1	

ITEM		PAGE NO. SEQUENCE
Calculation Cover Sheet	1.0 -	
Calculation Index	1.1 -	
Verification Checklist for Calculations and CMR's	1.2 -	
Calculation Reference List	1.3 -	1.301
Calculation Output Interface Documents Revision Index	1.4 -	
Calculation Output Summary	2.0 -	2.1
Calculation Method	3.0 -	3.4
Sketches	4.0 -	4.1
Manual Calculation	5.0 -	

APPENDICES:

	Appendix	A		Pages
	Appendix	B		Pages
	Appendix	C		Pages
Enercon Report WS129-PR-02 r1	Appendix	D	141	Pages - Attached
Enercon Cal NO. WS129-CALC-001 r2	Appendix	E	660	Pages - Attached (Pgs. 1 - 150)
Enercon Cal NO. WS129-CALC-002 r0	Appendix	F	54	Pages (NOT ATTACHED)
Sensitivity Evaluations & comments	Appendix	G	38	Pages - Attached (Pgs. 1 - 30)
Vendor correspondence	Appendix	H	4	Pages (NOT ATTACHED)
Enercon Report WS129-PR-01 r0	Appendix	I	129	Pages (NOT - ATTACHED)

ENERGY NORTHWEST People·Vision·Solutions	VERIFICATION CHECKLIST	Page No. 1.2	Cont'd on page 1.3
		Calculation No. NE-02-01-05	
		Revision No. 1	

Calculation/CMR NE-02-01-05 **Revision** 1
was verified using the following methods:

☒ Checklist Below ☒ Alternate Calculation(s)

Checklist Item	**Verifier Initials**
Clear statement of purpose of analysis	LSW
Methodology is clearly stated, sufficiently detailed, and appropriate for the proposed application	LSW
Does the analysis/calculation methodology (including criteria and assumptions) differ from that described in the Plant or ISFSI FSAR or NRC Safety Evaluation Report, or are the results of the analysis/calculation as described in the Plant or ISFSI FSAR or NRC Safety Evaluation Report affected? ☒ Yes ☐ No	LSW
If Yes, ensure that the requirements of 10 CFR 50.59 and/or 10 CFR 72.48 have been processed in accordance with SWP-LIC-02.	LSW
Does the analysis/calculation result require revising any existing output interface document as identified in DES-4-1, Attachment 7.3? ☒ Yes ☐ No	LSW
If Yes, ensure that the appropriate actions are taken to revise the output interface documents per DES-4-1, section 3.1.8 (i.e., document change is initiated in accordance with applicable procedures).	LSW
Logical consistency of analysis	LSW
• Completeness of documenting references	LSW
• Completeness of input	LSW
• Accuracy of input data	LSW
• Consistency of input data with approved criteria	LSW
• Completeness in stating assumptions	LSW
• Validity of assumptions	LSW
• Calculation sufficiently detailed	LSW
• Arithmetical accuracy	LSW
• Physical units specified and correctly used	LSW
• Reasonableness of output conclusion	LSW
Supervisor independency check (if acting as Verifier)	NA
- Did not specify analysis approach - Did not rule out specific analysis options - Did not establish analysis inputs	NA
If a computer program was used:	LSW
- Is the program appropriate for the proposed application? - Have the program error notices been reviewed to determine if they pose any limitations for this application? - Is the program name, revision number, and date of run inscribed on the output? - Is the program identified on the Calculation Method Form? If so, is it listed in Chapter 10 of the Engineering Standards Manual?	LSW
Other elements considered: NE-02-03-10 GOTHIC software V&V record	LSW

If separate Verifiers were used for validating these functions or a portion of these functions, each sign and initial below.

Based on the foregoing, the Calculation/CMR is adequate for the purpose intended.

Verifier Signature(s)/Date	Verifier Initials
LS Woosley [signature]	LSW

ENERGY NORTHWEST People·Vision·Solutions	CALCULATION REFERENCE LIST	Page No. 1.3	Cont'd on page 1.301
		Calculation No. NE-02-01-05	
Prepared by / Date: D Maley / 07-06-04 7/6/04	Verified by/Date: [signature] 9/8/04	Revision No. 0	

NO	AUTHOR	ISSUE DATE/ EDITION OR REV.	TITLE	DOCUMENT NO.
1	Energy Northwest	5	EWD for miscellaneous equipment Division 1/Division A lighting quenching	EWD-108E-013
2	Energy Northwest	6	EWD for miscellaneous equipment Division 2/Division B lighting quenching	EWD-108E-015
3	Energy Northwest	1	Setting range for the DG time delay relays	E/I-02-94-1352
4	Energy Northwest	0	Setting range determination for SGT voltage signal limiter 1A1	E/I-02-91-1066
5	Energy Northwest	0	SGT annubar flow meter correction factors	NE-02-92-06
6	Energy Northwest	1	Sizing of DG 1A/B water reservoir tanks	ME-02-91-50
7	Energy Northwest	0	Setting range determination for Instrument loop SW pressure switch 1B	E/I-02-91-1094
8	Energy Northwest	11	Standby service water operability	OSP-SW/IST-Q701
9	Energy Northwest	1	Calculation for SW motor operated valve design basis review	C106-92-03.04
10	Energy Northwest	0	Setpoint & allowable value determination for instrument loops SW relay 62/P1A, 62/P1B, TDS/P1A, and TDS/P1B	E/I-02-91-1137
11	Energy Northwest	5	Design specification for Division 300 Section 318A Reactor building	DIVISION 300 SECTION 318A
12	Energy Northwest	4	Summary of equipment qualification environmental profiles	TM-2019
13	NRC	0	Alternative radiological source terms for Evaluating design basis accidents at nuclear power plants	R.G. 1.183
14	NRC	2	Standard review plan – secondary containment functional design	6.2.3
15	Energy Northwest	N/A	CCR form for GOTHIC 7.1 Installation	2003-0127
16	Energy Northwest	1	Secondary Containment Drawdown Analysis	NE-02-94-19

ENERGY NORTHWEST People·Vision·Solutions	CALCULATION REFERENCE LIST	Page No. 1.301	Cont'd on page 1.4
		Calculation No. NE-02-01-05	
Prepared by / Date: D. Maley 9/29/04	Verified by/Date: [signature] 9/25/04	Revision No. 1	

NO	AUTHOR	ISSUE DATE/ EDITION OR REV.	TITLE	DOCUMENT NO.
17	Energy Northwest	2	Setpoint and Allowable Value determination for Instrument loops SGT-RLY-1TR/A1, SGT-RLY-1TR/A2, SGT-RLY-1TR/B1, SGT-RLY-1TR/B2	E/I-02-92-1024
18	Energy Northwest	2	Setpoint and Allowable Value determination for Instrument loops SGT-RLY-2TR/A1, SGT-RLY-2TR/A2, SGT-RLY-2TR/B1, SGT-RLY-2TR/B2	E/I-02-92-1026
19	Energy Northwest	4	Instrument Master Data Sheets for SGT-TS-EH1A11, etc	-
20	Energy Northwest	0	SGT FAN INFO FROM BUFFALO FORGE	28-00,99
21	Energy Northwest	0	SGT FAN MOTOR DATA	28-00,100

ENERGY NORTHWEST People·Vision·Solutions	CALCULATION OUTPUT INTERFACE DOCUMENT REVISION INDEX	Page No. 1.4	Cont'd on page 2.0
		Calculation No. NE-02-01-05	
Prepared by / Date: D. Maley / 07-06-04	Verified by/Date: 8/4/04	Revision No. 0	

The below listed output interface calculations and/or documents are impacted by the current revision of the subject calculation. The listed output interfaces require revision as a result of this calculation. The documents have been revised, or the revision deferred with Manager approval, as indicated below.

AFFECTED DOCUMENT NO.	CHANGED BY (e.g., BDC, SCN, CMR, Rev.)	CHANGED DEFERRED (e.g., RFTS, LETTER NO.)	DEPT. MANAGER *
ME-02-92-43	PDC 2406		
ME-02-99-20	PDC 2406		

* Required for deferred changes only.

ENERGY NORTHWEST People·Vision·Solutions	CALCULATION OUTPUT SUMMARY	Page No. 2.0	Cont'd on page 2.1
		Calculation No. NE-02-01-05	
Prepared by / Date: D. Maley / 07-06-04	Verified by/Date: [signature] 9/14/04	Revision No. 0	

REV BAR.

Discussion of Results

The Technical Specification 3.6.4.1.3 and 3.6.4.3 Bases assume a secondary containment drawdown time of twenty (20) minutes. The base case analysis demonstrating compliance with this requirement is contained in Appendix D. This analysis shows that the secondary containment will return to a negative pressure after 972 seconds (~16 minutes) when the Fuel Pool Cooling system will not be manually re-aligned to the Standby Service Water system (SW) until 12 hours into the event. The secondary containment will be maintained within the required specifications for the analytical period. The 12 hour delay in the manual re-alignment of the SW system to the fuel pool cooling was selected as a point in the event that is beyond the minimum time for operator action during an accident, but is within the maximum re-start time for the drawdown analysis. Procedures are in place to require manual alignment of the SW system to the fuel pool cooling based on temperature requirements that would take place prior to this drawdown requirement.

The calculations and analysis in Appendix D, E, and F have been reviewed and approved as separate vendor documents. All of these documents have been transmitted to files under DIC 1822.3.

The design case analysis for this calculation is documented in Appendix D. The basic calculation method is documented in Appendix E. The following is a summary of the results of methods used in this calculation:

- The leakage model in the GOTHIC analysis verifies that the Secondary Containment leakage limit is met based on the volume of secondary containment, Reference 3.1 of Appendix E, leakage modeling techniques, Reference 1.24 of Appendix E, and the secondary containment leakage test data, Reference 1.20 of Appendix E. This leakage limit is 2430 cubic feet per minute. The model provides a conservative result with respect to the periodic secondary containment drawdown tests.

- The modifications to the basic GOTHIC model presented in Appendix E show the design case initial secondary containment conditions and use an extended evaluation period to demonstrate containment stability. In Appendix D an analytical run was performed to test the case of operating the Secondary Containment with the initial differential pressure >0.0" WG. This condition was run to test the drawdown for a change in Technical Specification SR 3.6.4.1.1 limits. The input assumptions for this analysis are located in Appendix D. The GOTHIC model and calculations are located in Appendix E. This analysis is the design case analysis for the Secondary Containment Drawdown. This appendix D analysis is a QA approved document by Enercon and has been reviewed and approved by Energy Northwest under separate cover.

- Additional analytical runs were performed to benchmark the margin in the assumptions used in the GOTHIC model. The 70%/30% assumption of the split of the secondary containment leakage was verified to be a reasonable choice. Appendix G provides the details on the Independent Verification computer runs performed on the GOTHIC model. These runs verified that the model performs as required.

Conclusions:

The Secondary Containment Analysis will establish that the conditions of less than or equal to 0.25" WG Vacuum will be reached in 972 seconds (16.2 minutes). The required conditions will be maintained for the analytical period of 30 days.

REV BAR.

Discussion of Results (cont.)

The Secondary Containment Drawdown analysis results fully support the design assumptions. The drawdown in the analysis is within the allowed time assumed for the AST and includes margin that can be used to maintain that condition if future changes to the plant require additional analysis. The AST assumes that the Secondary Containment will be drawn down to equal or below -0.25 inches of Water Gauge in less than 20 minutes. Using the restoration of the SW cooling flow to the Fuel Pool cooling system at 12 hours the Standby Gas Treatment System will maintain the secondary containment at equal or below the -0.25 inches of Water Gauge for 720 hour duration of the analysis. The selection of the 12 hours for the restoration of cooling flow to the fuel pool was made to not require the operators to perform this action during the initial stages of the accident and still leave margin in the time until a limiting condition for this analysis required the flow. Due to the slow heat-up of the secondary containment and the attendant decrease in differential pressure (D/P), the analysis was run for a longer period to verify the fidelity of the GOTHIC model. The longer run verified that the conditions stabilize in the secondary containment in approximately 46 days, Appendix I, Page 14. The results are that the temperature and D/P stability are demonstrated to meet all requirements.

REV BAR.

Analysis Method (Check appropriate boxes)

☐ Manual (As required, document source of equations in Reference List)

☒ Computer ☐ Main Frame ☒ Personal

☐ In-House Program
☐ Computer Service Bureau Program

☐ BCS ☐ CDC ☐ PCC ☐ OTHER ____________

☒ Verified Program: Code name/Revision GOTHIC Version 7.1

☐ Unverified Program: ____________

Approach/Methodology

The implementation of this calculation at Energy Northwest, Columbia Generating Station requires prior NRC approval. No revised interfacing documents will be issued until the NRC approval process is completed.

This calculation was performed using GOTHIC, Version 7.1 (QA), which is a thermal-hydraulics analysis tool. GOTHIC is under the Appendix B, Quality Control of the vendor (Numerical Applications, Inc.). GOTHIC, Version 7.1 is maintained as a verified internal production code in accordance with SWP-CSW-04, Indirect Nuclear Safety and Regulatory Software Quality Assurance, Reference 15.

This drawdown calculation is an extension of the vendor calculation attached as Appendixes D, E and I. The conclusions, data and assumptions of the main body of the calculation need to be taken as part of the overall calculation along with the conclusions, data and assumptions in Appendixes D and E. Appendices E and I includes history of the model development. Appendix D contains the current results. This GOTHIC model was developed using the Energy Northwest GOTHIC program under the QA program of Enercon Services, INC. Energy Northwest verified the GOTHIC model and the case studies in this calculation were run using that model. Appendix F consists of the flow paths and loss coefficient inputs for the Reactor Building to be used as inputs to the secondary containment drawdown calculations. The results of Appendix F are used as inputs to Appendix E, results from E were used to develop Appendix I, and the result of I was used to create the license bases case Appendix D.

The methodology of this calculation is discussed and developed in Appendix E. The basic method consists of the following:

- Develop the boundary conditions surrounding the Secondary Containment. The boundary conditions use the Certified Vendor Information for the CGS five percent and ninety five percent Wind Speed and Temperature Values, Appendix E, Reference 1.12. This data is used to develop the dynamic and static pressures on the leakage points for the Secondary Containment. The development of the data is shown using equations 1 through 3 in Appendix E, pages 21 through 27.

REV BAR.

- Develop the initial input conditions of the Secondary Containment. The control pressure for secondary containment Standby Gas Treatment System (SGTS) and for each of the volumes modeled in the GOTHIC analysis is calculated. This value is calculated for both the 5% and 95% temperature conditions and is used to ensure that the required differential pressure is obtained in all location for all design conditions. The developments of these values are shown in Appendix E, pages 28 through 33.

- Develop the leakage model for the Secondary Containment from the surrounding environment. The leakage is based on the volume of secondary containment, Reference 3.1 of Appendix E, leakage modeling techniques, Reference 1.24 of Appendix E, and the secondary containment leakage test data, Reference 1.20 of Appendix E. The development of this data uses equations in Appendix E, pages 34 through 37.

- Develop the wind pressure coefficients and leakage flows. The boundary conditions and the leakage model discussed above are used to develop the wind pressure coefficients. The wind pressure coefficients are evaluated to provide the effect of the wind on the test data. The wind pressure and the leakage model are used to develop the leakage flow coefficients. This development is documented in Appendix E, pages 38 through 48.

- Develop the internal pressure values at the leakage points. The pressure at the internal side of the leakage points is determined to provide a bounding review of the pressure differential across the building walls. This data is developed in Appendix E, pages 49 and 50.

- Develop the leakage flow path input values. The leakage flow path areas and hydraulic diameters are developed for input into the GOTHIC model. These values are developed in Appendix E, pages 51 and 52.

- Develop the GOTHIC flow paths. The flow paths into, through, and out of the Secondary Containment are developed in Appendix F and shown in Appendix E pages 52 and 53. These flow paths are used in the GOTHIC model to model the air flow for drawdown.

- Develop the GOTHIC volume inputs and thermal inputs. Data is extracted from various references to compile the volume and thermal inputs for the GOTHIC model. See Appendix E, pages 54 through 93 for input data.

- Develop the thermal conductor boundary temperatures. The temperature profiles for the Wetwell and Drywell are developed from plant references. See Appendix E, pages 94 and 95.

- Develop GOTHIC heat transfer coefficients. The GOTHIC model heat transfer coefficients are developed on pages 96 through 98 of Appendix E.

- Develop heat loads and fan cooler unit data. The development of the heat input and the equation for the decay of the heat load after the LOOP are presented in Appendix E, pages 99 through 111.

- Develop the model for the Fuel Pool Heat Exchanger. The calculations for the model are developed in Appendix E, pages 112 through 114.

- Develop the model for the SGTS fan performance. The calculations for the SGTS fan performance to show the input path, flows, and output paths are developed in Appendix E, pages 115 through 124.

REV BAR.

- Develop the modifications to the basic GOTHIC model presented in Appendix E to show the initial secondary containment pressure and the extended evaluation period to demonstrate containment stability in Appendix I. InAppendix I an analytical run was performed to test the case of operating the Secondary Containment with the differential pressure 0.0" WG. This condition was run to test the drawdown for a change in Technical Specification SR 3.6.4.1.1 limits. However, it was determined that the SGT inlet heaters were not modeled correctly, and so that deficiency needed to be corrected.

- Develop the modifications to Appendix I to add the inlet heaters in SGT system. In Appendix D this analytical run was performed to test the case of operating the Secondary Containment with the differential pressure 0.0" WG. This condition was run to test the drawdown for a change in Technical Specification SR 3.6.4.1.1 limits. The input assumptions for this analysis are located in Appendix D. The GOTHIC model and calculations are located in Appendix E. This analysis is the design case for the Secondary Containment Drawdown Analysis.

The methodology of this analysis is consistent with the current methodology as discussed in Section 6.2.3.3.1.2 Calculation Approach of the FSAR. The use of the GOTHIC 7.1 model provides a current method of analysis of the thermal hydraulic conditions in Secondary Containment during a LOCA/LOOP.

Assumptions

The Assumptions for this calculation are listed in Appendix D and E. The discussion listed here is additional clarifying information.

1. The Normal Emergency Lighting for the Reactor Building is energized at the start of the accident and is lost for 15 seconds during the time the Emergency Diesel Generators (EDG) start and re-power the buses. References: 1, 2 & 3.

2. The Standby Gas Treatment System (SGTS) is assumed to operate at 4800 ACFM during the accident. This flow is based on the following for fan SGT-FN-1A1 and applies to all fans:
   a. Initial position of the Vortex Damper SGT-AD-1A1 will be fully open due to the low differential pressure between the Secondary Containment and the outside air.
   b. Following SGT fan start, the vortex damper will throttle as necessary to limit flow to the flow limiter SGT-LMTR-1A1 value of 5378 ICFM and to maintain the differential pressure setpoint on SGT-DPIC-1A1. Reference 4.
   c. The 5378 ICFM is 434 ICFM below the analytical limit of 5812 ICFM. Reference 4.
   d. Applying the 434 ICFM uncertainty to the limiter setpoint as a reduction sets the flow at 4944 ICFM. The rounding of the flow to 4800 ICFM is a conservative assumption.
   e. Additional margin is realized by using Actual CFM instead of ICFM with no correction for the sensor inaccuracy. Reference 5.

3. The Standby Service Water (SW) is assumed to be off at the initiation of the accident. The SW is assumed to be supplying full flow to the ECCS room coolers at 300 Seconds based on the following:
   a. At T=15 Seconds the EDG is loaded and the SW start sequence is initiated. Reference 1.
   b. The timing sequence for the starting of the SW pumps is determined from Reference 10. This value is 108 seconds.
   c. Five seconds is allowed for the SW pump to develop the 52 PSIG discharge pressure required for SW-PS-1A/B to actuate. This is based on Appendix 3, Reference 6. This data shows that at 10 seconds after a SW pump start, flow of at least 300 GPM is indicated at SW-FIS-15 located at the discharge of the DG heat exchanger. Pressure switch, SW-PS-1A/B, is the control sensor for the pump discharge valve opening and is required to be actuated prior to the flow starting in the DG heat exchanger, thus the 5 second assumption is a conservative number. The 52 PSIG for SW-PS-1A/B is based on Reference 7.
   d. Stroke times for the SW valves are the Action Hi values as listed in Reference 8. This procedure is the timing value in Reference 9. The Action Hi values are those stroke times beyond which the valve shall be immediately declared inoperable. This value is currently 140 seconds.

      NOTE: This value of 140 seconds is based on the trend test data and could be revised in the future. The time for SW-V-2A to be fully open and provide full SW flow includes 32 seconds margin to allow for any future changes in the Action Hi setpoint. This margin will also bound any setting variations in the control relays.

   e. The opening of the discharge valve is stopped at 20% for 48 seconds. The settings of the associated control relays, SW-RLY-V/2A3 & SW-RLY-V/2A4 and the B loop relays are based on field testing as discussed in page C-5 of Reference 10. As the Reference 10 states there is no allowable values on these relays.

REV BAR.

4. The initial temperature of the reactor building is assumed to be an average of 75°F. This temperature was derived by taking the day and night recordings of temperature in the Reactor Building from the Operator OPS2 rounds for January 5th 2004. These values were averaged to get an overall building temperature. This was the coldest day of the month with the local/regional outside temperatures in the range of 11 to 14 degrees below zero. This is well below the 5% value of 28°F, Reference 1.12, Appendix E, used in the analysis.

5. The secondary containment drawdown analysis, Appendix E assumes that the SGT system will be operating within 120 seconds. This time is developed in References 17 and 18 of this calculation.

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		Calculation No. NE-02-01-05	
Prepared by / Date: D. Maley / 07-06-04	Verified by/Date: 9/8/04	Revision No. 0	

REV BAR.

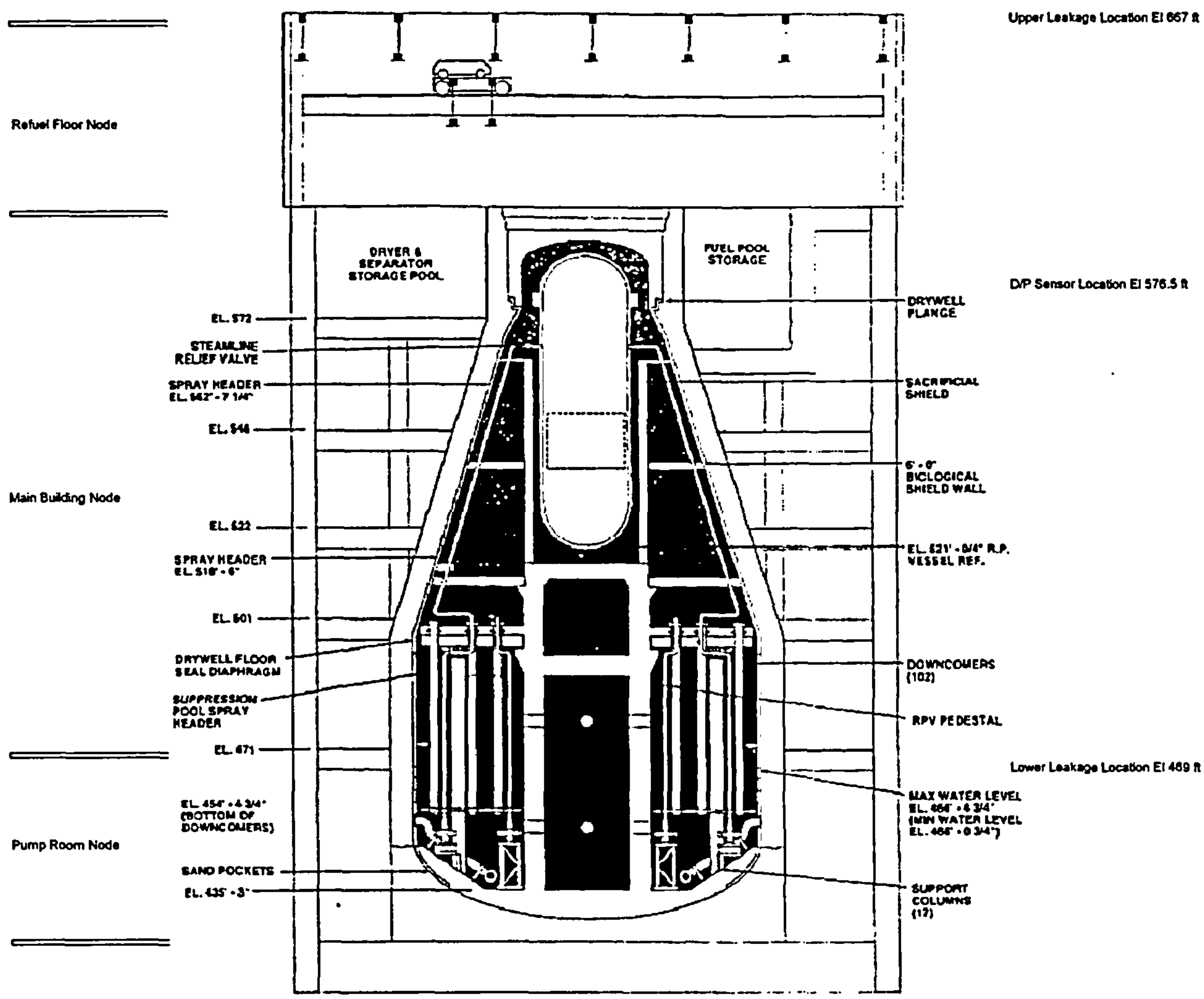

Figure 1

ENERGY NORTHWEST People·Vision·Solutions	SKETCHES	Page No. 4. 1	Cont'd on page 5.0
		Calculation No. NE-02-01-05	
Prepared by / Date: D. Maley 9/29/04	Verified by/Date: LS Woosley 9/29/04	Revision No. 1	

REV BAR.

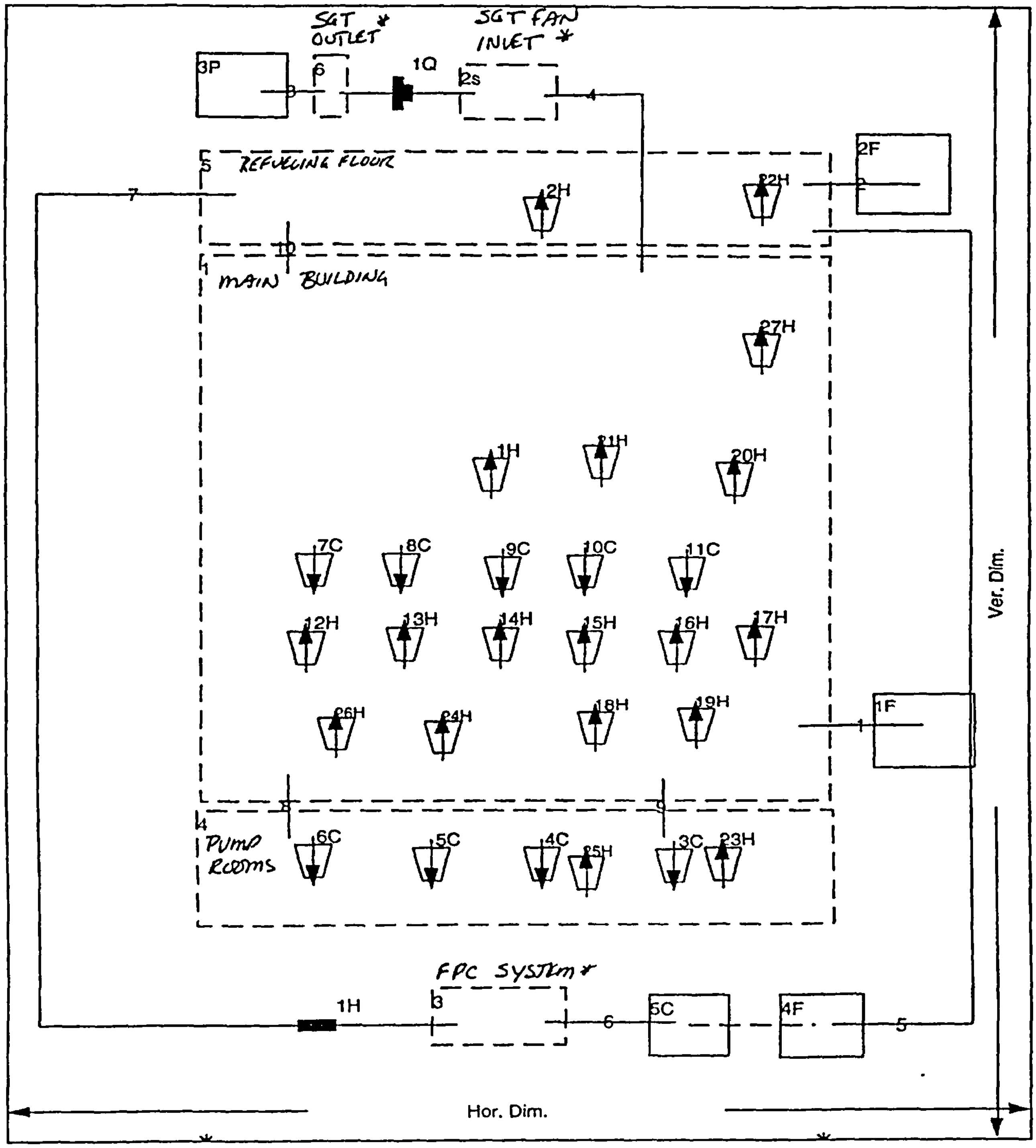

Figure 2

* VOLUMES CREATED TO COMPUTE PHYSICAL PROPERTIES

The test data for the leakage into secondary containment, Reference 1.20 of Appendix E, indicates that the majority of the leakage is at the upper location, Figure 1. This location consists of thousands of feet of lap between the metal sheeting of the upper section of the refuel floor volume. A review of the data indicates that the leakage from this area is at least 90% of the total leakage. However the D/P is higher at the lower leakage location, which is the railroad bay door, Figure 1. Due to this condition the leakage is conservatively adjusted to have an increase in the leakage at the lower location (highest D/P). A series of sensitivity studies were run to determine the effect of varying the leakage between the two locations. It was determined that the 70% upper/30% lower split is an acceptable conservative condition.

Plant Procedure TSP-RB-B501 verifies that the leakage is within the Technical Specification limits for an SGT fan to be in service and for verification of leakage rate. The secondary containment has only one leakage limit of 2430 CFM. For a discussion of the basis of the leakage value see page 34 of Appendix E. The split of the leakage is not a concern during operation and testing as long as the total leakage is within the specifications.

This secondary containment drawdown analysis is for a duration of 30 days as required by R. G. 1.183, Reference 13, Table 6. The evaluation of the results of Appendix E determined that the temperatures in the reactor building do not reach a stable condition prior to the end of the required duration. To verify that the model reaches a stable or decreasing temperature in the secondary containment the length of the analysis was extended to show the point of stability. The longer duration of the temperature increase is in part due to the conservative temperature assumed in the primary containment wetwell.

Background

The approach used in this calculation was to have Enercon Services, Inc develop the GOTHIC model based on previous models developed by Energy Northwest. The development of the model started with the assumptions and framework used in calculation NE-02-94-19, Reference 16. This model was then simplified from a multinode representation of secondary containment to a single node model. This model was used to run various sensitivity studies and to develop the three-node model. The three-node model was used to run additional sensitivity studies and to establish and test the assumptions.

Figure 2 shows the three node GOTHIC model used to perform the analysis. The final assumptions and input parameters were documented in the QA INPUTSR10a.doc. The information contained in QA INPUTSR10a.doc was incorporated into the body of Enercon calculation WS129-CALC-001. Both Enercon Services, Inc and Energy Northwest ran case studies. Enercon test cases are documented in Appendix D and E and I. Energy Northwest test cases are documented in the Appendix G of this calculation. The configuration of the GOTHIC model, Figure 2 on page 4.1, is used for all Energy Northwest test cases except those to test the Refuel Floor circulation where additional flow paths are added to the floor. The results of those studies are included in this calculation.

APPENDIX D
NE-02-01-05 R1
CMR 3381

ENERCON SERVICES, INC.	PROJECT REPORT COVER SHEET	NO. WS129-PR-02
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		PAGE NO. 1 of 44

PROJECT REPORT

For

Long Term Drawdown Analysis

Sensitivity On Modeling Location

Of SGTS Heater

Independent Review Required: Yes

Prepared by: Paul N Hansen [signature] Date: 9/28/04

Reviewed by: NA
Reviewer
Date:

Reviewed by: Bivins Calhoun III [signature]
Independent Reviewer
Date: 9-28-04

Approved by: Ralph Schwartzbeck [signature]
Project Manager or Designee
Date: 9/28/04

PROJECT REPORT REVISION STATUS

REVISION	DATE	DESCRIPTION
0	September 6, 2004	Initial Release
1	September 28, 2004	Revision

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All	1		

APPENDIX REVISION STATUS

APPENDIX NO.	PAGE NO.	REVISION NO.	APPENDIX NO.	PAGE NO.	REVISION NO
All	All	1			

Purpose:

Energy Northwest has requested that ENERCON evaluate the drawdown response with the SGTS heater elements located within the SGTS inlet volume. In addition, changes to the SGTS fan flow modeling is presented. The revised modeling incorporates an additional volume to the discharge side of the SGTS fan to allow for the inclusion of the fan efficiency heating of the fluid and to better represent the fluid momentum response of the system. The calculation documented in References 1 and 2 evaluates the response with the SGTS heater incorporated into the GOTHIC volumetric fan model.

References:

1. Calculation WS129-CALC-001 Revision 1 "Columbia Station GOTHIC Secondary Containment Drawdown Model"
2. WS129-PR-01 Revision 0 "Long Term Drawdown Analysis Demonstrating Steady State Condition is Reached From a Starting Condition based on 0.0" Water Gauge"
3. SGT-TS-EH1A11 Revision 4 "Instrument Master Data Sheet For SGTS-EHC-1A-1 First Stage Thermal Control"
4. Specification SPC 28-00, 99 (Provided in Appendix 2)
5. Specification SPC 28-00, 100 (Provided in Appendix 2)
6. E/I-02-92-1024
7. Heating Ventilating and Air Conditioning Analysis and Design Second Edition By Faye C. McQuiston and Jerald D. Parker ISBN 0-471-08259-7
8. E/I-02-91-1066

Methodology:

The analysis is performed using the GOTHIC Version 7.1 computer code (Energy Northwest license). All input changes are calculated using the methods documented and the GOTHIC model developed in Reference 1.

Assumptions:

1. The volume initial pressures are established based on the worst case building pressure differential pressure being a 0.0" water gauge difference between the inside and the outside of the building. This specific assumption is provided to establish a basis to change the TS SR 3.6.4.1.1 from ≥0.25" WG vacuum to >0.0" WG vacuum as requested by the plant.
2. The outside temperature conditions are based on the cold outside air data documented in Reference 1. The cold outside air conditions were shown to be bounding in the Reference 1 evaluations. The continued use of the bounding conditions is appropriate for this evaluation. This assumption is consistent with that used in Reference 2.
3. An Easterly Wind Direction is assumed in this analysis. The bounding evaluation in the Reference 1 analysis assumed an Easterly Wind Direction. The continued use of the bounding conditions is appropriate for this evaluation. This assumption is consistent with that used in Reference 2.
4. A 70%/30% Leakage Split as defined in Reference 1 produced the bounding response. This new analysis continues to use this bounding approach. This assumption is consistent with that used in Reference 2.
5. The Fuel Pool Cooling Start Time is assumed to be 12 hours. This value was requested by Energy Northwest as a conservative upper bound for an operator response to manually restart

the system within the control room following a LOCA. This assumption is consistent with that used for Reference 2.

6. The SGTS heater is assumed to start 13 seconds before the fan starts (Reference 6). The heater will continue to run provided air temperatures in the SGTS inlet volume are less than 225°F and the fan is running. The temperature value is selected based on the nominal value documented in Reference 3.
7. The SGTS heater is assumed to stop for air temperatures in the SGTS inlet volume that exceed 245°F. This value is arbitrarily selected and is not expected to have any impact on the analysis. It is provided as a place holder for future analysis and will be demonstrated to be inactive for the analysis by the results presented in this calculation.
8. The SGTS fan motor provides a heat source to the main reactor building volume equivent to that associated with a 25hp motor operating at 89% efficiency. The motor horsepower is established in Reference 5 as 25hp while the motor efficiency is established in Reference 4 to be 89% with flow at 75%. The flow assumed in the analysis is greater than 75%, however, Reference 4 provides higher efficiency at higher flow rates. Since the lower efficiency results in a greater heat load to the building this value is conservative. The fan is centrifugal and the motor for this type of fan is outside the flow stream and therefore provides a heat source to the building rather than the process fluid. Therefore, locating the heat source in the Main Reactor Building Volume is appropriate.
9. The SGTS fan adds heat to the process fluid. A portion of the shaft horse power adds heat to the fluid moved by the fan. Specifically, the fan imparts on the fluid a total power that raises the total pressure of the fluid and produces a flow. The total power imparted to the fluid is less than the shaft horsepower delivered by the motor. The ratio of these two values is the total fan efficiency. The portion of the shaft horsepower that does not result in flow and pressure rise adds heat to the fluid.
10. The SGTS fan flow is modeled assuming the VIV (Variable Inlet Vane) is 0% closed when building vacuum in the worst case location is less than 0.26 inwg (this value explained below). The original analysis documented in Reference 1 assumed that the VIV was 25% closed throughout. The actual control system for fan flow modulates the position of the VIV to control fan flow to establish the minumum required vacuum conditons within the building. This fan flow control loop utilizes one of two signal inputs - a building differential pressure signal provided by the reactor building pressure control system, which utilizes a controller setpoint value of -1.7 inwg and a maximum/minimum flow signal provided by an electonic limiter circuit, having a maximum setpoint of 5378 ICFM and a minimum setpoint value of 1560 ICFM. When there is a loss of vacuum in the building - as is the case for this analysis - the VIV is positioned to maximize flow, utilizing the limiter signal of 5378 ICFM. The maximum fan flow is restricted to prevent a motor thermal over load trip during low source voltage conditions and to ensure maximum residence time through the carbon filters (Reference 8). This maximum flow value of 5378 ICFM is maintained until the building pressure control setpoint of -1.7 inwg is reached, at which time the VIV will throttle as necessary, based on actual building inleakage rates, in an attempt to maintain this -1.7 inwg

setpoint value. Therefore, although the VIV will actually open to maximize flow up to the SGT fan flow limiter setpoint value of 5378 ICFM, for the purposes of this analysis, only a maximum flow rate of 4800 ACFM is used. This is accounted for in the modeling by limiting the fan curves to a maximum flow of 4800 ACFM.

Recent modeling changes that better simulate the fluid momentum response on the discharge side of the fan produce pressure drop conditions that result in flows below 4800 ACFM on the 25% closed fan curve while building vacuum remains below the analytical setpoint value. The modeling of the pressure drops in the system inlet are established to provide the maximum pressure drop associated with dirty filters. Therefore, the inability to establish the 4800 ACFM for the 25% closed VIV postion is not completely unreasonable and the opening of the VIV to establish the 4800 ACFM is to be expected under such conditons. As described above, the fan will position the VIV to full open if necessary to establish the maximum allowed flow when Building Vacuum is below the setpoint. Therefore, applying the 0% closed fan curve with a limit of 4800 ACFM is appropriate for the initial drawdown analysis evaluation.

Once the analytical vacuum criteria for the building is established the fan control will be switched back to the 25% closed position. If the analytical vacuum criteria is no longer met the fan control will return to the 0% curve. This is a very simplified approach since the actual fan controls would modulate through the 0% to 25% range prior to reaching a 25% position. This simple modeling of fan response could result in an artificial decrease in building vacuum below the minimum criteria. To address this a lag is introduced in the form of a slightly increased vacuum value that will be used to switch the fan flow curve. The vacuum value selected is 0.01 inwg greater than the minimum vacuum criteria of 0.25 inwg. Therefore, the fan curve will switch at 0.26 inwg of vacuum in the worst building location.

Evaluation:

Modeling Inputs

The modeling inputs are based on those documented in Reference 2 except were modified below. The changes to the model includes the modification of the heat source included in the GOTHIC volumetric fan. This is accomplished by applying a forcing function to represent the heat input provided by the fan . In addition, the fan flow control is altered to allow the use of the 0% curve as described above in assumption 10. This is accomplished by applying a forcing function to drive the flow using a control variable as shown in Table 1 and described below. Better representation of the fluid momentum response is provided by adding an additional volume associated with the SGTS modeling and rearranging the SGTS heater location relative to the inlet pressure drop. Finally, the SGTS fan motor heat is included in the reactor building volume.

Fan Heat

The fan heat forcing function (FF#46 Table 1) provides the heat input to the fluid by the fan using the fan efficiency. The fan efficiency is based on the shaft horse power delivered to the fluid. The shaft horse power is defined using the motor horse power and motor efficiency as shown in the equations following Table 1.

Table 1 – Modified GOTHIC Input Volumetric Fan Table 2

Volumetric Fan - Table 2							
Vol Fan #	Flow Option	Flow Rate (CFM)	Flow Rate FF	Heat Option	Heat Rate (Btu/s)	Heat Rate FF	Disch Vol
1Q	DP	1	48	Flow	1	46	6

$$ShaftHp = 0.89(25hp)\left(\frac{0.70679\, BTU/\sec}{1hp}\right)$$

$$ShaftHp = 15.726\, BTU/\sec$$

The fan efficiency and resulting fan heat is calculated using the shaft horse power as follows (Reference 7).

$$\eta_t = \frac{Flow(\Delta P)}{ShaftHp}$$

$$FanHeat = (1-\eta_t)(ShaftHp)$$

The fan heat is entered into the volumetric fan heat input using the forcing function controlled by a control variable based on the aforementioned Fan Heat relationship. The fan heat is calculated with two control variables. The first of these (#59) establishes the efficiency and the second (#60) gives the Fan heat. The GOTHIC inputs associated with these control variables and functions are outlined below.

Control Variables								
CV		Func.	Initial	Coeff.	Coeff.			Upd. Int.
#	Description	Form	Value	G	a0	Min	Max	Mult.
59	Fan Efficiency	mult	0	0.0116883	0	-1E+32	1E+32	0
60	Fan Heat	sum	0	15.73	0	-1E+32	1E+32	0

Function Components			
Control Variable 59			
Fan Efficiency			
mult			
Y=G*(a1X1*a2X2*...*anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Vfanf	cf1Q	1
2	Dpjnc	cJ11	1

Function Components			
Control Variable 60			
Fan Heat			
sum			
Y=G*(a0+a1X1+a2X2+...+anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	One	cM	1
2	Cvval	cv59	-1

Functions				
FF#	Description	Ind. Var.	Dep. Var.	Points
46	SGTS Fan Heat	cv60	Dep. Var.	2

Function			
48			
SGTS Flow Select			
Ind. Var.:			
Dep. Var.:			

Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	1000000	1000000

Fan Flow

The fan flow is established using control variables 58 to assess the controlling building vacuum. This control variable evaluates the building vacuum and compares it with the established value of 0.26 inwg (Assumption 10). Based on the comparison the control variable selects the appropriate fan curve as defined in Assumption 10. The GOTHIC inputs associated with these control variables and functions are outlined below.

Control Variables								
CV		Func.	Initial	Coeff.	Coeff.			Upd. Int.
#	Description	Form	Value	G	a0	Min	Max	Mult.
55	DP	sum	0	1	0	-1E+32	1E+32	0
56	0%VIV Flow	tfunc	0	1	0	-1E+32	1E+32	0
57	25%VIV Flow	tfunc	0	1	0	-1E+32	1E+32	0
58	Selector	if	0	1	-0.26	-1E+32	1E+32	0

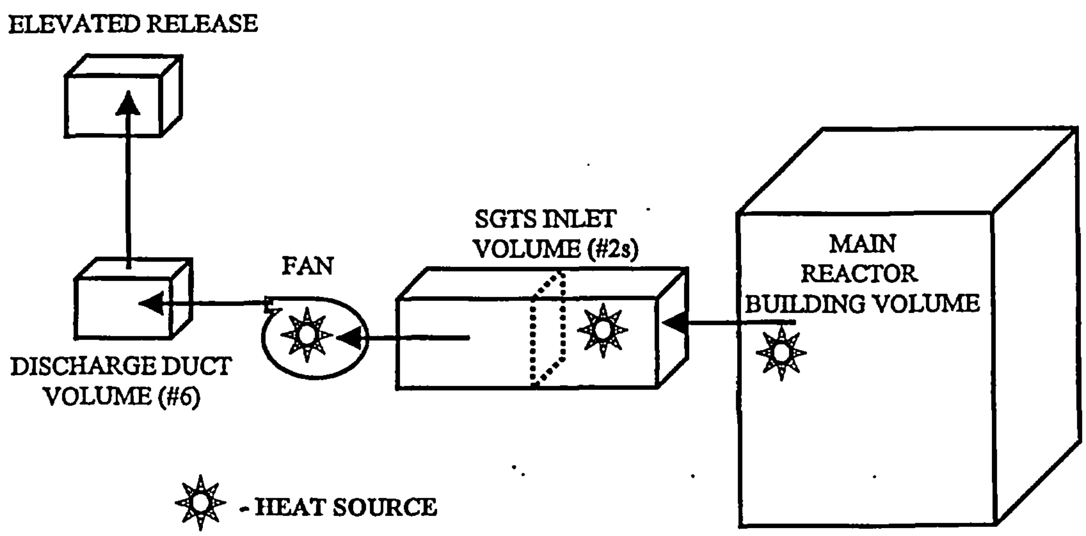
Function Components			
Control Variable 55			
DP			
sum			
Y=G*(a0+a1X1+a2X2+...+anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	P	cV6	1
2	P	cV2s1	-1
Function Components			
Control Variable 56			
0%VIV Flow			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Cvval	cv55	1
2	-	DC47	1
Function Components			
Control Variable 57			

25%VIV Flow			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Cvval	cv55	1
2	-	DC12	1
Function Components			
Control Variable 58			
Selector			
If(a1X1+a0<0 a1X1+a0=0 a1X1+a0>0)			
Y=Ga2X2 Y=Ga3X3 Y=Ga4X4			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Cvval	cv9	1
2	Cvval	cv56	1
3	Cvval	cv57	1
4	Cvval	cv57	1
Function			
12			
SGT Flow vs DP			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
-1	4800	0	4800
0.1444	4800	0.2707	4800
0.3609	4800	0.4421	4800
0.5007	4800	0.5503	4800
0.556	4800	0.5774	4000
0.5955	3000	0.6	2000
0.61	0	5	0
Function			
47			
SGTS 0%			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
-1	4800	0	4800
0.144	4800	0.208	4800
0.266	4800	0.316	4800
0.37	4800	0.415	4800
0.456	4800	0.496	4800

0.532	4800	0.559	4800
0.595	4800	0.613	4800
0.623	4800	0.632	4800
0.633	0	5	0
Function			
48			
SGTS Flow Select			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	1000000	1000000

Flow Paths and Volumes

The Revision 1 Fan Model configuration is illustrated the Figure below. Changes from Revision 0 include the division of the inlet volume, the addition of the discharge duct volume, and a connecting flow path.



The heat source that represents the SGTS heaters is relocated within the Volume 2 to simulate heating of the air before it reaches the SGTS Fan Inlet. To accommodate the relocation of the volumetric fan assumed heat source changes to the model are required. A review of the references listed in Reference 1 that form the basis for the models, indicate that two heaters are located in series just down stream of the inlet and Moisture Separators as outlined in Table 2 below. From Table 2 it can be seen that the pressure drop on the suction side of the fan can be logically divided between the region before the heaters and that after the heaters.

Table 2 – SGTS Fan Suction Information

Fan Suction Losses	Pressure Drop (inches WG)	Heat Input (kW)	Flow (ACFM)	Reference
Moisture Separators Loaded	2		4457	#1.9 para. 3.5.2 (pg. 15A-12)
Two Electric Heating Coils	0.2	21	4457	#1.9 para. 3.5.4 (pg. 15A-14)
Pre-Filters Cleanup loaded DP	1.0		4457	#1.9 para. 3.5.3 (pg. 15A-13)
Two HEPA Filters loaded to 900grams dust	4		4457	#1.9 para. 3.5.5 (pg. 15A-17)
Two Charcoal Absorber Filters	6		4457	#1.9 para. 3.5.6 (pg. 15A-19)
Electric Strip Heaters			4457	1.9
Total DP	13.2			
Total DP (psi)	0.488			
Area Assumed	1.767 ft^2			
Velocity	42.039 ft/sec			

The model currently documented in References 1 and 2 places the entire pressure drop in the flow path that connects the main reactor building volume with the SGTS inlet volume. Therefore, as currently modeled the entire suction pressure drop would occur prior to heating the air.

To properly model the pressure drop, it is necessary to separate the pressure drop calculation between the two regions as the velocity of the heated air will increase as it expands. This is accomplished by separating the SGTS fan Inlet Volume (GOTHIC Volume 2) into two sub-volumes. The area between the sub-volumes is assigned a loss coefficient that accounts for the losses listed in Table 2 after the heaters. The losses prior to the heaters and including the heaters will be assigned to the flow path number 4.

To ensure a conservative result, a total DP value of 13.5inwg will be assumed in this analysis. Using the pressure drop value of 13.5inwg, an equivalent pressure loss coefficient is developed

for the assumed area. The flow rate listed in Table 2 is less than that assumed in the analysis, but it provides the basis for the pressure drops. The flow information provided in the table is provided as Indicated CFM (ICFM). However, to add conservatism to the calculation of the pressure loss coefficient that follows, the flow rate is treated as if it is Actual CFM (ACFM). This is the same approach used in References 1 and 2.

As described earlier the pressure drop is divided between the region before the heater and the region after the heater. Therefore, a loss coefficient is assigned to represent each of these regions. The pressure drop before the heaters will include the heaters totaling 2.2in water gauge. The remainder of the 13.5inwg is assigned to the downstream region beyond the heaters. Using the same approach outlined in Reference 1 the loss coefficients are calculated.

$\text{Temp} := 68\text{Fahr}$

$P := 29.38 \cdot 0.4912\text{psi}$

Before Heaters

$\Delta\text{PWGbh} := 2.2\text{in}$

$P = 14.431\,\text{psi}$

$\text{Flow} := 4457\text{cfm}$ $\quad \text{Area} := 1.767\text{ft}^2$

$\text{Velocity} := \dfrac{\text{Flow}}{\text{Area}}$ $\quad \text{Velocity} = 42.039\,\dfrac{\text{ft}}{\text{sec}}$

$$\Delta\text{Pbh} := \frac{\Delta\text{PWGbh}\cdot g}{\text{vfTsat}(68\text{Fahr})\cdot\frac{\text{ft}^3}{\text{lb}}}$$

$\Delta\text{Pbh} = 0.079\,\text{psi}$

$$\text{Kinletbh} := \frac{2\Delta\text{Pbh}}{\rho_{gas}(P,\text{Temp},\text{"air"})\cdot\text{Velocity}^2}$$

Before Heaters

$\text{Kinletbh} = 5.644$

After Heaters

$\Delta\text{PWGah} := 13.5\text{in} - 2.2\text{in}$

$\text{Temp} = 68\,\text{Fahr}$

$\text{vfTsat}(68\text{Fahr})\cdot\dfrac{\text{ft}^3}{\text{lb}} = 0.016\,\dfrac{\text{ft}^3}{\text{lb}}$

$\rho_{gas}(P,\text{Temp},\text{"air"}) = 0.074\,\dfrac{\text{lb}}{\text{ft}^3}$

$$\Delta\text{Pah} := \frac{\Delta\text{PWGah}\cdot g}{\text{vfTsat}(68\text{Fahr})\cdot\frac{\text{ft}^3}{\text{lb}}}$$

$\Delta\text{Pah} = 0.408\,\text{psi}$

$$\text{Kinletah} := \frac{2\Delta\text{Pah}}{\rho_{gas}(P,\text{Temp},\text{"air"})\cdot\text{Velocity}^2}$$

After Heaters

$\text{Kinletah} = 28.989$

Therefore the inlet flow path will have a loss coefficient of 5.644 as calculated above with an area of 1.767ft^2. The remainder of the pressure drop is applied within the Fan Inlet Volume. The hydraulic diameter associated with this area is 1.5ft (18inch). In addition, a flow path #11 is added to the model to provide the volumetric fan connection between the SGTS inlet and the exhaust ductwork. Since the flow path is associated with a volumetric fan the hydraulics of the flow path are unimportant other than the inertial length which is maintained as 10 ft, which was established in Reference 1. The revised GOTHIC Input Flow Path Tables 1 through 3 are provided below in Table 3

Table 3

Flow Paths - Table 1

F.P. #	Description	Vol A	Elev (ft)	Ht (ft)	Vol B	Elev (ft)	Ht (ft)	
1	Ground Leakage	1	468.5	0.5	1F	468.5	0.5	
2	Elevated Leakage	5	667	0.1	2F	667	0.1	
3	SGTS	6	577	1.5	3P	671.17	1.5	
4	SGTS Inlet	1	577	1.5	2s2	577	1.5	
5	FP Cooling In	5	604.4	1	4F	568.124	1	
6	FP Cooling Outlet	3	568.125	1	5C	568.125	1	
7	FPHX	3	568.125	1	5	604.4	1	
8	Pump Room to Main Building	4	466	0.1	1	471	0.1	
9	Pump Room to Main Building	4	422.25	16.7	1	441	0.0104	
10	Main Building to Fuel Floor	1	572	0.1	5	607	0.1	
11	SGTS Fan	2s1	577	1.5	6	577	1.5	

Flow Paths - Table 2

Flow Path #	Flow Area (ft2)	Hyd. Diam. (ft)	Inertia Length (ft)	Friction Length (ft)	Relative Rough-ness	Dep Bend (deg)	Mom Trn Opt	Strat Flow Opt
1	0.36	0.68	136	1			-	NONE
2	0.85	1.04	130	1			-	NONE
3	1.767	1.5	0.1	157.81			-	NONE
4	1.767	1.5	10	1			-	NONE
5	0.216	1	1	1			-	NONE
6	0.216	1	1	1			-	NONE
7	0.216	1	1	1			-	NONE
8	191.41	1.77	105.31	2			-	NONE
9	16.83	1.4	105.31	2			-	NONE
10	409.61	11.89	112.33	2			-	NONE
11	1.767	1.5	10	0.01			-	NONE

Flow Paths - Table 3

Flow	Fwd.	Rev.		Critical	Exit	Drop		

Path #	Loss Coeff.	Loss Coeff.	Comp. Opt.	Flow Model	Loss Coeff.	Breakup Model		
1	1E+18	1	OFF	OFF	0	OFF		
2	1E+18	1	OFF	OFF	0	OFF		
3	4	4	OFF	OFF	0	OFF		
4	5.644	5.644	OFF	OFF	0	OFF		
5			OFF	OFF	0	OFF		
6			OFF	OFF	0	OFF		
7			OFF	OFF	0	OFF		
8	1.52	1.52	OFF	OFF	0	OFF		
9	1.5	1.5	OFF	OFF	0	OFF		
10	1.5	1.5	OFF	OFF	0	OFF		
11			OFF	OFF	0	OFF		

To accommodate this change the fan inlet volume is converted into a two node subdivided volume. Since the purpose of this change is to establish a pressure drop within the volume the subdivision is evenly split between the two sub volumes and the critical parameters are the area, hydraulic diameter and loss coefficient between these sub volumes.

The volume changes to accommodate this are provided in Tables 4 and 5. Table 4 identifies that the volume 2 is subdivided by assigning a 2s value to the number designation. The Volume 6 is added to provide a downstream volume for the volumetric fan used to simulate the SGTS. This volume size is arbitrarily established at 270 ft^3 which approximates the discharge ductwork volume. Table 5 provides the geometry input for the model with the x direction representing the flow direction. The volume dimensions are arbitrary and the flow pressure drop behavior is established by the X-Direction Cell Face Variations table inputs. The Area Porosity input is used to establish the flow area, which is associated with the loss coefficient documented by Table 2. The Area Porosity is simply the fraction of the area defined by the geometry that allows flow. This value is thus calculated as follows.

$$AreaPorosity = \frac{1.767 ft^2}{(1.5 ft)(25.8199 ft)} = 0.0456$$

The hydraulic diameter is set to be consistent with the area assumed in Table 2 and the loss coefficient is established to account for the difference between the total loss coefficient developed from Table 2 and that assigned to the flow path discussed above. This value is 28.989 and is listed in Table 5.

Table 4

Control Volumes							
Vol #	Description	Vol (ft3)	Elev (ft)	Ht (ft)	Hyd. D. (ft)	L/V IA (ft2)	Burn Opt
1	Reactor Building	1804568.96	441	163.875	28.9	DEFAULT	NONE
2s	SGTS Fan Inlet	1000	577	1.5	1.5	DEFAULT	NONE
3	Fuel Pool Piping	10	568.125	1	1	DEFAULT	NONE
4	Pump Rooms	345121.1	422.25	46.75	69.07	DEFAULT	NONE
5	Fuel Pool Floor	1321336.77	604.367	63.303	31.34	1360	NONE
6	Fan Discharge Duct	577	270	1.5	1e6	DEFAULT	NONE

Table 5

X-Direction Noding					
Volume 2s					
Cell Plane	Distance (ft)	Width (ft)			
1	0	12.91			
2	12.91	12.9099			
Y-Direction Noding					
Volume 2s					
Cell Plane	**Distance (ft)**	**Depth (ft)**			
1	0	25.8199			
Z-Direction Noding					
Volume 2s					
Cell Plane	**Distance (ft)**	**Height (ft)**			
1	0	1.5			
X-Direction Cell Face Variations					
Volume 2s					
Cell No.	**Blockage No.**	**Area Porosity**	**Hyd. Dia. (ft)**	**Loss Coeff.**	**Drop De-ent. Factor**
def	0	1	1000000	0	0
2s1	0	0.0456	1.5	28.989	0
2s2	0	0.0456	1.5	28.989	0

Heaters
As described above the heater was relocated to the inlet volume. To model this a new heater 27 was introduced as documented in Table 6. This heater is located in the inlet side of the volume 2s, designated as 2s2. This heater uses two trips to control the heat input to the volume. To allow for this two new trips were added to the model, trip 27 and 28 documented in Table 7.

The fan motor heat source is also modeled with a new heater located in volume 1. This heater #28 is documented in Table 6. The heater starts with trip 2, which starts the volumetric fan model to represent the SGTS. The heater has a heat load assigned that is based on a 25hp motor operating at 89% efficiency. The heat load input is calculated below for this heater.

$$Qmotor = (1-0.89)(25hp)\left(\frac{0.70679\,\mathrm{BTU}/\mathrm{sec}}{1\mathrm{hp}}\right) = 1.944\frac{BTU}{sec}$$

Table 6

Cooler/Heater										
Heater Cooler #	Description	Vol. #	On Trip #	Off Trip #	Flow Rate (CFM)	Flow Rate FF	Heat Rate (Btu/s)	Heat Rate FF	Phs Opt	Ctrlr Loc
1H	Main Building Heat	1	5				43.24		VTI	1
2H	Decay Heat	5	5				2720.56		LTI	5
3C	RRA-CC-1	4	1				1	37	VTE	4
4C	RRA-CC-4	4	1				1	38	VTE	4
5C	RRA-CC-5	4	1				1	39	VTE	4
6C	RRA-CC-6	4	1				0	5	VTE	4
7C	RRA-CC-11	1	22				1	41	VTE	1
8C	RRA-CC-12	1	22				1	42	VTE	1
9C	RRA-CC-13	1	22				1	43	VTE	1
10C	RRA-CC-15,17	1	22				2	44	VTE	1
11C	RRA-CC-19,20	1	22				2	45	VTE	1
12H	Aux Heat 522	1	6	7			190		VTE	1
13H	Aux Heat 548	1	8	9			100		VTE	1
14H	Aux Heat 572	1	10	11			50		VTE	1
15H	Aux Heat 548	1	12	13			100		VTE	1
16H	Aux Heat 572	1	14	15			50		VTE	1
17H	Aux Heat 522	1	16	17			190		VTE	1
18H	Aux Heat 501	1	18	19			200		VTE	1
19H	Aux Heat 471	1	20	21			200		VTE	1
20H	Emergency Lighting	1	25				43.4	1	VTI	1
21H	Auxiliary Heat	1	22				10.95	1	VTI	1
22H	Dry Cask	5	5				21.8		VTI	5
23H	Pump Heat	4	24				244.5		VTI	4
24H	Fuel Pool HX Rm	1	3				4.37		VTI	1
25H	Pump Room Fans	4	1				12.1		VTI	4
26H	Normal Lighing	1		26	0		1	27	VTI	1
27H	***SGTS Heater***	***2s2***	***27***	***28***			***19.9***		***VTI***	***2s2***
28H	***SGTS Fan Motor***	***1***	***2***				***1.944***		***VTI***	***1***

The trip number 27 is used to start the heater in volume 2s2 if the air temperature in the discharge volume 2s1 is less than 225°F (Assumption 6) and the SGTS fan has received a start signal established by Trip 2. To address the turning off of the heater an additional trip number 28 is provided to turn off the heater if the temperature in the discharge volume 2s1 exceeds 245°F (Assumption 7).

Table 7

Component Trips										
Trip #	Description	Sense Var.	Sensor 1 Loc.	Sensor 2 Loc.	Var. Limit	Set Point	Delay Time	Rset Trip	Cond Trip	Cond Type
1	Start Pump Room Coolers	TIME			UPPER	300	0			AND
2	Start SGTS	TIME			UPPER	120	0			AND
3	Start FP Cooler	TIME			UPPER	43200	0			AND
4	HVAC Isolation	TIME			UPPER	15	0			AND
5	Heat Load Starts	TIME			UPPER	0.1	0			AND
6	AH12H On	GAS TEMP	1		LOWER	68	1E+60	7		AND
7	AH12H Off	GAS TEMP	1		UPPER	70	0	6		AND
8	AH13H On	GAS TEMP	1		LOWER	74	1E+60	9		AND
9	AH13H Off	GAS TEMP	1		UPPER	77	0	8		AND
10	AH14H On	GAS TEMP	1		LOWER	71	1E+60	11		AND
11	AH14H Off	GAS TEMP	1		UPPER	73	0	10		AND
12	AH15H On	GAS TEMP	1		LOWER	70	1E+60	13		AND
13	AH15H Off	GAS TEMP	1		UPPER	73	0	12		AND
14	AH16H On	GAS TEMP	1		LOWER	62	1E+60	15		AND
15	AH16H Off	GAS TEMP	1		UPPER	64	0	14		AND
16	AH17H On	GAS TEMP	1		LOWER	70	1E+60	17		AND
17	AH17H Off	GAS TEMP	1		UPPER	73	0	16		AND
18	AH18H On	GAS TEMP	1		LOWER	71	1E+60	19		AND
19	AH18H Off	GAS TEMP	1		UPPER	73	0	18		AND
20	AH19H On	GAS TEMP	1		LOWER	73	1E+60	21		AND
21	AH19H Off	GAS TEMP	1		UPPER	75	0	20		AND
22	Main Building Coolers	TIME			UPPER	300	0			AND
23	OPEN REA/ROA	TIME			UPPER	1000000	1E+60			AND
24	Pump Heat	TIME			UPPER	30	0			AND
25	Emergency Lighting	TIME			UPPER	0.1	0			AND
26	Ensure OFF	TIME			UPPER	3600	0			AND
27	***SGTS Heater On***	***GAS TEMP***	***2s1***		***LOWER***	***225***	***0***	***28***	***2***	***AND***
28	***SGTS Heater Off***	***GAS TEMP***	***2s1***		***UPPER***	***245***	***0***	***27***		***AND***

Case Description

The model used to perform the analysis is described in full detail in References 1 and 2. The modifications made to address this sensitivity case are outlined in the previously presented Modeling Inputs section of this analysis. The analysis presented here assumes a different location for the SGTS heater input than documented in either Reference 1 or 2, and includes a heat load for the fan motor. All initial conditions and external wind and temperature conditions are identical with that assumed in Reference 2.

Results:

The results of this analysis are documented in Figures 1 through 18. Table 8 documents the GOTHIC Input deck name and the time to restore building differential pressure.

Table 8 – Timing Response

GOTHIC Deck	Time to Reach 0.25"WG	Time to Reach 0"WG
TNMRelHeaterR6.GTH	972.4 seconds	462.43 seconds

The DP criteria illustrated in Figure 1 shows that the differential pressure criteria stabilizes at approximately 4 million seconds (46 days 7 hours) after the event. Once a vacuum of >0.25" WG is established it does not drop below this value throughout the 10 million seconds (>115 days) analysis time.

NOTE: Figure 1 shows inches of WG Vacuum so a larger number, i.e. 0.5, indicates a lower pressure inside the secondary containment.

The pressure response of each of the three building volumes (Refueling Floor Volume, Main Building Volume, and Pump Rooms Volume) are illustrated in Figure 2. The impact that room air cooler water temperature as well as Fuel Pool Cooling start time have on the building pressure response can be seen in Figures 1 and 2. The increase in cooling water temperature causes a slight increase in building pressure. This is to be expected as temperature increases within the building illustrated in Figure 3. The start of fuel pool cooling (Figure 4) leads to a reduction in both fuel pool water temperature as well as refueling floor vapor temperature (Figure 3). This leads to a pressure reduction illustrated in Figure 2 and an increase in differential pressure illustrated in Figure 1.

The mass flow into and out of the building are illustrated in Figure 5. As can be seen by the flows provided on this figure the steady condition is reached at approximately 4 million seconds. Figure 6 provides a comparison of the upper and lower leakage flow rates as a function of differential pressure.

Figure 7 through 10 illustrate the heat loads and cooler response. Figures 11 through 13 illustrate the response of conductors heated by primary containment conditions.

Finally, Figures 14 and 15 provide the relative humidity of the volumes and steam mass ratios respectively. The impact of fuel pool cooling on the building humidity can be seen in these same figures. As water evaporates from the fuel pool the steam mass ratio and relative humidity rise rapidly on the refueling floor. The remaining building volumes lag behind, but soon follow with increases in both relative humidity and steam mass ratio. Once fuel pool cooling is started the steam mass ratio on the refueling floor begins to decrease. The pump room and main building volumes lag behind, but also show a decrease. The relative humidity stays high on the refueling

floor, but decreases in the other volumes. This is to be expected since as Figure 3 illustrates the water temperature on the refueling floor is superheated relative to the vapor temperature.

Figure 16 shows the SGTS heater comes on just prior to the fan start as expected. The temperature rise within the system never reaches the set point to trip the heater off, which validates the Assumption 7.

Figure 17 and 18 show the fan volumetric flow as a function of time. As can be seen once the vacuum criteria are met the fan flow drops off to that associated with the 25% closed curve described in Assumption 10. For the remainder of the run the fan remains on this curve since the building vacuum criteria is maintained throughout. The fan heat, SGTS heater and fan motor heat input is illustrated in Figure 18. This figure shows that these heaters behave as specified in the inputs.

Conclusions:

This evaluation demonstrates that with the SGTS heater located in the suction side volume of the model and with building conditions based on 0.0" Water Gauge (Reference 2) the SGTS response to a LOOP/LOCA is sufficient to establish 0.25" water gauge vacuum in less than 20 minutes. Moreover, the building conditions are maintained with a building vacuum of ≥0.25" WG throughout the analysis and a steady state pressure condition is achieved.

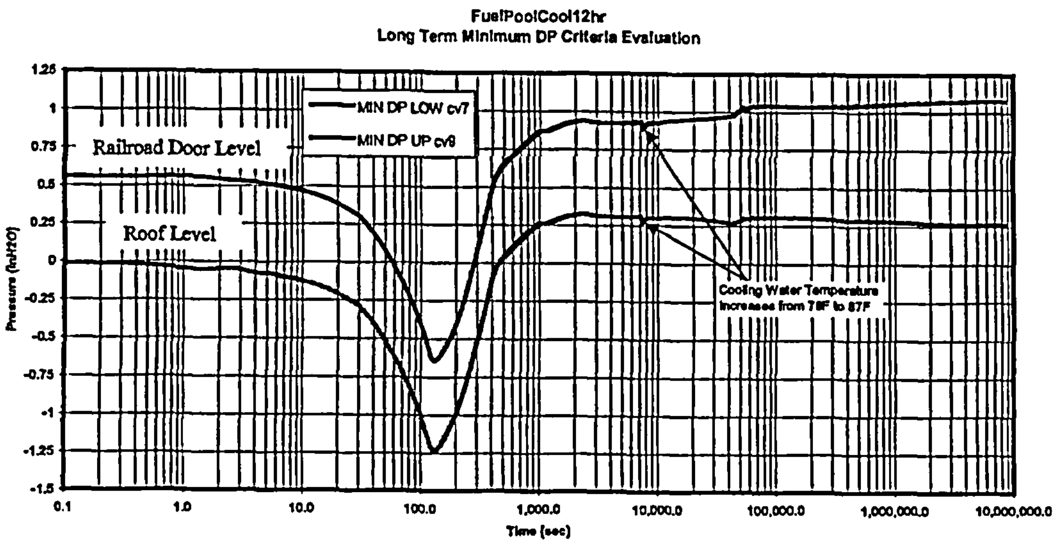
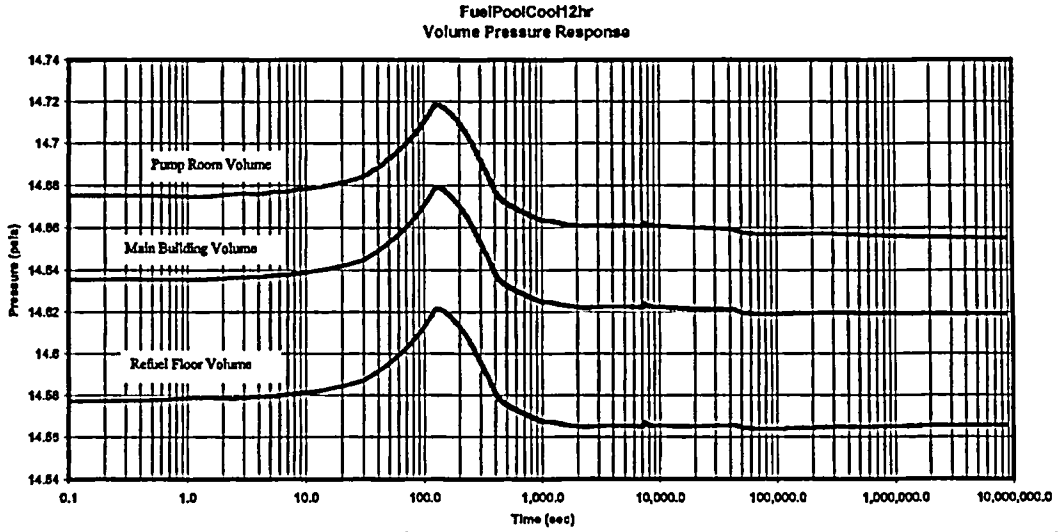

FuelPoolCool12hr
Long Term Minimum DP Criteria Evaluation
MIN DP LOW cv7
MIN DP UP cv9
Railroad Door Level
Roof Level
Cooling Water Temperature Increases from 78F to 87F
Pressure (inH2O)
Time (sec)
1.25
1
0.75
0.5
0.25
0
-0.25
-0.5
-0.75
-1
-1.25
-1.5
0.1
1.0
10.0
100.0
1,000.0
10,000.0
100,000.0
1,000,000.0
10,000,000.0

Figure 1



FuelPoolCool12hr
Volume Pressure Response
Pressure (psia)
Time (sec)
Pump Room Volume
Main Building Volume
Refuel Floor Volume
14.74
14.72
14.7
14.68
14.66
14.64
14.62
14.6
14.58
14.56
14.54
0.1
1.0
10.0
100.0
1,000.0
10,000.0
100,000.0
1,000,000.0
10,000,000.0

Figure 2

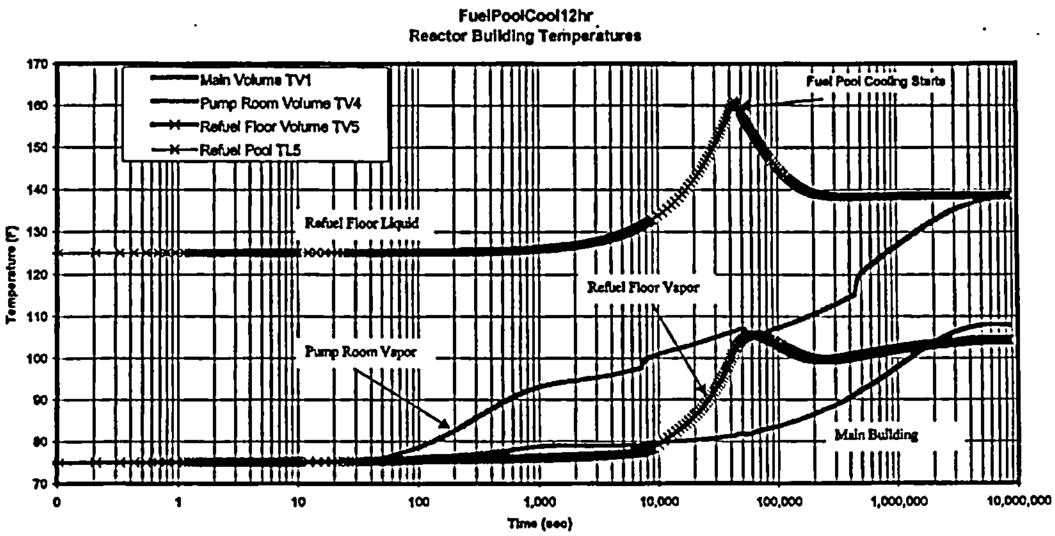
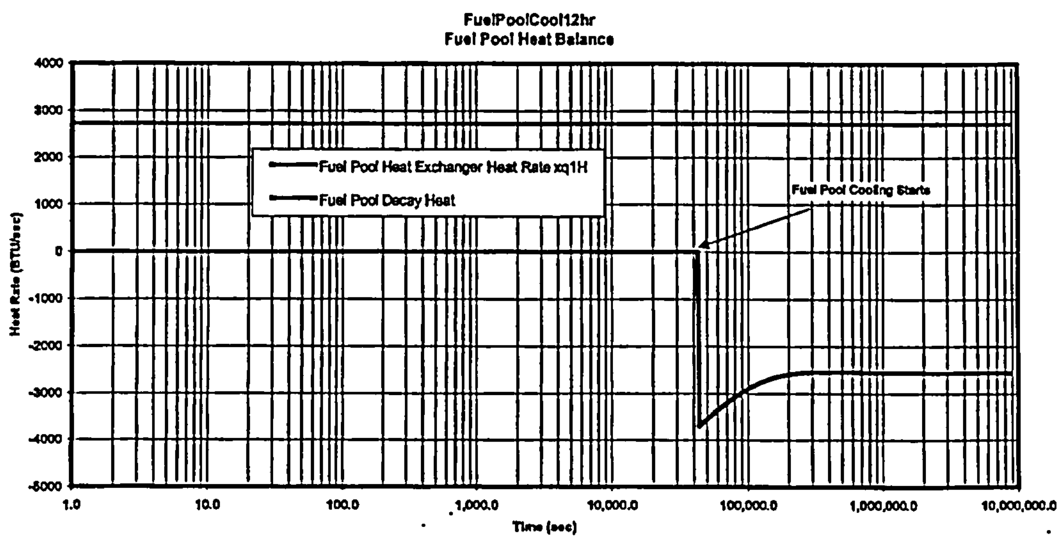
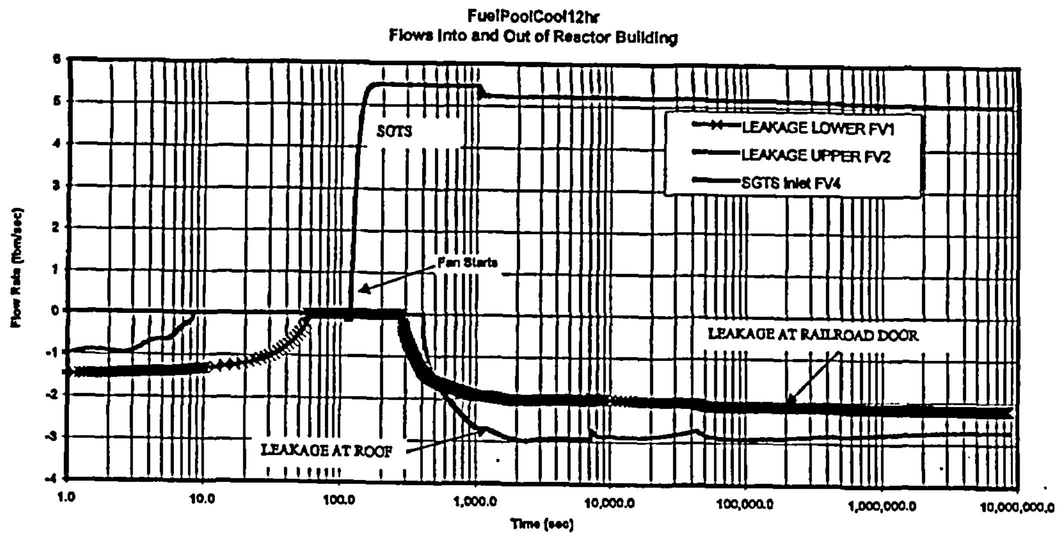

FuelPoolCool12hr
Reactor Building Temperatures
Main Volume TV1
Pump Room Volume TV4
Refuel Floor Volume TV5
Refuel Pool TL5
Fuel Pool Cooling Starts
Refuel Floor Liquid
Refuel Floor Vapor
Pump Room Vapor
Main Building
Temperature (F)
Time (sec)
170
160
150
140
130
120
110
100
90
80
70
0
1
10
100
1,000
10,000
100,000
1,000,000
10,000,000

Figure 3



FuelPoolCool12hr
Fuel Pool Heat Balance
Fuel Pool Heat Exchanger Heat Rate xq1H
Fuel Pool Decay Heat
Fuel Pool Cooling Starts
Heat Rate (BTU/sec)
Time (sec)
4000
3000
2000
1000
0
-1000
-2000
-3000
-4000
-5000
1.0
10.0
100.0
1,000.0
10,000.0
100,000.0
1,000,000.0
10,000,000.0

Figure 4



FuelPoolCool12hr
Flows Into and Out of Reactor Building
Flow Rate (lbm/sec)
Time (sec)
LEAKAGE LOWER FV1
LEAKAGE UPPER FV2
SGTS Inlet FV4
SGTS
Fan Starts
LEAKAGE AT RAILROAD DOOR
LEAKAGE AT ROOF
1.0
10.0
100.0
1,000.0
10,000.0
100,000.0
1,000,000.0
10,000,000.0

Figure 5

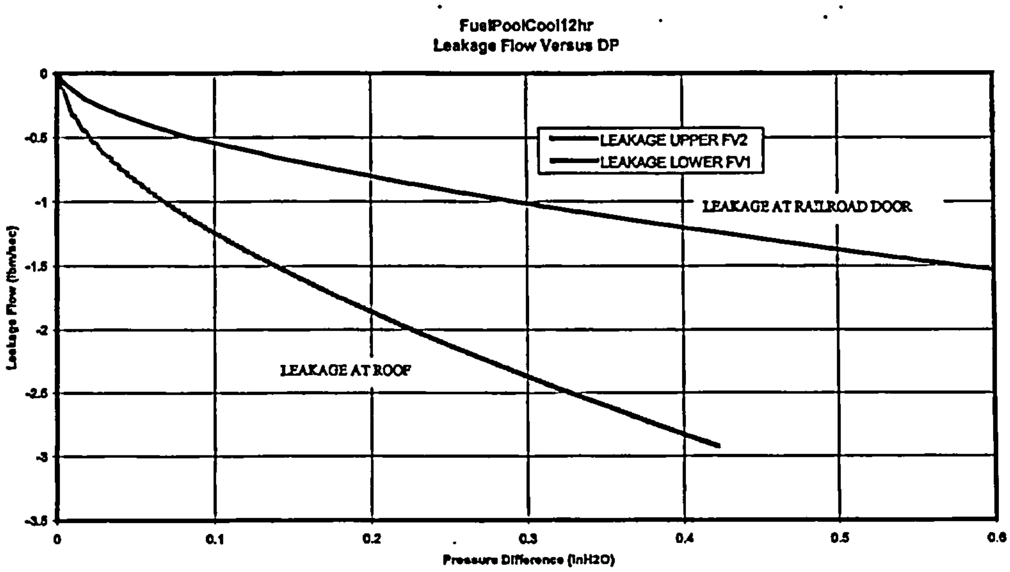
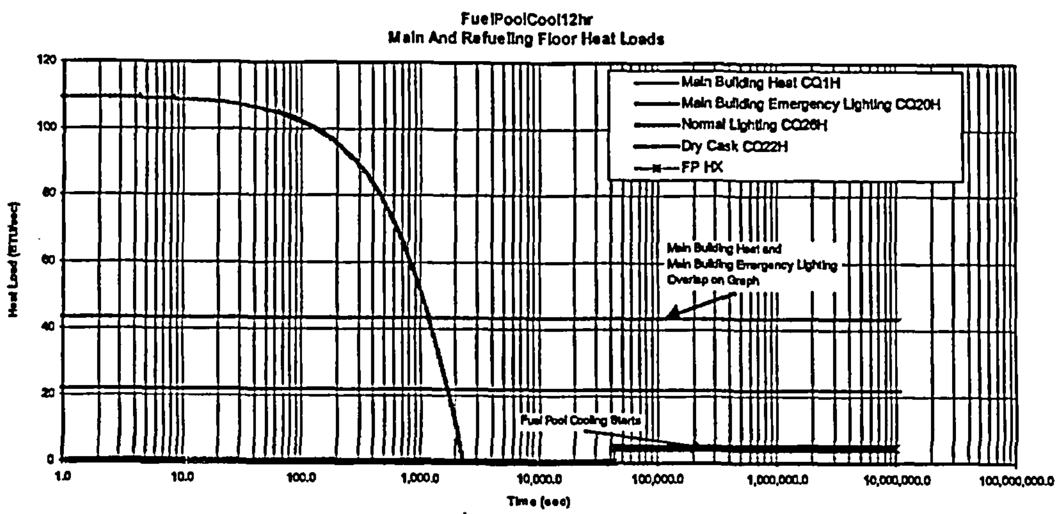

FuelPoolCool12hr
Leakage Flow Versus DP
LEAKAGE UPPER FV2
LEAKAGE LOWER FV1
LEAKAGE AT RAILROAD DOOR
LEAKAGE AT ROOF
Leakage Flow (lbm/sec)
Pressure Difference (inH2O)
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
0
0.1
0.2
0.3
0.4
0.5
0.6

Figure 6



FuelPoolCool12hr
Main And Refueling Floor Heat Loads
Heat Load (BTU/sec)
120
100
80
60
40
20
0
1.0
10.0
100.0
1,000.0
10,000.0
100,000.0
1,000,000.0
10,000,000.0
100,000,000.0
Time (sec)
Main Building Heat CQ1H
Main Building Emergency Lighting CQ20H
Normal Lighting CQ26H
Dry Cask CQ22H
FP HX
Main Building Heat and
Main Building Emergency Lighting
Overlap on Graph
Fuel Pool Cooling Starts

Figure 7

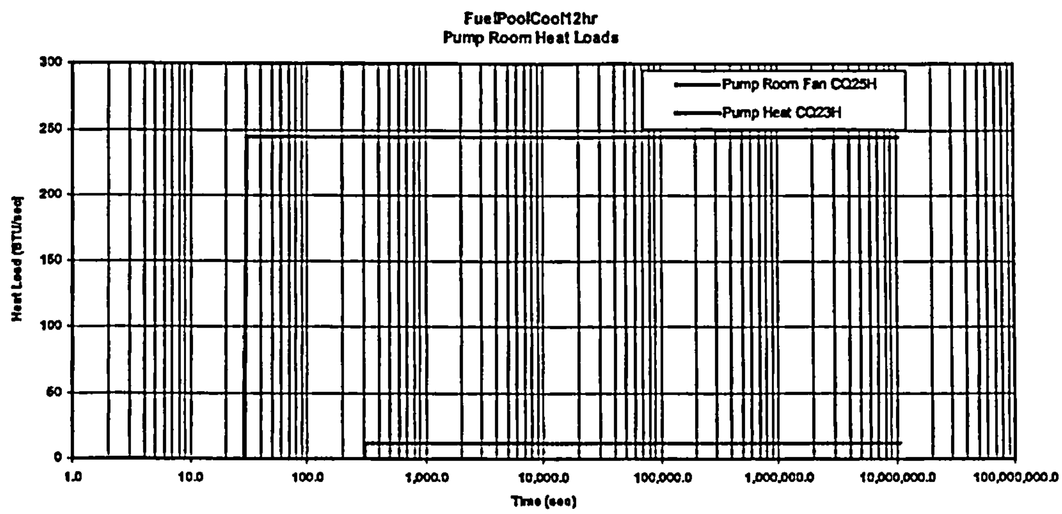
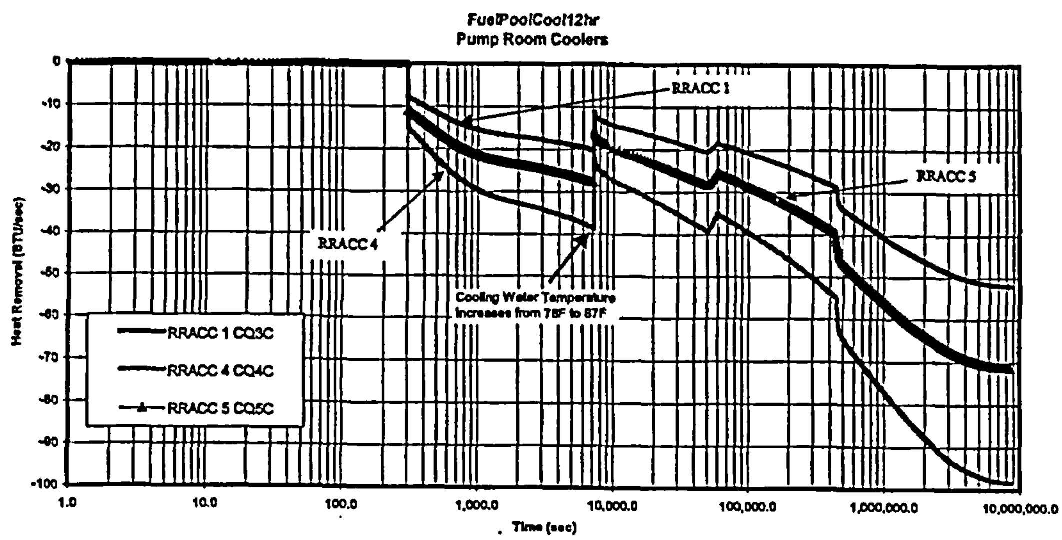
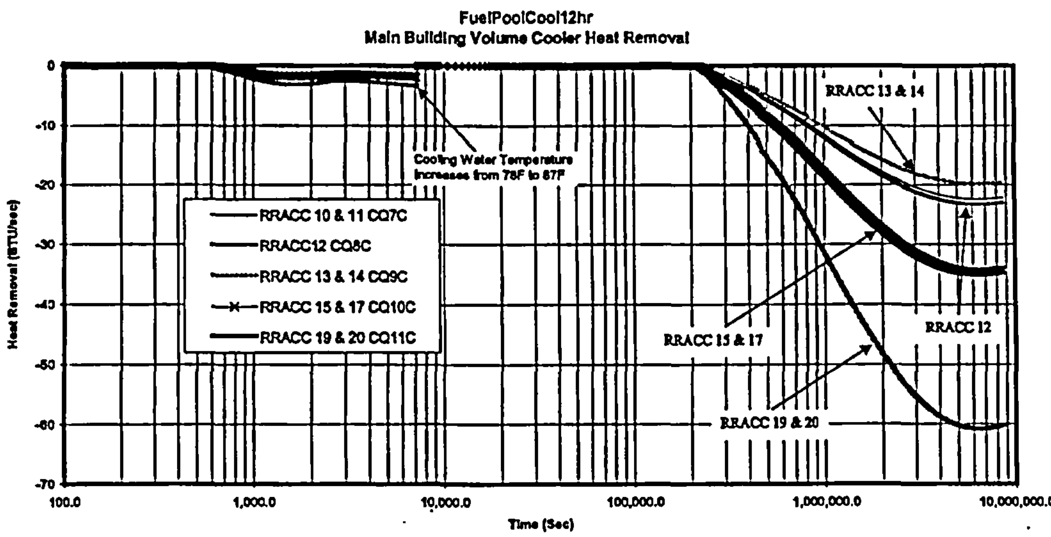

FuelPoolCool12hr
Pump Room Heat Loads
Pump Room Fan CO25H
Pump Heat CO23H
Heat Load (BTU/sec)
Time (sec)
300
250
200
150
100
50
0
1.0
10.0
100.0
1,000.0
10,000.0
100,000.0
1,000,000.0
10,000,000.0
100,000,000.0

Figure 8



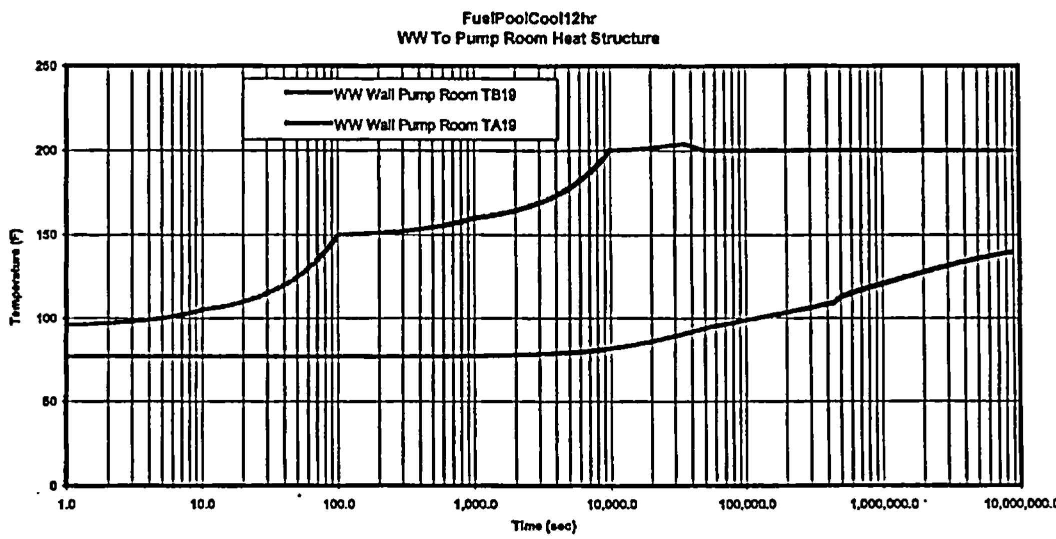
FuelPoolCool12hr
Pump Room Coolers
RRACC 1
RRACC 5
RRACC 4
Cooling Water Temperature Increases from 78F to 87F
RRACC 1 CQ3C
RRACC 4 CQ4C
RRACC 5 CQ5C
Heat Removal (BTU/sec)
Time (sec)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
1.0
10.0
100.0
1,000.0
10,000.0
100,000.0
1,000,000.0
10,000,000.0

Figure 9



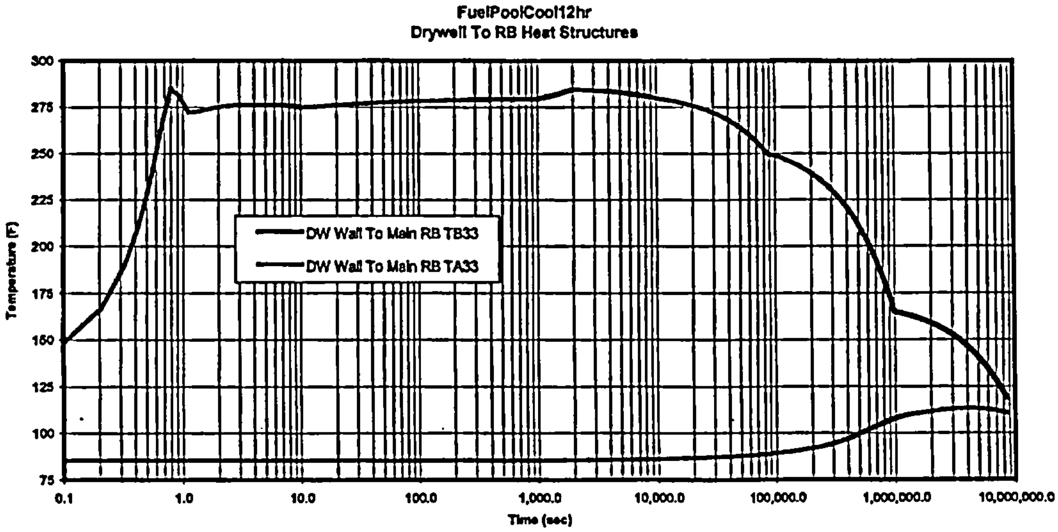
FuelPoolCool12hr
Main Building Volume Cooler Heat Removal
Heat Removal (BTU/sec)
Time (Sec)
0
-10
-20
-30
-40
-50
-60
-70
100.0
1,000.0
10,000.0
100,000.0
1,000,000.0
10,000,000.0
Cooling Water Temperature Increases from 78F to 87F
RRACC 10 & 11 CQ7C
RRACC12 CQ8C
RRACC 13 & 14 CQ9C
RRACC 15 & 17 CQ10C
RRACC 19 & 20 CQ11C
RRACC 13 & 14
RRACC 15 & 17
RRACC 12
RRACC 19 & 20

Figure 10



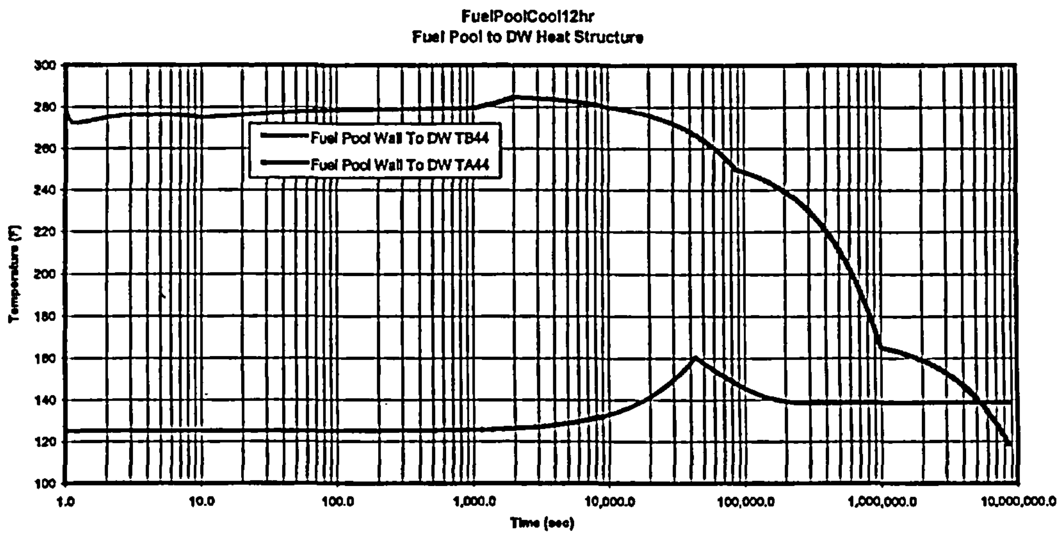
FuelPoolCool12hr
WW To Pump Room Heat Structure
WW Wall Pump Room TB19
WW Wall Pump Room TA19
Temperature (F)
250
200
150
100
50
0
1.0
10.0
100.0
1,000.0
10,000.0
100,000.0
1,000,000.0
10,000,000.0
Time (sec)

Figure 11



FuelPoolCool12hr
Drywell To RB Heat Structures
DW Wall To Main RB TB33
DW Wall To Main RB TA33
Temperature (F)
300
275
250
225
200
175
150
125
100
75
0.1
1.0
10.0
100.0
1,000.0
10,000.0
100,000.0
1,000,000.0
10,000,000.0
Time (sec)

Figure 12



FuelPoolCool12hr
Fuel Pool to DW Heat Structure
Fuel Pool Wall To DW TB44
Fuel Pool Wall To DW TA44
Temperature (F)
300
280
260
240
220
200
180
160
140
120
100
1.0
10.0
100.0
1,000.0
10,000.0
100,000.0
1,000,000.0
10,000,000.0
Time (sec)

Figure 13

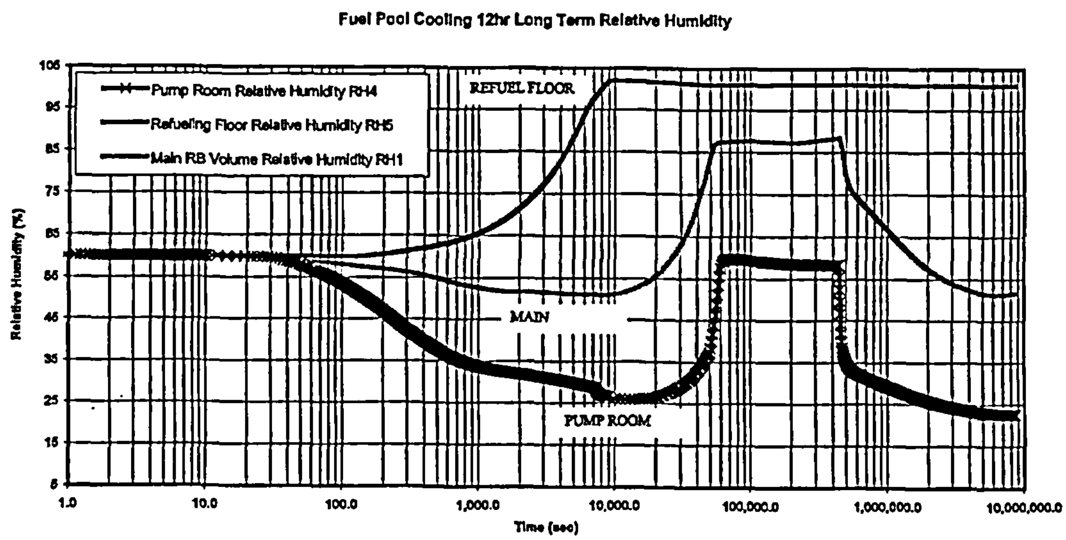

Fuel Pool Cooling 12hr Long Term Relative Humidity
Pump Room Relative Humidity RH4
Refueling Floor Relative Humidity RH5
Main RB Volume Relative Humidity RH1
REFUEL FLOOR
MAIN
PUMP ROOM
Relative Humidity (%)
Time (sec)
105
95
85
75
65
55
45
35
25
15
5
1.0
10.0
100.0
1,000.0
10,000.0
100,000.0
1,000,000.0
10,000,000.0

Figure 14

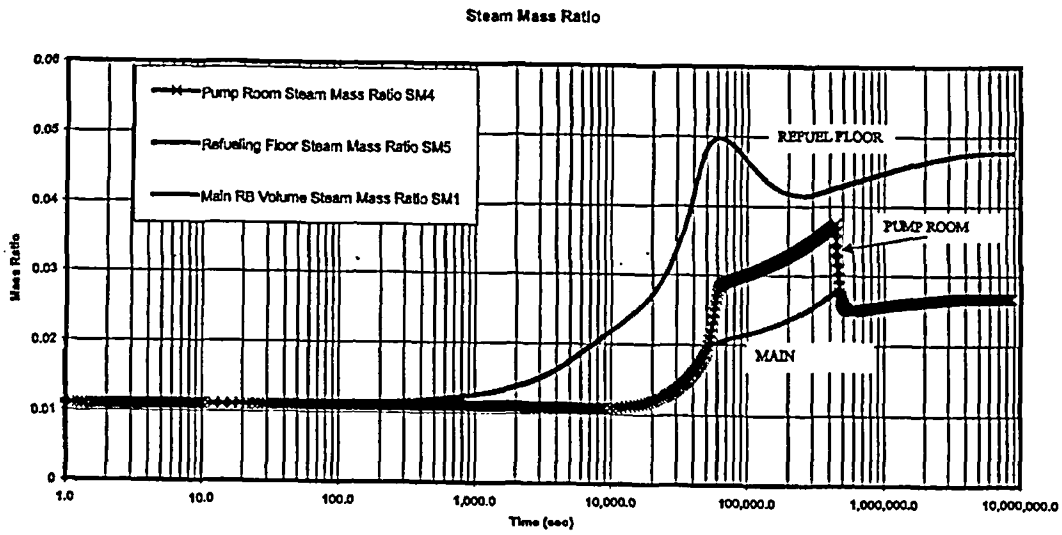

Steam Mass Ratio
Pump Room Steam Mass Ratio SM4
Refueling Floor Steam Mass Ratio SM5
Main RB Volume Steam Mass Ratio SM1
REFUEL FLOOR
PUMP ROOM
MAIN
Mass Ratio
Time (sec)
0.06
0.05
0.04
0.03
0.02
0.01
0
1.0
10.0
100.0
1,000.0
10,000.0
100,000.0
1,000,000.0
10,000,000.0

Figure 15

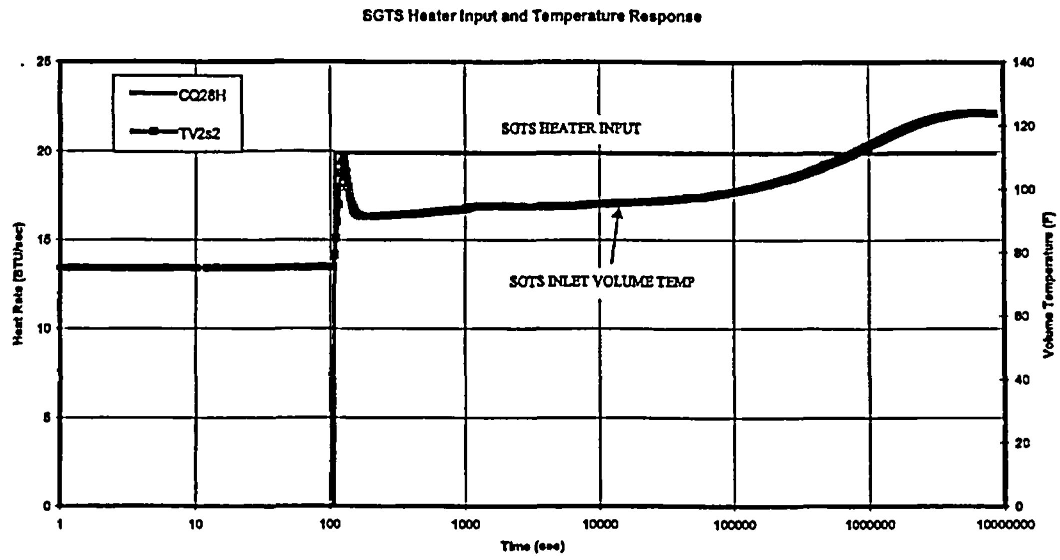

SGTS Heater Input and Temperature Response
CQ28H
TV2s2
SGTS HEATER INPUT
SGTS INLET VOLUME TEMP
Heat Rate (BTU/sec)
Volume Temperature (F)
Time (sec)
0
5
10
15
20
25
0
20
40
60
80
100
120
140
1
10
100
1000
10000
100000
1000000
10000000

Figure 16

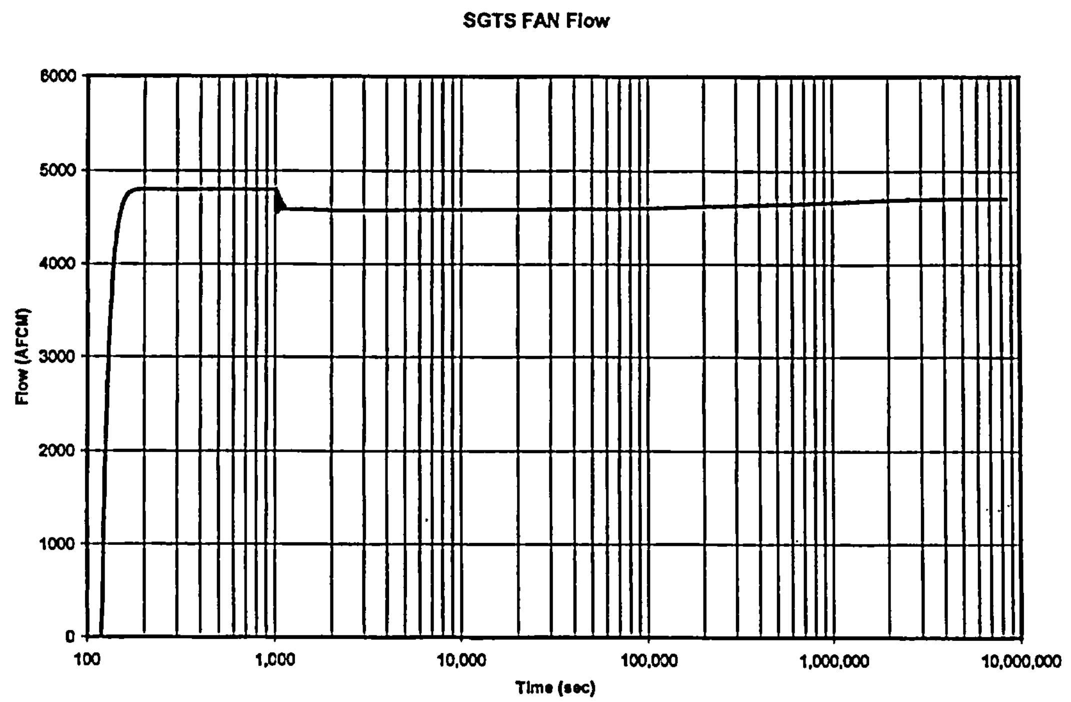


Figure 17 –Volumetric Fan Flow

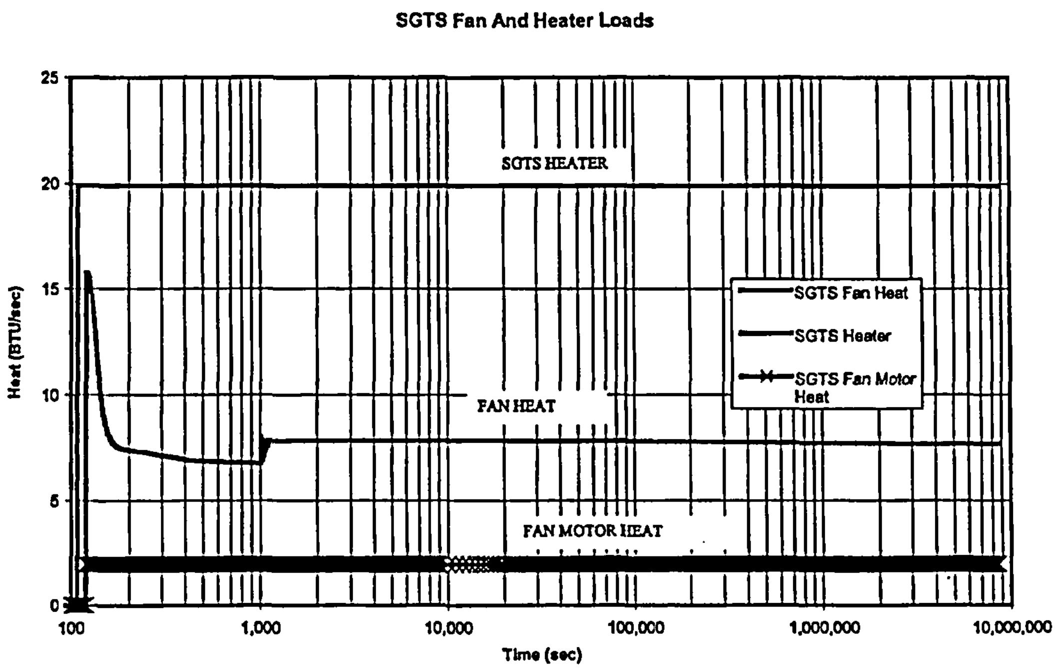


Figure 18 – SGTS Associated Heat Loads

Appendices:

1.	GOTHIC INPUT DECK	90 Pages
2.	Design Verification	2 Pages
3.	Fan Motor Specification	5 Pages

APPENDIX 1

GOTHIC INPUT DECK

Control Volumes							
Vol #	Description	Vol (ft3)	Elev (ft)	Ht (ft)	Hyd. D. (ft)	L/V IA (ft2)	Burn Opt
1	Reactor Building	1804568.96	441	163.875	28.9	DEFAULT	NONE
2s	SGTS Fan Inlet	1000	577	1.5	1.5	DEFAULT	NONE
3	Fuel Pool Piping	10	568.125	1	1	DEFAULT	NONE
4	Pump Rooms	345121.1	422.25	46.75	69.07	DEFAULT	NONE
5	Fuel Pool Floor	1321336.77	604.367	63.303	31.34	1360	NONE
6	Fan Duct	270	577	1.5	1000000	DEFAULT	NONE

Laminar Leakage									
Vol #	Lk Rate Factor (%/hr)	Ref Press (psia)	Ref Temp (F)	Ref Humid (%)	Sink /Src BC	Model Option	Rep Wall	Subvol Option	Leak Area (ft2)
1	0					CNST T		UNIFORM	DEFAULT
2	0					CNST T		UNIFORM	DEFAULT
3	0					CNST T		UNIFORM	DEFAULT
4	0					CNST T		UNIFORM	DEFAULT
5	0					CNST T		UNIFORM	DEFAULT
6	0					CNST T		UNIFORM	DEFAULT

Turbulent Leakage										
Vol #	Lk Rate Factor (%/hr)	Ref Press (psia)	Ref Temp (F)	Ref Humid (%)	Sink /Src BC	Model Option	Rep Wall	Subvol Option	Leak Area (ft2)	fL/D
1	0					CNST T		UNIFORM	DEFAULT	
2	0					CNST T		UNIFORM	DEFAULT	
3	0					CNST T		UNIFORM	DEFAULT	
4	0					CNST T		UNIFORM	DEFAULT	
5	0					CNST T		UNIFORM	DEFAULT	
5	0					CNST T		UNIFORM	DEFAULT	

X-Direction Noding		
Volume 2s		
Cell Plane	Distance (ft)	Width (ft)
1	0	12.91
2	12.91	12.9099
Y-Direction Noding		
Volume 2s		

Cell Plane	Distance (ft)	Depth (ft)
1	0	25.8199

Z-Direction Noding		
Volume 2s		
Cell Plane	Distance (ft)	Height (ft)
1	0	1.5

Cell Blockages - Table 1											
Volume 2s											
Blockage No.	Description	Type									
Cell Blockages - Table 2											
Volume 2s											
Blockage			Coordinates & Dimensions				(ft)				Curb
No.	X1	Y1	Z1	X2	Y2	Z2	X3	Y3	Z3	L	Height
X-Direction Cell Face Variations											
Volume 2s											
Cell No.	Blockage No.	Area Porosity	Hyd. Dia. (ft)	Loss Coeff.	Drop De-ent. Factor						
def	0	1	1000000	0	0						
2s1	0	0.0456	1.5	28.989	0						
2s2	0	0.0456	1.5	28.989	0						
Y-Direction Cell Face Variations											
Volume 2s											
Cell No.	Blockage No.	Area Porosity	Hyd. Dia. (ft)	Loss Coeff.	Drop De-ent. Factor						
def	0	1	1000000	0	0						
Z-Direction Cell Face Variations											
Volume 2s											

Cell	Blockage	Area	Hyd. Dia.	Loss	Drop De-ent.	Curb Ht					
No.	No.	Porosity	(ft)	Coeff.	Factor	(ft)					
def	0	1	1000000	0	0						
Volume Variations											
Volume 2s											
Cell	Blockage	Volume	Hyd. Dia.								
No.	No.	Porosity	(ft)								
def	0	1	1000000								

Fluid Boundary Conditions - Table 1												
		Press.		Temp.		Flow		S	J	ON	OFF	Elev.
BC#	Description	(psia)	FF	(F)	FF	(lbm/s)	FF	P	O	Trip	Trip	(ft)
1F	Ground Leakage	14.68294		28		v0.017	22	NO	NO			468.5
2F	Roof Leakage	14.56511		28		v0.017	21	NO	NO			667
3P	Elevated Release	14.56832		28				NO	NO			671.17
4F	Fuel Pool Cooling	14.7		120		-78.958	19	NO	NO	3		568.124
5C	Fuel Pool Cooling	14.7		120		0		NO	NO			568.125

Fluid Boundary Conditions - Table 2													
	Liq. V.		Stm.		Drop D.		Cpld	Flow		Heat		Outlet	
BC#	Frac.	FF	P.R.	FF	(in)	FF	BC#	Frac.	FF	(Btu/s)	FF	Quality	FF
1F	0		0		NONE							DEFAULT	
2F	0		0		NONE							DEFAULT	
3P			0		NONE							DEFAULT	
4F	1		1		NONE							DEFAULT	
5C	1		1		NONE		4F	1				DEFAULT	

Fluid Boundary Conditions - Table 3								
Gas Pressure Ratios								
	Air							
BC#	Gas 1	FF	Gas 2	FF	Gas 3	FF	Gas 4	FF
1F	1							
2F	1							
3P	1							
4F	0							
5C	0							

Fluid Boundary Conditions - Table 4								
Gas Pressure Ratios								
BC#	Gas 5	FF	Gas 6	FF	Gas 7	FF	Gas 8	FF
1F								
2F								
3P								
4F								
5C								

Flow Paths - Table 1							
F.P. #	Description	Vol A	Elev (ft)	Ht (ft)	Vol B	Elev (ft)	Ht (ft)
1	Ground Leakage	1	468.5	0.5	1F	468.5	0.5
2	Elevated Leakage	5	667	0.1	2F	667	0.1
3	SGTS	2s1	577	1.5	3P	671.17	1.5
4	SGTS Inlet	1	577	1.5	2s2	577	1.5
5	FP Cooling In	5	604.4	1	4F	568.124	1
6	FP Cooling Outlet	3	568.125	1	5C	568.125	1
7	FPHX	3	568.125	1	5	604.4	1
8	Pump Room to Main Building	4	466	0.1	1	471	0.1
9	Pump Room to Main Building	4	422.25	16.7	1	441	0.0104
10	Main Building to Fuel Floor	1	572	0.1	5	607	0.1
11	SGTS Fan	2s1	577	1.5	6	577	1.5

Flow Paths - Table 2								
Flow Path #	Flow Area (ft2)	Hyd. Diam. (ft)	Inertia Length (ft)	Friction Length (ft)	Relative Rough-ness	Dep Bend (deg)	Mom Trn Opt	Strat Flow Opt
1	0.36	0.68	136	1			-	NONE
2	0.85	1.04	130	1			-	NONE
3	1.767	1.5	10	157.81			-	NONE
4	1.767	1.5	10	1			-	NONE
5	0.216	1	1	1			-	NONE
6	0.216	1	1	1			-	NONE
7	0.216	1	1	1			-	NONE
8	191.41	1.77	105.31	2			-	NONE
9	16.83	1.4	105.31	2			-	NONE
10	409.61	11.89	112.33	2			-	NONE
11	1.767	1.5	10	0.01			-	NONE

Flow Paths - Table 3						
Flow Path #	Fwd. Loss Coeff.	Rev. Loss Coeff.	Comp. Opt.	Critical Flow Model	Exit Loss Coeff.	Drop Breakup Model
1	1E+18	1	OFF	OFF	0	OFF
2	1E+18	1	OFF	OFF	0	OFF
3	4	4	OFF	OFF	0	OFF
4	5.644	5.644	OFF	OFF	0	OFF
5			OFF	OFF	0	OFF
6			OFF	OFF	0	OFF
7			OFF	OFF	0	OFF
8	1.52	1.52	OFF	OFF	0	OFF
9	1.5	1.5	OFF	OFF	0	OFF
10	1.5	1.5	OFF	OFF	0	OFF
11			OFF	OFF	0	OFF

Thermal Conductors - Table 1									
Cond #	Description	Vol A	HT Co	Vol B	HT Co	Cond Type	S. A. (ft2)	Init. T.(F)	Or
1	ECCS Unin Pipe	4	7	4	4	1	2307.56	75	I
2	ECCS Ins Pipe	4	7	4	5	2	642.19	75	I
3	FP Unin Pipe	1	8	1	6	3	406.34	75	I
4	Pump Rm Ex Wall	4	9	4	3	15	1958.06	75	I
5	Pump Rm Ex Wall	4	9	4	3	18	4359.37	75	I
6	Pump Rm Ex Wall	4	9	4	3	21	714	75	I
7	Pump Rm Ex Wall	4	9	4	3	25	133	75	I
8	Pump Rm Coor Wall	4	9	4	3	15	1405.68	75	I
9	Pump Rm Coor Wall	4	9	4	3	18	1026.37	75	I
10	Pump Rm Coor Wall	4	9	4	3	25	208.25	75	I
11	Pump Rm Ceiling	4	11	1	10	5	2908	75	X
12	Pump Rm Ceiling	4	11	1	10	9	3117	75	X
13	Pump Rm RB Wall	4	9	1	9	14	5630.62	75	X
14	Pump Rm RB Wall	4	9	1	9	18	121.87	75	X
15	Pump Rm RB Wall	4	9	1	9	19	706.87	75	X
16	Pump Rm Int Wall	4	9	4	9	31	4743.45	75	I
17	Pump Rm Int Wall	4	9	4	9	21	97.5	75	I
18	Pump Rm Int Wall	4	9	4	9	24	5975	75	I
19	Pump Rm WW Wall	4	9	4	7	28	5676.25	75	I
20	Aux Rm Floor	4	11	1	10	9	92	75	X
21	Aux Rm Ex Wall	1	9	1	3	13	1324	75	I
22	Aux Rm Int Wall	1	9	1	9	4	4995.25	75	I
23	Aux Rm Int Wall	1	9	1	9	5	444.5	75	I
24	Aux Rm Int Wall	1	9	1	9	7	1241.5	75	I
25	Aux Rm Int Wall	1	9	1	9	15	322	75	I
26	Aux Rm Int Wall	1	9	1	9	17	264.5	75	I

Thermal Conductors - Table 1									
Cond #	Description	Vol A	HT Co	Vol B	HT Co	Cond Type	S. A. (ft2)	Init. T.(F)	Or
27	Aux Rm Int Wall	1	9	1	9	25	450.85	75	I
28	Aux Rm Int Wall	1	9	1	9	27	40.25	75	I
29	Aux Rm Int Wall	1	9	1	9	4	1149.36	75	I
30	Aux Rm Int Wall	1	9	1	9	5	814.31	75	I
31	Aux Rm Int Wall	1	9	1	9	9	150	75	I
32	Aux Rm Int Wall	1	9	1	9	12	101.66	75	I
33	Aux Rm DW Wall	1	9	1	1	20	289	75	I
34	Aux Rm FP Wall	1	9	1	12	23	422.875	75	I
35	Misc Wall	1	9	1	9	4	9789.87	75	I
36	Misc Wall	1	9	1	9	6	5445.41	75	I
37	Misc Wall	1	9	1	9	10	1704	75	I
38	Misc Wall	1	9	1	9	16	2334.49	75	I
39	Main Ex Wall	1	9	1	3	8	24402.43	75	I
40	Main Ex Wall	1	9	1	3	11	44567.01	75	I
41	Floor	1	11	1	10	9	55700.9	75	I
42	DW Wall	1	9	1	1	22	9443.95	75	I
43	DW Wall	1	9	1	1	26	13332.51	75	I
44	FP to DW Wall	5	12	5	1	20	1743.75	75	I
45	FP to Main Build	1	12	5	9	21	4378.75	75	X
46	Ex Wall	5	9	5	3	29	34800.06	75	I
47	Roof	5	11	5	3	30	20194.28	75	I
48	Floor	1	11	5	10	9	16205.5	75	X

Thermal Conductors - Table 2				
Cond #	Therm. Rad. Side A	Emiss. Side A	Therm. Rad. Side B	Emiss. Side B
1	No		No	
2	No		No	
3	No		No	
4	No		No	
5	No		No	
6	No		No	
7	No		No	
8	No		No	
9	No		No	
10	No		No	
11	No		No	
12	No		No	
13	No		No	
14	No		No	
15	No		No	
16	No		No	
17	No		No	
18	No		No	
19	No		No	
20	No		No	
21	No		No	
22	No		No	
23	No		No	
24	No		No	
25	No		No	
26	No		No	
27	No		No	
28	No		No	
29	No		No	
30	No		No	
31	No		No	
32	No		No	
33	No		No	
34	No		No	
35	No		No	
36	No		No	
37	No		No	
38	No		No	
39	No		No	
40	No		No	
41	No		No	
42	No		No	
43	No		No	

Thermal Conductors - Table 2				
Cond #	Therm. Rad. Side A	Emiss. Side A	Therm. Rad. Side B	Emiss. Side B
44	No		No	
45	No		No	
46	No		No	
47	No		No	
48	No		No	

Heat Transfer Coefficient Types - Table 1									
Type #	Heat Transfer Option	Nominal Value	FF	Cnd/ Cnv Opt	Cnd Opt	Sp Cnv HTC	Nat Cnv Opt	For Cnv Opt	Rad Opt
1	Sp Ambient and HTC	1	14			2			
2	Sp Conv HTC	1	18						OFF
3	Sp Heat Flux	0							
4	Direct			ADD	UCHIDA		HORZ CYL	OFF	ON
5	Direct			ADD	UCHIDA		HORZ CYL	OFF	ON
6	Direct			ADD	UCHIDA		HORZ CYL	OFF	ON
7	Sp Temp	1	26						
8	Sp Temp	1	25						
9	Direct			ADD	UCHIDA		VERT SURF	OFF	ON
10	Direct			ADD	UCHIDA		FACE UP	OFF	ON
11	Direct			ADD	UCHIDA		FACE DOWN	OFF	ON
12	Correlation Set						VERT SURF	OFF	OFF

Heat Transfer Coefficient Types - Table 2

Type #	Phase Opt	Min Liq Fract	Max Liq Fract	Convection Bulk Temp Model	FF	Condensation Bulk Temp Model	FF
1							
2	VAP			Tg-Tw			
3							
4	VAP			Tg-Tf		Tb-Tw	
5	VAP			Tg-Tf		Tb-Tw	
6	VAP			Tg-Tf		Tb-Tw	
7							
8							
9	VAP			Tg-Tf		Tb-Tw	
10	VAP			Tg-Tf		Tb-Tw	
11	VAP			Tg-Tf		Tb-Tw	
12	LIQ			Tg-Tw			

Heat Transfer Coefficient Types - Table 3

Type #	Char. Length (ft)	Nat Conv Coef FF	Exp FF	For Conv Coef FF	Exp FF	Nom Vel (ft/s)	Vel FF	Minimum Conv HTC (B/h-f2-F)	Char. Height (ft)
1									
2									
3									
4	1.75							DEFAULT	
5	1.83							DEFAULT	
6	0.61							DEFAULT	
7									
8									
9								DEFAULT	

10								DEFAULT	
11								DEFAULT	
12								DEFAULT	

HTC Types - Table 4

Type #	Const CT	Total Heat (Btu)	Peak Time (sec)	Exp XT	Initial Value (B/h-f2-F)	BD Exp yt	Post-BD Exp xt	Post-BD Direct FF
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

LSW 9/30/04

Intentionally Left Blank

Thermal Conductor Types							
Type #	Description	Geom	Thick. (in)	O.D. (in)	Regions	Heat (Btu/ft3-s)	Heat FF
1	ECCS Uninsulated	TUBE	0.38	21.02	2	0	
2	ECCS Insulated	TUBE	2.38	22	29	0	
3	FUEL POOL UNIN	TUBE	0.29	7.31	1	0	
4	Concrete 12"	WALL	12	0	13	0	
5	Concrete 18"	WALL	18	0	20	0	
6	Concrete 23.16	WALL	23.16	0	21	0	
7	Concrete 23.36"	WALL	23.36	0	21	0	
8	Concrete 23.83"	WALL	23.83	0	11	0	
9	Concrete 24"	WALL	24	0	15	0	
10	Concrete 27.79"	WALL	27.79	0	22	0	
11	Concrete 28.41"	WALL	28.41	0	12	0	
12	Concrete 32"	WALL	32	0	22	0	
13	Concrere 33.98"	WALL	33.98	0	12	0	
14	Concrete 35.12	WALL	35.12	0	22	0	
15	Concrete 36"	WALL	36	0	22	0	
16	Concrete 37.04"	WALL	37.04	0	22	0	
17	Concrete 44.26"	WALL	44.26	0	23	0	
18	Concrete 48"	WALL	48	0	23	0	
19	Concrete 58.14"	WALL	58.14	0	24	0	
20	DW Composite 60"	WALL	60	0	34	0	
21	Concrete 60"	WALL	60	0	24	0	
22	DW Composite 61.37"	WALL	61.37	0	34	0	
23	Concrete 62.55"	WALL	62.55	0	24	0	
24	WW Composite 64.06"	WALL	64.06	0	46	0	
25	Concrete 72"	WALL	72	0	24	0	
26	Composite 72"	WALL	72.09	0	34	0	
27	Concrete 102"	WALL	102	0	25	0	
28	Composite 154.86"	WALL	154.86	0	49	0	
29	RefuelFlWall	WALL	1.598	0	32	0	
30	RefuelFlRoof	WALL	0.049	0	1	0	
31	Concrete 35.1	WALL	35.1	0	24	0	

Thermal Conductor Type					
1					
ECCS Uninsulatedd					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
1	1	0	0.19	1	0
2	1	0.19	0.19	1	0

Thermal Conductor Type					
2					
ECCS Insulated					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
1	1	0	0.19	1	0
2	1	0.19	0.19	1	0
3	5	0.38	5.27778E-05	1	0
4	5	0.38005278	0.000105556	1	0
5	5	0.38015834	0.000211111	1	0
6	5	0.38036945	0.000422222	1	0
7	5	0.38079167	0.000844444	1	0
8	5	0.38163611	0.001688889	1	0
9	5	0.383325	0.003377778	1	0
10	5	0.38670278	0.006755556	1	0
11	5	0.39345834	0.013511111	1	0
12	5	0.40696945	0.027022222	1	0
13	5	0.43399167	0.054044444	1	0
14	5	0.48803611	0.10808889	1	0
15	5	0.596125	0.21617778	1	0
16	5	0.81230278	0.43235556	1	0
17	5	1.2446583	0.28383542	1	0
18	5	1.5284937	0.28383548	1	0
19	5	1.8123292	0.16886042	1	0
20	5	1.9811896	0.16886037	1	0
21	5	2.15005	0.11519995	1	0
22	5	2.26525	0.05759995	1	0
23	5	2.32285	0.02879995	1	0
24	5	2.35165	0.01440005	1	0
25	5	2.3660501	0.00719995	1	0
26	5	2.37325	0.00359995	1	0
27	5	2.37685	0.00180005	1	0
28	5	2.3786501	0.00089995	1	0
29	5	2.37955	0.00044995	1	0

Thermal Conductor Type					
3					
FUEL POOL UNIN					
Region	Mat. #	Bdry. (in)	Thick (in)	Sub-regs.	Heat Factor
1	1	0	0.29	1	0

Thermal Conductor Type					
4					
Concrete 12"					
Region	Mat. #	Bdry. (in)	Thick (in)	Sub-regs.	Heat Factor
1	2	0	0.126	1	0
2	2	0.126	0.252	1	0
3	2	0.378	0.504	1	0
4	2	0.882	1.008	1	0
5	2	1.89	2.016	1	0
6	2	3.906	2.0235	1	0
7	2	5.9295	2.0235	1	0
8	2	7.953	1.0785	1	0
9	2	9.0315	1.0785	1	0
10	2	10.11	1.008	1	0
11	2	11.118	0.504	1	0
12	2	11.622	0.252	1	0
13	2	11.874	0.126	1	0

Thermal Conductor Type					
5					
Concrete 18"					
Region	Mat. #	Bdry. (in)	Thick (in)	Sub-regs.	Heat Factor
1	2	0	0.0126	1	0
2	2	0.0126	0.0252	1	0
3	2	0.0378	0.0504	1	0
4	2	0.0882	0.1008	1	0
5	2	0.189	0.2016	1	0
6	2	0.3906	0.4032	1	0
7	2	0.7938	0.8064	1	0
8	2	1.6002	1.6128	1	0
9	2	3.213	3.2256	1	0
10	2	6.4386	2.89035	1	0
11	2	9.32895	2.89035	1	0
12	2	12.2193	2.09025	1	0
13	2	14.30955	2.09025	1	0
14	2	16.3998	0.8064	1	0
15	2	17.2062	0.4032	1	0
16	2	17.6094	0.2016	1	0
17	2	17.811	0.1008	1	0

Thermal Conductor Type					
5					
Concrete 18"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
18	2	17.9118	0.0504	1	0
19	2	17.9622	0.0252	1	0
20	2	17.9874	0.0126	1	0

Thermal Conductor Type					
6					
Concrete 23.16					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
1	2	0	0.0126	1	0
2	2	0.0126	0.0252	1	0
3	2	0.0378	0.0504	1	0
4	2	0.0882	0.1008	1	0
5	2	0.189	0.2016	1	0
6	2	0.3906	0.4032	1	0
7	2	0.7938	0.8064	1	0
8	2	1.6002	1.6128	1	0
9	2	3.213	3.2256	1	0
10	2	6.4386	4.18035	1	0
11	2	10.61895	4.18035	1	0
12	2	14.7993	2.57385	1	0
13	2	17.37315	2.57385	1	0
14	2	19.947	1.6128	1	0
15	2	21.5598	0.8064	1	0
16	2	22.3662	0.4032	1	0
17	2	22.7694	0.2016	1	0
18	2	22.971	0.1008	1	0
19	2	23.0718	0.0504	1	0
20	2	23.1222	0.0252	1	0
21	2	23.1474	0.0126	1	0

Thermal Conductor Type					
7					
Concrete 23.36"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
1	2	0	0.0126	1	0
2	2	0.0126	0.0252	1	0
3	2	0.0378	0.0504	1	0
4	2	0.0882	0.1008	1	0
5	2	0.189	0.2016	1	0
6	2	0.3906	0.4032	1	0

Thermal Conductor Type					
7					
Concrete 23.36"					
Region	Mat. #	Bdry. (in)	Thick (in)	Sub-regs.	Heat Factor
7	2	0.7938	0.8064	1	0
8	2	1.6002	1.6128	1	0
9	2	3.213	3.2256	1	0
10	2	6.4386	4.23035	1	0
11	2	10.66895	4.23035	1	0
12	2	14.8993	2.62385	1	0
13	2	17.52315	2.62385	1	0
14	2	20.147	1.6128	1	0
15	2	21.7598	0.8064	1	0
16	2	22.5662	0.4032	1	0
17	2	22.9694	0.2016	1	0
18	2	23.171	0.1008	1	0
19	2	23.2718	0.0504	1	0
20	2	23.3222	0.0252	1	0
21	2	23.3474	0.0126	1	0

Thermal Conductor Type					
8					
Concrete 23.83"					
Region	Mat. #	Bdry. (in)	Thick (in)	Sub-regs.	Heat Factor
1	2	0	0.0126	1	0
2	2	0.0126	0.0252	1	0
3	2	0.0378	0.0504	1	0
4	2	0.0882	0.1008	1	0
5	2	0.189	0.2016	1	0
6	2	0.3906	0.4032	1	0
7	2	0.7938	0.8064	1	0
8	2	1.6002	1.6128	1	0
9	2	3.213	3.2256	1	0
10	2	6.4386	8.6957	1	0
11	2	15.1343	8.6957	1	0

Thermal Conductor Type					
9					
Concrete 24"					
Region	Mat. #	Bdry. (in)	Thick (in)	Sub-regs.	Heat Factor
1	2	0	0.126	1	0
2	2	0.126	0.252	1	0
3	2	0.378	0.504	1	0

4	2	0.882	1.008	1	0
5	2	1.89	2.016	1	0
6	2	3.906	4.032	1	0
7	2	7.938	4.0155	1	0
8	2	11.9535	4.0155	1	0
9	2	15.969	2.0625	1	0
10	2	18.0315	2.0625	1	0
11	2	20.094	2.016	1	0
12	2	22.11	1.008	1	0
13	2	23.118	0.504	1	0
14	2	23.622	0.252	1	0
15	2	23.874	0.126	1	0

Thermal Conductor Type					
10					
Concrete 27.79"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
1	2	0	0.0126	1	0
2	2	0.0126	0.0252	1	0
3	2	0.0378	0.0504	1	0
4	2	0.0882	0.1008	1	0
5	2	0.189	0.2016	1	0
6	2	0.3906	0.4032	1	0
7	2	0.7938	0.8064	1	0
8	2	1.6002	1.6128	1	0
9	2	3.213	3.2256	1	0
10	2	6.4386	6.4512	1	0
11	2	12.8898	3.72505	1	0
12	2	16.61485	3.72505	1	0
13	2	20.3399	2.11855	1	0
14	2	22.45845	2.11855	1	0
15	2	24.577	1.6128	1	0
16	2	26.1898	0.8064	1	0
17	2	26.9962	0.4032	1	0
18	2	27.3994	0.2016	1	0
19	2	27.601	0.1008	1	0
20	2	27.7018	0.0504	1	0
21	2	27.7522	0.0252	1	0
22	2	27.7774	0.0126	1	0

Thermal Conductor Type					
11					
Concrete 28.41"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor

1	2	0	0.0126	1	0
2	2	0.0126	0.0252	1	0
3	2	0.0378	0.0504	1	0
4	2	0.0882	0.1008	1	0
5	2	0.189	0.2016	1	0
6	2	0.3906	0.4032	1	0
7	2	0.7938	0.8064	1	0
8	2	1.6002	1.6128	1	0
9	2	3.213	3.2256	1	0
10	2	6.4386	6.4512	1	0
11	2	12.8898	7.7601	1	0
12	2	20.6499	7.7601	1	0

Thermal Conductor Type					
12					
Concrete 32"					
Region	Mat. #	Bdry. (in)	Thick (in)	Sub-regs.	Heat Factor
1	2	0	0.0126	1	0
2	2	0.0126	0.0252	1	0
3	2	0.0378	0.0504	1	0
4	2	0.0882	0.1008	1	0
5	2	0.189	0.2016	1	0
6	2	0.3906	0.4032	1	0
7	2	0.7938	0.8064	1	0
8	2	1.6002	1.6128	1	0
9	2	3.213	3.2256	1	0
10	2	6.4386	6.4512	1	0
11	2	12.8898	4.77755	1	0
12	2	17.66735	4.77755	1	0
13	2	22.4449	3.17105	1	0
14	2	25.61595	3.17105	1	0
15	2	28.787	1.6128	1	0
16	2	30.3998	0.8064	1	0
17	2	31.2062	0.4032	1	0
18	2	31.6094	0.2016	1	0
19	2	31.811	0.1008	1	0
20	2	31.9118	0.0504	1	0
21	2	31.9622	0.0252	1	0
22	2	31.9874	0.0126	1	0

Thermal Conductor Type					
13					
Concrere 33.98"					
Region	Mat. #	Bdry. (in)	Thick (in)	Sub-regs.	Heat Factor
1	2	0	0.0126	1	0

2	2	0.0126	0.0252	1	0
3	2	0.0378	0.0504	1	0
4	2	0.0882	0.1008	1	0
5	2	0.189	0.2016	1	0
6	2	0.3906	0.4032	1	0
7	2	0.7938	0.8064	1	0
8	2	1.6002	1.6128	1	0
9	2	3.213	3.2256	1	0
10	2	6.4386	6.4512	1	0
11	2	12.8898	10.5451	1	0
12	2	23.4349	10.5451	1	0

Thermal Conductor Type					
14					
Concrete 35.12					
Region	Mat. #	Bdry. (in)	Thick (in)	Sub-regs.	Heat Factor
1	2	0	0.0126	1	0
2	2	0.0126	0.0252	1	0
3	2	0.0378	0.0504	1	0
4	2	0.0882	0.1008	1	0
5	2	0.189	0.2016	1	0
6	2	0.3906	0.4032	1	0
7	2	0.7938	0.8064	1	0
8	2	1.6002	1.6128	1	0
9	2	3.213	3.2256	1	0
10	2	6.4386	6.4512	1	0
11	2	12.8898	5.55755	1	0
12	2	18.44735	5.55755	1	0
13	2	24.0049	3.95105	1	0
14	2	27.95595	3.95105	1	0
15	2	31.907	1.6128	1	0
16	2	33.5198	0.8064	1	0
17	2	34.3262	0.4032	1	0
18	2	34.7294	0.2016	1	0
19	2	34.931	0.1008	1	0
20	2	35.0318	0.0504	1	0
21	2	35.0822	0.0252	1	0
22	2	35.1074	0.0126	1	0

Thermal Conductor Type					
15					
Concrete 36"					
Region	Mat. #	Bdry. (in)	Thick (in)	Sub-regs.	Heat Factor
1	2	0	0.0126	1	0
2	2	0.0126	0.0252	1	0

Thermal Conductor Type					
15					
Concrete 36"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
3	2	0.0378	0.0504	1	0
4	2	0.0882	0.1008	1	0
5	2	0.189	0.2016	1	0
6	2	0.3906	0.4032	1	0
7	2	0.7938	0.8064	1	0
8	2	1.6002	1.6128	1	0
9	2	3.213	3.2256	1	0
10	2	6.4386	6.4512	1	0
11	2	12.8898	5.77755	1	0
12	2	18.66735	5.77755	1	0
13	2	24.4449	4.17105	1	0
14	2	28.61595	4.17105	1	0
15	2	32.787	1.6128	1	0
16	2	34.3998	0.8064	1	0
17	2	35.2062	0.4032	1	0
18	2	35.6094	0.2016	1	0
19	2	35.811	0.1008	1	0
20	2	35.9118	0.0504	1	0
21	2	35.9622	0.0252	1	0
22	2	35.9874	0.0126	1	0

Thermal Conductor Type					
16					
Concrete 37.04"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
1	2	0	0.0126	1	0
2	2	0.0126	0.0252	1	0
3	2	0.0378	0.0504	1	0
4	2	0.0882	0.1008	1	0
5	2	0.189	0.2016	1	0
6	2	0.3906	0.4032	1	0
7	2	0.7938	0.8064	1	0
8	2	1.6002	1.6128	1	0
9	2	3.213	3.2256	1	0
10	2	6.4386	6.4512	1	0
11	2	12.8898	6.03755	1	0
12	2	18.92735	6.03755	1	0
13	2	24.9649	4.43105	1	0
14	2	29.39595	4.43105	1	0
15	2	33.827	1.6128	1	0
16	2	35.4398	0.8064	1	0

17	2	36.2462	0.4032	1	0
18	2	36.6494	0.2016	1	0
19	2	36.851	0.1008	1	0
20	2	36.9518	0.0504	1	0
21	2	37.0022	0.0252	1	0
22	2	37.0274	0.0126	1	0

Thermal Conductor Type					
17					
Concrete 44.26"					
Region	Mat. #	Bdry. (in)	Thick (in)	Sub-regs.	Heat Factor
1	2	0	0.0126	1	0
2	2	0.0126	0.0252	1	0
3	2	0.0378	0.0504	1	0
4	2	0.0882	0.1008	1	0
5	2	0.189	0.2016	1	0
6	2	0.3906	0.4032	1	0
7	2	0.7938	0.8064	1	0
8	2	1.6002	1.6128	1	0
9	2	3.213	3.2256	1	0
10	2	6.4386	6.4512	1	0
11	2	12.8898	7.84255	1	0
12	2	20.73235	7.84255	1	0
13	2	28.5749	4.62325	1	0
14	2	33.19815	4.62325	1	0
15	2	37.8214	3.2256	1	0
16	2	41.047	1.6128	1	0
17	2	42.6598	0.8064	1	0
18	2	43.4662	0.4032	1	0
19	2	43.8694	0.2016	1	0
20	2	44.071	0.1008	1	0
21	2	44.1718	0.0504	1	0
22	2	44.2222	0.0252	1	0
23	2	44.2474	0.0126	1	0

Thermal Conductor Type					
18					
Concrete 48"					
Region	Mat. #	Bdry. (in)	Thick (in)	Sub-regs.	Heat Factor
1	2	0	0.0126	1	0
2	2	0.0126	0.0252	1	0
3	2	0.0378	0.0504	1	0
4	2	0.0882	0.1008	1	0
5	2	0.189	0.2016	1	0

Thermal Conductor Type					
18					
Concrete 48"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
6	2	0.3906	0.4032	1	0
7	2	0.7938	0.8064	1	0
8	2	1.6002	1.6128	1	0
9	2	3.213	3.2256	1	0
10	2	6.4386	6.4512	1	0
11	2	12.8898	8.77755	1	0
12	2	21.66735	8.77755	1	0
13	2	30.4449	5.55825	1	0
14	2	36.00315	5.55825	1	0
15	2	41.5614	3.2256	1	0
16	2	44.787	1.6128	1	0
17	2	46.3998	0.8064	1	0
18	2	47.2062	0.4032	1	0
19	2	47.6094	0.2016	1	0
20	2	47.811	0.1008	1	0
21	2	47.9118	0.0504	1	0
22	2	47.9622	0.0252	1	0
23	2	47.9874	0.0126	1	0

Thermal Conductor Type					
19					
Concrete 58.14"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
1	2	0	0.0126	1	0
2	2	0.0126	0.0252	1	0
3	2	0.0378	0.0504	1	0
4	2	0.0882	0.1008	1	0
5	2	0.189	0.2016	1	0
6	2	0.3906	0.4032	1	0
7	2	0.7938	0.8064	1	0
8	2	1.6002	1.6128	1	0
9	2	3.213	3.2256	1	0
10	2	6.4386	6.4512	1	0
11	2	12.8898	12.9024	1	0
12	2	25.7922	8.08695	1	0
13	2	33.87915	8.08695	1	0
14	2	41.9661	4.86765	1	0
15	2	46.83375	4.86765	1	0
16	2	51.7014	3.2256	1	0
17	2	54.927	1.6128	1	0
18	2	56.5398	0.8064	1	0

Thermal Conductor Type					
19					
Concrete 58.14"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
19	2	57.3462	0.4032	1	0
20	2	57.7494	0.2016	1	0
21	2	57.951	0.1008	1	0
22	2	58.0518	0.0504	1	0
23	2	58.1022	0.0252	1	0
24	2	58.1274	0.0126	1	0

Thermal Conductor Type					
20					
DW Composite 60"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
1	1	0	0.00324	1	0
2	1	0.00324	0.00648	1	0
3	1	0.00972	0.01296	1	0
4	1	0.02268	0.02592	1	0
5	1	0.0486	0.05184	1	0
6	1	0.10044	0.10368	1	0
7	1	0.20412	0.20736	1	0
8	1	0.41148	0.54426	1	0
9	1	0.95574	0.54426	1	0
10	2	1.5	0.005833333	1	0
11	2	1.5058333	0.011666667	1	0
12	2	1.5175	0.023333333	1	0
13	2	1.5408333	0.046666667	1	0
14	2	1.5875	0.093333333	1	0
15	2	1.6808333	0.18666667	1	0
16	2	1.8675	0.37333333	1	0
17	2	2.2408333	0.74666667	1	0
18	2	2.9875	1.4933333	1	0
19	2	4.4808333	2.9866667	1	0
20	2	7.4675	5.9733333	1	0
21	2	13.440833	11.946667	1	0
22	2	25.3875	8.653125	1	0
23	2	34.040625	8.653125	1	0
24	2	42.69375	5.433825	1	0
25	2	48.127575	5.433825	1	0
26	2	53.5614	3.2256	1	0
27	2	56.787	1.6128	1	0
28	2	58.3998	0.8064	1	0
29	2	59.2062	0.4032	1	0
30	2	59.6094	0.2016	1	0

Thermal Conductor Type					
20					
DW Composite 60"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
31	2	59.811	0.1008	1	0
32	2	59.9118	0.0504	1	0
33	2	59.9622	0.0252	1	0
34	2	59.9874	0.0126	1	0

Thermal Conductor Type					
21					
Concrete 60"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
1	2	0	0.0126	1	0
2	2	0.0126	0.0252	1	0
3	2	0.0378	0.0504	1	0
4	2	0.0882	0.1008	1	0
5	2	0.189	0.2016	1	0
6	2	0.3906	0.4032	1	0
7	2	0.7938	0.8064	1	0
8	2	1.6002	1.6128	1	0
9	2	3.213	3.2256	1	0
10	2	6.4386	6.4512	1	0
11	2	12.8898	12.9024	1	0
12	2	25.7922	8.55195	1	0
13	2	34.34415	8.55195	1	0
14	2	42.8961	5.33265	1	0
15	2	48.22875	5.33265	1	0
16	2	53.5614	3.2256	1	0
17	2	56.787	1.6128	1	0
18	2	58.3998	0.8064	1	0
19	2	59.2062	0.4032	1	0
20	2	59.6094	0.2016	1	0
21	2	59.811	0.1008	1	0
22	2	59.9118	0.0504	1	0
23	2	59.9622	0.0252	1	0
24	2	59.9874	0.0126	1	0

Thermal Conductor Type					
22					
DW Composite 61.37"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
1	1	0	0.00324	1	0

Thermal Conductor Type					
22					
DW Composite 61.37"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
2	1	0.00324	0.00648	1	0
3	1	0.00972	0.01296	1	0
4	1	0.02268	0.02592	1	0
5	1	0.0486	0.05184	1	0
6	1	0.10044	0.10368	1	0
7	1	0.20412	0.20736	1	0
8	1	0.41148	0.54426	1	0
9	1	0.95574	0.54426	1	0
10	2	1.5	0.005833333	1	0
11	2	1.5058333	0.011666667	1	0
12	2	1.5175	0.023333333	1	0
13	2	1.5408333	0.046666667	1	0
14	2	1.5875	0.093333333	1	0
15	2	1.6808333	0.18666667	1	0
16	2	1.8675	0.37333333	1	0
17	2	2.2408333	0.74666667	1	0
18	2	2.9875	1.4933333	1	0
19	2	4.4808333	2.9866667	1	0
20	2	7.4675	5.9733333	1	0
21	2	13.440833	11.946667	1	0
22	2	25.3875	8.995625	1	0
23	2	34.383125	8.995625	1	0
24	2	43.37875	5.776325	1	0
25	2	49.155075	5.776325	1	0
26	2	54.9314	3.2256	1	0
27	2	58.157	1.6128	1	0
28	2	59.7698	0.8064	1	0
29	2	60.5762	0.4032	1	0
30	2	60.9794	0.2016	1	0
31	2	61.181	0.1008	1	0
32	2	61.2818	0.0504	1	0
33	2	61.3322	0.0252	1	0
34	2	61.3574	0.0126	1	0

Thermal Conductor Type					
23					
Concrete 62.55"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
1	2	0	0.0126	1	0
2	2	0.0126	0.0252	1	0
3	2	0.0378	0.0504	1	0

Thermal Conductor Type					
23					
Concrete 62.55"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
4	2	0.0882	0.1008	1	0
5	2	0.189	0.2016	1	0
6	2	0.3906	0.4032	1	0
7	2	0.7938	0.8064	1	0
8	2	1.6002	1.6128	1	0
9	2	3.213	3.2256	1	0
10	2	6.4386	6.4512	1	0
11	2	12.8898	12.9024	1	0
12	2	25.7922	9.18945	1	0
13	2	34.98165	9.18945	1	0
14	2	44.1711	5.97015	1	0
15	2	50.14125	5.97015	1	0
16	2	56.1114	3.2256	1	0
17	2	59.337	1.6128	1	0
18	2	60.9498	0.8064	1	0
19	2	61.7562	0.4032	1	0
20	2	62.1594	0.2016	1	0
21	2	62.361	0.1008	1	0
22	2	62.4618	0.0504	1	0
23	2	62.5122	0.0252	1	0
24	2	62.5374	0.0126	1	0

Thermal Conductor Type					
24					
WW Composite 64.06"					
Region	Mat. #	Bdry. (in)	Thick (in)	Sub-regs.	Heat Factor
1	1	0	0.00324	1	0
2	1	0.00324	0.00648	1	0
3	1	0.00972	0.01296	1	0
4	1	0.02268	0.02592	1	0
5	1	0.0486	0.05184	1	0
6	1	0.10044	0.10368	1	0
7	1	0.20412	0.20736	1	0
8	1	0.41148	0.54426	1	0
9	1	0.95574	0.54426	1	0
10	6	1.5	0.000483333	1	0
11	6	1.5004833	0.000966667	1	0
12	6	1.50145	0.001933333	1	0
13	6	1.5033833	0.003866667	1	0
14	6	1.50725	0.007733333	1	0
15	6	1.5149833	0.015466667	1	0
16	6	1.53045	0.030933333	1	0
17	6	1.5613833	0.061866667	1	0
18	6	1.62325	0.12373333	1	0
19	6	1.7469833	0.24746667	1	0
20	6	1.99445	0.49493333	1	0
21	6	2.4893833	0.31515417	1	0
22	6	2.8045375	0.31515423	1	0
23	6	3.1196917	0.26827917	1	0
24	6	3.3879709	0.26827922	1	0
25	6	3.6562501	0.09374995	1	0
26	7	3.75	0.075	1	0
27	7	3.825	0.11875	1	0
28	7	3.94375	0.059375	1	0
29	7	4.003125	0.059375	1	0
30	2	4.0625	1.1314655	1	0
31	2	5.1939655	2.262931	1	0
32	2	7.4568965	4.5258621	1	0
33	2	11.982759	9.0517241	1	0
34	2	21.034483	10.75638	1	0
35	2	31.790863	10.756379	1	0
36	2	42.547242	7.537079	1	0
37	2	50.084321	7.537079	1	0
38	2	57.6214	3.2256	1	0
39	2	60.847	1.6128	1	0
40	2	62.4598	0.8064	1	0
41	2	63.2662	0.4032	1	0
42	2	63.6694	0.2016	1	0

Thermal Conductor Type					
24					
WW Composite 64.06"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
43	2	63.871	0.1008	1	0
44	2	63.9718	0.0504	1	0
45	2	64.0222	0.0252	1	0
46	2	64.0474	0.0126	1	0

Thermal Conductor Type					
25					
Concrete 72"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
1	2	0	0.0126	1	0
2	2	0.0126	0.0252	1	0
3	2	0.0378	0.0504	1	0
4	2	0.0882	0.1008	1	0
5	2	0.189	0.2016	1	0
6	2	0.3906	0.4032	1	0
7	2	0.7938	0.8064	1	0
8	2	1.6002	1.6128	1	0
9	2	3.213	3.2256	1	0
10	2	6.4386	6.4512	1	0
11	2	12.8898	12.9024	1	0
12	2	25.7922	11.55195	1	0
13	2	37.34415	11.55195	1	0
14	2	48.8961	8.33265	1	0
15	2	57.22875	8.33265	1	0
16	2	65.5614	3.2256	1	0
17	2	68.787	1.6128	1	0
18	2	70.3998	0.8064	1	0
19	2	71.2062	0.4032	1	0
20	2	71.6094	0.2016	1	0
21	2	71.811	0.1008	1	0
22	2	71.9118	0.0504	1	0
23	2	71.9622	0.0252	1	0
24	2	71.9874	0.0126	1	0

Thermal Conductor Type					
26					
Composite 72"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
1	1	0	0.00324	1	0

Thermal Conductor Type					
26					
Composite 72"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
2	1	0.00324	0.00648	1	0
3	1	0.00972	0.01296	1	0
4	1	0.02268	0.02592	1	0
5	1	0.0486	0.05184	1	0
6	1	0.10044	0.10368	1	0
7	1	0.20412	0.20736	1	0
8	1	0.41148	0.54426	1	0
9	1	0.95574	0.54426	1	0
10	2	1.5	0.005833333	1	0
11	2	1.5058333	0.011666667	1	0
12	2	1.5175	0.023333333	1	0
13	2	1.5408333	0.046666667	1	0
14	2	1.5875	0.093333333	1	0
15	2	1.6808333	0.18666667	1	0
16	2	1.8675	0.37333333	1	0
17	2	2.2408333	0.74666667	1	0
18	2	2.9875	1.4933333	1	0
19	2	4.4808333	2.9866667	1	0
20	2	7.4675	5.9733333	1	0
21	2	13.440833	11.946667	1	0
22	2	25.3875	11.675625	1	0
23	2	37.063125	11.675625	1	0
24	2	48.73875	8.456325	1	0
25	2	57.195075	8.456325	1	0
26	2	65.6514	3.2256	1	0
27	2	68.877	1.6128	1	0
28	2	70.4898	0.8064	1	0
29	2	71.2962	0.4032	1	0
30	2	71.6994	0.2016	1	0
31	2	71.901	0.1008	1	0
32	2	72.0018	0.0504	1	0
33	2	72.0522	0.0252	1	0
34	2	72.0774	0.0126	1	0

Thermal Conductor Type					
27					
Concrete 102"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
1	2	0	0.0126	1	0
2	2	0.0126	0.0252	1	0
3	2	0.0378	0.0504	1	0

Thermal Conductor Type					
27					
Concrete 102"					
Region	Mat. #	Bdry. (in)	Thick (in)	Sub-regs.	Heat Factor
4	2	0.0882	0.1008	1	0
5	2	0.189	0.2016	1	0
6	2	0.3906	0.4032	1	0
7	2	0.7938	0.8064	1	0
8	2	1.6002	1.6128	1	0
9	2	3.213	3.2256	1	0
10	2	6.4386	6.4512	1	0
11	2	12.8898	12.9024	1	0
12	2	25.7922	19.05195	1	0
13	2	44.84415	19.05195	1	0
14	2	63.8961	12.60705	1	0
15	2	76.50315	12.60705	1	0
16	2	89.1102	6.4512	1	0
17	2	95.5614	3.2256	1	0
18	2	98.787	1.6128	1	0
19	2	100.3998	0.8064	1	0
20	2	101.2062	0.4032	1	0
21	2	101.6094	0.2016	1	0
22	2	101.811	0.1008	1	0
23	2	101.9118	0.0504	1	0
24	2	101.9622	0.0252	1	0
25	2	101.9874	0.0126	1	0

Thermal Conductor Type					
28					
Composite 154.86"					
Region	Mat. #	Bdry. (in)	Thick (in)	Sub-regs.	Heat Factor
1	1	0	0.00324	1	0
2	1	0.00324	0.00648	1	0
3	1	0.00972	0.01296	1	0
4	1	0.02268	0.02592	1	0
5	1	0.0486	0.05184	1	0
6	1	0.10044	0.10368	1	0
7	1	0.20412	0.20736	1	0
8	1	0.41148	0.54426	1	0
9	1	0.95574	0.54426	1	0
10	6	1.5	0.000483333	1	0
11	6	1.5004833	0.000966667	1	0
12	6	1.50145	0.001933333	1	0
13	6	1.5033833	0.003866667	1	0
14	6	1.50725	0.007733333	1	0
15	6	1.5149833	0.015466667	1	0
16	6	1.53045	0.030933333	1	0
17	6	1.5613833	0.061866667	1	0
18	6	1.62325	0.12373333	1	0
19	6	1.7469833	0.24746667	1	0
20	6	1.99445	0.49493333	1	0
21	6	2.4893833	0.31515417	1	0
22	6	2.8045375	0.31515423	1	0
23	6	3.1196917	0.26827917	1	0
24	6	3.3879709	0.26827922	1	0
25	6	3.6562501	0.09374995	1	0
26	7	3.75	0.075	1	0
27	7	3.825	0.11875	1	0
28	7	3.94375	0.11875	1	0
29	2	4.0625	1.1314655	1	0
30	2	5.1939655	2.262931	1	0
31	2	7.4568965	4.5258621	1	0
32	2	11.982759	9.0517241	1	0
33	2	21.034483	18.103448	1	0
34	2	39.137931	18.103448	1	0
35	2	57.241379	18.103449	1	0
36	2	75.344828	19.878793	1	0
37	2	95.223621	19.878789	1	0
38	2	115.10241	13.433893	1	0
39	2	128.5363	13.433897	1	0
40	2	141.9702	6.451204	1	0
41	2	148.4214	3.225604	1	0
42	2	151.647	1.612804	1	0

Thermal Conductor Type					
28					
Composite 154.86"					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
43	2	153.2598	0.806404	1	0
44	2	154.0662	0.403204	1	0
45	2	154.4694	0.201604	1	0
46	2	154.671	0.100804	1	0
47	2	154.7718	0.050404	1	0
48	2	154.8222	0.025204	1	0
49	2	154.8474	0.012604	1	0

Thermal Conductor Type					
29					
RefuelFlWall					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
1	1	0	0.049	1	0
2	7	0.049	0.0000348	1	0
3	7	0.0490348	0.0000696	1	0
4	7	0.0491044	0.0001392	1	0
5	7	0.0492436	0.0002784	1	0
6	7	0.049522	0.0005568	1	0
7	7	0.0500788	0.0011136	1	0
8	7	0.0511924	0.0022272	1	0
9	7	0.0534196	0.0044544	1	0
10	7	0.057874	0.0089088	1	0
11	7	0.0667828	0.0178176	1	0
12	7	0.0846004	0.0356352	1	0
13	7	0.1202356	0.0712704	1	0
14	7	0.191506	0.1425408	1	0
15	7	0.3340468	0.2850816	1	0
16	7	0.6191284	0.2324679	1	0
17	7	0.8515963	0.2324679	1	0
18	7	1.0840642	0.1612149	1	0
19	7	1.2452791	0.1612149	1	0
20	7	1.406494	0.0712704	1	0
21	7	1.4777644	0.0356352	1	0
22	7	1.5133996	0.0178176	1	0
23	7	1.5312172	0.0089088	1	0
24	7	1.540126	0.0044544	1	0
25	7	1.5445804	0.0022272	1	0
26	7	1.5468076	0.0011136	1	0
27	7	1.5479212	0.0005568	1	0
28	7	1.548478	0.0002784	1	0
29	7	1.5487564	0.0001392	1	0
30	7	1.5488956	0.0000696	1	0
31	7	1.5489652	0.0000348	1	0
32	1	1.549	0.049	1	0

Thermal Conductor Type					
30					
RefuelFlRoof					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
1	1	0	0.049	1	0

Thermal Conductor Type					
31					
Concrete 35.1					
	Mat.	Bdry.	Thick	Sub-	Heat
Region	#	(in)	(in)	regs.	Factor
1	2	0	0.00648	1	0
2	2	0.00648	0.01296	1	0
3	2	0.01944	0.02592	1	0
4	2	0.04536	0.05184	1	0
5	2	0.0972	0.10368	1	0
6	2	0.20088	0.20736	1	0
7	2	0.40824	0.41472	1	0
8	2	0.82296	0.82944	1	0
9	2	1.6524	1.65888	1	0
10	2	3.31128	3.31776	1	0
11	2	6.62904	6.63552	1	0
12	2	13.26456	5.45886	1	0
13	2	18.72342	5.45886	1	0
14	2	24.18228	3.80322	1	0
15	2	27.9855	3.80322	1	0
16	2	31.78872	1.65888	1	0
17	2	33.4476	0.82944	1	0
18	2	34.27704	0.41472	1	0
19	2	34.69176	0.20736	1	0
20	2	34.89912	0.10368	1	0
21	2	35.0028	0.05184	1	0
22	2	35.05464	0.02592	1	0
23	2	35.08056	0.01296	1	0
24	2	35.09352	0.00648	1	0

Cooler/Heater										
Heater Cooler #	Description	Vol. #	On Trip #	Off Trip #	Flow Rate (CFM)	Flow Rate FF	Heat Rate (Btu/s)	Heat Rate FF	Phs Opt	Ctrlr Loc
1H	Main Building Heat	1	5				43.24		VTI	1
2H	Decay Heat	5	5				2720.56		LTI	5
3C	RRA-CC-1	4	1				1	37	VTE	4
4C	RRA-CC-4	4	1				1	38	VTE	4
5C	RRA-CC-5	4	1				1	39	VTE	4
6C	RRA-CC-6	4	1				0	5	VTE	4
7C	RRA-CC-11	1	22				1	41	VTE	1
8C	RRA-CC-12	1	22				1	42	VTE	1
9C	RRA-CC-13	1	22				1	43	VTE	1
10C	RRA-CC-15,17	1	22				2	44	VTE	1
11C	RRA-CC-19,20	1	22				2	45	VTE	1
12H	Aux Heat 522	1	6	7			190		VTE	1
13H	Aux Heat 548	1	8	9			100		VTE	1
14H	Aux Heat 572	1	10	11			50		VTE	1
15H	Aux Heat 548	1	12	13			100		VTE	1
16H	Aux Heat 572	1	14	15			50		VTE	1
17H	Aux Heat 522	1	16	17			190		VTE	1
18H	Aux Heat 501	1	18	19			200		VTE	1
19H	Aux Heat 471	1	20	21			200		VTE	1
20H	Emergency Lighting	1	25				43.4	1	VTI	1
21H	Auxiliary Heat	1	22				10.95	1	VTI	1
22H	Dry Cask	5	5				21.8		VTI	5
23H	Pump Heat	4	24				244.5		VTI	4
24H	Fuel Pool HX Rm	1	3				4.37		VTI	1

Cooler/Heater										
Heater Cooler #	Description	Vol. #	On Trip #	Off Trip #	Flow Rate (CFM)	Flow Rate FF	Heat Rate (Btu/s)	Heat Rate FF	Phs Opt	Ctrlr Loc
25H	Pump Room Fans	4	1				12.1		VTI	4
26H	Normal Lighing	1		26	0		1	27	VTI	1
27H	SGTS Heater	2s2	27	28			19.9		VTI	2s2
28H	SGTS Fan Motor	1	2				1.944		VTI	1

Volumetric Fan - Table 1						
Vol		Flow	On	Off	Min	Max
Fan		Path	Trip	Trip	DP	DP
#	Description	#	#	#	(psi)	(psi)
1Q	SGTS Fan	11	2		DEFAULT	DEFAULT

Volumetric Fan - Table 2							
Vol		Flow	Flow		Heat	Heat	
Fan	Flow	Rate	Rate	Heat	Rate	Rate	Disch
#	Option	(CFM)	FF	Option	(Btu/s)	FF	Vol
1Q	DP	1	48	Flow	1	46	6

Heat Exchangers - Table 1						
Heat		HX	Prim	Scnd	Cpld	Drain
Ex.		Type	Flow	Flow	HX	Vol
#	Description	#	Path	Path	#	#
1H	Fuel Pool Cooler	1	7	SPEC		DISCARD

Heat Exchangers - Table 2										
Heat	Scnd	Scnd	Scnd	Scnd	Ext.	Ext.	Ext.	Ext.	Op.	Op.
Ex.	Flow	Flow	Temp	Temp	Flow	Flow	Heat	Heat	Pres	Pres
#	(lbm/s)	FF	(F)	FF	(lbm/s)	FF	(Btu/s)	FF	(psia)	FF
1H	79.503		1	46						

Heat Exchanger Types - Table 1					
HX		Passes	Tube	Thick-	Wall
Type		or	Mat.	ness	Area
#	Option	Zones	#	(in)	(ft2)
1	TUBE-SHELL	2	4	0.051	582.74

Heat Exchanger Types - Table 2								
HX Type #	Side	Fin Type	Flow Area (ft2)	Hyd. Diam. (in)	Tot. S. Area (ft2)	H.T. Coef Curv	H.T. Coef Type	Fouling Resistance (h-f2-F/B)
1	primary	NONE	0.377	0.75	625	17	NUSSELT	0.0002487
	SECONDARY	NONE	0.216	0.649	540.493	16	NUSSELT	0

Heat Exchanger Types - Table 3							
Fin Parameters							
HX Type #	Side	Fin Mat. Type #	Pin Diam. (in)	Length (in)	Thick-ness (in)	Surf. Area (ft2)	Film Thick Mult.
1	PRIMARY	0	0	0	0	0	1
	secondary	0	0	0	0	0	1

Volume Initial Conditions							
Vol #	Total Pressure (psia)	Vapor Temp. (F)	Liquid Temp. F	Relative Humidity (%)	Liquid Volume Fract.	Ice Volume Fract.	Ice Surf.A. (ft2)
def	14.7	75	104	60	0	0	0
1	14.63549	75	75	60	0	0	0
2	14.60724	75	75	60	0	0	0
3	30	104	104	100	1	0	0
4	14.67533	75	75	60	0	0	0
5	14.57722	75	125	60	0.03541	0	0

Initial Gas Pressure Ratios								
Vol	Air							
#	Gas 1	Gas 2	Gas 3	Gas 4	Gas 5	Gas 6	Gas 7	Gas 8
Def	1	0	0	0	0	0	0	0
1	1	0	0	0	0	0	0	0
2	1	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0
4	1	0	0	0	0	0	0	0
5	1	0	0	0	0	0	0	0

Noncondensing Gases						
Gas No.	Description	Symbol	Type	Mol. Weight	Lennard-Jones Diameter (Ang)	Parameters e/K (K)
1	Air	Air	POLY	28.97	3.617	97

Noncondensing Gases - Cp/Visc. Equations						
Gas No.	Cp Tmin (R)	Equation Tmax (R)	(Required) Cp (Btu/lbm-R)	Visc. Tmin (R)	Equation Tmax (R)	(Optional) Viscosity (lbm/ft-hr)
1	360	2880	0.238534-6.20064e-6*T+2.13043E-8*T**2-4.20247E-12*T**3			

Materials		
Type #	Description	Gap
1	CARBON STEEL	NO
2	CONCRETE	NO
3	FIBERBOARD	NO
4	COPPER TUBE	NO
5	CALCIUM SILICATE	NO
6	Poly Urithane	NO
7	FIBERGLASS	NO

Material Type			
1			
CARBON STEEL			
Temp.	Density	Cond.	Sp. Heat
(F)	(lbm/ft3)	(Btu/hr-ft-F)	(Btu/lbm-F)
75	490	26	0.11

Material Type			
2			
CONCRETE			
Temp.	Density	Cond.	Sp. Heat
(F)	(lbm/ft3)	(Btu/hr-ft-F)	(Btu/lbm-F)
75	144	0.54	0.2

Material Type			
3			
FIBERBOARD			
Temp.	Density	Cond.	Sp. Heat
(F)	(lbm/ft3)	(Btu/hr-ft-F)	(Btu/lbm-F)
75	3.25	0.022	0.2

Material Type			
4			
COPPER TUBE			
Temp.	Density	Cond.	Sp. Heat
(F)	(lbm/ft3)	(Btu/hr-ft-F)	(Btu/lbm-F)
32	488	8	0.11
212	488	9.4	0.11
572	488	10.9	0.11
932	488	12.4	0.11

Material Type			
5			
CALCIUM SILICATE			
Temp.	Density	Cond.	Sp. Heat
(F)	(lbm/ft3)	(Btu/hr-ft-F)	(Btu/lbm-F)
0	15	0.0375	0.201
200	15	0.0375	0.201
300	15	0.0417	0.201
400	15	0.0458	0.201
500	15	0.05	0.201
600	15	0.055	0.201

Material Type			
6			
Poly Urithane			
Temp.	Density	Cond.	Sp. Heat
(F)	(lbm/ft3)	(Btu/hr-ft-F)	(Btu/lbm-F)
32	75	0.1	0.48

Material Type			
7			
FIBERGLASS			
Temp.	Density	Cond.	Sp. Heat
(F)	(lbm/ft3)	(Btu/hr-ft-F)	(Btu/lbm-F)
32	6	0.029	0.21

Ice Condenser Parameters			
Initial	Bulk	Surface Area	Heat
Temp.	Density	Multiplier	Transfer
(F)	(lbm/ft3)	Function	Option
15	33.43		UCHIDA

Intentionally Left Blank

Component Trips										
Trip #	Description	Sense Var.	Sensor 1 Loc.	Sensor 2 Loc.	Var. Limit	Set Point	Delay Time	Rset Trip	Cond Trip	Cond Type
1	Start Pump Room Coolers	TIME			UPPER	300	0			AND
2	Start SGTS	TIME			UPPER	120	0			AND
3	Start FP Cooler	TIME			UPPER	43200	0			AND
4	HVAC Isolation	TIME			UPPER	15	0			AND
5	Heat Load Starts	TIME			UPPER	0.1	0			AND
6	AH12H On	GAS TEMP	1		LOWER	68	1E+60	7		AND
7	AH12H Off	GAS TEMP	1		UPPER	70	0	6		AND
8	AH13H On	GAS TEMP	1		LOWER	74	1E+60	9		AND
9	AH13H Off	GAS TEMP	1		UPPER	77	0	8		AND
10	AH14H On	GAS TEMP	1		LOWER	71	1E+60	11		AND
11	AH14H Off	GAS TEMP	1		UPPER	73	0	10		AND
12	AH15H On	GAS TEMP	1		LOWER	70	1E+60	13		AND
13	AH15H Off	GAS TEMP	1		UPPER	73	0	12		AND
14	AH16H On	GAS TEMP	1		LOWER	62	1E+60	15		AND
15	AH16H Off	GAS TEMP	1		UPPER	64	0	14		AND
16	AH17H On	GAS TEMP	1		LOWER	70	1E+60	17		AND
17	AH17H Off	GAS TEMP	1		UPPER	73	0	16		AND
18	AH18H On	GAS TEMP	1		LOWER	71	1E+60	19		AND
19	AH18H Off	GAS TEMP	1		UPPER	73	0	18		AND
20	AH19H On	GAS TEMP	1		LOWER	73	1E+60	21		AND
21	AH19H Off	GAS TEMP	1		UPPER	75	0	20		AND
22	Main Building Coolers	TIME			UPPER	300	0			AND
23	OPEN REA/ROA	TIME			UPPER	1000000	1E+60			AND
24	Pump Heat	TIME			UPPER	30	0			AND
25	Emergency Lighting	TIME			UPPER	0.1	0			AND
26	Ensure OFF	TIME			UPPER	3600	0			AND
27	SGTS Heater On	GAS TEMP	2s1		LOWER	225	0	28	2	AND
28	SGTS Heater Off	GAS TEMP	2s1		UPPER	245	0	27		AND

Functions				
FF#	Description	Ind. Var.	Dep. Var.	Points
0	Constant	-	-	0
1	Normal Heat Load	Ind. Var.	Dep. Var.	3
2	RRA-FC-1,2,3 T vs Ht Rate	Ind. Var.	Dep. Var.	42
3	RRA-FC-4 T vs Ht Rate	Ind. Var.	Dep. Var.	42
4	RRA-FC-5 T vs Ht Rate	Ind. Var.	Dep. Var.	42
5	RRA-FC-6 T vs Ht Rate	Ind. Var.	Dep. Var.	27
6	RRA-FC-8,9 T vs Heat Rate	Ind. Var.	Dep. Var.	26
7	RRA-FC-10,11 T vs Heat Rate	Ind. Var.	Dep. Var.	42
8	RRA-FC-12 T vs Heat Rate	Ind. Var.	Dep. Var.	42
9	RRA-FC-13, 14 T vs Heat Rate	Ind. Var.	Dep. Var.	42
10	RRA-FC-15,17 T vs Heat Rate	Ind. Var.	Dep. Var.	42
11	RRA-FC-19,20 T vs Heat Rate	Ind. Var.	Dep. Var.	42
12	SGT Flow vs DP	Ind. Var.	Dep. Var.	14
13	SGT Heat Rate	Ind. Var.	Dep. Var.	11
14	PC Temperature	Ind. Var.	Dep. Var.	13
15	Coeff	Ind. Var.	Dep. Var.	4
16	Nu Tube Side	Ind. Var.	Dep. Var.	28
17	Nu Shell Side	Ind. Var.	Dep. Var.	29
18	Cont Heat Transfer	cv4	Dep. Var.	2
19	Fuel Pool Flow	Ind. Var.	Dep. Var.	4
20	Upper Leak Flow	cv12	Dep. Var.	2
21	Lower Leak Flow	cv15	Dep. Var.	2
22	Wetwell Pool Temp	Ind. Var.	Dep. Var.	8
23	Fuel Pool Temp	cv17	Dep. Var.	2
24	ECCS Pipe Temp	cv19	Dep. Var.	2
25	Norm Pwr Decay	cv27	Dep. Var.	2
26	RRAFC123 87F	Ind. Var.	Dep. Var.	42
27	RRAFC4 87F	Ind. Var.	Dep. Var.	42
28	RRAFC5 87F	Ind. Var.	Dep. Var.	42
29	RRAFC8, 9 84F	Ind. Var.	Dep. Var.	26
30	RRAFC10,11 87F	Ind. Var.	Dep. Var.	42
31	RRAFC12 87F	Ind. Var.	Dep. Var.	42
32	RRAFC13, 14 87F	Ind. Var.	Dep. Var.	42
33	RRAFC15, 17 87F	Ind. Var.	Dep. Var.	42
34	RRAFC19, 20 87F	Ind. Var.	Dep. Var.	42
35	RRAFC123Cont	cv28	Dep. Var.	2
36	RRAFC4Cont	cv31	Dep. Var.	2
37	RRAFC5Cont	cv34	Dep. Var.	2
38	RRAFC89Cont	cv37	Dep. Var.	2
39	RRAFC1011Cont	cv40	Dep. Var.	2
40	RRAFC12Cont	cv43	Dep. Var.	2
41	RRAFC1314Cont	cv46	Dep. Var.	2
42	RRAFC1517Cont	cv49	Dep. Var.	2
43	RRAFC1920Cont	cv52	Dep. Var.	2

Functions				
FF#	Description	Ind. Var.	Dep. Var.	Points
44	Pool Temp Simple	Time (sec)	Temperature (F)	4
45	SGTS Start Time	Ind. Var.	Dep. Var.	6
46	SGTS Fan Heat	cv60	Dep. Var.	2
47	SGTS 0%	Ind. Var.	Dep. Var.	18
48	SGTS Flow Select	cv58	Dep. Var.	2

Function			
1			
Normal Heat Load			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	1	3600	1
10000000	1		

Function			
2			
RRA-FC-1,2,3 T vs Ht Rate			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	78	0
80	2.07	82	4.14
84	6.19	86	8.25
88	10.31	90	12.36
92	14.42	94	16.47
96	18.5	98	20.56
100	22.61	102	24.64
104	26.67	106	28.61
108	30.83	110	32.78
112	34.72	114	36.94
116	38.89	118	40.83
120	42.78	122	45
124	46.94	126	48.89
128	50.83	130	52.78
132	55	134	56.94
136	58.89	138	60.83
140	62.78	142	64.72
144	66.94	146	68.89
148	70.83	150	72.78
152	74.72	154	76.67
156	78.61	158	80.56

Function			
3			
RRA-FC-4 T vs Ht Rate			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	78	0
80	4	82	7.97
84	11.94	86	15.89
88	19.83	90	23.78
92	27.72	94	31.67
96	35.56	98	39.44
100	43.33	102	47.22
104	51.11	106	55
108	58.89	110	62.5
112	66.39	114	70.28
116	74.17	118	77.78
120	81.67	122	85.56
124	89.17	126	93.06
128	96.67	130	100.56
132	104.17	134	107.78
136	111.67	138	115.28
140	118.89	142	122.78
144	126.39	146	130
148	133.61	150	137.22
152	140.83	154	144.44
156	148.06	158	151.67

Function			
4			
RRA-FC-5 T vs Ht Rate			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	78	0
80	2.86	82	5.72
84	8.58	86	11.42
88	14.25	90	17.11
92	19.94	94	22.75
96	25.58	98	28.33
100	31.11	102	33.89
104	36.94	106	39.72
108	42.5	110	45.28
112	48.06	114	50.83
116	53.61	118	56.39
120	59.17	122	61.67

Function			
4			
RRA-FC-5 T vs Ht Rate			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
124	64.44	126	67.22
128	70	130	72.78
132	75.56	134	78.33
136	80.83	138	83.61
140	86.39	142	89.17
144	91.67	146	94.44
148	97.22	150	99.72
152	102.5	154	105.28
156	107.78	158	110.56

Function			
5			
RRA-FC-6 T vs Ht Rate			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	78	0
90	8.030555556	95	11.36388889
100	14.69166667	105	18.01111111
110	21.32222222	115	24.63055556
120	27.91666667	125	31.22222222
130	34.5	135	37.77777778
140	41.05555556	145	44.30555556
150	47.58333333	155	50.83333333
160	54.05555556	165	57.30555556
170	60.52777778	175	63.75
180	66.97222222	185	70.16666667
190	73.38888889	195	76.58333333
200	79.77777778	205	82.94444444
210	86.11111111		

Function			
6			
RRA-FC-8,9 T vs Heat Rate			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	84	0
85	1.074166667	90	6.433333333
95	11.775	100	17.1
105	22.40555556	110	27.69166667
115	32.97222222	120	38.22222222
125	43.44444444	130	48.66666667
135	53.86111111	140	59.02777778
145	64.19444444	150	69.33333333
155	74.47222222	160	79.58333333
165	84.66666667	170	89.75
175	94.80555556	180	99.83333333
185	104.8611111	190	109.8611111
195	114.8611111	200	119.8333333

Function			
7			
RRA-FC-10,11 T vs Heat Rate			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	78	0
80	2.15	82	4.3
84	6.45	86	8.59
88	10.73	90	12.87
92	15	94	17.13
96	19.26	98	21.39
100	23.51	102	25.63
104	27.75	106	29.86
108	31.97	110	34.08
112	36.19	114	38.29
116	40.39	118	42.49
120	44.58	122	46.67
124	48.76	126	50.85
128	52.93	130	55.01
132	57.09	134	59.16
136	61.23	138	63.3
140	65.36	142	67.43
144	69.49	146	71.54
148	73.6	150	75.65
152	77.7	154	79.74
156	81.79	158	83.83

Function			
8			
RRA-FC-12 T vs Heat Rate			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	78	0
80	2.24	82	4.47
84	6.7	86	8.93
88	11.15	90	13.37
92	15.59	94	17.8
96	20.01	98	22.22
100	24.43	102	26.63
104	28.83	106	31.02
108	33.21	110	35.4
112	37.59	114	39.77
116	41.95	118	44.13
120	46.3	122	48.47
124	50.64	126	52.81

Function			
8			
RRA-FC-12 T vs Heat Rate			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
128	54.97	130	57.13
132	59.28	134	61.43
136	63.58	138	65.73
140	67.87	142	70.01
144	72.15	146	74.28
148	76.41	150	78.54
152	80.67	154	82.79
156	84.91	158	87.02

Function			
9			
RRA-FC-13, 14 T vs Heat Rate			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	78	0
80	1.91	82	3.81
84	5.72	86	7.61
88	9.5	90	11.39
92	13.28	94	15.17
96	17.06	98	18.94
100	20.83	102	22.72
104	24.58	106	26.47
108	28.33	110	30.28
112	32.22	114	33.89
116	35.83	118	37.78
120	39.44	122	41.39
124	43.33	126	45
128	46.94	130	48.89
132	50.56	134	52.5
136	54.44	138	56.11
140	58.06	142	59.72
144	61.67	146	63.61
148	65.28	150	67.22
152	68.89	154	70.83
156	72.5	158	74.44

Function			
10			
RRA-FC-15,17 T vs Heat Rate			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	78	0
80	1.66	82	3.33
84	4.97	86	6.64
88	8.28	90	9.94
92	11.58	94	13.25
96	14.89	98	16.53
100	18.19	102	19.83
104	21.47	106	23.11
108	24.75	110	26.39
112	28.06	114	29.72
116	31.39	118	32.78
120	34.44	122	36.11
124	37.78	126	39.44
128	41.11	130	42.78
132	44.17	134	45.83
136	47.5	138	49.17
140	50.83	142	52.22
144	53.89	146	55.56
148	57.22	150	58.61
152	60.28	154	61.94
156	63.61	158	65

Function			
11			
RRA-FC-19,20 T vs Heat Rate			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	78	0
80	2.93	82	5.86
84	8.78	86	11.7
88	14.61	90	17.52
92	20.42	94	23.31
96	26.2	98	29.09
100	31.97	102	34.84
104	37.71	106	40.57
108	43.43	110	46.28
112	49.13	114	51.97
116	54.81	118	57.64
120	60.46	122	63.28
124	66.1	126	68.91

Function			
11			
RRA-FC-19,20 T vs Heat Rate			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
128	71.71	130	74.51
132	77.3	134	80.09
136	82.88	138	85.65
140	88.43	142	91.19
144	93.96	146	96.71
148	99.46	150	102.21
152	104.95	154	107.69
156	110.42	158	113.14

Function			
12			
SGT Flow vs DP			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
-1	4800	0	4800
0.1444	4800	0.2707	4800
0.3609	4800	0.4421	4800
0.5007	4800	0.5503	4800
0.556	4800	0.5774	4000
0.5955	3000	0.6	2000
0.61	0	5	0

Function			
13			
SGT Heat Rate			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0.2	0.1	0.08
0.2	0.05	0.3	0.09
0.4	0.16	0.5	0.25
0.6	0.37	0.7	0.5
0.8	0.65	0.9	0.81
1	1		

Function			
14			
PC Temperature			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	135	0.1	150
0.7	328	1	290
4	285	10	280
1000	280	2000	285
10000	280	86400	250
1000000	165	10000000	110
100000000	110		

Function			
15			
Coeff			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
-1000000	0	0	0.1
0.1	1000	1000000	1000

Function			
16			
Nu Tube Side			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	45350	299.64
49030	307.96	52830	316.13
56740	324.18	60760	332.11
64890	339.91	69120	347.6
73460	355.18	77890	362.65
82410	370.02	87030	377.29
91740	384.47	96540	391.55
101400	398.55	106400	405.46
111400	412.3	116600	419.05
121800	425.74	127000	432.36
132400	438.91	137800	445.4
143300	451.83	148900	458.21
154500	464.53	160200	470.8
165900	477.03	171700	483.21

Function			
17			
Nu Shell Side			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	15090	163.86
16310	167.23	17570	170.51
18860	173.7	20190	176.82
21550	179.85	22940	182.82
24350	185.71	25800	188.54
27270	191.29	28770	193.99
30300	196.62	31850	199.2
33420	201.72	35010	204.19
36620	206.61	38260	208.97
39910	211.29	41580	213.56
43270	215.79	44970	217.98
46680	220.13	48420	222.24
50160	224.31	51920	226.34
53690	228.34	55460	230.31
1000000	230.31		

Function			
18			
Cont Heat Transfer			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	100000000	100000000

Function			
19			
Fuel Pool Flow			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	1	0
1.1	1	100000000	1

Function			
20			
Upper Leak Flow			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	100000000	100000000

Function			
21			
Lower Leak Flow			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	100000000	100000000

Function			
22			
Wetwell Pool Temp			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	95	10	105
100	150	1000	160
10000	200	35000	204
50000	200	100000000	200

Function			
23			
Fuel Pool Temp			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	10000000	10000000

Function			
24			
ECCS Pipe Temp			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	10000000	10000000

Function			
25			
Norm Pwr Decay			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	100000000	100000000

Function			
26			
RRAFC123 87F			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	87	0
89	2.06	91	4.11
93	6.17	95	8.22
97	10.28	99	12.33
101	14.39	103	16.42
105	18.47	107	20.5
109	22.53	111	24.56
113	26.58	115	28.61
117	30.56	119	32.78
121	34.72	123	36.67
125	38.61	127	40.83
129	42.78	131	44.72
133	46.67	135	48.61
137	50.83	139	52.78
141	54.72	143	56.67
145	58.61	147	60.56
149	62.78	151	64.72
153	66.67	155	68.61
157	70.56	159	72.5
161	74.44	163	76.39
165	78.33	167	80.28

Function			
27			
RRAFC4 87F			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	87	0
89	3.97	91	7.92
93	11.86	95	15.81
97	19.72	99	23.64
101	27.56	103	31.39
105	35.28	107	39.17
109	43.06	111	46.94
113	50.83	115	54.72
117	58.33	119	62.22
121	66.11	123	69.72
125	73.61	127	77.5
129	81.11	131	85
133	88.61	135	92.5
137	96.11	139	100
141	103.61	143	107.22
145	110.83	147	114.72
149	118.33	151	121.94
153	125.56	155	129.17
157	132.78	159	136.39
161	140	163	143.61
165	147.22	167	150.83

Function			
28			
RRAFC5 87F			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	87	0
89	2.86	91	5.69
93	8.53	95	11.36
97	14.19	99	17.03
101	19.86	103	22.67
105	25.47	107	28.33
109	31.11	111	33.89
113	36.67	115	39.44
117	42.22	119	45
121	47.78	123	50.56
125	53.33	127	56.11
129	58.89	131	61.67
133	64.17	135	66.94

Function			
28			
RRAFC5 87F			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
137	69.72	139	72.5
141	75.28	143	77.78
145	80.56	147	83.33
149	86.11	151	88.61
153	91.39	155	94.17
157	96.67	159	99.44
161	102.22	163	104.72
165	107.5	167	110

Function			
29			
RRAFC8, 9 84F			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	84	0
85	0.669722222	90	4.013888889
95	7.352777778	100	10.68333333
105	14.00833333	110	17.325
115	20.63611111	120	23.93888889
125	27.23333333	130	30.52777778
135	33.80555556	140	37.08333333
145	40.36111111	150	43.61111111
155	46.86111111	160	50.11111111
165	53.36111111	170	56.58333333
175	59.80555556	180	63.02777778
185	66.25	190	69.44444444
195	72.63888889	200	75.83333333

Function			
30			
RRAFC10,11 87F			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	87	0
89	2.15	91	4.29
93	6.43	95	8.56
97	10.7	99	12.83
101	14.96	103	17.08

Function			
30			
RRAFC10,11 87F			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
105	19.2	107	21.32
109	23.44	111	25.55
113	27.66	115	29.77
117	31.88	119	33.98
121	36.08	123	38.17
125	40.27	127	42.36
129	44.44	131	46.53
133	48.61	135	50.69
137	52.77	139	54.84
141	56.91	143	58.98
145	61.04	147	63.11
149	65.17	151	67.22
153	69.28	155	71.33
157	73.37	159	75.42
161	77.46	163	79.5
165	81.54	167	83.57

Function			
31			
RRAFC12 87F			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	87	0
89	2.23	91	4.46
93	6.68	95	8.9
97	11.11	99	13.33
101	15.54	103	17.75
105	19.95	107	22.15
109	24.35	111	26.54
113	28.74	115	30.92
117	33.11	119	35.29
121	37.47	123	39.65
125	41.82	127	43.99
129	46.16	131	48.32
133	50.48	135	52.64
137	54.79	139	56.95
141	59.09	143	61.24
145	63.38	147	65.52
149	67.66	151	69.79
153	71.92	155	74.05
157	76.17	159	78.29
161	80.41	163	82.53
165	84.64	167	86.75

Function			
32			
RRAFC13, 14 87F			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	87	0
89	1.9	91	3.81
93	5.69	95	7.58
97	9.47	99	11.36
101	13.25	103	15.14
105	17.03	107	18.89
109	20.78	111	22.67
113	24.53	115	26.39
117	28.33	119	30
121	31.94	123	33.89
125	35.83	127	37.5
129	39.44	131	41.39
133	43.06	135	45

Function			
32			
RRAFC13, 14 87F			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
137	46.94	139	48.61
141	50.56	143	52.22
145	54.17	147	56.11
149	57.78	151	59.72
153	61.39	155	63.33
157	65.28	159	66.94
161	68.89	163	70.56
165	72.5	167	74.17

Function			
33			
RRAFC15, 17 87F			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	87	0
89	1.66	91	3.31
93	4.97	95	6.61
97	8.28	99	9.92
101	11.56	103	13.22
105	14.86	107	16.5
109	18.14	111	19.78
113	21.42	115	23.06
117	24.69	119	26.31
121	28.06	123	29.44
125	31.11	127	32.78
129	34.44	131	36.11
133	37.78	135	39.44
137	40.83	139	42.5
141	44.17	143	45.83
145	47.5	147	48.89
149	50.56	151	52.22
153	53.89	155	55.28
157	56.94	159	58.61
161	60.28	163	61.67
165	63.33	167	65

Function			
34			
RRAFC19, 20 87F			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	87	0
89	2.92	91	5.84
93	8.75	95	11.65
97	14.55	99	17.44
101	20.33	103	23.22
105	26.09	107	28.97
109	31.83	111	34.69
113	37.55	115	40.4
117	43.25	119	46.09
121	48.92	123	51.75
125	54.58	127	57.4
129	60.21	131	63.02
133	65.82	135	68.62
137	71.41	139	74.2
141	76.98	143	79.76
145	82.53	147	85.29
149	88.06	151	90.81
153	93.56	155	96.31
157	99.05	159	101.78
161	104.51	163	107.24
165	109.96	167	112.67

Function			
35			
RRAFC			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	10000000	10000000

Function			
36			
RRAFC4Cont			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	10000000	10000000

Function			
37			
RRAFC5Cont			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	10000000	10000000

Function			
38			
RRAFC89Cont			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	10000000	10000000

Function			
39			
RRAFC1011Cont			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	10000000	10000000

Function			
40			
RRAFC12Cont			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	10000000	10000000

Function			
41			
RRAFC1314Cont			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	10000000	10000000

Function			
42			
RRAFC1517Cont			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	10000000	10000000

Function			
43			
RRAFC1920Cont			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	10000000	10000000

Function			
44			
Pond Temp Simple			
Ind. Var.: Time (sec)			
Dep. Var.: Temperature (F)			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	78	7200	78
7200.01	87	100000000	87

Function			
45			
SGTS Start Time			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	106.9	0
107	1	119.9	1
120	1	10000000	1

Function			
46			
SGTS Fan Heat			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	1000000	1000000
Function			
47			
SGTS 0%			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
-1	4800	0	4800
0.144	4800	0.208	4800
0.266	4800	0.316	4800
0.37	4800	0.415	4800
0.456	4800	0.496	4800
0.532	4800	0.559	4800
0.595	4800	0.613	4800
0.623	4800	0.632	4800
0.633	0	5	0
Function			
48			
SGTS Flow Select			
Ind. Var.:			
Dep. Var.:			
Ind. Var.	Dep. Var.	Ind. Var.	Dep. Var.
0	0	1000000	1000000

Control Variables								
CV #	Description	Func. Form	Initial Value	Coeff. G	Coeff. a0	Min	Max	Upd. Int. Mult.
1	Vapor Temperature	tfunc	135	1	0	-1E+32	1E+32	0
2	DW Wall Temp	sum	135	1	0	-1E+32	1E+32	0
3	Temp Difference	sum	0	-1	0	-1E+32	1E+32	0
4	Coefficient	tfunc	0	1	0	0	10000	0
5	UHX	sum	0	1	0	-1E+32	1E+32	0
6	IP Top Door	sum	14.66328	1	0	-1E+32	1E+32	0
7	DPLow	sum	0.54474	27.71	14.68294	-1E+32	1E+32	0
8	IP Upper	sum	14.56125	1	0	-1E+32	1E+32	0
9	DPUpper	sum	0	27.71	14.56125	-1E+32	1E+32	0
10	Leakage DP Upper	sum	0	27.71	0	0	5	0
11	Turb Flow Upper	exp	0	2489.79	0.5	0	1E+32	0
12	Leak Flow Up	sum	0	1	0	0	1E+32	0
13	Leak DP Lower	sum	0	27.71	0	0	5	0
14	Turb Flow Low	exp	0	1139.86	0.5	0	1E+32	0
15	Leak Flow Low	sum	0	1	0	0	1E+32	0
16	Fuel Pool Temp	sum	125	1	0	0	300	0
17	FP Rm Pipe Temp	if	104	1	-1	-1E+32	1E+32	0
18	Wetwell Temp	tfunc	95	1	0	-1E+32	1E+32	0
19	ECCS Rm Pipe Temp	if	104	1	-0.1	-1E+32	1E+32	0
20	Main Bld Temp	sum	75	1	0	28	200	0
21	Pwr 1	sum	0	150	1	-1E+32	1E+32	0
22	Pwr 2	exp	0	75	2	-1E+32	1E+32	0
23	Pwr 3	exp	0	25	3	-1E+32	1E+32	0
24	Pwr 4	exp	0	6.25	4	-1E+32	1E+32	0
25	Norm Bld Eval	sum	0	1	0	-1E+32	1E+32	0
26	Norm Bld HT	if	0	1	0	0	300	0
27	Norm Bld Ht Load	if	0	1	-7200	0	300	0

Control Variables								
CV #	Description	Func. Form	Initial Value	Coeff. G	Coeff. a0	Min	Max	Upd. Int. Mult.
28	RRAFC123	if	0	1	-7200	-1E+32	1E+32	0
29	RRAFC12377	tfunc	0	1	0	-1E+32	1E+32	0
30	RRAFC12387	tfunc	0	1	0	-1E+32	1E+32	0
31	RRAFC4	if	0	1	-7200	-1E+32	1E+32	0
32	RRAFC477	tfunc	0	1	0	-1E+32	1E+32	0
33	RRAFC487	tfunc	0	1	0	-1E+32	1E+32	0
34	RRAFC5	if	0	1	-7200	-1E+32	1E+32	0
35	RRAFC577	tfunc	0	1	0	-1E+32	1E+32	0
36	RRAFC587	tfunc	0	1	0	-1E+32	1E+32	0
37	RRAFC89	if	0	1	-7200	-1E+32	1E+32	0
38	RRAFC8977	tfunc	0	1	0	-1E+32	1E+32	0
39	RRAFC8987	tfunc	0	1	0	-1E+32	1E+32	0
40	RRAFC1011	if	0	1	-7200	-1E+32	1E+32	0
41	RRAFC101177	tfunc	0	1	0	-1E+32	1E+32	0
42	RRAFC101187	tfunc	0	1	0	-1E+32	1E+32	0
43	RRAFC12	if	0	1	-7200	-1E+32	1E+32	0
44	RRAFC1277	tfunc	0	1	0	-1E+32	1E+32	0
45	RRAFC1287	tfunc	0	1	0	-1E+32	1E+32	0
46	RRAFC1314	if	0	1	-7200	-1E+32	1E+32	0
47	RRAFC131477	tfunc	0	1	0	-1E+32	1E+32	0
48	RRAFC131487	tfunc	0	1	0	-1E+32	1E+32	0
49	RRAFC1517	if	0	1	-7200	-1E+32	1E+32	0
50	RRAFC151777	tfunc	0	1	0	-1E+32	1E+32	0
51	RRAFC151787	tfunc	0	1	0	-1E+32	1E+32	0
52	RRAFC1920	if	0	1	-7200	-1E+32	1E+32	0
53	RRAFC192077	tfunc	0	1	0	-1E+32	1E+32	0
54	RRAFC192087	tfunc	0	1	0	-1E+32	1E+32	0
55	DP	sum	0	1	0	-1E+32	1E+32	0

Control Variables								
CV #	Description	Func. Form	Initial Value	Coeff. G	Coeff. a0	Min	Max	Upd. Int. Mult.
56	0%VIV Flow	tfunc	0	1	0	-1E+32	1E+32	0
57	25%VIV Flow	tfunc	0	1	0	-1E+32	1E+32	0
58	Selector	if	0	1	-0.26	-1E+32	1E+32	0
59	Fan Efficiency	mult	0	0.0116883	0	-1E+32	1E+32	0
60	Fan Heat	sum	0	15.73	0	-1E+32	1E+32	0

Function Components			
Control Variable 1			
Vapor Temperature			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Etime	cM	1
2	-	DC14	1
Function Components			
Control Variable 2			
DW Wall Temp			
sum			
Y=G*(a0+a1X1+a2X2+...+anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Tsrfs(1)	cC33	1
Function Components			
Control Variable 3			
Temp Difference			
sum			
Y=G*(a0+a1X1+a2X2+...+anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Cvval	cv2	1
2	Cvval	cv1	-1
Function Components			
Control Variable 4			
Coefficient			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Cvval	cv3	1
2	-	DC15	1

Function Components			
Control Variable 5			
UHX			
sum			
Y=G*(a0+a1X1+a2X2+...+anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Uhx(1)	cX1H	1

Function Components			
Control Variable 6			
IP Top Door			
sum			
Y=G*(a0+a1X1+a2X2+...+anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	P	cV1	1
2	Rm	cV1	0.37457

Function Components			
Control Variable 7			
DPLow			
sum			
Y=G*(a0+a1X1+a2X2+...+anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Cvval	cv6	-1

Function Components			
Control Variable 8			
IP Upper			
sum			
Y=G*(a0+a1X1+a2X2+...+anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	P	cV5	1
2	Rm	cV5	-0.21515

Function Components			
Control Variable 9			
DPUpper			
sum			
Y=G*(a0+a1X1+a2X2+...+anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Cvval	cv8	-1

Function Components			
Control Variable 10			
Leakage DP			
sum			
Y=G*(a0+a1X1+a2X2+...+anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Bc_p	cB2F	1
2	Cvval	cv8	-1

Function Components			
Control Variable 11			
Turb Flow Upper			
exp			
Y=G*(a0+a1X1)^a2X2 or G*(a1X1)^a0			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Cvval	cv10	1

Function Components			
Control Variable 12			
Leak Flow Up			
sum			
Y=G*(a0+a1X1+a2X2+...+anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Cvval	cv10	1226.31
2	Cvval	cv11	1

Function Components			
Control Variable 13			
Leak DP Lower			
sum			
Y=G*(a0+a1X1+a2X2+...+anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Bc_p	cB1F	1
2	Cvval	cv6	-1

Function Components			
Control Variable 14			
Turb Flow Low			
exp			
Y=G*(a0+a1X1)^a2X2 or G*(a1X1)^a0			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Cvval	cv13	1

Function Components			
Control Variable 15			
Leak Flow Low			
sum			
Y=G*(a0+a1X1+a2X2+...+anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Cvval	cv13	379.95
2	Cvval	cv14	1

Function Components			
Control Variable 16			
Fuel Pool Temp			
sum			
Y=G*(a0+a1X1+a2X2+...+anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Teml	cV5	1

Function Components			
Control Variable 17			
FP Rm Pipe Temp			
if(a1X1+a0<0 a1X1+a0=0 a1X1+a0>0)			
Y=Ga2X2 Y=Ga3X3 Y=Ga4X4			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Wljnc	cJ7	1
2	One	cM	104
3	One	cM	1
4	Cvval	cv16	1
Function Components			
Control Variable 18			
Wetwell Temp			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Etime	cM	1
2	-	DC24	1
Function Components			
Control Variable 19			
ECCS Rm Pipe Temp			
If(a1X1+a0<0 a1X1+a0=0 a1X1+a0>0)			
Y=Ga2X2 Y=Ga3X3 Y=Ga4X4			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Etime	cM	1
2	One	cM	104
3	One	cM	104
4	Cvval	cv18	1
Function Components			
Control Variable 20			
Main Bld Temp			
sum			
Y=G*(a0+a1X1+a2X2+...+anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Temv	cV1	1

Function Components			
Control Variable 21			
Pwr 1			
sum			
Y=G*(a0+a1X1+a2X2+...+anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Etime	cM	-0.0002778
Function Components			
Control Variable 22			
Pwr 2			
exp			
Y=G*(a0+a1X1)^a2X2 or G*(a1X1)^a0			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Etime	cM	-0.0002778
Function Components			
Control Variable 23			
Pwr 3			
exp			
Y=G*(a0+a1X1)^a2X2 or G*(a1X1)^a0			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Etime	cM	-0.00027778
Function Components			
Control Variable 24			
Pwr 4			
exp			
Y=G*(a0+a1X1)^a2X2 or G*(a1X1)^a0			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Etime	cM	-0.00027778

Function Components			
Control Variable 25			
Norm Bld Eval			
sum			
Y=G*(a0+a1X1+a2X2+...+anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Cvval	cv21	1
2	Cvval	cv22	1
3	Cvval	cv23	1
4	Cvval	cv24	1
5	Cvval	cv20	-1

Function Components			
Control Variable 26			
Norm Bld HT			
if(a1X1+a0<0 a1X1+a0=0 a1X1+a0>0)			
Y=Ga2X2 Y=Ga3X3 Y=Ga4X4			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Cvval	cv25	1
2	Zero	cM	1
3	Zero	cM	1
4	Cvval	cv25	1.4629

Function Components			
Control Variable 27			
Norm Bld Ht Load			
if(a1X1+a0<0 a1X1+a0=0 a1X1+a0>0)			
Y=Ga2X2 Y=Ga3X3 Y=Ga4X4			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Etime	cM	1
2	Cvval	cv26	1
3	Cvval	cv26	1
4	Zero	cM	1

Function Components			
Control Variable 28			
RRAFC123			
If(a1X1+a0<0 a1X1+a0=0 a1X1+a0>0)			
Y=Ga2X2 Y=Ga3X3 Y=Ga4X4			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Etime	cM	1
2	Cvval	cv29	1
3	Cvval	cv30	1
4	Cvval	cv30	1

Function Components			
Control Variable 29			
RRAFC12377			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Temv	cV4	1
2	-	DC2	1

Function Components			
Control Variable 30			
RRAFC12384			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Temv	cV4	1
2	-	DC28	1

Function Components			
Control Variable 31			
RRAFC4			
If(a1X1+a0<0 a1X1+a0=0 a1X1+a0>0)			
Y=Ga2X2 Y=Ga3X3 Y=Ga4X4			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Etime	cM	1
2	Cvval	cv32	1
3	Cvval	cv33	1

4	Cvval	cv33	1

Function Components			
Control Variable 32			
RRAFC478			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Temv	cV4	1
2	-	DC3	1

Function Components			
Control Variable 33			
RRAFC487			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Temv	cV4	1
2	-	DC29	1

Function Components			
Control Variable 34			
RRAFC5			
if(a1X1+a0<0 a1X1+a0=0 a1X1+a0>0)			
Y=Ga2X2 Y=Ga3X3 Y=Ga4X4			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Etime	cM	1
2	Cvval	cv35	1
3	Cvval	cv36	1
4	Cvval	cv36	1

Function Components			
Control Variable 35			
RRAFC578			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a

1	Temv	cV4	1
2	-	DC4	1

Function Components			
Control Variable 36			
RRAFC584			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Temv	cV4	1
2	-	DC30	1
Function Components			
Control Variable 37			
RRAFC89			
if(a1X1+a0<0 a1X1+a0=0 a1X1+a0>0)			
Y=Ga2X2 Y=Ga3X3 Y=Ga4X4			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Etime	cM	1
2	Cvval	cv38	1
3	Cvval	cv39	1
4	Cvval	cv39	1
Function Components			
Control Variable 38			
RRAFC8978			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Temv	cV1	1
2	-	DC6	1
Function Components			
Control Variable 39			
RRAFC8984			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.

#	Name	location	a
1	Temv	cV1	1
2	-	DC31	1

Function Components			
Control Variable 40			
RRAFC1011			
If(a1X1+a0<0 a1X1+a0=0 a1X1+a0>0)			
Y=Ga2X2 Y=Ga3X3 Y=Ga4X4			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Etime	cM	1
2	Cvval	cv41	1
3	Cvval	cv42	1
4	Cvval	cv42	1
Function Components			
Control Variable 41			
RRAFC101178			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Temv	cV1	1
2	-	DC7	1
Function Components			
Control Variable 42			
RRAFC101184			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Temv	cV1	1
2	-	DC32	1
Function Components			
Control Variable 43			
RRAFC12			
If(a1X1+a0<0 a1X1+a0=0 a1X1+a0>0)			
Y=Ga2X2 Y=Ga3X3 Y=Ga4X4			

	Gothic_s	Variable	Coef.
#	Name	location	a
1	Etime	cM	1
2	Cvval	cv44	1
3	Cvval	cv45	1
4	Cvval	cv45	1

Function Components			
Control Variable 44			
RRAFC1278			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Temv	cV1	1
2	-	DC8	1
Function Components			
Control Variable 45			
RRAFC1284			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Temv	cV1	1
2	-	DC33	1
Function Components			
Control Variable 46			
RRAFC1314			
if(a1X1+a0<0 a1X1+a0=0 a1X1+a0>0)			
Y=Ga2X2 Y=Ga3X3 Y=Ga4X4			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Etime	cM	1
2	Cvval	cv47	1
3	Cvval	cv48	1
4	Cvval	cv48	1
Function Components			
Control Variable 47			

RRAFC131478			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Temv	cV1	1
2	-	DC9	1

Function Components			
Control Variable 48			
RRAFC131484			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Temv	cV1	1
2	-	DC34	1
Function Components			
Control Variable 49			
RRAFC1517			
if(a1X1+a0<0 a1X1+a0=0 a1X1+a0>0)			
Y=Ga2X2 Y=Ga3X3 Y=Ga4X4			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Etime	cM	1
2	Cvval	cv50	1
3	Cvval	cv51	1
4	Cvval	cv51	1
Function Components			
Control Variable 50			
RRAFC151778			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Temv	cV1	1
2	-	DC10	1
Function Components			

Control Variable 51			
RRAFC151784			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Temv	cV1	1
2	-	DC35	1

Function Components			
Control Variable 52			
RRAFC192078			
If(a1X1+a0<0 a1X1+a0=0 a1X1+a0>0)			
Y=Ga2X2 Y=Ga3X3 Y=Ga4X4			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Etime	cM	1
2	Cvval	cv53	1
3	Cvval	cv54	1
4	Cvval	cv54	1
Function Components			
Control Variable 53			
RRAFC192084			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Temv	cV1	1
2	-	DC11	1
Function Components			
Control Variable 54			
RRAFC192084			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Temv	cV1	1
2	-	DC36	1

Function Components			
Control Variable 55			
DP			
sum			
Y=G*(a0+a1X1+a2X2+...+anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	P	cV6	1
2	P	cV2s1	-1
Function Components			
Control Variable 56			
0%VIV Flow			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Cvval	cv55	1
2	-	DC47	1
Function Components			
Control Variable 57			
25%VIV Flow			
tfunc			
Y=G*interp(X1,tableX2)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Cvval	cv55	1
2	-	DC12	1
Function Components			
Control Variable 58			
Selector			
If(a1X1+a0<0 a1X1+a0=0 a1X1+a0>0)			
Y=Ga2X2 Y=Ga3X3 Y=Ga4X4			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Cvval	cv9	1
2	Cvval	cv56	1
3	Cvval	cv57	1
4	Cvval	cv57	1

Function Components			
Control Variable 59			
Fan Efficiency			
mult			
Y=G*(a1X1*a2X2*...*anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	Vfanf	cf1Q	1
2	Dpjnc	cJ11	1
Function Components			
Control Variable 60			
Fan Heat			
sum			
Y=G*(a0+a1X1+a2X2+...+anXn)			
	Gothic_s	Variable	Coef.
#	Name	location	a
1	One	cM	1
2	Cvval	cv59	-1

Run Control Parameters (Seconds)									
Time Dom	DT Min	DT Max	DT Ratio	End Time	Print Int	Graph Int	Max CPU	Dump Int	Phs Chng Time Scale
1	0.000001	0.1	1E+12	0.1	50	0.1	600	0	DEFAULT
2	0.000001	0.1	1	10	50	0.1	3600	25	DEFAULT
3	0.000001	1	1	3600	50	2	600	0	DEFAULT
4	0.000001	1	1	9000	50	50	3600	86400	DEFAULT
5	0.000001	1	1	86400	10000	1000	100000	100000	DEFAULT
6	0.001	10	1	5500000	1000000	3600	1000000	1000000	DEFAULT
7	0.001	10	1	7500000	1000000	3600	1000000	1000000	DEFAULT
8	0.001	10	1	10000000	1000000	3600	1000000	1000000	DEFAULT
9	0.001	10	1	15000000	1000000	3600	1000000	1000000	DEFAULT

Solution Options								
Time Dom	Solution Method	Imp Conv Limit	Imp Iter Limit	Pres Sol Method	Pres Conv Limit	Pres Iter Limit	Differ Scheme	Burn Sharp
1	SEMI-IMP	0	1	DIRECT	0	1	FOUP	0
2	SEMI-IMP	0	1	DIRECT	0	1	FOUP	0
3	SEMI-IMP	0	1	DIRECT	0	1	FOUP	0
4	SEMI-IMP	0	1	DIRECT	0	1	FOUP	0
5	SEMI-IMP	0	1	DIRECT	0	1	FOUP	0
6	SEMI-IMP	0	1	DIRECT	0	1	FOUP	0
7	SEMI-IMP	0	1	DIRECT	0	1	FOUP	0
8	SEMI-IMP	0	1	DIRECT	0	1	FOUP	0
9	SEMI-IMP	0	1	DIRECT	0	1	FOUP	0

Run Options	
Option	Setting
Restart Time (sec)	0
Restart Time Step #	0
Restart Time Control	NEW
Revaporization Fraction	DEFAULT
Fog Model	OFF
Maximum Mist Density (lbm/ft3)	DEFAULT
Drop Diam. From Mist (in)	DEFAULT
Minimum HT Coeff. (B/h-ft2-F)	0
Reference Pressure (psia)	IGNORE
Forced Ent. Drop Diam. (in)	DEFAULT
Vapor Phase Head Correction	INCLUDE
Kinetic Energy	IGNORE
Vapor Phase	INCLUDE
Liquid Phase	INCLUDE
Drop Phase	INCLUDE
Force Equilibrium	IGNORE
Drop-Liq. Conversion	INCLUDE
QA Logging	OFF
Debug Output Level	0
Restart Dump on CPU Interval (sec)	3600

ENERCON SERVICES, INC.	CALCULATION DESIGN VERIFICATION PLAN AND SUMMARY SHEET	Calc. No. WS129-PR-02
		Rev. 1
		Page No. App. 2, 1 of 2

CALCULATION DESIGN VERIFICATION PLAN:

1. Verify that the overall approach and methodology are correct and reasonable
2. Verify that the design input and the source references used are correct and reasonable
3. Verify that the assumptions are reasonable
4. Verify that the results are correct and reasonable

(Print Name and Sign)		
Originator: Paul Hansen	Paul Hansen	**Date:** 9/28/04
Approver: Ralph Schwartzbeck	Ralph K. Schwartzbeck	**Date:** 9/28/04

CALCULATION DESIGN VERIFICATION SUMMARY:

Verification Scope:
The scope includes verification that the overall approach is reasonable, that the report method is acceptable, and that the equations and references used are properly applied. The input data and assumptions were reviewed for accuracy and applicability. The scope also includes verification that the results are correct and reasonable.

Methods:
The report was reviewed using the design review method. Design inputs were reviewed for correctness and to verify their validity. The reference calculation was reviewed to ensure the information was correctly extracted. The assumptions were reviewed to ensure they are reasonable. The overall approach and methodology was reviewed to ensure it is correct and reasonable. The math was verified to ensure arithmetic results were correct. The GOTHIC input file was reviewed to verify that the inputs were entered correctly. The report results were reviewed to ensure they are correct and that the output is reasonable when compared to the input.

Results:
The overall approach and methodology was found to be correct and reasonable. The appropriate formulae and data were correctly extracted from the reference calculation. The arithmetic was checked and verified to be correct. Numerical values were design verified using a calculator. The GOTHIC input file was correctly populated by the inputs developed within the report. The report results are reasonable and correct and are consistent with similar calculations performed in the past.

Conclusions:
Based on this review, this report is acceptable in the determination and presentation of the input parameters discussed in the purpose section of the document.

Based On The Above Summary, This Report Is Determined To Be Acceptable.

(Print Name and Sign)		
Design Verifier: F. Bivins Calhoun III	FBC III	**Date:** 9-28-04
Others:		**Date:**

ENERCON SERVICES, INC.	CALCULATION DESIGN VERIFICATION CHECKLIST	Calc. No. WS129-PR-02
		Rev. 1
		Page No. App. 2, 2 of 2

ITEM	CHECKLIST ITEMS	YES	NO	N/A
1	**Design Inputs** – Were the design inputs correctly selected, referenced (latest revision), consistent with the design basis and incorporated in the calculation?	☒	☐	☐
2	**Assumptions** – Were the assumptions reasonable and adequately described, justified and/or verified, and documented?	☒	☐	☐
3	**Quality Assurance** – Were the appropriate QA classification and requirements assigned to the calculation?	☒	☐	☐
4	**Codes, Standard and Regulatory Requirements** – Were the applicable codes, standards and regulatory requirements, including issue and addenda, properly identified and their requirements satisfied?	☐	☐	☒
5	**Construction and Operating Experience** – Have applicable construction and operating experience been considered?	☒	☐	☐
6	**Interfaces** – Have the design interface requirements been satisfied, including interactions with other calculations?	☐	☐	☒
7	**Methods** – Was the calculation methodology appropriate and properly applied to satisfy the calculation objective?	☒	☐	☐
8	**Design Outputs** – Was the conclusion of the calculation clearly stated,. did it correspond directly with the objectives and are the results reasonable compared to the inputs?	☒	☐	☐
9	**Radiation Exposure** – Has the calculation properly considered radiation exposure to the public and plant personnel?	☐	☐	☒
10	**Acceptance Criteria** – Are the acceptance criteria incorporated in the calculation sufficient to allow verification that the design requirements have been satisfactorily accomplished?	☒	☐	☐

Comments:

Editorial comments only. The report is technically correct and suitable for use as design input.
The design review considered not only the checklist items identified above, but all basic questions posed by ANSI N45.2.11-1977.

(Print Name and Sign)

Design Verifier: F. Bivins Calhoun III [signature]	**Date:** 9-28-04
Others:	**Date:**

APPENDIX 3

FAN MOTOR SPECIFICATION

Sep 02 04 02:48p Reactor/Fuels Engineering (509) 377-4786 p.2

Westinghouse Electric Corporation

Expected PNL (Ref)

Onsite Engineering

Active Lab

31.5
63
125
250
500
1000
2000
4000
8000
16000
dBA
dBC
Lin

RECEIVED SEP 21 1971

SPC 28-00,99

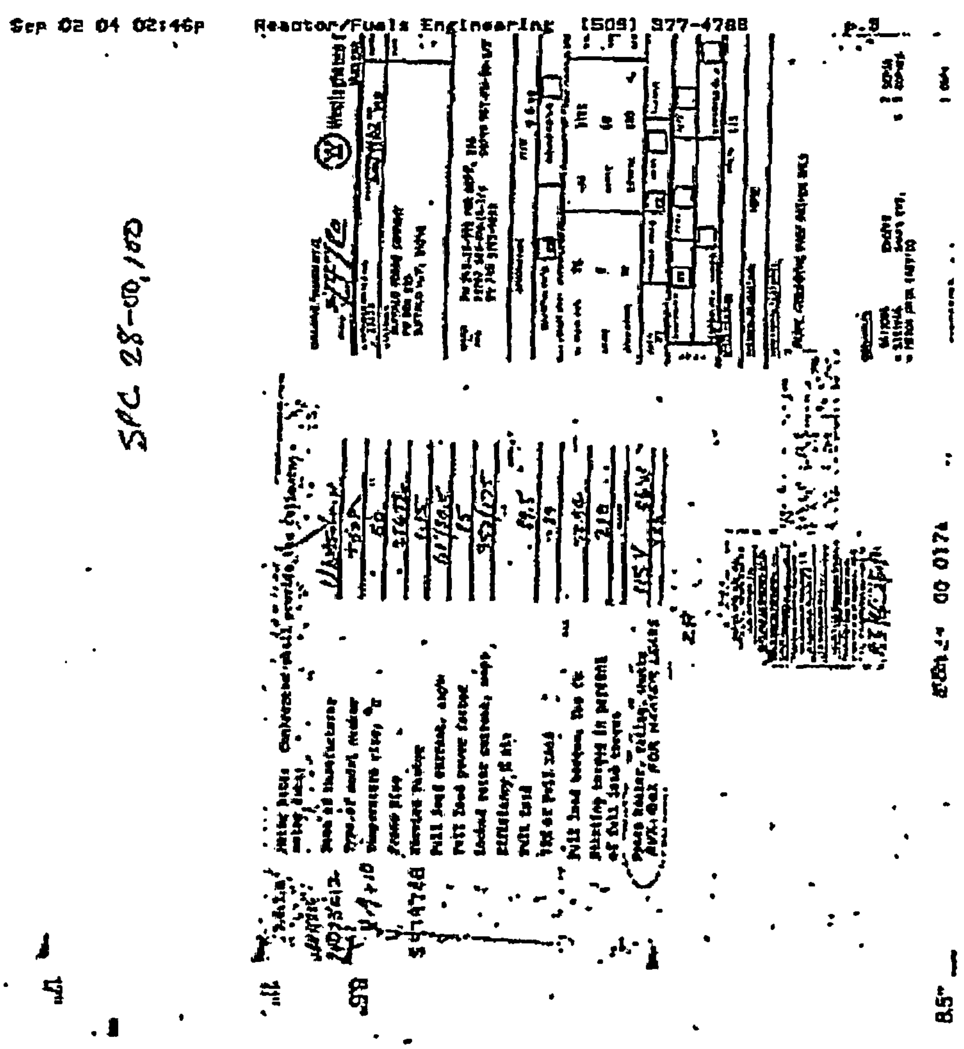
17"

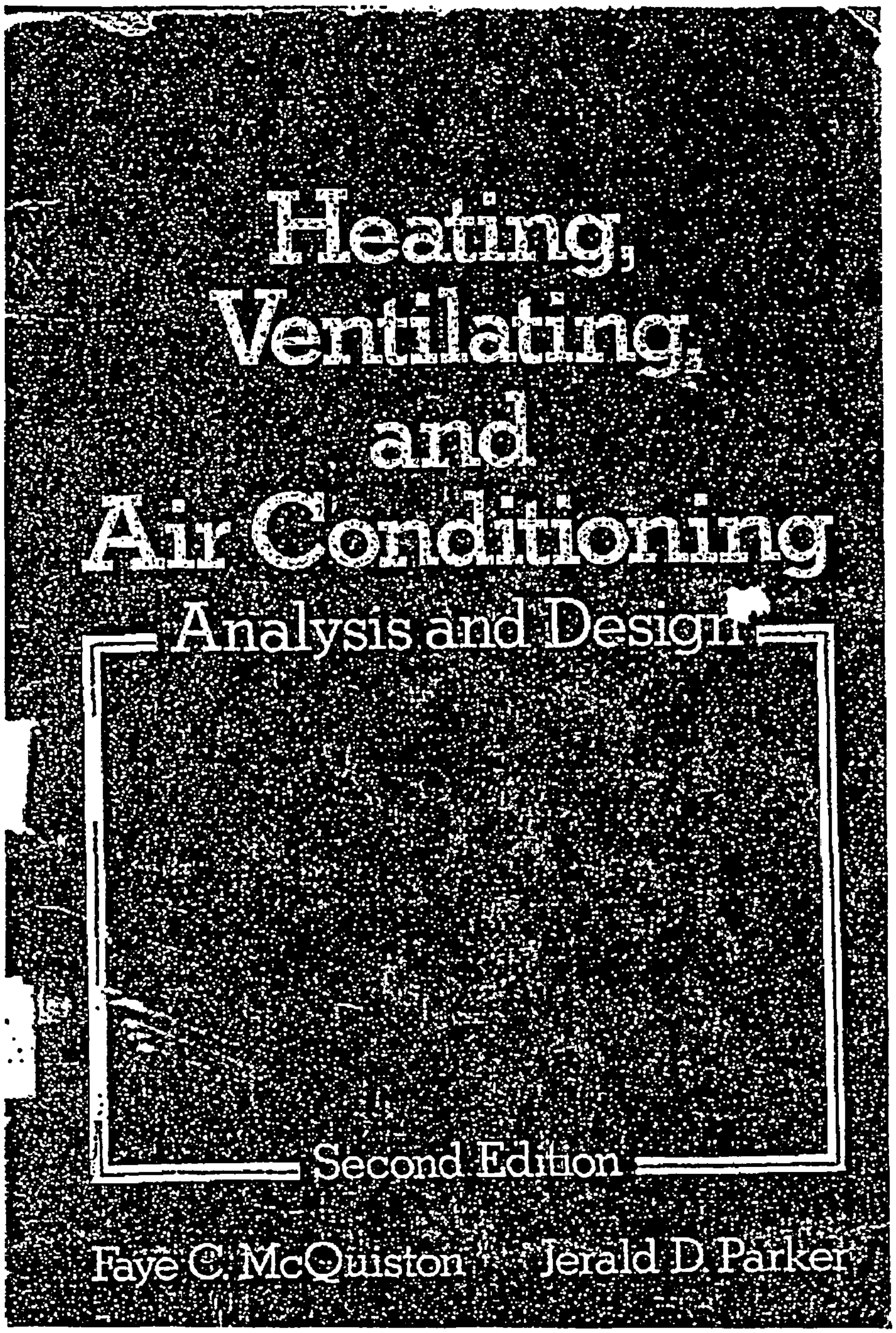
11"

8.5"

PIPE GROUNDING PAD PAPER ONLY

BUFFALO FORGE COMPANY


Sep 02 04 02:46p Reactor/Fuels Engineering (509) 377-4788 p.3
SPC 28-00,100
Motor Data: Contractor shall provide the following motor data:
Name of manufacturer: Westinghouse
Temperature rise, °C: 80
Service factor: 1.15
Efficiency, % at: Full load 89.5
Starting torque in percent of full load torque: 210
Space heater, voltage, watts: 115V
AUX. BOX FOR HEATER LEADS
Westinghouse
8.5"



Heating, Ventilating, and Air Conditioning
Analysis and Design
Second Edition
Faye C. McQuiston
Jerald D. Parker

In this form the equation expresses the increase in total head of the air. Multiplying Eq. (11-1) by g/g_c gives

$$w = \frac{P_{01} - P_{02}}{\rho} \qquad (11\text{-}1a)$$

which is an expression for the energy imparted to the air. Multiplication of Eq. (11-1a) by the mass flow rate of the air produces an expression for the *total power* imparted to the air.

$$\dot{W}_t = \frac{\dot{m}(P_{01} - P_{02})}{\rho} \qquad (11\text{-}2)$$

The *static power* is the part of the total power that is used to produce the change in static head.

$$\dot{W}_s = \frac{\dot{m}(P_1 - P_2)}{\rho} \qquad (11\text{-}3)$$

Fan efficiency may be expressed in two ways. The *total fan efficiency* is the ratio of total air power to the shaft power input.

$$\eta_t = \frac{\dot{W}_t}{\dot{W}_{sh}} = \frac{\dot{m}(P_{01} - P_{02})}{\rho \dot{W}_{sh}} \qquad (11\text{-}4)$$

In terms of volume flow rate Eq. (11-4) becomes

$$\eta_t = \frac{\dot{Q}(P_{01} - P_{02})}{\dot{W}_{sh}} \qquad (11\text{-}4a)$$

where

$\dot{Q}$ = volume flow rate, ft³/min or m³/s
$P_{01} - P_{02}$ = change in total pressure, lbf/ft² or Pa
$\dot{W}_{sh}$ = shaft power, (ft-lbf)/min or W

It has been common practice in the United States for $\dot{Q}$ to be in ft³/min., $(P_{01} - P_{02})$ to be in inches of water, and for $\dot{W}_{sh}$ to be in horsepower. In this special case,

$$\eta_t = \frac{\dot{Q}(P_{01} - P_{02})}{6350 \dot{W}_{sh}} \qquad (11\text{-}4b)$$

The *static fan efficiency* is the ratio of the static air power to the shaft power input.

$$\eta_s = \frac{\dot{W}_s}{\dot{W}_{sh}} = \frac{\dot{m}(P_1 - P_2)}{\rho \dot{W}_{sh}} = \frac{\dot{Q}(P_1 - P_2)}{\dot{W}_{sh}} \qquad (11\text{-}5)$$

where the same consistent units are used as with Eq. (11-4a). Using the units of Eq. (11-4b), we get

$$\eta_s = \frac{\dot{Q}(P_1 - P_2)}{6350 \dot{W}_{sh}} \qquad (11\text{-}5a)$$

NE-02-01-05 R1
CMR 3381 R1
APPENDIX E

ENERCON SERVICES, INC.	CALCULATION COVER SHEET	Calc. No. WS129-CALC-001
		Rev. 2
		Page No. 1 of 150

Title:	COLUMBIA STATION GOTHIC SECONDARY CONTAINMENT DRAWDOWN MODEL (Safety Related)	Client: ENERGY NORTHWEST
		Project: WS129

ITEM	COVER SHEET ITEMS	YES	NO
1	Does this calculation contain any assumptions that require confirmation? (If YES, identify the assumptions.) ______	☐	☒
2	Does this calculation serve as an "Alternate Calculation"? (If YES, identify the design verified calculation.) **Design Verified Calculation No.** ______	☐	☒
3	Does this calculation supersede an existing calculation? (If YES, identify the superseded calculation.) **Superseded Calculation No.** ______	☐	☒

SCOPE OF REVISION: Editorial and Formatting Changes and Minor Calculation Changes Only.

REVISION IMPACT ON RESULTS: These changes did not impact the results; that is there were no methodology or technical changes to the calculation. Therefore, the Design Verification performed for Revision 0 remains applicable.

PRELIMINARY CALCULATION ☐ **FINAL CALCULATION** ☒

(Print Name and Sign)

Originator: Paul N. Hansen *Paul N Hansen*	Date: 9/28/04
Design Verifier: F. Bivins Calhoun III *FB Calhoun III*	Date: 9-28-04
Approver: Ralph Schwartzbeck *Ralph K Schwartzbeck*	Date: 9-28-04

ENERCON SERVICES, INC.	CALCULATION REVISION STATUS SHEET	Calc. No. WS129-CALC-002 1 Rev. 2 Page No. 2 of 150

CALCULATION REVISION STATUS

REVISION	DATE	DESCRIPTION
0		Initial issue
1	6/03/2004	Minor Editorial Changes
2	9/28/2004	Minor Editorial and Calculation Change that introduced no impact

PAGE REVISION STATUS

PAGE NO.	REVISION	PAGE NO.	REVISION	PAGE NO.	REVISION	PAGE NO.	REVISION
1-2	2	43	2	82	0	98	1
3-5	0	44-53	0	83-85	1	99	1
6-9	1	54-56	1	86-90	0	100-101	0
10	2	57	0	91	1	102	1
11-12	0	58	1	92	0	103-118	0
13-14	1	59-60	0	93	1	119-121	1
15-18	0	61-62	1	94	0	122	2
19	1	63-64	0	95	1	123-124	0
20-27	0	65-70	1	96	0	125	1
28-30	1	71-76	0	97	1	126-150	0
31-35	0	77-78	1				
36-37	2	79-80	0				
38-42	0	81	1				

APPENDIX REVISION STATUS

APPENDIX NO.	PAGE NO.	REVISION	APPENDIX NO.	PAGE NO.	REVISION
1	57-60	2	4	All	0
2	All	0	5	All	0
3	All	0	6	All	0
			7	All	0

ENERCON SERVICES, INC.	CALCULATION DESIGN VERIFICATION PLAN AND SUMMARY SHEET	Calc. No. WS129-CALC-001
		Rev. 2
		Page No. 3 of 150

CALCULATION DESIGN VERIFICATION PLAN:

1. Verify that the overall approach and methodology are correct and reasonable
2. Verify that the design input and the source references used are correct and reasonable
3. Verify that the assumptions are reasonable
4. Verify that the results are correct and reasonable

	(Print Name and Sign)	
Originator: Paul Hansen	Paul N Hansen	**Date:** 9/28/04
Approver: Ralph Schwartzbeck	Ralph K. Schwartzbeck	**Date:** 9/28/04

CALCULATION DESIGN VERIFICATION SUMMARY:

Verification Scope:
The scope includes verification that the overall approach is reasonable, that the calculation method is acceptable, and that the equations and references used are properly applied. The input data and assumptions were reviewed for accuracy and applicability. The scope also includes verification that the results are correct and reasonable.

Methods:
The calculation was reviewed using the design review method. Design inputs were reviewed for correctness and to verify their validity. The referenced design drawings were reviewed to ensure the information was correctly extracted. The assumptions were reviewed to ensure they are reasonable. The overall approach and methodology was review to ensure it is correct and reasonable. The calculation section was reviewed to ensure the appropriate formulae and data were correctly extracted from their references. The Mathcad formulas were reviewed to verify that the equations were accurately entered. The math was verified to ensure arithmetic results were correct. The GOTHIC input files were reviewed to verify that the inputs were entered correctly. The GOTHIC modeling method was reviewed for appropriateness. The calculation results were reviewed to ensure they are correct and that the output is reasonable when compared to the input.

Results:
The overall approach and methodology was found to be correct and reasonable. The appropriate formulae and data were correctly extracted from the references. The arithmetic was checked and verified to be correct. Formulas were identified and accurately entered into Mathcad. Numerical values were design verified using a calculator. The GOTHIC input file was correctly populated by the inputs developed within the calculation. The GOTHIC modeling method are appropriate for this application. The calculation results are reasonable and correct and are consistent with similar calculations performed in the past.

Conclusions:
Based on this review, this calculation is acceptable in the determination and presentation of the input parameters discussed in the purpose section of the document.

Based On The Above Summary, The Calculation Is Determined To Be Acceptable.

	(Print Name and Sign)	
Design Verifier: F. Bivins Calhoun III	FB Calhoun III	**Date:** 9-28-04
Others:		**Date:**

ENERCON SERVICES, INC.	CALCULATION DESIGN VERIFICATION CHECKLIST	Calc. No. WS129-CALC-001
		Rev. 2
		Page No. 4 of 150

ITEM	CHECKLIST ITEMS	YES	NO	N/A
1	**Design Inputs** – Were the design inputs correctly selected, referenced (latest revision), consistent with the design basis and incorporated in the calculation?	☒	☐	☐
2	**Assumptions** – Were the assumptions reasonable and adequately described, justified and/or verified, and documented?	☒	☐	☐
3	**Quality Assurance** – Were the appropriate QA classification and requirements assigned to the calculation?	☒	☐	☐
4	**Codes, Standard and Regulatory Requirements** – Were the applicable codes, standards and regulatory requirements, including issue and addenda, properly identified and their requirements satisfied?	☐	☐	☒
5	**Construction and Operating Experience** – Have applicable construction and operating experience been considered?	☒	☐	☐
6	**Interfaces** – Have the design interface requirements been satisfied, including interactions with other calculations?	☐	☐	☒
7	**Methods** – Was the calculation methodology appropriate and properly applied to satisfy the calculation objective?	☒	☐	☐
8	**Design Outputs** – Was the conclusion of the calculation clearly stated, did it correspond directly with the objectives and are the results reasonable compared to the inputs?	☒	☐	☐
9	**Radiation Exposure** – Has the calculation properly considered radiation exposure to the public and plant personnel?	☐	☐	☒
10	**Acceptance Criteria** – Are the acceptance criteria incorporated in the calculation sufficient to allow verification that the design requirements have been satisfactorily accomplished?	☐	☐	☒

Comments:

(Print Name and Sign)	
Design Verifier: F. Bivins Calhoun III [signature]	**Date:** 9-28-04
Others:	**Date:**

Table of Contents

PURPOSE

The purpose of this calculation is to document the analysis inputs and results of the Columbia Station Secondary Containment drawdown analysis.

APPROACH

The approach used to develop this model starts with the original model documented in Reference 3.2. A number of sensitivity studies were performed to develop a full understanding of the phenomenon associated with the analysis. These sensitivity studies start with a single volume model, and add complexity one step at a time. The complexity is simply the addition of modeling features, such as internal heat sources, heat absorbing structure (thermal conductors), and wind pressure effects. Additional modeling features such as these are added one at a time to ensure that they were fully understood. The intent of this effort is to develop a multi-node model that will adequately represent the Columbia Generating Station Secondary Containment drawdown analysis .

As the model was developed, a number of sensitivity reports were generated. These sensitivities produced lessons learned and were used in the overall model development. Since these evaluations are sensitivity studies, there was no intention to go back and revise each case as new information was developed. The final model developed in this manner, will be completely independent of the model documented in Reference 3.2 and will act as a stand alone document.

RESULTS

A number of results are produced as part of this calculation. These are divided into short term and long term analysis. The short term analysis determines the time for the SGTS to restore the Secondary Containment Reactor Building pressure below the negative 0.25inch of Water Gauge. As part of the short term study there are eight sets of results documented in Table 51. These eight cases where developed to determine the bounding outside temperatures, wind direction and leakage distribution (leakage split). It is demonstrated by the results in Table 51 that with cold outside air and wind from the easterly direction a bounding result was produced given a 70/30 leakage roof to railroad door distribution. Under these conditions the SGTS would require 872 seconds to restore the Secondary Containment Reactor Building to below negative 0.25inch of Water Gauge. 1

This bounding case number 3 was used to perform the long term analysis. A total of four long term evaluations are conducted each with a different start time for the fuel pool cooling system. The results of the long term analysis are depicted in Figures 7 through 22. The full set of results are provided in Appendix 7.

CONCLUSIONS

The results of this evaluation demonstrate the ability of the SGTS system to restore and maintain the
Secondary Containment Reactor Building pressure below negative 0.25inch water gauge. The sensitivity 1
studies performed as part of the main body of this calculation demonstrate that the 70% to 30% split of
leakage between the upper and lower portions of the containment provide the bounding condition. This
split is considered to be conservative based on plant specific testing, which demonstrated that leakage into
the building is predominantly from the roof elevation.The cold outside air temperature condition produced
a more bounding result than the warm outside air. Under worst case conditions the SGTS can restore the
Secondary Containment Reactor Building Pressure back below negative 0.25inch water gauge within
872 seconds. The fuel pool cooling system must be started within 24 hours to ensure that the Secondary
Containment Reactor Building Pressure can be maintained below negative 0.25inch water gauge for long 1
term response of the building.

REFERENCE

GENERAL REFERENCES

1.1. Standard Review Plan 6.2.3 "Secondary Containment Functional Design" Rev. 2
1.2. GOTHIC 7.1 Users Manual
1.3. 1997 ASHRAE Fundamentals Chapter 26 Climatic Design Inputs
1.4. 1997 ASHRAE Fundamentals Chapter 28 Non Residential Cooling and Heating Load Calculations
1.5. FSAR Chapter 6, Amendment 57
1.6. LCS Table 1.6.4.2-1, Revision 24
1.7. Flow Of Fluids Through Valves, Fittings, and Pipe Crane Technical Paper No. 410 (Appendix 2), Twenty Third Printing - 1986 | 1
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ASSUMPTIONS

GENERAL ASSUMPTIONS

1.1 No credit is taken for secondary containment outleakage. This assumption is based on the guidelines provided in Reference 1.1, which specifically states the following.

"No credit should be taken for secondary containment outleakage."

1.2 The wind speed to be assumed will be based on the extreme wind speed for the region that exceeds the 95% compliance value for the time as defined in Reference 1.12. The 17.2 mph at 33 feet value is selected as the high value documented in Reference 1.12.

The guidelines provided in Reference 1.1 state the following. "The negative pressure differential to be maintained in the secondary containment and other contiguous plant area should be no less than 0.25 inches (water) when compared with adjacent regions, under all wind conditions up to the wind speed at which diffusion becomes great enough to assure site boundary exposures less than those calculated for the design basis accident even if exfiltration occurs."

In addition, the guidelines provided in Reference 1.25 state the following:

"The effect of high winds on the ability of the secondary containment to maintain a negative pressure should be evaluated on an individual case basis. The wind speed to be assumed is the 1-hour average value that is exceeded only 5% of the total number of hours in the data set. Ambient temperatures used in these assessments should be the 1-hour average value that is exceeded only 5% or 95% of the total numbers of hours in the data set, whichever is conservative for the intended use (e.g., if the high temperatures are limiting, use those exceeded only 5%)."

The outside temperature to be used in the analysis will be selected from the warm (86°F) and the cold (28°F) values provided in Reference 1.12. Sensitivity studies will be used to determine which value to use for the long term analysis. The value that provides a more bounding result will be applied.

Based upon the above, this assumption is considered appropriate and conservative.

1.3 Safety Related Room Coolers located throughout the Reactor Building that receive power from Divisions 1 and 3 will be credited in the analysis. The overall heat transfer coefficients for these room coolers are assumed to remain constant for the given flow rates defined in Reference 3.3. It is expected that the variation in the air temperature will change the overall heat transfer coefficient by no more than 5%. Therefore, the overall heat transfer coefficient will be reduced by an additional 5% after the reduction to 65% to account for fouling.

1.4 Flow Path Inputs are documented in Reference 3.7.

1.5 Reactor Building (RB) normal ventilation is excluded from the analysis. In actuality the normal ventilation is tripped and the supply and outlet valves are closed in 15 seconds

after the initiation of an accident signal. This is based on the allowable stroke time of the isolation valves documented in Reference 1.6.
Based on quarterly surveillance stroke times from procedure OSP-CONT/IST-Q702 (Reference 1.22), the following are the nominal actual CLOSING stroke times of the RB ventilation supply and exhaust valves:

VALVE TESTED CLOSE STROKE TIME, ALLOWABLE LCS Table 1.6.4.2

VALVE	CLOSE STROKE TIME	ALLOWABLE LCS
ROA-V-1	6.5 SEC	15 SEC
ROA-V-2	10.4 SEC	15 SEC
REA-V-1	6.6 SEC	8 SEC
REA-V-2	5.2 SEC	8 SEC

During this short time, the flow for both the supply and the exhaust will coast down toward zero. The mass balance of these two systems will cancel each other.

1.6 The SGTS fan performance characteristics are to be included in this evaluation. The basis for this assumption is found in Reference 1.1, which states the following.

"Fan performance characteristics should be considered in evaluating the depressurization of the secondary containment."

1.7 Service water to the room air coolers and fuel pool cooling heat exchanger is assumed to be 78°F for the first two hours. This temperature represents a bounding average water temperature for the ultimate heat sink at the beginning of the accident as demonstrated every 24 hours by plant surveillance (Reference 1.30), which shows an upper temperature limit of 77°F. For analysis purposes, after two hours the service water temperature is immediately increased to 87°F for the remainder of the analysis. This conservative approach is used to accommodate the simplified room cooler modeling approach. This approach uses tables based on two cooling water temperatures for each room cooler, rather than the hourly variations used in Reference 3.6. The use of these temperature values ignores the benefits of daily changes in ambient temperature and solar heat gain that allow for the cooling of the ultimate heat sink as demonstrated in Reference 3.6. In effect, a constant ambient condition is used, which is consistent with Reference 1.25, Section 4.3.

1.8 SGTS fan discharges to the elevated release (Reference 2.10). Any pressure reduction associated with wind effects is not credited. Since the elevated release exhausts upward from the roof of the building, it is appropriate to consider a negative or zero wind pressure contribution. The zero value will be applied in this analysis. This assumption is used to bound the discharge pressure of the fan and thus its most limiting performance condition.

1.9 The SGTS Fan Performance is assumed to be based upon the vortex damper at 25% Closed. For the purpose of this calculation, the SGTS fan will be considered to be running at 4800ACFM. This value is the indicated reading or ICFM as seen on the flow recorder in the control room. As shown in Reference 3.8, the upper limit of the fan is 5378 ICFM. Using the uncertainties and margin, the ICFM is reduced to 4800 ICFM. Additional margin is realized in using the indicated flow as actual flow in the SGTS.

Using the correction factors for the SGTS Annubar flow sensor, Reference 3.10, at 70% Relative Humidity (RH) and 105°F temperature (design RH and heat from the SGTS heaters), the actual SGTS fan flow would be 5446 ACFM.

The 25% closed value was selected to provide a conservative response for the building pressure returning below the negative 0.25inch minimum requirement. This is considered conservative, since when the system first starts it is expected that the vortex damper would be fully open. 1

1.10 The ability of the SGTS to establish the desired negative pressure is based on the greatest negative effect caused by the wind, while the boundary conditions (used to determine inleakage) will use the average pressure for the four sides. In terms of measurement and control, the negative value is bounding since the SGTS is attempting to drive the building pressure to a value of 0.25 inH2O below that which it measures and therefore, the inside pressure to be controlled is forced to a lower absolute value. The implementation of the control system in the plant compensates for the location of the pressure sensors and the design atmospheric conditions by setting the setpoint at 1.7 inH2O (based on the Analytical limit of –0.71 inH2O per Reference 3.15) below that which is measured at most limiting location. Similarly, the GOTHIC models' success will be measured by the greatest negative effect caused by the wind, while the boundary conditions will use the average pressure for the four sides.

This is not as great a contradiction as it may sound since the building will in fact experience these different wind pressure effects across its surface, and the pressure control evaluates all four sides and uses the most limiting.

The one exception to this approach is the leakage at the railroad door where only one side of the building is involved with leakage.

1.11 The Leakage Flow Split between the upper and lower elevations of the reactor building is assumed to be 70% to 30% split. The selection of this conservative split is established based upon specific testing that was done for Columbia Station to determine the relative leakage at different locations into the building. The testing, Reference 1.20, produced a set of results that indicate that leakage from the railroad door is around 10% of the total Reactor Building Secondary Containment Leakage. Since the differential pressure at the railroad door elevation is higher, as demonstrated in the calculation inputs development, a greater leakage assumption at this elevation is conservative. This will be demonstrated further in the analysis runs where a sensitivity study on the flow split will be conducted.

1.12 The initial temperature of the volumes in the three volume model is 75°F for the main building, refueling floor and the pump rooms. The initial temperature of the volumes are based on a reasonable operational temperature for the reactor building. The initial temperature is based on a review of the normal ventilation system operation using the initial outside ambient air condition specified for this analysis.

1.13 The Fuel Pool Cooling system is started manually by control room operators. Since actions are required to put this system into service by realigning the Standby Service Water (SW) system. The current requirement is to place the system into operation when the 125°F pool temperature limit is reached if the normal cooling is lost and not expected to be restored. No time limit is stated. Sensitivity studies will be performed to determine what delay if any is acceptable. The criteria associated with an acceptable delay is based

on the ability to maintain the secondary containment reactor building below negative 0.25inch water. It is important to note that other restrictions on fuel pool temperature such as fuel temperature and fuel pool structural limits may be more bounding. The delay time established for this analysis may not be acceptable for these other considerations. However, if the other considerations require an early start of the fuel pool cooling system, then the assumption used for this analysis would be bounding since an earlier start time would be required. 1

1.14 For the purpose of calculating boundary and initial conditions, the ground level pressure is assumed to be 14.696 psia. 1

1.15 The roof level leakage point is assumed to be 1 foot below the reported roof elevation. This elevation is selected to provide an upper limit on the wind velocity, which will produce a pressure effect on the corrugated sides of the upper reactor building.

1.16 The ECCS room coolers are available to provide cooling 300 seconds after the start of the event. This value is based on the sequence of events documented below.

0 seconds	LOOP/LOCA/SW Pump Trips
15 seconds	DG Load/ECCS Room cooler fans start/Begin SW start sequence
123 seconds	SW-P-1A start
128 seconds	SW-PS-1A at 52psig/SW-V-2A starts to open
142 seconds	SW-V-2A stops at 20% open for time delay
190 seconds	SW-V-2A continues opening
300 seconds	Full flow in the ECCS room coolers

1.17 The SGTS fan is assumed to start 120 seconds following the LOOP/LOCA.

1.18 The SGTS fan flow is assumed to be limited to 4,800 ACFM.

VOLUME ASSUMPTIONS

2.1 The total air volume used for Secondary Containment Drawdown analysis is conservatively developed by maximizing the air volume. This conservatism is accomplished using the volume information documented in Reference 3.1. This assumption is based on two basic issues associated with the drawdown analysis. As addressed by Reference 1.1, the allowable leakage is based on one air change per day. Therefore, the larger the air volume assumed the larger the air change per day that is to be expected. The second is that the larger the air space volume the more mass that must be removed to reduce the pressure.

2.2 The volume of the fuel pool is excluded from the air space volume calculation. It is, however, included in the GOTHIC thermal inputs to represent the fuel pool. Although assumption 2.1 identifies the benefit of an over estimate of the air space, the additional conservatism associated with counting the fuel pool is not warranted.

2.3 The secondary containment is modeled as three nodes. The first of these nodes is the pump rooms located on the 422.25' elevation; the second is the main building volume of the reactor building including the railroad bay up to the refueling floor; and the third is the refueling floor. This nodalization was selected to represent the major separations within the reactor building. The refueling floor is selected as one of the volumes since it contains a spent fuel pool and has associated with it, the upper RB siding, which is one of the leakage paths to the outside environment. The pump rooms are all located at the same elevation and contain significant thermal heat loads. They are also in communication with the suppression chamber of the primary containment via heat conduction. The remainder of the reactor building is generally connected by a large open hatch allowing for relatively free communication throughout and thus behaving like a single volume. This region also contains a number of small rooms that contain heat sources and associated safety related room coolers. Combining these rooms with the remainder of the building produces a conservative result. This is based on how the impact of the room heat loads affects the building pressure. Combining these volumes allows the room heat loads to directly impact the main building pressure and temperature. This modeling approach also reduces the effectiveness of the associated room coolers ability to remove this heat, since the resulting temperature is reduced with the increased volume. The air temperature reduction for the rooms artificially minimizes the temperature difference between the air and cooling water that services these coolers. Therefore, the heat removal provided by the coolers is under predicted.

2.4 Any Secondary Containment volume calculated in Reference 3.1 that is associated with the 422.25' elevation, but not the pump rooms is incorporated into the main building volume. These volumes are typically associated with stairwells, air locks, and condensate/CRD pump room areas. The inclusion of these volumes is appropriate and since they are not directly in communication with the pump rooms their inclusion in the main building volume is the logical choice. It should be noted that the pump rooms extend above the 441' elevation to the 471' elevation.

DIRECT HEAT INPUT ASSUMPTIONS

3.1 The heat load assumed for the Reactor Building is based on Division 1 & 3 loads, which include HPCS, LPCS and RHRA. The use of Division 1 & 3 loads maximizes the pump loads to the building, assuming one division of AC power is lost. Pumps and other auxiliary loads associated with Division II are excluded from the list.

3.2 The heat loads documented in Reference 3.3 that are associated with heat transfer from piping and walls are handled explicitly with heat conductors modeled with GOTHIC. This assumption provides a more realistic representation of these heat loads and eliminates excessive conservatism associated with using them as direct heating loads, which is appropriate for Reference 3.3, but inappropriate for this analysis.

3.3 The spent fuel pool decay heat load is 9,794,000 BTU/hr from the value reported in CMR 2449 to Reference 3.6. This value is maintained constant for the entire analysis period, which is considered to be conservative as decay heat will decrease with time.

3.4 The emergency lighting heat loads are assumed to start at approximately 0 seconds and operate continuously. The power to the emergency lights will be lost until the SL-71 bus is re-powered from the emergency diesel generator. This will occur 15 seconds after the LOOP. The heat load of the lighting will not be reduced by a large amount during the 15 seconds the lighting is off. Assuming the emergency lighting is on at time zero is conservative.

3.5 The emergency lighting heat loads are assigned to the main reactor building volume. This is a simplification, but is considered reasonable since the majority of these loads are located in the main building.

The total emergency lighting load is reported in Reference 3.12 to be 203,700.00 BTU/hr. The referenced material used to establish heat loads specifies the emergency lighting loads for certain areas. These are a subset of the 203,700 BTU/hr and are used to reduce this value when they are explicitly defined. However, in the case when they are reported as combined values with other loads the lighting is not subtracted as described above. The net result of this is that these lighting loads are counted twice, once as a portion of the combined value and once as a portion of the total emergency lighting load.

3.6 The normal lighting is lost immediately and considered to have negligible heat dissipation.

3.7 Normal operating equipment no longer running during the analysis is assumed to dissipate heat based on an exponential decay relationship. This relationship is developed in this calculation.

THERMAL CONDUCTOR ASSUMPTIONS

4.1 Piping systems that provide heat to the reactor building are modeled as heat conductors. These are associated with HPCS, LPCS, RHRA, and fuel pool cooling. The heat load assumed for the reactor building is based on Division 1 & 3 loads, which include HPCS, LPCS and RHRA system piping. The use of Division 1 & 3 loads maximizes the pump loads to the building. The inclusion of these system piping heat loads follows from the pump selection.

4.2 The heat loads associated with the ECCS pumps will be modeled with a tube geometry having an internal temperature boundary condition that matches the Post LOCA suppression pool temperature response. Since the analysis is an assessment of the Reactor Building heat gain following a LOCA, it is appropriate to apply the suppression pool temperature response when accessing the heat loads associated with the system operation following a LOCA.

4.3 The fuel pool cooling piping will provide a heat source following the start of the fuel pool cooling system. The internal boundary condition will match the fuel pool temperature.

4.4 Thermal conductors are assumed to be initially in thermal equilibrium with their boundary conditions. This allows the boundary condition to have a properly established initial temperature profile.

4.5 For the primary containment thermal conductors, the initial thermal profile will be a linear profile starting on the interior with the containment temperature and dropping across the conductor materials to the reactor building temperature. For conductors with the outside ambient as one of the boundary conditions, the temperature profile will be a constant value equal to that assumed for the Reactor Building. The reason for this is that the outside ambient boundary condition is assumed to be adiabatic, as required by Reference 1.1.

The heat transfer from the building to the surrounding atmosphere is ignored. These boundaries are treated as adiabatic. This assumption is based on Reference 1.1, which states the following.

"Adiabatic boundary conditions should be assumed for the surface of the secondary containment structure exposed to the outside environment."

4.6 Piping insulation is assumed to be Calcium Silicate as reported in Reference 3.3.

4.7 Polyurethane thermal properties are given in Reference 1.31. Fiber Glass properties are assumed to match that of Glass Wool Packed reported in Reference 1.13. Calcium Silicate properties are obtained from Reference 1.16.

4.8 The Equipment Pool is assumed to be drained. This is the normal configuration with the plant operating, which is the assumed conditions at the start of the analysis.

4.9 The primary containment structure that is in communication with the secondary containment atmosphere will be assigned a convective boundary condition that uses a temperature profile which corresponds to the most bounding accident profile for the primary containment (Reference 1.21). To accomplish this the Main Steam Line Break is

used for the short term response and the Main Steam Line Break, Large LOCA and Small Break LOCA are used to represent the long term response. This composite temperature profile is developed in Reference 1.21. The combination profile is a conservative representation of the containment response, which is the basis for the assumption. The need to include this type of boundary condition is found in Reference 1.1, which states the following.

"Heat Transfer from the primary to secondary containment should be considered." This assumption considers such a phenomena using a bounding temperature profile.

4.10 The Heat Transfer coefficient between the primary containment atmosphere and the primary containment structure is assumed to offer virtually no resistance to heat transfer in the early portion of the accident. This is a reasonable assumption since the highly turbulent blowdown conditions will offer significant heat transfer opportunity in conjunction with condensation on the containment walls. The long term response assumes a constant heat transfer coefficient that is smaller. The value is selected to conservatively represent the heat transfer to the structure. Specifically, the coefficient is assigned to drive heat into the wall while minimizing the cooling benefit that the atmosphere may offer later in the event. This approach is consistent with that documented in Reference 1.1, which states the following.

"Heat transfer from the primary containment atmosphere to the primary containment structure should be calculated using conservative heat transfer coefficients such as those provided in Branch Technical Position CSB 6-1."

This analysis will not directly use the CSB 6-1 values, but will maintain the conservative nature intended by Reference 1.1. The determination of heat transfer coefficients within primary containment is a dynamic calculation dependent upon fluid and structure temperatures. Further complicating the calculation is the condensate rate, which is influenced by the number of non-condensable gases present. Therefore, to properly implement the CSB 6-1 approach it is necessary to model the primary containment response in detail. Rather than use this complicated approach, a bounding approach will be used. The values selected are established in the heat transfer portion of this calculation.

4.11 Radiant Heat Transfer between the Primary Containment Outer wall and the Secondary Containment Atmosphere will be accounted for in the analysis. This assumption is based upon Reference 1.1, which states the following:

" Radiant heat transfer to the secondary containment should be considered."

Radiant heat transfer between other heat structures is ignored as these structures are typically cooler and exclusion of this feature is deemed to be conservative for this type of analysis.

4.12 The primary containment wall is assumed to be composed of a steel vessel and concrete. Any air gap or insulating material is not accounted for as they would serve to hinder the heat transfer to the Reactor Building. The containment vessel (Drywell Wall Steel Liner) is assumed to be 1.5 inch carbon steel plate. The actual liner has varying thickness based on location. In some cases, the thickness is less than 1.5 inches. However, the very conservative exclusion of the air gap described above allows this simplification without

any reduction in the models' overall conservative approach.

4.13 The reactor building roof will be treated as an 18 gage steel sheet. All other material associated with the roof will be ignored. Since the roof is treated as adiabatic, this assumption will be conservative because the overall heat capacity of the roof will be reduced. Reducing the heat capacity of the roof forces the model to calculate a greater amount of energy maintained in the building atmosphere, thus producing a conservatively higher pressure.

4.14 It is assumed that the temperature in the D104 corridor is 104°F. This value is selected to bound that expected under normal or accident conditions. The convection resistance that exists between the air in the corridor and the wall is ignored and the boundary condition of the conductor is set to 104°F. The temperature and the convection assumptions are used to conservatively minimize heat transfer from the pump rooms to the corridor.

4.15 The wetwell composite profile, Table 37, is composed of the data extracted from Reference 1.19 up to the end of that curve. The Wetwell composite profile is set at 200°F for the duration to the end of the analysis. This higher Wetwell composite profile is a conservative assumption. 1

BOUNDARY CONDITION ASSUMPTIONS

5.1 The Terrain in the area of the Meteorological Tower, as well as the Reactor Building, are judged to be open terrain with scattered obstacles generally less than 30 feet high.

DESIGN INPUTS

1.	Wind Speed	17.2 mph	Reference 1.12
2.	Outside Air Temperature	86°F/28 °F	Reference 1.12
3.	Initial Service Water Temperature	77°F	Reference 1.30
4.	Service Water Temperature is a function of time established in		Reference 3.6
5.	Fuel Pool Cooler Pump Flow	575 gpm	Reference 3.5
6.	Fuel Pool Cooler Service Water Pump Flow	575 gpm	Reference 3.5

METHODOLOGY

The GOTHIC inputs documented in this calculation are based upon engineering standards and no new methods or experiments are used in their development. MATHCAD software (Reference 1.26) is used to calculate these inputs, which is an accepted tool in the industry and used at ENERGY NORTHWEST. The MATHCAD file is provided in Appendix 1. The inputs are developed specifically for use in the EPRI GOTHIC 7.1 thermal hydraulic analysis software (Reference 1.2). The analysis portion is performed using the aforementioned GOTHIC software, which is an industry recognized program for thermal hydraulic analysis of this type.

MODELING INPUT DEVELOPMENT

BOUNDARY CONDITION INPUTS:

The boundary conditions to be used in the model were modified to account for the wind conditions and pressure information calculated in Appendix 1 and 3. The basis for the pressure and temperature values are established using ASHRAE methods applied and documented in Appendix 1 and 3. The resulting boundary conditions are listed in Tables 4 and 5.

The following discussion provides a derivation of the boundary condition pressures established for the door and roof line leakage paths. These pressures are calculated as the total stagnation pressure acting on the building leakage locations. For a given wind speed, wind direction and temperature the dynamic and static pressures are calculated for the building leakage locations. The first step is to calculate the static pressure contribution which is a function of temperature and elevation. This is followed by the determination of the wind pressure contribution which is a function of temperature, elevation and wind velocity.

The relationship used to establish the static pressure outside as a function of height is based on the Bernoulli equation (Reference 1.32) and is defined as follows.

(Equation 1)
$PoElev(EL,Temp) = Patm - \rho(Temp)*(EL-441ft)*g*C$

Where EL is the elevation of the location of interest, Temp is the air temperature, g is the gravity constant and C is the unit conversion constant. The ground level pressure is Patm at 441feet.

Patm = 14.696psi (Assumption 1.14)

$g = 32.2ft/sec^2$ (Reference 1.32)

For the static pressure at the top of the railroad door the following values are used.

Twin = 86°F (Design Input 2, Reference 1.12)

ELRRDoor = 441ft + 28ft = 469ft (Reference 3.1)

The static pressure at the roof line is calculated in a similar manner using the following values.

Twin = 86°F (Design Input 2, Reference 1.12)

ELRoof = 667ft (Assumption 1.15 and Reference 3.1)

The density of the air is calculated using the ideal gas law (Reference 1.32)
$\rho(86°F) = 0.073 lb/ft^3$

The static pressure at the door elevation 469ft is

PoElev(469ft, 86°F) = 14.68186psi

The static pressure at the roof elevation 667ft is

PoElev(667ft, 86°F) = 14.58189psi

The wind induced pressure effect is calculated using the Bernoulli Equation (Reference 4.2) along with the appropriate wind pressure coefficients (Reference 4.1) as follows.

This analysis assumes the terrain category of the Met Tower is Category 3 and the reactor building is also Category 3 (Assumption 5.1).

Table 1 - Terrain Category

Terrain Category	Description	Exponent "a"	Layer Thickness δ (ft)
1	Large city centers, in which at least 50% of buildings are higher than 70ft, over a distance of at least 6500ft upwind	0.33	1500
2	Urban, suburban, wooded areas, and other areas with closely spaced obstructions compared to or larger than single family dwellings (over a distance of at least 6500ft upwind)	0.22	1200
3	Open terrain with scattered obstacles generally less than 30ft high.	0.14	900
4	Flat, unobstructed areas exposed to wind flowing over a large water body (no more than 1600ft inland)	0.10	700

These categories are used to establish the appropriate wind velocities at the site as a function of elevation. The boundary condition values are developed using the MathCad software. Since this software understands and converts engineering units, some of the conversions are not explicitly documented in the following derivations.

(Equation 2)

$$\mathrm{Pw}(\mathrm{V},\mathrm{Temp},\mathrm{Hmet},\mathrm{Hbuild},\mathrm{Cp}) = \mathrm{Cp} * \rho * \frac{(U_{\mathrm{H}}(Met, Build, V, Hmet, Hbuild))^2}{2 * g} \frac{27.71in}{psi}$$

Where V is the wind velocity in miles per hour, Temp is the outside air temperature (°F), Hmet is the met tower height (ft) where the wind speed is measured, Hbuild is the height (ft) were the pressure effect is calculated, Cp is the wind pressure coefficient, Press and Temp are the pressure and temperature used to establish the air density.

U_H is a function used to convert the measured wind velocity to wind velocity at the point of interest, such as the door or roof line. Equation 3 provides specifics of the function.

Met = 3 and Build = 3 are the Terrain categories (Assumption 5.1 and Reference 4.1).

Using a met tower wind speed of 17.2 mph, Reference 1.12, the door level velocity is calculated in Appendix 1 to be 16.809 mph and the roof level velocity is calculated in Appendix 1 to be 22.517 mph.

$$V_{WIND} = V_{MET}\left(\frac{900ft}{HMet}\right)^{0.14}\left(\frac{HBuild}{900ft}\right)^{0.14} \qquad \text{(Equation 3)}$$

The wind pressure coefficient is developed in Appendix 3 of this document. These coefficients are established for the upper and lower leakage paths as well as the location of instrumentation credited in the analysis. The wind pressure coefficient is used to account for the wind direction on the surface of the building. The values used in this analysis are summarized in Table 2. Note that the wind pressure coefficients for the instrumentation are based on incident angles used in the analysis.

Table 2 - Local Wind pressure coefficients as a Function of Wind Incident Angle and Location

Building Face Wind Incident Angle	Average Local Wind pressure coefficient For Upper Surface	Average Local Wind pressure coefficient Pressure Instrument 1A4	Average Local Wind pressure coefficient Pressure Instrument 1A3	Average Local Wind pressure coefficient Railroad Door
0°	0.638	NOT USED	NOT USED	0.517
15°	0.63	NOT USED	NOT USED	NOT USED
30°	0.466	0.25	NOT USED	NOT USED
45°	0.238	NOT USED	NOT USED	0.5
60°	-0.0294	-0.10	NOT USED	NOT USED
75°	-0.415	NOT USED	NOT USED	-0.50
90°	-0.738	-0.55	-0.90	-0.85
105°	-0.685	-0.742	NOT USED	NOT USED
120°	-0.619	NOT USED	NOT USED	-0.50
135°	-0.5597	-0.65	NOT USED	NOT USED
150°	-0.545	NOT USED	NOT USED	-0.35
165°	-0.47	NOT USED	NOT USED	NOT USED
180°	-0.403	NOT USED	NOT USED	NOT USED

The values provided in Table 2 include information that is used to assess test data used in the development of the building leakage relationships. These values are applied later in this document. For Secondary Containment drawdown analysis purposes, two wind directions are evaluated, which include winds from the East and winds from the South East. The wind coefficients applied to each area of interest is documented in Table 3.

Table 3 - Wind Pressure Coefficient Assignment and Wind Incidence Angle

Case	Upper Building South Face Wind Pressure Coefficient (Incident Angle)	Upper Building North Face Wind Pressure Coefficient (Incident Angle)	Upper Building East Face Wind Pressure Coefficient(Incident Angle)	Upper Building West Face Wind Pressure Coefficient (Incident Angle)	Rail Road Door Wind Pressure Coefficient (CpRR) (Incident Angle)	Pressure Instrument Wind Pressure Coefficient (Incident Angle)
Analysis Value Wind Direction From East	-0.738 (90°)	-0. 738 (90°)	0.638 (0°)	-0.403 (180°)	0.517 (0°)	-0.90 (90°) Instrument 1A3
Analysis Value Wind Direction From South East (Wind Angle 135°)	0.238 (45°)	-0.5597 (135°)	0.238 (45°)	-0.5597 (135°)	0.5 (45°)	-0.65 (135°) Instrument 1A4

At the door and roof level, the wind induced pressure is calculated as follows for an Easterly wind direction. This wind direction is assigned a wind angle of 90°, and has a 0° incidence angle on the eastern wall where the Railroad Bay door exists (Refer to Appendix 3 Figure 5).

Twin = 86°F Vwin = 17.2 mph

At the door level, the calculation uses the Railroad Door Coefficient CpRR as follows.

$$(CpRR(90^\circ))\rho)\rho(14.6\,psi, 86^\circ F)\frac{U_H(Met, Build, VWin, HmetLow, ELRRDoor - 441ft)^2}{2 * g}\frac{27.71in}{psi}$$

$= 0.06832in$

where

$CpRR(90^\circ)$ is the wind pressure coefficient for a wind angle of $90^\circ = 0.517$

$\rho(14.696psi, 86^\circ F)$ is the density of the air $= 0.0731b/ft^3$

U_H is the wind velocity as a function of the terrain conditions = 16.809mph

Met, Build documented in Table 1 = 3,3

measured velocity (VWin) = 17.2mph

Height of the measurement (HmetLow) = 33ft

Elevation of the building where the calculation is perfomrmed (ELRRDoor) = 469ft

TWin = $86^\circ F$

At the roof level, the calculation uses the wind coefficient for each upper face. The Easterly wind has a 0° incident angle on the Eastern Wall, 90° incident angles for the North and South Walls, and 180° incident angle for the Western Wall. As shown in Appendix 1, the wind incidence at the roof level is a weighted average of the four sides.

$$CpU(90^\circ) = \frac{(-0.738 - 0.738)(149ft) + (0.638 - 0.403)(133ft)}{2(149ft + 133ft)} = -0.335$$

$$CpU(90^\circ) * \rho(14.696psi, 86^\circ F)\frac{U_H(Met, Build, VWin, HmetLow, ELRoof - 441ft)^2}{2}\frac{27.71in}{psi}$$

$= -0.07945in$

Where ELRoof is the building elevation where the calculation is performed. ELRoof = 667ft.

The total pressure for the boundary conditions is the total of the static and wind effect pressures. The pressure boundary condition at the door is as follows.

$$14.68186psi + 0.06832in\frac{1psi}{27.71in} = 14.68433psi$$

The pressure boundary condition at the roof is as follows.

$$14.58189psi - 0.07945in\frac{1psi}{27.71in} = 14.57903psi$$

Note that when evaluating the success of building pressure reduction efforts, the minimum exterior pressure is used based on the above relationships applying the minimum wind pressure coefficient for the roof elevation. Refer to assumption 1.10 for additional discussion.

Table 4 – High Temperature Boundary Condition Inputs Used For Leakage Calculations

Fluid Boundary Conditions				
	Easterly Wind		South Easterly Wind	
	Press.	Temp.	Press.	Temp.
Description	(psia)	(F)	(psia)	(F)
Roof Leakage	14.57903	86	14.58052	86
Gound Leakage	14.68433	86	14.68425	86
Elevated Release	14.58189	86	14.58189	86

Table 5 – Low Temperature Boundary Condition Inputs Used For Leakage Calculation

Fluid Boundary Conditions				
	Easterly Wind		South Easterly Wind	
	Press.	Temp.	Press.	Temp.
Description	(psia)	(F)	(psia)	(F)
Roof Leakage	14.56511	28	14.56678	28
Gound Leakage	14.68294	28	14.68285	28
Elevated Release	14.56832	28	14.56832	28

INITIAL CONDITION INPUTS:

The control pressure for the secondary containment building at the sensing elevation of 576ft-6in is calculated and used to establish the building initial conditions. This building pressure is calculated for both the 95% and 5% temperature values, Reference 1.12. From these values, the initial condition for each of the building volumes is calculated at the corresponding volume center.

The building initial conditions are established using the outside pressures developed above along with the outside pressure at the instrument tap for the SGTS elevation 576ft-6in. The approach is to determine the SGTS control differential pressure that is required to ensure the worst case pressure difference in the building is 0.25inch WG. The control pressure is evaluated for each of the three elevations of interest, which include the door, the upper structure and the instrument tap itself.

The mathematical relationship (based on Bernoulli Equation Reference 1.32) used to determine the inside pressure is provided in Equation 4.

$$Pinside = Pcontrol - \rho(Tinside)(Elevation - 576.5ft)g \quad \text{(Equation 4)}$$

The internal pressure as a function of elevation is simply the pressure at the control elevation (576ft 6in) adjusted for the elevation change within the building. The arguments used in determining the control elevation pressure are as follows.

- Tinside is the building temperature
- ρ is the density of the air based on building temperature
- Elevation is the elevation of the inside pressure being calculated
- g is the gravitational constant
- Pcontrol is the pressure inside the building at the instrument elevation

The control pressure (Pcontrol) is calculated using Equation 5.

$$Pcontrol = (Poutside + Pwind + \Delta Psp)\frac{1psi}{27.71in} \quad \text{(Equation 5)}$$

The terms included in this relationship are

- Outside Static Pressure (Poutside) defined previously (Equation 1) in the boundary conditions section of this calculation to be a function of elevation and temperature
- Wind induced pressure increase (Pwind) defined previously (Equation 2) to be a function of wind direction, wind speed, outside air temperature and elevation.
- Finally, the control setpoint (ΔPsp) is found using a MathCAD Solve routine based on ensuring that the building pressure satisfies the negative 0.25inch water gauge criteria. | 1

As can be seen, the control pressure is simply the total outside pressure added to the setpoint value.

The setpoint differential pressure (ΔPsp) is selected to ensure that the pressure difference at the three elevations is maintained at no less than negative 0.25inch WG. | 1

A MathCAD function is defined to evaluate the setpoint pressure difference value for each of the locations. Equation 6 shows the relationships used to evaluate the pressure differential based on Equations 1, 2 and 4.

(Equation 6)

$$\Delta PiPoElev = [\{PiElev(TempOut, TempIn, H, V, \Delta Psp, CpInstrument) - PoElev(H, TempOut)\}\frac{27.71in}{psi}$$
$$- \mathrm{Pw(V, TempOut, Hmet, H - ELBuildLow, CpWall)}]$$

where

$PoElev(H, TempOut)$	Outside Pressure Function Based on Equation 1
Pw(V, TempOut, Hmet, H - ELBuildLow, CpWall)	Wind Pressure Function Based on Equation 2
$PiElev(TempOut, TempIn, H, V, \Delta Psp, CpInstrument)$	Inside Pressure Function Based on Equation 4

Notice that the function uses two wind pressure coefficients (CpWall and CPInstrument). The first of these is used to establish the internal pressure based on the control pressure defined in Equation 5. The second is used to evaluate the wind pressure applied to the wall being evaluated. When considering the instrument location, these values are the same as illustrated below.

The mathematical evaluation used to determine the setpoint control is illustrated below. The approach is to solve for the required ΔPsp value to ensure negative 0.25in pressure difference exists at the roof, railroad 1
door and instrument locations. Notice that the solve routine requires a seed value, which in this case is – 0.501in. A seed value is provided only to begin the calculations iterative solution. The value has no impact on the result it simply provides a place to start in obtaining a solution. For each elevation, the setpoint is solved to satisfy the negative 0.25in criteria. The value to be used will be the minimum of the 1
three calculated. The example that follows is based on a wind from the East with the "1A3" instrument providing control of building pressure.

$\Delta PspWin := -0.501\,in$

Given

$\Delta PiPoElev(Tmax, TBuild, ELBuildHigh, VWin, \Delta PspWin, CpInst("1A3", 90), CpUMin(90)) = -0.25\,in$

$\Delta PspWinU := Find(\Delta PspWin)$

Given

$\Delta PiPoElev(Tmax, TBuild, ELInst, VWin, \Delta PspWin, CpInst("1A3", 90), CpInst("1A3", 90)) = -0.25\,in$

$\Delta PspWinI := Find(\Delta PspWin)$

Given

$\Delta PiPoElev(Tmax, TBuild, ELKingKongDoorTop, VWin, \Delta PspWin, CpInst("1A3", 90), CpRR(90)) = -0.25\,in$

$\Delta PspWinL := Find(\Delta PspWin)$ $\quad$ $Tmax = 86\,Fahr$

$\Delta PspWinL = -0.028\,in$ $\quad$ $\Delta PspWinU = -0.214\,in$ $\quad$ $\Delta PspWinI = -0.25\,in$

Because of the wind pressure coefficient assignment, the instrument location provides the controlling pressure differential and the resulting initial pressures are calculated using this value.

The initial pressure of the control volume is calculated as follows.

$$PInstWin = PiElev(TempOut, TempIn, H, V, \Delta Psp, CpInstrument)$$
$$PInstWin = 14.612\,psi$$

With the internal pressure established at the instrument location (Pcontrol) the initial pressure in each of the volumes of the GOTHIC model can be determined using Equation 4. The GOTHIC code assigns the pressure to the center of the volume, therefore, the center elevation of each of the volumes is calculated as part of the calculation of the initial conditions.

Volume 1 represents the main portion of the Reactor Building between the pump rooms and the refueling floor. The instrumentation that measures pressure is included within this volume and the pressure change between the center of the volume and the instrument location is calculated using the temperature of the main reactor building volume.

ELCenterV1 = ELMain + HTMain/2

ELMain = 441ft
HTMain = 163.875ft

ELCenterV1 = 522.938ft

PinitialConditionV1 = 14.612psi + (576.5ft - 522.938ft)(0.074lb/ft^3)(gc)(1ft^2/144in^2)
PinitialConditionV1 = 14.63949psi

Volume 2 is used in support of the SGTS modeling and is within the main volume described by Volume 1. The volume height and elevation values are arbitrarily established based upon elevations information for the SGTS system provided in Reference 2.8.

ELCenterV2 = 577ft + 1.5ft/2

ELCenterV2 = 577.75ft

PinitialConditionV2 = 14.612psi + (576.5ft - 577,75ft)(0.074lb/ft3)(gc)(1ft2/144in2)
PinitialConditionV2 = 14.61125psi

Volume 3

This volume is used in association with cooling water modeling and has an arbitrarily assigned initial pressure.

Volume 4 represents the pump rooms at the lowest elevation of the building. The elevation pressure change associated with the calculation of Volume 4 initial pressure includes both Volume 1 and Volume 4. The relationship is divided to accommodate different densities between the two volumes.

ELInst = 576.5ft   ELPumpRm = 422.25ft   HTPumpRm = 46.75ft

The pump room and main building temperatures are assumed to both be 75°F and therefore, have the same density.

PinitialConditionV4 = 14.612psi + (576.5ft-(422.25ft+46.75ft)))(0.074lb/ft^3)(gc)(1ft^2/144in^2)
+ (46.75ft/2) (0.074lb/ft^3)(gc)(1ft^2/144in^2)
PinitialConditionV4 = 14.67933psi

Volume 5 represents the refueling floor at the highest elevation of the building. The elevation pressure change associated with the calculation of Volume 5 initial pressure includes both Volume 1 and Volume 5. The relationship is divided to accommodate different densities between the two volumes.

ELInst = 576.5ft   ELRefuelFloor = 604.367ft   HTRefuelFloor = 63.303ft
ELCenterV5 = ELRefuelFloor + HTRefuelFloor/2
ELCenterV5 = 636.018ft

The refuel floor and main building temperatures are assumed to both be 75F and therefore, have the same density.

PinitialConditionV5 = 14.612psi + (576.5ft-604.367ft)(0.074lb/ft^3)(gc)(1ft^2/144in^2)
+ (604.367ft-636.018ft)((0.074lb/ft^3)(gc)(1ft^2/144in^2)
PinitialConditionV5 = 14.58122psi

The resulting initial conditions for the volumes are documented in Tables 6 and 7.

Table 6 – High External Temperature (86°F) Initial Conditions

INITIAL CONDITIONS	Easterly Wind		South Easterly Wind	
BUILDING ELEVATION	BUILDING PRESSURE	BUILDING TEMPERATURE	BUILDING PRESSURE	BUILDING TEMPERATURE
Refueling Floor (Volume 5)	14.58122psi	75F	14.58307	75F
Main Building volume (Volume 1)	14.63949psi	75F	14.64134psi	75F
Pump Rooms (Volume 4)	14.67933psi	75F	14.6812psi	75F
SGTS Volume (Volume 2)	14.61125psi	75F	14.61310psi	75F

The Initial Conditions documented in Table 7 are calculated in the same manner as documented above, however, the cold outside air temperature value of 28°F is used.

Table 7 – Low External Temperature (28°F) Initial Conditions

INITIAL CONDITIONS	Easterly Wind		South Easterly Wind	
BUILDING ELEVATION	BUILDING PRESSURE	BUILDING TEMPERATURE	BUILDING PRESSURE	BUILDING TEMPERATURE
Refueling Floor (Volume 5)	14.5682psi	75F	14.5699psi	75F
Main Building volume (Volume 1)	14.62647psi	75F	14.62817psi	75F
Pump Rooms (Volume 4)	14.6663psi	75F	14.66801psi	75F
SGTS Volume (Volume 2)	14.59822psi	75F	14.59993psi	75F

CONTROL VARIABLE INPUTS

This model uses control variables to calculate the leakage flow and assess building pressure response. To accomplish the first of these tasks, control variables are used in combination with flow boundary conditions to establish the volumetric leakage flow at the roof and railroad door leakage points. This approach is taken to allow for laminar as well as turbulent leakage into the building. Test data is used to develop the necessary relationships.

Control variables are also used to calculate the pressure difference across the leakage paths. This simple calculation is required to modify the volume pressure calculated in GOTHIC at the center of the volume to correspond with the elevation of the leakage path.

LEAKAGE FLOW PATHS CONTROL VARIABLES

The drawdown model includes leakage into the building from two primary locations. These locations are the corrugated structure above elevation 612ft-10.5in, Reference 2.21, and the rail road door. The criteria for establishing these flow paths is the allowable leakage into the building for a given differential pressure of 0.25inches of water. The volumetric flow associated with this differential pressure is assumed to be one air change per day per guidance in SRP 6.2.3. For the calculation, the volume selected is based on the building volume established in this calculation, which has a total volume of 3,424,238.83ft^3. This volume is calculated in the Volume Inputs section of this document, which corresponds to a leakage flow rate of

$$3{,}424{,}238.83\,ft^3/[(24hr/day)(60min/hr)] = 2378cfm\,.$$

The calculation in Reference 3.1 derives a volume of $3.477x10^6$ ft^3. This value is rounded up to a nominal value of $3.5x10^6$ ft^3. This corresponds to a leakage flow rate of

$$3{,}500{,}000ft^3/[(24\ hr/day)(60min/hr)] = 2430\ cfm.$$

This bounding conservative value will be used in the analysis.

The leakage relationship documented in Reference 1.24 specifies that the leakage is based upon a combination of Laminar and Turbulent flows producing the following relationship.

$$LeakageFlow = A * DP + B * \sqrt{DP} \qquad \text{(Equation 7)}$$

where

DP is the pressure differential

A is the laminar flow coefficient and B is the turbulent flow coefficient

To implement this flow model, a leakage flow control variable is linked with the GOTHIC flow boundary condition. Using this approach, the need to specify flow path criteria is not critical as they are not used to establish flow into the building. The only issue is to establish a reasonable area to ensure that the velocity of the entering fluid is not artificial and influencing the model with momentum effects.

LEAKAGE MODEL DEVELOPMENT

This section of the calculation documents the approach to be used when accessing the leakage flow model. Reference 1.20 provides data from a test of the secondary containment leakage. Reference 1.24 provides the basic relationship for a leakage flow correlation (Equation 7) to be used with the data relating the controlling differential pressure to the leakage flow rate. The data used to develop the coefficients "A" and "B" used in Equation 7 is provided in Table 8. The first step in this effort is to evaluate the data developed as part of the secondary containment leakage test. This initial evaluation will be used to establish an understanding of the data and how it will be applied. This data will be further evaluated using the pressure modeling methods previously described (Appendix 1). This later evaluation is used to transform the measured pressure into applied pressures at the roof and railroad door leakage points. Once the pressure conditions are understood at these locations, the data will be further evaluated to determine the characteristics of the leakage flow. This characterization of the leakage flow will be used to establish the Leakage Model used in the GOTHIC analysis.

Table 8 – Reference 1.20 Data

Description	Variable Name	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
Outside Temperature (F)	TWin	64	66	68	70	72	75
Inside Temperature (F)	Tinside	80.5	82	80	80	79	79
Wind Speed (mph)	VMet	13.52/12.6	7.8/9.9	12.63/14.2	13.6/15.3	13.4/14.2	5.6/7.3
SGTS Flow (ICFM)	Leakage	2111	2017	2019	2032	2056	2539
Differential Pressure measured by Pressure Instrument 1A4 (inWG)	ΔPmeasured	0.48	0.448	0.46	0.39	0.448	0.65
Wind Direction		175/180	156/170	172/183	177/188	175/185	241/180

The approach to be used in this effort is to correlate the leakage data to the pressure differential at the roofline and the Railroad Bay Door using the control differential pressure. The first step in this effort is to convert the control differential pressure to corresponding pressures at the four sides of the roofline as well as the Railroad Bay door.

The data provided in Table 8 contains a range of wind speeds and directions that may not be directly related. In addition, the Met Tower height used to measure the values reported is not known. A review of the data is conducted to determine how to apply this data given the aforementioned uncertainties.

The impact of the values reported in the table will determine the contribution of the leakage that is laminar versus that which is turbulent. Specifically, the data will establish the coefficients used in the Equation 7 relationship.

To determine the impact of the uncertainty, an evaluation of the data assuming the measurement was taken from the high Met Tower height (245feet) and the low Met Tower height (33feet) was conducted. In addition, the data was evaluated assuming the highest wind speed and the lowest wind speed. The evaluation used the methods that are described below for establishing the characteristics of the leakage. This evaluation showed that assuming the higher velocity listed in Table 8 is measured from the lower tower elevation produced the largest laminar contribution of the leakage flows, or greatest "A" coefficient in Equation 7. The larger the laminar component ("A") the greater the leakage flow rate for a given differential pressure (DP) as illustrated in Equation 7. The data was used to establish the maximum laminar component ("A"), since it maximizes the building leakage. Therefore, the analysis that follows will apply the assumption that the Met Tower measurement is from 33 feet using the highest wind speeds.

With regards to the wind direction, the variability within the tests was considered to be sufficiently small that the average wind direction could be used. The one exception to this is the data documented in Test #6. While evaluating the Test #6 data, an inconsistency was revealed between the wind direction and the measured differential pressure. Specifically, this test produced a fairly high measured pressure differential, which is not expected for the instrument "1A4" location for either the reported 180° value or the average 210° value. It is, however, consistent with the reported wind direction of 241°. Based on this evaluation, Test #6 is used assuming the wind direction is rounded to 240 °.

A further adjustment of the data is required to address the issue of indicated versus actual flow documented for SGTS in Table 8. With regards to the SGTS flow, it is appropriate to adjust the flow values documented in Table 8 from an indicated flow to an actual flow using the results of calculation NE-02-92-06 (Reference 3.14). After the indicated flow is converted to actual it is further adjusted to account for fluid conditions entering the building from the outside.

The first step is to apply a conservative correction factor to convert the Indicated CFM (ICFM) values provided in Table 8 to Actual CFM (ACFM) values. The conversion is based on the temperature of the air at the annubar located downstream of the fan. This temperature value is calculated based on the inlet temperature with heat added from the 21 kW heater and the fan. For the given flows and temperatures provided in Table 8 the maximum temperature is calculated in Appendix 1 (page 57) to be 130°F. A review of the Reference 3.14 data tables indicates that the largest correction factor at the assumed temperature results from 100% humidity for the low barometric pressure (Refer to page 5.009 of Reference 3.14). This value of 1.2053 is applied to the data to obtain the Actual CFM for the test data. This correction is thus far associated with flow from within the building, while the leakage flow is from outside the building. The flow is further modified to account for leakage flow from outside the building. The approach is to simply establish the leakage flow necessary to conserve mass in the building. Therefore, leakage flow rate is calculated as follows. 2

$$Leakage = (1.2053)(SGTSFlow)\frac{\rho(14.696psi, TInside)}{\rho(14.696psi, TWin)}$$

The relationship assumes dry air which was confirmed to be conservative for the analysis by sensitivity comparison with 100% humidity. The resulting leakage flow rate is included for each of the test cases in Table 9.

Table 9 – Revised Test Data

Description	Variable Name	Test 1	Test 2	Test 3	Test 4	Test 5	Test 6
Outside Temperature (F)	TWin	64	66	68	70	72	75
Inside Temperature (F)	Tinside	80.5	82	80	80	79	79
Wind Speed (mph)	VMet	13.52	9.9	14.2	15.3	14.2	7.3
Leakage Flow (ACFM)	Leakage	2467	2359	2379	2404	2446	3038
Differential Pressure measured by Pressure Instrument 1A4 (inWG)	ΔPmeasured	0.48	0.448	0.46	0.39	0.448	0.65
Wind Direction		180	165	180	180	180	240

2

This data is ready for further evaluation using the pressure modeling methods previously described. The wind pressure coefficients developed in Appendix 3 and reported in Table 2 are used in this effort to convert the measured pressure to the local pressure at the Roofline and Railroad Bay Door (Table 10).

Table 10 – Wind pressure coefficients

Test Data Description (Wind Direction Angle)	Upper Building South Face Wind Coefficient (Incident Angle)	Upper Building North Face Wind Coefficient (Incident Angle)	Upper Building East Face Wind Coefficient(Incident Angle)	Upper Building West Face Wind Coefficient (Incident Angle)	Rail Road Door Wind Coefficient (Incident Angle)	Pressure Instrument Wind Coefficient (Incident Angle)
Test Data Wind Direction South (240)	-0.0294 (60°)	-0.619 (120°)	-0.545 (150°)	0.466 (30°)	-0.35 (150°)	0.25 (30°) Instrument 1A4
Test Data Wind Direction South (165)	0.63 (15°)	-0.47 (165°)	-0.415 (75°)	-0.685 (105°)	-0.50 (75°)	-0.742 (105°) Instrument 1A4
Test Data Wind Direction South (180)	0.638 (0°)	-0.403 (180°)	-0. 738 (90°)	-0. 738 (90°)	-0.85 (90°)	-0.55 (90°) Instrument 1A4

For a wind direction from the South (180°), the southern side of the building would use a 0° incident angle and the associated wind pressure coefficient. The Railroad door is on the East side of the building and for a Southern wind would use the flow coefficient associated with a 90° incident angle and wind pressure coefficient value at the lower elevation. The details of how these wind pressure coefficients were developed and assigned are provided in Appendix 3. It should be noted that the test data used Pressure Instrument "1A4" exclusively.

With these wind pressure coefficients determined for each test condition, it is possible to determine the wind contribution to the measured pressure differential and establish the corresponding pressure differences for the four roofline sides and the railroad bay door. The relationships used in this effort are developed and documented Appendix 1. The mathematical relationships that apply these methods are illustrated below. To calculate the wind pressure effect the met tower velocity is compensated for elevation and obstructions as follows, using the previously defined Equation 3.

$$V_{WIND} = V_{MET}\left(\frac{900ft}{HMet}\right)^{0.14}\left(\frac{HBuild}{900ft}\right)^{0.14} \qquad \text{(Equation 3)}$$

For the wind pressure contribution to the control instrument, Hmet is 33 feet and Hbuild is 135.5 feet. For the upper elevation, Hmet is 33 feet and Hbuild is 226 feet. The railroad bay door calculation will use Hmet of 33 feet and Hbuild of 28 feet. With the measured velocity converted to the velocity at the elevation of the pressure instrument ("1A4"), the wind contribution to the pressure measurement can be calculated. The method used to calculate the wind pressure contribution is outlined in Appendix 1, but is simply the dynamic pressure portion of the well documented Bernoulli equation (Reference 1.32) multiplied by the appropriate wind pressure coefficient. Using this approach, the wind pressure effect on the measured instrument for Test 6 is calculated as follows.

$$\Delta P_{WINDMEASURED} = (0.25)\rho(TWin)\frac{V_{WIND}^{2}}{2}\frac{27.71inH2O}{psi} \quad \text{(Equation 8)}$$

The wind pressure contribution to the measurement is calculated specifically so that it can be subtracted from the measured value, revealing the static pressure difference at the measurement location. The static pressure contribution can then be modified to represent that expected at the roof elevation as well as the railroad door. Furthermore, knowing the wind speed and the wind pressure coefficients at different locations on the building, the wind pressure can be calculated for those locations and added to the corrected static pressure values. This allows the establishment of the wind pressure differences on the leakage locations that correspond with the test data. The mathematical relationship that accomplishes this is defined below for each face of the building, as well as the rail road door. The following summarizes what the equation shows. Using the wind speed information and location of the instrument, the wind pressure contribution to the measured value can be calculated and subtracted from that measured value provided in Table 9.

$$\Delta P_{Measured} - \Delta P_{WindMeasured} \quad \text{(Equation 9)}$$

The outside static pressure change between the measurement elevation (HbuildMid) and the elevation of interest (HBuildUp) on the building (i.e., Roof) can be calculated using the Bernoulli equation and density based on the outside Temperature (Toutside) documented in Table 9. The same is done for the internal conditions using the internal temperature (Tinside) also documented in Table 9.

$$\rho(14.7psi, TWin, "air")(g)(HBuildMid - HBuildUp)$$
$$\rho(14.7psi, TInside, "air")(g)(HBuildMid - HBuildUp)$$

The difference between these values is added to Equation 9. Finally, the wind pressure determined using Table 9 wind speed and direction, as well as Equations 3 and 8, is added to the aforementioned quantity. The combined relationship for each of the sides of the building is illustrated below with a functional form of Equation 8 represented as Pw(). The term CpRoof is the weighted average coefficient for the roof as defined in Appendix 1. The resulting pressure difference across the walls at the roof level is provided in Equation 10.

EQUATION 10

$$\Delta P_{Roof_i} := \left[\Delta P_{Measured_i} - \Delta P_{WindMeasured_i} \cdots \\ + \left(\rho_{gas}\left(Patm, TWin_i, \text{"air"}\right) - \rho_{gas}\left(Patm, TInside_i, \text{"air"}\right)\right)\cdot\left[g\cdot(HBuildMid - HBuildUp)\right]\cdot\frac{27.71\cdot in}{psi} \cdots \\ + Pw\left(VWin_i, TWin_i, HmetLow, HBuildUp, CpRoof_i\right)\right]$$

The resulting pressure difference across the rail road bay door is provided in Equation 11.

EQUATION 11

$$\Delta P_{RRDoor_i} := \left[\Delta P_{Measured_i} - \Delta P_{WindMeasured_i} \cdots \\ + \left(\rho_{gas}\left(Patm, TWin_i, \text{"air"}\right) - \rho_{gas}\left(Patm, TInside_i, \text{"air"}\right)\right)\cdot g\cdot(HBuildMid - HBuildL)\cdot\frac{27.71 in}{psi} \cdots \\ + Pw\left(VWin_i, TWin_i, HmetLow, HBuildL, CpRRDoor_i\right)\right]$$

The calculated wind pressure for each of the cases listed in Table 9 are provided in Table 11.

Table 11 – Wind Pressure Effect Calculation Results

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Vwind Inst (mph)	16.476	12.065	17.305	18.645	17.305	8.896
Vwind Roof (mph)	17.699	12.96	18.59	20.03	18.59	9.557
Vwind RR (mph)	13.213	9.675	13.877	14.952	13.877	7.134
Air Density Inside (lb/ft^3)	0.0734	0.0732	0.0735	0.0735	0.0737	0.0737
Air Density Outside (lb/ft^3)	0.0758	0.0755	0.0752	0.0749	0.0746	0.0742
ΔPwind Inst (in H2O)	-0.073	-0.052	-0.079	-0.092	-0.079	9.42E-03
ΔPwind Roof Roof (in H2O)	-0.044	-0.018	-0.048	-0.055	-0.047	-8.29E-03
ΔPwind RR (in H2O)	-0.072	-0.023	-0.079	-0.092	-0.079	-8.50E-03

Recall that the pressure correction accounts for the wind pressure as a function of direction and elevation (Table 9). In addition, the static pressure change for the inside and outside, based on the measured temperatures, is included. The building height information (Hbuild... values) used in this calculation is provided below.

HBuildUp = 667ft – 441ft = 226ft
HBuildMid = 576.5ft – 441 ft = 135.5ft
HBuildL = 469ft – 441ft = 28ft

The resulting pressure differentials calculated using Equations 10 and 11 are provided in Table 12.

Table 12 – Calculated Local Pressure Differences

Case	Upper	Railroad Bay Door
1	0.469 in	0.528 in
2	0.444 in	0.524 in
3	0.463 in	0.495 in
4	0.403 in	0.419 in
5	0.463 in	0.469 in
6	0.623 in	0.643 in

Per Assumption 1.11, a flow split of 70%/30% is assumed for the data. This will be used to calculate a leakage correlation for the roofline and the railroad bay door. The same turbulent/laminar flow relationship used in Reference 1.24 will be applied in determining the coefficients for the building leakage.

As described in Reference 1.24 and illustrated in Equation 7, the leakage flow rates are proportional to either ½ or 1 power pressure difference. Therefore, the pressure differences established in Table 10, along with the measured flow rates, are used to provide a power relationship for each of the leakage path ways. This will result in a set of relationships based on Equation 7.

The data that will be evaluated to establish the appropriate coefficients are summarized in Table 13.

Table 13 – Calculated Local Pressure Differences and Leakage Flows

Test Case	Roof Differential Pressure	Railroad Door Differential Pressure	Leakage Flow (ACFM)
#1	0.469 in	0.528 in	2467
#2	0.444 in	0.524 in	2359
#3	0.463 in	0.495 in	2379
#4	0.403 in	0.419 in	2404
#5	0.463 in	0.469 in	2446
#6	0.623 in	0.643 in	3038

2

The data in Table 13 is used to establish a curve fit using a power function provided as part of the MathCad software package. To complete the evaluation, it is necessary to include a zero flow condition established at 0 inch pressure difference.

The power function is described by the MathCad software as follows.

*Returns a vector containing the coefficients for a power curve of the form a*x^b+c that best approximates the data in vectors vx and vy. Vector vg contains guess values for the three coefficients.*

This function is used to obtain a sense of the Leakage Data behavior as a function of differential pressure. From the results of this assessment, it will be possible to select the appropriate "A" and "B" coefficients used in Equation 7.

Evaluating the data with the aforementioned power function showed that the Roof leakage flow was proportional to the 0.644 power of the differential pressure. The Railroad door leakage flow was shown to be proportional to the 0.598 power of the differential pressure.

The "c" coefficient returned in each case was less than 1 and is considered to be insignificant and ignored in the establishment of the Equation 7 coefficients. The approach taken to establish the Equation 7 coefficients is to weight the ½ and 1 power values of the relationship to match the curve developed by the MathCad Result. Figures 1 and 2 illustrate the characteristics of the flow and compares the power function with the weighted resulting relationships. From Figure 1, it can be seen that the characteristics of the leakage at the roof are best represented by 1/3rd of the leakage is laminar, while the remaining 2/3rds are turbulent. Figure 2 illustrates that the flow at the railroad door matches the measured flow with 75% turbulent flow condition and 25% of the flow behaving as laminar.

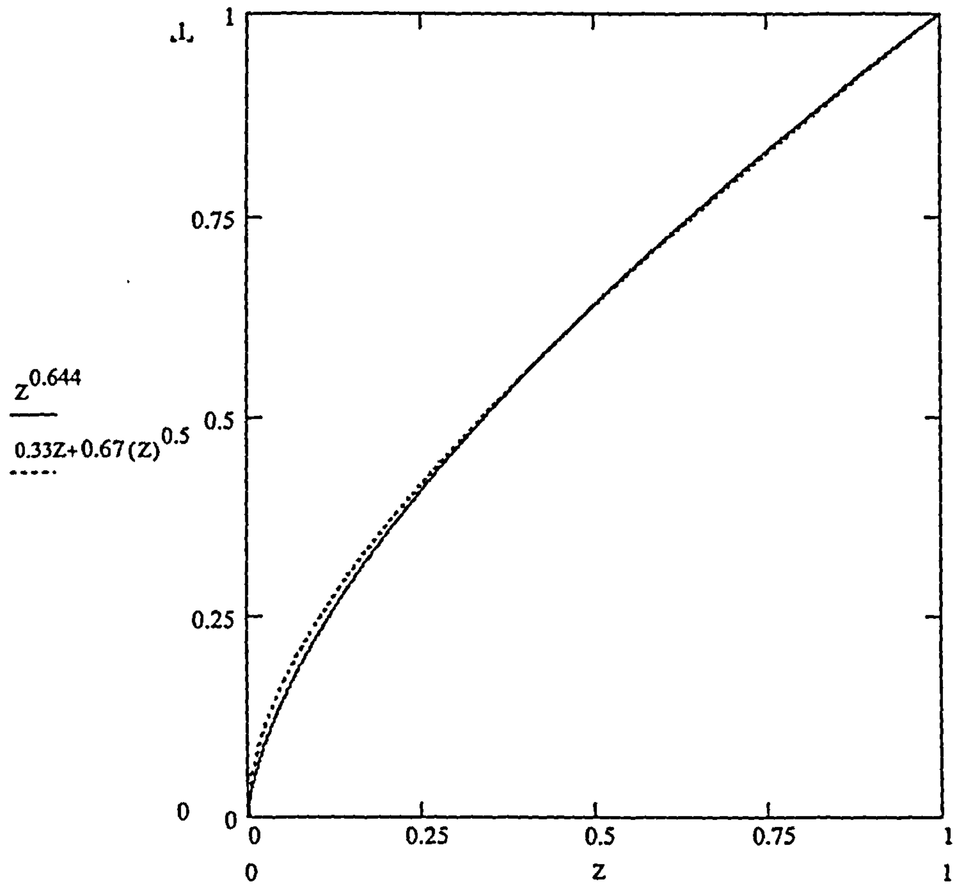

Figure 1 – Leakage Flow Characteristics At Roof Level

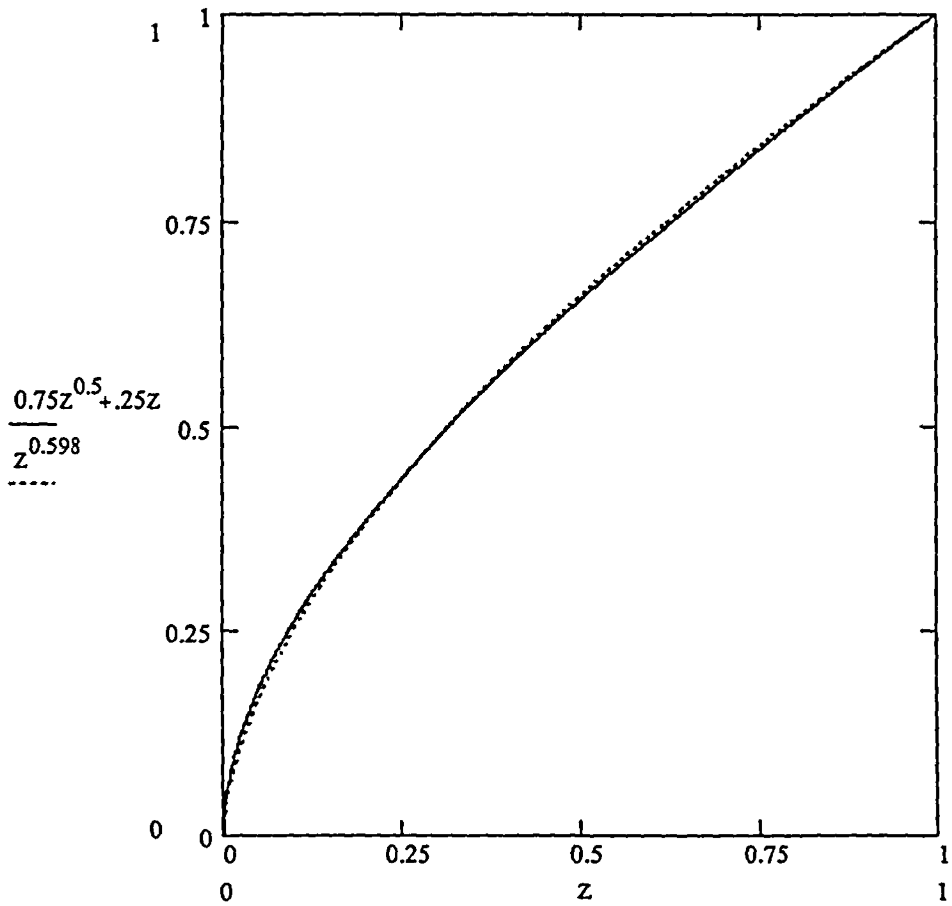

Figure 2 – Leakage Flow Comparison For Railroad Door

The coefficients for Equation 7 can now be established for each of the leakage flow paths using the following relationship.

$$LeakageRoof = FS(2430ACFM) = A(\Delta P) + B(\Delta P)^{1/2}$$
$$where$$
$$A = 0.33(C)$$
$$B = 0.67(C)$$
$$\Delta P = 0.25in$$
$$FS = 0.7$$
$$Solving$$
$$C = 4074.25$$
$$A = 1344.5$$
$$B = 2729.75$$
$$LeakageRoof = 1344.5(\Delta P) + 2729.75(\Delta P)^{1/2}$$

$$LeakageDoor = (1 - FS)(2430ACFM) = A(\Delta P) + B(\Delta P)^{1/2}$$
$$where$$
$$A = 0.25(C)$$
$$B = 0.75(C)$$
$$\Delta P = 0.25in$$
$$FS = 0.7$$
$$Solving$$
$$C = 1666.29$$
$$A = 416.57$$
$$B = 1249.71$$
$$LeakageDoor = 416.57(\Delta P) + 1249.71(\Delta P)^{1/2}$$

These relationships are established for a technical specification value 2430CFM assuming an air temperature of 75°F. A ratio of the densities are used to modify the values for use with the temperature conditions considered in this evaluation.

$T\max = 86^{o}F$

Roof Leakage

Roof Laminar Term

$$1344.5\frac{\rho(14.696psi,75^{o}F)}{\rho(14.696psi,T\max)} = 1372.16$$

Roof Turbulent Term

$$2729.75\frac{\rho(14.696psi,75^{o}F)}{\rho(14.696psi,T\max)} = 2785.91$$

$$\text{RoofLeakage}(86^{o}\text{F}) = 1372.16\Delta\text{P} + 2785.91\Delta\text{P}^{1/2}$$

$T\max = 86^{o}F$

Door Leakage

Door Laminar Term

$$416.57\frac{\rho(14.696psi,75^{o}F)}{\rho(14.696psi,T\max)} = 425.14$$

Door Turbulent Term

$$1249.57\frac{\rho(14.696psi,75^{o}F)}{\rho(14.696psi,T\max)} = 1275.43$$

$$\text{DoorLeakage}(86^{o}\text{F}) = 425.14\Delta\text{P} + 1275.43\Delta\text{P}^{1/2}$$

$T\min = 28° F$

Roof Leakage

Roof Laminar Term

$$1344.5\frac{\rho(14.696 psi, 75° F)}{\rho(14.696 psi, T\min)} = 1226.31$$

Roof Turbulent Term

$$2729.75\frac{\rho(14.696 psi, 75° F)}{\rho(14.696 psi, T\min)} = 2489.79$$

$$\text{RoofLeakage}(28° \text{F}) = 1226.31\Delta\text{P} + 2489.79\Delta\text{P}^{1/2}$$

$T\min = 28° F$

Door Leakage

Door Laminar Term

$$416.57\frac{\rho(14.696 psi, 75° F)}{\rho(14.696 psi, T\min)} = 379.95$$

Door Turbulent Term

$$1249.71\frac{\rho(14.696 psi, 75° F)}{\rho(14.696 psi, T\min)} = 1139.86$$

$$\text{DoorLeakage}(28° \text{F}) = 379.95\Delta\text{P} + 1139.86\Delta\text{P}^{1/2}$$

PRESSURE CRITERIA INPUTS CONTROL VARIABLES

The successful depressurization of the secondary containment reactor building is determined by evaluating the pressure at the leakage locations. The leakage locations are at the roof and railroad door elevations. These two extremes in the building elevation provide a bounding look at the pressure difference across the building walls.

The elevations considered are the 667ft (roof) and 469ft (railroad door). Control variables are used to calculate the building internal pressures at these elevations as follows.

$$P = P_{VOLUME} + \rho_{VOLUME}\begin{pmatrix} ELEVATIONVOLUMECENTER \\ - ELEVATIONLEAKAGEPATH \end{pmatrix} g_c C$$

where

P_{VOLUME} = the GOTHIC calculated volume pressure

ρ_{VOLUME} = the GOTHIC calculated volume density

g_c = the gravitational constant

C = conversion constant

Two internal pressure values are calculated in this manner one at the roof level (GOTHIC Control Volume 5) and one at the railroad door (GOTHIC Control Volume 1). The volume center of volume 1 is determined based on values documented in the volumes input section (Table 18) to be 522.94ft. Similarly the volume 5 value is 636.02ft. The leakage path elevations were previously defined to be roof 667ft and railroad door 469ft.

Based on these values the control variable equations can be defined as follows.

$$P_{ROOF} = P_{VOLUME5} + \rho_{VOLUME5}\left(-0.215 psi\frac{ft^3}{lbm}\right)$$

$$P_{RAILROADDOOR} = P_{VOLUME1} + \rho_{VOLUME1}\left(0.375 psi\frac{ft^3}{lbm}\right)$$

These pressures are then compared with the minimum pressures acting on the leakage path. For the railroad door, the minimum pressure is the same as the boundary condition pressure since the pressure is on one side of the building only. For the roof, the minimum side pressure is used as opposed to the weighted pressure used in the boundary condition. The minimum pressures are calculated in Appendix 1 for the roof elevation.

FLOW PATH INPUT:

Flow paths are used in the GOTHIC model to provide hydraulic connections between volumes and boundary conditions. The upper leakage flow path is associated with the refueling floor, while the lower leakage flow path is associated with the main reactor building volume. These flow path areas and hydraulic diameters are simply calculated to be based upon the anticipated flow with a 0.25inWG pressure difference. The flow path area and hydraulic diameter for the upper leakage path are calculated as follows.

$$\rho = 0.075\, {ft^3}/{lb}$$

$$V = \sqrt{\frac{2(0.25in)\left(144\, {in^2}/{ft^2}\right)(32.2)}{\left(0.075\, {ft^3}/{lb}\right)\left(\frac{27.71in}{psi}\right)}} = 33.4\, {ft}/{sec}$$

$$Flow = 2430cfm(0.7) = 1701.0cfm$$

$$Area = {Flow}/{V} = {1701.0cfm}\Big/\left(60\, {sec}/{min}\left(33.4\, {ft}/{sec}\right)\right)$$

$$Area = 0.85 ft^2$$

The Hydraulic Diameter is calculated for each of the leakage flow paths as follows.

$$HD = \sqrt{{4Area}/{\pi}} = 1.04 ft$$

The flow path area and hydraulic diameter for the lower leakage path are calculated as follows.

$$\rho = 0.075\, {ft^3}/{lb}$$

$$V = \sqrt{\frac{2(0.25in)\left(144\,{in^2}/{ft^2}\right)(32.2)}{\left(0.075\,{ft^3}/{lb}\right)\left(\frac{27.71in}{psi}\right)}} = 33.4\,{ft}/{sec}$$

$$Flow = 2430cfm(0.3) = 729.0cfm$$

$$Area = {Flow}/{V} = {729.0cfm}\Big/\left(60\,{sec}/{min}\left(33.4\,{ft}/{sec}\right)\right)$$

$$Area = 0.36ft^2$$

The Hydraulic Diameter is calculated for each of the leakage flow paths as follows.

$$HD = \sqrt{{4Area}/{\pi}} = 0.68ft$$

Flow Paths between the volumes are established based on Reference 3.7. The flow path information used is provided in Table 14. The values are combined into values suitable for the GOTHIC Input (Table 15). It should be noted that flow paths associated with the SGTS are documented later in this report.

Table 14 Flow Path Information from Reference 3.7

Description	Flow Area ft^2	Friction Length ft.	Hydraulic Diameter ft.	Forward Loss Coeff.	Reverse Loss Coeff.
RHRB TO 471	56.65	2	1.74	1.52	1.52
RHRA TO 471	54.61	2	1.86	1.52	1.52
RCIC TO 471	20.82	2	1.80	1.56	1.56
RHRC TO 471	33.47	2	2.63	1.50	1.50
LPCS TO 471	13.41	2	1.96	1.50	1.50
HPCS TO 471	12.45	2	1.14	1.50	1.50
CRD/COND TO 471	16.83	2	1.40	1.50	1.50
572S - 606S, 1	409.61	2	11.89	1.5	1.5

Table 15 GOTHIC Flow Paths

Description	From Vol	Elev (ft)	Ht (ft)	To Vol	Elev (ft)	Ht (ft)	Flow Area (ft^2)	Hydraulic Dia (ft)	Inertial Len (ft)	Fric Len (ft)
Pump Room To Main Building	4	466	0.1	1	471	0.1	191.41	1.767	105.31	2
Pump Room To Main Building	4	422.25	16.7	1	441	0.0104	16.83	1.4	105.31	2
Main Building To Fuel Floor	1	572	0.1	5	607	0.1	409.61	11.89	112.33	2
SGTS Inlet	1	577	1.5	2	577	1.5	1.767	1.5	10	1
SGTS Discharge	2	577	1.5	3P	671.17	1.5	1.767	1.5	10	157.81
Roof Leakage	5	667	0.1	2F	667	0.1	0.85	1.04	130	1
Ground Leakage	1	468.5	0.5	1F	468.5	0.5	0.36	0.68	136	1

VOLUME INPUT:

The purpose of this section is to document the basis for the volume inputs developed for the drawdown analysis. The model is composed of three volumes. These volumes represent the refueling floor with its refuel pool, the pump rooms located on the 422.25 foot elevation and the remainder of the reactor building. The volumes are developed using information provided in References 3.1 and 3.9.

The result of this effort is provided in Table 18. Table 16 provides the volume inputs obtained from Reference 3.1. These inputs are used to generate the values depicted in Table 17 as described below. The fuel pool liquid volume is obtained from Reference 3.9 and has a value of 350,000 gallons. Note 1 gallon equals 0.13368 ft^3 resulting is a fuel pool liquid volume of 46,788 ft^3. 1

Table 16 - Volume Values Obtained From Reference 3.1

Elevation	Description	Volume Value (ft^3)	Fuel Pool Volume (ft^3)	Air Volume (ft^3)
Reactor Building Inputs				
422.25' (includes pump rooms)		195,522.54		195,522.54
441' (includes pump room mezzanines)		204,327.76		204,327.76
RRB		76,897.33		76,897.33
471'		325,391.98		325,391.98
501'		232,981.87		232,981.87
522'		340,597.54		340,597.54
548'		347,958.94		347,958.94
572'		426,012.10		426,012.10
Total RB below Refueling Floor w/pump rooms				2,149,690.06
606' - 10.5"	Refueling Floor	1,327,248.77	52,700.00 [1]	1,274,548.77
606' - 10.5"	Fuel Pool Water Volume		46,788.00	
Pump Room Inputs				
422.25'	RHR B	72,302.76		72,302.76
422.25'	RHR A	71,064.20		71,064.20
422.25'	RCIC	42,033.90		42,033.90
422.25'	RHR C	35,756.92		35,756.92
422.25'	LPCS	27,933.37		27,933.37
422.25'	HPCS	50,476.90		50,476.90
422.25'	CRD	45,553.05		45,553.05
Total pump rooms				345,121.10
Total RB below Refueling Floor w/o pump rooms				1,804,568.96

1

1 This volume is based on the dimensions of the fuel pool and includes all volume occupied by fuel assemblies as well as water.

The pump room volume is established based on the Pump Room inputs, which as described in the assumptions, overlap with the Reactor Building Inputs. Therefore, the Pump Room Volume is simply the summation of the Pump Room Volumes listed in Table 16. The main building volume is the sum of the Reactor Building Volumes minus the Pump Room Volume and the refueling floor volume. The volume inputs for the described volumes are provided in Table 17. The total Reactor Building Volume is different from that reported in Reference 3.1 due to the Spent Fuel Pool normal water volume. This water is assumed to be present in this calculation to allow the modeling of the fuel pool heat input response.

Table 17 - Three Node Volume Inputs

Node Description	Total Internal Volume (ft^3)	Fuel Pool Volume (ft^3)	Air Volume Volume (ft^3)	Input Volume (ft^3) [2]	Fraction Water (%) [3]
Pump Room Volume	345,121.10		345,121.10	345,121.1	0
Main Building Volume	1,804,568.96		1,804,568.96	1,804,568.96	0
Refueling Floor Volume	1,327,248.77	52,700	1,274,548.77	1,321,336.77	3.541%
Fuel Pool Water Volume		46,788	0	NA	NA
Total			3,424,238.83	NA	NA

1

The GOTHIC Inputs are documented in Table 18.

2 Refueling Floor Input Volume is $1{,}274{,}548.77ft^3 + 46{,}788ft^3$

3 Pool Fraction is $46{,}788ft^3/1{,}321336.77ft^3$

Table 18 – GOTHIC Inputs

Volume No.	Description	Volume (ft^3)	Elevation [4] (ft)	Height (ft)	Hydraulic Diameter (ft)	Pool Area (ft^2)
1	Main Building	1,804,568.96	441	163.875	28.9	DEFAULT
2	SGTS Fan Inlet	1,000 [5]	577	1.5	1.5	DEFAULT
3	Fuel Pool Cooling System	10	568.125	1	1	DEFAULT
4	Pump Rooms	345,121.1	422.25	46.75	69.07	DEFAULT
5	Refuel Floor	1,321,336.77	604.367	63.303	31.34	1360

1

1

4 Refueling Floor elevation is established to accommodate the liquid volume.
5 Volume 2 was set to 1000ft^3 to ensure reasonable run time without adversely impacting the results.

THERMAL CONDUCTOR INPUT:

This section documents the basis for the basic heat conductor inputs to be used in the GOTHIC drawdown model. The inputs are developed for the three node model. The three nodes represent the pump rooms, refueling floor and the remainder of the reactor building.

The results of this calculation are 48 thermal conductors. The primary thermal conductors information is summarized in Table 19. The walls are in general concrete and the pipes are carbon steel. Those conductors that are described as composite have more than one material associated with them. The material composition and the thickness of the different material regions is provided in Table 35 of this report. The boundary condition specifics are found in the Thermal Conductor Boundary Temperatures section of the report.

Table 19 Thermal Conductor Inputs

Cond. #	Conductor Description	Side 1 Thermal Condition	Side 2 Thermal Condition	Thick. (in)	O.D. (in)	Surface Area (ft2)	Geom	Details
1	Uninsulated Piping	Pump Room	Wetwell	0.38	21.02	2,307.56	Tube	Table 21
2	Insulated Piping (Composite)	Pump Room	Wetwell	2.38	22.00	642.19	Tube	Table 21
3	Uninsulated Piping	Main Reactor Building	Fuel Pool	0.29	7.31	406.34	Tube	Table 21
4	Pump Room Exterior Concrete Wall	Pump Room	Adiabatic	36.00	NA	1958.06	Wall	Table 23
5	Pump Room Exterior Concrete Wall	Pump Room	Adiabatic	48.00	NA	4359.37	Wall	Table 23
6	Pump Room Exterior Concrete Wall	Pump Room	Adiabatic	60.00	NA	714.00	Wall	Table 23
7	Pump Room Exterior Concrete Wall	Pump Room	Adiabatic	72.00	NA	133.00	Wall	Table 23
8	Pump Room Wall	Pump Room	D104 Corridor	36.00	NA	1405.68	Wall	Table 23
9	Pump Room Wall	Pump Room	D104 Corridor	48.00	NA	1026.37	Wall	Table 23
10	Pump Room Wall	Pump Room	D104 Corridor	72.00	NA	208.25	Wall	Table 23
11	Pump Room Ceiling	Pump Room	Main Reactor Building	18.00	NA	2,908.00	Wall	Table 23
12	Pump Room Ceiling	Pump Room	Main Reactor Building	24.00	NA	3,117.00	Wall	Table 23
13	Pump Room Wall	Pump Room	Main Reactor Building	35.12	NA	5,630.62	Wall	Table 23

Cond. #	Conductor Description	Side 1 Thermal Condition	Side 2 Thermal Condition	Thick. (in)	O.D. (in)	Surface Area (ft^2)	Geom	Details	
14	Pump Room Wall	Pump Room	Main Reactor Building	48.00	NA	121.87	Wall	Table 23	1
15	Pump Room Wall	Pump Room	Main Reactor Building	58.14	NA	706.87	Wall	Table 23	
16	Pump Room Internal Wall	Pump Room	Pump Room	35.10	NA	4,743.45 (9,286.9) [6]	Wall	Table 23	1
17	Pump Room Internal Wall	Pump Room	Pump Room	60.00	NA	97.50	Wall	Table 23	
18	Pump Room Wetwell Wall (Composite)	Pump Room	Wetwell	64.06	NA	5,975.00	Wall	Table 23	
19	Pump Room Wetwell Wall (Composite)	Pump Room	Wetwell	154.86	NA	5,676.25	Wall	Table 23	
20	AUXILIARY ROOMS Floor	Main Reactor Building	Pump Room	24.00	NA	92.00	Wall	Table 30	
21	AUXILIARY ROOMS Wall	Main Reactor Building	Adiabatic	33.98	NA	1,324.00	Wall	Table 30	
22	AUXILIARY ROOMS Wall	Main Reactor Building	Main Reactor Building	12.00	NA	4,995.25	Wall	Table 30	
23	AUXILIARY ROOMS Wall	Main Reactor Building	Main Reactor Building	18.00	NA	444.50	Wall	Table 30	
24	AUXILIARY ROOMS Wall	Main Reactor Building	Main Reactor Building	23.36	NA	1,241.50	Wall	Table 30	
25	AUXILIARY ROOMS Wall	Main Reactor Building	Main Reactor Building	36.00	NA	322.00	Wall	Table 30	
26	AUXILIARY ROOMS Wall	Main Reactor Building	Main Reactor Building	44.26	NA	264.50	Wall	Table 30	
27	AUXILIARY ROOMS Wall	Main Reactor Building	Main Reactor Building	72.00	NA	450.85	Wall	Table 30	
28	AUXILIARY ROOMS Wall	Main Reactor Building	Main Reactor Building	102.00	NA	40.25	Wall	Table 30	
29	AUXILIARY ROOMS Floor	Main Reactor Building	Main Reactor Building	12.00	NA	1,149.36	Wall	Table 30	
30	AUXILIARY ROOMS Floor	Main Reactor Building	Main Reactor Building	18.00	NA	814.31	Wall	Table 30	
31	AUXILIARY ROOMS Floor	Main Reactor Building	Main Reactor Building	24.00	NA	150.00	Wall	Table 30	
32	AUXILIARY ROOMS Floor	Main Reactor Building	Main Reactor Building	32.00	NA	101.66	Wall	Table 30	
33	AUXILIARY ROOMS Wall (Composite)	Main Reactor Building	Drywell	60.00	NA	289.00	Wall	Table 30	

6 The area of internal conductor walls in the pump rooms (Table 23) are calculated based on both sides of these walls. Therefore, when applied in the GOTHIC conductors model ½ the value is used.

Cond. #	Conductor Description	Side 1 Thermal Condition	Side 2 Thermal Condition	Thick. (in)	O.D. (in)	Surface Area (ft2)	Geom	Details
34	AUXILIARY ROOMS Wall	Main Reactor Building	Fuel Pool	62.55	NA	422.87	Wall	Table 30
35	MISCELLANEOUS WALLS	Main Reactor Building	Main Reactor Building	12.00	NA	9,789.87	Wall	Table 30
36	MISCELLANEOUS WALLS	Main Reactor Building	Main Reactor Building	23.16	NA	5,445.41	Wall	Table 30
37	MISCELLANEOUS WALLS	Main Reactor Building	Main Reactor Building	27.79	NA	1,704.00	Wall	Table 30
38	MISCELLANEOUS WALLS	Main Reactor Building	Main Reactor Building	37.04	NA	2,334.49	Wall	Table 30
39	MAIN STRUCTURE WALLS	Main Reactor Building	Adiabatic	23.83	NA	24,402.43	Wall	Table 30
40	MAIN STRUCTURE WALLS	Main Reactor Building	Adiabatic	28.41	NA	44,567.01	Wall	Table 30
41	MAIN STRUCTURE FLOOR	Main Reactor Building	Main Reactor Building	24	NA	55,700.90	Wall	Table 30
42	DRYWELL WALLS (COMPOSITE)	Main Reactor Building	Drywell	61.37	NA	9,443.95	Wall	Table 30
43	DRYWELL WALLS (COMPOSITE)	Main Reactor Building	Drywell	72.09	NA	13,332.51	Wall	Table 30
44	FUEL POOL WALL (COMPOSITE)	Fuel Pool	Drywell	60.00	NA	1,743.75	Wall	Table 30
45	FUEL POOL WALL	Fuel Pool	Main Reactor Building	60.00	NA	4,378.75	Wall	Table 30
46	COMPOSITE WALL (Composite)	Refueling Floor	Adiabatic	1.598	NA	34,800.06	Wall	Table 33
47	COMPOSITE ROOF (Composite)	Refueling Floor	Adiabatic	0.049	NA	20,194.28	Wall	Table 33
48	CONCRETE FLOOR	Refueling Floor	Main Reactor Building	24.00	NA	16,205.50	Wall	Table 33

The thermal conductors are developed for each of the three distinct volumes used in the building model. These volumes include the pump rooms, the main reactor building and the refueling floor.

PUMP ROOM THERMAL CONDUCTORS

The pump rooms contain thermal conductors that have a heated surface (Primary Containment), have an adiabatic surface (Assumption 4.5), communicate with the main reactor building volume and have both

surfaces internal to the volume. The conductors that have a heated surface are associated with operational ECCS pipes (Assumption 4.1) as well as primary containment walls. These heat structures will be assigned a boundary condition that is a time dependent temperature value that matches the wetwell response to the LOCA conditions, Table 37.

Those conductors within the pump room that are assigned an adiabatic boundary condition are associated with walls and floors that communicate to conditions outside of the reactor building. The thermal conductors that communicate with the main reactor building volume are the pump room ceilings. The conductors that contain both sides within the pump room volume are the walls that adjoin the pump rooms.

PIPING HEAT STRUCTURES
Table 20 provides all of the basic data as well as calculated surface areas for the piping system heat conductors. It should be noted that the Fuel Pool Heat Exchanger Room Piping is located in the Main Reactor Building Volume.

$$TotalDia = OD + 2(InsulThick)$$

$$TotalWallThick = \frac{(TotalDia - ID)}{2}$$

$$SurfaceArea = \pi(TotalDia)(Lgth)$$

Table 20 - Raw Data for Piping Systems That Provide Heat Source

Room Location [7]	Structure Description	BOUNDARY CONDITION	Diam (in)	Lgth (ft)	Schedule	OD (in)	Wall Thick (in)	ID (in)	Insul Thick (in)	TOTAL WALL THICK (in)	TOTAL DIA (in)	Surface Area (ft^2)	Ref
RHR PUMP 2C ROOM R-3 (R14)	RHR(3)-1	WETWELL	24	64.92	SA106 STD GROUP B	24.00	0.375	23.25	0	0.375	24	407.90	3.4
RHR PUMP 2C ROOM R-3 (R14)	RHR(1)-2	WETWELL	18	111.50	SA106 STD GROUP B	18.00	0.375	17.25	2	2.375	22	642.19	3.4
FUEL POOL HX ROOM	FPC(1)-1-1	FUEL POOL	10	15.00	SA106 STD GROUP B	10.75	0.365	10.02	0	0.365	10.75	42.22	3.4
FUEL POOL HX ROOM	FPC(1)-1-1	FUEL POOL	8	18.00	SA106 STD GROUP B	8.625	0.322	7.981	0	0.322	8.625	40.64	3.4
FUEL POOL HX ROOM	FPC(2)-1-1	FUEL POOL	8	5.00	SA106 STD GROUP B	8.625	0.322	7.981	0	0.322	8.625	11.29	3.4

1

7 Note that RHR Pump 2C Room R-3 is used as opposed to RHR Pump 2A specified in Assumption 4.1. Review of the Reference 3.4 calculation indicates that the RHRC piping representation used in the model bounds that associated with RHRA therefore, the model documented in this calculation is conservative.

Room Location [7]	Structure Description	BOUNDARY CONDITION	Diam (in)	Lgth (ft)	Schedule	OD (in)	Wall Thick (in)	ID (in)	Insul Thick (in)	TOTAL WALL THICK (in)	TOTAL DIA (in)	Surface Area (ft²)	Ref
FUEL POOL HX ROOM	FPC	FUEL POOL	6	180.00	SA106 STD GROUP B	6.625	0.280	6.065	0	0.28	6.625	312.20	3.4
LPCS PUMP ROOM R-5 (R12)	LPCS(2)-1	WETWELL	24	80.63	SA106 STD GROUP B	24.00	0.375	23.25	0	0.375	24	506.61	3.4
LPCS PUMP ROOM R-5 (R12)	LPCS(1)-2	WETWELL	16	105.90	SA106 STD GROUP B	16.00	0.375	15.25	0	0.375	16	443.38	3.4
HPCS PUMP ROOM (R-6) R11	HPCS(2)-1	WETWELL	24	84.85	SA106 STD GROUP B	24	0.375	23.25	0	0.375	24	533.13	3.4
HPCS PUMP ROOM (R-6) R11	HPCS(1)-4	WETWELL	16	99.44	SA106 STD GROUP B	16	0.375	15.25	0	0.375	16	416.53	3.4

1

To establish heat structures that represent the piping system it is necessary to divide these system into those associated with Fuel Pool Cooling and ECCS. The next step is to further sub divided them into insulated and not insulated. The final step is to group the piping by wall thickness.

Piping within each group is combined into a heat conductor by calculating an average diameter and thickness that is representative of the total surface area of the group. This approach provides an equivalent heat sink to represent each piping group minimizing the number of heat structures required by the model.

Table 21 summarizes the result of this calculation.

$$AvgThickness = \frac{\sum (Area)(Thickness)}{\sum (Area)}$$

$$AvgDia = \frac{\sum (Area)(Dia)}{\sum (Area)}$$

Table 21 Piping System Thermal Conductor Inputs

Cond. #	Piping Location	Piping Description	Internal Boundary Condition	Conductor Geometry	Conductor Outside Diameter (in)	Insulation Thickness (in)	Conductor Wall Thickness (in)	Conductor Surface Area (ft^2)	Piping Material	Insulation Material
1	Pump Room Volume	Uninsulated Piping	Suppression Pool Post LOCA Temperature Response	Tube	21.02	0	0.38	2,307.56	SA106	NA
2	Pump Room Volume	Insulated Piping	Suppression Pool Post LOCA Temperature Response	Tube	22.00	2	2.38	642.19	SA106	Calcium Silicate
3	Main Building Volume	Uninsulated Piping	Fuel Pool Temperature Calculated by GOTHIC	Tube	7.31	0	0.29	406.34	SA106	NA

PUMP ROOM WALLS AND CEILINGS

The data associated with walls and ceilings is developed in Table 22.

$$SurfaceArea = (Height)(Width)$$

Note that where the width and height are not provided the surface area was taken directly from the reference.

Table 22 Pump Room Walls and Ceilings

Structure Location	Structure Description	Elevation (ft)	WIDTH (ft)	HEIGHT (ft)	THICKNESS (in)	SURFACE AREA (ft^2)	BOUNDARY CONDITION LOCATION	REF	Material and Orientation
ROOM RHR PUMP 2B ROOM R-1 (R7)	NORTH WALL	422	29.25	48.75	36	1425.94	R6	3.3	Concrete Wall
ROOM RHR PUMP 2B ROOM R-1 (R7)	SOUTH WALL 1	422	25	48.75	36	1218.75	RB	3.3	Concrete Wall
ROOM RHR PUMP 2B ROOM R-1 (R7)	SOUTH WALL 2	422	5	48.75	60	243.75	RB	3.3	Concrete Wall
ROOM RHR PUMP 2B ROOM R-1 (R7)	SOUTH WALL 3	422	2.5	48.75	48	121.88	RB	3.3	Concrete Wall
ROOM RHR PUMP 2B ROOM R-1 (R7)	SOUTH WALL 4	422	17	48.75	30	828.75	RB	3.3	Concrete Wall
ROOM RHR PUMP 2B ROOM R-1 (R7)	WEST WALL 1 BELOW GRADE	422	7	19	72	133.00	GROUND	3.3	Concrete Wall
ROOM RHR PUMP 2B ROOM R-1 (R7)	WEST WALL 1 ABOVE GRADE	441	7	29.75	72	208.25	D104 CORRIDOR	3.3	Concrete Wall
ROOM RHR PUMP 2B ROOM R-1 (R7)	WEST WALL 2 BELOW GRADE	422	34.5	19	48	655.50	GROUND	3.3	Concrete Wall
ROOM RHR PUMP 2B ROOM R-1 (R7)	WEST WALL 2 ABOVE GRADE	441	34.5	29.75	48	1026.38	D104 CORRIDOR	3.3	Concrete Wall

1

Structure Location	Structure Description	Elevation (ft)	WIDTH (ft)	HEIGHT (ft)	THICKNESS (in)	SURFACE AREA (ft²)	BOUNDARY CONDITION LOCATION	REF	Material and Orientation
ROOM RHR PUMP 2B ROOM R-1 (R7)	CEILING AREA				18	1533	RB	3.3	Concrete Floor
ROOM RHR PUMP 2A ROOM R-2 (R6)	NORTH WALL BELOW GRADE	422	21.75	19	36	413.25	GROUND	3.3	Concrete Wall
ROOM RHR PUMP 2A ROOM R-2 (R6)	NORTH WALL ABOVE GRADE	441	21.75	29.75	36	647.06	AMBIENT	3.3	Concrete Wall
ROOM RHR PUMP 2A ROOM R-2 (R6)	SOUTH WALL	422	29.25	48.75	36	1425.94	R7	3.3	Concrete Wall
ROOM RHR PUMP 2A ROOM R-2 (R6)	WEST WALL BELOW GRADE	422	47.25	19	36	897.75	GROUND	3.3	Concrete Wall
ROOM RHR PUMP 2A ROOM R-2 (R6)	WEST WALL ABOVE GRADE	441	47.25	29.75	36	1405.69	D104 CORRIDOR	3.3	Concrete Wall
ROOM RHR PUMP 2A ROOM R-2 (R6)	EAST WALL SECTION 1	422	28.5	48.75	30	1389.38	R15	3.3	Concrete Wall
ROOM RHR PUMP 2A ROOM R-2 (R6)	CEILING AREA				18	1375	RB	3.3	Concrete Floor
RCIC PUMP ROOM R-3 (R15)	NORTH WALL SECTION 1	441	7	29.75	60	208.25	AMBIENT	3.3	Concrete Wall
RCIC PUMP ROOM R-3 (R15)	NORTH WALL SECTION 2	441	44	29.75	48	1309.00	AMBIENT	3.3	Concrete Wall
RCIC PUMP ROOM R-3 (R15)	WEST WALL SECTION 1	422.	31.50	48.75	36	1535.63	R6	3.3	Concrete Wall
RCIC PUMP ROOM R-3 (R15)	WEST WALL SECTION 2	422	2.00	48.75	60	97.50	R6	3.3	Concrete Wall
RCIC PUMP ROOM R-3 (R15)	EAST WALL	422	10.00	48.75	36	487.50	R14	3.3	Concrete Wall
RCIC PUMP ROOM R-3 (R15)	CEILING AREA				24	944.00	RB	3.3	Concrete Floor

1

Structure Location	Structure Description	Elevation (ft)	WIDTH (ft)	HEIGHT (ft)	THICKNESS (in)	SURFACE AREA (ft^2)	BOUNDARY CONDITION LOCATION	REF	Material and Orientation
RHR PUMP 2C ROOM R-4 (R14)	NORTH WALL SECTION 1	441	23.5	29.75	48	699.13	AMBIENT	3.3	Concrete Wall
RHR PUMP 2C ROOM R-4 (R14)	NORTH WALL SECTION 2	441	3	29.75	60	89.25	AMBIENT	3.3	Concrete Wall
RHR PUMP 2C ROOM R-4 (R14)	WEST WALL	422	10	48.75	36	487.50	R15	3.3	Concrete Wall
RHR PUMP 2C ROOM R-4 (R14)	EAST WALL SECTION 1	422	21	48.75	36	1023.75	RB	3.3	Concrete Wall
RHR PUMP 2C ROOM R-4 (R14)	EAST WALL SECTION 2	422	4.5	48.75	54	219.38	RB	3.3	Concrete Wall
RHR PUMP 2C ROOM R-4 (R14)	EAST WALL SECTION 3	422	8	48.75	36	390.00	R12	3.3	Concrete Wall
RHR PUMP 2C ROOM R-4 (R14)	CEILING AREA				24	535	RB	3.3	Concrete Floor
LPCS PUMP ROOM R-5 (R12)	NORTH WALL SECTION 1	422	8	48.75	36	390.00	R14	3.3	Concrete Wall
LPCS PUMP ROOM R-5 (R12)	NORTH WALL SECTION 2	422	17.5	48.75	36	853.13	RB	3.3	Concrete Wall
LPCS PUMP ROOM R-5 (R12)	SOUTH WALL	422	18.00	48.75	36	877.50	R11	3.3	Concrete Wall
LPCS PUMP ROOM R-5 (R12)	EAST WALL SECTION 1	441	21.50	29.75	48	639.63	AMBIENT	3.3	Concrete Wall
LPCS PUMP ROOM R-5 (R12)	EAST WALL SECTION 2	441	7.00	29.75	60	208.25	AMBIENT	3.3	Concrete Wall
LPCS PUMP ROOM R-5 (R12)	CEILING AREA				24	523	RB	3.3	Concrete Floor
HPCS PUMP ROOM (R-6) R12	NORTH WALL	422	18	48.75	36	877.50	R12	3.3	Concrete Wall

1

Structure Location	Structure Description	Elevation (ft)	WIDTH (ft)	HEIGHT (ft)	THICKNESS (in)	SURFACE AREA (ft^2)	BOUNDARY CONDITION LOCATION	REF	Material and Orientation
HPCS PUMP ROOM (R-6) R13	SOUTH WALL SECTION 1	422	35	48.75	36	1706.25	RB	3.3	Concrete Wall
HPCS PUMP ROOM (R-6) R14	SOUTH WALL SECTION 2	422	5	48.75	60	243.75	RB	3.3	Concrete Wall
HPCS PUMP ROOM (R-6) R17	EAST WALL SECTION 1	441	35.5	29.75	48	1056.13	AMBIENT	3.3	Concrete Wall
HPCS PUMP ROOM (R-6) R18	EAST WALL SECTION 2	441	7	29.75	60	208.25	AMBIENT	3.3	Concrete Wall
HPCS PUMP ROOM (R-6) R19	CEILING AREA				24	1115	RB	3.3	Concrete Floor
ROOM RHR PUMP 2B ROOM R-1 (R7)	EAST WALL SECTION 1 TO PRIMARY CONTAINMENT	422	50	23.75	154.863	1187.50	WETWELL	3.3	COMPOSITE WALL
ROOM RHR PUMP 2B ROOM R-1 (R7)	EAST WALL SECTION 2 TO PRIMARY CONTAINMENT	446	50	25	64.063	1250.00	WETWELL	3.3	COMPOSITE WALL
ROOM RHR PUMP 2A ROOM R-2 (R6)	EAST WALL SECTION 2 TO PRIMARY CONTAINMENT	422	27	23.75	154.863	641.25	WETWELL	3.3	COMPOSITE WALL
ROOM RHR PUMP 2A ROOM R-2 (R6)	EAST WALL SECTION 3 TO PRIMARY CONTAINMENT	446	27	25	64.063	675.00	WETWELL	3.3	COMPOSITE WALL

1

Structure Location	Structure Description	Elevation (ft)	WIDTH (ft)	HEIGHT (ft)	THICKNESS (in)	SURFACE AREA (ft^2)	BOUNDARY CONDITION LOCATION	REF	Material and Orientation
RCIC PUMP ROOM R-3 (R15)	SOUTH WALL SECTION 1 TO PRIMARY CONTAINMENT	422	44	23.75	154.863	1045.00	WETWELL	3.3	COMPOSITE WALL
RCIC PUMP ROOM R-3 (R15)	SOUTH WALL SECTION 2 TO PRIMARY CONTAINMENT	446	44	25	64.063	1100.00	WETWELL	3.3	COMPOSITE WALL
RHR PUMP 2C ROOM R-4 (R14)	SOUTH WALL SECTION 1 TO PRIMARY CONTAINMENT	422	44	23.75	154.863	1045.00	WETWELL	3.3	COMPOSITE WALL
RHR PUMP 2C ROOM R-4 (R14)	SOUTH WALL SECTION 2 TO PRIMARY CONTAINMENT	446	44	25	64.063	1100.00	WETWELL	3.3	COMPOSITE WALL
LPCS PUMP ROOM R-5 (R12)	WEST WALL SECTION 1 TO PRIMARY CONTAINMENT	422	27	23.75	154.863	641.25	WETWELL	3.3	COMPOSITE WALL
LPCS PUMP ROOM R-5 (R12)	WEST WALL SECTION 2 TO PRIMARY CONTAINMENT	446	27	25	64.063	675.00	WETWELL	3.3	COMPOSITE WALL
HPCS PUMP ROOM (R-6) R15	WEST WALL SECTION 1 TO PRIMARY CONTAINMENT	422	47	23.75	154.863	1116.25	WETWELL	3.3	COMPOSITE WALL

1

Structure Location	Structure Description	Elevation (ft)	WIDTH (ft)	HEIGHT (ft)	THICKNESS (in)	SURFACE AREA (ft^2)	BOUNDARY CONDITION LOCATION	REF	Material and Orientation
HPCS PUMP ROOM (R-6) R16	WEST WALL SECTION 2 TO PRIMARY CONTAINMENT	446	47	25	64.063	1175.00	WETWELL	3.3	COMPOSITE WALL

1

Similar to the piping system assessment described above, the Pump Room has criteria used to establish thermal conductors associated with walls and ceilings. The walls and ceilings are grouped by thickness.

Pump Room conductors within each group are combined into thermal conductors by calculating an average thickness that is representative of the total area of the group. This approach provides an equivalent heat sink to represent each Pump Room conductor group minimizing the number of thermal conductors required by the GOTHIC model.

$$AvgThickness = \frac{\sum(Area)(Thickness)}{\sum(Area)}$$

Table 23 summarizes the results of this thermal conductor calculation.

Table 23 Pump Room Concrete conductors

PUMP ROOM CONCRETE THERMAL CONDUCTORS				
Conductor #	BOUNDARY CONDITION / ORIENTATION	THICKNESS (in)	SURFACE AREA (ft^2)	Material Details
	BOUNDARY CONDITION ADIABATIC			
4	Wall	36	1958.063	Concrete
5	Wall	48	4359.375	Concrete
6	Wall	60	714	Concrete
7	Wall	72	133	Concrete
	BOUNDARY CONDITION D104 CORRIDOR			
8	Wall	36	1405.688	Concrete
9	Wall	48	1026.375	Concrete
10	Wall	72	208.25	Concrete
	BOUNDARY CONDITION MAIN REACTOR BUILDING			
11	Ceiling	18	2908	Concrete
12	Ceiling	24	3117	Concrete
13	Wall	35.117	5630.625	Concrete
14	Wall	48	121.875	Concrete
15	Wall	58.138	706.875	Concrete
	BOUNDARY CONDITION INTERNAL			
16	Wall	35.1	4743.45 (9286.9)	Concrete
17	Wall	60	97.5	Concrete
	BOUNDARY CONDITION WETWELL			
18	COMPOSITE WALL	64.063	5975	Table 35
19	COMPOSITE WALL	154.863	5676.25	Table 35

MAIN REACTOR BUILDING THERMAL CONDUCTORS

The main reactor building has thermal conductors that have a heated surface (Primary Containment – Drywell above 501', wetwell below 501'), have an adiabatic surface (Assumption 4.5), communicate with the pump room and refueling floor volumes, and have both surfaces internal to the volume. The conductors that have a heated surface are associated with primary containment walls. These heat structures will be assigned a boundary condition that is a time dependent temperature value that matches the drywell and wetwell response to the LOCA conditions, Table 36 and 37.

Those conductors within the main reactor building volume that are assigned an adiabatic boundary condition are associated with walls that communicate to conditions outside of the reactor building. The thermal conductors that communicate with the pump rooms and refueling floor are the pump room ceilings and the refueling floor. The conductors that contain both sides within the main reactor building volume are the walls that adjoin the internal rooms.

Those conductors that are associated with internal rooms are documented in Tables 24 and 25. It should be noted that the thermal conductors associated with these internal rooms have conductors that communicate with the reactor building atmosphere, the fuel pool, the ambient and the primary containment. These are identified in the table by the boundary condition column of the table. The atmosphere boundary condition is identified as adiabatic in the table.

Table 26 develops a summary of the thermal conductors that represent the exterior walls of the reactor building. Table 27 develops a summary of the thermal conductors that are in communication with the drywell as well as the fuel pool that communicate with the main reactor building volume. The floor thermal conductors are developed in Table 28. The thermal conductor thickness and surface area inputs are summarized in Table 30. Thermal conductor thickness is defined to be the inner surface to the outer surface of the structure unless specified otherwise.

Table 24 identifies the wall, floor and ceiling dimensions and reports the surface area calculated from these thermal conductors associated with the Auxiliary Rooms. The boundary conditions are identified along with the thermal conductors material and orientation. All of these conductors communicate with the Main Reactor Building Volume. The inclusion of a column labeled Boundary Condition Location is only to identify what communicates with the other side of the conductor. The term INTERNAL identifies that both sides of the conductor are in communication with the Main Reactor Building Volume.

$$SurfaceArea = (Height)(Width)$$

Note that where the width and height are not provided the surface area was taken directly from the reference.

Table 24 Auxiliary Rooms Walls, Floors and Ceilings

Structure Location	Structure Description	WIDTH (ft)	HEIGHT (ft)	THICKNESS (in)	SURFACE AREA (ft^2)	BOUNDARY CONDITION LOCATION	REF	Material and Orientation
FUEL POOL HEAT EXCHANGER PUMP ROOM (R506)	NORTH WALL	22.75	14.00	24	318.50	INTERNAL	3.3	Concrete Wall
FUEL POOL HEAT EXCHANGER PUMP ROOM (R506)	SOUTH WALL	22.75	14.00	24	318.50	INTERNAL	3.3	Concrete Wall
FUEL POOL HEAT EXCHANGER PUMP ROOM (R506)	WEST WALL	31.75	14.00	30	444.50	ADIABATIC	3.3	Concrete Wall
FUEL POOL HEAT EXCHANGER PUMP ROOM (R506)	EAST WALL SECTION 1 WALL	20.75	14.00	18	290.50	INTERNAL	3.3	Concrete Wall
FUEL POOL HEAT EXCHANGER PUMP ROOM (R506)	EAST WALL SECTION 2 BLOCK WALL	11.00	14.00	18	154.00	INTERNAL	3.3	Concrete Wall

Structure Location	Structure Description	WIDTH (ft)	HEIGHT (ft)	THICKNESS (in)	SURFACE AREA (ft^2)	BOUNDARY CONDITION LOCATION	REF	Material and Orientation
FUEL POOL HEAT EXCHANGER PUMP ROOM (R506)	CEILING AREA BELOW 572'	31.75	14.20	72	450.85	INTERNAL	3.3	Concrete Wall
FUEL POOL HEAT EXCHANGER PUMP ROOM (R506)	CEILING AREA BELOW FUEL POOL	31.75	8.50	64	269.88	FUEL POOL	3.3	Concrete Wall
FUEL POOL HEAT EXCHANGER PUMP ROOM (R506)	FLOOR	31.75	22.75	18	722.31	INTERNAL	3.3	Concrete Floor
DC MCC ROOM (DIV. 1) (R212)	NORTH WALL	12.00	28.50	36	342.00	ADIABATIC	3.3	Concrete Wall
DC MCC ROOM (DIV. 1) (R212)	SOUTH WALL	10.00	28.50	12	285.00	INTERNAL	3.3	Concrete Wall
DC MCC ROOM (DIV. 1) (R212)	WEST WALL	6.50	28.50	12	185.25	INTERNAL	3.3	Concrete Wall
DC MCC ROOM (DIV. 1) (R212)	EAST WALL	8.00	28.50	12	228.00	INTERNAL	3.3	Concrete Wall
DC MCC ROOM (DIV. 1) (R212)	CEILING	-	-	18	92.00	INTERNAL	3.3	Concrete Floor
DC MCC ROOM (DIV. 1) (R212)	FLOOR	-	-	24	92.00	PUMP ROOM	3.3	Concrete Floor
MCC ROOM (DIV 2) (R410)	NORTH WALL	7.5	24	12	180.00	INTERNAL	3.3	Concrete Wall
MCC ROOM (DIV 2) (R410)	SOUTH WALL	7.5	24	12	180.00	INTERNAL	3.3	Concrete Wall
MCC ROOM (DIV 2) (R410)	WEST WALL SECTION 1	16.5	24	12	396.00	INTERNAL	3.3	Concrete Wall
MCC ROOM (DIV 2) (R410)	WEST WALL SECTION 2	3.5	24	42	84.00	INTERNAL	3.3	Concrete Wall
MCC ROOM (DIV 2) (R410)	EAST WALL	20	24	12	480.00	INTERNAL	3.3	Concrete Wall
MCC ROOM (DIV 2) (R410)	CEILING	20.00	7.5	24	150.00	INTERNAL	3.3	Concrete Floor

Structure Location	Structure Description	WIDTH (ft)	HEIGHT (ft)	THICKNESS (in)	SURFACE AREA (ft^2)	BOUNDARY CONDITION LOCATION	REF	Material and Orientation
MCC ROOM (DIV 2) (R410)	FLOOR	20.00	7.5	12	150.00	INTERNAL	3.3	Concrete Floor
MCC ROOM (DIV 1) (R411)	NORTH WALL	21.5	25	36	537.50	ADIABATIC	3.3	Concrete Wall
MCC ROOM (DIV 1) (R411)	SOUTH WALL SECTION 1	17.5	25	12	437.50	INTERNAL	3.3	Concrete Wall
MCC ROOM (DIV 1) (R411)	SOUTH WALL SECTION 2	4	25	48	100.00	INTERNAL	3.3	Concrete Wall
MCC ROOM (DIV 1) (R411)	WEST WALL	6.00	25.00	12	150.00	INTERNAL	3.3	Concrete Wall
MCC ROOM (DIV 1) (R411)	EAST WALL	8.50	25.00	12	212.50	INTERNAL	3.3	Concrete Wall
MCC ROOM (DIV 1) (R411)	CEILING	8.50	12.50	12	106.25	INTERNAL	3.3	Concrete Floor
MCC ROOM (DIV 1) (R411)	CEILING	-	-	12	9.6	INTERNAL	3.3	Concrete Floor
MCC ROOM (DIV 1) (R411)	FLOOR	8.50	12.50	12	106.25	INTERNAL	3.3	Concrete Floor
MCC ROOM (DIV 1) (R411)	FLOOR	-	-	12	9.6	INTERNAL	3.3	Concrete Floor
ANALYZER ROOM 1A (R516)	NORTH WALL SECTION 1	5.50	23.00	21	126.50	INTERNAL	3.3	Concrete Wall
ANALYZER ROOM 1A (R516)	NORTH WALL SECTION 2	3.50	23.00	42	80.50	INTERNAL	3.3	Concrete Wall
ANALYZER ROOM 1A (R516)	SOUTH WALL	8.00	23.00	12	184.00	INTERNAL	3.3	Concrete Wall
ANALYZER ROOM 1A (R516)	WEST WALL	6.00	23.00	12	138.00	INTERNAL	3.3	Concrete Wall
ANALYZER ROOM 1A (R516)	EAST WALL	15.00	23.00	12	345.00	INTERNAL	3.3	Concrete Wall
ANALYZER ROOM 1A (R516)	CEILING	-	-	12	5.66	INTERNAL	3.3	Concrete Floor
ANALYZER ROOM 1A (R516)	FLOOR	-	-	32	5.66	INTERNAL	3.3	Concrete Floor
ANALYZER ROOM 1B (R512)	NORTH WALL	6.00	23.00	21	138.00	INTERNAL	3.3	Concrete Wall
ANALYZER ROOM 1B (R512)	SOUTH WALL	6.00	23.00	12	138.00	INTERNAL	3.3	Concrete Wall
ANALYZER ROOM 1B (R512)	WEST WALL SECTION 1	14.00	23.00	36	322.00	INTERNAL	3.3	Concrete Wall
ANALYZER ROOM 1B (R512)	WEST WALL SECTION 2	1.75	23.00	102	40.25	INTERNAL	3.3	Concrete Wall

Structure Location	Structure Description	WIDTH (ft)	HEIGHT (ft)	THICKNESS (in)	SURFACE AREA (ft^2)	BOUNDARY CONDITION LOCATION	REF	Material and Orientation
ANALYZER ROOM 1B (R512)	EAST WALL	16.00	23.00	12	368.00	INTERNAL	3.3	Concrete Wall
ANALYZER ROOM 1B (R512)	CEILING	6.00	16.00	12	96.00	INTERNAL	3.3	Concrete Floor
ANALYZER ROOM 1B (R512)	FLOOR	6	16	32	96.00	INTERNAL	3.3	Concrete Floor
H2 RECOMBINER MCC ROOM (DIV. 1) (R611)	NORTH WALL	17	17	60	289.00	DRYWELL	3.3	Concrete Wall
H2 RECOMBINER MCC ROOM (DIV. 1) (R611)	SOUTH WALL	17.00	17	12	289.00	INTERNAL	3.3	Concrete Wall
H2 RECOMBINER MCC ROOM (DIV. 1) (R611)	WEST WALL	9.00	17	12	153.00	INTERNAL	3.3	Concrete Wall
H2 RECOMBINER MCC ROOM (DIV. 1) (R611)	EAST WALL	9	17	12	153.00	INTERNAL	3.3	Concrete Wall
H2 RECOMBINER MCC ROOM (DIV. 1) (R611)	CEILING	9	17	12	153.00	INTERNAL	3.3	Concrete Floor
H2 RECOMBINER MCC ROOM (DIV. 1) (R611)	FLOOR	9	17	12	153.00	INTERNAL	3.3	Concrete Floor
H2 RECOMBINER MCC ROOM (DIV. 2) (R612)	NORTH WALL	9	17	60	153.00	FUEL POOL	3.3	Concrete Wall
H2 RECOMBINER MCC ROOM (DIV. 2) (R612)	SOUTH WALL	9	17	12	153.00	INTERNAL	3.3	Concrete Wall
H2 RECOMBINER MCC ROOM (DIV. 2) (R612)	WEST WALL	20	17	24	340.00	INTERNAL	3.3	Concrete Wall
H2 RECOMBINER MCC ROOM (DIV. 2) (R612)	EAST WALL	20.00	17.00	12	340.00	INTERNAL	3.3	Concrete Wall
H2 RECOMBINER MCC ROOM (DIV. 2) (R612)	CEILING	9.00	20.00	12	180.00	INTERNAL	3.3	Concrete Floor
H2 RECOMBINER MCC ROOM (DIV. 2) (R612)	FLOOR	9.00	20.00	12	180.00	INTERNAL	3.3	Concrete Floor

Table 25 identifies the wall dimensions and reports the surface area calculated for these thermal conductors associated with the Miscellaneous Interior Walls. The boundary conditions are identified along with the thermal conductors material and orientation. All of these conductors communicate with the Main Reactor Building Volume. The inclusion of a column labeled Boundary Condition Location is only to identify what communicates with the other side of the conductor. The term INTERNAL identifies that both sides of the conductor are in communication with the Main Reactor Building Volume.

$$SurfaceArea = (Height)(Width)$$

Table 25 Miscellaneous Interior Walls

Associated Room	Elevation (ft)	WIDTH (ft)	HEIGHT (ft)	THICKNESS (in)	SURFACE AREA (ft^2)	BOUNDARY CONDITION LOCATION	REF	Material and Orientation
R206	471.0	10.86	28.00	12	304.21	INTERNAL	2.17	Concrete Wall
R213	471.0	38.03	16.50	12	627.43	INTERNAL	2.17	Concrete Wall
R211	471.0	21.73	16.50	12	358.54	INTERNAL	2.17	Concrete Wall
R208	471.0	20.18	28.00	12	564.96	INTERNAL	2.17	Concrete Wall
R214	471.0	55.88	16.50	12	921.94	INTERNAL	2.17	Concrete Wall
R305	501.0	41.67	19.00	12	791.81	INTERNAL	2.18	Concrete Wall
R312	501.0	24.70	19.00	12	469.22	INTERNAL	2.18	Concrete Wall
R320	501.0	15.43	19.00	12	293.27	INTERNAL	2.18	Concrete Wall
R309	501.0	72.54	19.00	12	1378.33	INTERNAL	2.18	Concrete Wall
R315	501.0	46.30	12.25	12	567.23	INTERNAL	2.18	Concrete Wall
R319	501.0	12.35	19.00	12	234.61	INTERNAL	2.18	Concrete Wall
R412	522.0	26.24	24.00	12	629.73	INTERNAL	2.19	Concrete Wall
R408	522.0	64.83	24.00	12	1555.82	INTERNAL	2.19	Concrete Wall
R405	522.0	20.84	24.00	12	500.08	INTERNAL	2.19	Concrete Wall
UNLABELED NEAR OPEN FLOOR HATCH	522.0	24.70	24.00	12	592.69	INTERNAL	2.19	Concrete Wall
R507	548.0	71.00	24.00	27.79	1704	INTERNAL	2.19	Concrete Wall

1

Associated Room	Elevation (ft)	WIDTH (ft)	HEIGHT (ft)	THICKNESS (in)	SURFACE AREA (ft^2)	BOUNDARY CONDITION LOCATION	REF	Material and Orientation
R509	548.0	58.65	24.00	23.16	1407.66	INTERNAL	2.19	Concrete Wall
R510	548.0	60.20	24.00	23.16	1444.7	INTERNAL	2.19	Concrete Wall
R511	548.0	55.57	24.00	23.16	1333.57	INTERNAL	2.19	Concrete Wall
R505	548.0	52.48	24.00	23.16	1259.48	INTERNAL	2.19	Concrete Wall
R605	572.0	18.52	32.88	37.04	609	INTERNAL	2.19	Concrete Wall
R606	572.0	52.48	32.88	37.04	1725.49	INTERNAL	2.19	Concrete Wall

1

Table 26 identifies the exterior wall dimensions and reports the surface area calculated for these thermal conductors. The boundary conditions are identified along with the thermal conductors material and orientation. All of these conductors communicate with the main reactor building volume. The inclusion of a column labeled Boundary Condition Location is only to identify what communicates with the other side of the conductor. The term ADIABATIC identifies that these conductors do not transfer heat out of the main building although they do transfer heat with the main reactor building volume.

$$SurfaceArea = 2(Height)(Width)$$

Table 26 Main Reactor Building Walls

Structure Description	Elevation (ft)	WIDTH (ft)	HEIGHT (ft)	THICKNESS (in)	SURFACE AREA (ft^2)	BOUNDARY CONDITION LOCATION	REF	Material and Orientation
RB ELEVATION 471 NORTH & SOUTH	471	129.67	28	32	7261.52	ADIABATIC	3.1	Concrete Wall
RB ELEVATION 471 EAST & WEST	471	145.84	28	31	8167.04	ADIABATIC	3.1	Concrete Wall
RB ELEVATION 501 NORTH & SOUTH	501	128.17	19	29	4870.46	ADIABATIC	3.1	Concrete Wall
RB ELEVATION 501 EAST & WEST	501	144.5	19	27	5491	ADIABATIC	3.1	Concrete Wall
RB ELEVATION 522 NORTH & SOUTH	522	128.25	24	28.5	6156	ADIABATIC	3.1	Concrete Wall
RB ELEVATION 522 EAST & WEST	522	144.84	24	25	6952.32	ADIABATIC	3.1	Concrete Wall
RB ELEVATION 548 NORTH & SOUTH	548	128.83	22.00	25.02	5668.67	ADIABATIC	3.1	Concrete Wall
RB ELEVATION 548 EAST & WEST	548	145.00	22.00	24	6380	ADIABATIC	3.1	Concrete Wall
RB ELEVATION 572 NORTH & SOUTH	572	129.08	32.88	23.52	8487.23	ADIABATIC	3.1	Concrete Wall
RB ELEVATION 572 EAST & WEST	572	145.00	32.88	24	9535.2	ADIABATIC	3.1	Concrete Wall

Table 27 identifies the Drywell and Fuel Pool wall dimensions and reports the surface area calculated for these thermal conductors. The boundary conditions are identified along with the thermal conductors material and orientation. This table is organized differently from the previous tables in terms of the boundary conditions. The boundary conditions are described by both the structure description as well as the boundary condition location. With the exception of the Fuel Pool Wall communicating with the drywell all of these structures communicate with the main reactor building volume atmosphere on one side. The fuel pool wall in question provides heat transfer between the drywell and the fuel pool.

The wall thickness reported in the table is established by scaling the referenced drawing. The drywell wall heights are established to be the floor to floor distance. For example, the height of the drywell wall reported for the 572ft elevation is

34.88ft = (606ft 10.5in) – (572ft)

The upper elevations of the drywell wall are reported as having a width as opposed to an outer radius. The width value used is the overall outside dimension of the wall illustrated in the referenced drawing. This will represent the conservative upper bound of this structure, which acts as a source of heat to the reactor building model.

For the fuel pool walls the thickness is taken from the referenced drawing to be 5ft. This value is assigned to both the drywell and reactor building sides of the pool. The fuel pool wall height is established based on the inside pool dimension provided in referenced drawing. For the drywell side of the fuel pool, the wall width is the center to center distance between columns K and L illustrated in the Reference 2.15.

For the reactor building side of the fuel pool the wall width is established using Reference 2.18 plan dimensions

113ft=2*22.5ft+2*34ft

The surface area of these structures is calculated as follows.

$$SurfaceArea = 2\pi(OuterRadius)(Height)$$
$$OR$$
$$SurfaceArea = (Width)(Height)$$

Table 27 Drywell And Fuel Pool Walls

Structure Description	Elevation (ft)	Inside Radius (ft)	Outer Radius (ft)	WIDTH (ft)	HEIGHT (ft)	THICKNESS (in)	SURFACE AREA (ft^2)	BOUNDARY CONDITION LOCATION	Material	REF
DRYWELL WALL	501		46.2		21	60.860	6095.95	RB	Concrete Wall	2.12
DRYWELL WALL	522		41		26	69.77	6697.88	RB	Concrete Wall	2.13
DRYWELL WALL	548	27.35	33.59		24	74.88	5065.26	RB	Concrete Wall	2.14
DRYWELL WALL NORTH	572			48.00	34.88	62.31	1674.00	RB	Concrete Wall	2.15, 2.16
DRYWELL WALL SOUTH	572			48.00	34.88	62.31	1674.00	RB	Concrete Wall	2.16
DRYWELL WALL EAST	572			45.00	34.88	73.05	1569.38	RB	Concrete Wall	2.16
FUEL POOL WALL	568			45.00	38.75	60	1743.75	DRYWELL	Concrete Wall	2.18
FUEL POOL WALL	568			113	38.75	60	4378.75	RB	Concrete Wall	2.15

1

The calculation of the Main Reactor Building Floors is developed using the dimensions listed in Table 28. The Lost Area column in the table provides a summary of the corresponding areas listed in Table 28. As described below these areas are subtracted from the over all area.

$$SurfaceArea = (Width)(Height) - LostArea$$

Table 28 Main Reactor Building Floors

Structure Description	Elevation (ft)	WIDTH (ft)	HEIGHT (ft)	THICKNESS (in)	LOST AREA (Table 29) (ft^2)	SURFACE AREA (ft2)	BOUNDARY CONDITION LOCATION	REF	Material and Orientation
RB ELEVATION 471 FLOOR	471	129.67	145.84	24	14124.40	4786.68	INTERNAL	3.1	Concrete Floor
RB ELEVATION 501 FLOOR	501	128.17	144.5	24	8152.56	10368.00	INTERNAL	3.1	Concrete Floor
RB ELEVATION 522 FLOOR	522	128.25	144.84	24	6835.20	11740.53	INTERNAL	3.1	Concrete Floor
RB ELEVATION 548 FLOOR	548	128.83	145.00	24	5565.59	13115.24	INTERNAL	3.1	Concrete Floor
RB ELEVATION 572 FLOOR	572	129.08	145.00	24	3025.67	15690.93	INTERNAL	3.1	Concrete Floor

When calculating the floor areas within the main building it is necessary to subtract the areas occupied by other building features as well as floor areas already accounted for by rooms within the building that are developed separately. Table 29 summarizes the values that will be subtracted from the floor calculation for the main building.

Table 29 Areas Subtracted From Main Building Floors

LOST FLOOR AREAS							
ELEVATION (ft)	PENETRATION AREAS (ft^2)	AUXILIARY ROOM FLOOR AND CEILING AREAS (Table 23 and Table 24) (ft^2)	MISCELLANEOUS ROOM WALL AREAS (Width)(Thickness) Table 25 (ft^2)	PRIMARY CONTAINMENT Table 27 provides Radius Values to calculate areas unless noted otherwise (ft^2)	Total Area (ft^2)	Note	Reference
471	55.76	6,117.00	146.68	7,289.59	13,609.03	Primary Containment Radius 48' 2"	3.1, 3.7
471	53.72				53.72		3.7
471	19.82				19.82		3.7
471	33.47				33.47		3.7
471	13.41				13.41		3.7
471	12.45				12.45		3.7
471	382.5				382.5		3.7
471 Total					14,124.40		
501	331.58	667.05	213	6,705.54	7,917.17		3.7
501	97.55				97.55		3.7
501	91.94				91.94		3.7
501	27.01				27.01		3.7

1

LOST FLOOR AREAS

ELEVATION (ft)	PENETRATION AREAS (ft²)	AUXILIARY ROOM FLOOR AND CEILING AREAS (Table 23 and Table 24) (ft²)	MISCELLANEOUS ROOM WALL AREAS (Width)(Thickness) Table 25 (ft²)	PRIMARY CONTAINMENT Table 27 provides Radius Values to calculate areas unless noted otherwise (ft²)	Total Area (ft²)	Note	Reference
501	18.88				18.89		3.7
501 Total					8,152.56		
522	20.58	265.85	602.33	5,281.02	6,169.78		3.7
522	117.40				117.40		3.7
522	548.02				548.02		3.7
522 Total					6,835.20		
548	402.03	823.97	602.32	3,544.62	5,372.94		3.7
548	102.59				102.59		3.7
548	82.06				82.06		3.7
548	8.00				8.00		3.7
548 Total					5,565.59		
572	63.25		219.16	1809.56	2,091.97	Primary Containment Diameter assumed to be 48ft which equals the width in table 27	3.7
572	466.85				466.85		3.7

1

LOST FLOOR AREAS							
ELEVATION (ft)	PENETRATION AREAS (ft^2)	AUXILIARY ROOM FLOOR AND CEILING AREAS (Table 23 and Table 24) (ft^2)	MISCELLANEOUS ROOM WALL AREAS (Width)(Thickness) Table 25 (ft^2)	PRIMARY CONTAINMENT Table 27 provides Radius Values to calculate areas unless noted otherwise (ft^2)	Total Area (ft^2)	Note	Reference
572	466.85				466.85		3.7
572 Total					3,025.67		

1

Similar to the Pump Room thermal conductors the main reactor building volume thermal conductors are combined. The walls and ceilings are grouped by thickness.

Main building conductors within each group are combined into a thermal conductors by calculating an average thickness that is representative of the total area of the group. This approach provides an equivalent heat sink to represent each main building conductor group minimizing the number of thermal conductors required by the GOTHIC model.

$$AvgThickness = \frac{\sum (Area)(Thickness)}{\sum (Area)}$$

Table 30 summarizes the results of this thermal conductor calculation.

Table 30 Main Building Thermal Conductors

Conductor #	BOUNDARY CONDITION / ORIENTATION	THICKNESS (in)	SURFACE AREA (ft^2)	Material Details
AUXILIARY ROOMS				
	PUMP ROOM			
20	Floor	24	92	Concrete
	ADIABATIC			
21	Wall	33.98	1,324	Concrete
	INTERNAL			
22	Wall	12	4,995.25	Concrete
23	Wall	18	444.5	Concrete
24	Wall	23.36	1,241.5	Concrete
25	Wall	36	322	Concrete
26	Wall	44.26	264.5	Concrete
27	Wall	72	450.85	Concrete
28	Wall	102	40.25	Concrete
29	Floor	12	1,149.36	Concrete
30	Floor	18	814.31	Concrete
31	Floor	24	150	Concrete
32	Floor	32	101.66	Concrete
	DRYWELL			
33	Wall	60	289	Table 35

Conductor #	BOUNDARY CONDITION / ORIENTATION	THICKNESS (in)	SURFACE AREA (ft^2)	Material Details
	FUEL POOL			
34	Wall	62.55	422.875	Concrete
	MISCELLANEOUS WALLS			
	INTERNAL			
35	Wall	12	9789.87	Concrete
36	Wall	23.16	5,445.41	Concrete
37	Wall	27.79	1,704	Concrete
38	Wall	37.04	2,334.49	Concrete
	MAIN STRUCTURE			
	ADIABATIC			
39	Wall	23.83	24,402.43	Concrete
40	Wall	28.41	44,567.01	Concrete
	INTERNAL			
41	Floor	24	55,700.90	Concrete
	DRYWELL WALLS			
	RB			
42	Wall	61.37	9,443.95	Table 35
43	Wall	72.09	13,332.515	Table 35
	FUEL POOL			
	DRYWELL			
44	Wall	60	1,743.75	Table 35

Conductor #	BOUNDARY CONDITION / ORIENTATION	THICKNESS (in)	SURFACE AREA (ft^2)	Material Details
	RB			
45	Wall	60	4,378.75	Concrete

REFUELING FLOOR THERMAL CONDUCTORS

The data used to develop the thermal conductors for the refueling floor is provided in Table 31. The final inputs are provided in Table 32.

Table 31 identifies the wall, floor and ceiling dimensions and reports the surface area calculated from these thermal conductors associated with the Refueling Floor Volume. The boundary conditions are identified along with the thermal conductors material and orientation. All of these conductors communicate with the Refueling Floor Volume. The term ADIABATIC identifies that these conductors do not transfer heat out of the refueling floor although they do transfer heat with the Refueling Floor Volume.

Table 31 – Refueling Floor Thermal Conductors

Structure Description	Elevation (ft)	WIDTH (ft)	HEIGHT (ft)	THICKNESS (in)	LOST AREA (Table 26) (ft^2)	SURFACE AREA (ft2)	BOUNDARY CONDITION LOCATION	REF	Material and Orientation
RB ELEVATION 606' 101/2" NORTH SOUTH	606.9	134.33	61.13	1.598		16,422.21	ADIABATIC	3.1	COMPOSITE WALL
RB ELEVATION 606' 101/2" EAST WEST	606.9	150.33	61.13	1.598		18,377.85	ADIABATIC	3.1	COMPOSITE WALL
RB ELEVATION 606' 101/2" FLOOR	606.9	150.33	134.33	24	3,988.79	16,205.5	INTERNAL	3.1	CONCRETE FLOOR
RB ROOF	668	134.33	150.33	0.049		20,194.28	ADIABATIC	3.1	COMPOSITE FLOOR

When calculating the floor areas within the refueling floor it is necessary to subtract the areas occupied by other building features. Table 32 summarizes the values that will be subtracted from the floor calculation for the refueling floor. It should be noted that there may be more than one penetration value associated with a floor. When this is the case a row will be included in the table to represent each penetration.

Table 32 Areas Subtracted From Refueling Floor Areas

LOST FLOOR AREAS							
ELEVATION (ft)	PENETRATION AREAS (ft²)	AUXILIARY ROOM FLOOR AND CEILING AREAS (24) (ft²)	MISCELLANEOUS ROOM WALL AREAS (Width)(Thickness) Table 25 (ft²)	FUEL POOL (ft²)	PRIMARY CONTAINMENT Table 27 provides Radius Values to calculate areas unless noted otherwise (ft²)	Note	Reference
606.9	409.61			1360	1809.56	Primary Containment Diameter assumed to be 48ft which equals the width in table 27	3.1, 3.7
606.9	409.61						3.7

1

Similar to the main reactor building thermal conductors the refueling floor volume thermal conductors are combined. The walls and ceilings are grouped by thickness.

Table 33 summarizes the results of this thermal conductor calculation.

Table 33 Refueling Floor Thermal Conductors

Conductor #	BOUNDARY CONDITION / ORIENTATION	THICKNESS (in)	SURFACE AREA (ft^2)	Material Details
46	ADIABATIC COMPOSITE WALL	1.598	34,800.06	Table 35
47	ADIABATIC COMPOSITE ROOF	0.049	20,194.28	Table 35
48	MAIN REACTOR BUILDING VOLUME CONCRETE FLOOR	24	16,205.5	Concrete

THERMAL CONDUCTOR MATERIAL PROPERTIES

The basic material properties that will be applied to the structures are provided in Table 34. Several of the structures are identified as having several materials or are composite structures. The composition of these structures are provided in Table 35.

Table 34 Material Properties

Material Description	Density (lb/ft^3)	Conductivity (BTU/hr/ft/F)	Heat Capacity (BTU/lbF)	Reference
Concrete	144	0.54	0.2	1.13
Carbon Steel	490	26.00	0.11	1.13, Piping Specification SA106
Calcium Silicate	15	0.0375 (0°F) 0.0375 (200°F) 0.0417 (300°F) 0.0458 (400°F) 0.05 (500°F) 0.055 (600°F)	0.201	1.16
Poly Urethane	2.5	0.1 – 0.2 (0.1 Used)	0.48	1.14 (Ref. 1.14 Table 4), 1.15
Fiberglass	6	0.029	0.21	1.13 (Glass Wool Packed)

Table 35 Composite Structure Material Composition | 1

Conductor #	Description [8]	Thickness (in)	Material	Reference
	Wetwell Wall Steel Liner	1.5	Carbon Steel	3.3
	Wetwell Wall Poly Urethane	2.25	Poly Urethane	3.3
	Wetwell Wall Fiberglass	0.3125	Fiberglass	3.3
	Wetwell Wall Concrete	60	Concrete	3.3
18	Total Thickness	64.0625		
	Wetwell Wall Steel Liner	1.5	Carbon Steel	3.3
	Wetwell Wall PolyUrithane	2.25	Poly Urethane	3.3
	Wetwell Wall Fiberglass	0.3125	Fiberglass	3.3
	Wetwell Wall Concrete	150.84	Concrete	3.3
19	Total Thickness	154.9		
	Insulated Piping Steel	0.38	Carbon Steel	3.3
	Insulated Piping Insulation	2	Calcium Silicate	3.3
2	Total Thickness	2.38		
	Refueling Floor Walls Metal Interior	0.049	Carbon Steel	1.18
	Refueling Floor Walls Insulation	1.5	Fiber Board	1.18
	Refueling Floor Walls Metal Exterior	0.049	Carbon Steel	1.18
46	Total Thickness	1.598		
47	Refueling Floor Roof	0.049	Carbon Steel	Assumption 4.13
	Drywell Wall Steel Liner	1.5	Carbon Steel	Assumption 4.12
	Drywell Wall Concrete	58.5	Concrete	
33 & 44	Total Thickness	60		Table 24
	Drywell Wall Steel Liner	1.5	Carbon Steel	Assumption 4.12
	Drywell Wall Concrete	59.87404	Concrete	
42	Total Thickness	61.37404		Table 24
	Drywell Wall Steel Liner	1.5	Carbon Steel	Assumption 4.12
	Drywell Wall Concrete	70.59747	Concrete	
43	Total Thickness	72.09747		Table 24

8 Drywell Concrete Thickness is developed by subtracting the Steel Liner thickness from the overall thickness.

THERMAL CONDUCTOR BOUNDARY TEMPERATURES

PRIMARY CONTAINMENT DRYWELL CONDUCTOR INNER WALL TEMPERATURE

The inner surface of conductors used to represent the primary containment are assigned a temperature that corresponds to the containment accident profile. As described in Assumption 4.9 a composite of the LOCA and MSLB are used. The profiles for these accidents are obtained from Reference 1.21 and illustrated in Table 36.

In addition, a conservative representation of the associated heat transfer coefficient (Assumption 4.10) will be used to ensure that the heat flow is biased into the structure from the containment atmosphere. The heat transfer coefficient is assigned the Type 4 (Refer to Table 38) in the GOTHIC Model. The coefficient used is as follows.

If the vapor temperature is greater than the wall temperature the value assigned is 1120BTU/hr/ft^2/R. This value corresponds to 4 times the maximum UCHIDA heat transfer coefficient documented in Reference 1.10 (280BTU/hr-ft^2-F). If the vapor temperature is less than or equal to the wall temperature than the value assigned is 0.1BTU/hr/ft^2/R (Heat Transfer Coefficient Type 2 Refer to Table 38). This minimum value is considered to be a representative natural convection heat transfer coefficient that will minimize wall cooling to ensure a conservative result.

Table 36 – Composite Profile Assigned to Drywell Boundary Condition

Time (sec)	Temperature (°F)
0.0	135
0.1	150
0.7	328
1	290
4	285
10	280
1,000	280
2,000	285
10,000	280
86,400	250
1,000,000	165
10,000,000	110

PRIMARY CONTAINMENT WETWELL CONDUCTOR INNER WALL TEMPERATURE

The inner surface of conductors used to represent the primary containment wetwell are assigned a temperature that corresponds to the wetwell pool accident LOCA profile. The profile for the accident is obtained from Reference 1.19 and illustrated in Table 37. See assumption 4.15 for discussion of the profile. 1

Table 37 - Composite Profile Assigned to Wetwell Boundary Condition

Time (sec)	Temperature (°F)
0	95
10	105
100	150
1,000	160
10,000	200
35,000	204
50,000	200
10,000,000	200

FUEL POOL CONDUCTOR INNER WALL TEMPERATURE

The inner surface of conductors used to represent the fuel pool will be assigned a temperature that corresponds to the calculated fuel pool temperature. The GOTHIC model will dynamically calculate this value.

D104 CORRIDOR CONDUCTOR INNER WALL TEMPERATURE

The west wall of two RHR pump rooms communicate with an adjacent corridor designated as D104 in Reference 3.3. The outer surface of these wall conductors are in communication with the air temperature of the D104 Corridor. It is assumed that the temperature in the D104 corridor is 104°F. This value is selected to bound that expected under normal or accident conditions. The convection resistance that exists between the air in the corridor and the wall is ignored and the boundary condition of the conductor is set to 104°F. The temperature and the convection assumptions are used to conservatively minimize heat transfer from the pump rooms to the corridor.

Table 38 - GOTHIC Heat Transfer Coefficient Inputs

Heat Transfer Coefficient Types -										
	Heat			Cnd/		Sp	Nat	For		Description
Type	Transfer	Nominal		Cnv	Cnd	Cnv	Cnv	Cnv	Rad	
#	Option	Value	FF	Opt	Opt	HTC	Opt	Opt	Opt	
1	Sp Ambient and HTC	1	14			2				Drywell Temperature Profile (Table 36)
2	Sp Conv HTC	1	18						OFF	Drywell Convection Coefficient
3	Sp Heat Flux	0								Adiabatic Boundary Condition
4	Direct			ADD	UCHIDA		HORZ CYL	OFF	ON	RB Side Pipe Conductor Convection Coefficient
5	Direct			ADD	UCHIDA		HORZ CYL	OFF	ON	RB Side Pipe Conductor Convection Coefficient
6	Direct			ADD	UCHIDA		HORZ CYL	OFF	ON	RB Side Pipe Conductor Convection Coefficient
7	Sp Temp	1	26							WW Inside and ECCS Inside Pipe Temperature (Table 37)
8	Sp Temp	1	25							Fuel Pool Cooling System Inside Pipe Temperature
9	Direct			ADD	UCHIDA		VERT SURF	OFF	ON	RB Side Vertical Wall Convection Coefficient
10	Direct			ADD	UCHIDA		FACE UP	OFF	ON	RB Side Floor Convection Coefficient
11	Direct			ADD	UCHIDA		FACE DOWN	OFF	ON	RB Side Ceiling Convection Coefficient
12	Correlation Set						VERT SURF	OFF	OFF	Fuel Pool Side Wall Heat Transfer Coefficient

Natural Convection Correlation's used in the analysis are as follows.

Vertical Surface – Flat vertical surface used for internal walls

$$h = \left(\frac{k}{L}\right) Max\left(0.59 Ra^{0.25}, 0.13 Ra^{1/3}\right)$$

Where
k is the thermal conductivity of the fluid;
L is the characteristic length of the heat sink;
Ra is the dimensionless Rayleigh number.

Face Up – Flat horizontal surface facing upward such as a floor

When the surface is hotter than the surrounding fluid the following is used.

$$h = \left(\frac{k}{L}\right) Max\left(0.54 Ra^{0.25}, 0.14 Ra^{1/3}\right)$$

When the surface is cooler than the surrounding fluid the following is used.

$$h = \left(\frac{k}{L}\right) 0.27 Ra^{0.25}$$

Where
k is the thermal conductivity of the fluid;
L is the characteristic length of the heat sink;
Ra is the dimensionless Rayleigh number.

Face Down – Flat horizontal surface facing downward such as a ceiling

When the surface is cooler than the surrounding fluid the following is used.

$$h = \left(k/L\right) Max\left(0.54Ra^{0.25}, 0.14Ra^{1/3}\right)$$

When the surface is hotter than the surrounding fluid the following is used.

$$h = \left(k/L\right) 0.27Ra^{0.25}$$

Where
k is the thermal conductivity of the fluid;
L is the characteristic length of the heat sink;
Ra is the dimensionless Rayleigh number.

Horizontal Cylinder – Horizontal Cylinder such as a pipe.

$$h = \left(k/L\right) Max\left(0.53Ra^{0.25}, 0.126Ra^{1/3}\right)$$

Where
k is the thermal conductivity of the fluid;
L is the characteristic length of the heat sink;
Ra is the dimensionless Rayleigh number.

Vertical Surface with Radiation Option (Heat Transfer Coefficient Type 5)
Refer to Vertical Surface described above for the correlation applied for natural convection.

Adiabatic Surface
This boundary is assigned a zero heat flux.

Radiation Heat Transfer Option
The radiation heat transfer option which allows heat transfer between the thermal conductor surface and the air space will be applied to those conductors that represent a potential heat source to the reactor building. Included amongst these are the drywell wall, wetwell wall and the piping conductors.

HEAT INPUTS AND FAN COOLER UNITS

This section develops the basis for the direct heat loads and cooler inputs that will be included in the GOTHIC drawdown analysis. Direct heat loads are defined to be electrical heat loads that are assumed to be applied directly to the atmosphere without the need to evaluate any physics of heat transfer.

The result of this effort is Table 39. This table provides the values to be used as well as the time when they start and stop in the analysis. These values are summations of values provided in Table 40, which includes the referenced basis for each input used to create the summary Table.

The main building electrical equipment that is tripped off at the time of the LOOP will provide residual heat to the building. This heat load decays with time and is described by the Equation 15. Equation 15 is developed based upon the same criteria outlined in Reference 3.12.

Equation 15

$$K = \frac{263{,}314\, BTU/hr}{50^\circ F} = 5{,}266.28\, BTU/((hr)(^\circ F))$$ See Note [9] 1

$$Q = 5{,}266.28 \frac{BTU}{hrF}\left(150e^{-T} - tair\right)$$

Where

T is the elapsed time in hours

tair is the vapor temperature of the main reactor building volume (Volume 1)

9 The value 263,314BTU/hr represents the 229,184BTU/hr + 34,130BTU/hr provided on page 39 of Reference 3.12

Table 39 – Summary of Direct Heat Input Loads

MODEL Volume	Heat Load Value (BTU/hr)	Heat Load Value (BTU/s)	Time Starts (seconds)	Time Ends (seconds)
Pump Room	880,089.8	244.5	30	Never
Pump Room	43,487.51	12.08	When Fan Starts	Never
Main Building	155,651.4	43.24	0	Never
Main Building	39,434.55	10.95	When Fan Starts	Never
Main Building	15,724.04	4.37	When Fuel Pool Cooling Starts	Never
Main Building Equipment	Equation 15	Equation 15	0	NA
Main Building Emergency Lighting	156,236.08	43.4	0	Never
Refueling Floor	78,479.26	21.8	0	Never
Refueling Floor (Fuel Pool)	9,794,000.0	2,720.56	0	Never

Table 40 - Direct Heat Loads For Drawdown Analysis

MODEL Volume	Location	Location Description	Heat Load Description	Heat Load Value (BTU/hr)	Time Starts (seconds)	Time Ends (seconds)	Reference
Pump Room	R11	HPCS Pump Room (R-6)	Lighting	11,601.53	30	Never	3.3
Pump Room	R11	HPCS Pump Room (R-6)	RRA-M_FN/4 Fan Motor	23,929.79	When Fan Cooler Starts	Never	3.3
Pump Room	R11	HPCS Pump Room (R-6)	HPCS-M-P/3	6,213.15	30	Never	3.3
Pump Room	R11	HPCS Pump Room (R-6)	HPCS-M-P/1 Pump Motor	435,000.00	30	Never	3.3
Pump Room	R11	HPCS Pump Room (R-6)	FDR-P-4A,B Floor Drain Pump Motors	5,585.34	30	Never	3.3
Pump Room	R12	LPCS Pump Room R-5	Lighting	7,541.00	30	Never	3.3
Pump Room	R12	LPCS Pump Room R-5	RRA-M-FN/5 Fan Motor	12,498.97	When Fan Cooler Starts	Never	3.3
Pump Room	R12	LPCS Pump Room R-5	LPCS-M-P/1 Pump Motor	238,000.00	30	Never	3.3
Pump Room	R12	LPCS Pump Room R-5	LPCS-M-P/2	6,213.15	30	Never	3.3
Pump Room	R15	RCIC Pump Room R-3	Electrical Equipment, lights, cable	11,192.07	30	Never	3.3
Pump Room	R6	RHR Pump 2A Room	Electrical Equipment, lights, cable	11,703.90	30	Never	3.3

MODEL Volume	Location	Location Description	Heat Load Description	Heat Load Value (BTU/hr)	Time Starts (seconds)	Time Ends (seconds)	Reference
Pump Room	R6	RHR Pump 2A Room	PSR-M-P/5 motor	850.00	30	Never	3.3
Pump Room	R6	RHR Pump 2A Room	RRA-M-FN/2 Fan Motor	7,058.75	When Fan Cooler Starts	Never	3.3
Pump Room	R6	RHR Pump 2A Room	RHR-M-P/2A	126,000.00	30	Never	3.3
Pump Room	R6	RHR Pump 2A Room	FDR-P-1A,B	5,585.34	30	Never	3.3
Pump Room	R7	RHR Pump 2B Room R-1 (R7)	Electrical Equipment, lights, cable	14,604.28	30	Never	3.3
Main Building	R212	DC MCC Room (DIV. 1) (R212)	Electrical Equipment, lights, cable	11,874.51	0	Never	3.3
Main Building	R212	DC MCC Room (DIV. 1) (R212)	RRA-FC-12 Fan Motor	6,876.85	When Fan Cooler Starts	Never	3.3
Main Building	R410	MCC Room (Div 2) (R410)	Electrical Equipment, lights, cable	0	Never	Never	3.3
Main Building	R410	MCC Room (Div 2) (R410)	RRA-FC-10 Fan Motor	0	Never	Never	3.3
Main Building	R411	MCC Room (Div 1) (R411)	Electrical Equipment, lights, cable	35,964.76	0	Never	3.3
Main Building	R411	MCC Room (Div 1) (R411)	RRA-FC-11 Fan Motor	9,192.79	When Fan Cooler Starts	Never	3.3
Main Building	R506	Fuel Pool Heat Exchanger Pump Room (R506)	Lighting	28,321.39	0	Never	3.3
Main Building	R506	Fuel Pool Heat Exchanger Pump Room (R506)	FPC-M-P/1A or FPC-M-P/1B Pump Motor	15,724.04	When Fuel Pool Cooling Starts	Never	3.3
Main Building	R506	Fuel Pool Heat Exchanger Pump Room (R506)	RRA-FC-19 or 20 Fan Motor	12,722.17	When Fan Cooler Starts	Never	3.3
Main Building	R512	Analyzer Room 1B (R512)	Electrical Equipment, lights, cable	9,758.94	0	Never	3.3
Main Building	R512	Analyzer Room 1B (R512)	RRA-FC-17 Fan Motor	3,274.69	When Fan Cooler Starts	Never	3.3
Main Building	R516	Analyzer Room 1A (R516)	Electrical Equipment, lights, cable	8,462.30	0	Never	3.3
Main Building	R516	Analyzer Room 1A (R516)	RRA-FC-15 Fan Motor	3,274.69	When Fan Cooler Starts	Never	3.3
Main Building	R611	H2 Recombiner MCC Room (Div. 1) (R611)	Electrical Equipment, lights, cable	18,289.48	0	Never	3.3
Main Building	R611	H2 Recombiner MCC Room (Div. 1) (R611)	RRA-FC-13 Fan Motor	4,093.36	When Fan Cooler Starts	Never	3.3

MODEL Volume	Location	Location Description	Heat Load Description	Heat Load Value (BTU/hr)	Time Starts (seconds)	Time Ends (seconds)	Reference
Main Building	R612	H2 Recombiner MCC Room (Div. 2) (R612)	Electrical Equipment, lights, cable	0	Never	Never	3.3
Main Building	R612	H2 Recombiner MCC Room (Div. 2) (R612)	RRA-FC-14 Fan Motor	0	Never	Never	3.3
Main Building	Reactor Building	Stack Monitor Load		42,980.0	0	Never	3.14
Main Building	Reactor Building	Emergency Lighting	Emergency Lighting	156,236.08 [10]	0	Never	3.12
Main Building	Reactor Building	Main Reactor Building Equipment	Off Line Equipment Heat Decay Pre trip Heat Load	263,314.00 Equation 15	NA	NA	3.12
Refueling Floor	Reactor Building Refueling Floor	dry cask		78,479.26 (23kW)	0	Never	1.27
Refueling Floor Fuel Pool Water	Fuel Pool		Decay Heat	9,794,000.00	0	Never	3.6 (Assumption 3.3)

It should be noted that the refueling floor fuel pool water heat load described in Table 40 is applied to the liquid in the fuel pool modeled in GOTHIC. Heat transfer from the pool to the rest of the building is accounted for by heat and mass transfer from the pool. All other heat loads listed in Table 40 apply the heat loads to the building volume atmospheres.

Rooms within the reactor building are equipped with safety related fan cooler units. These units are cooled by Service Water and provide safety related cooling to those areas with equipment required to mitigate the consequences of an accident. Table 41 provides a list of the rooms where coolers are credited as well as the overall UA (Reference 3.3) value to be used to establish the GOTHIC inputs. Note that the minimum water flow rate reported in Reference 3.3 is used, which corresponds with the Cooler UA value reported. In addition, the air flow rate reported in Table 41 is the 90% value used in Reference 3.3 to develop the UA calculation.

10 The value reported is based on 203,700.00 (Reference 3.12) with Lighting values listed above subtracted. i.e., 203,700.00 – 11,601.53 – 7,541.00 – 28,321.39 = 156,236.08. Note that only explicitly defined lighting loads are subtracted. Refer to Assumption 3.5 for additional discussion.

Table 41 Cooler Coils Credited in Model

Room	Coil Designation	Cooler UA (BTU/hrF)	Cooling Water Flowrate (gpm)	Air Flowrate (cfm)	Reference
R506 Fuel Pool HX Room	RRA-CC-19, 20	17,140	21	9,000	3.3
R212 DC MCC Room Div. 1	RRA-CC-12	10,550	10	5,850	3.3
R411 MCC Room Div. 1	RRA-CC-11	9,921	8	5,157	3.3
R516 Analyzer room 1A	RRA-CC-15	6,765	7	2,970	3.3
R512 Analyzer room 1B	RRA-CC-17	6,765	7	2,970	3.3
R611 Hydrogen Recombiner MCC Room Div. 1	RRA-CC-13	8,236	7	3,690	3.3
R14 RHR Pump Room R-4	RRA-CC-1	9,321	15	4,687	3.3
R12 LPCS Pump Room R-5	RRA-CC-5	16,340	32	8,437	3.3
R11 HPCS Pump Room R-6	RRA-CC-4	36,510	30	14,062	3.3

Per assumption 1.3 the overall UA values listed above are reduced to 65% to account for fouling and then again by an additional 5% to account for changes in the UA value associated with changes in inlet air temperature. Per assumption 1.7, cooling water temperatures of 78°F and 87°F will be used to develop the cooler heat removal values as a function of room temperature. These temperature values represents a simplification of cooling water temperature as illustrated in Figure 3. It can be seen that the use of a single value is clearly conservative for the first 14 hours of the analysis. Using this information and the method presented in Reference 3.4, the heat removal of each cooler as a function of air temperature is calculated. The MathCad software was used to establish the inputs and the method is illustrated below.

To determine the heat removal rate of the fan coolers, it is assumed that the volume flow rate of the air past the coil is constant. The mass flow rate, however, changes because the density of air varies with temperature. As a result, the heat capacity rate of the air will change with temperature. To account for this in the calculation of heat removal rate, the following function is defined.

$$A_1(T) = 0.24\frac{BTU}{lbR}(\rho_{air}(T)AirFlow$$

$$AirFlow = 10{,}000cfm$$

$$T = 78^\circ F$$

$$A_1(78^\circ F) = 0.24\frac{BTU}{lbR}\left(0.074\frac{lb}{ft^3}\right)10{,}000cfm = 177.6\frac{BTU}{\min(^\circ F)}$$

The heat capacity rate for the water is calculated in a similar manner.

$$B_1 = 500\frac{BTU(\min)}{hr(R)(gal)}WaterFlow$$

$$WaterFlow = 21gpm$$

$$B_1 = 500\frac{BTU(\min)}{hr(R)(gal)}(21gpm) = 10{,}500\frac{BTU}{hr(R)}$$

As described earlier, the overall UA value of the cooling coil will be reduced to address fouling and uncertainty in the constant temperature assumption.

For the coil RRA-CC-19

UA1 = 0.95(0.65)(17,140 BTU/hrft^2) = 10,584 BTU/hrft^2

The MathCAD solve block is used to determine the heat removal. This method requires the initial guess values, which are defined below. The results of these calculations for each of the coils used are provide in Tables 42 and 43.

$T = 100°F$ $\quad Y_1 = 2°F$ $\quad X_1 = 50°F$ $\quad Q = 50{,}000$

Calculation of Heat Transferred based on Air

$T := 100R \quad Y_1 := 2Fahr \quad X_1 := 50Fahr \quad Q := 50000\frac{BTU}{hr}$ Inital Guesses

Given

$$Y_1 = Q\cdot\left(\frac{1}{A_1(T)} - \frac{1}{B_1}\right)$$

$$X_1 = \frac{Y_1}{e^{UA_1\cdot\left(\frac{Y_1}{Q}\right)} - 1} + T_w$$

$$Q = A_1(T)\cdot T - X_1\cdot A_1(T)$$

$$HTR(T) := Find(Y_1, X_1, Q)$$

$i := 0..16$

$T_i := 80Fahr + i\cdot 5Fahr \qquad T_w = 78Fahr$

$$\begin{pmatrix} Y_{1_i} \\ X_{1_i} \\ Q_i \end{pmatrix} := HTR(T_i)$$

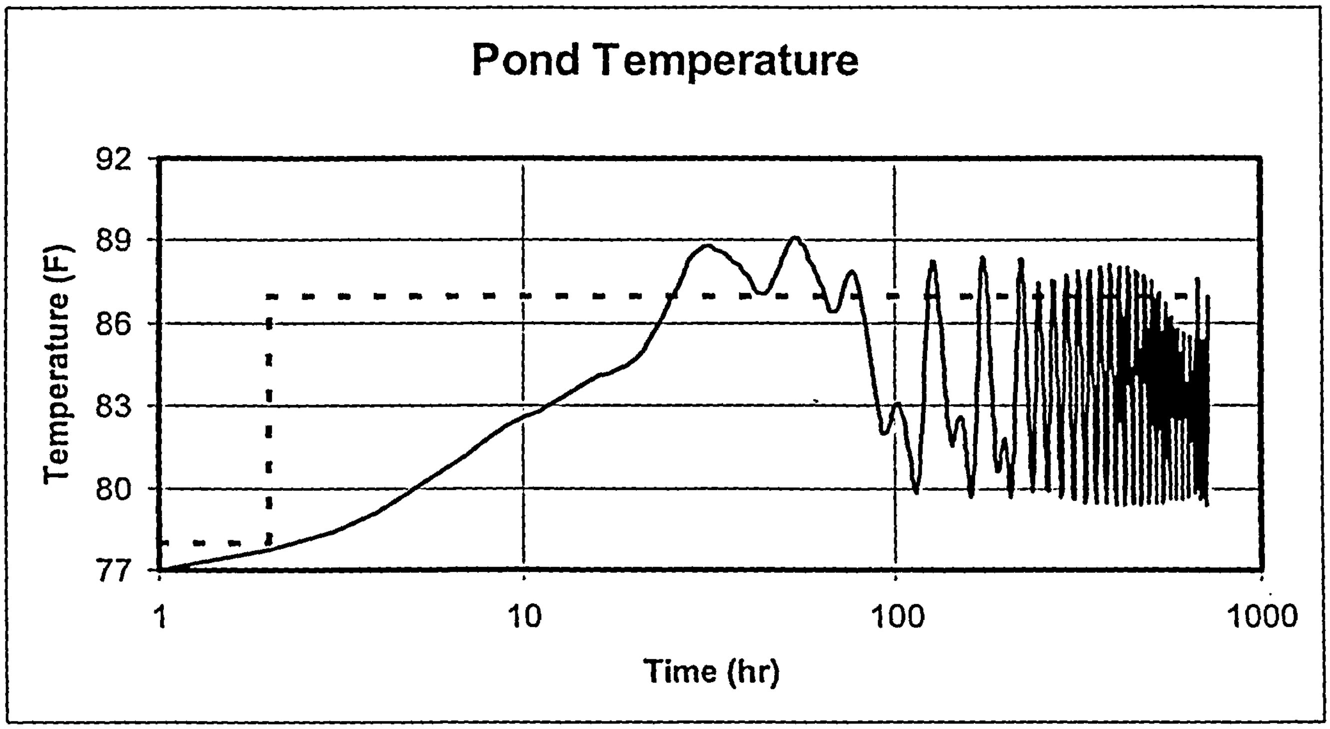

Figure 3 – Actual (Reference 3.6) and Assumed Pond Temperature vs. Time

The selection of a three volume model has a conservative impact on the performance of the fan coolers. These coolers are typically located within small compartments within the reactor building. Including these volumes within the main reactor building volume as opposed to providing their own volumes, produces an underestimate of the temperature these coolers will be working against. Assuming that the volume temperature is represented by the main portions of the reactor building will lead to a lower initial temperature (approximately 75°F) and produce overly conservative conditions in terms of the aforementioned room cooler performance. The reason that the performance is overly conservative results from the fact that the rooms where the heat sources and coolers are located would actually experience temperature increases that are greater than that reflected by the overall building temperature rise. This of course is the result of applying the heat inputs to a smaller volume as compared to the main portion of the reactor building. Further aggravating this situation is the assumption that the initial temperature of the area is significantly lower than that anticipated for the rooms, since the coolers would be removing heat from air that is greater than or equal to 104°F. Therefore, the coolers are virtually ineffective with the lower temperature assumption. The arguments provided are applicable to the pump rooms. In the interest of producing a conservative representation of these coolers the 75°F reactor building temperature is assigned to all three volumes included in the model.

Table 42 Cooling Water Temperature 78°F

Air Temp (F)	Cooling Unit Heat Removal (BTU/hr)							
	FF# 2	FF# 3	FF# 4	FF# 7	FF# 8	FF# 9	FF# 10	FF# 11
	RRA-CC-1	RRA-CC-4	RRA-CC-5	RRA-CC-11	RRA-CC-12	RRA-CC-13	RRA-CC-15 or 17	RRA-CC-19 or 20
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
80	7440.00	14400.00	10300.00	7746.87	8050.52	6860.00	5980.00	10558.70
82	14900.00	28700.00	20600.00	15483.24	16089.70	13700.00	12000.00	21097.89
84	22300.00	43000.00	30900.00	23209.11	24117.54	20600.00	17900.00	31617.61
86	29700.00	57200.00	41100.00	30924.49	32134.05	27400.00	23900.00	42117.85
88	37100.00	71400.00	51300.00	38629.39	40139.26	34200.00	29800.00	52598.65
90	44500.00	85600.00	61600.00	46323.82	48133.15	41000.00	35800.00	63060.02
92	51900.00	99800.00	71800.00	54007.81	56115.77	47800.00	41700.00	73501.98
94	59300.00	114000.00	81900.00	61681.35	64087.10	54600.00	47700.00	83924.55
96	66600.00	128000.00	92100.00	69344.45	72047.17	61400.00	53600.00	94327.74
98	74000.00	142000.00	102000.00	76997.13	79995.97	68200.00	59500.00	104711.57
100	81400.00	156000.00	112000.00	84639.38	87933.53	75000.00	65500.00	115076.06
102	88700.00	170000.00	122000.00	92271.23	95859.85	81800.00	71400.00	125421.24
104	96000.00	184000.00	133000.00	99892.69	103774.95	88500.00	77300.00	135747.11
106	103000.00	198000.00	143000.00	107503.76	111678.84	95300.00	83200.00	146053.70
108	111000.00	212000.00	153000.00	115104.45	119571.52	102000.00	89100.00	156341.03
110	118000.00	225000.00	163000.00	122694.78	127453.01	109000.00	95000.00	166609.10
112	125000.00	239000.00	173000.00	130274.75	135323.32	116000.00	101000.00	176857.96
114	133000.00	253000.00	183000.00	137844.37	143182.47	122000.00	107000.00	187087.60
116	140000.00	267000.00	193000.00	145403.67	151030.45	129000.00	113000.00	197298.06
118	147000.00	280000.00	203000.00	152952.63	158867.29	136000.00	118000.00	207489.34
120	154000.00	294000.00	213000.00	160491.28	166692.99	142000.00	124000.00	217661.47
122	162000.00	308000.00	222000.00	168019.63	174507.57	149000.00	130000.00	227814.48
124	169000.00	321000.00	232000.00	175537.68	182311.03	156000.00	136000.00	237948.36
126	176000.00	335000.00	242000.00	183045.45	190103.39	162000.00	142000.00	248063.16
128	183000.00	348000.00	252000.00	190542.94	197884.66	169000.00	148000.00	258158.88
130	190000.00	362000.00	262000.00	198030.17	205654.85	176000.00	154000.00	268235.54
132	198000.00	375000.00	272000.00	205507.15	213413.98	182000.00	159000.00	278293.17
134	205000.00	388000.00	282000.00	212973.88	221162.04	189000.00	165000.00	288331.78
136	212000.00	402000.00	291000.00	220430.38	228899.06	196000.00	171000.00	298351.39
138	219000.00	415000.00	301000.00	227876.65	236625.04	202000.00	177000.00	308352.02
140	226000.00	428000.00	311000.00	235312.71	244340.00	209000.00	183000.00	318333.70
142	233000.00	442000.00	321000.00	242738.57	252043.94	215000.00	188000.00	328296.44
144	241000.00	455000.00	330000.00	250154.23	259736.88	222000.00	194000.00	338240.26
146	248000.00	468000.00	340000.00	257559.71	267418.83	229000.00	200000.00	348165.18
148	255000.00	481000.00	350000.00	264955.02	275089.81	235000.00	206000.00	358071.22

Air Temp (F)	Cooling Unit Heat Removal (BTU/hr)							
	FF# 2	FF# 3	FF# 4	FF# 7	FF# 8	FF# 9	FF# 10	FF# 11
	RRA-CC-1	RRA-CC-4	RRA-CC-5	RRA-CC-11	RRA-CC-12	RRA-CC-13	RRA-CC-15 or 17	RRA-CC-19 or 20
150	262000.00	494000.00	359000.00	272340.17	282749.81	242000.00	211000.00	367958.41
152	269000.00	507000.00	369000.00	279715.16	290398.86	248000.00	217000.00	377826.75
154	276000.00	520000.00	379000.00	287080.01	298036.96	255000.00	223000.00	387676.27
156	283000.00	533000.00	388000.00	294434.73	305664.12	261000.00	229000.00	397507.00
158	290000.00	546000.00	398000.00	301779.33	313280.36	268000.00	234000.00	407318.94

Table 43 Cooling Water Temperature 87°F

Air Temp (F)	Cooling Unit Heat Removal (BTU/hr)							
	FF# 28	FF# 29	FF# 30	FF# 32	FF# 33	FF# 34	FF# 35	FF# 36
	RRA-CC-1	RRA-CC-4	RRA-CC-5	RRA-CC-11	RRA-CC-12	RRA-CC-13	RRA-CC-15 or 17	RRA-CC-19 or 20
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
89	7420.00	14300.00	10300.00	7723.26	8025.02	6840.00	5970.00	10514.87
91	14800.00	28500.00	20500.00	15436.04	16038.73	13700.00	11900.00	21010.29
93	22200.00	42700.00	30700.00	23138.36	24041.14	20500.00	17900.00	31486.27
95	29600.00	56900.00	40900.00	30830.21	32032.26	27300.00	23800.00	41942.85
97	37000.00	71000.00	51100.00	38511.63	40012.09	34100.00	29800.00	52380.02
99	44400.00	85100.00	61300.00	46182.59	47980.65	40900.00	35700.00	62797.85
101	51800.00	99200.00	71500.00	53843.15	55937.97	47700.00	41600.00	73196.30
103	59100.00	113000.00	81600.00	61493.29	63884.03	54500.00	47600.00	83575.41
105	66500.00	127000.00	91700.00	69133.01	71818.86	61300.00	53500.00	93935.21
107	73800.00	141000.00	102000.00	76762.34	79742.47	68000.00	59400.00	104275.70
109	81100.00	155000.00	112000.00	84381.29	87654.86	74800.00	65300.00	114596.91
111	88400.00	169000.00	122000.00	91989.86	95556.05	81600.00	71200.00	124898.86
113	95700.00	183000.00	132000.00	99588.06	103446.04	88300.00	77100.00	135181.56
115	103000.00	197000.00	142000.00	107175.91	111324.86	95000.00	83000.00	145445.04
117	110000.00	210000.00	152000.00	114753.41	119192.51	102000.00	88900.00	155689.30
119	118000.00	224000.00	162000.00	122320.58	127049.00	108000.00	94700.00	165914.38
121	125000.00	238000.00	172000.00	129877.43	134894.34	115000.00	101000.00	176120.29
123	132000.00	251000.00	182000.00	137423.95	142728.55	122000.00	106000.00	186307.05
125	139000.00	265000.00	192000.00	144960.18	150551.63	129000.00	112000.00	196474.67
127	147000.00	279000.00	202000.00	152486.11	158363.60	135000.00	118000.00	206623.18
129	154000.00	292000.00	212000.00	160001.75	166164.47	142000.00	124000.00	216752.60
131	161000.00	306000.00	222000.00	167507.12	173954.25	149000.00	130000.00	226862.95
133	168000.00	319000.00	231000.00	175002.23	181732.94	155000.00	136000.00	236954.24
135	175000.00	333000.00	241000.00	182487.08	189500.57	162000.00	142000.00	247026.49
137	183000.00	346000.00	251000.00	189961.69	197257.14	169000.00	147000.00	257079.73
139	190000.00	360000.00	261000.00	197426.06	205002.66	175000.00	153000.00	267113.97
141	197000.00	373000.00	271000.00	204880.21	212737.15	182000.00	159000.00	277129.23
143	204000.00	386000.00	280000.00	212324.15	220460.62	188000.00	165000.00	287125.54
145	211000.00	399000.00	290000.00	219757.88	228173.07	195000.00	171000.00	297102.91
147	218000.00	413000.00	300000.00	227181.42	235874.52	202000.00	176000.00	307061.36
149	226000.00	426000.00	310000.00	234594.78	243564.97	208000.00	182000.00	317000.91
151	233000.00	439000.00	319000.00	241997.97	251244.45	215000.00	188000.00	326921.58
153	240000.00	452000.00	329000.00	249390.99	258912.96	221000.00	194000.00	336823.40
155	247000.00	465000.00	339000.00	256773.86	266570.51	228000.00	199000.00	346706.38
157	254000.00	478000.00	348000.00	264146.59	274217.12	235000.00	205000.00	356570.53

Air Temp (F)	Cooling Unit Heat Removal (BTU/hr)							
	FF# 28	FF# 29	FF# 30	FF# 32	FF# 33	FF# 34	FF# 35	FF# 36
	RRA-CC-1	RRA-CC-4	RRA-CC-5	RRA-CC-11	RRA-CC-12	RRA-CC-13	RRA-CC-15 or 17	RRA-CC-19 or 20
159	261000.00	491000.00	358000.00	271509.19	281852.79	241000.00	211000.00	366415.89
161	268000.00	504000.00	368000.00	278861.66	289477.54	248000.00	217000.00	376242.47
163	275000.00	517000.00	377000.00	286204.02	297091.37	254000.00	222000.00	386050.30
165	282000.00	530000.00	387000.00	293536.28	304694.31	261000.00	228000.00	395839.38
167	289000.00	543000.00	396000.00	300858.45	312286.35	267000.00	234000.00	405609.75

FUEL POOL HEAT EXCHANGER INPUTS

The fuel pool heat exchanger will be explicitly modeled using the heat exchanger datasheet provided in Reference 3.5. The modeling approach is illustrated in Figure 4 where the GOTHIC heat exchanger component will be used to represent a single fuel pool heat exchanger.

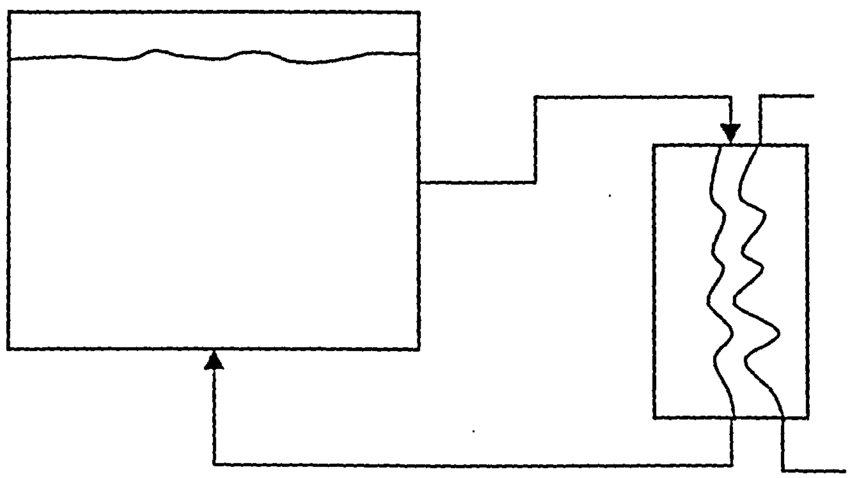

Figure 4 – Fuel Pool Cooler Modeling Approach

The GOTHIC inputs are calculated as follows.

GOTHIC Inputs
Shell Side Velocity and Flow Area

Heat Exchanger Specification information is obtained from Exchanger Specification Sheet attached to Calculation 5.35.18 (Reference 3.5)

$V_{SS} := 3.4\frac{ft}{sec}$ $\quad V_{TS} := 5.94\frac{ft}{sec}$ $\quad A_{HX} = 625ft^2$

$TubeOD := 0.75in$

$NumTubes := 94$ $\quad TubePasses := 2$

$T_{FPin} := 125Fahr$ $\quad T_{FPout} := 111Fahr$

$T_{SWin} := 95Fahr$ $\quad T_{SWout} := 109Fahr$

$$T_{FP} := \left(\frac{T_{FPin} + T_{FPout}}{2}\right) \qquad T_{SW} := \left(\frac{T_{SWin} + T_{SWout}}{2}\right)$$

Shell Side Mass Flow Rate and Flow Area

$$MassFlow_{Shell} := G_{FPC} \cdot \rho\left(\frac{T_{FPin}}{Fahr}\right) = 78.958\frac{lb}{sec}$$

$$A_{SS} := \frac{G_{FPC}}{V_{SS}} \qquad A_{SS} = 0.377ft^2 \qquad \rho\left(\frac{T_{FPin}}{Fahr}\right) = 61.633\frac{lb}{ft^3}$$

Tube Thickness and Flow Area

$$A_{TS} := \frac{G_{SW}}{V_{TS}} \qquad A_{TS} = 0.216ft^2$$

$$TubeWallThick := \frac{TubeOD - funHD\left(\frac{A_{TS}}{NumTubes}\right)}{2}$$

$$TubeWallThick = 0.051in \qquad funHD\left(\frac{A_{TS}}{NumTubes}\right) = 0.649in$$

Tube Mass Flow Rate and Tube Length

$$MassFlow_{Tube} := G_{SW} \cdot \rho\left(\frac{T_{SW}}{Fahr}\right) = 79.503 \frac{lb}{sec} \qquad T_{SW} = 95Fahr$$

$$TubeLength := \frac{A_{HX}}{funPerim(TubeOD) \cdot TubePasses \cdot NumTubes}$$

Outer and Inner Surface Areas

$$TubeOuterArea := funPerim(TubeOD) \cdot TubePasses \cdot TubeLength \cdot NumTubes$$

$$TubeOuterArea = 625 ft^2$$

$$TubeInnerArea := funPerim(TubeID) \cdot TubePasses \cdot TubeLength \cdot NumTubes$$

$$TubeInnerArea = 540.493 ft^2$$

$$funPerim\left(\frac{TubeID + TubeOD}{2}\right) = 2.197 in$$

$$TubeAvgArea := funPerim\left(\frac{TubeID + TubeOD}{2}\right) \cdot TubePasses \cdot TubeLength \cdot NumTubes$$

$$TubeAvgArea = 582.747 ft^2$$

The service water temperature used to provide fuel pool cooling is developed in Reference 3.6, and simplified as per assumption 1.7.

SGTS FAN PERFORMANCE

The fan component used to represent the SGTS is provided with the flow characteristics of the fan as required by assumption 1.6.

SGTS Model Inputs

The Standby Gas Treatment system will be modeled as a GOTHIC Volumetric Fan component with an inlet volume a discharge boundary condition and two flow paths (Figure 5).

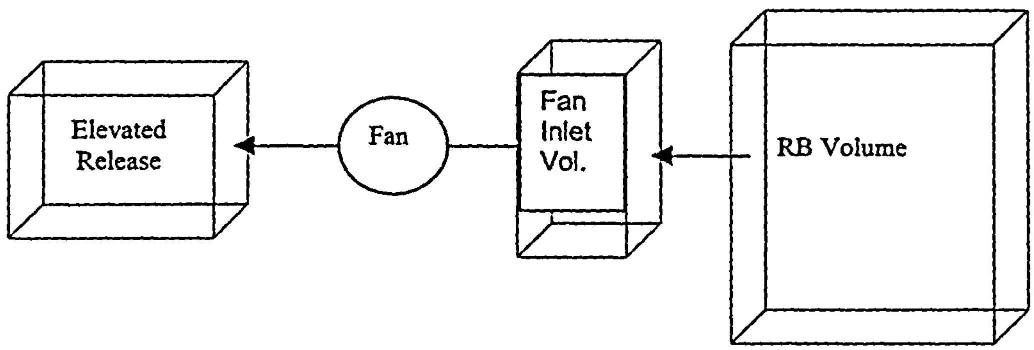

Figure 5 – SGTS Model

Figure 5 illustrates the basic modeling approach that will be used for the SGTS. The SGTS inlet will take suction from the reactor building volume through the inlet flow path, which connects the two volumes illustrated in Figure 5. This inlet flow path is developed to include the pressure drops associated with the SGTS filter, heater, etc. as listed in the table below. It should be noted that the flow value used to establish the pressure drop is different than what is assumed in the analysis. This will not impact the results since this information is used to establish a loss coefficient and the pressure drop will be calculated by the GOTHIC code.

Table 44 – SGTS Fan Suction Information

Fan Suction Losses	Pressure Drop (inches WG)	Heat Input (kW)	Flow (ACFM)	Reference
Moisture Separators Loaded	2		4457	#1.9 para. 3.5.2 (pg. 15A-12)
Two Electric Heating Coils	0.2	21	4457	#1.9 para. 3.5.4 (pg. 15A-14)
Pre-Filters Cleanup loaded DP	1.0		4457	#1.9 para. 3.5.3 (pg. 15A-13)
Two HEPA Filters loaded to 900grams dust	4		4457	#1.9 para. 3.5.5 (pg. 15A-17)
Two Charcoal Absorber Filters	6		4457	#1.9 para. 3.5.6 (pg. 15A-19)
Electric Strip Heaters			4457	1.9
Total DP	13.2			
Total DP (psi)	0.488			
Area Assumed	1.767 ft^2			
Velocity	42.039 ft/sec			

To ensure a conservative result, a total DP value of 13.5inwg will be assumed in this analysis. Using the pressure drop value of 13.5inwg, an equivalent pressure loss coefficient is developed for the assumed area. The flow rate listed in Table 44 is less than that assumed in the analysis, but it provides the basis for the pressure drops. The flow information provided in the table is provided as Indicated CFM (ICFM). However, to add conservatism to the calculation of the pressure loss coefficient that follows, the flow rate is treated as if it is Actual CFM (ACFM).

$P = 14.431\,\text{psi}$

$\text{Temp} = 68\,\text{Fahr}$

$\text{Flow} := 4457\,\text{cfm}$

$\text{vfTsat}(68\text{Fahr})\cdot\frac{\text{ft}^3}{\text{lb}} = 0.016\,\frac{\text{ft}^3}{\text{lb}}$

$\text{Area} := 1.767\,\text{ft}^2$

$\Delta P := \frac{13.5\,\text{in}\cdot g}{\text{vfTsat}(68\text{Fahr})\cdot\frac{\text{ft}^3}{\text{lb}}}$

$\text{Velocity} := \frac{\text{Flow}}{\text{Area}}$

$\text{Velocity} = 42.039\,\frac{\text{ft}}{\text{sec}}$

$\Delta P = 0.488\,\text{psi}$

$\rho_{gas}(P,\text{Temp},\text{"air"}) = 0.074\,\frac{\text{lb}}{\text{ft}^3}$

$\text{Kinlet} := \frac{2\Delta P}{\rho_{gas}(P,\text{Temp},\text{"air"})\cdot \text{Velocity}^2}$

$\text{Kinlet} = 34.633$

Therefore the inlet flow path will have a loss coefficient of 34.633 as calculated above with an area of $1.767ft^2$. The hydraulic diameter associated with this area is 1.5ft (18inch).

The fan inlet volume is used only to allow for the inlet flow path described above. This allows for the accounting of the pressure drop between the SGTS inlet and the fan inlet.

The fan is modeled as a volumetric fan component with the flow driven by a forcing function that is based on the fan performance curve provided in Reference 2.7 and reproduced below in Figure 6.

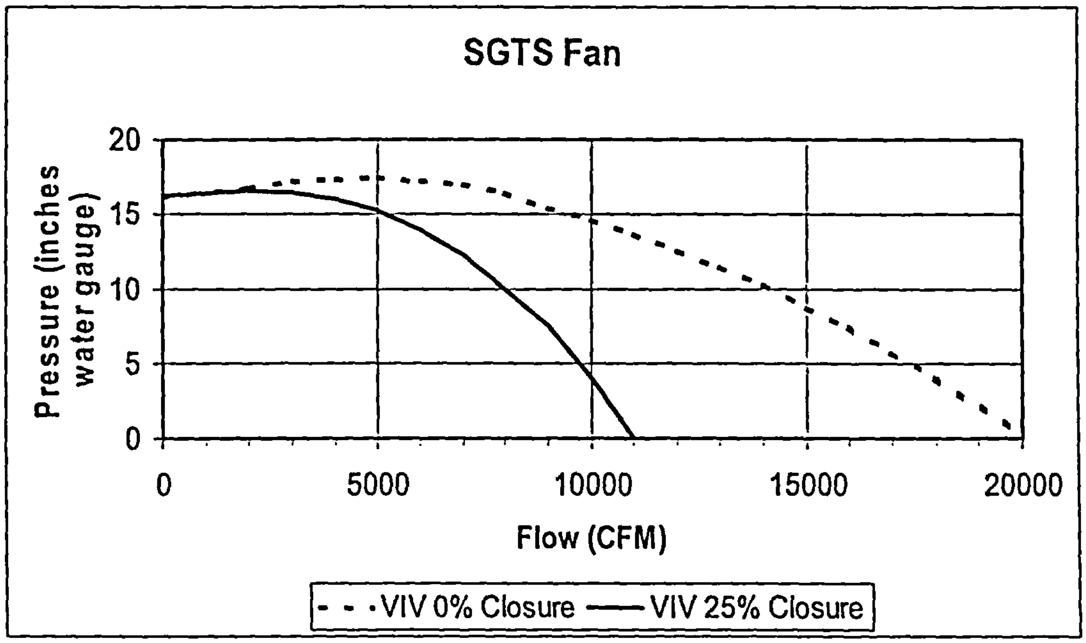

Figure 6 – Fan Performance Curve Without Limit on Maximum Flow

The fan performance curve is entered into the GOTHIC model as a forcing function of flow (ACFM) vs. pressure (psid). The data read from the curve (Reference 2.7) is reproduced in the table below with the GOTHIC inputs provided in Table 46.

Table 45

ACFM	VIV 0% CLOSED (in water gauge)	VIV 25% CLOSED (in water gauge)	VIV 25% CLOSED (psid)
0	16.25	16.25	0.6 [11]
2000	16.75	16.625	0.599963912
3000	17.25	16.5	0.595452905
4000	17.375	16	0.577408878
5000	17.5	15.25	0.550342837
6000	17.25	13.875	0.500721761
7000	17	12.25	0.442078672
8000	16.5	10	0.360880549
9000	15.5	7.5	0.270660411
10000	14.75	4	0.144352219
11000	13.75	0	0
12000	12.625		
13000	11.5		
14000	10.25		
15000	8.75		
16000	7.375		
17000	5.75		
18000	4		
20100	0		

1

11 This value is artificially set to allow for input into the GOTHIC table which requires a consistent upward or downward trend in the data. If the data is used exactly as depicted on the fan curves the GOTHIC code would run into difficulties under conditions where a given pressure has two flows. Establishing the artificial value avoids this conflict and has minimum impact on the results.

The fan flow assumed in the analysis is limited to 4800ACFM (Reference 3.13 and assumption 1.18).

Table 46 – GOTHIC Inputs

VIV 25% CLOSED (psid)	ACFM
0.61	0
0.6	2000
0.5955	3000
0.5774	4000
0.5503	4800
0.5007	4800
0.4421	4800
0.3609	4800
0.2707	4800
0.1444	4800
0	4800

1

The discharge side of the fan is represented by a junction, which extends from the fan outlet to the exit of the elevated release. Since there are four fans associated with the SGTS, the fan with the longest flow path is evaluated. This is fan SGT-FN-1B2 based upon a review of Reference 2.8. The data associated with the flow path is provided in Table 47. The flow coefficient calculations are provided after the table.

Table 47 – SGTS Discharge Flow path Input Development

1

Discharge Flow Path Description	Width (in)	Depth (in)	Diameter (in)	HD (ft)	Length (ft)	Area (ft^2)	Loss Coeff	Corrected Loss Coefficient	Elevation (ft)	Reference
Fan Discharge Connection	18.25	15.125		1.378433208	1	1.916884	0.0174	0.013		2.9
Flexible Connection			18	1.5	1	1.767146		-		2.9
Vertical Run			18	1.5	3	1.767146		-		2.9
90 degree Elbow			18	1.5	2.904579	1.767146	0.240	0.240		2.9
Horizontal Run			18	1.5	15.73958	1.767146		-		2.8
Butter Fly Valve (SGT-V-5B2)			18	1.5	0.961538	1.767146	0.300	0.300		2.8
90 degree Elbow			18	1.5	2.904579	1.767146	0.240	0.240		2.8
Horizontal Run			18	1.5	5.288462	1.767146		-		2.8
Tee Connection			18	1.5	0	1.767146	1.100	1.100		2.8
Horizontal Run			18	1.5	8.173077	1.767146		-		2.8
90 degree Elbow			18	1.5	2.904579	1.767146	0.240	0.240		2.8
Horizontal Run			18	1.5	14.91118	1.767146		-		2.9
45 degree Elbow			18	1.5	1.380665	1.767146	0.192	0.192		2.9
45 degree Elbow			18	1.5	1.380665	1.767146	0.192	0.192		2.9
Horizontal Run			18	1.5	7.179459	1.767146		-		2.9
Discharge to Duct			18	1.5	0	1.767146	1.000	1.000	583.08333	2.9
Elevated Release Duct	20	20		1.666666667	23.79167	2.777778		-	606.875	2.9
Flow Past Tee	20	20		1.666666667	0	2.777778	-	-		2.9
Discharge Into Elevated Release	20	20		1.666666667	1	2.777778	1.000	0.405		2.9
Elevated Release	45	120		5.454545455	64.29167	37.5		-	671.17	2.10
Discharge to Atmosphere	45	120		5.454545455	0	37.5	1.000	0.002	671.17	2.10

Fan Discharge Connection Loss Coefficient

This loss coefficient is calculated using the method outlined in Diagram 5-27 of Reference 1.8 (See Appendix 2).

$$ReNum(P,T,FL,D) := \frac{\rho_{gas}(P,T,\text{"air"}) \cdot \frac{FL}{funArea(D)} \cdot D}{\mu(T)}$$

$\mu(75Fahr) = 1.231 \times 10^{-5} \frac{lb}{ft \cdot sec}$ $\quad$ $funArea(18in) = 1.767ft^2$

$\frac{4800cfm}{funArea(18in)} = 45.271\frac{ft}{sec}$ $\quad$ $\rho_{gas}(14.7psi, 75Fahr, \text{"air"}) = 0.074\frac{lb}{ft^3}$

$ReValue := ReNum(14.7psi, 75Fahr, 4800cfm, 1.5ft)$ 2

$ReValue = 4.095 \times 10^5$

$\delta\lambda := 0.3 \cdot \exp\left(-ReValue \cdot 10^{-5}\right)$ $\quad$ $\delta\lambda = 4.999 \times 10^{-3}$

$Fout := funArea(18in)$ $\quad$ $Fin := 18.25in \cdot 15.125in$

$\frac{Fout}{Fin} = 0.922$ $\quad$ $HDout := \frac{4 \cdot Fout}{\pi \cdot (18in)}$ $\quad$ $HDout = 1.5ft$

$HDin := \frac{4 \cdot Fin}{2 \cdot (18.25in + 15.125in)}$ $\quad$ $HD := \frac{HDin + HDout}{2}$

$c_{lcon} := 0.002$

From Diagram 5-27

$len := 1ft$

$\frac{len}{HD} = 0.695$

From Diagram 2-1 (Reference 1.8)

$$\lambda := \frac{1}{(1.8 \cdot \log(ReValue) - 1.64)^2} \qquad \lambda = 0.014$$

$$\lambda sim := \left(c0 + c_{lcon} \cdot \frac{18.25\,in}{15.125in}\right)\left(\frac{Fout}{Fin}\right)^2$$

$\lambda sim = 0.013$

$KFanDischarge := \lambda sim + \delta\lambda$

$KFanDischarge = 0.0153$

The loss coefficients calculated with Reference 1.7 were found to bound those calculated based upon methods presented in Reference 1.8.

Component	Loss Coefficient	Reference
45deg elbow	0.192	1.7
90deg elbow	0.24	1.7
Butterfly	0.3	1.7

Flow through Tee Connections are calculated using methods provided in Reference 1.8 (Appendix 2).

Tee Connection	Values		Reference
Flow From Branch			1.8
A	0.55	Table 7-1	1.8
Qs/Qc,Fs/Fc	1		
zeta'cs	2	Diagram 7-4	1.8
Loss Coefficient	1.1		
Flow Past Tee in Stack			1.8
Qs/Qc	0		
zeta'c,st	0	Straight Passage	

Several of the loss coefficients are calculated based upon the actual area of the section, such as the stack. Since these are all combined into one flow path, the loss coefficients must be adjusted to allow for a common assumed area for the flow path. This is accomplished by multiplying the result by the squared ratio of the assumed area to the actual area.

Corrected Loss Coefficient is calculated as follows.
Fan Discharge Connection

$$(0.0153)\left(\frac{1.767146}{1.916884}\right)^2 = 0.013$$

From the table 47 the flow path inputs are established to be

Frictional Length = 157.81ft – This value is the sum of the lengths provided in Table 47.

Inertial Length =10ft – This value was established via evaluation of the models fan response time to plant data. To match the plant data, a value of 10ft was required.

Area = 1.767ft^2 – This value is arbitrarily selected to correspond with the duct runs listed in Table 47

The forward and Reverse Loss Coefficients are the sum of the corrected loss coefficients provided in Table 47
Forward Loss Coefficient = 4
Reverse Loss Coefficient = 4
The hydraulic diameter corresponds to that document for the assumed area.
Hydraulic Diameter = 1.5ft

TIME LINE
The analysis is based on a time line assessment that is documented below.

0 seconds	LOOP/LOCA		
0 seconds	Emergency Lighting On	(Assumption 3.4)	
15 seconds	Normal HVAC Isolates	(Assumption 1.5)	
30 seconds	All ECCS Pump Heat Loads Start	(Reference 1.17)	
120 seconds	SGTS Fan Starts	(Assumption 1.17)	
300 seconds	Fan Cooler Units Start, Fuel Pool Cooler Starts	(Assumption 1.16)	
12 hours	Fuel Pool Cooling Starts, As selected by Energy Northwest	(Assumption 1.13)	1

CALCULATION

SENSITIVITY AND SCOPING ANALYSES

The final model developed started with the multinode model documented in Reference 3.2, which was used to access the building response using realistic conditions that did not include conservatism's associated with a licensing basis analysis. A review of that model led to the development of a simplified single volume model. This initial single volume model was developed using leakage flow paths at the roof and railroad door. These flow paths were developed using a turbulent flow model that assumed a 50/50 flow split between the paths given equal pressure drops. In addition, the model assumed very conservative temperature and wind speed conditions. The analysis results and model description can be found in Appendix 4, Section I.

This initial single volume modeling effort demonstrated that the 50/50 split assumption is not achieved with actual pressure and temperature conditions. The pressure difference is not the same at the two leakage flow points. From this, the modeling development continued with the understanding that the flow split would be developed based on equal pressures at the leakage locations and the actual flows would be quite different. These early results indicated that the pressure criteria most difficult to satisfy are at the roof level for both the cold and warm exterior conditions. This is the result of the leeward side pressure effect producing a great challenge to the SGTS.

The next set of single volume sensitivity studies documented in Section II of Appendix 4, entitled "Single Volume Model Sensitivity On SGTS Maximum Fan Flow", were performed to evaluate the impact of increasing the assumed SGTS flow rate. The additional change was to modify the discharge pressure assumed for the SGTS stack to eliminate the dynamic pressure of the wind. These analyses showed some improvement, but did not result in a successful return to below the desired minimum pressure condition.

This set of results further revealed that the leakage flow model used in this analysis is overly conservative. The use of the turbulent flow model should be replaced with a better representation. Prior to the implementation of a more realistic leakage flow model, a number of studies were performed to access the significance of certain modeling features. The next set of studies eliminated the wind pressure effect as well as the internal heat sources. The analysis is documented in Section III of Appendix 4, entitled "Single Volume Model Sensitivity Study Elimination of Wind Pressure Effect All Internal Heat Sources Modified Leakage Model". The results of this study suggest that the modeling approach of using the windward side pressure as the source of inleakage at the roof level is overly conservative. A more reasonable approach is to credit the average pressure on all four sides of the upper building elevation.

The final set of single volume analysis are documented in Section IV of Appendix 4, entitled "Single Volume Model Sensitivity Study Modified Leakage Model"

FINAL ANALYSES

The model developed in the earlier portions of this calculation will be used to evaluate the drawdown effectiveness of the Columbia Station Standby Gas Treatment and Secondary Containment Systems. This analysis will include the short-term recovery of the building to below 0.25"WG as well as an assessment of the long-term ability to maintain the 0.25"WG criteria.

The analysis includes all heat loads within the Reactor Building that are pertinent for the LOOP LOCA assessment as documented previously. These loads impact both the short-term response as well as the long-term response. The loads that will impact the short-term response are primarily the electrical heat loads. With the exception of the decaying normal heat loads, all electrical loads will impact the long-term response as they continue to put energy into the building. There are loads that will be involved throughout the analysis, but will not begin to impact the building response until later in the analysis. These loads include decay heat in the fuel pool as well as heat transferred from the primary containment. These sources of energy are delayed by the heat storage capacity of the fuel pool and the primary containment walls, respectively. Coupled with the increase in temperature of the ultimate heat sink, these sources could potentially raise building pressure back above the 0.25"WG. Therefore, the analysis is run for a total analysis time of 30 days.

As part of the analysis documented in the main body of this report, several sensitivity studies will be conducted. The first of these will be an assessment of the leakage flow split. Assumption 1.11 identifies that the basis of the model will be a 70% to 30% flow split between the roof and the railroad door, respectively. Based upon testing documented in Reference 1.20, this value provides a conservatively high representation for the railroad door leakage contribution and may underestimate the roof leakage. To evaluate the significance of this selection, a case using a 90% to 10% flow split between the roof and the railroad door, respectively, will be performed. This analysis will be conducted based on boundary conditions documented in Tables 4 & 5 and initial conditions documented in Tables 6 & 7.

The flow split described in Assumption 1.11 is based on pressures across the roof and railroad bay doors being equal. Since weather conditions will alter the actual pressures across these leakage paths, it is necessary to evaluate the two extremes to fully demonstrate the impact of these conditions. Therefore, the boundary conditions identified in Table 4 and Table 5 will be evaluated with their corresponding initial conditions documented in Table 6 and Table 7.

INPUT AND ASSUMPTION EVALUATION STUDIES

The input development has lead to a total of eight possible cases for initial evaluation. These address two bounding wind directions, outside temperature conditions, as well as flow split. These cases will be evaluated as part of the model development to establish the necessary inputs for long term analysis. A number of changes to the base deck (APPENDIX 6) are required to evaluate these different cases. Specifically, the initial conditions of the volumes are changed along with the boundary conditions and control variable inputs. All other GOTHIC Code inputs are unchanged for this effort. Each of these cases is run to evaluate the short term response, specifically the time to reach the 0.25inch water gauge acceptance value. The case that produces the longest response time will be used to establish the inputs to the final analysis.

The GOTHIC file names and a description of the cases are provided in Table 48. The initial conditions of the volumes as well as the boundary condition values are provided in Table 49. Changes to the control variable inputs associated with leakage flow and pressure evaluation are provided in Table 50.

Table 48 – Case Description and GOTHIC designation

Case	Deck Name	Description
1	TNMFF1.GTH	Warm Air with Easterly wind and 70/30 leakage flow split
2	TNMFF1SE.GTH	Warm Air with South Easterly wind and 70/30 leakage flow split
3	TNMFFW1.GTH	Cold Air with Easterly wind and 70/30 leakage flow split
4	TNMFFW1SE.GTH	Cold Air with South Easterly wind and 70/30 leakage flow split
5	TNMFF19.GTH	Warm Air with Easterly wind and 90/10 leakage flow split
6	TNMFFW19.GTH	Cold Air with Easterly wind and 90/10 leakage flow split
7	TNMFF1SE9.GTH	Warm Air with South Easterly wind and 90/10 leakage flow split
8	TNMFFW1SE9.GTH	Cold Air with South Easterly wind and 90/10 leakage flow split

Table 49 – Case Initial and Boundary Conditions

	Initial Conditions					Boundary Conditions			
Case	Pressure Volume 1 (psia)	Pressure Volume 2 (psia)	Pressure Volume 4 (psia)	Pressure Volume 5 (psia)	Temperature (°F)	BC Roof Pressure (psia)	BC Door Pressure (psia)	BC Release Pressure (psia)	Temp (°F)
1	14.63949	14.61125	14.67933	14.58122	75.00	14.57903	14.68433	14.58189	86.00
2	14.64134	14.61310	14.68120	14.58307	75.00	14.58052	14.68425	14.58189	86.00
3	14.62647	14.59822	14.66630	14.56820	75.00	14.56511	14.68294	14.56832	28.00
4	14.62817	14.59993	14.66801	14.56990	75.00	14.56678	14.68285	14.56832	28.00
5	14.63949	14.61125	14.67933	14.58122	75.00	14.57903	14.68433	14.58189	86.00
6	14.62647	14.59822	14.66630	14.56820	75.00	14.56511	14.68294	14.56832	28.00
7	14.64134	14.61310	14.68120	14.58307	75.00	14.58052	14.68425	14.58189	86.00
8	14.62817	14.59993	14.66801	14.56990	75.00	14.56678	14.68285	14.56832	28.00

Table 50 – Case Control Variable Inputs

	Control Variable Inputs									
Case	IP Top Door	IC DP Low	a0 DP Low	IP Upper	IC DP Upper	a0 DP Upper	Laminar Door (A)	Turbulent Door (B)	Laminar Roof (A)	Turbulent Roof (B)
1	14.66728	0.47230	14.68433	14.56526	0.286	14.57558	425.14	1275.43	1372.16	2785.91
2	14.66914	0.41870	14.68425	14.56711	0.277	14.57710	425.14	1275.43	1372.16	2785.91
3	14.65426	0.79474	14.68294	14.55223	0.250	14.56125	379.95	1139.86	1226.31	2489.79
4	14.65597	0.74491	14.68285	14.55394	0.250	14.56296	379.95	1139.86	1226.31	2489.79
5	14.66728	0.47230	14.68433	14.56526	0.286	14.57558	141.71	425.14	1764.21	3581.88
6	14.65426	0.79474	14.68294	14.55223	0.250	14.56125	126.65	379.95	1576.69	3201.16
7	14.66914	0.41870	14.68425	14.56711	0.277	14.57710	141.71	425.14	1764.21	3581.88
8	14.65597	0.74491	14.68285	14.55394	0.250	14.56296	126.65	379.95	1576.69	3201.16

The results of these short term studies are documented in Table 51. They show that for the 70/30 split, the wind from the easterly direction bounds the south easterly wind. In addition, the cold outside air conditions bound that of the warm outside conditions. This is contrary to that demonstrated in the early studies documented in Appendix 4 and 5, but the difference is associated with the leakage flow model, which has changed since that early analysis. For the 90/10 split, the easterly wind direction remains dominate over the south easterly and the outside temperature has a small affect on the time to reach 0.25inch water gauge.

These results demonstrates that the 70/30 split assumption (Assumption 1.11) is conservative and will be applied for the long term analysis. In addition, the cold air temperature value of 28°F provided a bounding result for the assumed flow split when compared with the warm condition. This occurs because of the large calculated differential pressure required across the railroad door to ensure that the entire building remains below 0.25inch water gauge. Therefore, the cold air temperature will be assumed for the long term evaluations. The model used for the final analysis evaluations will be based on that documented as Case 3.

Table 51 – Results of Short Term Analysis

Case	Description	Time to Reach 0.25inch water (sec)
1	Warm Air with Easterly wind and 70/30 leakage flow split	743
2	Warm Air with South Easterly wind and 70/30 leakage flow split	720
3	Cold Air with Easterly wind and 70/30 leakage flow split	872
4	Cold Air with South Easterly wind and 70/30 leakage flow split	831
5	Warm Air with Easterly wind and 90/10 leakage flow split	680
6	Cold Air with Easterly wind and 90/10 leakage flow split	660
7	Warm Air with South Easterly wind and 90/10 leakage flow split	672
8	Cold Air with South Easterly wind and 90/10 leakage flow split	645

LONG TERM ANALYSIS AND MANUAL OPERATOR ACTION RESPONSE TIME EVALUATIONS

As stated in Assumption 1.13, the fuel pool cooling will need to be started manually from the control room since the normal cooling will be lost. The response of the fuel pool will have an impact on the ability to maintain the 0.25inch water gauge pressure requirement. Delay in fuel pool cooling results in pool heat up and ultimately pool boiling. The heat up of the pool by the stored fuel will provide a source of heat and mass to the refueling floor volume (Volume 5). This will lead to a pressure increase of the building if cooling is not restarted.

The long term analyses, which are used to demonstrate the ability to maintain the building depressurized will evaluate acceptable operator action times to ensure the building remains depressurized. The results of these studies as well as those associated with stored fuel temperatures and structural limits, which are beyond the scope of this analyses, should be used to establish any procedural operator action criteria.

This analysis will define an upper and lower operator action time to be used in the sensitivities. The lower time is set to be 20 minutes. This value is selected to provide a time that exceeds the 10 minute operator action criteria that is in general acceptance in the industry for operator actions associated with manual start of safety systems. The upper limit will be based upon the time required to reach bulk boiling of the fuel pool. To represent this time a pool temperature of 212°F is used in combination with the assumed pool initial temperature of 125°F. Given the previously defined pool volume and decay value, an estimate of the time can be calculated as follows using steam table information obtained from Reference 1.33.

$$\Delta time = \frac{Cp(212F)\rho(212F)(VolumePool)(212F-125F)}{Q_{DecayHeat}}$$

$$\Delta time = \frac{0.998\frac{BTU}{lbF}59.814\frac{lb}{ft^3}(46788ft^3)(212F-125F)}{2720.56\frac{BTU}{sec}}\left(\frac{1hr}{3600\sec}\right)$$

$$\Delta time = 24.8hr$$

Since this simple calculation does not include heat or mass transfer, the actual time should be longer. However, in the interest of providing margin to the bulk boiling condition, which will challenge the ability of the fuel pool cooling system, 24 hours will be selected.

Table 52 – Long Term Analysis Cases

Case	Deck Name	Description	Figure
9	TNMFFW1.GTH	Cold Outside Air Easterly Wind Direction 70/30 Leakage Split Fuel Pool Cooling Start Time 20 minutes	7, 8, 9 and 10
10	TNMFFW3hr.GTH	Cold Outside Air Easterly Wind Direction 70/30 Leakage Split Fuel Pool Cooling Start Time 3 hours	11, 12, 13 and 14
11	TNMFFW12hr.GTH	Cold Outside Air Easterly Wind Direction 70/30 Leakage Split Fuel Pool Cooling Start Time 12 hours	15, 16, 17 and 18
12	TNMFFW24hr.GTH	Cold Outside Air Easterly Wind Direction 70/30 Leakage Split Fuel Pool Cooling Start Time 24 hours	19, 20, 21 and 22

Each of these long term cases were run for a total of 30 days. The results are depicted in Figures 7 through 22. The full set of graphical results for each of these cases is provided in Appendix 7. These figures illustrate the overall response of the building volumes and leakage flow path pressure difference. In each case the building pressure is restored and maintained below the 0.25inch water gauge.

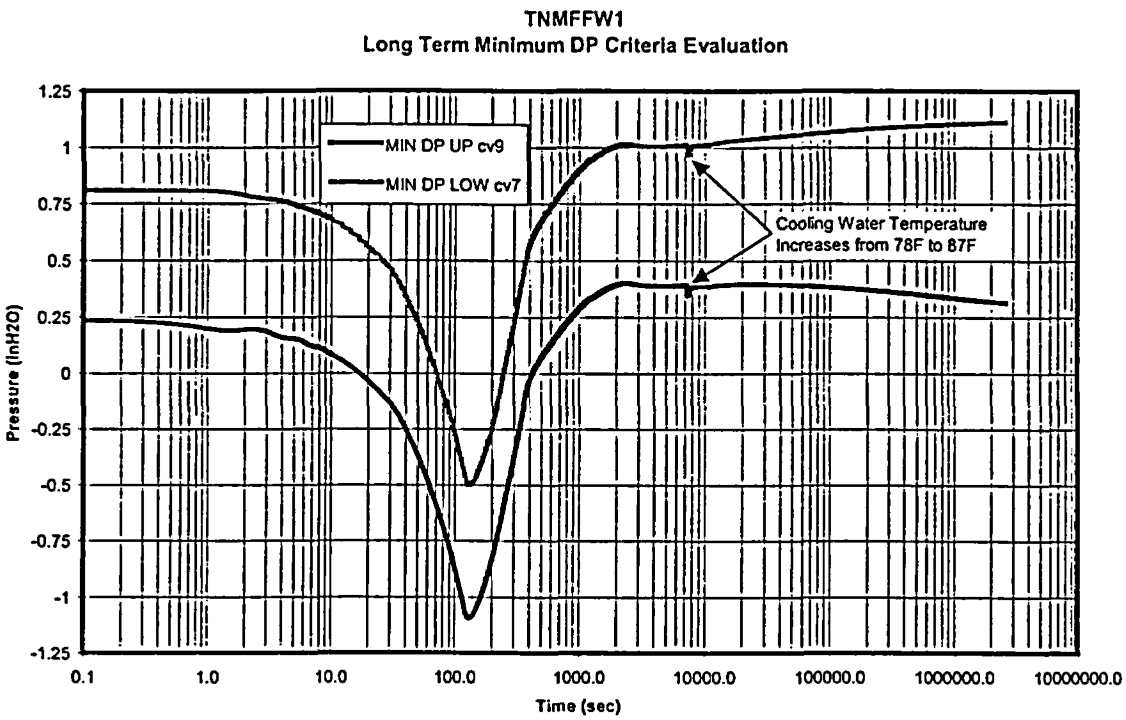

Figure 7 – Minimum Pressure Differential Response Fuel Pool Cooling Start at Time = 20minutes

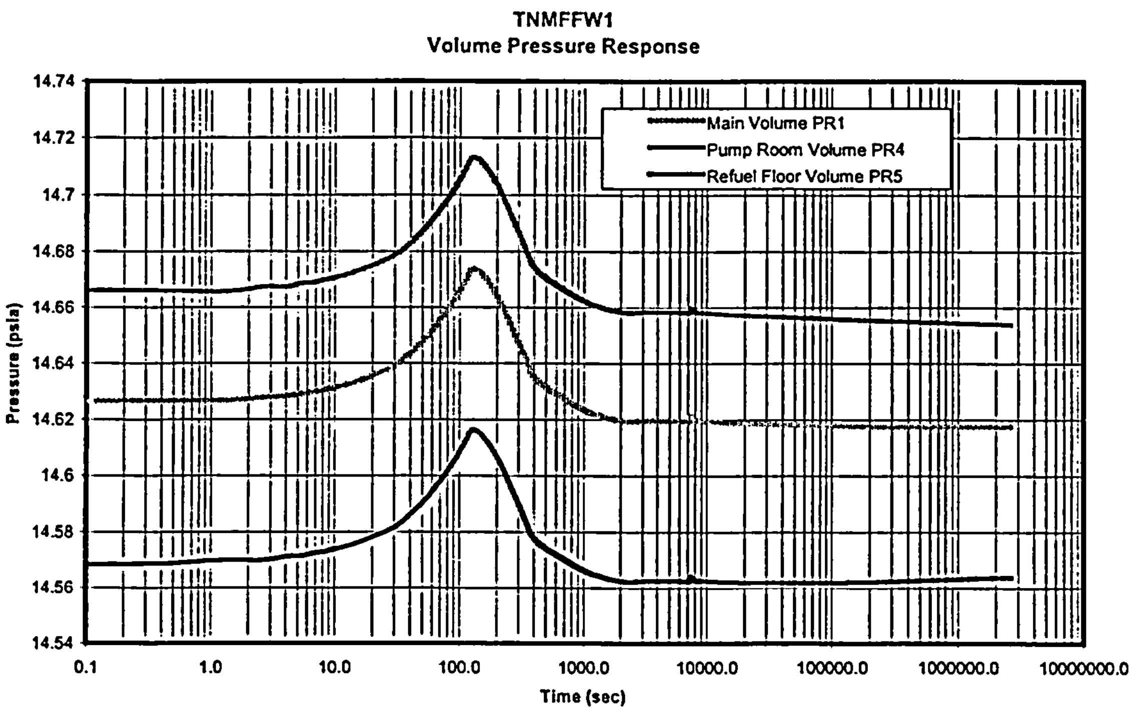

Figure 8 – Volume Pressure Response Fuel Pool Cooling Start at Time = 20minutes

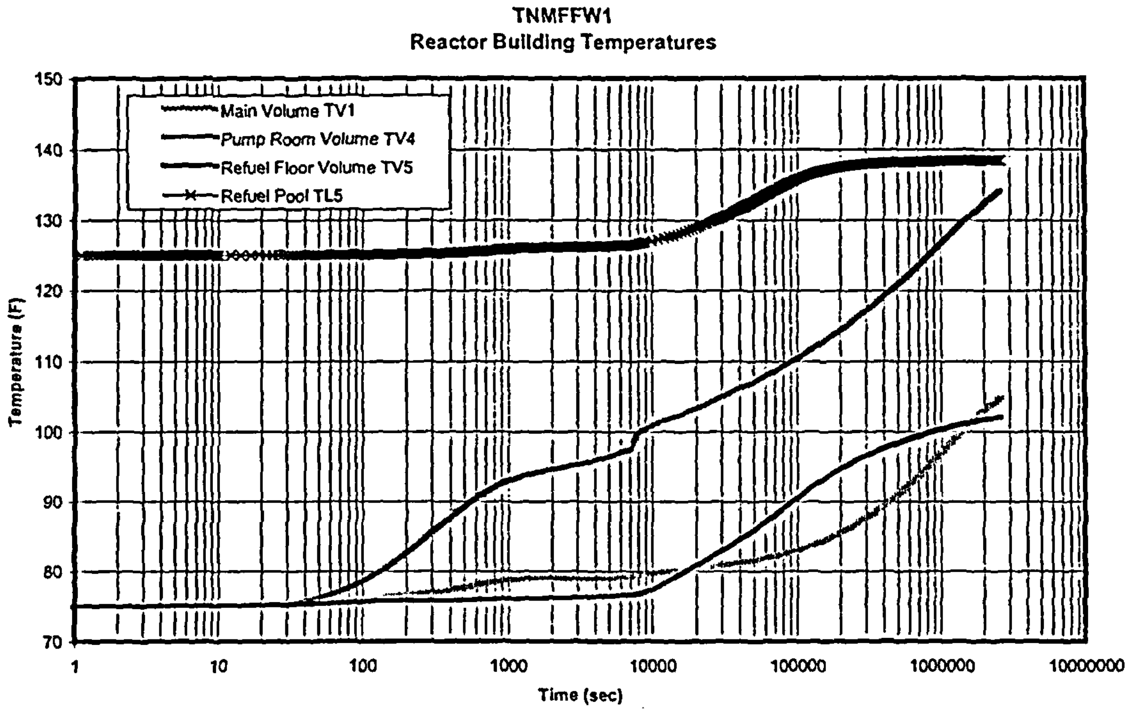

Figure 9 – Volume Temperature Response Fuel Pool Cooling Start at Time = 20minutes

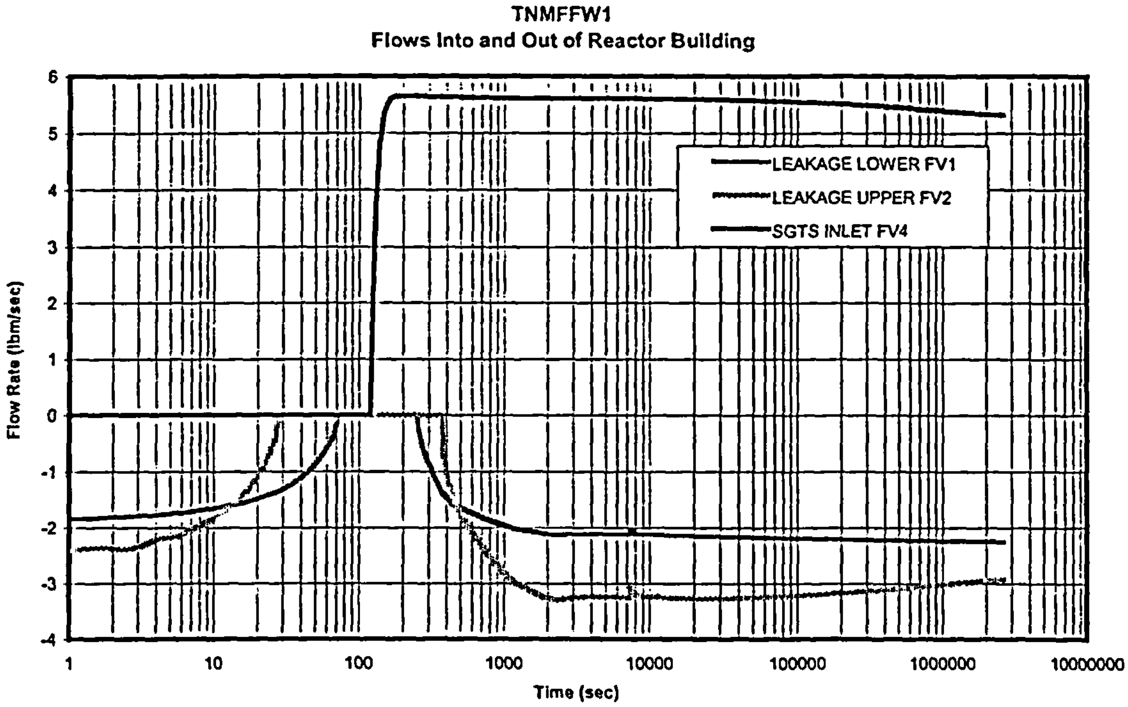

Figure 10 – Flow Into and Out of Building Fuel Pool Cooling Start at Time = 20minutes

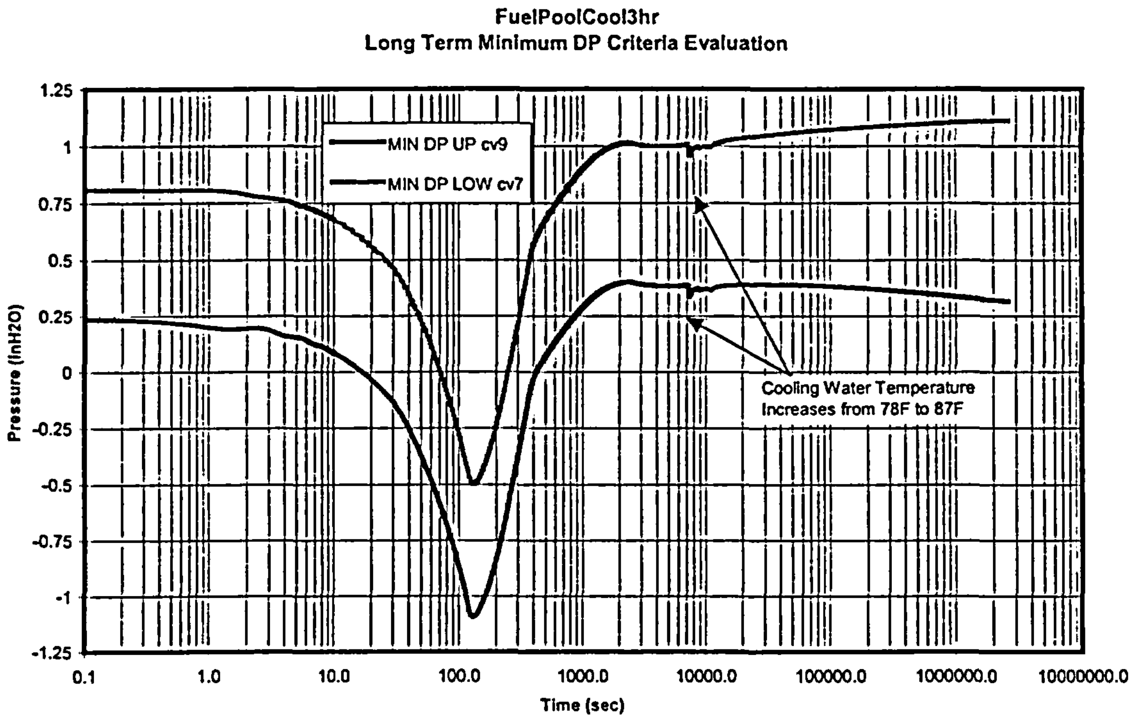

Figure 11 – Minimum Pressure Differential Response Fuel Pool Cooling Start at Time = 3 hours

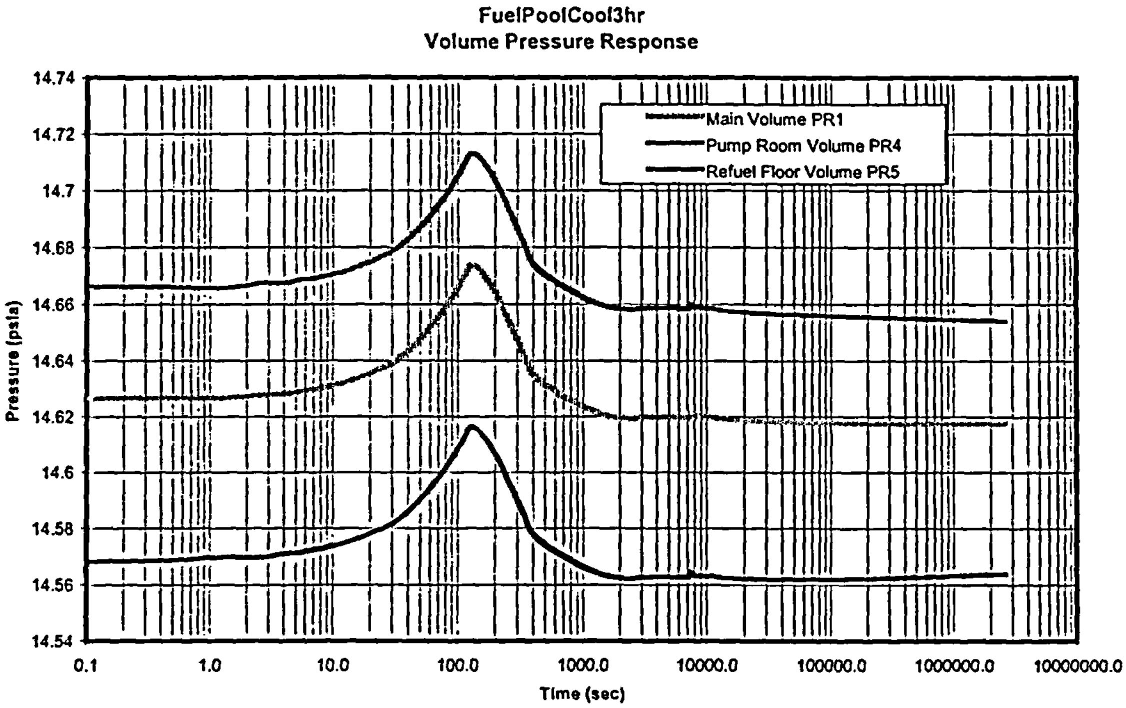

Figure 12 Volume Pressure Response Fuel Pool Cooling Start at Time = 3 hours

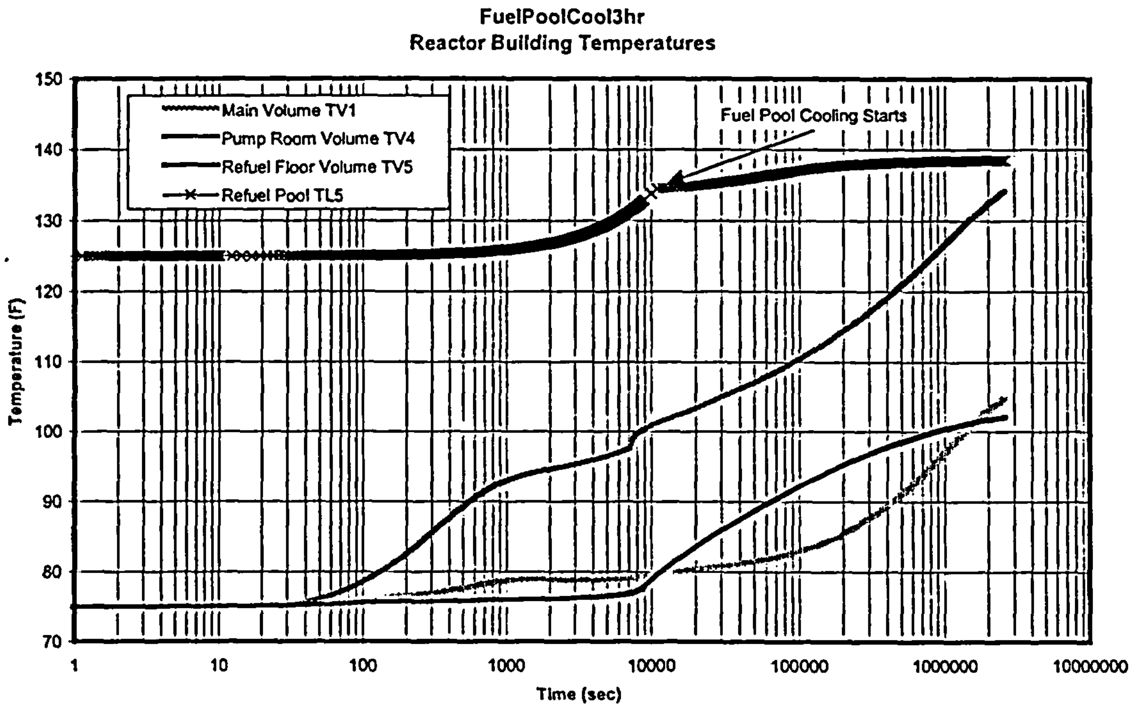

Figure 13 Volume Temperature Response Fuel Pool Cooling Start at Time = 3 hours

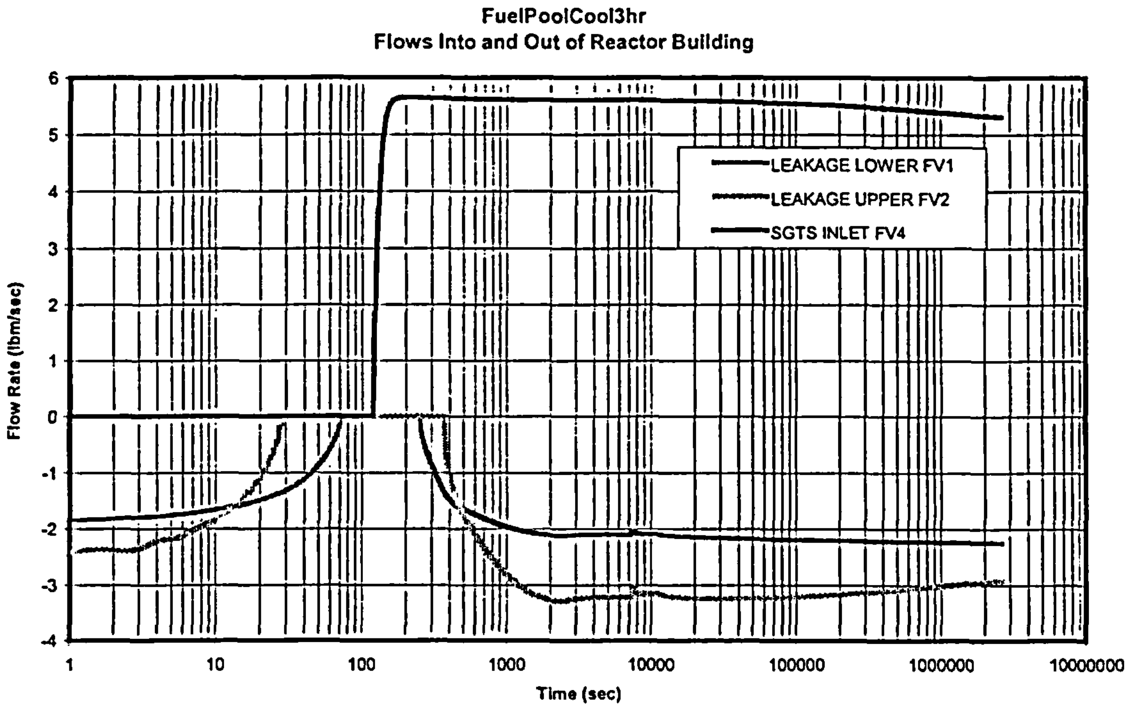

Figure 14 Flow Into and Out of Building Fuel Pool Cooling Start at Time = 3 hours

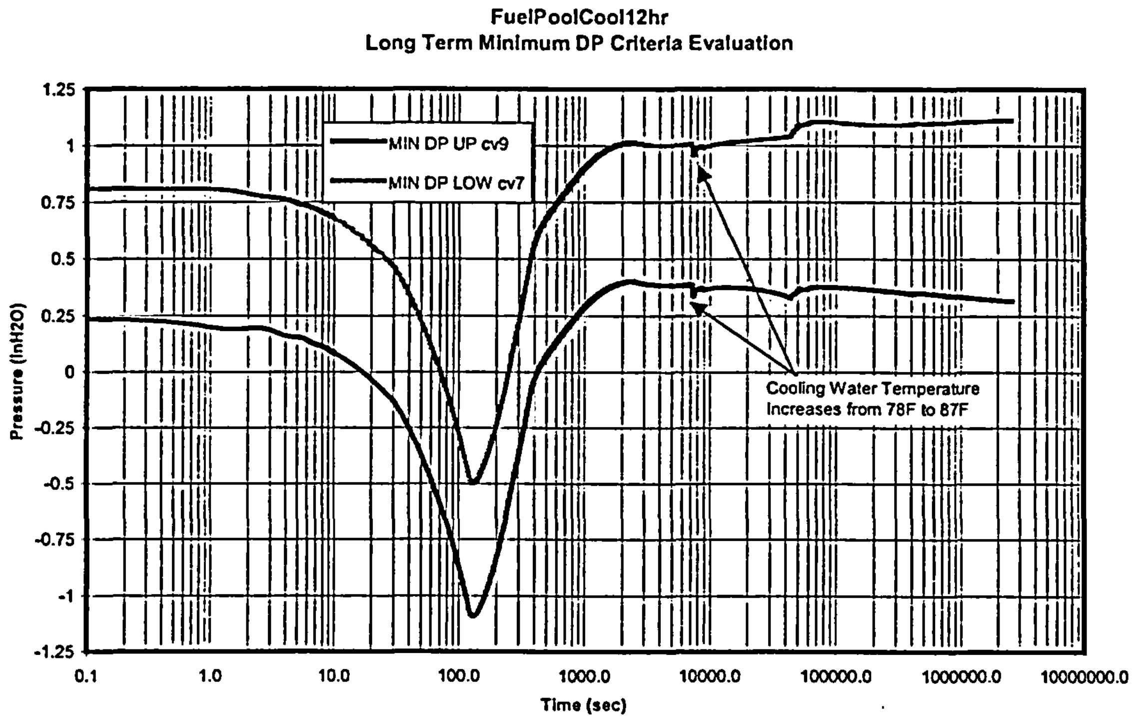

Figure 15 Minimum Pressure Differential Response Fuel Pool Cooling Start at Time = 12 hours

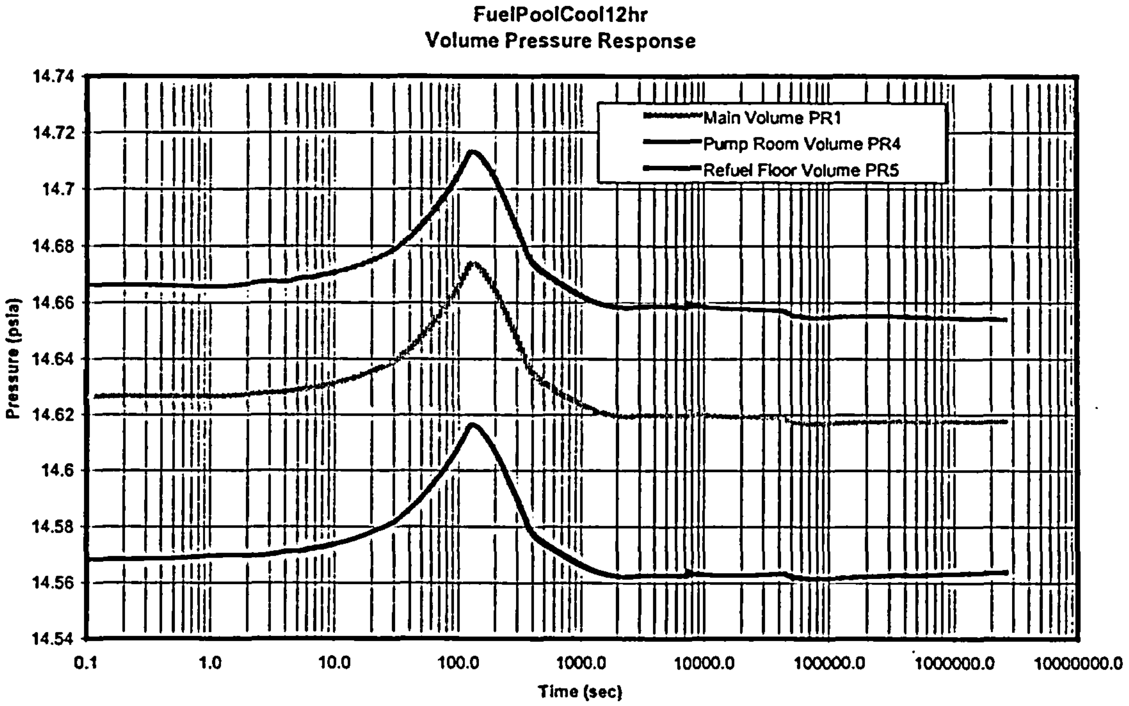

Figure 16 Volume Pressure Response Fuel Pool Cooling Start at Time = 12 hours

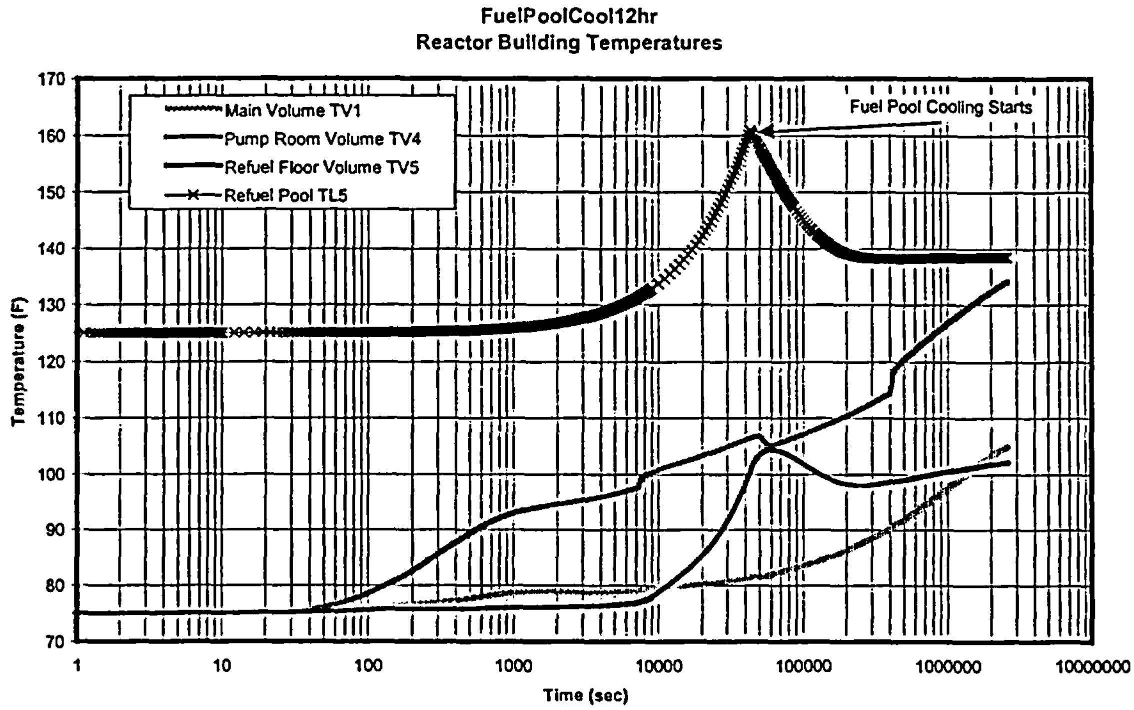

Figure 17 Volume Temperature Response Fuel Pool Cooling Start at Time = 12 hours

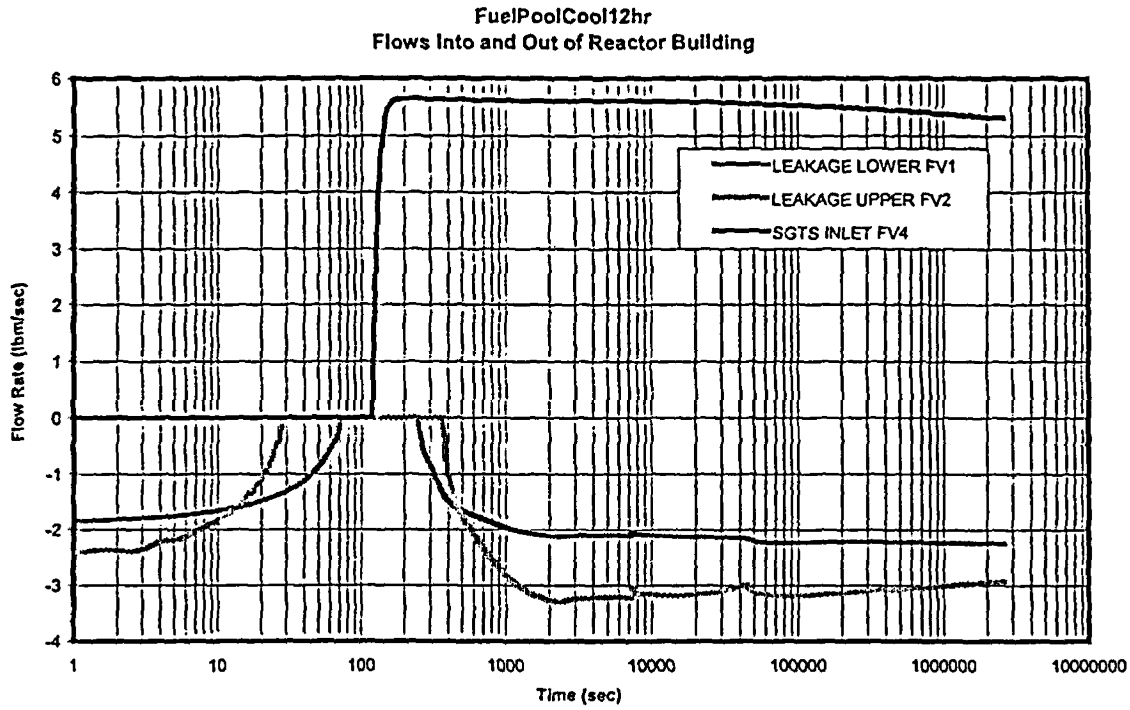

Figure 18 Flow Into and Out of Building Fuel Pool Cooling Start at Time = 12 hours

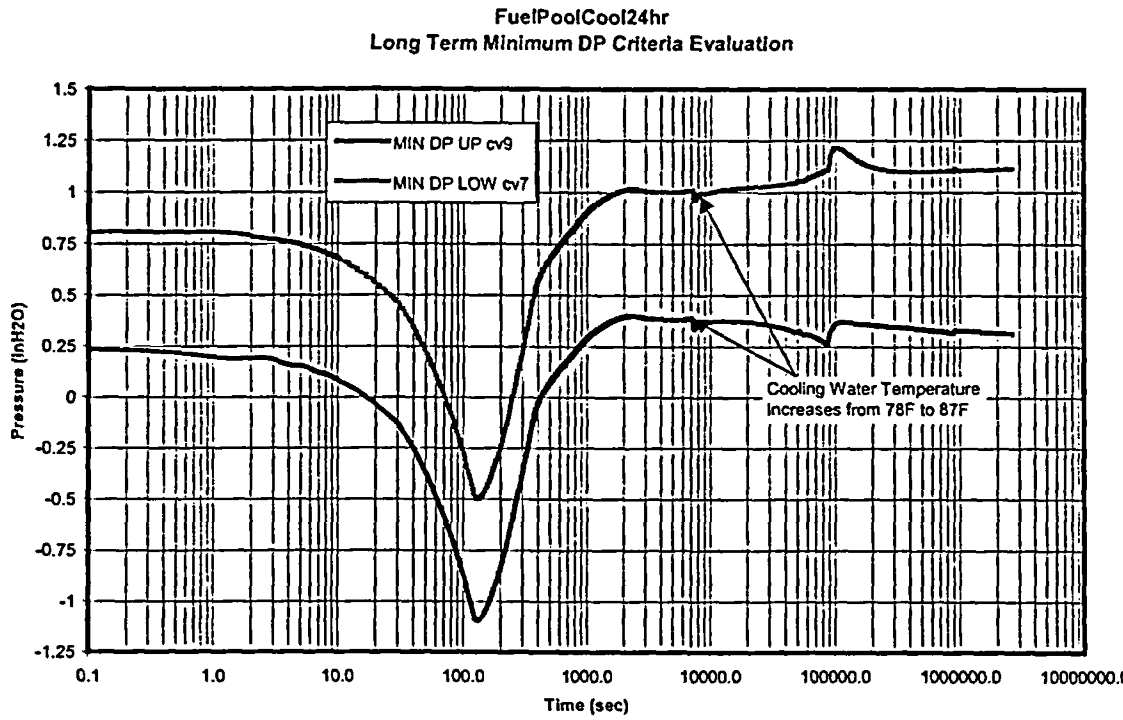

Figure 19 Minimum Pressure Differential Response Fuel Pool Cooling Start at Time = 24 hours

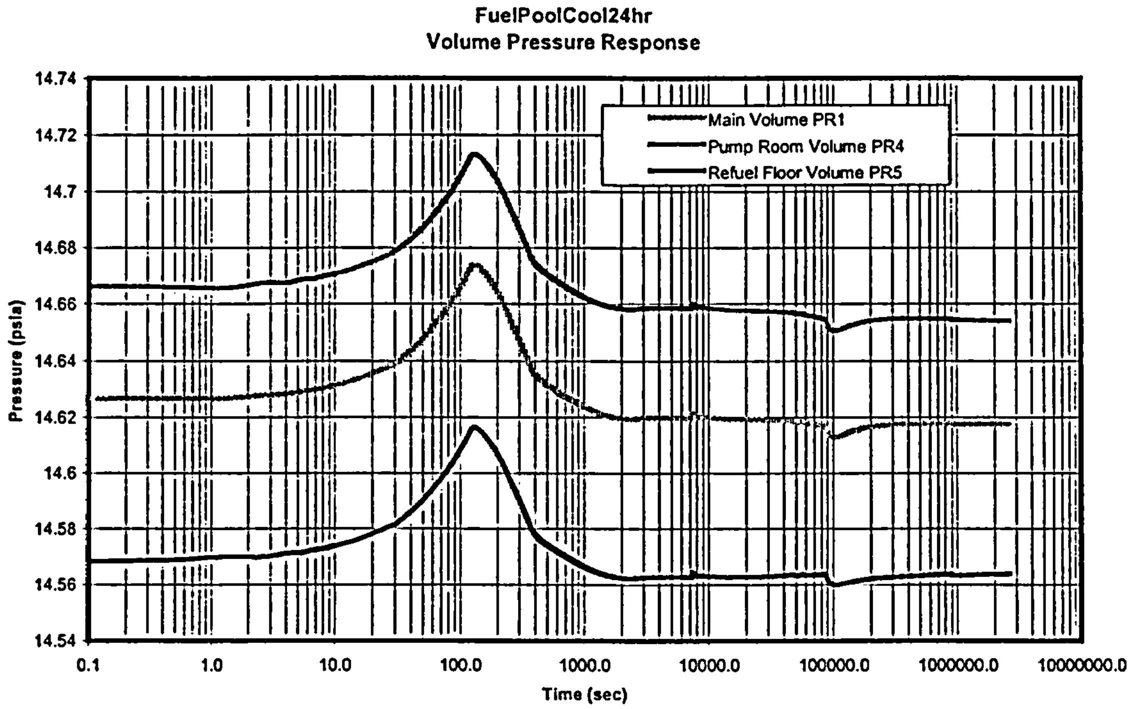

Figure 20 Volume Pressure Response Fuel Pool Cooling Start at Time = 24 hours

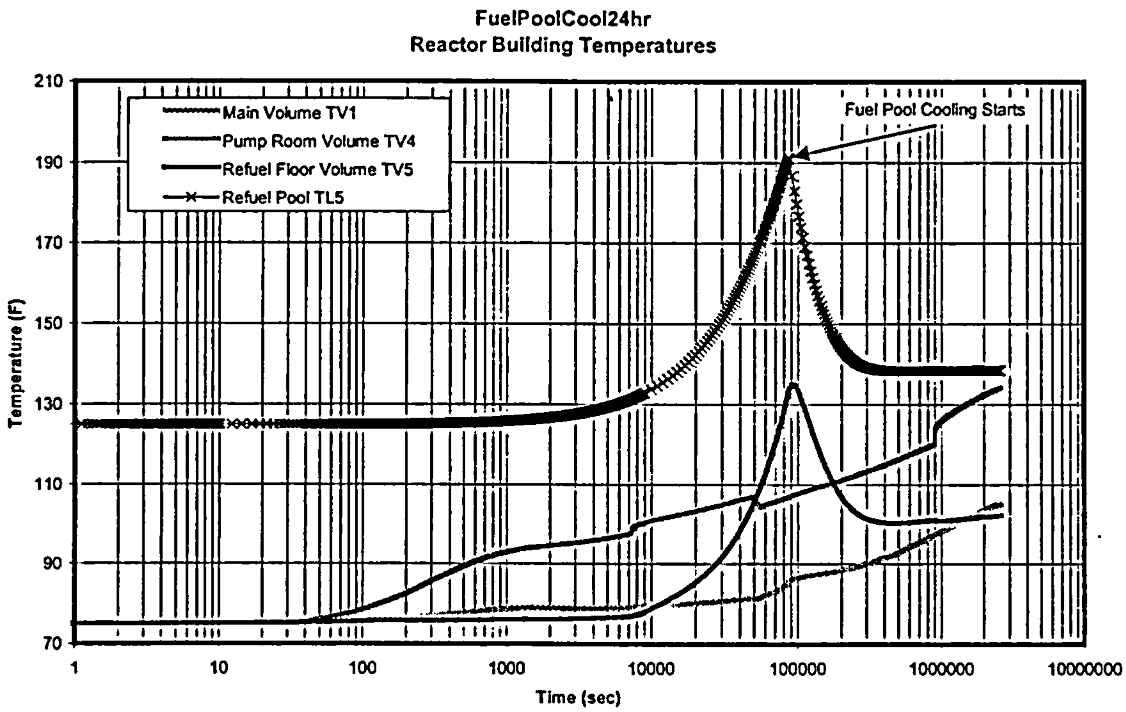

Figure 21 Volume Temperature Response Fuel Pool Cooling Start at Time = 24 hours

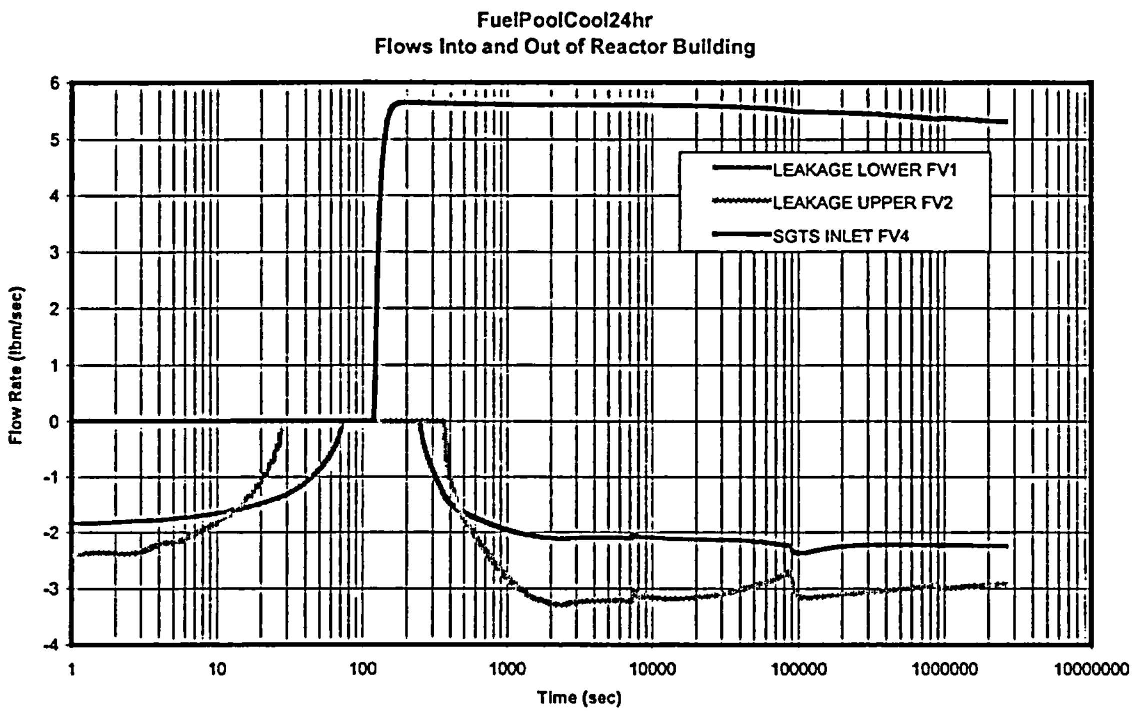

Figure 22 Flow Into and Out of Building Fuel Pool Cooling Start at Time = 24 hours

APPENDICES

APPENDIX 1 – BOUNDARY AND INITIAL CONDITIONS
APPENDIX 2 – LOSS COEFFICIENT REFERENCE MATERIAL
APPENDIX 3 – WIND PRESSURE COEFFICIENT DEVELOPMENT
APPENDIX 4 – SINGLE VOLUME SENSITIVITY STUDIES
APPENDIX 5 – THREE VOLUME SENSITIVITY STUDIES
APPENDIX 6 – GOTHIC INPUTS BASE DECK
APPENDIX 7 – LONG TERM ANALYSIS GRAPHICAL RESULTS

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The purpose of this appendix is to capture some sensitivity evaluations performed by the verifier as part of the review of this calculation model. At the time this review, the text portion of the calculation was not available, so all of the following discussion is in terms of the GOTHIC variable names and resulting graphs. The actual file that this evaluation started with was a "planned LBD case" from WS129-CALC-001 (Appendix E of this calculation) prior to the development of the "final LBD case" presented in Appendix D. Some results from this verification were used to determine the final LBD case.

The acceptance criteria for a drawdown case are as follows:

1. The entire building is drawn down to –0.25"wg.
   This can be determined by examining graph 9 "Close-up: Drawdown Time", which is a narrow sliver of graph 17, for the most limiting dP. The limiting dP is that experienced by **cv9**, and drawdown is reached when cv9 = 0.25 as long as it occurs before 1200 seconds. (TSR 3.6.4.1.4 Bases)

   NOTE: CV9 is control variable 9 in the table of control variables. CV7 and CV9 are the differential pressures experienced by the flow leakage paths, lower and upper respectively. A positive value of 0.25 represents the pressure differential of -0.25"wg because of the direction reversal.

2. The 30-day pressure response for the entire building remains drawn down to -0.25"wg.
   This can be determined by examining graph 17 "Drawdown Time", for the same limiting dP **cv9** remaining above 0.25 until 2.592e6 seconds. (TSR 3.6.4.1.5)

The following sensitivity studies use the model for case 11 (planned LBD case) to perform the evaluation. The files are located in CENTRAL-STOR and also on the corporate LAN in [FUELS] /GOTHIC/MODELS; the file names are TxxFFWyyyy, where xx = % lower leakage and yyyy = service water start time, using "mn" for minute and "hr" for hour.

Evaluations include the following:

- Sensitivity studies

  1. Determine the limiting "leakage split" between the sheet metal walls (upper leak path) and the rail bay doors (lower leak path), based on the impact to drawdown time. The fraction of the total leakage from the lower path was varied from 0.05 up to 0.5. Further evaluation in the range of 0.5 up to 1.0 was not warranted because the drawdown was no longer viable; i.e. either not possible within the proposed TS limiting time of 20 minutes (1200 s) or never achieved. The results table shows that the model is sensitive to this change, with leakage being the parameter with the largest impact on drawdown time. Results table can be found on page G-7. In general, the limiting leakage split is 45% lower / 55% upper, as determined by the fact that the 50%/50% case does not meet criterion 1 or 2.

     MATHCAD and EXCEL spreadsheet pages were used to determine the parameters to enter into the control variables in order to change the leakage split. The pages are included for the record, and can be found on pages G-4 to G-27.

  2. Evaluate the impact of the service water start time on the secondary containment drawdown time. The LBD case is for a 12-hour start. Evaluations were performed for 5, 20 minutes, 1, 3, 6, 9, 12, and 24 hours. The results, shown on page G-28, indicate that any delay in service water start time of greater than 1 hour yields the same drawdown time. However, any cooling that is performed in the first hour has an adverse impact on drawdown time, actually increasing the time to drawdown. This result is still bounded by 20 minutes total drawdown time, but should be kept in

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mind, or evaluated more thoroughly, if this margin needs to be used in the future. Service water start time does not need to be considered.

3. Determine if modeling limitations are responsible for 100% humidity on 606' elevation. It was found that more exact modeling of the flow paths between 606' and 572' elevation, in order to increase air circulation, did not have enough of an impact on the relative humidity to warrant a model change.

Refuel floor peak relative humidity		
Description	filename	Peak RH
LBD case	T30FFW12hr.GTH	100
Case w 606' paths	T30FFW12hr+.GTH	100

The "+" was added to the filename indicate the additional modeled flow paths. It was possible that air circulation might lower relative humidity below 100%.

- Evaluate bounding EQ containment temperature profile

LBD Case 11 uses the composite temperature profile for primary containment function from Profile 1a in TM-2019 [function page G-29], but the EQ program uses the bounding profile shown on the same graph [function page G-30]. Both of these options are more conservative than the profile currently in FSAR 6.2. This case evaluated the impact of using the higher PC temperature.

Bounding EQ Containment Temperature Profile		
Description	filename	Drawdown time
LBD case	T30FFW12hr.GTH	872
Case with limiting PC profile	T30FFW12hr_PC.GTH	873

The result shows that the model is insensitive to this change in containment profile and produced a negligible 1-second impact on the drawdown time of around 15 minutes.

Reference: NE-02-03-10 GOTHIC code (V&V)

All GOTHIC FILES, EXCEL SPREADSHEETS, & WORD text files can be examined in CENTRAL-STOR / DOCUMENTS / CALC / 2001 / NE-02-01-05 directory

NE-02-01-05 r0 AppG.doc	WORD file; pages G-1 through G-3, G-28
NE-02-01-05 r0 prep.xls	EXCEL file; pages G-4 through G-27, G-29, G-30

GOTHIC v7.1 files:

TxxFFWyyyy, where xx = % lower leakage [05, 10, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 75, 80, 85, 90, 95] and yyyy = service water start time, using "mn" for minute and "hr" for hour [05mn, 20mn, 45mn, 01hr, 03hr, 06hr, 09hr, 12hr, 24hr]

Each GOTHIC run contains:

- design description *.DES
- graphics files *.GBK, *.GDT, *.GER, *.GIN
- backup file *.SAV
- solver files *.SD1, *.SDM, *.SER, *.SGR, *.SIN, *.SOT

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The following sensitivity studies use the final LBD case to perform the evaluation. The files are located in CENTRAL-STOR and also on the corporate LAN in [FUELS] /GOTHIC/MODELS; the file names are LBD_CASExx, where xx = H (added SGT heater), no (no heaters). The file LBD_case is the same as that used to generate Appendix D, but with a different name.

Evaluations include the following:

- Impact of explicit modeling the SGT heaters

  Determine the impact of modeling the SGT heaters in the inlet volume rather than as part of the fan heat, in order to maximize the volumetric expansion. Compare to the impact of not modeling the SGT heaters at all in the model.

Explicit Modeling the SGT Heaters		
Description	filename	Drawdown time
LBD case – fan heat	LBD_case	882
Case with inlet heat	LBD_caseH	964
Case with no heat	LBD_caseno	881

  The result shows that the model is sensitive to this change in inlet heat methodology. With the heater added to the SGT fan inlet volume (V2), the gas expansion takes place before the volumetric fan removes it, rather than heating as it is removed. This is validated by the ~20F increase in train temperature observed by the system engineer. This is also validated by the reduction in humidity, which is the purpose for which the heaters were included in the design. If this effect is included in the LBD model, then the ICFM/ACFM conversion will need to be dropped

- Impact of shifting starting pressure

  Determine the impact of modeling the entire building at above atmospheric pressure at the start of the accident evaluation. This could be accomplished by shifting the pressure such that cv7=0 rather than cv9=0. However, then the rest of the building would be above atmospheric pressure at t=0, which is a condition not in compliance with Technical Specifications, and is therefore not required to be analyzed.

Evaluations that were NOT performed, with the reason for decision and disposition:

- EQ has requested in the past that secondary containment zones be assessed at an initial temperature of 124F rather than 104F, due to summer heat during plant operation as part of efforts to remove outage barriers. Current safety analyses are the short term and long term drawdown, supporting the TS JCO and the EQ program respectively; and the long term is used for the EQ equipment in the secondary containment. This is documenting the decision that a sensitivity case was not needed, and further evaluation was not necessary, because high building temperature above 104F is a condition beyond plant design.

- The GOTHIC model in NE-02-01-05 does not assume that any of the floor plugs are removed. PER 203-1229 dealt with barrier impairment issues regarding open floor plugs. The current drawdown model supporting the JCO NE-02-94-19 contains open floor plugs, and therefore any plant activity with the floor plugs removed was considered bounded by the safety analysis and required no further evaluation. It was decided that, for this calculation, the safety analysis would not credit the floor plug hatch because it is not the current plant design. The change management issues with our customers in the plant will have to be addressed in the PDC. The maintenance rule evaluations are required to perform the risk assessment, whether for the floor-plug-removed evolutions or not; maintenance personnel are not accustomed to performing the evaluation and will need training.

LS Woosley *[signature]* 8/19/04

NE-02-01-05 DRAWDOWN prep
Flow path input

INPUTS			
leakage flow rate	2430	cfm	100%/day
density	0.075	ft3/lb	assumed
pressure differential	0.25	in wg	TS
gc	32.2	ft lbf/lbm s	
conversions			
convert ft2 to in2	144	in2/ft2	CRC
convert psi to in.H2O	27.71	in/psi	CRC
convert min to sec	60	sec/min	CRC

time (hr)	time (sec)
0.333333	1200
1	3600
3	10800
6	21600
9	32400
10	36000
11	39600
12	43200
24	86400

Sample Calculation		*0.5*	*fraction of flow area*
velocity	V =	33.4	ft/sec
path flow	F =	1215	cfm
area	A =	0.6063	ft2
hyd dia	HD =	0.879	ft

LS Woosley [signature] 8/19/04

leakage split calculation for input to NE-02-01-05 drawdown calc

flow path fraction				lower = KK doors		upper = roofline	
path 1 LOWER	path 2 UPPER	flow 1 cfm	flow 2 cfm	AREA 1 ft2	hyd dia 1 ft	AREA 2 ft2	hyd dia 2 ft
0	1	0	2430	0	0.000	1.213	1.243
0.1	0.9	243	2187	0.121	0.393	1.091	1.179
0.2	0.8	486	1944	0.243	0.556	0.970	1.111
0.25	0.75	607.5	1822.5	0.303	0.621	0.909	1.076
0.3	0.7	729	1701	0.364	0.681	0.849	1.040
0.4	0.6	972	1458	0.485	0.786	0.728	0.962
0.5	0.5	1215	1215	0.606	0.879	0.606	0.879
0.6	0.4	1458	972	0.728	0.962	0.485	0.786
0.7	0.3	1701	729	0.849	1.040	0.364	0.681
0.75	0.25	1822.5	607.5	0.909	1.076	0.303	0.621
0.8	0.2	1944	486	0.970	1.111	0.243	0.556
0.9	0.1	2187	243	1.091	1.179	0.121	0.393
1	0	2430	0	1.213	1.243	0	0.000

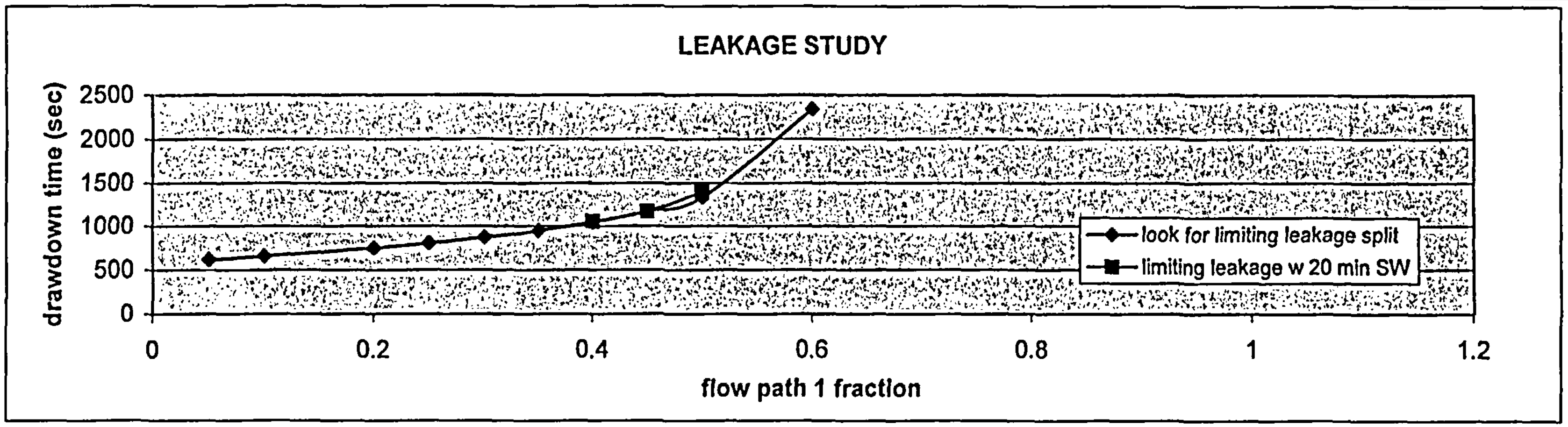
leakage split calculation for input to NE-02-01-05 drawdown calc with 20min SW start

flow path fraction				lower = KK doors			upper = roofline			TxxFFWyyyy cold air/east wind with this split results	
path 1 LOWER	path 2 UPPER	flow 1 cfm	flow 2 cfm	A2	laminar door	turbulent door	A3	laminar roof	turbulent roof	CASE FILENAME	DD TIME sec
				from mathcad sheet			from mathcad sheet				
0	1	0.0	2430.0								
0.05	0.95	121.5	2308.5	277.7	69.4	208.3	5529.3	1824.7	3704.7		
0.1	0.9	243.0	2187.0	555.4	138.9	416.6	5238.3	1728.6	3509.7		
0.2	0.8	486.0	1944.0	1110.9	277.7	833.1	4656.3	1536.6	3119.7		
0.25	0.75	607.5	1822.5	1388.6	347.1	1041.4	4365.3	1440.5	2924.7		
0.3	0.7	729.0	1701.0	1666.3	416.6	1249.7	4074.3	1344.5	2729.7		
0.35	0.65	850.5	1579.5	1944.0	486.0	1458.0	3783.2	1248.5	2534.8	T35FFW20mn	
0.4	0.6	972.0	1458.0	2221.7	555.4	1666.3	3492.2	1152.4	2339.8	T40FFW20mn	1053
0.45	0.55	1093.5	1336.5	2499.4	624.9	1874.6	3201.2	1056.4	2144.8	T45FFW20mn no DD	[redacted]
0.5	0.5	1215.0	1215.0	2777.1	694.3	2082.9	2910.2	960.4	1949.8	T50FFW20mn no DD	[redacted]
0.6	0.4	1458.0	972.0	3332.6	833.1	2499.4	2328.1	768.3	1559.9		
0.7	0.3	1701.0	729.0	3888.0	972.0	2916.0	1746.1	576.2	1169.9		
0.75	0.25	1822.5	607.5	4165.7	1041.4	3124.3	1455.1	480.2	974.9		
0.8	0.2	1944.0	486.0	4443.4	1110.9	3332.6	1164.1	384.1	779.9		
0.9	0.1	2187.0	243.0	4998.9	1249.7	3749.1	582.0	192.1	390.0		
0.95	0.05	2308.5	121.5	5276.6	1319.1	3957.4	291.0	96.0	195.0		
1	0	2430.0	0.0								

leakage split calculation for input to NE-02-01-05 drawdown calc with 12 hr SW start

TxxFFWyyyy
cold air/east wind with this split

flow path fraction				lower = KK doors			upper = roofline			results		
path 1 LOWER	path 2 UPPER	flow 1 cfm	flow 2 cfm	A2	laminar door	turbulent door	A3	laminar roof	turbulent roof	CASE FILENAME	notes	DD TIME sec
				from mathcad sheet			from mathcad sheet					
0	1	0.0	2430.0									
0.05	0.95	121.5	2308.5	277.7	69.4	208.3	5529.3	1824.7	3704.7	T05FFW12hr		618
0.1	0.9	243.0	2187.0	555.4	138.9	416.6	5238.3	1728.6	3509.7	T10FFW12hr	660	657
0.2	0.8	486.0	1944.0	1110.9	277.7	833.1	4656.3	1536.6	3119.7	T20FFW12hr		750
0.25	0.75	607.5	1822.5	1388.6	347.1	1041.4	4365.3	1440.5	2924.7	T25FFW12hr		807
0.3	0.7	729.0	1701.0	1666.3	416.6	1249.7	4074.3	1344.5	2729.7	T30FFW12hr	872	872
0.35	0.65	850.5	1579.5	1944.0	486.0	1458.0	3783.2	1248.5	2534.8	T35FFW12hr		950
0.4	0.6	972.0	1458.0	2221.7	555.4	1666.3	3492.2	1152.4	2339.8	T40FFW12hr		1045
0.45	0.55	1093.5	1336.5	2499.4	624.9	1874.6	3201.2	1056.4	2144.8	T45FFW12hr		1167
0.5	0.5	1215.0	1215.0	2777.1	694.3	2082.9	2910.2	960.4	1949.8	T50FFW12hr	no DD	[redacted]
0.6	0.4	1458.0	972.0	3332.6	833.1	2499.4	2328.1	768.3	1559.9	T60FFW12hr	never	[redacted]
0.7	0.3	1701.0	729.0	3888.0	972.0	2916.0	1746.1	576.2	1169.9	T70FFW12hr	never	
0.75	0.25	1822.5	607.5	4165.7	1041.4	3124.3	1455.1	480.2	974.9	T75FFW12hr	never	
0.8	0.2	1944.0	486.0	4443.4	1110.9	3332.6	1164.1	384.1	779.9	T80FFW12hr	never	
0.9	0.1	2187.0	243.0	4998.9	1249.7	3749.1	582.0	192.1	390.0	T90FFW12hr	never	
0.95	0.05	2308.5	121.5	5276.6	1319.1	3957.4	291.0	96.0	195.0	T95FFW12hr	never	
1	0	2430.0	0.0									



LS Woosley [signature] 8/15/04

COMPUTE LEAKAGE FLOWS FROM BUILDING
from p. 46 of WS129-CALC-001

dP = 0.25 in wg

path 1 LOWER	path 2 UPPER	C	A	B	leakage LOWER	C	A	B	leakage UPPER	CHECK leakage SUM
0	1									
0.05	0.95	277.7	69.4	208.3	121.5	5529.3	1824.7	3704.7	2308.5	2430.0
0.1	0.9	555.4	138.9	416.6	243.0	5238.3	1728.6	3509.7	2187.0	2430.0
0.2	0.8	1110.9	277.7	833.1	486.0	4656.3	1536.6	3119.7	1944.0	2430.0
0.25	0.75	1388.6	347.1	1041.4	607.5	4365.3	1440.5	2924.7	1822.5	2430.0
0.3	0.7	1666.3	416.6	1249.7	729.0	4074.3	1344.5	2729.7	1701.0	2430.0
0.35	0.65	1944.0	486.0	1458.0	850.5	3783.2	1248.5	2534.8	1579.5	2430.0
0.4	0.6	2221.7	555.4	1666.3	972.0	3492.2	1152.4	2339.8	1458.0	2430.0
0.45	0.55	2499.4	624.9	1874.6	1093.5	3201.2	1056.4	2144.8	1336.5	2430.0
0.5	0.5	2777.1	694.3	2082.9	1215.0	2910.2	960.4	1949.8	1215.0	2430.0
0.6	0.4	3332.6	833.1	2499.4	1458.0	2328.1	768.3	1559.9	972.0	2430.0
0.7	0.3	3888.0	972.0	2916.0	1701.0	1746.1	576.2	1169.9	729.0	2430.0
0.75	0.25	4165.7	1041.4	3124.3	1822.5	1455.1	480.2	974.9	607.5	2430.0
0.8	0.2	4443.4	1110.9	3332.6	1944.0	1164.1	384.1	779.9	486.0	2430.0
0.9	0.1	4998.9	1249.7	3749.1	2187.0	582.0	192.1	390.0	243.0	2430.0
0.95	0.05	5276.6	1319.1	3957.4	2308.5	291.0	96.0	195.0	121.5	2430.0
1	0									

ADD TEMPERATURE EFFECT TO LEAKAGE FLOWS (from page G-8)
from page 47-8 of WS129-CALC-001

				enter ratio to establish outdoor conditions				
				density		1.020573	<86F	
	dP =	0.25	in wg	ratio =	0.912094	0.912094	<28F	
path 1 LOWER	path 2 UPPER	A	B	leakage LOWER	A	B	leakage UPPER	
0	1							
0.05	0.95	63.32669	189.9801	110.8217	1664.282	3378.997	2105.569	
0.1	0.9	126.6534	379.951	221.6388	1576.689	3201.155	1994.75	
0.2	0.8	253.2976	759.902	443.2754	1401.501	2845.472	1773.111	
0.25	0.75	316.6243	949.8821	554.0971	1313.907	2667.63	1662.292	
0.3	0.7	379.951	1139.853	664.9142	1226.31	2489.788	1551.471	LBD case
0.35	0.65	443.2777	1329.833	775.7359	1138.719	2311.945	1440.652	
0.4	0.6	506.6044	1519.813	886.5576	1051.125	2134.103	1329.833	
0.45	0.55	569.9311	1709.784	997.3748	963.5315	1956.261	1219.013	
0.5	0.5	633.2577	1899.764	1108.196	875.9377	1778.419	1108.194	
0.6	0.4	759.902	2279.715	1329.833	700.75	1422.735	886.5551	
0.7	0.3	886.5554	2659.666	1551.472	525.5632	1067.051	664.9165	
0.75	0.25	949.8821	2849.646	1662.294	437.9693	889.2096	554.0971	
0.8	0.2	1013.209	3039.617	1773.111	350.3754	711.3676	443.2777	
0.9	0.1	1139.853	3419.568	1994.747	175.1877	355.6838	221.6388	
0.95	0.05	1203.18	3609.548	2105.569	87.59386	177.8419	110.8194	
1	0							
control variable f-n		cv15	cv14		cv12	cv11		
		a1	G		a1	G		

P.65 App I
NE-02-01-05
p65-66

6-10

Calculation of Inputs For 90/10 Split

A3 := 100 FS := 0.05

Laminar_Roof = 0.33 Turbulent_Roof = 0.67

Laminar_Door = 0.25 Turbulent_Door = 0.75

Given

$$FS \cdot 2430 = \left[Laminar\_Roof \cdot A3 \cdot (.25) + Turbulent\_Roof \cdot A3 \cdot \left(.25^{0.5}\right)\right]$$

A3 := Find(A3)

A3 = 291.018

$$Laminar\_Roof \cdot A3 \cdot .25 + Turbulent\_Roof \cdot A3 \cdot \left(.25^{.5}\right) = 121.5$$

Laminar_Roof·A3 = 96.036

Turbulent_Roof·A3 = 194.982

A2 := 100

Given

$$(1 - FS) \cdot 2430 = \left[Laminar\_Door \cdot A2 \cdot (.25) + Turbulent\_Door \cdot A2 \cdot \left(.25^{0.5}\right)\right]$$

A2 := Find(A2)

A2 = 5276.57

$$Laminar\_Door \cdot A2 \cdot .25 + Turbulent\_Door \cdot A2 \cdot \left(.25^{.5}\right) = 2.309 \times 10^{3}$$ $$(1 - FS) \cdot 2430 = 2.309 \times 10^{3}$$

Laminar_Door·A2 = 1319.14

Turbulent_Door·A2 = 3957.43

Tmax = ▪ Fahr

$A2 = 5.277 \times 10^{3}$ A3 = 291.018

Calculation of Inputs For 90/10 Split

$A3 := 100$ $FS := 0.1$

$Laminar\_Roof = 0.33$ $Turbulent\_Roof = 0.67$

$Laminar\_Door = 0.25$ $Turbulent\_Door = 0.75$

Given

$$FS \cdot 2430 = \left[Laminar\_Roof \cdot A3 \cdot (.25) + Turbulent\_Roof \cdot A3 \cdot \left(.25^{0.5}\right)\right]$$

$A3 := Find(A3)$

$A3 = 582.036$

$Laminar\_Roof \cdot A3 \cdot .25 + Turbulent\_Roof \cdot A3 \cdot \left(.25^{.5}\right) = 243$

$Laminar\_Roof \cdot A3 = 192.072$

$Turbulent\_Roof \cdot A3 = 389.964$

$A2 := 100$

Given

$$(1 - FS) \cdot 2430 = \left[Laminar\_Door \cdot A2 \cdot (.25) + Turbulent\_Door \cdot A2 \cdot \left(.25^{0.5}\right)\right]$$

$A2 := Find(A2)$

$A2 = 4998.86$

$Laminar\_Door \cdot A2 \cdot .25 + Turbulent\_Door \cdot A2 \cdot \left(.25^{.5}\right) = 2.187 \times 10^{3}$ $(1 - FS) \cdot 2430 = 2.187 \times 10^{3}$

$Laminar\_Door \cdot A2 = 1249.71$

$Turbulent\_Door \cdot A2 = 3749.14$

$Tmax = Fahr$

$A2 = 4.999 \times 10^{3}$ $A3 = 582.036$

80/20

Calculation of Inputs For 90/10 Split

$A3 := 100$ $FS := 0.2$

$Laminar\_Roof = 0.33$ $Turbulent\_Roof = 0.67$

$Laminar\_Door = 0.25$ $Turbulent\_Door = 0.75$

Given

$$FS \cdot 2430 = \left[Laminar\_Roof \cdot A3 \cdot (.25) + Turbulent\_Roof \cdot A3 \cdot \left(.25^{0.5}\right)\right]$$

+

$A3 := Find(A3)$

$A3 = 1164.072$

$Laminar\_Roof \cdot A3 \cdot .25 + Turbulent\_Roof \cdot A3 \cdot \left(.25^{.5}\right) = 486$

$Laminar\_Roof \cdot A3 = 384.144$

$Turbulent\_Roof \cdot A3 = 779.928$

$A2 := 100$

Given

$$(1 - FS) \cdot 2430 = \left[Laminar\_Door \cdot A2 \cdot (.25) + Turbulent\_Door \cdot A2 \cdot \left(.25^{0.5}\right)\right]$$

$A2 := Find(A2)$

$A2 = 4443.43$

$Laminar\_Door \cdot A2 \cdot .25 + Turbulent\_Door \cdot A2 \cdot \left(.25^{.5}\right) = 1.944 \times 10^3$ $(1 - FS) \cdot 2430 = 1.944 \times 10^3$

$Laminar\_Door \cdot A2 = 1110.86$

$Turbulent\_Door \cdot A2 = 3332.57$

Tmax = ■ Fdu

$A2 = 4.443 \times 10^3$ $A3 = 1.164 \times 10^3$

75/25

Calculation of Inputs For 90/10 Split

$A3 := 100$ $FS := 0.25$

$Laminar\_Roof = 0.33$ $Turbulent\_Roof = 0.67$

$Laminar\_Door = 0.25$ $Turbulent\_Door = 0.75$

Given

$$FS \cdot 2430 = \left[Laminar\_Roof \cdot A3 \cdot (.25) + Turbulent\_Roof \cdot A3 \cdot \left(.25^{0.5}\right)\right]$$

$A3 := Find(A3)$

$A3 = 1455.09$

$Laminar\_Roof \cdot A3 \cdot .25 + Turbulent\_Roof \cdot A3 \cdot \left(.25^{.5}\right) = 607.5$

$Laminar\_Roof \cdot A3 = 480.18$

$Turbulent\_Roof \cdot A3 = 974.91$

$A2 := 100$

Given

$$(1 - FS) \cdot 2430 = \left[Laminar\_Door \cdot A2 \cdot (.25) + Turbulent\_Door \cdot A2 \cdot \left(.25^{0.5}\right)\right]$$

$A2 := Find(A2)$

$A2 = 4165.71$

$Laminar\_Door \cdot A2 \cdot .25 + Turbulent\_Door \cdot A2 \cdot \left(.25^{.5}\right) = 1.822 \times 10^{3}$ $(1 - FS) \cdot 2430 = 1.822 \times 10^{3}$

$Laminar\_Door \cdot A2 = 1041.43$

$Turbulent\_Door \cdot A2 = 3124.29$

$Tmax = \blacksquare\, Fahr$

$A2 = 4.166 \times 10^{3}$ $A3 = 1.455 \times 10^{3}$

70/50

Calculation of Inputs For 90/10 Split

$A3 := 100$ $FS := 0.3$

$Laminar\_Roof = 0.33$ $Turbulent\_Roof = 0.67$

$Laminar\_Door = 0.25$ $Turbulent\_Door = 0.75$

Given

$$FS \cdot 2430 = \left[Laminar\_Roof \cdot A3 \cdot (.25) + Turbulent\_Roof \cdot A3 \cdot \left(.25^{0.5}\right)\right]$$ +

$A3 := Find(A3)$

$A3 = 1746.108$

$Laminar\_Roof \cdot A3 \cdot .25 + Turbulent\_Roof \cdot A3 \cdot \left(.25^{.5}\right) = 729$

$Laminar\_Roof \cdot A3 = 576.216$

$Turbulent\_Roof \cdot A3 = 1169.892$

$A2 := 100$

Given

$$(1 - FS) \cdot 2430 = \left[Laminar\_Door \cdot A2 \cdot (.25) + Turbulent\_Door \cdot A2 \cdot \left(.25^{0.5}\right)\right]$$

$A2 := Find(A2)$

$A2 = 3888$

$Laminar\_Door \cdot A2 \cdot .25 + Turbulent\_Door \cdot A2 \cdot \left(.25^{.5}\right) = 1.701 \times 10^{3}$ $(1 - FS) \cdot 2430 = 1.701 \times 10^{3}$

$Laminar\_Door \cdot A2 = 972$

$Turbulent\_Door \cdot A2 = 2916$

$Tmax = \blacksquare Fahr$ $A2 = 3.888 \times 10^{3}$ $A3 = 1.746 \times 10^{3}$

65/75

Calculation of Inputs For 90/10 Split

A3 := 100 FS := 0.35

Laminar_Roof = 0.33 Turbulent_Roof = 0.67

Laminar_Door = 0.25 Turbulent_Door = 0.75

Given

$FS \cdot 2430 = \left[Laminar\_Roof \cdot A3 \cdot (.25) + Turbulent\_Roof \cdot A3 \cdot \left(.25^{0.5}\right)\right]$

A3 := Find(A3)

A3 = 2037.126

$Laminar\_Roof \cdot A3 \cdot .25 + Turbulent\_Roof \cdot A3 \cdot \left(.25^{.5}\right) = 850.5$

Laminar_Roof·A3 = 672.251

Turbulent_Roof·A3 = 1364.874

A2 := 100

Given

$(1 - FS) \cdot 2430 = \left[Laminar\_Door \cdot A2 \cdot (.25) + Turbulent\_Door \cdot A2 \cdot \left(.25^{0.5}\right)\right]$

A2 := Find(A2)

A2 = 3610.29

$Laminar\_Door \cdot A2 \cdot .25 + Turbulent\_Door \cdot A2 \cdot \left(.25^{.5}\right) = 1.579 \times 10^{3}$ $(1 - FS) \cdot 2430 = 1.579 \times 10^{3}$

Laminar_Door·A2 = 902.57

Turbulent_Door·A2 = 2707.71

Tmax = Fehr

$A2 = 3.61 \times 10^{3}$ $A3 = 2.037 \times 10^{3}$

60/40

Calculation of Inputs For 90/10 Split

$A3 := 100$ $FS := 0.4$

$Laminar\_Roof = 0.33$ $Turbulent\_Roof = 0.67$

$Laminar\_Door = 0.25$ $Turbulent\_Door = 0.75$

Given

$$FS \cdot 2430 = \left[Laminar\_Roof \cdot A3 \cdot (.25) + Turbulent\_Roof \cdot A3 \cdot \left(.25^{0.5}\right)\right]$$

+

$A3 := Find(A3)$

$A3 = 2328.144$

$Laminar\_Roof \cdot A3 \cdot .25 + Turbulent\_Roof \cdot A3 \cdot \left(.25^{.5}\right) = 972$

$Laminar\_Roof \cdot A3 = 768.287$

$Turbulent\_Roof \cdot A3 = 1559.856$

$A2 := 100$

Given

$$(1 - FS) \cdot 2430 = \left[Laminar\_Door \cdot A2 \cdot (.25) + Turbulent\_Door \cdot A2 \cdot \left(.25^{0.5}\right)\right]$$

$A2 := Find(A2)$

$A2 = 3332.57$

$Laminar\_Door \cdot A2 \cdot .25 + Turbulent\_Door \cdot A2 \cdot \left(.25^{.5}\right) = 1.458 \times 10^{3}$ $(1 - FS) \cdot 2430 = 1.458 \times 10^{3}$

$Laminar\_Door \cdot A2 = 833.14$

$Turbulent\_Door \cdot A2 = 2499.43$

$Tmax = \blacksquare\ Fahr$

$A2 = 3.333 \times 10^{3}$ $A3 = 2.328 \times 10^{3}$

55/45

Calculation of Inputs For 90/10 Split

$A3 := 100$ $FS := 0.45$

Laminar_Roof = 0.33 Turbulent_Roof = 0.67

Laminar_Door = 0.25 Turbulent_Door = 0.75

Given

$$FS \cdot 2430 = \left[Laminar\_Roof \cdot A3 \cdot (.25) + Turbulent\_Roof \cdot A3 \cdot \left(.25^{0.5}\right)\right]$$

+

$A3 := Find(A3)$

$A3 = 2619.162$

$Laminar\_Roof \cdot A3 \cdot .25 + Turbulent\_Roof \cdot A3 \cdot \left(.25^{.5}\right) = 1.093 \times 10^{3}$

$Laminar\_Roof \cdot A3 = 864.323$

$Turbulent\_Roof \cdot A3 = 1754.838$

$A2 := 100$

Given

$$(1 - FS) \cdot 2430 = \left[Laminar\_Door \cdot A2 \cdot (.25) + Turbulent\_Door \cdot A2 \cdot \left(.25^{0.5}\right)\right]$$

$A2 := Find(A2)$

$A2 = 3054.86$

$Laminar\_Door \cdot A2 \cdot .25 + Turbulent\_Door \cdot A2 \cdot \left(.25^{.5}\right) = 1.336 \times 10^{3}$ $(1 - FS) \cdot 2430 = 1.337 \times 10^{3}$

$Laminar\_Door \cdot A2 = 763.71$

$Turbulent\_Door \cdot A2 = 2291.14$

Tmix = ∎ Fahr

$A2 = 3.055 \times 10^{3}$ $A3 = 2.619 \times 10^{3}$

Hf'ld G-18

50/50

Calculation of Inputs For 90/10 Split

A3 := 100

FS := 0.5

Laminar_Roof = 0.33   Turbulent_Roof = 0.67

Laminar_Door = 0.25   Turbulent_Door = 0.75

Given

+

$$FS \cdot 2430 = \left[Laminar\_Roof \cdot A3 \cdot (.25) + Turbulent\_Roof \cdot A3 \cdot \left(.25^{0.5}\right)\right]$$

A3 := Find(A3)

A3 = 2910.18

$$Laminar\_Roof \cdot A3 \cdot .25 + Turbulent\_Roof \cdot A3 \cdot \left(.25^{.5}\right) = 1.215 \times 10^{3}$$

Laminar_Roof·A3 = 960.359

Turbulent_Roof·A3 = 1949.82

A2 := 100

Given

$$(1 - FS) \cdot 2430 = \left[Laminar\_Door \cdot A2 \cdot (.25) + Turbulent\_Door \cdot A2 \cdot \left(.25^{0.5}\right)\right]$$

A2 := Find(A2)

A2 = 2777.14

$$Laminar\_Door \cdot A2 \cdot .25 + Turbulent\_Door \cdot A2 \cdot \left(.25^{.5}\right) = 1.215 \times 10^{3}$$

$$(1 - FS) \cdot 2430 = 1.215 \times 10^{3}$$ ✓

Laminar_Door·A2 = 694.29

Turbulent_Door·A2 = 2082.86

Tmax = ■ Fahr

$A2 = 2.777 \times 10^{3}$ $A3 = 2.91 \times 10^{3}$

Calculation of Inputs For 90/10 Split

$A3 := 100$ $FS := 0.55$

$Laminar\_Roof = 0.33$ $Turbulent\_Roof = 0.67$

$Laminar\_Door = 0.25$ $Turbulent\_Door = 0.75$

Given

$$FS \cdot 2430 = \left[Laminar\_Roof \cdot A3 \cdot (.25) + Turbulent\_Roof \cdot A3 \cdot \left(.25^{0.5}\right)\right]$$

$A3 := Find(A3)$

$A3 = 3201.198$

$Laminar\_Roof \cdot A3 \cdot .25 + Turbulent\_Roof \cdot A3 \cdot \left(.25^{.5}\right) = 1.336 \times 10^3$

$Laminar\_Roof \cdot A3 = 1056.395$

$Turbulent\_Roof \cdot A3 = 2144.802$

$A2 := 100$

Given

$$(1 - FS) \cdot 2430 = \left[Laminar\_Door \cdot A2 \cdot (.25) + Turbulent\_Door \cdot A2 \cdot \left(.25^{0.5}\right)\right]$$

$A2 := Find(A2)$

$A2 = 2499.43$

$Laminar\_Door \cdot A2 \cdot .25 + Turbulent\_Door \cdot A2 \cdot \left(.25^{.5}\right) = 1.093 \times 10^3$ $(1 - FS) \cdot 2430 = 1.093 \times 10^3$

$Laminar\_Door \cdot A2 = 624.86$

$Turbulent\_Door \cdot A2 = 1874.57$

Tmax = ▮ Fahr

$A2 = 2.499 \times 10^3$ $A3 = 3.201 \times 10^3$

G-20

40/60

Calculation of Inputs For 90/10 Split

A3 := 100 FS := 0.6

Laminar_Roof = 0.33 Turbulent_Roof = 0.67

Laminar_Door = 0.25 Turbulent_Door = 0.75

Given

$FS \cdot 2430 = \left[Laminar\_Roof \cdot A3 \cdot (.25) + Turbulent\_Roof \cdot A3 \cdot \left(.25^{0.5}\right)\right]$

A3 := Find(A3)

A3 = 3492.216

$Laminar\_Roof \cdot A3 \cdot .25 + Turbulent\_Roof \cdot A3 \cdot \left(.25^{.5}\right) = 1.458 \times 10^3$

Laminar_Roof·A3 = 1152.431

Turbulent_Roof·A3 = 2339.784

A2 := 100

Given

$(1 - FS) \cdot 2430 = \left[Laminar\_Door \cdot A2 \cdot (.25) + Turbulent\_Door \cdot A2 \cdot \left(.25^{0.5}\right)\right]$

A2 := Find(A2)

A2 = 2221.71

$Laminar\_Door \cdot A2 \cdot .25 + Turbulent\_Door \cdot A2 \cdot \left(.25^{.5}\right) = 972$ $(1 - FS) \cdot 2430 = 972$

Laminar_Door·A2 = 555.43

Turbulent_Door·A2 = 1666.29

Tmax = ▪ Falu

$A2 = 2.222 \times 10^3$ $A3 = 3.492 \times 10^3$

35/65

Calculation of Inputs For 90/10 Split

A3 := 100 FS := 0.65

Laminar_Roof = 0.33 Turbulent_Roof = 0.67

Laminar_Door = 0.25 Turbulent_Door = 0.75

Given +

$$FS \cdot 2430 = \left[Laminar\_Roof \cdot A3 \cdot (.25) + Turbulent\_Roof \cdot A3 \cdot \left(.25^{0.5}\right)\right]$$

A3 := Find(A3)

A3 = 3783.234

$Laminar\_Roof \cdot A3 \cdot .25 + Turbulent\_Roof \cdot A3 \cdot \left(.25^{.5}\right) = 1.579 \times 10^3$

$Laminar\_Roof \cdot A3 = 1248.467$

$Turbulent\_Roof \cdot A3 = 2534.766$

A2 := 100

Given

$$(1 - FS) \cdot 2430 = \left[Laminar\_Door \cdot A2 \cdot (.25) + Turbulent\_Door \cdot A2 \cdot \left(.25^{0.5}\right)\right]$$

A2 := Find(A2)

A2 = 1944

$Laminar\_Door \cdot A2 \cdot .25 + Turbulent\_Door \cdot A2 \cdot \left(.25^{.5}\right) = 850.5$ $(1 - FS) \cdot 2430 = 850.5$

$Laminar\_Door \cdot A2 = 486$

$Turbulent\_Door \cdot A2 = 1458$

Tmax = Fdr

$A2 = 1.944 \times 10^3$ $A3 = 3.783 \times 10^3$

6-22

30/70

Calculation of Inputs For 90/10 Split

$A3 := 100$ $FS := 0.7$

$Laminar\_Roof = 0.33$ $Turbulent\_Roof = 0.67$

$Laminar\_Door = 0.25$ $Turbulent\_Door = 0.75$

Given

$$FS \cdot 2430 = \left[Laminar\_Roof \cdot A3 \cdot (.25) + Turbulent\_Roof \cdot A3 \cdot \left(.25^{0.5}\right)\right]$$

$A3 := Find(A3)$

$A3 = 4074.251$

$Laminar\_Roof \cdot A3 \cdot .25 + Turbulent\_Roof \cdot A3 \cdot \left(.25^{.5}\right) = 1.701 \times 10^3$

$Laminar\_Roof \cdot A3 = 1344.503$

$Turbulent\_Roof \cdot A3 = 2729.749$

p. 47

$A2 := 100$

Given

$$(1 - FS) \cdot 2430 = \left[Laminar\_Door \cdot A2 \cdot (.25) + Turbulent\_Door \cdot A2 \cdot \left(.25^{0.5}\right)\right]$$

$A2 := Find(A2)$

$A2 = 1666.29$

$Laminar\_Door \cdot A2 \cdot .25 + Turbulent\_Door \cdot A2 \cdot \left(.25^{.5}\right) = 729$ $(1 - FS) \cdot 2430 = 729$

$Laminar\_Door \cdot A2 = 416.57$

$Turbulent\_Door \cdot A2 = 1249.71$

Tmax = ▪ Fahr

$A2 = 1.666 \times 10^3$ $A3 = 4.074 \times 10^3$

25/75

Calculation of Inputs For 90/10 Split

A3 := 100 FS := 0.75

Laminar_Roof = 0.33 Turbulent_Roof = 0.67

Laminar_Door = 0.25 Turbulent_Door = 0.75

Given

$FS \cdot 2430 = [Laminar\_Roof \cdot A3 \cdot (.25) + Turbulent\_Roof \cdot A3 \cdot (.25^{0.5})]$

A3 := Find(A3)

A3 = 4365.269

$Laminar\_Roof \cdot A3 \cdot .25 + Turbulent\_Roof \cdot A3 \cdot (.25^{.5}) = 1.822 \times 10^{3}$

Laminar_Roof·A3 = 1440.539

Turbulent_Roof·A3 = 2924.731

A2 := 100

Given

$(1 - FS) \cdot 2430 = [Laminar\_Door \cdot A2 \cdot (.25) + Turbulent\_Door \cdot A2 \cdot (.25^{0.5})]$

A2 := Find(A2)

A2 = 1388.57

$Laminar\_Door \cdot A2 \cdot .25 + Turbulent\_Door \cdot A2 \cdot (.25^{.5}) = 607.5$ $(1 - FS) \cdot 2430 = 607.5$

Laminar_Door·A2 = 347.14

Turbulent_Door·A2 = 1041.43

Tmax = ■ Fahr

$A2 = 1.389 \times 10^{3}$ $A3 = 4.365 \times 10^{3}$

20/80

Calculation of Inputs For 90/10 Split

A3 := 100 FS := 0.8

Leminar_Roof = 0.33 Turbulent_Roof = 0.67

Leminar_Door = 0.25 Turbulent_Door = 0.75

+

Given

$FS \cdot 2430 = \left[Leminar\_Roof \cdot A3 \cdot (.25) + Turbulent\_Roof \cdot A3 \cdot \left(.25^{0.5}\right)\right]$

A3 := Find(A3)

A3 = 4656.287

$Leminar\_Roof \cdot A3 \cdot .25 + Turbulent\_Roof \cdot A3 \cdot \left(.25^{.5}\right) = 1.944 \times 10^{3}$

Leminar_Roof·A3 = 1536.575

Turbulent_Roof·A3 = 3119.713

A2 := 100

Given

$(1 - FS) \cdot 2430 = \left[Leminar\_Door \cdot A2 \cdot (.25) + Turbulent\_Door \cdot A2 \cdot \left(.25^{0.5}\right)\right]$

A2 := Find(A2)

A2 = 1110.86

$Leminar\_Door \cdot A2 \cdot .25 + Turbulent\_Door \cdot A2 \cdot \left(.25^{.5}\right) = 486$ $(1 - FS) \cdot 2430 = 486$

Leminar_Door·A2 = 277.71

Turbulent_Door·A2 = 833.14

Tmax = ▮ Fdır

$A2 = 1.111 \times 10^{3}$ $A3 = 4.656 \times 10^{3}$

Calculation of Inputs For 90/10 Split

A3 := 100 FS := 0.85

Laminar_Roof = 0.33 Turbulent_Roof = 0.67

Laminar_Door = 0.25 Turbulent_Door = 0.75

Given

$$FS \cdot 2430 = \left[Laminar\_Roof \cdot A3 \cdot (.25) + Turbulent\_Roof \cdot A3 \cdot \left(.25^{0.5}\right)\right]$$

A3 := Find(A3)

A3 = 4947.305

$$Laminar\_Roof \cdot A3 \cdot .25 + Turbulent\_Roof \cdot A3 \cdot \left(.25^{.5}\right) = 2.065 \times 10^{3}$$

Laminar_Roof·A3 = 1632.611

Turbulent_Roof·A3 = 3314.695

A2 := 100

Given

$$(1 - FS) \cdot 2430 = \left[Laminar\_Door \cdot A2 \cdot (.25) + Turbulent\_Door \cdot A2 \cdot \left(.25^{0.5}\right)\right]$$

A2 := Find(A2)

A2 = 833.14

$$Laminar\_Door \cdot A2 \cdot .25 + Turbulent\_Door \cdot A2 \cdot \left(.25^{.5}\right) = 364.5$$ $(1 - FS) \cdot 2430 = 364.5$

Laminar_Door·A2 = 208.29

Turbulent_Door·A2 = 624.86

Tmax = ■ Fahr

A2 = 833.143 $A3 = 4.947 \times 10^{3}$

10/90

Calculation of Inputs For 90/10 Split

A3 := 100

FS := 0.9

Laminar_Roof = 0.33   Turbulent_Roof = 0.67

Laminar_Door = 0.25   Turbulent_Door = 0.75

Given

+

$$FS\cdot 2430 = \left[Laminar\_Roof\cdot A3\cdot(.25) + Turbulent\_Roof\cdot A3\cdot\left(.25^{0.5}\right)\right]$$

A3 := Find(A3)

A3 = 5238.323

$$Laminar\_Roof\cdot A3\cdot .25 + Turbulent\_Roof\cdot A3\cdot\left(.25^{.5}\right) = 2.187\times 10^{3}$$

Laminar_Roof·A3 = 1728.647

Turbulent_Roof·A3 = 3509.677

A2 := 100

Given

$$(1 - FS)\cdot 2430 = \left[Laminar\_Door\cdot A2\cdot(.25) + Turbulent\_Door\cdot A2\cdot\left(.25^{0.5}\right)\right]$$

A2 := Find(A2)

A2 = 555.43

$$Laminar\_Door\cdot A2\cdot .25 + Turbulent\_Door\cdot A2\cdot\left(.25^{.5}\right) = 243$$

$$(1 - FS)\cdot 2430 = 243$$

Laminar_Door·A2 = 138.86

Turbulent_Door·A2 = 416.57

Tmax = ▮ Fahr

A2 = 555.429 $A3 = 5.238\times 10^{3}$

5/95

Calculation of Inputs For 90/10 Split

$A3 := 100$ $FS := 0.95$

$Laminar\_Roof = 0.33$ $Turbulent\_Roof = 0.67$

$Laminar\_Door = 0.25$ $Turbulent\_Door = 0.75$

+

Given

$$FS \cdot 2430 = \left[Laminar\_Roof \cdot A3 \cdot (.25) + Turbulent\_Roof \cdot A3 \cdot \left(.25^{0.5}\right)\right]$$

$A3 := Find(A3)$

$A3 = 5529.341$

$Laminar\_Roof \cdot A3 \cdot .25 + Turbulent\_Roof \cdot A3 \cdot \left(.25^{.5}\right) = 2.308 \times 10^{3}$

$Laminar\_Roof \cdot A3 = 1824.683$

$Turbulent\_Roof \cdot A3 = 3704.659$

$A2 := 100$

Given

$$(1 - FS) \cdot 2430 = \left[Laminar\_Door \cdot A2 \cdot (.25) + Turbulent\_Door \cdot A2 \cdot \left(.25^{0.5}\right)\right]$$

$A2 := Find(A2)$

$A2 = 277.71$

$Laminar\_Door \cdot A2 \cdot .25 + Turbulent\_Door \cdot A2 \cdot \left(.25^{.5}\right) = 121.5$ $(1 - FS) \cdot 2430 = 121.5$

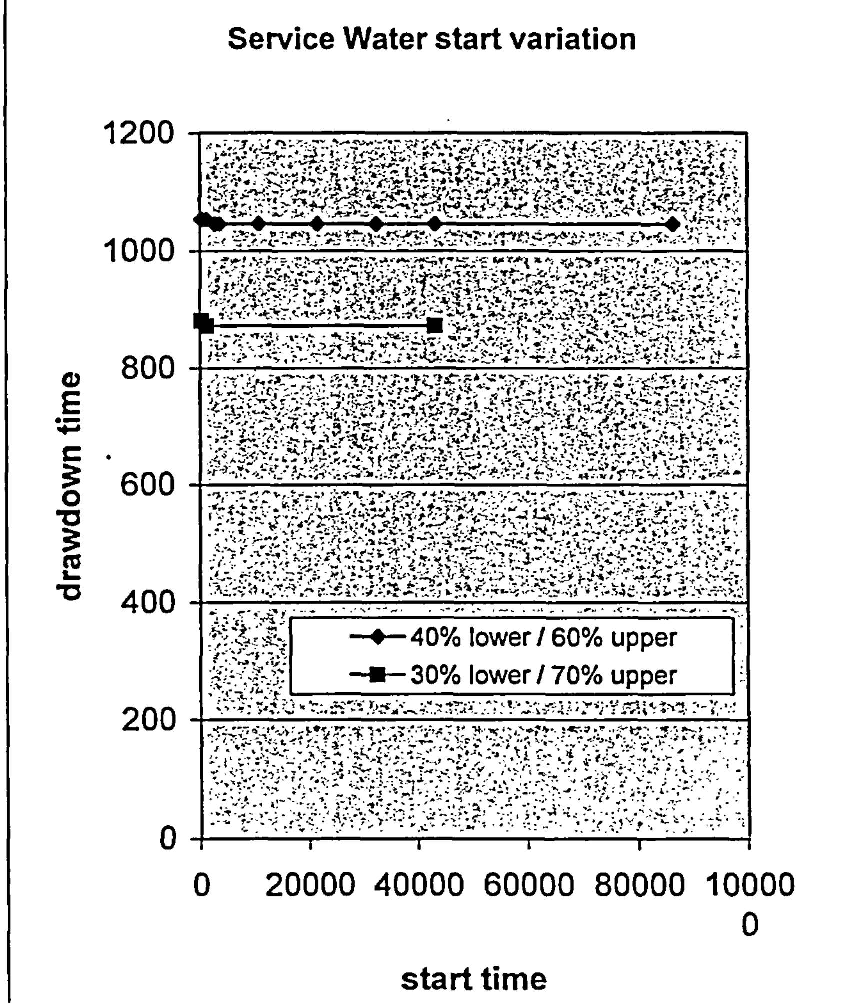
$Laminar\_Door \cdot A2 = 69.43$

$Turbulent\_Door \cdot A2 = 208.29$

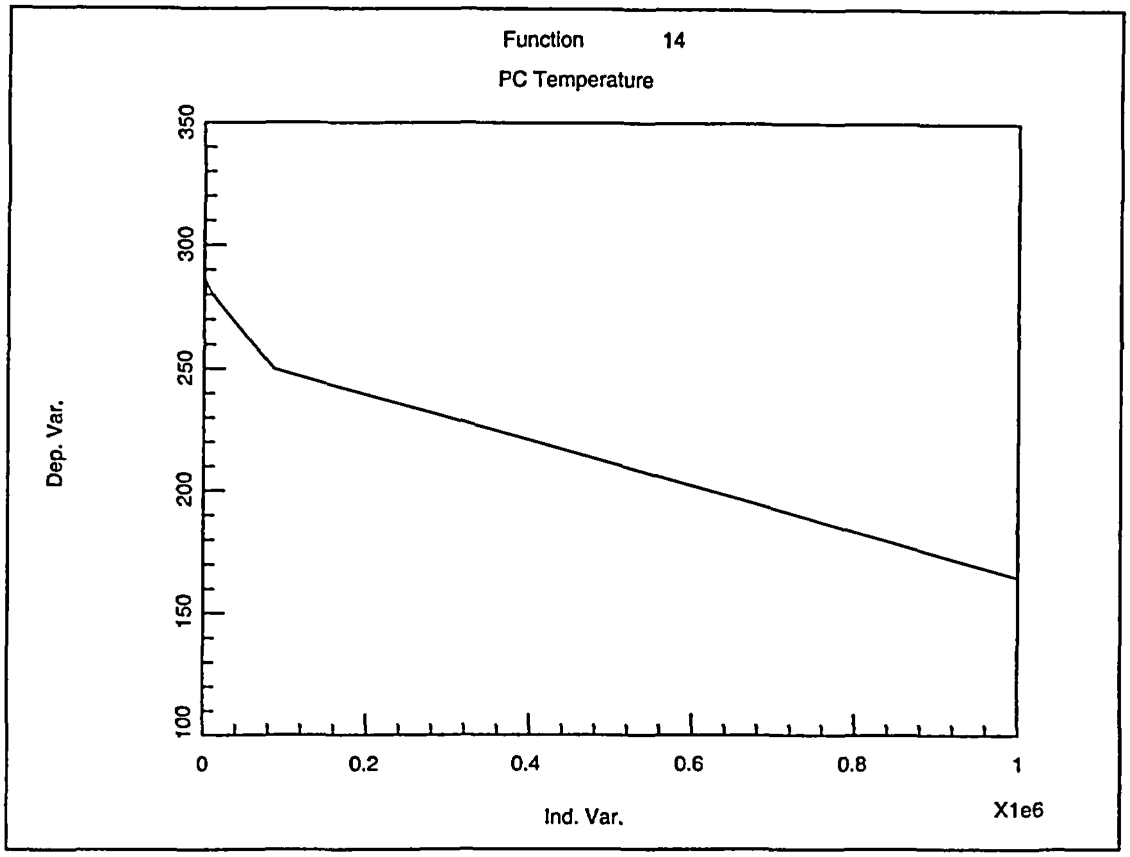
$Tmax = \blacksquare Fahr$ $A2 = 277.714$ $A3 = 5.529 \times 10^{3}$

SW start variation

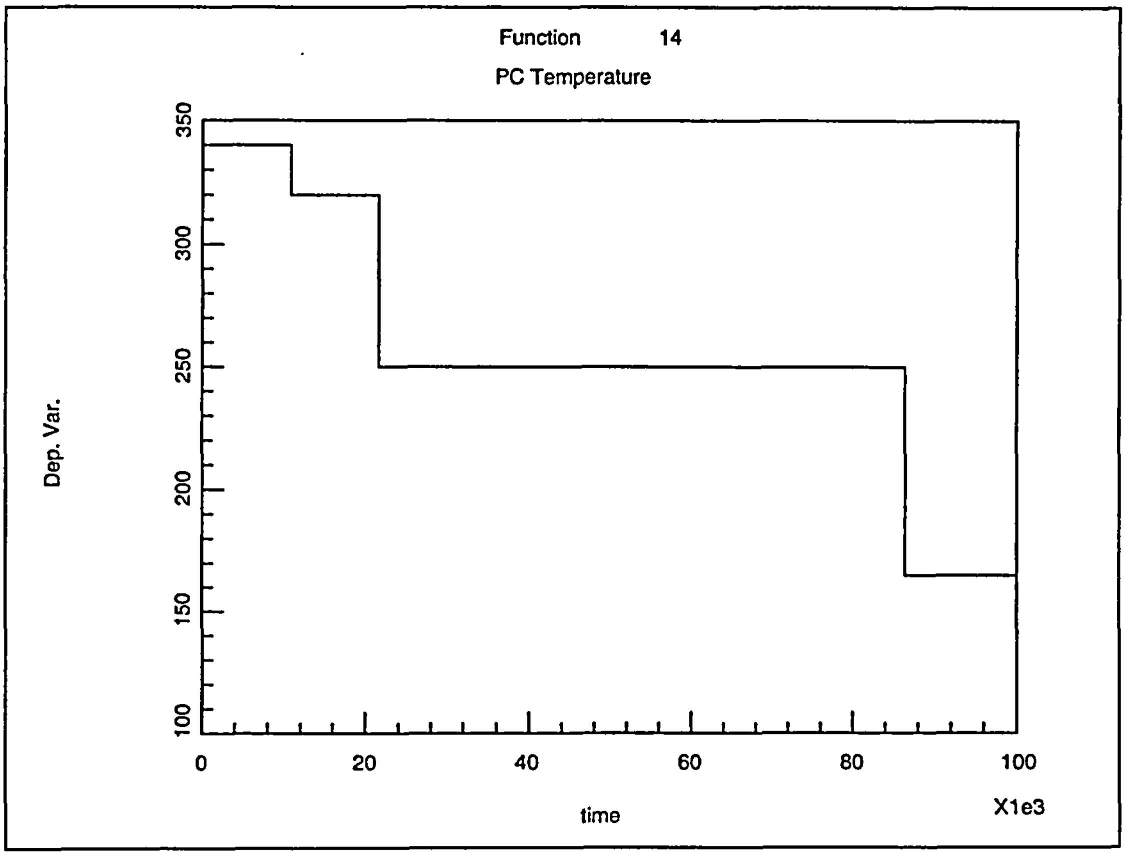
flow path fraction			cold air/east wind with flow split results		
path 1 LOWER	path 2 UPPER	SW delay sec	CASE FILENAME	notes	DD TIME sec
0.3	0.7		T30FFWyyyy		
		300	T30FFW05mn	5 min	881
		1200	T30FFW20mn	20 min	872
		43200	T30FFW12hr	12 hr	872
0.4	0.6		T40FFWyyyy		
		300	T40FFW05mn	5 min	1053
		1200	T40FFW20mn	20 min	1053
		2700	T40FFW45mn	45 min	1045
		3600	T40FFW01hr	1 hr	1045
		10800	T40FFW03hr	3 hr	1045
		21600	T40FFW06hr	6 hr	1045
		32400	T40FFW09hr	9 hr	1045
		43200	T40FFW12hr	12 hr	1045
		86400	T40FFW24hr	24 hr	1045



Cold Air with Easterly wind and 70/30 leakage flow split
Jun/09/2004 12:12:45
GOTHIC Version 7.1(QA) - January 2003
File: G:\GOTHIC\MODELS\TNMFFW12hr+



Cold Air with Easterly wind and 70/30 leakage flow split
Jun/09/2004 12:56:25
GOTHIC Version 7.1(QA) - January 2003
File: G:\GOTHIC\MODELS\TNMFFW12hr_PC



Proprietary versions of Supporting Calculations

1. Polestar Applied Technology Affidavit for Withholding Proprietary Information, dated September 21, 2004
2. Energy Northwest Calculation NE-02-04-05, "Columbia Offsite and Control Room Doses for LOCA using AST and NRC Methods" Revision 0, dated August 4, 2004
3. Energy Northwest Calculation NE-02-03-15, "POST-LOCA SUPPRESSION POOL pH" Revision 0, dated August 3, 2004

List of Regulatory Commitments

Page 5

The updating of the FSAR to reflect these changes will be performed as part of the implementation of the LAR

Page 42

New procedural guidance is required to address reliance on SLC for pH control. The appropriate procedural guidance will be established during the implementation of the LAR. (See section 4.8.1 for additional information on the SLC system and the justification for the use of SLC in this application.)

Page 48

To preclude this undesirable operator action, the appropriate plant procedure(s) will be revised to prohibit the securing of a CREF train within the first 10 hours of the design basis LOCA.

Page 71

New procedural guidance is required to address reliance on SLC for pH control. The appropriate procedural guidance will be established during the implementation of the LAR. (See section 4.8.1 for additional information on the SLC system and the justification for the use of SLC in this application.)

Page 72

The TSGs will be revised to require manual initiation of the SLC system, at a level of 14,000 R/hr, and to continue injection until the SLC tank low level alarm is received.

Page 72

In addition, Technical Support Center (TSC) Operations Managers will receive training on the TSG revisions as part of the implementation of the approved AST changes.

Page 73

In addition, the changes to the TSGs for high containment radiation will instruct the operators to inject until low tank signal is received.