Attachment 6

Millstone Nuclear Power Station, Unit No. 3

Calculation WM(B)-02
Normalized X/Q at the Unit 3 Control Room For
Releases From the Unit 1 Stack

CALCULATION TITLE PAGE

Total Number of Pages: 30

Normalized X/Q at the Unit 3 Control Room For Releases From the Unit 1 Stack

TITLE

N/A	0	RBVS/SLCRS
CALCULATION #	**REVISION No.**	**SYSTEM NAME**
WM(B)-02	CB	3314I
VENDOR CALCULATION NUMBER	**Structure**	**System Number**

NUCLEAR INDICATOR:	Calc. Supports DCR/MMOD?	Calc. Supports Ind. Analysis?	N/A
☒CAT1 ☐RWQA ☐SBOQA ☐FPQA ☐ATWSQA ☐NON-QA	☒YES ☐ NO	☐YES ☒NO	**Component**
	↓	↓	
	M3-98-029	N/A	
	DCR/MMOD No.	**Reference**	

INCORPORATES:

CCN NO:	AGAINST REV.
N/A	N/A

Executive Summary

THIS IS FORMAL APPROVAL OF A QA APPROVED VENDOR CALCULATION. NO (NU) IR IS REQUIRED.

REC'D 6-8-98
ON HOLD
CDS 6/17/98
CDS QC 6/24/98
NRP ✓ TJ

Approvals (Print & Sign Name)

Preparer::James L. Wheeler		Date: 5/27/98
Interdiscipline Reviewer:N/A	Discipline:	Date:
Interdiscipline Reviewer:N/A	Discipline:	Date:
Independent Reviewer:N/A		Date:
Supervisor: William Eakin		Date: 5/27/98

Installation Verification

☒ Calculation accurately reflects plant configuration, OR

☐ N/A does not affect plant configuration)

Preparer/Designer Engineer:JAMES L. WHEELER Date: 5/27/98

PassPort DATABASE INPUTs

CH #4

Calculation Number: N/A (prefix) N/A (sequence no.) N/A (suffix) Revision: N/A

Vendor Calculation Number/Other: 03703.7002-WM(B)-02 Revision: 0

CCN # N/A QA ☒ Yes ☐ No Calc Voided: ☐ Yes ☒ No

Superseded By: N/A Supersedes Calc: N/A

Discipline (Up to 10) N,A,Z

Unit	Project Reference (EWA)	Component Id	Computer Code	Rev. No./ Level No.
3	N/A	N/A	EN-113	6/8

PMMS CODES*				
Structure	System	Component	Reference Calculation	Rev No.
CB	RBV	N/A	N/A	N/A

*The codes required must be alpha codes designed for structure, system and component.

Reference Drawing	Sheet	Rev. No.
25212-10002	A	11
25212-11000	A	9

Comments:

Table of Contents

Title page	1A
CTP Database	1B
Table of Contents	1C
Vendor Calculation Pages	1 thru 12
Appendix 1	15 pages
Total number of pages	30

5010.65

STONE & WEBSTER ENGINEERING CORPORATION
CALCULATION TITLE PAGE

CLIENT & PROJECT:	PAGE 1 of 12
NORTHEAST UTILITIES - MILLSTONE UNIT 3	Total Pages: 27 w/attachments pages
CALCULATION TITLE:	QA CATEGORY (✓)
Normalized Concentrations (X/Q) at Unit 3 Control Room Air Intake for Gaseous Releases from the Top of the Unit 1 Stack Under Fumigation and Non-Fumigation Conditions	☑ I

CALCULATION IDENTIFICATION NUMBER				OPTIONAL WORK PACKAGE NO.
JOB ORDER NO.	DISCIPLINE	CURRENT CALC NO	OPTIONAL TASK CODE	
037037002	WM(B)	02 Rev 0		

APPROVALS - SIGNATURE & DATE			REVISION NO. OR NEW CALCULATION NO.	SUPERSEDES CALCULATION NO. OR REVISON NO.	CONFIRMATION REQUIRED (✓)	
PREPARES(S) / DATE(S)	REVIEWER(S) / DATES(S)	INDEPENDENT REVIEWER(S) / DATE(S)			YES	NO
S. A. Vigeant Stephen A. Vigeant 5/21/98	C. A. Mazzola Carl A. Mazzola 5/21/98	C. A. Mazzola Carl A. Mazzola 5/21/98	0			✓

DISTRIBUTION

GROUP	NAME & LOCATION	COPY SENT (✓)	GROUP	NAME & LOCATION	COPY SENT (✓)
Record Mgmt. File (or Fire File if none)					
~~Lead Environmental Specialist~~	~~Carl A. Mazzola Atlanta~~				
	Steven A. Vigeant Boston	CC			
~~Project Files~~	~~Charlie Croman Boston~~				
NU RAD PROT	RJ Schmidt New Britain	CC			
NUNDS	MP3 Site	ORIGINAL			
SWEC Rad Prot	S Ferguson (Boston)	CC			

STONE & WEBSTER ENGINEERING CORPORATION

5010.65

CALCULATION SHEET

CALCULATION IDENTIFICATION NUMBER				
JOB ORDER NO.	DISCIPLINE	CALCULATION NO.	OPTIONAL TASK CODE	PAGE
037037002	WM(B)	02 Rev 0		2 OF 12

CHANGE HISTORY PAGE

REVISION NO.	DESCRIPTION OF CHANGES	PAGES REVISED	PAGES ADDED	PAGES REPLACED
0	0	N/A.		

TABLE OF CONTENTS

COVER PAGE 1

CHANGE HISTORY PAGE 2

TABLE OF CONTENTS 3

OBJECTIVE 4

METHODOLOGY 4

ASSUMPTIONS 4

DATA 4

EQUATION .....

CALCULATION 5

CONCLUSIONS 5

REFERENCES 6

ATTACHMENTS 6

APPENDICES 6

OBJECTIVE

To calculate the normalized atmospheric dispersion (X/Q) values at the Unit 3 Control Room air intake for a gaseous release from the top of the Unit 1 stack under fumigation conditions for the 0 - 4 hour period and under non-fumigation conditions for the remaining averaging periods of 4-8 hours, 8-24 hours, 1-4 days, and 4-30 days.

METHODOLOGY

The applicable methodology is identified in Regulatory Guide 1.145 (Ref. 1). The fumigation X/Q is used for the first 4 hours of the accident. The non-fumigation X/Qs for the longer averaging times are derived from the log-log interpolation between the 2-hour and annual average value obtained from Ref. 3 using 1974 to 1981 on-site meteorological data (Ref. 4). The highest annual average X/Q from among the affected downwind sectors is taken Ref. 3. The affected downwind sectors (W, WNW, NW, and NNW) are determined using the "s/d" method from Ref. 9 (see Data Section).

ASSUMPTIONS

1. It is conservatively assumed that the sea breeze fumigation condition is occurring simultaneously with the onset of an accident condition with the wind direction moving the plume centerline towards the Unit 3 CR intake located on the control building.

2. It is conservatively assumed that the NRC recommended wind speed of 2.0 meters per second in Regulatory Guide 1.145 is representative of the fumigation layer. Fumigation most frequently occurs at higher wind speeds (Ref. 5). The top of the fumigation layer is located at the centerline of the elevated plume, while the bottom of the fumigation layer is conservatively located at the shortest roof height in the control building complex (Ref. 8) rather than ground level. The stack effluent is uniformly mixed in the vertical fumigation layer which normally extends from stack top to ground level.

3. It is conservatively assumed that the effective stack height is the same as the actual stack height. Therefore, no credit is taken for plume rise that can occur due to either thermal buoyancy, where the plume is warmer than the ambient air it is being released into, or mechanical rise due to its efflux velocity.

4. The sea breeze fumigation condition is assumed to persist for the 0-4 hour period which is consistent with the NRC recommendation in Ref. 1 for off-site calculations. Although sea breeze fumigation can persist for longer periods of time, the point of fumigation moves with time due to sea breeze inland penetration and backing due to the Coriolis effect forming a helical track down the coastline (Ref. 5).

5. It is assumed that the Unit 3 control room air intake X/Q values are representative of the X/Q values for the center of the Unit 3 control room given that the distances and directions from the release to these receptors are very similar.

DATA

Top of stack = plant elevation 389.0 ft MSL (Ref. 6)
Bottom of stack = plant elevation 14.0 ft MSL (Ref. 6)
Height of lowest roof top in control building complex = plant elevation 64.5 ft MSL (Ref. 8)
h_e = Height from stack top to bottom of fumigation layer = 389.0 ft - 64.5 ft = 324.5 ft = 98.9 m
u_{he} = Wind speed representative of the fumigation layer = 2.0 m/sec (Ref. 1)
Distance (s) from stack to Unit 3 control room air intake = 1165 ft = 355 m (Ref. 7)
Direction from stack to Unit 3 control room air intake = 130° (Ref. 7)
Diameter (d) of stack top =7.0 ft = 2.1 m (Ref. 6)
s/d = 355 m/2.1 m = 169.1 or 3 sectors (3 x 22.5° = 68° or 130° - 34° = 96° to 130° + 34° = 164° (Ref. 9)
Wind directions 96° to 164° include the 22.5° downwind sectors of W, WNW, NW, and NNW
σ_z @ 355 m for F-stability class = 14.51 m (Ref. 2)

EQUATION

$X/Q = [(2\pi)^{1/2}(u_{he})\sigma_y(h_e)]^{-1}$ (Ref. 1)

CALCULATION

Unit 1 Stack to Unit 3 Control Room Air Intake

u_{he} = 2.0 m/sec (Ref. 1)
σ_y @ 355 m for F-stability class = 14.51 m (Ref. 2)
h_e = 98.9 m

Short-Term X/Q Value for Unit 3 Intake (0 - 4 Hours)

$X/Q = [(2.5066)(2\ m/sec)(14.51m)(98.9\ m)]^{-1}$

X/Q = 1.39 E-4 sec/m³

CONCLUSIONS

The fumigation X/Q applicable to the Unit 3 intake for the 0-4 hour period of the accident is 1.39 E-4 sec/m³. The non-fumigation X/Qs for the longer averaging times are derived from the log-log interpolation between the 2-hour and annual average value obtained from Ref. 3 using 1974 to 1981 on-site meteorological data (Ref. 4). This period of record (8 years) is temporally representative of the meteorological conditions encountered at the site. The highest annual average X/Q from among the affected downwind sectors is taken Ref. 3 (see Appendix 1, p. 15). The affected downwind sectors (W, WNW, NW, and NNW) are determined using the "s/d" method from Ref. 9 (see Data Section). The X/Q values are as follows:

Period (Hours after Accident)	Logarithmic Interpolation Point (Hr)	X/Q (sec/m³)
4-8	8	3.23 E- 5
8-24	16	1.56 E- 5
24-96	72	3.20 E- 6
96-720	624	3.30 E- 7
Annual	8760	2.05 E- 8

The intermediate period X/Q values are calculated according to the expression:

$X/Q_t = \exp\{\ln(X/Q_2) + \{[(\ln(X/Q_a) - \ln(X/Q_2)] / [\ln(8760) - \ln(2)]\}[\ln(t) - \ln(2)]\}$

where t is the time period in hours, X/Q_t is the X/Q value for time t, X/Q_2 is the 2-hour X/Q value, X/Q_a is the annual average X/Q value, and 8760 is the number of hours in a year.

The Unit 3 control room air intake X/Q values are representative of the X/Q values for the center of the Unit 3 control room given that the distances and directions from the release to these receptors are very similar. The Unit 3 control room air intake X/Q values are also representative of those for the Technical Support Center which is located adjacent to the control room.

REFERENCES

1. US Nuclear Regulatory Commission, Office of Standards Development, Regulatory Guide 1.145, "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants", August, 1979.

2. U. S. Nuclear Regulatory Commission, Subroutine "POLYN", Horizontal and Vertical Dispersion Coefficients as a Function of Downwind Distance (see Attachment 1 for F-stability values), 1974.

3. Stone & Webster computer program EN-113, Version 6, Level 8. See output in Appendix 1.

4. On-site meteorological data for the period 1974 - 1981 provided by Northeast Utilities. The data are hourly values represented by one 15-minute average value per hour (see Attachment 2).

5. Lyons, W. A., "Turbulent Diffusion and Pollutant Transport in Shoreline Environments" from Lectures on Air Pollution and Environmental Impact Analyses, American Meteorological Society, Boston, Massachusetts, September 29 to October 3, 1975, pp. 182-194.

6. Telecopier transmittal from Bill Jones, Northeast Utilities to Joe Creamer, Stone & Webster dated 4/23/98 providing Millstone Unit 1 stack dimensions (see Attachment 3).

7. Stone & Webster Drawing No. 12179-EY-16A-7, Rev. 7, 8/18/81, "Station Plan" (see Attachment 4)

8. Stone & Webster Drawing No. 12179-EM-1A-11. (see Attachment 5)

9. Murphy, K.G. and K.M. Campe., "Nuclear Power Plant Control Room Ventilation System Design for Meeting General Design Criterion 19". Presented at the 13th AEC Air Cleaning Conference, August, 1974.

ATTACHMENTS

1. "POLYN" Horizontal and Vertical Dispersion Coefficient Values as a Function of Downwind Distance (F-stability).

2. Letter from Northeast Utilities transmitting onsite meteorological data for the period 1974 - 1981.

3. Telecopier transmittal from Bill Jones, Northeast Utilities to Joe Creamer, Stone & Webster dated 4/23/98 providing Millstone Unit 1 stack dimensions

4. Stone & Webster Drawing No. 12179-EY-16A-7, Rev. 7, 8/18/81, "Station Plan"

5. Stone & Webster Drawing No. 12179-EM-1A-11, "Plot Plan".

APPENDICES (15 pages)

1. EN-113 computer output, Job No. 04820 dated 4/29/98.

DISPERSION COEFFICIENTS AS A FUNCTION OF DOWNWIND DISTANCE
PASQUILL STABILITY CLASS (F)

DOWNWIND DISTANCE (METERS)	STONE & WEBSTER SIGMA Y	STONE & WEBSTER SIGMA Z	POLYN (LONG) SIGMA Y	POLYN (LONG) SIGMA Z	POLYN (DESERT) SIGMA Y	POLYN (DESERT) SIGMA Z	POLYN (X00000) SIGMA Y	POLYN (X00000) SIGMA Z
10.	0.4739	0.1971	0.4014	0.1395	2.4230	1.6073	0.5776	0.3454
20.	0.8969	0.4437	0.8020	0.3243	4.5718	1.9981	1.0802	0.6072
30.	1.3054	0.6928	1.2022	0.5313	6.6201	2.2694	1.5578	0.8446
40.	1.7048	0.9383	1.6022	0.7540	8.6265	2.4839	2.0200	1.0675
50.	2.0977	1.1786	2.0021	0.9093	10.5029	2.6642	2.4710	1.2601
60.	2.4855	1.4134	2.4019	1.2351	12.5064	2.8212	2.9133	1.4849
70.	2.8691	1.6427	2.8015	1.4900	14.4031	2.9611	3.3485	1.6834
80.	3.2490	1.8667	3.2011	1.7530	16.2771	3.0879	3.7776	1.8767
90.	3.6259	2.0857	3.6006	2.0232	18.1315	3.2043	4.2016	2.0655
100.	4.0000	2.3000	4.0000	2.3000	19.9686	3.3120	4.6210	2.2472
110.	4.3716	2.5098	4.3994	2.5829	21.7903	3.4126	5.0364	2.4369
120.	4.7409	2.7153	4.7987	2.7365	23.5981	3.5072	5.4481	2.6223
130.	5.1082	2.9169	5.1979	2.8894	25.3933	3.5964	5.8565	2.8037
140.	5.4736	3.1146	5.5971	3.0416	27.1769	3.6811	6.2619	2.9815
150.	5.8372	3.3088	5.9963	3.1930	28.9499	3.7617	6.6645	3.1560
160.	6.1991	3.4995	6.3954	3.3437	30.7129	3.8387	7.0644	3.3275
170.	6.5595	3.6870	6.7945	3.4937	32.4667	3.9125	7.4620	3.4962
180.	6.9184	3.8714	7.1936	3.6430	34.2119	3.9834	7.8573	3.6624
190.	7.2759	4.0528	7.5926	3.7916	35.9489	4.0516	8.2505	3.8261
200.	7.6321	4.2314	7.9916	3.9395	37.6782	4.1174	8.6417	3.9877
210.	7.9871	4.4073	8.3905	4.0867	39.4003	4.1809	9.0309	4.1472
220.	8.3409	4.5806	8.7895	4.2332	41.1156	4.2424	9.4184	4.3047
230.	8.6935	4.7514	9.1884	4.3790	42.8242	4.3021	9.8042	4.4603
240.	9.0451	4.9198	9.5872	4.5241	44.5267	4.3599	10.1884	4.6143
250.	9.3956	5.0860	9.9861	4.6685	46.2232	4.4162	10.5710	4.7665
260.	9.7451	5.2499	10.3425	4.8123	47.9140	4.4709	10.9521	4.9172
270.	10.0936	5.4117	10.6986	4.9553	49.5994	4.5242	11.3319	5.0664
280.	10.4412	5.5714	11.0542	5.0977	51.2795	4.5762	11.7102	5.2141
290.	10.7878	5.7292	11.4095	5.2395	52.9546	4.6269	12.0873	5.3605
300.	11.1337	5.8850	11.7643	5.3805	54.6248	4.6764	12.4631	5.5056
310.	11.4786	6.0390	12.1188	5.5209	56.2904	4.7248	12.8377	5.6494
320.	11.8228	6.1912	12.4729	5.6607	57.9515	4.7721	13.2111	5.7920
330.	12.1661	6.3416	12.8266	5.7997	59.6082	4.8185	13.5833	5.9335
340.	12.5087	6.4903	13.1799	5.9382	61.2607	4.8639	13.9546	6.0739
350.	12.8505	6.6374	13.5328	6.0759	62.9091	4.9083	14.3247	6.2131
360.	13.1916	6.7830	13.8854	6.2131	64.5535	4.9519	14.6938	6.3513
370.	13.5320	6.9269	14.2375	6.3496	66.1942	4.9947	15.0619	6.4886
380.	13.8718	7.0694	14.5893	6.4854	67.8311	5.0367	15.4291	6.6249
390.	14.2107	7.2104	14.9407	6.6206	69.4644	5.0780	15.7953	6.7603
400.	14.5491	7.3500	15.2917	6.7552	71.0942	5.1185	16.1606	6.8947
410.	14.8868	7.4882	15.6424	6.8892	72.7205	5.1583	16.5250	7.0283
420.	15.2239	7.6251	15.9927	7.0225	74.3436	5.1975	16.8886	7.1611
430.	15.5604	7.7607	16.3426	7.1552	75.9634	5.2360	17.2513	7.2930
440.	15.8963	7.8949	16.6921	7.2872	77.5800	5.2740	17.6132	7.4242
450.	16.2316	8.0280	17.0413	7.4187	79.1935	5.3113	17.9743	7.5545
460.	16.5663	8.1598	17.3901	7.5496	80.8041	5.3481	18.3347	7.6841
470.	16.9005	8.2904	17.7385	7.6798	82.4117	5.3843	18.6943	7.8130
480.	17.2340	8.4199	18.0865	7.8094	84.0164	5.4201	19.0531	7.9412
490.	17.5670	8.5482	18.4342	7.9384	85.6184	5.4553	19.4112	8.0687

"POLYN" Dispersion Coefficients

P 7
03703.7602
WM(B)-02
Rev-0

Northeast
Utilities System

107 Selden Street, Berlin, CT 06037

Northeast Utilities Service Company
P.O. Box 270
Hartford, CT 06141-0270
(860) 665-5000

P. 8
03703,701.
WM(B)-02
Rev 0

April 28, 1998

Mr. Joseph Creamer
Stone and Webster
245 Summer Street, 7th Floor
Boston, MA 02210

Dear Mr. Creamer:

Millstone Nuclear Power Station
Meteorological Data

Accompanying this memo are four computer diskettes containing the meteorological data from 1974 through 1981, for your use in the Millstone Unit 3 X/Q calculations. Each diskette contains two years of data, as noted on the labels. The year of data is represented in each dataset name.

Each line of the datasets represents one hour of data. There is a nine character "time stamp" on each line; columns 1 and 2 are the year, columns 3 through 5 are the Julian day, and columns 6 through 9 are the time (military time, always on Eastern Standard Time). Columns 10 through 54 are, in order, the AT033, WS033, WD033, WS142, WD142, DT142, WS374, WD374, & DT374 (AT = air temperature, WS = wind speed, WD = wind direction, DT = delta-temperature, and numbers are instrument height). These are all in "F5.1" format. Missing data are represented by "999.0."

The data generated by our meteorological monitoring system consist of four fifteen-minute averages per hour. However, the attached datasets only contain one fifteen-minute average per hour. Historically, most of our analyses involving meteorological data, including Category 1 X/Q calculations, have been based on one fifteen-minute average representing an entire hour of data. It was found that this methodology introduced very small errors into the analyses results, compared to calculating an average of the available fifteen-minute averages for each hour.

If you have any questions, please call me, at (860) 665-3183.

Very truly yours,

H. L. Chamberlain, Jr.
Environmental Services

Enclosures

P. 9
03703.700
WM(B)-0
KWO

Northeast Utilities System

TELECOPIER COVER LETTER
(FAX)

WM(76L-1 REV. 9-94

DATE:	TIME:	TOTAL NUMBER OF PAGES BEING SENT: (Including this page) 2

TO:

COMPANY	
DEPARTMENT/DIVISION	
ATTENTION JOE CREAMER	TELEPHONE NUMBER ( ) X 1027
TELECOPIER TELEPHONE NUMBER ➤	(INCLUDE AREA CODE) ( )

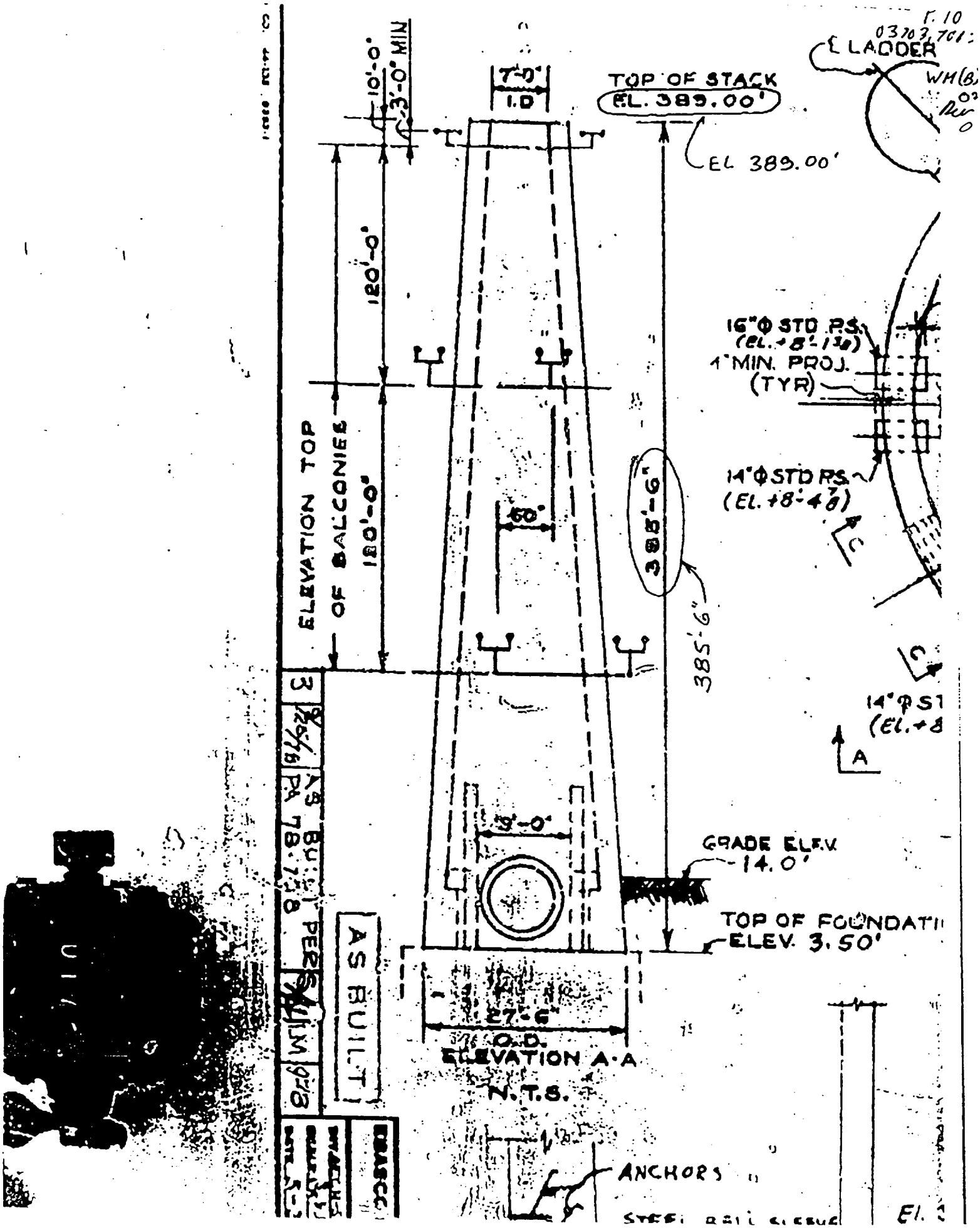
FROM:

NAME BILL JONES	ROOM NO.	TELEPHONE NUMBER * ( ) X0199
DEPARTMENT/DIVISION		
TELECOPIER TELEPHONE NUMBER ➤	(INCLUDE AREA CODE) ( )	

[redacted]

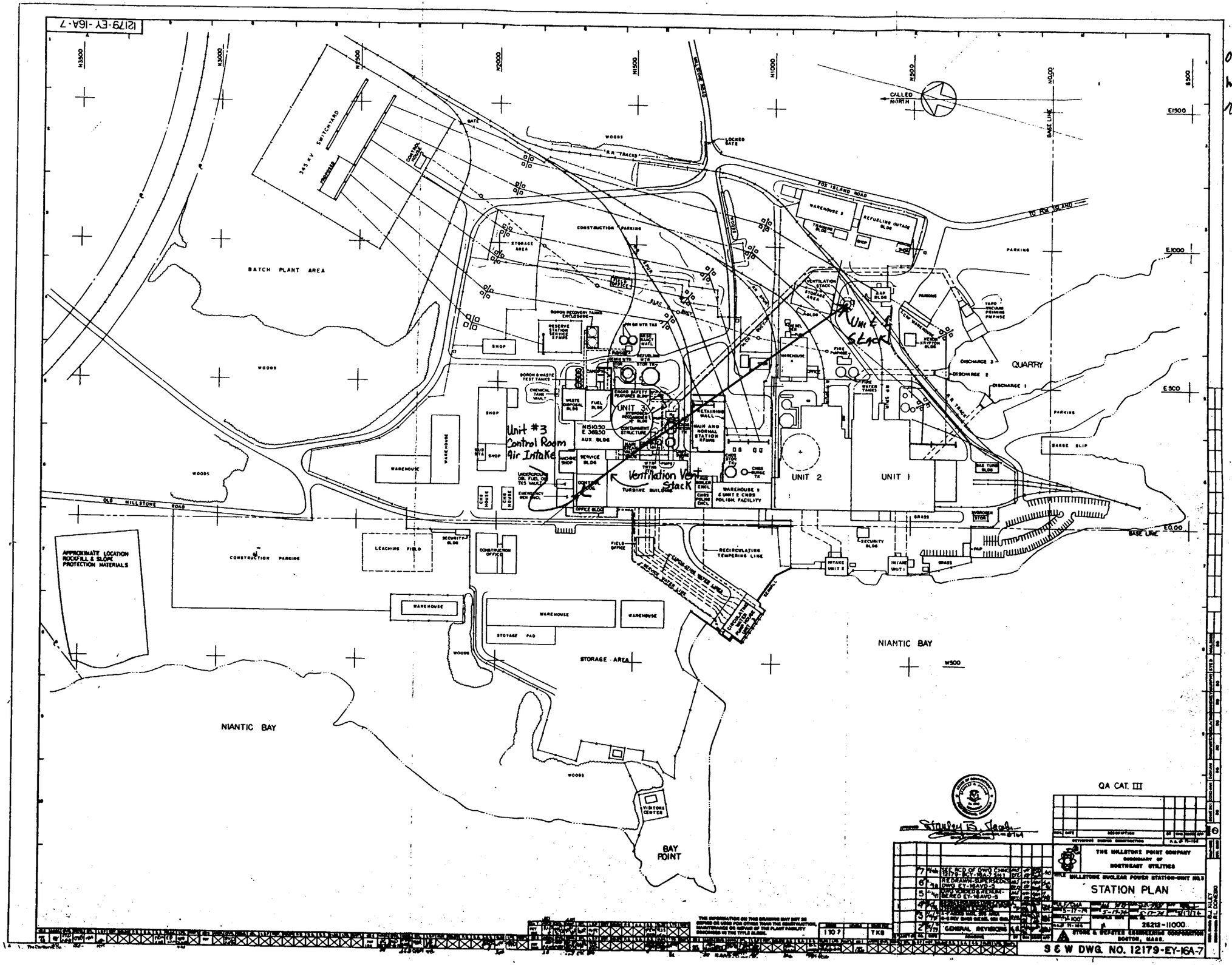
COMMENTS/DIRECTIONS

UNIT 1 STACK HEIGHT



TOP OF STACK
EL. 389.00'
EL 389.00'
7'-0"
I.D
10'-0"
3'-0" MIN
120'-0"
120'-0"
ELEVATION TOP OF BALCONIES
60"
385'-6"
385'-6"
9'-0"
GRADE ELEV. 14.0'
TOP OF FOUNDATI
ELEV. 3.50'
27'-6"
O.D.
ELEVATION A-A
N.T.S.
AS BUILT
ANCHORS
LADDER
16"Φ STD P.S.
(EL. +8'-1 3/8)
4" MIN. PROJ.
(TYP)
14"Φ STD P.S.
(EL. +8'-4 7/8)
14"Φ ST
(EL. +8
A
C

P.11
03703.
WM(B)-02
rev 0



P.12
037037002
WM(B)-02
Rev 0

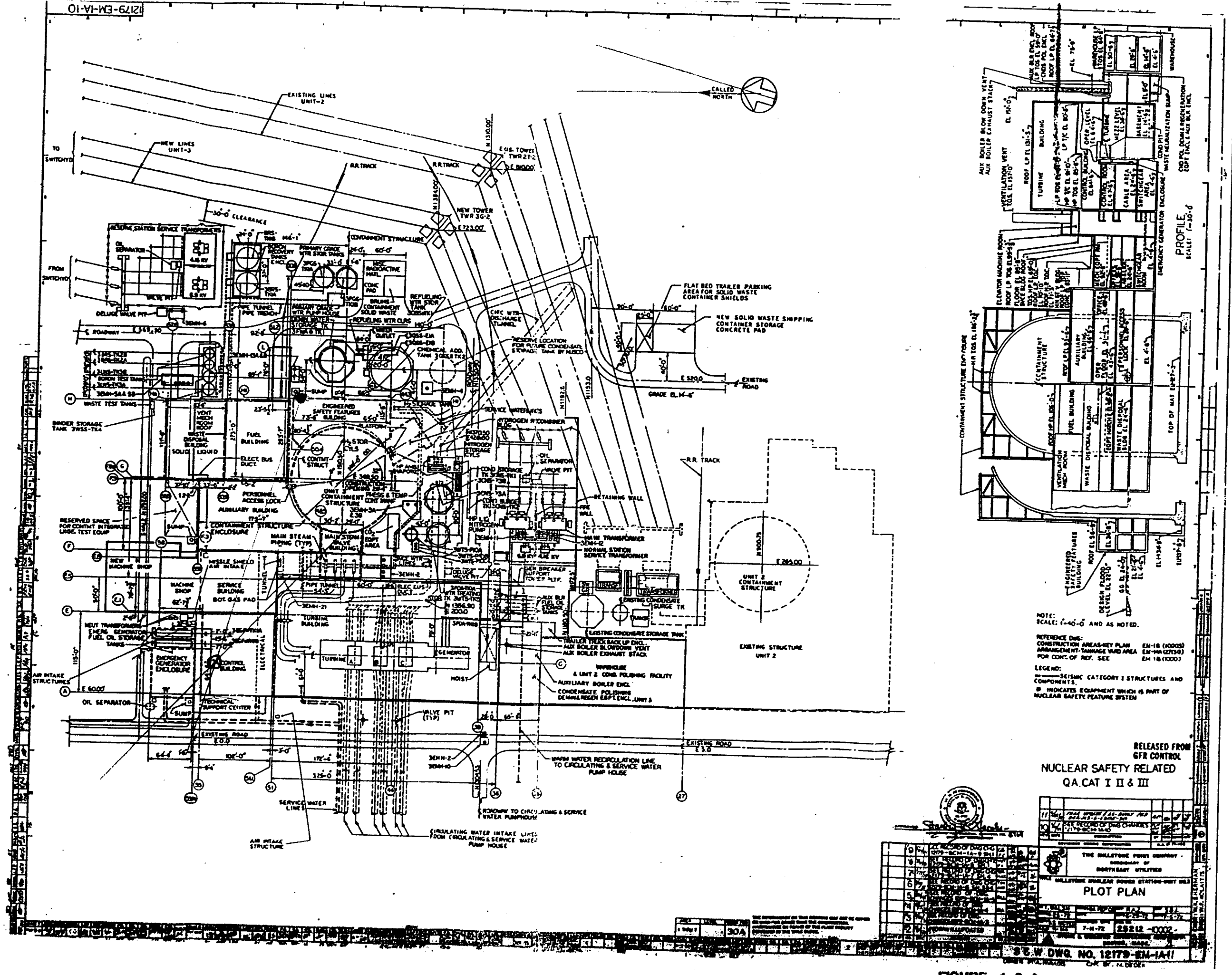


FIGURE 1.2-2

MAY 1992

```
J E S 2  J O B  L O G  --  S Y S T E M  C 1 6 8  --  N O D E  J E S 2 B O S

10.02.03 JOB04820  IRR010I  USERID VIG7988  IS ASSIGNED TO THIS JOB.
10.02.37 JOB04820  ICH70001I VIG7988  LAST ACCESS AT 10:01:36 ON WEDNESDAY, APRIL 29, 1998
10.02.37 JOB04820  $HASP373 CQ68     STARTED - INIT   10 - CLASS A - SYS C168
10.02.47 JOB04820  IEC137I TRACK OVERFLOW RESET FOR FT11F001
10.03.06 JOB04820  IEC137I TRACK OVERFLOW RESET FOR FT10F001
10.03.10 JOB04820  IEC137I TRACK OVERFLOW RESET FOR FT16F001
10.03.10 JOB04820  IEC137I TRACK OVERFLOW RESET FOR FT31F001
10.05.13 JOB04820  +IH0002I STOP      1
10.05.14 JOB04820  $HASP395 CQ68     ENDED

------ JES2 JOB STATISTICS ------

  29 APR 1998 JOB EXECUTION DATE

          59 CARDS READ

       1,971 SYSOUT PRINT RECORDS

           0 SYSOUT PUNCH RECORDS

         148 SYSOUT SPOOL KBYTES

        2.62 MINUTES EXECUTION TIME
```

```
 1 //CQ68 JOB (0031,3),'VIGEANT-SA',                          29-APR-98JOB04820
   //  MSGLEVEL=2,MSGCLASS=A
   //* RJETRAN.VIG7988.DATA(CQ68EL)
   /*JOBPARM  ROOM=3                                                JOB04820
 2 //METRDISK EXEC METRPROC
 9 //DISK DD DISP=SHR,DSN=ENVIRONM.METDATA.MILSTONE.YR7481
12 //SYSIN     DD *                GENERATED STATEMENT
13 //CHIQ68 EXEC PGM=CHIOQ68,REGION=700K,TIME=20
14 //STEPLIB DD DSN=ENVIRONM.HXLOADLB,DISP=SHR
15 //GO.FT06F001 DD DCB=PRINT1,SYSOUT=*
16 //GO.FT08F001 DD DUMMY
17 //GO.FT09F001 DD DCB=PRINT1,SYSOUT=*
18 //GO.FT10F001 DD UNIT=DISK,SPACE=(19982,(100,10)),DISP=(,PASS),
   //  DCB=(RECFM=VBST,LRECL=X,BLKSIZE=19982)
19 //GO.FT11F001 DD UNIT=DISK,SPACE=(19982,(100,10)),DISP=(,PASS),
   //  DCB=(RECFM=VBST,LRECL=X,BLKSIZE=19982)
20 //GO.FT12F001 DD UNIT=DISK,DISP=(OLD,DELETE),DSN=&SAMPLE
21 //GO.FT16F001 DD UNIT=DISK,SPACE=(32760,(70,10)),DISP=(,PASS),
   //  DCB=(RECFM=VST,LRECL=X,BLKSIZE=32760,BUFNO=1)
22 //GO.FT31F001 DD UNIT=DISK,SPACE=(32760,(70,10)),DISP=(,PASS),
   //  DCB=(RECFM=VST,LRECL=X,BLKSIZE=32760,BUFNO=1)
23 //GO.FT05F001  DD  *
24 //IMBLIST EXEC PGM=IMBLIST
25 //SYSPRINT DD SYSOUT=*
26 //SYSLIB DD DSN=ENVIRONM.HXLOADLB,DISP=SHR
27 //SYSIN     DD *                GENERATED STATEMENT
```

```
STMT NO. MESSAGE
       2 IEFC001I PROCEDURE METRPROC HAS EXPANDED USING SYSTEM LIBRARY SYS1.USER.PROCLIB
IEH70001I VIG7988  LAST ACCESS AT 10:01:36 ON WEDNESDAY, APRIL 29, 1998
IEF236I ALLOC. FOR CQ68 METRPROC METRDISK
IGD103I SMS ALLOCATED TO DDNAME STEPLIB
IEF237I JES2 ALLOCATED TO FT06F001
IEF237I JES2 ALLOCATED TO SYSPRINT
IGD103I SMS ALLOCATED TO DDNAME SYS010
IGD101I SMS ALLOCATED TO DDNAME (SYS011  )
        DSN (SYS98119.T100237.RA000.CQ68.SAMPLE.H01      )
        STORCLAS (TEMP) MGMTCLAS (         ) DATACLAS (         )
        VOL SER NOS= VIO
IEF237I JES2 ALLOCATED TO FT05F001
IEF142I CQ68 METRPROC METRDISK - STEP HAS EXECUTED - COND CODE 0000
IGD104I ENVIRONM.METOLOGY                          RETAINED,  DDNAME=STEPLIB
IEF285I   VIG7988.CQ68.JOB04820.D0000104.?           SYSOUT
IEF285I   VIG7988.CQ68.JOB04820.D0000105.?           SYSOUT
IGD104I ENVIRONM.METDATA.MILSTONE.YR7481           RETAINED,  DDNAME=SYS010
IGD106I SYS98119.T100237.RA000.CQ68.SAMPLE.H01     PASSED,    DDNAME=SYS011
IEF285I   VIG7988.CQ68.JOB04820.D0000101.?           SYSIN
.JOB - CQ68    , SUBMITTER - VIGEANT-SA          , FLOOR - 3   , READER TIME, DATE -   10.02.02,  04/29/98                    V09 .
.STEP NUMBER -   1, STEP NAME - METRPROC, PROGRAM NAME - METHR01 , RAN FROM  10.02.37 TO  10.02.44                              .
.ENDING CONDITION - RETURN CODE     0, REGION USED -    380K, PERFORMANCE GROUP -  20, SWAPS -      0                          .
.PAGEINS -      0, PAGEOUTS -      0, VIO PAGEINS -      0, VIO PAGEOUTS -     0                                                 .
.CPU TIME -      .60 VECTOR TIME -      .00 SECS, EXCPS -(       354 NON-VIO,     1,754 VIO), CPU UNITS -      2.50 SECS        .
.SYSIN RECORDS -     3, OPENS - (     0 TAPE,     0 TEMP,     0 PERM),                              COST =     $4.17            .
.EXCPS/DDNAME -                          9/STEPLIB          345/SYS010          1,754/SYS011                                   .
IEF373I STEP/METRPROC/START 1998119.1002
IEF374I STEP/METRPROC/STOP  1998119.1002 CPU    0MIN 00.56SEC SRB    0MIN 00.02SEC VIRT    88K SYS   292K EXT       4K SYS   10120K
IEF236I ALLOC. FOR CQ68 CHIQ68
IGD103I SMS ALLOCATED TO DDNAME STEPLIB
IEF237I JES2 ALLOCATED TO FT06F001
IEF237I DMY  ALLOCATED TO FT08F001
IEF237I JES2 ALLOCATED TO FT09F001
IGD101I SMS ALLOCATED TO DDNAME (FT10F001)
        DSN (SYS98119.T100237.RA000.CQ68.R0110984        )
        STORCLAS (TEMP) MGMTCLAS (         ) DATACLAS (         )
        VOL SER NOS= VIO
IGD101I SMS ALLOCATED TO DDNAME (FT11F001)
        DSN (SYS98119.T100237.RA000.CQ68.R0110985        )
        STORCLAS (TEMP) MGMTCLAS (         ) DATACLAS (         )
        VOL SER NOS= VIO
IGD103I SMS ALLOCATED TO DDNAME FT12F001
IGD101I SMS ALLOCATED TO DDNAME (FT16F001)
        DSN (SYS98119.T100237.RA000.CQ68.R0110986        )
        STORCLAS (TEMP) MGMTCLAS (         ) DATACLAS (         )
        VOL SER NOS= VIO
IGD101I SMS ALLOCATED TO DDNAME (FT31F001)
        DSN (SYS98119.T100237.RA000.CQ68.R0110987        )
        STORCLAS (TEMP) MGMTCLAS (         ) DATACLAS (         )
        VOL SER NOS= VIO
IEF237I JES2 ALLOCATED TO FT05F001
IEC137I TRACK OVERFLOW RESET FOR FT11F001
IEC137I TRACK OVERFLOW RESET FOR FT10F001
IEC137I TRACK OVERFLOW RESET FOR FT16F001
IEC137I TRACK OVERFLOW RESET FOR FT31F001
IEF142I CQ68 CHIQ68 - STEP HAS EXECUTED - COND CODE 0001
```

```
IGD104I ENVIRONM.WXLOADLB                          RETAINED,  DDNAME=STEPLIB
IEF285I   VIG7988.CQ68.JOB04820.D0000106.?           SYSOUT
IEF285I   VIG7988.CQ68.JOB04820.D0000107.?           SYSOUT
IGD106I SYS98119.T100237.RA000.CQ68.R0110984       PASSED,    DDNAME=FT10F001
IGD106I SYS98119.T100237.RA000.CQ68.R0110985       PASSED,    DDNAME=FT11F001
IGD105I SYS98119.T100237.RA000.CQ68.SAMPLE.H01     DELETED,   DDNAME=FT12F001
IGD106I SYS98119.T100237.RA000.CQ68.R0110986       PASSED,    DDNAME=FT16F001
IGD106I SYS98119.T100237.RA000.CQ68.R0110987       PASSED,    DDNAME=FT31F001
IEF285I   VIG7988.CQ68.JOB04820.D0000102.?           SYSIN
.......................................................................................................................
.JOB - CQ68    , SUBMITTER - VIGEANT-SA          , FLOOR - 3    , READER TIME, DATE -   10.02.02,  04/29/98                V09 .
.STEP NUMBER -   2, STEP NAME - CHIQ68   , PROGRAM NAME - CHIOQ68 , RAN FROM  10.02.44 TO  10.05.14                          .
.ENDING CONDITION - RETURN CODE     1, REGION USED -    864K, PERFORMANCE GROUP -  20, SWAPS -      0                      .
.PAGEINS -      0, PAGEOUTS -      0, VIO PAGEINS -      0, VIO PAGEOUTS -      0                                            .
.CPU TIME -    21.02 VECTOR TIME -      .00 SECS, EXCPS -(        30 NON-VIO,    10,311 VIO), CPU UNITS -     30.33 SECS      .
.SYSIN RECORDS -    28, OPENS - (     0 TAPE,     0 TEMP,     0 PERM),                                COST =    $50.55        .
.EXCPS/DDNAME -                          30/STEPLIB          228/FT10F001          228/FT11F001        1,755/FT12F001       .
.              4,050/FT16F001        4,050/FT31F001                                                                          .
.......................................................................................................................
IEF373I STEP/CHIQ68  /START 1998119.1002
IEF374I STEP/CHIQ68  /STOP  1998119.1005 CPU    0MIN 20.98SEC SRB    0MIN 00.03SEC VIRT   556K SYS   308K EXT       4K SYS   10404K
IEF236I ALLOC. FOR CQ68 IMBLIST
IEF237I JES2 ALLOCATED TO SYSPRINT
IGD103I SMS ALLOCATED TO DDNAME SYSLIB
IEF237I JES2 ALLOCATED TO SYSIN
IEF142I CQ68 IMBLIST - STEP HAS EXECUTED - COND CODE 0008
IEF285I   VIG7988.CQ68.JOB04820.D0000108.?           SYSOUT
IGD104I ENVIRONM.WXLOADLB                          RETAINED,  DDNAME=SYSLIB
IEF285I   VIG7988.CQ68.JOB04820.D0000103.?           SYSIN
.......................................................................................................................
.JOB - CQ68    , SUBMITTER - VIGEANT-SA          , FLOOR - 3    , READER TIME, DATE -   10.02.02,  04/29/98                V09 .
.STEP NUMBER -   3, STEP NAME - IMBLIST , PROGRAM NAME - IMBLIST , RAN FROM  10.05.14 TO  10.05.14                          .
.ENDING CONDITION - RETURN CODE     8, REGION USED -    428K, PERFORMANCE GROUP -  20, SWAPS -      0                      .
.PAGEINS -      0, PAGEOUTS -      0, VIO PAGEINS -      0, VIO PAGEOUTS -      0                                            .
.CPU TIME -      .03 VECTOR TIME -      .00 SECS, EXCPS -(         0 NON-VIO,         0 VIO), CPU UNITS -       .03 SECS      .
.SYSIN RECORDS -     1, OPENS - (     0 TAPE,     0 TEMP,     0 PERM),                                COST =     $0.05        .
.......................................................................................................................
IEF373I STEP/IMBLIST /START 1998119.1005
IEF374I STEP/IMBLIST /STOP  1998119.1005 CPU    0MIN 00.03SEC SRB    0MIN 00.00SEC VIRT   156K SYS   272K EXT       4K SYS   10116K
IGD105I SYS98119.T100237.RA000.CQ68.R0110984       DELETED,   DDNAME=FT10F001
IGD105I SYS98119.T100237.RA000.CQ68.R0110985       DELETED,   DDNAME=FT11F001
IGD105I SYS98119.T100237.RA000.CQ68.R0110986       DELETED,   DDNAME=FT16F001
IGD105I SYS98119.T100237.RA000.CQ68.R0110987       DELETED,   DDNAME=FT31F001
IEF375I  JOB/CQ68    /START 1998119.1002
IEF376I  JOB/CQ68    /STOP  1998119.1005 CPU    0MIN 21.57SEC SRB    0MIN 00.05SEC
.......................................................................................................................
.TOTAL CPU TIME -     21.65 SECS,   TOTAL VECTOR TIME -       .00 SECS,   TOTAL CPU UNITS -     32.85 SECS                  .
.TOTAL EXCPS -(       384 NON-VIO,    12,065 VIO)                                                                          .
.TOTAL JOB COST EXCLUDING PRINT CHARGES =     $54.77       CHARGED TO AUTH = 0031 , JO/HO = 022685067                      .
.......................................................................................................................
```

STONE & WEBSTER ENGINEERING CORPORATION

ENVIRONMENTAL ENGINEERING DIVISION

COMPUTER CODE IDENTIFICATION

PROGRAM NAME: SITE DATA RETREIVAL PROGAM

VERSION OF PROGRAM: 00

LINK EDIT DATE (JULIAN): 80.184

DATE OF RUN (MO/DAY/YR): 4/29/98

JOB NAME OF RUN: CQ68

LIBRARY REFERENCE NUMBER: EN-112

LEVEL OF PROGRAM: 01

LINK EDIT TIME (HRS.MINS.SECS): 14.21.36

TIME OF RUN (MILITARY): 1002

JOB04820

INPUT DATA TRACEBACK

DATA SUBMITTED ON DEVICE: 5

```
CARD# ----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8
   1       3
   2    131 132 135
   3   74001     81365
CARD# ----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8

      * * * * * * * * * * * * * * END OF INPUT ON DEVICE 5 * * * * * * * * * * * * * *
```

APPENDIX 1
EN-113 Program Output
Unit 1 Stack to Unit 3 Control Room Air Intake

INPUT TO METOWER PROGRAM
B
[illegible] 135
[illegible] 81365

END OF INPUT DATA REACHED

NUMBER OF CARDS SELECTED = 8766

NUMBER OF DAYS SELECTED = 2922

STONE & WEBSTER ENGINEERING CORPORATION

ENVIRONMENTAL ENGINEERING DIVISION

COMPUTER CODE IDENTIFICATION

PROGRAM NAME: ATMOSPHERIC DISPERSION FACTORS

VERSION OF PROGRAM: 06

LOAD MODULE: ENVIRONM.HXLOADLB

LINK EDIT DATE (JULIAN): 82.263

DATE OF RUN (MO/DAY/YR): 4/29/98

JOB NAME OF RUN: CQ68

LIBRARY REFERENCE NUMBER: EN-113

LEVEL OF PROGRAM: 08

MEMBER (PGM): CHIOQ68

LINK EDIT TIME (HRS.MINS.SECS): 12.40.03

TIME OF RUN (MILITARY): 1002

JOB04820

INPUT DATA TRACEBACK

DATA SUBMITTED ON DEVICE: 5

```
CARD# ----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8
  1  MILLSTONE NULCEAR POWER STATION - UNIT 3    037037002
  2  ONSITE METDATA (1974-1981)
  3  7400181365 2922    3  341    2
  4    131  132    0    0    0  135    0    0    0    0    0
  5    0.1    0    0    0    0  0.1    0    0    0    0    0    0    0    0    0
  6      2 ELEVATED RELEASE (355 M)
  7      1         0  389    0    0    0    0         0         00   2    0    0    0
  8      1    0    0    0   16    3    0         0         0    0    0    0   00    0
  9      1    0    0    0    0 1000    8    0  1.1  0.6  0.0  0.0                    0
 10    35599999

CARD# ----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8
 11    35199999
 12
 13      1 64.5 64.5
 14      2 64.5 64.5
 15      3 64.5 64.5
 16      4 64.5 64.5
 17      5 64.5 64.5
 18      6 64.5 64.5
 19      7 64.5 64.5
 20      8 64.5 64.5

CARD# ----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8
 21      9 64.5 64.5
 22     10 64.5 64.5
 23     11 64.5 64.5
 24     12 64.5 64.5
 25     13 64.5 64.5
 26     14 64.5 64.5
 27     15 64.5 64.5
 28     16 64.5 64.5
CARD# ----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8

     * * * * * * * * * * * * * END OF INPUT ON DEVICE   5 * * * * * * * * * * * * *
```

```
CHIO - D/Q PROGRAM          EN-113  VERSION 6 LEVEL 8   MODULE 82.263  12.40.03    CQ68        29 APR 1998     PAGE    1

---------- PROGRAM OPTIONS AVALIABLE IN THE LOAD MODULE  (ENVIRONM.WXLOADLB(CHIOQ68)) **********

   METSTB - METHOD OF DETERMINING STABILITY CLASS.  - ALL METHODS
   IREDIS - REDISTRIBUTION OF CALMS - ALL
   TPGRAD - SPECIFIED TEMPERATURE GRADIENTS FOR STABILITY CLASS DETERMINATION
   IRETYP - RELEASE POINT AND CALCULATION TYPE
   ISTTYP - STATION TYPE - NUCLEAR OR FOSSIL, - BOTH
   HLID   - LIMITED MIXING LID HEIGHT
   ISTRLN - CALCULATE TIME PERIOD AVERAGES USING STRAIGHT LINE
   ICALM  - RESET WIND SPEED TO CALM SPEED IF WIND SPEED FALLS BELOW CALM SPEED
   UCU    - UNSTABLE AND NETURAL WIND SPEED CORRECTION FACTOR
   UCS    - STABLE WIND SPEED HEIGHT CORRECTION FACTOR
   ISECVG - SECTOR AVERAGING CORRECTION
   MESMT  - WIND SPEED MODIFICATION WITH HEIGHT (ASME)
   IAECSG - DISPERSION COEFFICIENTS (SIGMA Y AND SIGMA Z), AEC, AEC DESERT AND S+H (TURNER'S)
   IBWEFF - BUILDING WAKE EFFECT (SHORT TERM) - ALL
   ITOPO  - TOPOGRAPHIC DATA INPUT CONTROL
   ITERIN - TERRAIN ADJUSTMENT FACTOR - ALL
   ISIGMA - SIGMA VALUE PRINTOUT CONTROL
   ISTABY - HORIZONTAL DISPERSION COEFFICIENT SELECTION ARRAY
   ISTABZ - VERTICAL DISPERSION COEFFICIENT SELECTION ARRAY
   NHR72  - 72 HOUR SLIDING AVERAGE HOURS TO BE SLID CONTROL
   NHR624 - 624 HOUR SLIDING AVERAGE HOURS TO BE SLID CONTROL
   LIMXQR - X/Q - D/Q WRITE LIMIT CONTROL
   PRGHRS - NUMBER OF PURGE HOURS
   RFCWSP - WIND SPEED BELOW WHICH TERRAIN RECIRCULATION FRACTION WILL BE APPLIED
   JHRARY - TIME PERIOD CONTROL
   IPLMEQ - PLUME RISE EQUATION CONTROL (14 METHODS)
   BHT    - BUILDING HEIGHT WAKE EFFECT (LONG TERM)
   SPDBWE - GROUND TO ELEVATED RELEASE SHIFT AND DOWNWASH CONTROL
   IAJDIR - ADJACENT DOWNWIND SECTOR DISTANCE SELECTION SWITCH
```

```
CHI/Q - D/Q PROGRAM                    EN-113  VERSION 6 LEVEL 8   MODULE 82.263  12.40.03    CQ68          29 APR 1998     PAGE    2

                                                  CALCULATION NUMBER
MILLSTONE NULCEAR POWER STATION - UNIT 3          ONSITE METDATA (1974-1981)                          037037002
 ELEVATED RELEASE (355 M)

---------- READ1 (6.8) INPUT DATA **********
                CLIENT(11)                                                  JOBNO(3)
MILLSTONE NULCEAR POWER STATION - UNIT 3                                   037037002
                 SITE(11)                                                   CALCNU(5)
ONSITE METDATA (1974-1981)
  ISTART   ISTOP  NDYSDT  METSTB     DHT  IREDIS
   74001   81365    2922       3   341.0       2
                                                   ELEVATED CONDITIONS
   SPEED     DIR    TEMP   RANGE STD DEV DELTA T   SPEED     DIR    TEMP  ISPUNT  ITPUNT
     131     132       0       0       0     135       0       0       0       0       0
                                PARMUL(9)                                                    TPGRAD(6)
    0.10    1.00    1.00    1.00    1.00    0.10    1.00    1.00    1.00     0.0     0.0     0.0     0.0     0.0     0.0
---------- READ2 (6.8) INPUT DATA **********
  IRETYP                RELSID(11)
       2 ELEVATED RELEASE (355 M)
  ISTTYP           HFLUE   STKHT  STKDIA  GASVEL      TS    HLID            HFUEL           HVALUE  ISTRLN   ICALM     UCU     UCS
       1              0.  389.00    0.0     0.0      0.      0.               0.              0.   0   2       0     0.0     0.0
  ISECVG   MESHT  IAECSG  IBWEFF   ITOPO  ITERIN  ISIGMA          ISTABY          ISTABZ   NHR72  NHR624  LIMXQR  PRGHRS  RFCHSP
       1       0       0       0      16       3       0         0000000         0000000       0       0       0     0.0     0.0
                  JHRARY(6)                       IPLMEQ  PLUMRS  CALMAC  CALMAN     BHT  SPDBWE                             IAJDIR
       1       0       0       0       0    1000       8     0.0     1.1     0.6     0.0     0.0                                  0
            DISITE(16)
   355.0   355.0   355.0   355.0   355.0   355.0   355.0   355.0   355.0   355.0   355.0   355.0   355.0   355.0   355.0   355.0
            DISLPZ(16)
   351.0   351.0   351.0   351.0   351.0   351.0   351.0   351.0   351.0   351.0   351.0   351.0   351.0   351.0   351.0   351.0
  IDSLP     DISTAN(10)
       0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
    IDR      TOPOHT(16,12)
       1    64.5    64.5
       2    64.5    64.5
       3    64.5    64.5
       4    64.5    64.5
       5    64.5    64.5
       6    64.5    64.5
       7    64.5    64.5
       8    64.5    64.5
       9    64.5    64.5
      10    64.5    64.5
      11    64.5    64.5
      12    64.5    64.5
      13    64.5    64.5
      14    64.5    64.5
      15    64.5    64.5
      16    64.5    64.5
---------- TERRAIN ADJUSTMENT FACTORS USED **********
    IDR      FACTORS ( 2)
       1   4.000   4.000
       2   4.000   4.000
       3   4.000   4.000
       4   4.000   4.000
       5   4.000   4.000
       6   4.000   4.000
       7   4.000   4.000
       8   4.000   4.000
```

APPENDIX 1
EN-113 Program Output
Unit 1 Stack to Unit 3 Control Room Air Intake

9	4.000	4.000
10	4.000	4.000
11	4.000	4.000
12	4.000	4.000
13	4.000	4.000
14	4.000	4.000
15	4.000	4.000
16	4.000	4.000

CHI/Q - D/Q PROGRAM EN-113 VERSION 6 LEVEL 8 MODULE 82.263 12.40.0 CQ68 29 APR 1998 PAGE 3

CALCULATION NUMBER
MILLSTONE NULCEAR POWER STATION - UNIT 3 ONSITE METDATA (1974-1981) 037037002
ELEVATED RELEASE (355 M)
CHI/Q CALCULATION 1 HOUR PERIOD 1/01/74 - 12/31/81
RELEASE TYPE - ELEVATED NUCLEAR ZERO PLUME RISE
STABILITY DETERMINED BY DELTA TEMPERATURE TOPOGRAPHY USED - YES
WIND SPEED ASSIGNED TO CALM OBSERVATIONS = 1.10 MPH CALM REDISTRIBUTION - PROP TO 1.5 MPS W/S CLASS DIR FREQ
DISPERSION COEFFICIENTS (AEC GIFFORD'S)

---------- CHI/Q VALUES **********

DOWNWIND SECTOR	DOWNWIND DISTANCE (M)	MAXIMUM VALUE	ARITHMETIC MEAN	50 PERCENT VALUE	50 PC EQUAL RISK VALUE	5 PERCENT VALUE	5 PC EQUAL RISK VALUE	8 PC EQUAL RISK VALUE
S	355.	0.8356E-05	0.5924E-07	0.5133E-14	0.7795E-23	0.5092E-07	0.2730E-07	0.1641E-13
SSW	355.	0.2051E-04	0.4650E-07	0.5191E-14	0.4313E-14	0.2850E-07	0.1945E-07	0.1641E-13
SW	355.	0.9601E-05	0.3937E-07	0.5966E-14	0.3547E-14	0.2850E-07	0.2964E-13	0.1641E-13
WSW	355.	0.7780E-05	0.7870E-08	0.6336E-14	0.3178E-59	0.2297E-13	0.1641E-13	0.1209E-13
W	355.	0.4600E-05	0.1766E-07	0.3995E-14	0.1626E-23	0.2552E-13	0.1413E-13	0.9571E-14
WNW	355.	0.8058E-05	0.3805E-07	0.4836E-14	0.9035E-59	0.2158E-07	0.1641E-13	0.1178E-13
NW	355.	0.1126E-04	0.7589E-07	0.7362E-23	0.1491E-59	0.4594E-13	0.1641E-13	0.1209E-13
NNW	355.	0.4102E-04	0.1217E-06	0.3118E-23	0.1000E-70	0.2137E-13	0.1371E-13	0.9987E-14
N	355.	0.1128E-04	0.6439E-07	0.2409E-23	0.1031E-23	0.1955E-13	0.1458E-13	0.1134E-13
NNE	355.	0.1456E-04	0.6309E-07	0.2120E-23	0.2409E-23	0.1458E-13	0.1641E-13	0.1134E-13
NE	355.	0.1253E-04	0.3063E-07	0.2120E-23	0.2648E-14	0.1242E-13	0.2042E-13	0.1242E-13
ENE	355.	0.2507E-04	0.2092E-07	0.2366E-23	0.4313E-14	0.1413E-13	0.1763E-07	0.1701E-13
E	355.	0.1003E-04	0.1550E-07	0.3797E-14	0.4940E-14	0.1407E-07	0.1970E-07	0.3675E-13
ESE	355.	0.2507E-04	0.3352E-07	0.5280E-14	0.6336E-14	0.2605E-07	0.6124E-07	0.2255E-07
SE	355.	0.9199E-05	0.8219E-07	0.5535E-14	0.8587E-14	0.4819E-06	0.8363E-06	0.5440E-06
SSE	355.	0.2256E-04	0.8636E-07	0.5405E-14	0.6425E-14	0.5326E-06	0.6571E-06	0.4306E-06
DIRECTION INDEPENDENT		0.4102E-04	0.4872E-07	0.4065E-14		0.2385E-07		

OBSERVATIONS EXAMINED 70128 GOOD OBSERVATIONS 65563 PERCENT DATA RECOVERY 93.49

GOOD DATA PERIODS	65563																0
NUMBER CHI/Q = 0.0	62538	62314	62719	63469	63066	63362	63430	63523	62782	61111	58971	58276	59875	60166	57739	60104	
	95.39	95.04	95.66	96.81	96.19	96.64	96.75	96.89	95.76	93.21	89.95	88.89	91.32	91.77	88.07	91.67	0.0
NON ZERO TOTAL	3025	3249	2844	2094	2497	2201	2133	2040	2781	4452	6592	7287	5688	5397	7824	5459	65563

CALCULATION NUMBER

---------- CUMULATIVE FREQUENCY SUMMARY **********

DOWNWIND SECTOR	S	SSW	SW	WSW	W	WNW	NW	NNW	N	NNE	NE	ENE	E	ESE	SE	SSE	DIRECTION
DOWNWIND DISTANCE (M)	355.	355.	355.	355.	355.	355.	355.	355.	355.	355.	355.	355.	355.	355.	355.	355.	INDEPENDENT
TOPOGRAPHIC HEIGHT	65.	65.	65.	65.	65.	65.	65.	65.	65.	65.	6	65.	65.	65.	65.	65.	
CHI/Q RANGE GTE LT																	
0.10E-08	2792	3034	2672	2057	2411	2083	2039	1983	2710	4357	6448	7041	5383	4908	6610	4823	61351
	92.30	93.38	93.95	98.23	96.56	94.64	95.59	97.21	97.45	97.87	97.82	96.62	94.64	90.94	84.48	88.35	93.58
0.10E-08 0.39E-08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	92.30	93.38	93.95	98.23	96.56	94.64	95.59	97.21	97.45	97.87	97.82	96.62	94.64	90.94	84.48	88.35	93.58
0.40E-08 0.69E-08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	92.30	93.38	93.95	98.23	96.56	94.64	95.59	97.21	97.45	97.87	97.82	96.62	94.64	90.94	84.48	88.35	93.58
0.70E-08 0.99E-08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	92.30	93.38	93.95	98.23	96.56	94.64	95.59	97.21	97.45	97.87	97.82	96.62	94.64	90.94	84.48	88.35	93.58
0.10E-07 0.39E-07	69	85	63	12	31	37	14	5	6	9	38	116	188	278	536	235	1722
	94.58	96.00	96.17	98.81	97.80	96.32	96.25	97.45	97.66	98.07	98.39	98.22	97.94	96.09	91.33	92.65	96.20
0.40E-07 0.69E-07	30	37	31	12	9	22	22	5	10	15	20	14	2	7	40	41	317
	95.57	97.14	97.26	99.38	98.16	97.32	97.28	97.70	98.02	98.41	98.70	98.41	97.98	96.22	91.85	93.41	96.69
0.70E-07 0.99E-07	4	10	10	1	6	5	3	5	2	1	1	2	2	0	1	2	55
	95.70	97.45	97.61	99.43	98.40	97.55	97.42	97.94	98.09	98.43	98.71	98.44	98.01	96.22	91.86	93.44	96.77
0.10E-06 0.39E-06	3	8	5	4	2	6	6	2	2	1	7	33	47	68	121	14	329
	95.80	97.69	97.78	99.62	98.48	97.82	97.70	98.04	98.17	98.45	98.82	98.89	98.84	97.48	93.40	93.70	97.27
0.40E-06 0.69E-06	46	15	15	2	16	12	2	0	0	4	16	38	45	90	265	155	721
	97.32	98.15	98.31	99.71	99.12	98.36	97.80	98.04	98.17	98.54	99.06	99.41	99.63	99.15	96.79	96.54	98.37
0.70E-06 0.99E-06	33	23	21	3	13	11	5	2	2	5	18	7	3	7	63	64	280
	98.41	98.86	99.05	99.86	99.64	98.86	98.03	98.14	98.24	98.65	99.33	99.51	99.68	99.28	97.60	97.71	98.80
0.10E-05 0.29E-05	35	23	16	2	6	18	21	12	28	23	20	26	15	34	164	102	545
	99.57	99.57	99.61	99.95	99.88	99.68	99.02	98.73	99.24	99.17	99.64	99.86	99.95	99.91	99.69	99.58	99.63
0.30E-05 0.49E-05	10	9	6	0	3	5	11	8	8	11	9	5	1	3	23	15	127
	99.90	99.85	99.82	99.95	100.00	99.91	99.53	99.12	99.53	99.42	99.77	99.93	99.96	99.96	99.99	99.85	99.82
0.50E-05 0.69E-05	0	3	2	0	0	1	5	6	7	15	9	3	1	0	0	5	57
	99.90	99.94	99.89	99.95	100.00	99.95	99.77	99.41	99.78	99.75	99.91	99.97	99.98	99.96	99.99	99.95	99.91
0.70E-05 0.89E-05	3	1	2	1	0	1	3	5	3	7	2	1	0	0	0	1	30
	100.00	99.97	99.96	100.00	100.00	100.00	99.91	99.66	99.89	99.91	99.94	99.99	99.98	99.96	99.99	99.96	99.96
0.90E-05 0.11E-04	0	0	1	0	0	0	2	3	3	2	3	0	1	1	1	1	18
	100.00	99.97	100.00	100.00	100.00	100.00	100.00	99.80	100.00	99.96	99.98	99.99	100.00	99.98	100.00	99.98	99.98
0.12E-04 0.31E-04	0	1	0	0	0	0	0	3	0	2	1	1	0	1	0	1	10
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.95	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
0.32E-04 0.51E-04	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

CHI/Q - D/Q PROGRAM EN-113 VERSION 6 LEVEL 8 MODULE 82.263 12.40.03 CQ68 29 APR 1998 PAGE 7

CALCULATION NUMBER
MILLSTONE NULCEAR POWER STATION - UNIT 3 ONSITE METDATA (1974-1981) 037037002
ELEVATED RELEASE (355 M)
CHI/Q CALCULATION ANNUAL 1/01/74 - 12/31/81
RELEASE TYPE - ELEVATED NUCLEAR ZERO PLUME RISE
STABILITY DETERMINED BY DELTA TEMPERATURE TOPOGRAPHY USED - YES
WIND SPEED ASSIGNED TO CALM OBSERVATIONS = 0.60 MPH CALM REDISTRIBUTION - PROP TO 1.5 MPS W/S CLASS DIR FREQ
DISPERSION COEFFICIENTS (AEC GIFFORD'S)
RECIRCULATION FACTORS APPLIED (PLAIN (CURVE))
HEIGHT OF ELEVATED RELEASE 389.0 FEET (118.6 METERS)

********** ANNUAL CHI/Q AVERAGES ********** UNDECAYED UNDEPLETED CHI/Q VALUES.

DOWNWIND DOWNWIND DISTANCE (M) AND CHI/Q AVERAGES
SECTOR

	355.	351.	
S	0.133E-07	0.129E-07	
SSW	0.112E-07	0.108E-07	
SW	0.809E-08	0.782E-08	
WSW	0.118E-08	0.114E-08	
W	0.299E-08	0.286E-08	← 259° - 281°
WNW	0.628E-08	0.611E-08	← 282° - 305°
NW	0.126E-07	0.124E-07	← 306° - 329°
NNW	0.205E-07	0.202E-07	← 330° - 353°
N	0.138E-07	0.134E-07	
NNE	0.224E-07	0.220E-07	
NE	0.159E-07	0.156E-07	
ENE	0.116E-07	0.113E-07	
E	0.642E-08	0.622E-08	
ESE	0.133E-07	0.129E-07	
SE	0.484E-07	0.471E-07	
SSE	0.358E-07	0.349E-07	

OBSERVATIONS EXAMINED 70128 GOOD OBSERVATIONS 65563 PERCENT DATA RECOVERY 93.49

Maximum Value 2.05×10^{-8}