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AUTH.NAME AUTHOR AFFILIATION
FITZPATRICK,E. Indiana Michigan Power Co. (formerly Indiana & Michigan Ele
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SUBJECT: Responds to RAI re calculations provided to NRC during recent sys operation performance insp repts 50-315/96-13 & 50-316/96-13.

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Power Company
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INDIANA MICHIGAN POWER

April 10, 1997

AEP:NRC:1238F1
10 CFR 2.201

Docket Nos.: 50-315
50-316

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

Gentlemen:

Donald C. Cook Nuclear Plant Units 1 and 2
NRC INSPECTION REPORTS NO. 50-315/96013 (DRS) AND 316/96013 (DRS)
REPLY TO REQUEST FOR ADDITIONAL INFORMATION

This letter is in response to a letter from G. E. Grant, dated February 4, 1997, that requested additional information regarding calculations that were provided to the NRC during the recent system operation performance inspection (SOPI). The requested information is described in attachments A and B to the inspection report.

Specifically, additional information was requested on calculation ENSM 961213AF, revision 0, "Allowable Centrifugal Charging Pump Degradation", and calculation RD-96-02, revision 0, "Offsite and Control Room Thyroid Doses From Containment Bypass Associated With a Charging Pump in ECCS Mode".

The additional information requested is provided in the attachments to this letter.

Sincerely,

E E Fitzpatrick

E. E. Fitzpatrick
Vice President

vlb

Attachments

cc: A. A. Blind
A. B. Beach
MDEQ - DW & RPD
NRC Resident Inspector
J. R. Padgett

1/1

Ie 01

150062

ATTACHMENT 1 TO AEP:NRC:1238F1

RESPONSE FOR ADDITIONAL INFORMATION REGARDING
CALCULATION ENSM 961213AF

Introduction

During the system operation performance inspection (SOPI), inspectors reviewed the capability for boration from the refueling water storage tank (RWST). A concern was expressed regarding the ability of the centrifugal charging pumps (CCPs) to supply 120 gpm of 2400 ppm boron from the RWST, which had been determined equivalent to the technical specification (T/S) required boration flow rate of 10 gpm of 20,000 ppm boron, based on an analysis by Westinghouse in 1988. Inspectors were concerned that acceptance limits had not been incorporated into the inservice testing (IST) program which ensured this capability could be met. A calculation was completed to determine the allowable degradation these pumps could undergo without compromising their ability to perform this function. This calculation was provided to inspectors at the SOPI exit meeting.

As a point of information, noted in our response to the SOPI inspection report (AEP:NRC:1238F), the original analysis by Westinghouse which calculated the 120 gpm required flowrate contained a very conservative assumption regarding a step increase in power to 100% while at peak xenon. A reanalysis has been performed using a more realistic ramp rate of 10%/hr which is a limitation contained in plant procedures. This reanalysis indicated that the boration flow requirements of the T/Ss could be satisfied by as little as 60.1 gpm of 2400 ppm boron, instead of the 120 gpm previously defined. We are in the process of recalculating the allowable degradation of the CCPs given this new boration flowrate requirement. The revised calculation will be completed and verified by May 30, 1997.

The following responses are offered to the questions on the original calculation contained in attachment A to the SOPI report:

1. **Please provide the basis for the assumption that the CCP miniflow paths are isolated when the suction is aligned to the RWST.**

   Response

   The original calculation assumed that when the CCP suction source was switched from the volume control tank to the refueling water storage tank, the operators would close the miniflow path to provide maximum charging flow to the reactor coolant system (RCS). Subsequent review of the operating procedures for each unit indicated that no specific guidance is provided regarding the position of the miniflow valves. Therefore, it is conservative to assume they are kept open. As noted above, a revision to the subject calculation is being performed to reflect the 60.1 gpm boration flow requirement instead of the previous 120 gpm requirement. This revision will also reflect that the miniflow path is open.

2. **Please provide the basis for the assumption that control valves QRV-200 and QRV-251 are fully open.**

   Response:

   Control valves QRV-200 (charging to regenerative heat exchanger flow control valve) and QRV-251 (CCPs discharge flow control valve) are assumed fully open to assure maximum flow through the normal and alternate charging flow paths.

During normal operation, the 32 gpm supplied to the reactor coolant pump (RCP) seals is maintained automatically by valves QRV-200 and QRV-251. QRV-251 controls the charging flowrate to the RCS as required to maintain pressurizer level. QRV-200 maintains sufficient backpressure in the charging header to ensure adequate flow of seal injection water to the RCP seal injection system.

Guidance in operating procedures OHP 4021.005.007, "Operation of the Emergency Boration Flow Paths", directs the operators to "adjust charging and letdown flow to ~120 gpm." Therefore, this assumption reflects that they will adjust control valves QRV-200 and QRV-251 to the full open position, if necessary, to achieve the desired flow. Since the subject calculation was performed to confirm the capability to supply the required flow, it is reasonable to assume the operators will configure the system to supply maximum capability, consistent with their procedure guidance.

3. **Although this calculation accounts for pressurizer pressure instrument uncertainty, it does not appear to account for the uncertainty in the instruments used to record the data. Please provide additional information regarding this issue.**

Response:

Besides pressurizer pressure instrumentation, other instruments relevant to this calculation include pressurizer level instrumentation, and instrumentation used to determine operability of the centrifugal charging pumps within the IST program. A discussion of the effect of pressurizer level instrument uncertainty was included in the original calculation. The impact of pressurizer level instrument uncertainty on the calculation results was determined to be very minor, approximately 2 psi compared to a CCP developed head of approximately 2500 psid, and therefore was not included in the calculation.

Instrumentation associated with IST of the CCPs includes the suction and discharge pressure gauges, and the charging pumps discharge flow gauge. Our IST program for pumps is based on the code for operation and maintenance of nuclear plants (ASME OM Code-1990). The ASME code recognizes that instrument inaccuracy exists, and includes provisions for a +/- 2% accuracy for pressure and flow instruments. Instruments used for inservice testing of pumps at Cook Nuclear Plant are included in both a calibration program and the "as-found reportable", (AFR) program, which provides for evaluation of instruments found out of calibration. The AFR program includes provisions for assessing the significance of instruments found to be out of calibration on the results of previous operability tests to determine equipment operability from a historical perspective, and also reportability. Since the instruments used to test the CCPs are periodically calibrated, and provisions exist to evaluate the significance of instruments found out of calibration tolerances with respect to previous test results, CCP test instrument error was not included in the original calculation to determine allowable degradation of the CCPs. However, we will include this inaccuracy in the revised calculation to add additional conservatism.

4. **Please provide the unit 2 pre-1990 operability review results.**

Response:

Although the equivalent boration flow requirement of 120 gpm of 2400 ppm boron was calculated and transmitted to Cook Nuclear Plant by Westinghouse in 1988, the technical specification clarification which implemented this equivalent flow rate was not issued until November 5, 1990. Therefore, since there was no reliance on this equivalent boration flow source prior to late 1990, there is no need to assess operability prior to 1990.

5. **Please provide additional information regarding piping configuration input into the Proto-Flo code.**

Response:

The Proto-Flo code is used to perform steady-state analyses of thermal-hydraulic systems. The code has been approved for use in safety related applications under the company's quality assurance program. Proto-Flo allows multiple evaluations of systems for a variety of cases considering flow path variations, pump combinations, heat exchanger capability, valve throttling, etc.

The piping configuration parameters utilized by Proto-Flo are obtained from the isometric drawings and other design documents. These parameters include pipe lengths, pipe diameters and elevations, as well as the existence of fittings such as elbows and valves. Equipment characteristics and fluid parameters are also required inputs. These include performance characteristics of heat exchangers and pumps, and physical parameters such as known pressures and temperatures. Proto-Flo uses this information to determine the friction losses, flow distribution, pump operating points, and temperature changes.

6. **Please provide additional information regarding fluid viscosity inputs into the Proto-Flo code.**

Response:

Fluid temperature is a required input parameter. Proto-Flo uses this information in determining the fluid's properties used in thermal-hydraulic calculations. The fluid properties are determined through Proto-Flo's computer codes. Proto-Flo determines the fluid's density, dynamic viscosity, vapor pressure, specific heat, and thermal conductivity.

7. **Please provide additional information regarding initial RWST level assumptions.**

Response:

The original calculation assumed that the refueling water storage tank was at a level corresponding to minimum volume of 350,000 gals required by the T/Ss. During normal plant operation, administrative limits ensure that RWST level is maintained above the T/S minimum volume. This assumption regarding RWST level was considered reasonable. However, the revised calculation being performed for the new boration flow

rate of 60.1 gpm will assume the RWST level has been reduced to the centerline of the outlet pipe, for consistency with other similar calculations.

8. **Please discuss the sensitivity of flowrate to developed head and how this was factored into the calculation.**

Response:

The performance curve (developed head versus flow) for the CCPs is characteristically flat near the point of operation under study in the calculation. For example, the curve exhibits little change in the developed head from 0 gpm (5880 ft. of head) to approximately 150 gpm (5840 ft. of head). Therefore, the flowrate has a relatively high sensitivity to developed head in this region of the pump curve. Given that there is a relatively high sensitivity of flowrate to developed head, it is critical to ensure that developed head is determined in a conservative manner, such that the corresponding flow is not overstated.

Centrifugal pumps characteristically operate at the intersection of their head-capacity curve and the system curve which shows the head required (i.e., developed head) to make the liquid flow through the system of piping, valves, and components. The head in a typical system is made up of three components: 1) static head, 2) pressure head, and 3) friction losses.

Static head, defined for this calculation by the elevation difference between the RWST level and the pressurizer level, is a relatively minor contributor to system head. As noted in the response to question 7, the original calculation conservatively assumed that the level in the RWST was at the technical specification minimum level. Additional conservatism will be added by assuming the RWST level is at the centerline of the outlet pipe in the calculation revision under development. As noted in the response to question 3, pressurizer level instrument uncertainty was also evaluated and the impact on the calculation results was determined to be negligible.

Pressure head (RCS system pressure) is the dominant contributor to system head for the case considered. As noted in question 3, pressurizer pressure instrumentation uncertainty was included in the calculation. This conservatively results in a higher RCS pressure against which the CCPs must deliver flow.

Friction losses are calculated using standard hydraulic analysis methods/practices. The software used for these calculations has been approved under the company's quality assurance program, and results predicted by the model have been observed to be consistent with actual plant parameters. Therefore, there is a high degree of confidence that the friction losses are being accurately calculated.

Therefore, considering the three components of system head, the calculation approach results in a system head which is conservatively high. Although it is recognized that there is a relatively high sensitivity of flowrate to developed head, the calculation methodology ensures that developed head is not underestimated, and therefore, that flowrate is not overstated. Finally, as noted above, the required boration flow value has also been recalculated using more realistic assumptions. The required flowrate is now 60.1 gpm of 2400 ppm boron, instead of the 120 gpm originally calculated. This provides additional assurance that the CCPs can provide the required flows.

ATTACHMENT 2 TO AEP:NRC:1238F1

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
REGARDING CALCULATION RD-96-02

Introduction

Calculation RD-96-02 was performed during the SOPI and provided to the inspection team at the exit meeting. The calculation determined the offsite and control room thyroid doses associated with the potential failure of the CCP emergency leak-off valve to close. (Failure of these valves to isolate during a loss-of-coolant accident could result in diversion of emergency core cooling system (ECCS) recirculation fluid outside containment.)

The following responses are offered to the questions on this calculation contained in attachment B to the SOPI inspection report:

1. **Please provide the basis for the assumption that the leak persists for four hours.**

   Response:

   We assumed that within four hours the operator would recognize the problem and take some action to correct it, such as shut off the pump. Even if the leak was assumed to persist for 30 days, the dose to the control operators would still have been within the GDC-19 limits. Using the same values of filtered and unfiltered control room inleakage assumed in calculation RD-96-02, the dose with no action taken by operators and a leak of 70 gpm for 30 days would be 25.32 rem to the thyroid. (This result was determined in calculation RD-97-02, which is included as attachment 3 to this letter.)

2. **Please provide additional documentation which supports the chosen operating point of filtered and unfiltered control room inleakage used in the calculation.**

   Response:

   The information was based on previous test results. Test results from the last test prior to the SOPI are attached (see attachment 4 to this letter). A margin was added to the previous test results to allow for degradation.

3. **Please provide additional discussion of the purpose and effect of doubling the "LEAKRATE" term in the code.**

   Response:

   The purpose of doubling the "LEAKRATE" term was to correct an error in the modeling of the ECCS leakage component of the operator dose. Thyroid dose to the operator is attributable to two components, iodine leaking from the containment and iodine coming out of solution in the ECCS recirculation fluid leaking outside of the containment. Per the UFSAR, the containment leakage portion assumes 25% of the core iodines are available for leakage from the containment atmosphere, and 50% of the core iodines are resident in the ECCS recirculation fluid. The previous calculation (RD-88-01, rev. 2) assumed 25% core iodines for both of these sources. Doubling the "LEAKRATE" term had the same effect as doubling the percentage of iodine in the ECCS recirculation fluid, and

thus corrected the error. The effect of the doubling was small. For example, for the base case of 10 gpm ECCS leakage the dose went from 17.3 rem to 17.9 rem for an assumed filtered inleakage of 1,000 cfm and an unfiltered inleakage of 30 cfm.

4. **Please discuss whether the contribution from ESF leakage was included in the control room thyroid dose calculation.**

Response:

Contributions from the engineered safety features (ESF) leakage were included in the calculation. In the calculation, the leakrate from the ESF systems is considered to be 70 gpm for the first four hours of the accident and 10 gpm for the remainder of the accident. See the response to item 1 for additional information.

5. **Please provide RD-94-01, "Offsite Doses Due to ECCS Leakage."**

Response:

The requested calculation is included as attachment 5 to this letter.

6. **Please provide RD-88-01, Revision 2, "Control Room Dose to Operators Following a LOCA."**

Response:

The requested calculation is included as attachment 6 to this letter.

ATTACHMENT 3 TO AEP:NRC:1238F1

CALCULATION NO. RD-97-02
"CALCULATION OF THYROID DOSE TO OPERATORS ASSUMING A 70 GPM ECCS LEAK FOR 30 DAYS"

American Electric Power
Nuclear Generation Group

Regulatory Affairs
Calculation Cover Sheet

Calculation No. RD-97-02 Rev. 0	Plant Cook Nuclear Plant Unit: Both
Subject : Calculation of thyroid dose to operators assuming a 70 gpm ECCS leak for 30 days	Company American Electric Power
	Calculated By [signature] 3/11/97
	Verified/Checked By [signature] Review of source code, comparison to previous calc
Safety Related System Yes X No	Method of Verification
Supersedes Calc. No.	Approved By [signature] 3/13/97

Problem Description:

This calculation is a "what-if" analysis of RD-96-02. In RD-96-02, the dose to the thyroid of the operators was calculated for an ECCS leakrate of 70 GPM for 4 hours. This calculation is to take the same assumptions and methodology but assume that the 70 GPM will not be isolated for the 30 days the accident is assumed to occur.

Design Basis Or References:

1. Calculation Number RD-96-02, Rev 0, "Offsite Thyroid Doses and Control Room Thyroid Doses", W T. MacRae, 12/12/96.

Executive Summary:

The dose to the control room operators is still within the limit of 30 rem to the thyroid for typical filtered and unfiltered inleakages. Using the same filtered and unfiltered inleakage points for this calculation as for RD-96-02 the dose to the operators would be 25.32 rem.

Superseded By Calculation No: _____ Dated _____
Reason: _____

CL note 3/12/97

Introduction

This calculation was done as a "what-if" analysis of a previous calculation to determine the 30 day dose to the thyroid of the control operators. In Calculation Number RD-96-02, the control room operator doses were calculated with an ECCS leakrate of 70 GPM for 4 hours. This calculation is the same calculation with one change. The ECCS leakrate is considered to continue for 30 days.

Statement of Purpose

The purpose of this calculation is to determine the dose to the control room operators after 30 days assuming that there is an ECCS leakrate of 70 GPM for 30 days following an accident.

Assumptions

The data for this calculation and the methodologies used are from a past calculations, RD-96-02. The assumptions used in that calculation is considered to apply to this calculation. The only change to the assumptions is that the leak rate that in RD-96-02 that was 70 gpm for 4 hours was changed to 70 gpm for 30 days. RD-96-02 assumed that actions would be taken within 4 hours to stop 60 GPM of the leakage.* For this calculation it is assumed that no action would successfully isolate the flow and that it would continue for 30 days.

Analysis

The analysis was a recalculation using a FORTRAN computer code. The code from RD-96-02 was changed in one place to take out the step that made the leakrate 70 GPM for times less than 4 hours and it was set to always be 70 GPM. Attachment 1 contains a printout of the code THY9702.FOR. The change is on page 2 in the step numbered 31.

Results

The program was run for filtered intake rates of 900 to 1500 CFM and unfiltered inleakage rates of 10 to 50 CFM. The result for a filtered intake of 1000 CFM and an unfiltered inleakage of 30 CFM is 25.32 rem. The values of 1000 CFM and 30 CFM were the same values used in RD-96-02. These values bound the current conditions. The complete output from the program is in Attachment 2. The results for 100 CFM filtered intake and 30 CFM unfiltered inleakage can be found on page 16 of Attachment 2. The dose of 25.32 rem is within the limit of 30 rem allowed for the thyroid dose.

* note: Stopping within 4 hrs 60 gpm of leakage restores leakage to within the 70 gpm previously analyzed (see calc RD 96-02 pg. 2)

Verification

The verification was done by comparing the output for this calculation with the output from RD-96-02. RD-96-02 has been verified. This code was verified by comparing the output for the first 2 hours from each calculation. Attachment 3 is the output sheet for the computer code ran for RD-96-02. It is the output for the point of concern 100 CFM filtered intake and 30 CFM unfiltered inleakage. Attachment 4 is the same point for this calculation.

To verify the output for this calculation, it was compared to the output of RD-96-02 for time steps .5 hours, 1 hour and 2 hour. Each of the values for the different forms of the iodine isotopes compared exactly.

Conclusion

The dose to the control room operators for 1000 CFM filtered intake and 30 CFM unfiltered inleakage is 25.32 rem. The dose to the control room operators is still within the limit of 30 rem to the thyroid.

```
      REAL*8 ILAMB(5),IDCF(5),PFACT(3),LEAKRT,LPART,
     1 SF,ICI(5),BREATH,F1,F2,F3,F30,ETA(3),IPF(3),
     2 DOSE,DOSET(7),T,DELTAT,XQF(4),S,DOSE05,LEAKFACT,
     3 DOSE10,DOSE20,DOSE80,DOSE96,TFLOW,XQ,F10
        CHARACTER*4 NAME(5)
        DATA DELTAT/1.0/
        DATA NAME/'I131','I132','I133','I134','I135'/
        DATA ILAMB/0.00359, 0.301, 0.0333, 0.791, 0.105/
        DATA ICI/ 2.5E+07,3.7E+07,5.0E+07,5.5E+07,4.8D+07/
        DATA IDCF/1.07E+06,6.29E+03,1.81E+05,1.07E+03,3.14E+04/
        DATA XQF/6.17D-9,3.64D-9,1.42D-9,4.07D-10/
        DATA BREATH/44.1/
        DATA LPART/6.7/
        DATA ETA/0.95,0.95,0.99/
        DATA PFACT/0.955,0.02,0.025/
       OPEN (UNIT = 6, FILE = 'I:\NSL\MSA\CTRLROOM\THY9702.OUT')
C  VENTILATION SYSTEM FLOWRATE
        TFLOW=5400.0D0
C  LOOP TO USE VARIOUS FILTERED INTAKE RATES
        DO 130 I2=1,8
         F1=800.0D0
        IF(I2.EQ.2) F1=900.0D0
        IF(I2.EQ.3) F1=1000.0D0
        IF(I2.EQ.4) F1=1100.0D0
        IF(I2.EQ.5) F1=1200.0D0
        IF(I2.EQ.6) F1=1300.0D0
        IF(I2.EQ.7) F1=1400.0D0
        IF(I2.EQ.8) F1=1500.0D0
          F10=4200.0
          F2=TFLOW-F1
C  LOOP TO USE VARIOUS UNFILTERED INLEAKAGE RATES
        DO 120 I3=1,6
        F3=0.0D0
        IF(I3.EQ.2) F3=10.0D0
        IF(I3.EQ.3) F3=20.0D0
        IF(I3.EQ.4) F3=30.0D0
        IF(I3.EQ.5) F3=40.0D0
        IF(I3.EQ.6) F3=50.0D0
         F30 = F3 + 200
        DOSET(I3) = 0.0D0
        WRITE (6,290)
290     FORMAT('INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR')
        WRITE (6,295)
295     FORMAT('OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT')
        WRITE (6,297)
297     FORMAT('NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT,
     1   CORRECTED I-135 ')
        WRITE(6,12) F2,F1,F3
12      FORMAT ('1',4X,'RECIRCULATION FLOW FROM CONTROL ROOM(CFM) ',
     1  E10.4,/,5X,'FILTERED INLEAKAGE(CFM) 'E10.4,/5X,
     2  'UNFILTERED INLEAKAGE(CFM)',E10.4,/13X,
     3  'ISOTOPE',1X,'.5 HOUR DOSE(REM)',1X,' 1 HOUR DOSE(REM)',
```

```
     4  1X,' 2 HOUR DOSE(REM)',1X,' 8 HOUR DOSE(REM)',
     5  1X,' 4 DAY DOSE(REM)',1X,' 30 DAY DOSE(REM)',/)
C  LOOP TO SUM DOSES AND DISTINGUISH ELEMENTAL=1 ORGANIC=2 PART=3
       DO 110 I = 1,3
C  LOOP FOR DIFFERENT ISOTOPES OF IODINE
       DO 100 K=1,5
       DOSE = 0.0D0
       T=0.0D0
90      DELTAT = 0.01D0
       IF(T.GE.1.0) DELTAT = 0.1D0
       IF(T.GE.24.0) DELTAT = 1.0D0
C  LOOP FOR TIME INCREMENTS TO SUM CONCENTRATIONS AND DOSES
       IF(I.EQ.1) THEN
        SF=125.0
        IF (T.LT.0.100) SF=1.0/DEXP(-17.0*T)
        IF (T.GT.0.100.AND.T.LT.0.167) SF=5.47/DEXP(-14.3*(T-0.100))
        IF (T.GT.0.167.AND.T.LT.0.333) SF=14.26/DEXP(-22.5*(T-0.167))
        GO TO 11
       ENDIF
       IF(I.EQ.2) THEN
         SF=1.0
         GO TO 11
       ENDIF
       IF(I.EQ.3) THEN
         SF=200.0
         IF (T.LT.0.584) SF=1.0/DEXP(-LPART*T)
         IF (T.GT.0.584.AND.T.LT.2.65) THEN
           SF = 50.0/DEXP((-LPART/10.0)*(T-0.584))
         ENDIF
         GO TO 11
       ENDIF
C  DISPERSION FACTORS
11      XQ=XQF(1)
       IF(T.GT.8.0) XQ=XQF(2)
       IF(T.GT.24.0) XQ=XQF(3)
       IF(T.GT.96.0) XQ=XQF(4)
       LEAKRT = 1.04D-04
       IF(T.GT.24.0) LEAKRT = 5.21D-05
       IF((ILAMB(K)*T).LT.100.0) GO TO 31
       S = 0.0D0
       GO TO 32
C  THE LEAKFACT TERM BELOW IS MULTIPLIED BY 7 TO CONVERT
C   FROM 10 TO 70 GPM
31         LEAKFACT=7.0D0*1.03D-7
           S = ICI(K)*(DEXP(-ILAMB(K)*T))*XQ*PFACT(I)*(LEAKRT/SF+
     1      2.0D0*LEAKFACT)
      IPF(I)=(F1+ETA(I)*F2+F3)/((1.0-ETA(I))*F1+F3)
       IF (T.LT.2.00) IPF(I)=(F1+ETA(I)*F2+F30)/((1.0-ETA(I))*F1+F30)
C      IF (T.LT.2.00) IPF(I)=(F10+F3)/((1.0-ETA(I))*F10+F3)
       DOSE = DOSE + (IDCF(K)*BREATH*S*DELTAT)/IPF(I)
32     IF(T.LT.0.51.AND.T.GT.0.49) DOSE05=DOSE
       IF(T.LT.1.01.AND.T.GT.0.99) DOSE10=DOSE
```

```
      IF(T.LT.2.05.AND.T.GT.1.95) DOSE20=DOSE
      IF(T.LT.8.05.AND.T.GT.7.95) DOSE80=DOSE
      IF(T.LT.96.1.AND.T.GT.95.9) DOSE96=DOSE
       T = T+DELTAT
34     IF(T.LE.720.0) GO TO 90
      IF(I.NE.1) GO TO 71
      WRITE(6,70) NAME(K),DOSE05,DOSE10,DOSE20,DOSE80,DOSE96,DOSE
70     FORMAT('  ELEMENTAL  ',A4,6(8X,E10.4))
71     IF(I.NE.2) GO TO 72
      WRITE(6,75) NAME(K),DOSE05,DOSE10,DOSE20,DOSE80,DOSE96,DOSE
75     FORMAT('  ORGANIC    ',A4,6(8X,E10.4))
72     IF(I.NE.3) GO TO 73
      WRITE(6,74) NAME(K),DOSE05,DOSE10,DOSE20,DOSE80,DOSE96,DOSE
74     FORMAT('  PARTICULATE ',A4,6(8X,E10.4))
73     DOSET(I3) = DOSET(I3) + DOSE
100    CONTINUE
110    CONTINUE
       WRITE(6,200) DOSET(I3)
200    FORMAT(' ',/,'TOTAL DOSE FOR 30 DAYS ',E10.4//)
120    CONTINUE
130    CONTINUE
      WRITE(6,140)
140    FORMAT(';')
     STOP
     END
```

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4600E+04
FILTERED INLEAKAGE(CFM) .8000E+03
UNFILTERED INLEAKAGE(CFM) .0000E+00

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2344E+01	.2760E+01	.3404E+01	.4125E+01	.6554E+01	.7715E+01
ELEMENTAL I132	.1993E-01	.2279E-01	.2638E-01	.2797E-01	.2816E-01	2816E-01
ELEMENTAL I133	.7912E+00	.9285E+00	.1137E+01	.1347E+01	.1675E+01	.1678E+01
ELEMENTAL I134	.4861E-02	.5355E-02	.5796E-02	.5863E-02	.5863E-02	.5863E-02
ELEMENTAL I135	.1310E+00	.1526E+00	.1838E+00	.2085E+00	.2231E+00	.2231E+00
ORGANIC I131	.3495E+00	.7531E+00	.1379E+01	.2079E+01	.3943E+01	.4643E+01
ORGANIC I132	.2826E-02	.5603E-02	.9090E-02	.1064E-01	.1082E-01	.1082E-01
ORGANIC I133	.1174E+00	.2508E+00	.4532E+00	.6573E+00	.9398E+00	.9414E+00
ORGANIC I134	.6359E-03	.1115E-02	.1544E-02	.1609E-02	.1609E-02	.1609E-02
ORGANIC I135	.1920E-01	.4019E-01	.7046E-01	.9448E-01	.1082E+00	.1082E+00
PARTICULATE I131	.1107E+00	.1241E+00	.1400E+00	.1431E+00	.1541E+00	.1595E+00
PARTICULATE I132	.9267E-03	.1019E-02	.1108E-02	.1115E-02	.1116E-02	.1116E-02
PARTICULATE I133	.3732E-01	.4175E-01	.4687E-01	.4779E-01	.4925E-01	.4926E-01
PARTICULATE I134	.2204E-03	.2365E-03	.2476E-03	.2479E-03	.2479E-03	.2479E-03
PARTICULATE I135	.6156E-02	.6854E-02	.7622E-02	.7731E-02	.7794E-02	.7794E-02

TOTAL DOSE FOR 30 DAYS .1557E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4600E+04
FILTERED INLEAKAGE(CFM) .8000E+03
UNFILTERED INLEAKAGE(CFM) .1000E+02

	ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL	I131	.2437E+01	.2869E+01	.3542E+01	.4441E+01	.7472E+01	.8920E+01
ELEMENTAL	I132	.2072E-01	.2369E-01	.2744E-01	.2943E-01	.2966E-01	.2966E-01
ELEMENTAL	I133	.8226E+00	.9654E+00	.1183E+01	.1445E+01	.1854E+01	.1857E+01
ELEMENTAL	I134	.5054E-02	.5568E-02	.6028E-02	.6111E-02	.6111E-02	.6111E-02
ELEMENTAL	I135	.1362E+00	.1587E+00	.1912E+00	.2221E+00	.2402E+00	.2402E+00
ORGANIC	I131	.3634E+00	.7831E+00	.1436E+01	.2309E+01	.4635E+01	.5508E+01
ORGANIC	I132	.2938E-02	.5826E-02	.9463E-02	.1139E-01	.1162E-01	.1162E-01
ORGANIC	I133	.1220E+00	.2607E+00	.4720E+00	.7266E+00	.1079E+01	.1081E+01
ORGANIC	I134	.6611E-03	.1160E-02	.1607E-02	.1687E-02	.1688E-02	.1688E-02
ORGANIC	I135	.1997E-01	.4179E-01	.7337E-01	.1033E+00	.1205E+00	.1205E+00
PARTICULATE	I131	.1158E+00	.1299E+00	.1465E+00	.1536E+00	.1782E+00	.1903E+00
PARTICULATE	I132	.9696E-03	.1066E-02	.1160E-02	.1176E-02	.1177E-02	.1177E-02
PARTICULATE	I133	.3904E-01	.4367E-01	.4906E-01	.5113E-01	.5440E-01	.5443E-01
PARTICULATE	I134	.2306E-03	.2475E-03	.2591E-03	.2597E-03	.2597E-03	.2597E-03
PARTICULATE	I135	.6441E-02	.7171E-02	.7977E-02	.8222E-02	.8365E-02	.8365E-02

TOTAL DOSE FOR 30 DAYS .1803E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4600E+04
FILTERED INLEAKAGE(CFM) .8000E+03
UNFILTERED INLEAKAGE(CFM) .2000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2530E+01	.2978E+01	.3679E+01	.4756E+01	.8386E+01	.1012E+02
ELEMENTAL I132	.2151E-01	.2460E-01	.2850E-01	.3088E-01	.3115E-01	.3115E-01
ELEMENTAL I133	.8539E+00	.1002E+01	.1229E+01	.1543E+01	.2033E+01	.2037E+01
ELEMENTAL I134	.5247E-02	.5780E-02	.6258E-02	.6358E-02	.6358E-02	.6358E-02
ELEMENTAL I135	.1414E+00	.1647E+00	.1986E+00	.2356E+00	.2573E+00	.2573E+00
ORGANIC I131	.3773E+00	.8129E+00	.1493E+01	.2539E+01	.5324E+01	.6370E+01
ORGANIC I132	.3050E-02	.6048E-02	.9835E-02	.1215E-01	.1241E-01	.1241E-01
ORGANIC I133	.1267E+00	.2706E+00	.4907E+00	.7957E+00	.1218E+01	.1220E+01
ORGANIC I134	.6863E-03	.1204E-02	.1669E-02	.1766E-02	.1766E-02	.1766E-02
ORGANIC I135	.2073E-01	.4338E-01	.7628E-01	.1122E+00	.1327E+00	.1327E+00
PARTICULATE I131	.1209E+00	.1356E+00	.1530E+00	.1640E+00	.2023E+00	.2210E+00
PARTICULATE I132	.1012E-02	.1113E-02	.1211E-02	.1236E-02	.1239E-02	.1239E-02
PARTICULATE I133	.4076E-01	.4560E-01	.5124E-01	.5446E-01	.5953E-01	.5958E-01
PARTICULATE I134	.2407E-03	.2583E-03	.2705E-03	.2715E-03	.2715E-03	.2715E-03
PARTICULATE I135	.6724E-02	.7486E-02	.8332E-02	.8711E-02	.8933E-02	.8933E-02

TOTAL DOSE FOR 30 DAYS .2048E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4600E+04
FILTERED INLEAKAGE(CFM) .8000E+03
UNFILTERED INLEAKAGE(CFM) .3000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2622E+01	.3087E+01	.3816E+01	.5070E+01	.9297E+01	.1132E+02
ELEMENTAL I132	.2230E-01	.2550E-01	.2955E-01	.3232E-01	.3264E-01	.3264E-01
ELEMENTAL I133	.8851E+00	.1039E+01	.1274E+01	.1640E+01	.2210E+01	.2215E+01
ELEMENTAL I134	.5438E-02	.5991E-02	.6488E-02	.6604E-02	.6605E-02	.6605E-02
ELEMENTAL I135	.1466E+00	.1708E+00	.2060E+00	.2490E+00	.2743E+00	.2743E+00
ORGANIC I131	.3911E+00	.8426E+00	.1550E+01	.2768E+01	.6011E+01	.7229E+01
ORGANIC I132	.3162E-02	.6269E-02	.1020E-01	.1290E-01	.1321E-01	.1321E-01
ORGANIC I133	.1313E+00	.2805E+00	.5094E+00	.8645E+00	.1356E+01	.1359E+01
ORGANIC I134	.7114E-03	.1248E-02	.1731E-02	.1843E-02	.1844E-02	.1844E-02
ORGANIC I 35	.2148E-01	.4496E-01	.7917E-01	.1210E+00	.1449E+00	.1449E+00
PARTICULATE I131	.1260E+00	.1413E+00	.1595E+00	.1744E+00	.2262E+00	.2516E+00
PARTICULATE I132	1055E-02	.1160E-02	.1262E-02	.1296E-02	.1299E-02	.1299E-02
PARTICULATE I133	.4247E-01	.4751E-01	.5341E-01	.5777E-01	.6465E-01	.6471E-01
PARTICULATE I134	.2508E-03	.2692E-03	.2819E-03	.2833E-03	.2833E-03	.2833E-03
PARTICULATE I135	.7006E-02	.7801E-02	.8684E-02	.9198E-02	.9499E-02	.9499E-02

TOTAL DOSE FOR 30 DAYS .2292E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4600E+04
FILTERED INLEAKAGE(CFM) .8000E+03
UNFILTERED INLEAKAGE(CFM) .4000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2714E+01	.3196E+01	.3952E+01	.5382E+01	.1020E+02	.1251E+02
ELEMENTAL I132	.2308E-01	.2639E-01	.3060E-01	.3376E-01	.3413E-01	.3413E-01
ELEMENTAL I133	.9162E+00	.1075E+01	.1320E+01	.1737E+01	.2387E+01	.2393E+01
ELEMENTAL I134	.5629E-02	.6201E-02	.6717E-02	.6849E-02	.6850E-02	.6850E-02
ELEMENTAL I135	.1517E+00	.1768E+00	.2133E+00	.2624E+00	.2913E+00	.2913E+00
ORGANIC I131	.4048E+00	.8722E+00	.1607E+01	.2995E+01	.6695E+01	.8085E+01
ORGANIC I132	.3273E-02	.6489E-02	.1057E-01	.1365E-01	.1400E-01	.1400E-01
ORGANIC I133	.1359E+00	.2904E+00	.5280E+00	.9330E+00	.1494E+01	.1497E+01
ORGANIC I134	.7364E-03	.1292E-02	.1793E-02	.1921E-02	.1922E-02	.1922E-02
ORGANIC I135	.2224E-01	.4654E-01	.8205E-01	.1297E+00	.1570E+00	.1570E+00
PARTICULATE I131	.1311E+00	.1469E+00	.1660E+00	.1848E+00	.2501E+00	.2821E+00
PARTICULATE I132	.1097E-02	.1207E-02	.1315E-02	.1355E-02	.1360E-02	.1360E-02
PARTICULATE I133	.4417E-01	.4942E-01	.5558E-01	.6107E-01	.6974E-01	.6982E-01
PARTICULATE I134	.2609E-03	.2800E-03	.2932E-03	.2950E-03	.2950E-03	.2950E-03
PARTICULATE I135	.7288E-02	.8114E-02	.9036E-02	.9684E-02	.1006E-01	.1006E-01

TOTAL DOSE FOR 30 DAYS .2535E+02

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4600E+04
FILTERED INLEAKAGE(CFM) .8000E+03
UNFILTERED INLEAKAGE(CFM) .5000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2806E+01	.3304E+01	.4088E+01	.5694E+01	.1111E+02	.1369E+02
ELEMENTAL I132	.2386E-01	.2728E-01	.3164E-01	.3519E-01	.3560E-01	.3560E-01
ELEMENTAL I133	.9472E+00	.1112E+01	.1365E+01	.1834E+01	.2564E+01	.2570E+01
ELEMENTAL I134	.5820E-02	.6411E-02	.6945E-02	.7093E-02	.7094E-02	.7094E-02
ELEMENTAL I135	.1569E+00	.1827E+00	.2206E+00	.2757E+00	.3082E+00	.3082E+00
ORGANIC I131	.4185E+00	.9017E+00	.1663E+01	.3222E+01	.7376E+01	.8937E+01
ORGANIC I132	.3383E-02	.6708E-02	.1094E-01	.1439E-01	.1479E-01	.1479E-01
ORGANIC I133	.1405E+00	.3002E+00	.5465E+00	.1001E+01	.1631E+01	.1634E+01
ORGANIC I134	.7613E-03	.1335E-02	.1854E-02	.1998E-02	.1999E-02	.1999E-02
ORGANIC I135	.2299E-01	.4812E-01	.8492E-01	.1384E+00	.1690E+00	.1690E+00
PARTICULATE I131	.1361E+00	.1526E+00	.1724E+00	.1951E+00	.2739E+00	.3125E+00
PARTICULATE I132	.1139E-02	.1253E-02	.1364E-02	.1415E-02	.1420E-02	.1420E-02
PARTICULATE I133	.4587E-01	.5132E-01	.5774E-01	.6436E-01	.7482E-01	.7491E-01
PARTICULATE I134	.2710E-03	.2908E-03	.3045E-03	.3067E-03	.3067E-03	.3067E-03
PARTICULATE I135	.7568E-02	.8426E-02	.9386E-02	.1017E-01	.1063E-01	.1063E-01

TOTAL DOSE FOR 30 DAYS .2777E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4500E+04
FILTERED INLEAKAGE(CFM) .9000E+03
UNFILTERED INLEAKAGE(CFM) .0000E+00

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2391E+01	.2814E+01	.3473E+01	.4283E+01	.7014E+01	.8318E+01
ELEMENTAL I132	.2033E-01	.2324E-01	.2691E-01	.2870E-01	.2891E-01	.2891E-01
ELEMENTAL I133	.8069E+00	.9470E+00	.1160E+01	.1396E+01	.1765E+01	.1768E+01
ELEMENTAL I134	.4958E-02	.5461E-02	.5912E-02	.5987E-02	.5987E-02	.5987E-02
ELEMENTAL I135	.1336E+00	.1557E+00	.1875E+00	.2153E+00	.2317E+00	.2317E+00
ORGANIC I131	.3565E+00	.7681E+00	.1408E+01	.2194E+01	.4289E+01	.5076E+01
ORGANIC I132	.2882E-02	.5715E-02	.9277E-02	.1102E-01	.1122E-01	.1122E-01
ORGANIC I133	.1197E+00	.2557E+00	.4626E+00	.6920E+00	.1009E+01	.1011E+01
ORGANIC I134	.6485E-03	.1138E-02	.1575E-02	.1648E-02	.1649E-02	.1649E-02
ORGANIC I135	.1959E-01	.4099E-01	.7192E-01	.9891E-01	.1144E+00	.1144E+00
PARTICULATE I131	.1112E+00	.1247E+00	.1406E+00	.1442E+00	.1565E+00	.1625E+00
PARTICULATE I132	.9310E-03	.1024E-02	.1113E-02	.1121E-02	.1122E-02	.1122E-02
PARTICULATE I133	.3749E-01	.4194E-01	.4709E-01	.4813E-01	.4977E-01	.4978E-01
PARTICULATE I134	.2214E-03	.2376E-03	.2488E-03	.2491E-03	.2491E-03	.2491E-03
PARTICULATE I135	.6185E-02	.6886E-02	.7658E-02	.7780E-02	.7852E-02	.7852E-02

TOTAL DOSE FOR 30 DAYS .1679E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR .
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT .
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4500E+04
FILTERED INLEAKAGE(CFM) .9000E+03
UNFILTERED INLEAKAGE(CFM) .1000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2484E+01	.2924E+01	.3611E+01	.4599E+01	.7930E+01	.9521E+01
ELEMENTAL I132	.2112E-01	.2415E-01	.2797E-01	.3015E-01	.3041E-01	.3041E-01
ELEMENTAL I133	.8383E+00	.9838E+00	.1206E+01	.1494E+01	.1943E+01	.1947E+01
ELEMENTAL I134	.5150E-02	.5674E-02	.6143E-02	.6235E-02	.6235E-02	.6235E-02
ELEMENTAL I135	.1388E+00	.1617E+00	.1949E+00	.2288E+00	.2488E+00	.2488E+00
ORGANIC I131	.3704E+00	.7980E+00	.1465E+01	.2424E+01	.4980E+01	.5940E+01
ORGANIC I132	.2994E-02	.5937E-02	.9649E-02	.1177E-01	.1202E-01	.1202E-01
ORGANIC I133	.1244E+00	.2657E+00	.4814E+00	.7612E+00	.1148E+01	.1151E+01
ORGANIC I134	.6737E-03	.1182E-02	.1638E-02	.1727E-02	.1727E-02	.1727E-02
ORGANIC I135	.2035E-01	.4258E-01	.7483E-01	.1078E+00	.1266E+00	.1266E+00
PARTICULATE I131	.1164E+00	.1304E+00	.1472E+00	.1547E+00	.1806E+00	.1934E+00
PARTICULATE I132	.9738E-03	.1071E-02	.1165E-02	.1182E-02	.1184E-02	.1184E-02
PARTICULATE I133	.3921E-01	.4387E-01	.4928E-01	.5147E-01	.5492E-01	.5495E-01
PARTICULATE I134	.2316E-03	.2486E-03	.2602E-03	.2609E-03	.2609E-03	.2609E-03
PARTICULATE I135	.6469E-02	.7202E-02	.8013E-02	.8271E-02	.8422E-02	.8422E-02

TOTAL DOSE FOR 30 DAYS .1924E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4500E+04
FILTERED INLEAKAGE(CFM) .9000E+03
UNFILTERED INLEAKAGE(CFM) .2000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2576E+01	.3033E+01	.3748E+01	.4913E+01	.8842E+01	.1072E+02
ELEMENTAL I132	.2190E-01	.2505E-01	.2902E-01	.3160E-01	.3190E-01	.3190E-01
ELEMENTAL I133	.8695E+00	.1020E+01	.1252E+01	.1592E+01	.2121E+01	.2126E+01
ELEMENTAL I134	.5342E-02	.5885E-02	.6373E-02	.6481E-02	.6482E-02	.6482E-02
ELEMENTAL I135	.1440E+00	.1678E+00	.2023E+00	.2423E+00	.2658E+00	.2658E+00
ORGANIC I131	.3842E+00	.8277E+00	.1522E+01	.2653E+01	.5668E+01	.6800E+01
ORGANIC I132	.3106E-02	.6158E-02	.1002E-01	.1252E-01	.1281E-01	.1281E-01
ORGANIC I133	.1290E+00	.2756E+00	.5001E+00	.8301E+00	.1287E+01	.1290E+01
ORGANIC I134	.6989E-03	.1226E-02	.1700E-02	.1805E-02	.1805E-02	.1805E-02
ORGANIC I135	.2111E-01	.4417E-01	.7772E-01	.1166E+00	.1388E+00	.1388E+00
PARTICULATE I131	.1215E+00	.1362E+00	.1537E+00	.1651E+00	.2047E+00	.2241E+00
PARTICULATE I132	.1016E-02	.1118E-02	.1216E-02	.1242E-02	.1245E-02	.1245E-02
PARTICULATE I133	.4093E-01	.4579E-01	.5146E-01	.5479E-01	.6005E-01	.6009E-01
PARTICULATE I134	.2417E-03	.2594E-03	.2716E-03	.2727E-03	.2727E-03	.2727E-03
PARTICULATE I135	.6752E-02	.7518E-02	.8367E-02	.8760E-02	.8990E-02	.8990E-02

TOTAL DOSE FOR 30 DAYS .2169E+02

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4500E+04
FILTERED INLEAKAGE(CFM) .9000E+03
UNFILTERED INLEAKAGE(CFM) .3000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2668E+01	.3142E+01	.3884E+01	.5226E+01	.9751E+01	.1191E+02
ELEMENTAL I132	.2269E-01	.2594E-01	.3007E-01	.3304E-01	.3338E-01	.3338E-01
ELEMENTAL I133	.9007E+00	.1057E+01	.1297E+01	.1689E+01	.2299E+01	.2304E+01
ELEMENTAL I134	.5534E-02	.6096E-02	.6603E-02	.6727E-02	.6727E-02	.6727E-02
ELEMENTAL I135	.1492E+00	.1738E+00	.2097E+00	.2557E+00	.2828E+00	.2828E+00
ORGANIC I131	.3979E+00	.8574E+00	.1578E+01	.2882E+01	.6353E+01	.7657E+01
ORGANIC I132	.3217E-02	.6379E-02	.1039E-01	.1327E-01	.1360E-01	.1360E-01
ORGANIC I133	.1336E+00	.2855E+00	.5187E+00	.8988E+00	.1425E+01	.1428E+01
ORGANIC I134	.7239E-03	.1270E-02	.1762E-02	.1882E-02	.1883E-02	.1883E-02
ORGANIC I135	.2186E-01	.4575E-01	.8061E-01	.1253E+00	.1509E+00	.1509E+00
PARTICULATE I131	.1265E+00	.1418E+00	.1602E+00	.1755E+00	.2286E+00	.2547E+00
PARTICULATE I132	.1059E-02	.1165E-02	.1267E-02	.1302E-02	.1305E-02	.1305E-02
PARTICULATE I133	.4264E-01	.4770E-01	.5363E-01	.5810E-01	.6516E-01	.6522E-01
PARTICULATE I134	.2519E-03	.2703E-03	.2830E-03	.2845E-03	.2845E-03	.2845E-03
PARTICULATE I135	.7035E-02	.7832E-02	.8720E-02	.9247E-02	.9556E-02	.9556E-02

TOTAL DOSE FOR 30 DAYS .2412E+02

6/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4500E+04
FILTERED INLEAKAGE(CFM) .9000E+03
UNFILTERED INLEAKAGE(CFM) .4000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2760E+01	.3250E+01	.4020E+01	.5538E+01	.1066E+02	.1310E+02
ELEMENTAL I132	.2347E-01	.2684E-01	.3112E-01	.3448E-01	.3487E-01	.3487E-01
ELEMENTAL I133	.9317E+00	.1093E+01	.1343E+01	.1785E+01	.2476E+01	.2481E+01
ELEMENTAL I134	.5724E-02	.6306E-02	.6831E-02	.6971E-02	.6972E-02	.6972E-02
ELEMENTAL I135	.1543E+00	.1797E+00	.2170E+00	.2691E+00	.2997E+00	.2997E+00
ORGANIC I131	.4116E+00	.8869E+00	.1635E+01	.3109E+01	.7036E+01	.8511E+01
ORGANIC I132	.3328E-02	.6599E-02	.1076E-01	.1402E-01	.1439E-01	.1439E-01
ORGANIC I133	.1382E+00	.2953E+00	.5372E+00	.9672E+00	.1562E+01	.1566E+01
ORGANIC I134	.7488E-03	.1314E-02	.1824E-02	.1960E-02	.1960E-02	.1960E-02
ORGANIC I135	.2262E-01	.4733E-01	.8348E-01	.1341E+00	.1630E+00	.1630E+00
PARTICULATE I131	.1316E+00	.1475E+00	.1666E+00	.1858E+00	.2525E+00	.2851E+00
PARTICULATE I132	.1101E-02	.1211E-02	.1318E-02	.1361E-02	.1366E-02	.1366E-02
PARTICULATE I133	.4434E-01	.4961E-01	.5579E-01	.6140E-01	.7025E-01	.7033E-01
PARTICULATE I134	.2619E-03	.2811E-03	.2944E-03	.2962E-03	.2962E-03	.2962E-03
PARTICULATE I135	.7316E-02	.8145E-02	.9071E-02	.9732E-02	.1012E-01	.1012E-01

TOTAL DOSE FOR 30 DAYS .2655E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4500E+04
FILTERED INLEAKAGE(CFM) .9000E+03
UNFILTERED INLEAKAGE(CFM) .5000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2852E+01	.3358E+01	.4156E+01	.5849E+01	.1156E+02	.1429E+02
ELEMENTAL I132	.2425E-01	.2773E-01	.3216E-01	.3591E-01	.3634E-01	.3634E-01
ELEMENTAL I133	.9626E+00	.1130E+01	.1388E+01	.1882E+01	.2652E+01	.2658E+01
ELEMENTAL I134	.5914E-02	.6515E-02	.7059E-02	.7215E-02	.7216E-02	.7216E-02
ELEMENTAL I135	.1594E+00	.1857E+00	.2243E+00	.2824E+00	.3166E+00	.3166E+00
ORGANIC I131	.4253E+00	.9164E+00	.1691E+01	.3336E+01	.7716E+01	.9362E+01
ORGANIC I132	.3438E-02	.6818E-02	.1112E-01	.1476E-01	.1518E-01	.1518E-01
ORGANIC I133	.1428E+00	.3051E+00	.5557E+00	.1035E+01	.1699E+01	.1703E+01
ORGANIC I134	.7737E-03	.1357E-02	.1885E-02	.2037E-02	.2038E-02	.2038E-02
ORGANIC I135	.2337E-01	.4890E-01	.8635E-01	.1428E+00	.1751E+00	.1751E+00
PARTICULATE I131	.1366E+00	.1532E+00	.1731E+00	.1962E+00	.2762E+00	.3155E+00
PARTICULATE I132	.1143E-02	.1258E-02	.1369E-02	.1421E-02	.1427E-02	.1427E-02
PARTICULATE I133	.4604E-01	.5151E-01	.5795E-01	.6469E-01	.7533E-01	.7542E-01
PARTICULATE I134	.2720E-03	.2919E-03	.3057E-03	.3079E-03	.3079E-03	.3079E-03
PARTICULATE I135	.7596E-02	.8457E-02	.9421E-02	.1022E-01	.1068E-01	.1068E-01

TOTAL DOSE FOR 30 DAYS .2896E+02

3/17/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4400E+04
FILTERED INLEAKAGE(CFM) .1000E+04
UNFILTERED INLEAKAGE(CFM) .0000E+00

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2437E+01	.2869E+01	.3542E+01	.4441E+01	.7472E+01	.8920E+01
ELEMENTAL I132	.2072E-01	.2369E-01	.2744E-01	.2943E-01	.2966E-01	.2966E-01
ELEMENTAL I133	8226E+00	.9654E+00	.1183E+01	.1445E+01	.1854E+01	.1857E+01
ELEMENTAL I134	5054E-02	.5568E-02	.6028E-02	.6111E-02	.6111E-02	.6111E-02
ELEMENTAL I135	.1362E+00	.1587E+00	.1912E+00	.2221E+00	.2402E+00	.2402E+00
ORGANIC I131	.3634E+00	.7831E+00	.1436E+01	.2309E+01	.4635E+01	.5508E+01
ORGANIC I132	.2938E-02	.5826E-02	.9463E-02	.1139E-01	.1162E-01	.1162E-01
ORGANIC I133	.1220E+00	.2607E+00	.4720E+00	.7266E+00	.1079E+01	.1081E+01
ORGANIC I134	.6611E-03	.1100E-02	.1607E-02	.1687E-02	.1688E-02	.1688E-02
ORGANIC I135	.1997E-01	.4179E-01	.7337E-01	.1033E+00	.1205E+00	.1205E+00
PARTICULATE I131	.1118E+00	.1253E+00	.1413E+00	.1452E+00	.1589E+00	.1656E+00
PARTICULATE I132	.9353E-03	.1029E-02	.1119E-02	.1127E-02	.1128E-02	.1128E-02
PARTICULATE I133	.3766E-01	.4213E-01	.4731E-01	.4846E-01	.5028E-01	.5030E-01
PARTICULATE I134	.2224E-03	.2387E-03	.2499E-03	.2503E-03	.2503E-03	.2503E-03
PARTICULATE I135	.6213E-02	.6918E-02	.7693E-02	.7829E-02	.7909E-02	.7909E-02

TOTAL DOSE FOR 30 DAYS .1800E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4400E+04
FILTERED INLEAKAGE(CFM) .1000E+04
UNFILTERED INLEAKAGE(CFM) .1000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2530E+01	.2978E+01	.3679E+01	.4756E+01	.8386E+01	.1012E+02
ELEMENTAL I132	.2151E-01	.2460E-01	.2850E-01	.3088E-01	.3115E-01	.3115E-01
ELEMENTAL I133	.8539E+00	.1002E+01	.1229E+01	.1543E+01	.2033E+01	.2037E+01
ELEMENTAL I134	.5247E-02	.5780E-02	.6258E-02	.6358E-02	.6358E-02	.6358E-02
ELEMENTAL I135	.1414E+00	.1647E+00	.1986E+00	.2356E+00	.2573E+00	.2573E+00
ORGANIC I131	.3773E+00	.8129E+00	.1493E+01	.2539E+01	.5324E+01	.6370E+01
ORGANIC I132	.3050E-02	.6048E-02	.9835E-02	.1215E-01	.1241E-01	.1241E-01
ORGANIC I133	.1267E+00	.2706E+00	.4907E+00	.7957E+00	.1218E+01	.1220E+01
ORGANIC I134	.6863E-03	.1204E-02	.1669E-02	.1766E-02	.1766E-02	.1766E-02
ORGANIC I135	.2073E-01	.4338E-01	.7628E-01	.1122E+00	.1327E+00	.1327E+00
PARTICULATE I131	.1169E+00	.1310E+00	.1478E+00	.1557E+00	.1830E+00	.1964E+00
PARTICULATE I132	.9781E-03	.1076E-02	.1170E-02	.1188E-02	.1190E-02	.1190E-02
PARTICULATE I133	.3938E-01	.4406E-01	.4950E-01	.5180E-01	.5543E-01	.5546E-01
PARTICULATE I134	.2326E-03	.2496E-03	.2614E-03	.2621E-03	.2621E-03	.2621E-03
PARTICULATE I135	.6497E-02	.7234E-02	.8048E-02	.8320E-02	.8479E-02	.8479E-02

TOTAL DOSE FOR 30 DAYS .2045E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4400E+04
FILTERED INLEAKAGE(CFM) .1000E+04
UNFILTERED INLEAKAGE(CFM) .2000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2622E+01	.3087E+01	.3816E+01	.5070E+01	.9297E+01	.1132E+02
ELEMENTAL I132	.2230E-01	.2550E-01	.2955E-01	.3232E-01	.3264E-01	.3264E-01
ELEMENTAL I133	.8851E+00	.1039E+01	.1274E+01	.1640E+01	.2210E+01	.2215E+01
ELEMENTAL I134	.5438E-02	.5991E-02	.6488E-02	.6604E-02	.6605E-02	.6605E-02
ELEMENTAL I135	.1466E+00	.1708E+00	.2060E+00	.2490E+00	.2743E+00	.2743E+00
ORGANIC I131	.3911E+00	.8426E+00	.1550E+01	.2768E+01	.6011E+01	.7229E+01
ORGANIC I132	.3162E-02	.6269E-02	.1020E-01	.1290E-01	.1321E-01	.1321E-01
ORGANIC I133	.1313E+00	.2805E+00	.5094E+00	.8645E+00	.1356E+01	.1359E+01
ORGANIC I134	.7114E-03	.1248E-02	.1731E-02	.1843E-02	.1844E-02	.1844E-02
ORGANIC I135	.2148E-01	.4496E-01	.7917E-01	.1210E+00	.1449E+00	.1449E+00
PARTICULATE I131	.1220E+00	.1367E+00	.1543E+00	.1661E+00	.2071E+00	.2271E+00
PARTICULATE I132	.1021E-02	.1123E-02	.1221E-02	.1248E-02	.1251E-02	.1251E-02
PARTICULATE I133	.4110E-01	.4598E-01	.5168E-01	.5512E-01	.6056E-01	.6061E-01
PARTICULATE I134	.2428E-03	.2605E-03	.2728E-03	.2739E-03	.2739E-03	.2739E-03
PARTICULATE I135	.6781E-02	.7549E-02	.8402E-02	.8808E-02	.9046E-02	.9046E-02

TOTAL DOSE FOR 30 DAYS .2289E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4400E+04
FILTERED INLEAKAGE(CFM) .1000E+04
UNFILTERED INLEAKAGE(CFM) .3000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2714E+01	.3196E+01	.3952E+01	.5382E+01	.1020E+02	.1251E+02
ELEMENTAL I132	.2308E-01	.2639E-01	.3060E-01	.3376E-01	.3413E-01	.3413E-01
ELEMENTAL I133	.9162E+00	.1075E+01	.1320E+01	.1737E+01	.2387E+01	.2393E+01
ELEMENTAL I134	.5629E-02	.6201E-02	.6717E-02	.6849E-02	.6850E-02	.6850E-02
ELEMENTAL I135	.1517E+00	.1768E+00	.2133E+00	.2624E+00	.2913E+00	.2913E+00
ORGANIC I131	.4048E+00	.8722E+00	.1607E+01	.2995E+01	.6695E+01	.8085E+01
ORGANIC I132	.3273E-02	.6489E-02	.1057E-01	.1365E-01	.1400E-01	.1400E-01
ORGANIC I133	.1359E+00	.2904E+00	.5280E+00	.9330E+00	.1494E+01	.1497E+01
ORGANIC I134	.7364E-03	.1292E-02	.1793E-02	.1921E-02	.1922E-02	.1922E-02
ORGANIC I135	.2224E-01	.4654E-01	.8205E-01	.1297E+00	.1570E+00	.1570E+00
PARTICULATE I131	.1270E+00	.1424E+00	.1608E+00	.1765E+00	.2310E+00	.2577E+00
PARTICULATE I132	.1063E-02	.1169E-02	.1273E-02	.1308E-02	.1312E-02	.1312E-02
PARTICULATE I133	.4281E-01	.4789E-01	.5385E-01	.5843E-01	.6567E-01	.6573E-01
PARTICULATE I134	.2529E-03	.2714E-03	.2842E-03	.2856E-03	.2857E-03	.2857E-03
PARTICULATE I135	.7063E-02	.7863E-02	.8755E-02	.9296E-02	.9612E-02	.9612E-02

TOTAL DOSE FOR 30 DAYS .2532E+02

7/12/13

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4400E+04
FILTERED INLEAKAGE(CFM) .1000E+04
UNFILTERED INLEAKAGE(CFM) .4000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2806E+01	.3304E+01	.4088E+01	.5694E+01	.1111E+02	.1369E+02
ELEMENTAL I132	.2386E-01	.2728E-01	.3164E-01	.3519E-01	.3560E-01	.3560E-01
ELEMENTAL I133	.9472E+00	.1112E+01	.1365E+01	.1834E+01	.2564E+01	.2570E+01
ELEMENTAL I134	5820E-02	.6411E-02	.6945E-02	.7093E-02	.7094E-02	.7094E-02
ELEMENTAL I135	.1569E+00	.1827E+00	.2206E+00	.2757E+00	.3082E+00	.3082E+00
ORGANIC I131	.4185E+00	.9017E+00	.1663E+01	.3222E+01	.7376E+01	.8937E+01
ORGANIC I132	.3383E-02	.6708E-02	.1094E-01	.1439E-01	.1479E-01	.1479E-01
ORGANIC I133	.1405E+00	.3002E+00	.5465E+00	.1001E+01	.1631E+01	.1634E+01
ORGANIC I134	.7613E-03	.1335E-02	.1854E-02	.1998E-02	.1999E-02	.1999E-02
ORGANIC I135	.2299E-01	.4812E-01	.8492E-01	.1384E+00	.1690E+00	.1690E+00
PARTICULATE I131	.1321E+00	.1481E+00	.1673E+00	.1869E+00	.2548E+00	.2882E+00
PARTICULATE I132	.1106E-02	.1216E-02	.1324E-02	.1367E-02	.1372E-02	.1372E-02
PARTICULATE I133	.4451E-01	.4980E-01	.5601E-01	.6173E-01	.7076E-01	.7084E-01
PARTICULATE I134	.2629E-03	.2822E-03	.2955E-03	.2974E-03	.2974E-03	.2974E-03
PARTICULATE I135	.7344E-02	.8176E-02	.9106E-02	.9781E-02	.1018E-01	.1018E-01

TOTAL DOSE FOR 30 DAYS .2774E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4400E+04
FILTERED INLEAKAGE(CFM) .1000E+04
UNFILTERED INLEAKAGE(CFM) .5000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2898E+01	.3411E+01	.4223E+01	.6004E+01	.1201E+02	.1488E+02
ELEMENTAL I132	.2464E-01	.2817E-01	.3268E-01	.3662E-01	.3708E-01	.3708E-01
ELEMENTAL I133	.9780E+00	.1148E+01	.1410E+01	.1930E+01	.2740E+01	.2746E+01
ELEMENTAL I134	.6009E-02	.6620E-02	.7172E-02	.7337E-02	.7338E-02	.7338E-02
ELEMENTAL I135	.1620E+00	.1887E+00	.2279E+00	.2890E+00	.3250E+00	.3250E+00
ORGANIC I131	.4321E+00	.9310E+00	.1719E+01	.3449E+01	.8055E+01	.9786E+01
ORGANIC I132	.3493E-02	.6927E-02	.1131E-01	.1513E-01	.1557E-01	.1557E-01
ORGANIC I133	.1451E+00	.3100E+00	.5649E+00	.1069E+01	.1767E+01	.1771E+01
ORGANIC I134	.7861E-03	.1379E-02	.1916E-02	.2075E-02	.2076E-02	.2076E-02
ORGANIC I135	.2374E-01	.4968E-01	.8777E-01	.1471E+00	.1811E+00	.1811E+00
PARTICULATE I131	.1371E+00	.1537E+00	.1737E+00	.1972E+00	.2786E+00	.3185E+00
PARTICULATE I132	.1148E-02	.1262E-02	.1374E-02	.1427E-02	.1433E-02	.1433E-02
PARTICULATE I133	.4621E-01	.5170E-01	.5817E-01	.6502E-01	.7583E-01	.7593E-01
PARTICULATE I134	.2730E-03	.2929E-03	.3068E-03	.3090E-03	.3090E-03	.3090E-03
PARTICULATE I135	.7624E-02	.8488E-02	.9456E-02	.1026E-01	.1074E-01	.1074E-01

TOTAL DOSE FOR 30 DAYS .3016E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4300E+04
FILTERED INLEAKAGE(CFM) .1100E+04
UNFILTERED INLEAKAGE(CFM) .0000E+00

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2484E+01	.2924E+01	.3611E+01	.4599E+01	.7930E+01	.9521E+01
ELEMENTAL I132	.2112E-01	.2415E-01	.2797E-01	.3015E-01	.3041E-01	.3041E-01
ELEMENTAL I133	.8383E+00	.9838E+00	.1206E+01	.1494E+01	.1943E+01	.1947E+01
ELEMENTAL I134	.5150E-02	.5674E-02	.6143E-02	.6235E-02	.6235E-02	.6235E-02
ELEMENTAL I135	.1388E+00	.1617E+00	.1949E+00	.2288E+00	.2488E+00	.2488E+00
ORGANIC I131	.3704E+00	.7980E+00	.1465E+01	.2424E+01	.4980E+01	.5940E+01
ORGANIC I132	.2994E-02	.5937E-02	.9649E-02	.1177E-01	.1202E-01	.1202E-01
ORGANIC I133	.1244E+00	.2657E+00	.4814E+00	.7612E+00	.1148E+01	.1151E+01
ORGANIC I134	.6737E-03	.1182E-02	.1638E-02	.1727E-02	.1727E-02	.1727E-02
ORGANIC I135	.2035E-01	.4258E-01	.7483E-01	.1078E+00	.1266E+00	.1266E+00
PARTICULATE I131	.1123E+00	.1259E+00	.1419E+00	.1463E+00	.1613E+00	.1687E+00
PARTICULATE I132	.9396E-03	.1034E-02	.1124E-02	.1133E-02	.1135E-02	.1135E-02
PARTICULATE I133	.3783E-01	.4233E-01	.4753E-01	.4880E-01	.5080E-01	.5081E-01
PARTICULATE I134	.2235E-03	.2398E-03	.2510E-03	.2515E-03	.2515E-03	.2515E-03
PARTICULATE I135	.6242E-02	.6949E-02	.7729E-02	.7878E-02	.7966E-02	.7966E-02

TOTAL DOSE FOR 30 DAYS .1921E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4300E+04
FILTERED INLEAKAGE(CFM) .1100E+04
UNFILTERED INLEAKAGE(CFM) .1000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2576E+01	.3033E+01	.3748E+01	.4913E+01	.8842E+01	.1072E+02
ELEMENTAL I132	.2190E-01	.2505E-01	.2902E-01	.3160E-01	.3190E-01	.3190E-01
ELEMENTAL I133	.8695E+00	.1020E+01	.1252E+01	.1592E+01	.2121E+01	.2126E+01
ELEMENTAL I134	.5342E-02	.5885E-02	.6373E-02	.6481E-02	.6482E-02	.6482E-02
ELEMENTAL I135	.1440E+00	.1678E+00	.2023E+00	.2423E+00	.2658E+00	.2658E+00
ORGANIC I131	.3842E+00	.8277E+00	.1522E+01	.2653E+01	.5668E+01	.6800E+01
ORGANIC I132	.3106E-02	.6158E-02	.1002E-01	.1252E-01	.1281E-01	.1281E-01
ORGANIC I133	.1290E+00	.2756E+00	.5001E+00	.8301E+00	.1287E+01	.1290E+01
ORGANIC I134	.6989E-03	.1226E-02	.1700E-02	.1805E-02	.1805E-02	.1805E-02
ORGANIC I135	.2111E-01	.4417E-01	.7772E-01	.1166E+00	.1388E+00	.1388E+00
PARTICULATE I131	.1174E+00	.1316E+00	.1485E+00	.1567E+00	.1854E+00	.1995E+00
PARTICULATE I132	.9824E-03	.1081E-02	.1175E-02	.1194E-02	.1196E-02	.1196E-02
PARTICULATE I133	.3956E-01	.4425E-01	.4971E-01	.5213E-01	.5594E-01	.5598E-01
PARTICULATE I134	.2336E-03	.2507E-03	.2625E-03	.2633E-03	.2633E-03	.2633E-03
PARTICULATE I135	.6526E-02	.7266E-02	.8084E-02	.8369E-02	.8535E-02	.8535E-02

TOTAL DOSE FOR 30 DAYS .2166E+02

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4300E+04
FILTERED INLEAKAGE(CFM) .1100E+04
UNFILTERED INLEAKAGE(CFM) .2000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2668E+01	.3142E+01	.3884E+01	.5226E+01	.9751E+01	.1191E+02
ELEMENTAL I132	.2269E-01	.2594E-01	.3007E-01	.3304E-01	.3338E-01	.3338E-01
ELEMENTAL I133	.9007E+00	.1057E+01	.1297E+01	.1689E+01	.2299E+01	.2304E+01
ELEMENTAL I134	.5534E-02	.6096E-02	.6603E-02	.6727E-02	.6727E-02	.6727E-02
ELEMENTAL I135	.1492E+00	.1738E+00	.2097E+00	.2557E+00	.2828E+00	.2828E+00
ORGANIC I131	.3979E+00	.8574E+00	.1578E+01	.2882E+01	.6353E+01	.7657E+01
ORGANIC I132	.3217E-02	.6379E-02	.1039E-01	.1327E-01	.1360E-01	.1360E-01
ORGANIC I133	.1336E+00	.2855E+00	.5187E+00	.8988E+00	.1425E+01	.1428E+01
ORGANIC I134	.7239E-03	.1270E-02	.1762E-02	.1882E-02	.1883E-02	.1883E-02
ORGANIC I135	.2186E-01	.4575E-01	.8061E-01	.1253E+00	.1509E+00	.1509E+00
PARTICULATE I131	.1225E+00	.1373E+00	.1550E+00	.1672E+00	.2095E+00	.2302E+00
PARTICULATE I132	.1025E-02	.1127E-02	.1227E-02	.1254E-02	.1257E-02	.1257E-02
PARTICULATE I133	.4127E-01	.4617E-01	.5189E-01	.5545E-01	.6107E-01	.6112E-01
PARTICULATE I134	.2438E-03	.2616E-03	.2739E-03	.2751E-03	.2751E-03	.2751E-03
PARTICULATE I135	.6809E-02	.7581E-02	.8438E-02	.8857E-02	.9103E-02	.9103E-02

TOTAL DOSE FOR 30 DAYS .2409E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4300E+04
FILTERED INLEAKAGE(CFM) .1100E+04
UNFILTERED INLEAKAGE(CFM) .3000E+02

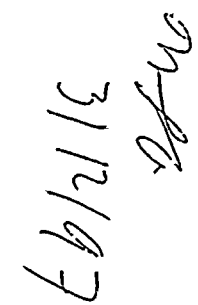
	ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL	I131	.2760E+01	.3250E+01	.4020E+01	.5538E+01	.1066E+02	.1310E+02
ELEMENTAL	I132	.2347E-01	.2684E-01	.3112E-01	.3448E-01	.3487E-01	.3487E-01
ELEMENTAL	I133	.9317E+00	.1093E+01	.1343E+01	.1785E+01	.2476E+01	.2481E+01
ELEMENTAL	I134	.5724E-02	.6306E-02	.6831E-02	.6971E-02	.6972E-02	.6972E-02
ELEMENTAL	I135	.1543E+00	.1797E+00	.2170E+00	.2691E+00	.2997E+00	.2997E+00
ORGANIC	I131	.4116E+00	.8869E+00	.1635E+01	.3109E+01	.7036E+01	.8511E+01
ORGANIC	I132	.3328E-02	.6599E-02	.1076E-01	.1402E-01	.1439E-01	.1439E-01
ORGANIC	I133	.1382E+00	.2953E+00	.5372E+00	.9672E+00	.1562E+01	.1566E+01
ORGANIC	I134	.7488E-03	.1314E-02	.1824E-02	.1960E-02	.1960E-02	.1960E-02
ORGANIC	I135	.2262E-01	.4733E-01	.8348E-01	.1341E+00	.1630E+00	.1630E+00
PARTICULATE	I131	.1275E+00	.1430E+00	.1615E+00	.1776E+00	.2334E+00	.2608E+00
PARTICULATE	I132	.1067E-02	.1174E-02	.1278E-02	.1314E-02	.1318E-02	.1318E-02
PARTICULATE	I133	.4298E-01	.4808E-01	.5406E-01	.5876E-01	.6618E-01	.6624E-01
PARTICULATE	I134	.2539E-03	.2724E-03	.2853E-03	.2868E-03	.2868E-03	.2868E-03
PARTICULATE	I135	.7091E-02	.7895E-02	.8790E-02	.9344E-02	.9669E-02	.9669E-02

TOTAL DOSE FOR 30 DAYS .2652E+02

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4300E+04
FILTERED INLEAKAGE(CFM) .1100E+04
UNFILTERED INLEAKAGE(CFM) .4000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2852E+01	.3358E+01	.4156E+01	.5849E+01	.1156E+02	.1429E+02
ELEMENTAL I132	.2425E-01	.2773E-01	.3216E-01	.3591E-01	.3634E-01	.3634E-01
ELEMENTAL I133	.9626E+00	.1130E+01	.1388E+01	.1882E+01	.2652E+01	.2658E+01
ELEMENTAL I134	.5914E-02	.6515E-02	.7059E-02	.7215E-02	.7216E-02	.7216E-02
ELEMENTAL I135	.1594E+00	.1857E+00	.2243E+00	.2824E+00	.3166E+00	.3166E+00
ORGANIC I131	.4253E+00	.9164E+00	.1691E+01	.3336E+01	.7716E+01	.9362E+01
ORGANIC I132	.3438E-02	.6818E-02	.1112E-01	.1476E-01	.1518E-01	.1518E-01
ORGANIC I133	.1428E+00	.3051E+00	.5557E+00	.1035E+01	.1699E+01	.1703E+01
ORGANIC I134	.7737E-03	.1357E-02	.1885E-02	.2037E-02	.2038E-02	.2038E-02
ORGANIC I135	.2337E-01	.4890E-01	.8635E-01	.1428E+00	.1751E+00	.1751E+00
PARTICULATE I131	.1326E+00	.1486E+00	.1679E+00	.1879E+00	.2572E+00	.2912E+00
PARTICULATE I132	.1110E-02	.1221E-02	.1329E-02	.1373E-02	.1378E-02	.1378E-02
PARTICULATE I133	.4468E-01	.4999E-01	.5623E-01	.6206E-01	.7127E-01	.7135E-01
PARTICULATE I134	.2639E-03	.2832E-03	.2966E-03	.2985E-03	.2985E-03	.2985E-03
PARTICULATE I135	.7372E-02	.8208E-02	.9141E-02	.9829E-02	.1023E-01	.1023E-01

TOTAL DOSE FOR 30 DAYS .2894E+02



INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4300E+04
FILTERED INLEAKAGE(CFM) .1100E+04
UNFILTERED INLEAKAGE(CFM) .5000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2943E+01	.3465E+01	.4291E+01	.6159E+01	.1246E+02	.1547E+02
ELEMENTAL I132	.2502E-01	.2862E-01	.3320E-01	.3733E-01	.3781E-01	.3781E-01
ELEMENTAL I133	.9934E+00	.1166E+01	.1433E+01	.1978E+01	.2827E+01	.2834E+01
ELEMENTAL I134	.6104E-02	.6724E-02	.7286E-02	.7458E-02	.7459E-02	.7459E-02
ELEMENTAL I135	.1645E+00	.1917E+00	.2315E+00	.2957E+00	.3334E+00	.3334E+00
ORGANIC I131	.4389E+00	.9457E+00	.1747E+01	.3561E+01	.8394E+01	.1021E+02
ORGANIC I132	.3548E-02	.7036E-02	.1149E-01	.1550E-01	.1596E-01	.1596E-01
ORGANIC I133	.1474E+00	.3149E+00	.5741E+00	.1103E+01	.1835E+01	.1840E+01
ORGANIC I134	.7984E-03	.1401E-02	.1946E-02	.2114E-02	.2115E-02	.2115E-02
ORGANIC I135	.2411E-01	.5047E-01	.8920E-01	.1515E+00	.1871E+00	.1871E+00
PARTICULATE I131	.1376E+00	.1543E+00	.1744E+00	.1982E+00	.2810E+00	.3216E+00
PARTICULATE I132	.1152E-02	.1267E-02	.1379E-02	.1433E-02	.1439E-02	.1439E-02
PARTICULATE I133	.4638E-01	.5189E-01	.5838E-01	.6535E-01	.7634E-01	.7643E-01
PARTICULATE I134	.2740E-03	.2940E-03	.3079E-03	.3102E-03	.3102E-03	.3102E-03
PARTICULATE I135	.7652E-02	.8519E-02	.9491E-02	.1031E-01	.1079E-01	.1079E-01

TOTAL DOSE FOR 30 DAYS .3134E+02

3/11/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4200E+04
FILTERED INLEAKAGE(CFM) .1200E+04
UNFILTERED INLEAKAGE(CFM) .0000E+00

	ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL	I131	.2530E+01	.2978E 01	.3679E+01	.4756E+01	.8386E+01	.1012E+02
ELEMENTAL	I132	.2151E-01	.2460E-01	.2850E-01	.3088E-01	.3115E-01	.3115E-01
ELEMENTAL	I133	.8539E+00	.1002E+01	.1229E+01	.1543E+01	.2033E+01	.2037E+01
ELEMENTAL	I134	5247E-02	.5780E-02	.6258E-02	.6358E-02	.6358E-02	.6358E-02
ELEMENTAL	I135	.1414E+00	.1647E+00	.1986E+00	.2356E+00	.2573E+00	.2573E+00
ORGANIC	I131	.3773E+00	.8129E+00	.1493E+01	.2539E+01	.5324E+01	.6370E+01
ORGANIC	I132	.3050E-02	.6048E-02	.9835E-02	.1215E-01	.1241E-01	.1241E-01
ORGANIC	I133	.1267E+00	.2706E+00	.4907E+00	.7957E+00	.1218E+01	.1220E+01
ORGANIC	I134	.6863E-03	.1204E-02	.1669E-02	.1766E-02	.1766E-02	.1766E-02
ORGANIC	I135	.2073E-01	.4338E-01	.7628E-01	.1122E+00	.1327E+00	.1327E+00
PARTICULATE	I131	.1128E+00	.1264E+00	.1426E+00	.1473E+00	.1637E+00	.1718E+00
PARTICULATE	I132	.9439E-03	.1038E-02	.1129E-02	.1139E-02	.1141E-02	.1141E-02
PARTICULATE	I133	.3801E-01	.4252E-01	.4775E-01	.4913E-01	.5131E-01	.5133E-01
PARTICULATE	I134	.2245E-03	.2409E-03	.2522E-03	.2526E-03	.2526E-03	.2526E-03
PARTICULATE	I135	.6270E-02	.6981E-02	.7764E-02	.7927E-02	.8023E-02	.8023E-02

TOTAL DOSE FOR 30 DAYS .2042E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4200E+04
FILTERED INLEAKAGE(CFM) .1200E+04
UNFILTERED INLEAKAGE(CFM) .1000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2622E+01	.3087E+01	.3816E+01	.5070E+01	.9297E+01	.1132E+02
ELEMENTAL I132	.2230E-01	.2550E-01	.2955E-01	.3232E-01	.3264E-01	.3264E-01
ELEMENTAL I133	.8851E+00	.1039E+01	.1274E+01	.1640E+01	.2210E+01	.2215E+01
ELEMENTAL I134	.5438E-02	.5991E-02	.6488E-02	.6604E-02	.6605E-02	.6605E-02
ELEMENTAL I135	.1466E+00	.1708E+00	.2060E+00	.2490E+00	.2743E+00	.2743E+00
ORGANIC I131	.3911E+00	.8426E+00	.1550E+01	.2768E+01	.6011E+01	.7229E+01
ORGANIC I132	.3162E-02	.6269E-02	.1020E-01	.1290E-01	.1321E-01	.1321E-01
ORGANIC I133	.1313E+00	.2805E+00	.5094E+00	.8645E+00	.1356E+01	.1359E+01
ORGANIC I134	.7114E-03	.1248E-02	.1731E-02	.1843E-02	.1844E-02	.1844E-02
ORGANIC I135	.2148E-01	.4496E-01	.7917E-01	.1210E+00	.1449E+00	.1449E+00
PARTICULATE I131	.1179E+00	.1322E+00	.1491E+00	.1578E+00	.1878E+00	.2026E+00
PARTICULATE I132	.9866E-03	.1085E-02	.1180E-02	.1200E-02	.1202E-02	.1202E-02
PARTICULATE I133	.3973E-01	.4444E-01	.4993E-01	.5246E-01	.5646E-01	.5649E-01
PARTICULATE I134	.2347E-03	.2518E-03	.2637E-03	.2645E-03	.2645E-03	.2645E-03
PARTICULATE I135	.6554E-02	.7297E-02	.8119E-02	.8418E-02	.8592E-02	.8592E-02

TOTAL DOSE FOR 30 DAYS .2286E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4200E+04
FILTERED INLEAKAGE(CFM) .1200E+04
UNFILTERED INLEAKAGE(CFM) .2000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2714E+01	.3196E+01	.3952E+01	.5382E+01	.1020E+02	.1251E+02
ELEMENTAL I132	.2308E-01	.2639E-01	.3060E-01	.3376E-01	.3413E-01	.3413E-01
ELEMENTAL I133	.9162E+00	.1075E+01	.1320E+01	.1737E+01	.2387E+01	.2393E+01
ELEMENTAL I134	.5629E-02	.6201E-02	.6717E-02	.6849E-02	.6850E-02	.6850E-02
ELEMENTAL I135	.1517E+00	.1768E+00	.2133E+00	.2624E+00	.2913E+00	.2913E+00
ORGANIC I131	.4048E+00	.8722E+00	.1607E+01	.2995E+01	.6695E+01	.8085E+01
ORGANIC I132	.3273E-02	.6489E-02	.1057E-01	.1365E-01	.1400E-01	.1400E-01
ORGANIC I133	.1359E+00	.2904E+00	.5280E+00	.9330E+00	.1494E+01	.1497E+01
ORGANIC I134	.7364E-03	.1292E-02	.1793E-02	.1921E-02	.1922E-02	.1922E-02
ORGANIC I135	.2224E-01	.4654E-01	.8205E-01	.1297E+00	.1570E+00	.1570E+00
PARTICULATE I131	.1230E+00	.1379E+00	.1556E+00	.1682E+00	.2119E+00	.2333E+00
PARTICULATE I132	.1029E-02	.1132E-02	.1232E-02	.1260E-02	.1263E-02	.1263E-02
PARTICULATE I133	.4144E-01	.4636E-01	.5211E-01	.5579E-01	.6158E-01	.6163E-01
PARTICULATE I134	.2448E-03	.2627E-03	.2751E-03	.2763E-03	.2763E-03	.2763E-03
PARTICULATE I135	.6837E-02	.7612E-02	.8473E-02	.8906E-02	.9160E-02	.9160E-02

TOTAL DOSE FOR 30 DAYS .2529E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4200E+04
FILTERED INLEAKAGE(CFM) .1200E+04
UNFILTERED INLEAKAGE(CFM) .3000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2806E+01	.3304E+01	.4088E+01	.5694E+01	.1111E+02	.1369E+02
ELEMENTAL I132	.2386E-01	.2728E-01	.3164E-01	.3519E-01	.3560E-01	.3560E-01
ELEMENTAL I133	.9472E+00	.1112E+01	.1365E+01	.1834E+01	.2564E+01	.2570E+01
ELEMENTAL I134	.5820E-02	.6411E-02	.6945E-02	.7093E-02	.7094E-02	.7094E-02
ELEMENTAL I135	.1569E+00	.1827E+00	.2206E+00	.2757E+00	.3082E+00	.3082E+00
ORGANIC I131	.4185E+00	.9017E+00	.1663E+01	.3222E+01	.7376E+01	.8937E+01
ORGANIC I132	.3383E-02	.6708E-02	.1094E-01	.1439E-01	.1479E-01	.1479E-01
ORGANIC I133	.1405E+00	.3002E+00	.5465E+00	.1001E+01	.1631E+01	.1634E+01
ORGANIC I134	.7613E-03	.1335E-02	.1854E-02	.1998E-02	.1999E-02	.1999E-02
ORGANIC I135	.2299E-01	.4812E-01	.8492E-01	.1384E+00	.1690E+00	.1690E+00
PARTICULATE I131	.1281E+00	.1435E+00	.1621E+00	.1786E+00	.2358E+00	.2638E+00
PARTICULATE I132	.1072E-02	.1179E-02	.1283E-02	.1320E-02	.1324E-02	.1324E-02
PARTICULATE I133	.4315E-01	.4827E-01	.5428E-01	.5910E-01	.6669E-01	.6675E-01
PARTICULATE I134	.2549E-03	.2735E-03	.2864E-03	.2880E-03	.2880E-03	.2880E-03
PARTICULATE I135	.7119E-02	.7926E-02	.8825E-02	.9393E-02	.9725E-02	.9725E-02

TOTAL DOSE FOR 30 DAYS .2771E+02

Duplicate
3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4200E+04
FILTERED INLEAKAGE(CFM) .1200E+04
UNFILTERED INLEAKAGE(CFM) .4000E+02

	ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL	I131	.2898E+01	.3411E+01	.4223E+01	.6004E+01	.1201E+02	.1488E+02
ELEMENTAL	I132	.2464E-01	.2817E-01	.3268E-01	.3662E-01	.3708E-01	.3708E-01
ELEMENTAL	I133	9780E+00	.1148E+01	.1410E+01	.1930E+01	.2740E+01	.2746E+01
ELEMENTAL	I134	6009E-02	.6620E-02	.7172E-02	.7337E-02	.7338E-02	.7338E-02
ELEMENTAL	I135	.1620E+00	.1887E+00	.2279E+00	.2890E+00	.3250E+00	.3250E+00
ORGANIC	I131	.4321E+00	.9310E+00	.1719E+01	.3449E+01	.8055E+01	.9786E+01
ORGANIC	I132	.3493E-02	.6927E-02	.1131E-01	.1513E-01	.1557E-01	.1557E-01
ORGANIC	I133	.1451E+00	.3100E+00	.5649E+00	.1069E+01	.1767E+01	.1771E+01
ORGANIC	I134	.7861E-03	.1679E-02	.1916E-02	.2075E-02	.2076E-02	.2076E-02
ORGANIC	I135	.2374E-01	.4968E-01	.8777E-01	.1471E+00	.1811E+00	.1811E+00
PARTICULATE	I131	.1331E+00	.1492E+00	.1686E+00	.1889E+00	.2596E+00	.2943E+00
PARTICULATE	I132	.1114E-02	.1225E-02	.1334E-02	.1379E-02	.1384E-02	.1384E-02
PARTICULATE	I133	.4485E-01	.5018E-01	.5644E-01	.6239E-01	.7178E-01	.7186E-01
PARTICULATE	I134	.2649E-03	.2843E-03	.2978E-03	.2997E-03	.2997E-03	.2997E-03
PARTICULATE	I135	.7400E-02	.8239E-02	.9176E-02	.9878E-02	.1029E-01	.1029E-01

TOTAL DOSE FOR 30 DAYS .3013E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4200E+04
FILTERED INLEAKAGE(CFM) .1200E+04
UNFILTERED INLEAKAGE(CFM) .5000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2989E+01	.3519E+01	.4358E+01	.6313E+01	.1291E+02	.1605E+02
ELEMENTAL I132	.2541E-01	.2906E-01	.3372E-01	.3804E-01	.3854E-01	.3854E-01
ELEMENTAL I133	.1009E+01	.1184E+01	.1455E+01	.2026E+01	.2915E+01	.2922E+01
ELEMENTAL I134	.6198E-02	.6828E-02	.7399E-02	.7579E-02	.7580E-02	.7580E-02
ELEMENTAL I135	.1671E+00	.1946E+00	.2352E+00	.3023E+00	.3417E+00	.3417E+00
ORGANIC I131	.4457E+00	.9603E+00	.1775E+01	.3674E+01	.8732E+01	.1063E+02
ORGANIC I132	.3603E-02	.7145E-02	.1167E-01	.1587E-01	.1635E-01	.1635E-01
ORGANIC I133	.1497E+00	.3197E+00	.5833E+00	.1137E+01	.1903E+01	.1908E+01
ORGANIC I134	.8108E-03	.1422E-02	.1977E-02	.2152E-02	.2153E-02	.2153E-02
ORGANIC I135	.2449E-01	.5125E-01	.9062E-01	.1558E+00	.1931E+00	.1931E+00
PARTICULATE I131	.1381E+00	.1549E+00	.1750E+00	.1993E+00	.2833E+00	.3246E+00
PARTICULATE I132	.1156E-02	.1272E-02	.1384E-02	.1438E-02	.1445E-02	.1445E-02
PARTICULATE I133	.4655E-01	.5208E-01	.5860E-01	.6568E-01	.7685E-01	.7694E-01
PARTICULATE I134	.2750E-03	.2951E-03	.3091E-03	.3113E-03	.3114E-03	.3114E-03
PARTICULATE I135	.7680E-02	.8551E-02	.9526E-02	.1036E-01	.1085E-01	.1085E-01

TOTAL DOSE FOR 30 DAYS .3253E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4100E+04
FILTERED INLEAKAGE(CFM) .1300E+04
UNFILTERED INLEAKAGE(CFM) .0000E+00

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2576E+01	.3033E+01	.3748E+01	.4913E+01	.8842E+01	.1072E+02
ELEMENTAL I132	.2190E-01	.2505E-01	.2902E-01	.3160E-01	.3190E-01	.3190E-01
ELEMENTAL I133	.8695E+00	.1020E+01	.1252E+01	.1592E+01	.2121E+01	.2126E+01
ELEMENTAL I134	.5342E-02	.5885E-02	.6373E-02	.6481E-02	.6482E-02	.6482E-02
ELEMENTAL I135	.1440E+00	.1678E+00	.2023E+00	.2423E+00	.2658E+00	.2658E+00
ORGANIC I131	.3842E+00	.8277E+00	.1522E+01	.2653E+01	.5668E+01	.6800E+01
ORGANIC I132	.3106E-02	.6158E-02	.1002E-01	.1252E-01	.1281E-01	.1281E-01
ORGANIC I133	.1290E+00	.2756E+00	.5001E+00	.8301E+00	.1287E+01	.1290E+01
ORGANIC I134	.6989E-03	.1226E-02	.1700E-02	.1805E-02	.1805E-02	.1805E-02
ORGANIC I135	.2111E-01	.4417E-01	.7772E-01	.1166E+00	.1388E+00	.1388E+00
PARTICULATE I131	.1133E+00	.1270E+00	.1432E+00	.1484E+00	.1602E+00	.1749E+00
PARTICULATE I132	.9482E-03	.1043E-02	.1134E-02	.1146E-02	.1147E-02	.1147E-02
PARTICULATE I133	.3818E-01	.4271E-01	.4797E-01	.4947E-01	.5183E-01	.5185E-01
PARTICULATE I134	.2255E-03	.2420E-03	.2533E-03	.2538E-03	.2538E-03	.2538E-03
PARTICULATE I135	.6299E-02	.7013E-02	.7800E-02	.7976E-02	.8080E-02	.8080E-02

TOTAL DOSE FOR 30 DAYS .2163E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4100E+04
FILTERED INLEAKAGE(CFM) .1300E+04
UNFILTERED INLEAKAGE(CFM) .1000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2668E+01	.3142E+01	.3884E+01	.5226E+01	.9751E+01	.1191E+02
ELEMENTAL I132	.2269E-01	.2594E-01	.3007E-01	.3304E-01	.3338E-01	.3338E-01
ELEMENTAL I133	.9007E+00	.1057E+01	.1297E+01	.1689E+01	.2299E+01	.2304E+01
ELEMENTAL I134	.5534E-02	.6096E-02	.6603E-02	.6727E-02	.6727E-02	.6727E-02
ELEMENTAL I135	.1492E+00	.1738E+00	.2097E+00	.2557E+00	.2828E+00	.2828E+00
ORGANIC I131	.3979E+00	.8574E+00	.1578E+01	.2882E+01	.6353E+01	.7657E+01
ORGANIC I132	.3217E-02	.6379E-02	.1039E-01	.1327E-01	.1360E-01	.1360E-01
ORGANIC I133	.1336E+00	.2855E+00	.5187E+00	.8988E+00	.1425E+01	.1428E+01
ORGANIC I134	.7239E-03	.1270E-02	.1762E-02	.1882E-02	.1883E-02	.1883E-02
ORGANIC I135	.2186E-01	.4575E-01	.8061E-01	.1253E+00	.1509E+00	.1509E+00
PARTICULATE I131	.1184E+00	.1327E+00	.1498E+00	.1588E+00	.1903E+00	.2057E+00
PARTICULATE I132	.9909E-03	.1090E-02	.1186E-02	.1206E-02	.1208E-02	.1208E-02
PARTICULATE I133	.3990E-01	.4464E-01	.5015E-01	.5280E-01	.5697E-01	.5701E-01
PARTICULATE I134	.2357E-03	.2529E-03	.2648E-03	.2656E-03	.2657E-03	.2657E-03
PARTICULATE I135	.6583E-02	.7329E-02	.8155E-02	.8467E-02	.8649E-02	.8649E-02

TOTAL DOSE FOR 30 DAYS .2406E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4100E+04
FILTERED INLEAKAGE(CFM) .1300E+04
UNFILTERED INLEAKAGE(CFM) .2000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2760E+01	.3250E+01	.4020E+01	.5538E+01	.1066E+02	.1310E+02
ELEMENTAL I132	.2347E-01	.2684E-01	.3112E-01	.3448E-01	.3487E-01	.3487E-01
ELEMENTAL I133	.9317E+00	.1093E+01	.1343E+01	.1785E+01	.2476E+01	.2481E+01
ELEMENTAL I134	5724E-02	.6306E-02	.6831E-02	.6971E-02	.6972E-02	.6972E-02
ELEMENTAL I135	.1543E+00	.1797E+00	.2170E+00	.2691E+00	.2997E+00	.2997E+00
ORGANIC I131	.4116E+00	.8869E+00	.1635E+01	.3109E+01	.7036E+01	.8511E+01
ORGANIC I132	.3328E-02	.6599E-02	.1076E-01	.1402E-01	.1439E-01	.1439E-01
ORGANIC I133	.1382E+00	.2953E+00	.5372E+00	.9672E+00	.1562E+01	.1566E+01
ORGANIC I134	.7488E-03	.1514E-02	.1824E-02	.1960E-02	.1960E-02	.1960E-02
ORGANIC I135	.2262E-01	.4733E-01	.8348E-01	.1341E+00	.1630E+00	.1630E+00
PARTICULATE I131	.1235E+00	.1384E+00	.1563E+00	.1693E+00	.2142E+00	.2363E+00
PARTICULATE I132	.1033E-02	.1137E-02	.1237E-02	.1266E-02	.1269E-02	.1269E-02
PARTICULATE I133	.4161E-01	.4655E-01	.5233E-01	.5612E-01	.6209E-01	.6215E-01
PARTICULATE I134	.2458E-03	.2638E-03	.2762E-03	.2774E-03	.2774E-03	.2774E-03
PARTICULATE I135	.6865E-02	.7644E-02	.8508E-02	.8955E-02	.9216E-02	.9216E-02

TOTAL DOSE FOR 30 DAYS .2649E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4100E+04
FILTERED INLEAKAGE(CFM) .1300E+04
UNFILTERED INLEAKAGE(CFM) .3000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2852E+01	.3358E+01	.4156E+01	.5849E+01	.1156E+02	.1429E+02
ELEMENTAL I132	.2425E-01	.2773E-01	.3216E-01	.3591E-01	.3634E-01	.3634E-01
ELEMENTAL I133	.9626E+00	.1130E+01	.1388E+01	.1882E+01	.2652E+01	.2658E+01
ELEMENTAL I134	.5914E-02	.6515E-02	.7059E-02	.7215E-02	.7216E-02	.7216E-02
ELEMENTAL I135	.1594E+00	.1857E+00	.2243E+00	.2824E+00	.3166E+00	.3166E+00
ORGANIC I131	.4253E+00	.9164E+00	.1691E+01	.3336E+01	.7716E+01	.9362E+01
ORGANIC I132	.3438E-02	.6818E-02	.1112E-01	.1476E-01	.1518E-01	.1518E-01
ORGANIC I133	.1428E+00	.3051E+00	.5557E+00	.1035E+01	.1699E+01	.1703E+01
ORGANIC I134	.7737E-03	.1357E-02	.1885E-02	.2037E-02	.2038E-02	.2038E-02
ORGANIC I135	.2337E-01	.4890E-01	.8635E-01	.1428E+00	.1751E+00	.1751E+00
PARTICULATE I131	.1286E+00	.1441E+00	.1627E+00	.1796E+00	.2382E+00	.2669E+00
PARTICULATE I132	.1076E-02	.1183E-02	.1288E-02	.1325E-02	.1330E-02	.1330E-02
PARTICULATE I133	.4332E-01	.4847E-01	.5450E-01	.5943E-01	.6720E-01	.6727E-01
PARTICULATE I134	.2559E-03	.2746E-03	.2876E-03	.2892E-03	.2892E-03	.2892E-03
PARTICULATE I135	.7147E-02	.7957E-02	.8860E-02	.9441E-02	.9781E-02	.9781E-02

TOTAL DOSE FOR 30 DAYS .2891E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4100E+04
FILTERED INLEAKAGE(CFM) .1300E+04
UNFILTERED INLEAKAGE(CFM) .4000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2943E+01	.3465E+01	.4291E+01	.6159E+01	.1246E+02	.1547E+02
ELEMENTAL I132	.2502E-01	.2862E-01	.3320E-01	.3733E-01	.3781E-01	.3781E-01
ELEMENTAL I133	.9934E+00	.1166E+01	.1433E+01	.1978E+01	.2827E+01	.2834E+01
ELEMENTAL I134	.6104E-02	.6724E-02	.7286E-02	.7458E-02	.7459E-02	.7459E-02
ELEMENTAL I135	.1645E+00	.1917E+00	.2315E+00	.2957E+00	.3334E+00	.3334E+00
ORGANIC I131	.4389E+00	.9457E+00	.1747E+01	.3561E+01	.8394E+01	.1021E+02
ORGANIC I132	.3548E-02	.7036E-02	.1149E-01	.1550E-01	.1596E-01	.1596E-01
ORGANIC I133	.1474E+00	.3149E+00	.5741E+00	.1103E+01	.1835E+01	.1840E+01
ORGANIC I134	.7984E-03	.1401E-02	.1946E-02	.2114E-02	.2115E-02	.2115E-02
ORGANIC I135	.2411E-01	.5047E-01	.8920E-01	.1515E+00	.1871E+00	.1871E+00
PARTICULATE I131	.1336E+00	.1498E+00	.1692E+00	.1900E+00	.2620E+00	.2973E+00
PARTICULATE I132	.1118E-02	.1230E-02	.1339E-02	.1385E-02	.1390E-02	.1390E-02
PARTICULATE I133	.4502E-01	.5037E-01	.5666E-01	.6272E-01	.7228E-01	.7237E-01
PARTICULATE I134	.2659E-03	.2854E 03	.2989E-03	.3009E-03	.3009E-03	.3009E-03
PARTICULATE I135	.7428E-02	.8270E-02	.9211E-02	.9926E-02	.1034E-01	.1034E-01

TOTAL DOSE FOR 30 DAYS .3131E+02

3/12/13

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4100E+04
FILTERED INLEAKAGE(CFM) .1300E+04
UNFILTERED INLEAKAGE(CFM) .5000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.3034E+01	.3572E+01	.4425E+01	.6467E+01	.1335E+02	.1664E+02
ELEMENTAL I132	.2580E-01	.2950E-01	.3424E-01	.3875E-01	.3927E-01	.3927E-01
ELEMENTAL I133	.1024E+01	.1202E+01	.1478E+01	.2073E+01	.3002E+01	.3010E+01
ELEMENTAL I134	.6292E-02	.6931E-02	.7511E-02	.7700E-02	.7701E-02	.7701E-02
ELEMENTAL I135	.1696E+00	.1976E+00	.2388E+00	.3089E+00	.3501E+00	.3501E+00
ORGANIC I131	.4525E+00	.9749E+00	.1803E+01	.3786E+01	.9069E+01	.1105E+02
ORGANIC I132	.3658E-02	.7253E-02	.1185E-01	.1624E-01	.1674E-01	.1674E-01
ORGANIC I133	.1519E+00	.3246E+00	.5924E+00	.1171E+01	.1971E+01	.1976E+01
ORGANIC I134	.8231E-03	.1444E-02	.2007E-02	.2190E-02	.2191E-02	.2191E-02
ORGANIC I135	.2486E-01	.5202E-01	.9204E-01	.1601E+00	.1990E+00	.1990E+00
PARTICULATE I131	.1386E+00	.1554E+00	.1756E+00	.2003E+00	.2857E+00	.3276E+00
PARTICULATE I132	.1160E-02	.1276E-02	.1390E-02	.1444E-02	.1451E-02	.1451E-02
PARTICULATE I133	.4672E-01	.5227E-01	.5881E-01	.6601E-01	.7735E-01	.7745E-01
PARTICULATE I134	.2760E-03	.2961E-03	.3102E-03	.3125E-03	.3125E-03	.3125E-03
PARTICULATE I135	.7708E-02	.8582E-02	.9561E-02	.1041E-01	.1091E-01	.1091E-01

TOTAL DOSE FOR 30 DAYS .3371E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4000E+04
FILTERED INLEAKAGE(CFM) .1400E+04
UNFILTERED INLEAKAGE(CFM) .0000E+00

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2622E+01	.3087E+01	.3816E+01	.5070E+01	.9297E+01	.1132E+02
ELEMENTAL I132	.2230E-01	.2550E-01	.2955E-01	.3232E-01	.3264E-01	.3264E-01
ELEMENTAL I133	.8851E+00	.1039E+01	.1274E+01	.1640E+01	.2210E+01	.2215E+01
ELEMENTAL I134	5438E-02	.5991E-02	.6488E-02	.6604E-02	.6605E-02	.6605E-02
ELEMENTAL I135	.1466E+00	.1708E+00	.2060E+00	.2490E+00	.2743E+00	.2743E+00
ORGANIC I131	.3911E+00	.8426E+00	.1550E+01	.2768E+01	.6011E+01	.7229E+01
ORGANIC I132	.3162E-02	.6269E-02	.1020E-01	.1290E-01	.1321E-01	.1321E-01
ORGANIC I133	.1313E+00	.2805E+00	.5094E+00	.8645E+00	.1356E+01	.1359E+01
ORGANIC I134	.7114E-03	.1248E-02	.1731E-02	.1843E-02	.1844E-02	.1844E-02
ORGANIC I135	.2148E-01	.4496E-01	.7917E-01	.1210E+00	.1449E+00	.1449E+00
PARTICULATE I131	.1138E+00	.1276E+00	.1439E+00	.1494E+00	.1686E+00	.1780E+00
PARTICULATE I132	.9525E-03	.1048E-02	.1139E-02	.1152E-02	.1153E-02	.1153E-02
PARTICULATE I133	.3835E-01	.4290E-01	.4819E-01	.4980E-01	.5234E-01	.5237E-01
PARTICULATE I134	.2265E-03	.2431E-03	.2545E-03	.2550E-03	.2550E-03	.2550E-03
PARTICULATE I135	.6327E-02	.7044E-02	.7835E-02	.8026E-02	.8137E-02	.8137E-02

TOTAL DOSE FOR 30 DAYS .2283E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4000E+04
FILTERED INLEAKAGE(CFM) .1400E+04
UNFILTERED INLEAKAGE(CFM) .1000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2714E+01	.3196E+01	.3952E+01	.5382E+01	.1020E+02	.1251E+02
ELEMENTAL I132	.2308E-01	.2639E-01	.3060E-01	.3376E-01	.3413E-01	.3413E-01
ELEMENTAL I133	.9162E+00	.1075E+01	.1320E+01	.1737E+01	.2387E+01	.2393E+01
ELEMENTAL I134	.5629E-02	.6201E-02	.6717E-02	.6849E-02	.6850E-02	.6850E-02
ELEMENTAL I135	.1517E+00	.1768E+00	.2133E+00	.2624E+00	.2913E+00	.2913E+00
ORGANIC I131	.4048E+00	.8722E+00	.1607E+01	.2995E+01	.6695E+01	.8085E+01
ORGANIC I132	.3273E-02	.6489E-02	.1057E-01	.1365E-01	.1400E-01	.1400E-01
ORGANIC I133	.1359E+00	.2904E+00	.5280E+00	.9330E+00	.1494E+01	.1497E+01
ORGANIC I134	.7364E-03	.1292E-02	.1793E-02	.1921E-02	.1922E-02	.1922E-02
ORGANIC I135	.2224E-01	.4654E-01	.8205E-01	.1297E+00	.1570E+00	.1570E+00
PARTICULATE I131	.1189E+00	.1333E+00	.1504E+00	.1599E+00	.1927E+00	.2087E+00
PARTICULATE I132	.9952E-03	.1095E-02	.1191E-02	.1212E-02	.1214E-02	.1214E-02
PARTICULATE I133	.4007E-01	.4483E-01	.5037E-01	.5313E-01	.5748E-01	.5752E-01
PARTICULATE I134	.2367E-03	.2540E-03	.2659E-03	.2668E-03	.2668E-03	.2668E-03
PARTICULATE I135	.6611E-02	.7360E-02	.8190E-02	.8515E-02	.8706E-02	.8706E-02

TOTAL DOSE FOR 30 DAYS .2526E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4000E+04
FILTERED INLEAKAGE(CFM) .1400E+04
UNFILTERED INLEAKAGE(CFM) .2000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2806E+01	.3304E+01	.4088E+01	.5694E+01	.1111E+02	.1369E+02
ELEMENTAL I132	.2386E-01	.2728E-01	.3164E-01	.3519E-01	.3560E-01	.3560E-01
ELEMENTAL I133	.9472E+00	.1112E+01	.1365E+01	.1834E+01	.2564E+01	.2570E+01
ELEMENTAL I134	.5820E-02	.6411E-02	.6945E-02	.7093E-02	.7094E-02	.7094E-02
ELEMENTAL I135	.1569E+00	.1827E+00	.2206E+00	.2757E+00	.3082E+00	.3082E+00
ORGANIC I131	.4185E+00	.9017E+00	.1663E+01	.3222E+01	.7376E+01	.8937E+01
ORGANIC I132	.3383E-02	.6708E-02	.1094E-01	.1439E-01	.1479E-01	.1479E-01
ORGANIC I133	.1405E+00	.3002E+00	.5465E+00	.1001E+01	.1631E+01	.1634E+01
ORGANIC I134	.7613E-03	.1335E-02	.1854E-02	.1998E-02	.1999E-02	.1999E-02
ORGANIC I135	.2299E-01	.4812E-01	.8492E-01	.1384E+00	.1690E+00	.1690E+00
PARTICULATE I131	.1240E+00	.1390E+00	.1569E+00	.1703E+00	.2106E+00	.2394E+00
PARTICULATE I132	.1038E-02	.1141E-02	.1242E-02	.1272E-02	.1275E-02	.1275E-02
PARTICULATE I133	.4179E-01	.4675E-01	.5254E-01	.5645E-01	.6261E-01	.6266E-01
PARTICULATE I134	.2468E-03	.2649E-03	.2773E-03	.2786E-03	.2786E-03	.2786E-03
PARTICULATE I135	.6894E-02	.7675E-02	.8543E-02	.9004E-02	.9273E-02	.9273E-02

TOTAL DOSE FOR 30 DAYS .2769E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4000E+04
FILTERED INLEAKAGE(CFM) .1400E+04
UNFILTERED INLEAKAGE(CFM) .3000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2898E+01	.3411E+01	.4223E+01	.6004E+01	.1201E+02	.1488E+02
ELEMENTAL I132	.2464E-01	.2817E-01	.3268E-01	.3662E-01	.3708E-01	.3708E-01
ELEMENTAL I133	.9780E+00	.1148E+01	.1410E+01	.1930E+01	.2740E+01	.2746E+01
ELEMENTAL I134	.6009E-02	.6620E-02	.7172E-02	.7337E-02	.7338E-02	.7338E-02
ELEMENTAL I135	.1620E+00	.1887E+00	.2279E+00	.2890E+00	.3250E+00	.3250E+00
ORGANIC I131	.4321E+00	.9310E+00	.1719E+01	.3449E+01	.8055E+01	.9786E+01
ORGANIC I132	.3493E-02	.6927E-02	.1131E-01	.1513E-01	.1557E-01	.1557E-01
ORGANIC I133	.1451E+00	.3100E+00	.5649E+00	.1069E+01	.1767E+01	.1771E+01
ORGANIC I134	.7861E-03	.1379E-02	.1916E-02	.2075E-02	.2076E-02	.2076E-02
ORGANIC I135	.2374E-01	4968E-01	.8777E-01	.1471E+00	.1811E+00	.1811E+00
PARTICULATE I131	.1291E+00	.1447E+00	.1634E+00	.1807E+00	.2405E+00	.2699E+00
PARTICULATE I132	.1080E-02	.1188E-02	.1293E-02	.1331E-02	.1336E-02	.1336E-02
PARTICULATE I133	.4349E-01	.4866E-01	.5471E-01	.5976E-01	.6771E-01	.6778E-01
PARTICULATE I134	.2569E-03	.2757E-03	.2887E-03	.2903E-03	.2903E-03	.2903E-03
PARTICULATE I135	.7175E-02	.7989E-02	.8896E-02	.9490E-02	.9838E-02	.9838E-02

TOTAL DOSE FOR 30 DAYS .3010E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4000E+04
FILTERED INLEAKAGE(CFM) .1400E+04
UNFILTERED INLEAKAGE(CFM) .4000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2989E+01	.3519E+01	.4358E+01	.6313E+01	.1291E+02	.1605E+02
ELEMENTAL I132	.2541E-01	.2906E-01	.3372E-01	.3804E-01	.3854E-01	.3854E-01
ELEMENTAL I133	.1009E+01	.1184E+01	.1455E+01	.2026E+01	.2915E+01	.2922E+01
ELEMENTAL I134	6198E-02	.6828E-02	.7399E-02	.7579E-02	.7580E-02	.7580E-02
ELEMENTAL I135	.1671E+00	.1946E+00	.2352E+00	.3023E+00	.3417E+00	.3417E+00
ORGANIC I131	.4457E+00	.9603E+00	.1775E+01	.3674E+01	.8732E+01	.1063E+02
ORGANIC I132	.3603E-02	.7145E-02	.1167E-01	.1587E-01	.1635E-01	.1635E-01
ORGANIC I133	.1497E+00	.3197E+00	.5833E+00	.1137E+01	.1903E+01	.1908E+01
ORGANIC I134	.8108E-03	.1422E-02	.1977E-02	.2152E-02	.2153E-02	.2153E-02
ORGANIC I135	.2449E-01	.5125E-01	.9062E-01	.1558E+00	.1931E+00	.1931E+00
PARTICULATE I131	.1341E+00	.1503E+00	.1698E+00	.1910E+00	.2644E+00	.3003E+00
PARTICULATE I132	.1122E-02	.1235E-02	.1344E-02	.1391E-02	.1396E-02	.1396E-02
PARTICULATE I133	.4519E-01	.5056E-01	.5687E-01	.6305E-01	.7279E-01	.7288E-01
PARTICULATE I134	.2669E-03	.2865E-03	.3000E-03	.3020E-03	.3020E-03	.3020E-03
PARTICULATE I135	.7456E-02	.8301E-02	.9246E-02	.9974E-02	.1040E-01	.1040E-01

TOTAL DOSE FOR 30 DAYS .3250E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4000E+04
FILTERED INLEAKAGE(CFM) .1400E+04
UNFILTERED INLEAKAGE(CFM) .5000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.3079E+01	.3625E+01	.4492E+01	.6621E+01	.1380E+02	.1723E+02
ELEMENTAL I132	.2618E-01	.2994E-01	.3475E-01	.3946E-01	.4000E-01	.4000E-01
ELEMENTAL I133	.1039E+01	.1220E+01	.1500E+01	.2121E+01	.3089E+01	.3097E+01
ELEMENTAL I134	.6386E-02	.7035E-02	.7624E-02	.7821E-02	.7822E-02	.7822E-02
ELEMENTAL I135	.1721E+00	.2005E+00	.2424E+00	.3155E+00	.3584E+00	.3584E+00
ORGANIC I131	.4592E+00	.9895E+00	.1831E+01	.3898E+01	.9405E+01	.1147E+02
ORGANIC I132	.3713E-02	.7361E-02	.1204E-01	.1661E-01	.1713E-01	.1713E-01
ORGANIC I133	.1542E+00	.3294E+00	.6016E+00	.1205E+01	.2039E+01	.2044E+01
ORGANIC I134	.8354E-03	.1465E-02	.2038E-02	.2229E-02	.2230E-02	.2230E-02
ORGANIC I135	.2523E-01	.5280E-01	.9346E-01	.1644E+00	.2050E+00	.2050E+00
PARTICULATE I131	.1391E+00	.1560E+00	.1763E+00	.2013E+00	.2881E+00	.3306E+00
PARTICULATE I132	.1165E-02	.1281E-02	.1395E-02	.1450E-02	.1457E-02	.1457E-02
PARTICULATE I133	.4689E-01	.5246E-01	.5903E-01	.6633E-01	.7786E-01	.7796E-01
PARTICULATE I134	.2770E-03	.2972E-03	.3113E-03	.3137E-03	.3137E-03	.3137E-03
PARTICULATE I135	.7736E-02	.8613E-02	.9596E-02	.1046E-01	.1096E-01	.1096E-01

TOTAL DOSE FOR 30 DAYS .3489E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .3900E+04
FILTERED INLEAKAGE(CFM) .1500E+04
UNFILTERED INLEAKAGE(CFM) .0000E+00

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2668E+01	.3142E+01	.3884E+01	.5226E+01	.9751E+01	.1191E+02
ELEMENTAL I132	.2269E-01	.2594E-01	.3007E-01	.3304E-01	.3338E-01	.3338E-01
ELEMENTAL I133	.9007E+00	.1057E+01	.1297E+01	.1689E+01	.2299E+01	.2304E+01
ELEMENTAL I134	.5534E-02	.6096E-02	.6603E-02	.6727E-02	.6727E-02	.6727E-02
ELEMENTAL I135	.1492E+00	.1738E+00	.2097E+00	.2557E+00	.2828E+00	.2828E+00
ORGANIC I131	.3979E+00	.8574E+00	.1578E+01	.2882E+01	.6353E+01	.7657E+01
ORGANIC I132	.3217E-02	.6379E-02	.1039E-01	.1327E-01	.1360E-01	.1360E-01
ORGANIC I133	.1336E+00	.2855E+00	.5187E+00	.8988E+00	.1425E+01	.1428E+01
ORGANIC I134	.7239E-03	.1270E-02	.1762E-02	.1882E-02	.1883E-02	.1883E-02
ORGANIC I135	.2186E-01	.4575E-01	.8061E-01	.1253E+00	.1509E+00	.1509E+00
PARTICULATE I131	.1143E+00	.1282E+00	.1445E+00	.1505E+00	.1710E+00	.1811E+00
PARTICULATE I132	.9567E-03	.1052E-02	.1144E-02	.1158E-02	.1159E-02	.1159E-02
PARTICULATE I133	.3852E-01	.4310E-01	.4840E-01	.5013E-01	.5286E-01	.5288E-01
PARTICULATE I134	.2275E-03	.2442E-03	.2556E-03	.2562E-03	.2562E-03	.2562E-03
PARTICULATE I135	.6356E-02	.7076E-02	.7871E-02	.8075E-02	.8194E-02	.8194E-02

TOTAL DOSE FOR 30 DAYS .2403E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .3900E+04
FILTERED INLEAKAGE(CFM) .1500E+04
UNFILTERED INLEAKAGE(CFM) .1000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2760E+01	.3250E+01	.4020E+01	.5538E+01	.1066E+02	.1310E+02
ELEMENTAL I132	.2347E-01	.2684E-01	.3112E-01	.3448E-01	.3487E-01	.3487E-01
ELEMENTAL I133	.9317E+00	.1093E+01	.1343E+01	.1785E+01	.2476E+01	.2481E+01
ELEMENTAL I134	.5724E-02	.6306E-02	.6831E-02	.6971E-02	.6972E-02	.6972E-02
ELEMENTAL I135	.1543E+00	.1797E+00	.2170E+00	.2691E+00	.2997E+00	.2997E+00
ORGANIC I131	.4116E+00	.8869E+00	.1635E+01	.3109E+01	.7036E+01	.8511E+01
ORGANIC I132	.3328E-02	.6599E-02	.1076E-01	.1402E-01	.1439E-01	.1439E-01
ORGANIC I133	.1382E+00	.2953E+00	.5372E+00	.9672E+00	.1562E+01	.1566E+01
ORGANIC I134	.7488E-03	.1314E-02	.1824E-02	.1960E-02	.1960E-02	.1960E-02
ORGANIC I135	.2262E-01	4733E-01	.8348E-01	.1341E+00	.1630E+00	.1630E+00
PARTICULATE I131	.1194E+00	.1339E+00	.1511E+00	.1609E+00	.1951E+00	.2118E+00
PARTICULATE I132	.9994E-03	.1099E-02	.1196E-02	.1218E-02	.1220E-02	.1220E-02
PARTICULATE I133	.4024E-01	.4502E-01	.5059E-01	.5346E-01	.5800E-01	.5804E-01
PARTICULATE I134	.2377E-03	.2551E-03	.2671E-03	.2680E-03	.2680E-03	.2680E-03
PARTICULATE I135	.6639E-02	.7392E-02	.8125E-02	.8564E-02	.8763E-02	.8763E-02

TOTAL DOSE FOR 30 DAYS .2646E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .3900E+04
FILTERED INLEAKAGE(CFM) .1500E+04
UNFILTERED INLEAKAGE(CFM) .2000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2852E+01	.3358E+01	.4156E+01	.5849E+01	.1156E+02	.1429E+02
ELEMENTAL I132	.2425E-01	.2773E-01	.3216E-01	.3591E-01	.3634E-01	.3634E-01
ELEMENTAL I133	.9626E+00	.1130E+01	.1388E+01	.1882E+01	.2652E+01	.2658E+01
ELEMENTAL I134	.5914E-02	.6515E-02	.7059E-02	.7215E-02	.7216E-02	.7216E-02
ELEMENTAL I135	.1594E+00	.1857E+00	.2243E+00	.2824E+00	.3166E+00	.3166E+00
ORGANIC I131	.4253E+00	.9164E+00	.1691E+01	.3336E+01	.7716E+01	.9362E+01
ORGANIC I132	.3438E-02	.6818E-02	.1112E-01	.1476E-01	.1518E-01	.1518E-01
ORGANIC I133	.1428E+00	.3051E+00	.5557E+00	.1035E+01	.1699E+01	.1703E+01
ORGANIC I134	.7737E-03	.1357E-02	.1885E-02	.2037E-02	.2038E-02	.2038E-02
ORGANIC I135	.2337E-01	.4890E-01	.8635E-01	.1428E+00	.1751E+00	.1751E+00
PARTICULATE I131	.1245E+00	.1396E+00	.1576E+00	.1713E+00	.2190E+00	.2424E+00
PARTICULATE I132	.1042E-02	.1146E-02	.1247E-02	.1278E-02	.1281E-02	.1281E-02
PARTICULATE I133	.4196E-01	.4694E-01	.5276E-01	.5678E-01	.6312E-01	.6317E-01
PARTICULATE I134	.2478E-03	.2659E-03	.2785E-03	.2798E-03	.2798E-03	.2798E-03
PARTICULATE I135	.6922E-02	.7707E-02	.8579E-02	.9052E-02	.9330E-02	.9330E-02

TOTAL DOSE FOR 30 DAYS .2888E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .3900E+04
FILTERED INLEAKAGE(CFM) .1500E+04
UNFILTERED INLEAKAGE(CFM) .3000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2943E+01	.3465E+01	.4291E+01	.6159E+01	.1246E+02	.1547E+02
ELEMENTAL I132	.2502E-01	.2862E-01	.3320E-01	.3733E-01	.3781E-01	.3781E-01
ELEMENTAL I133	.9934E+00	.1166E+01	.1433E+01	.1978E+01	.2827E+01	.2834E+01
ELEMENTAL I134	.6104E-02	.6724E-02	.7286E-02	.7458E-02	.7459E-02	.7459E-02
ELEMENTAL I135	.1645E+00	.1917E+00	.2315E+00	.2957E+00	.3334E+00	.3334E+00
ORGANIC I131	.4389E+00	.9457E+00	.1747E+01	.3561E+01	.8394E+01	.1021E+02
ORGANIC I132	.3548E-02	.7036E-02	.1149E-01	.1550E-01	.1596E-01	.1596E-01
ORGANIC I133	.1474E+00	.3149E+00	.5741E+00	.1103E+01	.1835E+01	.1840E+01
ORGANIC I134	.7984E-03	.1401E-02	.1946E-02	.2114E-02	.2115E-02	.2115E-02
ORGANIC I135	.2411E-01	.5047E-01	.8920E-01	.1515E+00	.1871E+00	.1871E+00
PARTICULATE I131	.1296E+00	.1452E+00	.1640E+00	.1817E+00	.2429E+00	.2730E+00
PARTICULATE I132	.1084E-02	.1193E-02	.1298E-02	.1337E-02	.1342E-02	.1342E-02
PARTICULATE I133	.4366E-01	.4885E-01	.5493E-01	.6009E-01	.6822E-01	.6829E-01
PARTICULATE I134	.2579E-03	.2768E-03	.2898E-03	.2915E-03	.2915E-03	.2915E-03
PARTICULATE I135	.7203E-02	.8020E-02	.8931E-02	.9538E-02	.9894E-02	.9894E-02

TOTAL DOSE FOR 30 DAYS .3129E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .3900E+04
FILTERED INLEAKAGE(CFM) .1500E+04
UNFILTERED INLEAKAGE(CFM) .4000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.3034E+01	.3572E+01	.4425E+01	.6467E+01	.1335E+02	.1664E+02
ELEMENTAL I132	.2580E-01	.2950E-01	.3424E-01	.3875E-01	.3927E-01	.3927E-01
ELEMENTAL I133	.1024E+01	.1202E+01	.1478E+01	.2073E+01	.3002E+01	.3010E+01
ELEMENTAL I134	.6292E-02	.6931E-02	.7511E-02	.7700E-02	.7701E-02	.7701E-02
ELEMENTAL I135	.1696E+00	.1976E+00	.2388E+00	.3089E+00	.3501E+00	.3501E+00
ORGANIC I131	.4525E+00	.9749E+00	.1803E+01	.3786E+01	.9069E+01	.1105E+02
ORGANIC I132	.3658E-02	.7253E-02	.1185E-01	.1624E-01	.1674E-01	.1674E-01
ORGANIC I133	.1519E+00	.3246E+00	.5924E+00	.1171E+01	.1971E+01	.1976E+01
ORGANIC I134	.8231E-03	.1444E-02	.2007E-02	.2190E-02	.2191E-02	.2191E-02
ORGANIC I135	.2486E-01	.5202E-01	.9204E-01	.1601E+00	.1990E+00	.1990E+00
PARTICULATE I131	.1346E+00	.1509E+00	.1705E+00	.1920E+00	.2607E+00	.3034E+00
PARTICULATE I132	.1127E-02	.1239E-02	.1349E-02	.1397E-02	.1402E-02	.1402E-02
PARTICULATE I133	.4536E-01	.5075E-01	.5709E-01	.6338E-01	.7330E-01	.7338E-01
PARTICULATE I134	.2679E-03	.2876E-03	.3012E-03	.3032E-03	.3032E-03	.3032E-03
PARTICULATE I135	.7484E-02	.8333E-02	.9282E-02	.1002E-01	.1046E-01	.1046E-01

TOTAL DOSE FOR 30 DAYS .3368E+02

7/21/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .3900E+04
FILTERED INLEAKAGE(CFM) .1500E+04
UNFILTERED INLEAKAGE(CFM) .5000E+02

	ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL	I131	.3125E+01	.3679E+01	.4559E+01	.6775E+01	.1424E+02	.1781E+02
ELEMENTAL	I132	.2657E-01	.3038E-01	.3527E-01	.4017E-01	.4073E-01	.4073E-01
ELEMENTAL	I133	.1055E+01	.1238E+01	.1522E+01	.2169E+01	.3176E+01	.3184E+01
ELEMENTAL	I134	.6480E-02	.7138E-02	.7737E-02	.7941E-02	.7942E-02	.7942E-02
ELEMENTAL	I135	.1747E+00	.2035E+00	.2460E+00	.3220E+00	.3667E+00	.3667E+00
ORGANIC	I131	.4660E+00	.1004E+01	.1859E+01	.4010E+01	.9741E+01	.1189E+02
ORGANIC	I132	.3767E-02	.7470E-02	.1222E-01	.1697E-01	.1752E-01	.1752E-01
ORGANIC	I133	.1565E+00	.3343E+00	.6107E+00	.1238E+01	.2107E+01	.2112E+01
ORGANIC	I134	.8477E-03	.1487E-02	.2068E-02	.2267E-02	.2268E-02	.2268E-02
ORGANIC	I135	.2560E-01	5358E-01	.9488E-01	.1687E+00	.2109E+00	.2109E+00
PARTICULATE	I131	.1396E+00	.1565E+00	.1769E+00	.2023E+00	.2905E+00	.3337E+00
PARTICULATE	I132	.1169E-02	.1286E-02	.1400E-02	.1456E-02	1463E-02	.1463E-02
PARTICULATE	I133	.4706E-01	.5265E-01	.5924E-01	.6666E-01	.7836E-01	.7846E-01
PARTICULATE	I134	.2780E-03	.2983E-03	.3124E-03	.3148E-03	.3148E-03	.3148E-03
PARTICULATE	I135	.7764E-02	.8644E-02	.9631E-02	.1051E-01	.1102E-01	.1102E-01

TOTAL DOSE FOR 30 DAYS .3607E+02

3/12/97

Calculation RD-97-02
Attachment 3
Page 1 of 1
March 11, 1997

INPUT I:\NSL\MSA\CTRLROOM\MSAFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\MSAFINAL.OUT
FINAL CASE: NEW XQ, 3588,70 GPM, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4400E+04
FILTERED INLEAKAGE(CFM) .1000E+04
UNFILTERED INLEAKAGE(CFM) .3000E+02

ISOTOPE		.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL	I131	.2714E+01	.3196E+01	.3952E+01	.4853E+01	.6730E+01	.7501E+01
ELEMENTAL	I132	.2308E-01	.2639E-01	.3060E-01	.3294E-01	.3310E-01	.3310E-01
ELEMENTAL	I133	.9162E+00	.1075E+01	.1320E+01	.1587E+01	.1860E+01	.1862E+01
ELEMENTAL	I134	.5629E-02	.6201E-02	.6717E-02	.6834E-02	.6834E-02	.6834E-02
ELEMENTAL	I135	.1517E+00	.1768E+00	.2133E+00	.2461E+00	.2590E+00	.2590E+00
ORGANIC	I131	.4048E+00	.8722E+00	.1607E+01	.2984E+01	.6622E+01	.7980E+01
ORGANIC	I132	.3273E-02	.6489E-02	.1057E-01	.1363E-01	.1398E-01	.1398E-01
ORGANIC	I133	.1359E+00	.2904E+00	.5280E+00	.9299E+00	.1483E+01	.1486E+01
ORGANIC	I134	.7364E-03	.1292E-02	.1793E-02	.1921E-02	.1921E-02	.1921E-02
ORGANIC	I135	.2224E-01	.4654E-01	.8205E-01	.1294E+00	.1563E+00	.1563E+00
PARTICULATE	I131	.1270E+00	.1424E+00	.1608E+00	.1698E+00	.1870E+00	.1943E+00
PARTICULATE	I132	.1063E-02	.1169E-02	.1273E-02	.1297E-02	.1299E-02	.1299E-02
PARTICULATE	I133	.4281E-01	.4789E-01	.5385E-01	.5654E-01	.5900E-01	.5901E-01
PARTICULATE	I134	.2529E-03	.2714E-03	.2842E-03	.2854E-03	.2855E-03	.2855E-03
PARTICULATE	I135	.7063E-02	.7863E-02	.8755E-02	.9088E-02	.9203E-02	.9203E-02

TOTAL DOSE FOR 30 DAYS .1956E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4400E+04
FILTERED INLEAKAGE(CFM) .1000E+04
UNFILTERED INLEAKAGE(CFM) .3000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2714E+01	.3196E+01	.3952E+01	.5382E+01	.1020E+02	.1251E+02
ELEMENTAL I132	.2308E-01	.2639E-01	.3060E-01	.3376E-01	.3413E-01	.3413E-01
ELEMENTAL I133	.9162E+00	.1075E+01	.1320E+01	.1737E+01	.2387E+01	.2393E+01
ELEMENTAL I134	.5629E-02	.6201E-02	.6717E-02	.6849E-02	.6850E-02	.6850E-02
ELEMENTAL I135	.1517E+00	.1768E+00	.2133E+00	.2624E+00	.2913E+00	.2913E+00
ORGANIC I131	.4048E+00	.8722E+00	.1607E+01	.2995E+01	.6695E+01	.8085E+01
ORGANIC I132	.3273E-02	.6489E-02	.1057E-01	.1365E-01	.1400E-01	.1400E-01
ORGANIC I133	.1359E+00	.2904E+00	.5280E+00	.9330E+00	.1494E+01	.1497E+01
ORGANIC I134	.7364E-03	.1292E-02	.1793E-02	.1921E-02	.1922E-02	.1922E-02
ORGANIC I135	.2224E-01	.4654E-01	.8205E-01	.1297E+00	.1570E+00	.1570E+00
PARTICULATE I131	.1270E+00	.1424E+00	.1608E+00	.1765E+00	.2310E+00	.2577E+00
PARTICULATE I132	.1063E-02	.1169E-02	.1273E-02	.1308E-02	.1312E-02	.1312E-02
PARTICULATE I133	.4281E-01	.4789E-01	.5385E-01	.5843E-01	.6567E-01	.6573E-01
PARTICULATE I134	.2529E-03	.2714E-03	.2842E-03	.2856E-03	.2857E-03	.2857E-03
PARTICULATE I135	.7063E-02	.7863E-02	.8755E-02	.9296E-02	.9612E-02	.9612E-02

TOTAL DOSE FOR 30 DAYS .2532E+02

3/12/97

INPUT I:\NSL\MSA\CTRLROOM\THY9702.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THY9702.OUT
NRC CASE: NEW XQ, 3588, 70 GPM CONSTANT, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4400E+04
FILTERED INLEAKAGE(CFM) .1000E+04
UNFILTERED INLEAKAGE(CFM) .3000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2714E+01	.3196E+01	.3952E+01	5382E+01	.1020E+02	.1251E+02
ELEMENTAL I132	.2308E-01	.2639E-01	.3060E-01	.3376E-01	.3413E-01	.3413E-01
ELEMENTAL I133	.9162E+00	.1075E+01	.1320E+01	.1737E+01	.2387E+01	.2393E+01
ELEMENTAL I134	.5629E-02	.6201E-02	.6717E-02	.6849E-02	.6850E-02	.6850E-02
ELEMENTAL I135	.1517E+00	.1768E+00	.2133E+00	.2624E+00	.2913E+00	.2913E+00
ORGANIC I131	.4048E+00	.8722E+00	.1607E+01	.2995E+01	.6695E+01	.8085E+01
ORGANIC I132	.3273E-02	.6489E-02	.1057E-01	.1365E-01	.1400E-01	.1400E-01
ORGANIC I133	.1359E+00	.2904E+00	.5280E+00	.9330E+00	.1494E+01	.1497E+01
ORGANIC I134	.7364E-03	.1292E-02	.1793E-02	.1921E-02	.1922E-02	.1922E-02
ORGANIC I135	.2224E-01	.4654E-01	.8205E-01	.1297E+00	.1570E+00	.1570E+00
PARTICULATE I131	.1270E+00	.1424E+00	.1608E+00	.1765E+00	.2310E+00	.2577E+00
PARTICULATE I132	.1063E-02	.1169E-02	.1273E-02	.1308E-02	.1312E-02	.1312E-02
PARTICULATE I133	.4281E-01	.4789E-01	.5385E-01	.5843E-01	.6567E-01	.6573E-01
PARTICULATE I134	.2529E-03	.2714E-03	.2842E-03	.2856E-03	.2857E-03	.2857E-03
PARTICULATE I135	.7063E-02	.7863E-02	.8755E-02	.9296E-02	.9612E-02	.9612E-02

TOTAL DOSE FOR 30 DAYS .2532E+02

3/12/97

ATTACHMENT 4 TO AEP:NRC:1238F1

TEST RESULTS FROM **12EHP4030STP229
"CONTROL ROOM EMERGENCY VENTILATION SYSTEM"

Test Results.
SOP.I RESPONSE - Attachment B. Issue 2

PROCEDURE NUMBER: KK12 EHV 4030 STP.229
DATE STARTED: 4-2-96
DATE COMPLETED: 4-9-96
CONDUCTED BY: [signature]

UNIT NUMBER: U2

0004-06100

5.5.24 Before adjusting any dampers, inspect door seals, drains, hatches, and fire seals for leak paths.

N/A *

* NO ADJUSTMENTS REQUIRED.

NOTE

The 800 cfm filtered makeup airflow limit is a desired value. The actual limit is to be determined based on unfiltered leakage and dose value.

5.5.25 If desired (to meet desirable criteria), mark position of dampers HV-ACRDA-2 and HV-ACRDV-7, then adjust them to obtain the following. If no adjustments are necessary, mark substeps N/A.

1. Adjust HV-ACRDA-2 and HV-ACRDV-7, then retest as appropriate starting at Step 5.5.6, until all the following criteria are met:

   - HV-ACRF-2 airflow is 6160 - 6440 cfm
   - Combined filter ΔP is ≤ 3.5 iwg
   - Control Room ΔP relative to Turbine Building is ≥ 0.064 iwg
   - Filtered makeup airflow is ≤ 800 cfm (desirable)
   - Equipment Room ΔP relative to Turbine Building is ≥ 0.041 iwg (desirable)
   - Unfiltered makeup airflow is 5 - 10 cfm.

   N/A

2. Record final values below, including sign (+ or -) and magnitude as applicable:

UNIT 2

   - HV-ACRF-2 airflow: 6400 cfm
   - Combined filter ΔP: 2.30 iwg
   - Control Room ΔP relative to Turbine Building: +0.26 iwg
   - Filtered makeup airflow: 820 cfm
   - Equip Room ΔP relative to Turbine Building: +0.26 iwg
   - Unfiltered makeup airflow: 12.6 cfm

   BMP 14-2-96

NOTE

The 800 cfm filtered makeup airflow limit is a desired value. The actual limit is to be determined based on unfiltered leakage and dose value.

5.4.25 If desired (to meet desirable criteria), mark position of dampers HV-ACRDA-2 and HV-ACRDV-7, then adjust them to obtain the following. If no adjustments are necessary, mark substeps N/A.

1. Adjust HV-ACRDA-2 and HV-ACRDV-7, then retest as appropriate starting at Step 5.4.6, until all the following criteria are met:

   - HV-ACRF-1 airflow is 6160 - 6440 cfm
   - Combined filter ΔP is ≤ 3.5 iwg
   - Control Room ΔP relative to Turbine Building is ≥ 0.064 iwg
   - Filtered makeup airflow is ≤ 800 cfm (desirable)
   - Equipment Room ΔP relative to Turbine Building is ≥ 0.041 iwg (desirable)
   - Unfiltered makeup airflow is 5 - 10 CFM.

   N/A / _____

UNIT 1

2. Record final values below, including sign (+ or -) and magnitude as applicable:

   - HV-ACRF-1 airflow: 6350 cfm
   - Combined filter ΔP: 2.25 iwg
   - Control Room ΔP relative to Turbine Building: +.30 iwg
   - Filtered makeup airflow: ~~12.6~~ 820 cfm MH 4/12/96
   - Equip Room ΔP relative to Turbine Building: +.23 iwg
   - Unfiltered makeup airflow: 12.6 cfm

   M. Hughes 4/12/96

0043

ATTACHMENT 5 TO AEP:NRC:1238F1

CALCULATION NO. RD-94-01
"OFFSITE DOSES DUE TO ECCS LEAKAGE"

American Electric Power Service Corporation

Nuclear Safety, Licensing & Assessment Calculation Cover Sheet

Calculation No. RD-94-01 Rev. ___
Subject Offsite Doses Due to ECCS Leakage
Safety Related System Yes ✓ No ___
Supercedes Calc. No. RD ES-03

Plant Donald C. Cook Unit 1 & 2
Company FM
Calculated By DJ-KG
Verified/Checked By Steven L Collins
Method of Verification Review/Independent Calculation
Approved By D K Griffin 2/24/94

Problem Description: Determine Site Boundary & LPZ doses post-LOCA due to ECCS leakage in aux. bldg. and leakage to RWST, following switchover to containment sump for ECCS suction. 2/24/94

Design Basis Or References:
UFSAR, 14.3.5
IE Info Notice 91-56 (AEP: NRC: 9945)

Executive Summary:
Doses due to ~~storage~~ now 11/18/94 ECCS leakage of 4576 cc/hr & RWST leakage of ___ to 10 gpm were determined. Doses were very small compared to 10 CFR 100 limits. Sources of leakage are transparent to calc, see statement of purpose for details. 11/24/94

Superseded By Calculation No. _____ Dated _____

Reason: _____

1. TABLE OF CONTENTS

1/28/84
3/23

2. STATEMENT OF PURPOSE

The purpose of this calculation is to determine offsite thyroid doses due to leakage of ECCS water during the recirculation phase of a LOCA. The leakage, which occurs outside containment, is comprised of two parts: *

(i) Leakage from ECCS components (pumps, valves, etc.) in the auxiliary building, and

(ii) Leakage through valves (e.g. SI miniflow valves) back to the refueling water storage tank (RWST).

The calculation will determine the 2 hour dose at the site boundary and the 30 day dose at the low population zone. This is consistent with the requirements of 10 CFR 100 (Ref. 1).

1/28/84

* note that the leakages ... bldg & RWST, on a per cc basis, have the same contribution to the offsite dose. This is because 1) no credit is taken for L = ventilation filtration, 2) no dilution in the RWST is credited, and 3) the same χ/Q is used for both aux bldg & RWST leakages.

3. ASSUMPTIONS

This section will be divided into two parts, one for the leakage from ECCS components in the auxiliary building, and the second for leakage through valves back to the RWST.

3.1 Assumptions for Dose Due to Leakage in the Auxiliary Building.

3.1.1 Source Term

Fifty percent of the core iodine is released and is contained in the containment sump. (Ref. 2). The iodine inventory derived by Westinghouse for the power uprate program (Ref. 3) will be used. This source term was derived for a thermal power level of 3588 MW, which bounds the licensed power level of Unit 1 (3250 MW) and Unit 2 (3411 MW).

ISOTOPE	ACTIVITY (CURIES)
I-131	5.0E+7
I-132	7.3E+7
I-133	1.0E+8
I-134	1.1E+8
I-135	1.9E+8

3.1.2 Dilution Volume

The iodine concentration is diluted by only by the water in the sump. (Dilution by RWST water is conservatively ignored.) The volume of water in the sump is 2.2E+9 cc, which includes the RCS and ECCS water, plus water from the melting of 50% of the total ice (Ref. 4).

3.1.3 Sump Water Temperature

No flashing to steam occurs in the sump (Ref. 4).

3.1.4 Iodine Entrainment

Iodine entrainment in vapor (from evaporation) is factor of ~~10E-4~~ 1x10^-4 (Ref. 4). This factor was based on experiments described in Ref. 4.

3.1.5 Iodine Filtration

No credit was taken for filtration of the ECCS leakage in the auxiliary building by the ESF ventilation system.

3.1.6 Leakage Rate

The design basis leakage rate of 4576 cc/hr was used for ECCS leakage in the auxiliary building (Ref. 4). This leakage was considered to be constant throughout the entire course of the LOCA (30 days). The leakage of concern is from the water that is recirculated from the containment sump following switchover of ECCS suction from the RWST to the containment sump. No credit was taken for the fact that there is approximately a 20 minute delay before recirculation flow is established.

3.1.7 Breathing Rate

Breathing Rate of 3.47E-4 sec/m^3 (Ref. 2).

3.1.8 Atmospheric Dispersion Factor

ECCS leakage in the auxiliary building would be picked up by the ESF ventilation system and ultimately released to the containment unit vent. (The auxiliary building is maintained at a negative pressure relative to the outside air post-accident.) The X/Q's developed for a containment release will be used, as provided in Ref. 4. Note that the containment X/Q's in Ref. 4 were developed for a ground level release. This is conservative, since the unit vent is located on top of the containment and therefore which results in an elevating of the release.

Values of X/Q (site boundary and low population zone) used in the calculation are:

TIME (HR)	X/Q (SB), SEC/M^3)	X/Q (LPZ), SEC/M^3
0-24	3.15E-4	7.5E-5
24-120	2.5E-5	2.6E-6
120-720	8.4E-6	7.9E-7

3.1.9 Dose Conversion Factors

Dose conversion factors are from ICRP-30, as listed in Ref. 5.

ISOTOPE	DCF (REM/CI)
I-131	1.07E+6
I-132	6.29E+3
I-133	1.81E+5
I-134	1.07E+3

I-135	3.14E+4 ✓	

3.1.10 Radioactive Decay Data

Data taken from Ref. 6.

ISOTOPE	HALF-LIFE (hrs)	LAMBDA (ln 2/half-life)
I-131	193	3.59E-3 ✓
I-132	2.30	3.01E-1 ✓
I-133	20.8	3.33E-2 ✓
I-134	0.877	7.91E-1 ✓
I-135	6.61	1.05E-1 ✓

3.2 Assumptions for Dose Due to Leakage to RWST

3.2.1 Source Term

Same as Section 3.1.1

3.2.2 Dilution Volume

Same as Section 3.1.2. Dilution of the water by the RWST will conservatively be ignored.

3.2.3 Sump Water Temperature

Same as Section 3.1.3.

3.2.4 Iodine Entrainment

Same as Section 3.1.4.

3.2.5 Iodine Filtration

There are no filters that would affect the leak path from the refueling water storage tank to the atmosphere.

3.2.6 Leakage Rate

Values of leakage back to the RWST of 1.0 and 10.0 gpm will be analyzed. As discussed in Section 3.1.6, no credit is taken for the delay that exists before the recirculation flow path is established.

3.2.7 Breathing Rate

Same as Section 3.1.7.

3.2.8 Atmospheric Dispersion Factor

The same factors presented in section 3.1.8 will be used. It is noted that the X/Q values presented in that section were derived using the cross-sectional area of the containment building. (X/Q is inversely related to the cross-sectional area of the building.) Although the RWST has a smaller cross-sectional area, the UFSAR values are considered to be acceptable since, 1) the plant structures influence the wake around the

NTF
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8/23

RWST for all wind directions, and 2) as discussed in Section 2.2.3 of the UFSAR, the worst case X/Q ever recorded was approximately an order of magnitude lower than the UFSAR value.

3.2.9 Dose Conversion Factors

Same as Section 3.1.9.

3.2.10 Radioactive Decay Data

Same as Section 3.1.10.

4. ANALYSIS

The offsite dose rate from an iodine isotope due to leakage from a liquid source is expressed as:

$$DR = (L)(C)(X/Q)(B)(DCF)(F) \quad (1)$$

where:

DR = dose rate, rem/hr
L = leakage rate, cc/hr
C = concentration of activity, Ci/cc
B = breathing rate, cc/sec
DCF = dose conversion factor, rem/Ci
F = entrainment factor
X/Q = atmospheric dispersion factor, sec/m3

The concentration, C, is obtained by dividing the activity (Ci) by the volume in the sump (cc). The concentration, C, is a time dependent function, due to radioactive decay. Thus, $C(t) = C_0\exp(-\lambda t)$.

The atmospheric dispersion term, X/Q, also varies with time. The UFSAR defines discrete intervals (0-1 day, 1-5 days, and 5-30 days) in which X/Q is held constant.

Eqn. (1) can be written in time dependent terms as:

$$DR = (L)[C_0\exp(-\lambda t)][X/Q(t)](B)(DCF)(F) \quad (2)$$

The total dose received is the integral of eqn.(2), or:

$$D = DR = \int_0^t (L)[C_0\exp(-\lambda t)][X/Q(t)](B)(DCF)(F)dt \quad (3)$$

Over the time interval in which X/Q is held constant, the eqn.(3) becomes:

$$D = (L)(C_0)(X/Q)(B)(DCF)(F)\int_0^t \exp(-\lambda t)dt \quad (4)$$

Solving the integral for the time period t=0 to t, the equation becomes:

$$D = (L)(C_0)(X/Q)(B)(DCF)(F)(1/\lambda)[1-\exp(-\lambda t)] \quad (5)$$

In order to obtain the total dose, the above equations would be repeated for each of the five iodine isotopes of interest, and the results summed.

The calculation was performed using a program written in MSFORTRAN 5.0, which runs on a PC. Attachment 1 contains the computer code (the version with leakage to the RWST of 10.0 gpm was provided.) Section 6 contains the output results for the 2 cases analyzed, i.e., leakage to the RWST of 1.0 and 10 gpm.

5. VERIFICATION

The calculational results are provided in the next section. The code was verified by performing hand calculations to ensure the code output matched the exact solution, which is expressed in eqn. (5). Verification was performed for I-131 for site boundary and low population zone doses, for both ESF and RWST leakage. In addition, a check of the site boundary dose for RWST leakage was made for I-133. These hand calculations are provided below. Lastly, the code output was reviewed to ensure that the doses due to the various isotopes were added correctly, and that the ESF and RWST leakage contributions were added correctly. In all cases, the code results matched the hand calculations.

7223(9-83)
FORM GE-8(C)

ENGINEERING DEPT. 0 0 1 0 0 1 5 0 0 1 2 SHEET 11a OF 23

AMERICAN ELECTRIC POWER SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OHIO

DATE 1/28/94 BY [illegible] CK.
COMPANY G.O.
PLANT

SUBJECT Verification

Case 1: ESF Leakage, Site Boundary (0-2 hrs, I-131

$\frac{\chi}{Q} = 3.15 \times 10^{-4}$

$D = L C_0 \frac{\chi}{Q} B (DCF)(F)(1/\lambda)(1 - e^{-\lambda t})$

$= .4576)(\frac{5.0 \times 10^7}{2.2 \times 10^9})(3.15 \times 10^{-4})(3.47 \times 10^{-4})(1.07 \times 10^6)(\frac{1}{10,000})$

$* (\frac{1}{3.59 \times 10^{-3}})(1 - e^{-(3.59 \times 10^{-3} * 2)})$

E.M. 2/24/94

$= 2.4 \times 10^{-3}$ ✓ (Same as code)

Case 2: RWST Leakage Site Boundary
(0-2 hrs, I-131

$\frac{\chi}{Q} = 3.15 \times 10^{-4}$

$D = L C_0 \frac{\chi}{Q} B (DCF)(F)(\frac{1}{\lambda})(1 - e^{-\lambda t})$

$L = \frac{1 \text{ gal}}{\text{min}} \times \frac{60 \text{ min}}{\text{hr}} \times \frac{3785.43 \text{ cm}^3}{\text{gal}} = 227,125.8 \frac{\text{cc}}{\text{hr}}$

$D = (227,125.8)(\frac{5 \times 10^7}{2.2 \times 10^9})(3.15 \times 10^{-4})(3.47 \times 10^{-4})$

$* (1.07 \times 10^6)(\frac{1}{10,000})(\frac{1}{3.59 \times 10^{-3}})(1 - e^{-(3.59 \times 10^{-3} * 2)})$

$= 0.12$ ✓ (Same as Code)

SUBJECT

Case 3: ESF Leakage, LPZ

Dose at LPZ = Dose 0-1 day + Dose 1-5 day + Dose 5-30 day

Dose 0-1 day ($\frac{\chi}{Q} = 7.5 \times 10^{-5}$)

$D_{0-1} = L C_0 \frac{\chi}{Q} B (DCF)(F)(\frac{1}{\lambda})(1-e^{-\lambda t})$

$= (4576)(\frac{5\times10^7}{2.2\times10^9})(7.5\times10^{-5})(3.47\times10^{-4})(1.07\times10^6)$

$* (\frac{1}{10,000})(\frac{1}{3.59\times10^{-3}})(1-e^{-(3.59\times10^{-3})(24)})$

$= 0.666 \times 10^{-2}$ ✓ (Same as code)

Dose 1-5 day ($\frac{\chi}{Q} = 2.6\times10^{-6}$)

To obtain dose @ 1-5 days, first determine C @ 1 day, by $C = C_0 e^{-\lambda t}$. In subsequent calc, $t = 5 \text{ days} - 1 \text{ day} = 4 \text{ days} = 96 \text{ hrs}$.

$C = C_0 e^{-\lambda t} = (\frac{5\times10^7}{2.2\times10^9})(e^{-(3.59\times10^{-3})(24)}) = 0.0205$

$D = LC \frac{\chi}{Q} B (DCF)(F)(\frac{1}{\lambda})(1-e^{-\lambda t})$

$= (4576)(0.0205)(2.6\times10^{-6})(3.47\times10^{-4})(1.07\times10^6)(\frac{1}{10,000})$

$* (\frac{1}{3.59\times10^{-3}})(1-e^{-(3.59\times10^{-3})(96)})$

$= 7.48\times10^{-4}$

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FORM GE-8(C)

ENGINEERING DEPT.
AMERICAN ELECTRIC POWER SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OHIO

SHEET 12 OF 23
DATE 1/28/94 BY MRG CK.
COMPANY G.O.
PLANT

SUBJECT

Case 3 : ESF Leakage, LPZ (cont'd)

$Dose_{5-30\ days}\ .\ (\frac{\chi}{Q} = 7.9 \times 10^{-7})$

To obtain dose @ 5-30 days, first determine C @ 5 days, by $C = C_0 e^{-\lambda t}$. In subsequent calc, $t = 30\ days - 5\ days = 25\ days = 600\ hrs$.

$C = C_0 e^{-\lambda t} = \left(\frac{5 \times 10^{7}}{2.2 \times 10^{9}}\right) e^{-(3.59 \times 10^{-3})(120)} = 0.01477$

$D_{5-30} = LC \frac{\chi}{Q} B\,(DCF)\,(F)\,\left(\frac{1}{\lambda}\right)\,(1 - e^{-\lambda t})$

$= (4576)(0.01477)(7.9 \times 10^{-7})(3.47 \times 10^{-4})(1.07 \times 10^{6})\left(\frac{1}{3.59 \times 10^{-3}}\right)\left(1 - e^{-(3.59 \times 10^{-3})(600)}\right)$

$= 0.4882\ E-3$

Total Dose @ 30 days $= D_{0-1} + D_{1-5} + D_{5-30}$

$= 0.666\ E-2 + 0.748\ E-3 + 0.488\ E-3$

$= \boxed{0.710\ E-2}$ same as code

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FORM GE-8(C)

ENGINEERING DEPT.
AMERICAN ELECTRIC POWER SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OHIO

SHEET 13 OF 23
DATE 1/28/94 BY MRA CK.
COMPANY G.O.
PLANT

SUBJECT

Case 4: RWST Leakage, LPZ, I-131

Dose at LPZ = Dose$_{0-1\,day}$ + Dose$_{1-5\,day}$ + Dose$_{5-30\,day}$

Dose 0-1 day $\left(\frac{\chi}{Q} = 7.5 \times 10^{-5}\right)$

$D_{0-1} = L\, C_0 \frac{\chi}{Q} B (DCF)(F)\left(\frac{1}{\lambda}\right)(1 - e^{-\lambda t})$

L = Same as Case 2, 227,125.8

$D_{0-1} = (227,125.8)\left(\frac{5 \times 10^{7}}{2.2 \times 10^{9}}\right)(7.5 \times 10^{-5})(3.47 \times 10^{-4})$
$(1.07 \times 10^{6})\left(\frac{1}{10,000}\right)\left(\frac{1}{3.59 \times 10^{-3}}\right)\left(1 - e^{-(3.59 \times 10^{-3})(24)}\right)$

= 0.331, same as Code

Dose$_{1-5\,day}$ $\left(\frac{\chi}{Q} = 2.6 \times 10^{-5}\right)$

To obtain dose @ 1-5 days, first determine C @ 1 day, by $C = C_0 e^{-\lambda t}$. In subsequent calc, t = 5 days - 1 day = 4 days = 96 hrs

$C = C_0 e^{-\lambda t} = \left(\frac{5 \times 10^{7}}{2.2 \times 10^{9}}\right)\left(e^{-(3.59 \times 10^{-3})(24)}\right) = 0.02085$

$D = L\, C \frac{\chi}{Q} B (DCF)(F)\left(\frac{1}{\lambda}\right)(1 - e^{-\lambda t})$

$= (227,125.8)(0.02085)(2.6 \times 10^{-5})(3.47 \times 10^{-4})(1.07 \times 10^{6})$
$(10,000)\left(\frac{1}{3.59 \times 10^{-3}}\right)\left(1 - e^{-(3.59 \times 10^{-3})(96)}\right)$

= 0.3712 E-1

SUBJECT

Case 4 : RWST Leakage, LPZ, I-131 (cont'd)

$Dose_{5-30}$ $\left(\frac{\chi}{Q} = 7.9 \times 10^{-7}\right)$

To obtain dose @ 5-30 days, first determine C @ 5 days by $C = C_0 e^{-\lambda t}$. In subsequent calc, t = 30 days - 5 days = 25 days = 600 hrs.

$$C = C_0 e^{-\lambda t} = \left(\frac{5 \times 10^7}{2.2 \times 10^9}\right) e^{-(3.59 \times 10^{-3})(120)} = 0.01472$$

$$D_{5-30} = L\left(\frac{\chi}{Q}\right) B\,(DCF)(F)\left(\frac{1}{\lambda}\right)\left(1 - e^{-\lambda t}\right)$$

$$= (227{,}125\ 8)(0.01477)(7.9 \times 10^{-7})(3.47 \times 10^{-4})(1.07 \times 10^6)\left(\frac{1}{10{,}000}\right)\left(\frac{1}{3.59 \times 10^{-3}}\right)\left(1 - e^{-(3.59 \times 10^{-3})(600)}\right)$$

$$= 0.2423\ E-1$$

Total Dose @ 30 days = $D_{0-1} + D_{1-5} + D_{5-30}$

$$= 0.331\ E+0 + 0.371\ E-1 + 0.242\ E-1$$

$$= \boxed{0.392\ E+0} \quad \text{same as code}$$

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AMERICAN ELECTRIC POWER SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OHIO

DATE 1/28/94 BY [illegible] CK.
COMPANY G.O.
PLANT

SUBJECT

Case 5: RWST Leakage, 5'k Boundary (0-2 hr.) I-133

$\frac{\chi}{Q} = 3.15 \times 10^{-4}$

$D = L C_0 \frac{\chi}{Q} B (DCF)(F)\left(\frac{1}{\lambda}\right)(1 - e^{-\lambda t})$

$= (22712.8)\left(\frac{1 \times 10^8}{2.2 \times 10^9}\right)(3.15 \times 10^{-4})(3.47 \times 10^{-4})(1.81 \times 10^5)$
$\left(\frac{1}{10,000}\right)\left(\frac{1}{3.33 \times 10^{-2}}\right)\left(1 - e^{-(3.33 \times 10^{-2} \times 2)}\right)$

$= \boxed{0.40 \text{ E-1}}$, same as code

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12.6/94
16/23

6. RESULTS

6.1 RWST LEAKAGE = 1.0 GPM

ESF LEAKAGE = 4576. CC/HR
RWST LEAKAGE = 1.00 GPM

SITE BOUNDARY DOSE (ESF LEAKAGE)

ISOTOPE	2-HR DOSE (REM)
I131	.242D-02
I132	.159D-04
I133	.798D-03
I134	.280D-05
I135	.246D-03
TOTAL =	.349D-02

SITE BOUNDARY DOSE (RWST LEAKAGE)

ISOTOPE	2-HR DOSE (REM)
I131	.120D+00
I132	.790D-03
I133	.396D-01
I134	.139D-03
I135	.122D-01
TOTAL =	.173D+00

TOTAL ESF + RWST= .177D+00

LPZ DOSE (ESF LEAKAGE) (REM)

ISOTOPE	2-HR	1-DAY	5-DAY	30-DAY
I131	.577D-03	.666D-02	.741D-02	.790D-02
I132	.379D-05	.838D-05	.838D-05	.838D-05
I133	.190D-03	.162D-02	.167D-02	.167D-02
I134	.666D-06	.838D-06	.838D-06	.838D-06
I135	.586D-04	.284D-03	.285D-03	.285D-03
TOTAL =	.830D-03	.858D-02	.937D-02	.986D-02

LPZ DOSE (RWST LEAKAGE) (REM)

ISOTOPE	2-HR	1-DAY	5-DAY	30-DAY
I131	.287D-01	.331D+00	.368D+00	.392D+00
I132	.188D-03	.416D-03	.416D-03	.416D-03
I133	.943D-02	.805D-01	.827D-01	.827D-01
I134	.330D-04	.416D-04	.416D-04	.416D-04
I135	.291D-02	.141D-01	.142D-01	.142D-01
TOTAL =	.412D-01	.426D+00	.465D+00	.489D+00

TOTAL 30-DAY DOSE (ESF + RWST) = .499D+00 REM

6.2 RWST LEAKAGE = 10 GPM

ESF LEAKAGE = 4576. CC/HR
RWST LEAKAGE = 10.00 GPM

SITE BOUNDARY DOSE (ESF LEAKAGE)

ISOTOPE	2-HR DOSE (REM)
I131	.242D-02
I132	.159D-04
I133	.798D-03
I134	.280D-05
I135	.246D-03
TOTAL =	.349D-02

SITE BOUNDARY DOSE (RWST LEAKAGE)

ISOTOPE	2-HR DOSE (REM)
I131	.120D+01
I132	.790D-02
I133	.396D+00
I134	.139D-02
I135	.122D+00
TOTAL =	.173D+01

TOTAL ESF + RWST= .173D+01

LPZ DOSE (ESF LEAKAGE) (REM)

ISOTOPE	2-HR	1-DAY	5-DAY	30-DAY
I131	.[illegible]2-0[illegible]	.666D-02	.741D-02	.790D-02
I132	.379D-05	.838D-05	.838D-05	.838D-05
I133	.190D-03	.162D-02	.167D-02	.167D-02
I134	.666D-06	.838D-06	.838D-06	.838D-06
I135	.586D-04	.284D-03	.285D-03	.285D-03
TOTAL =	.830D-03	.858D-02	.937D-02	.986D-02

LPZ DOSE (RWST LEAKAGE) (REM)

ISOTOPE	2-HR	1-DAY	5-DAY	30-DAY
I131	.287D+00	.331D+01	.368D+01	.392D+01
I132	.188D-02	.416D-02	.416D-02	.416D-02
I133	.943D-01	.805D+00	.827D+00	.827D+00
I134	.330D-03	.416D-03	.416D-03	.416D-03
I135	.291D-01	.141D+00	.142D+00	.142D+00
TOTAL =	.412D+00	.426D+01	.465D+01	.489D+01

TOTAL 30-DAY DOSE (ESF + RWST) = .490D+01 REM

7. DISCUSSION OF RESULTS

The results of the calculation demonstrate that the contribution to the LOCA offsite doses (site boundary and LPZ) from ECCS leakage and leakage back to the RWST is only a small fraction of the total dose. The 10 CFR 100 offsite dose criteria is 300 rem to the thyroid for the 0-2 hour dose at the site boundary and the dose at the LPZ over the course of the accident, which is typically taken to be 30 days.

In Ref. 3, the 2 hour site boundary dose was calculated to be 134 rem. The additional site boundary dose due to design basis ECCS leakage plus a 10.0 gpm leak to the RWST was determined to be 1.7 rem. The total site boundary dose is therefore 135.7 rem, well within the 300 rem limit.

In Ref. 3, the 30 day LPZ dose was calculated to be 126 rem. The additional LPZ dose due to design basis ECCS leakage plus a 10.0 gpm leak to the RWST was determined to be 4.9 rem. The total LPZ dose is therefore 130.9 rem, well within the 300 rem limit.

1/28/94
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8. REFERENCES

1. 10 CFR 100
2. NUREG 0800 (Standard Review Plan), Chapter 15.6.5 Appx B, Rev. 1.
3. WCAP 12135
4. UFSAR, Chapter 14.3.5
5. WCAP 11020
6. ICRP 30
7. Reg Guide 1.4 1/28/94

1/28/94
20/23

ATTACHMENT

CODE LISTING (RWST LEAKAGE = 10 GPM)

```
      REAL*8 EDOSESBT(5),EDOSELPT(5),XQSB,XQESFSB(3)
      REAL*8 XQLP,XQESFLP(3),DELTAT,EDOSESB(5),ESFLEAK
      REAL*8 ICI(5),VOL,BREATHE,IDCF(5),PTFACT,ILAMB(5),T
      REAL*8 EDOSELP(5),ESB2(5)
      REAL*8 ELP2(5),ELP24(5),ELP120(5),ELP720(5)
      REAL*8 RDOSESBT(5),RDOSELPT(5),XQRWSTSB(3),XQRWSTLP(3)
      REAL*8 RDOSESB(5),RWSTGPM,RWSTLEAK,RDOSELP(5),RSB2(5),RLP2(5)
      REAL*8 RLP24(5),RLP120(5),RLP720(5),TOTALESB,TOTALRSB,TOTALSB
      REAL*8 TOTLE2,TOTLE24,TOTLE120,TOTLE720
      REAL*8 TOTLR2,TOTLR24,TOTLR120,TOTLR720,TOTAL
      CHARACTER*4 NAME(5)
      DATA NAME/'I131','I132','I133','I134','I135'/
      DATA IDCF/1.07D+06,6.29D+03,1.81D+05,1.07D+03,3.14D+04/
      DATA BREATHE/3.47D-04/
      DATA XQESFSB/3.15D-04,2.5D-05,8.4D-06/
      DATA XQRWSTSB/3.15D-04,2.5D-05,8.4D-06/
      DATA XQESFLP/7.5D-05,2.6D-06,7.9D-07/
      DATA XQRWSTLP/7.5D-05,2.6D-06,7.9D-07/
      DATA ICI/5.0D+07,7.3D+07,1.0D+08,1.1D+08,1.9D+08/
      DATA ILAMB/3.59D-03,3.01D-01,3.33D-02,7.91D-01,1.05D-01/
      DATA ESFLEAK/4576.0D0/
      DATA RWSTGPM/10.0/
      DATA PTFACT/10000.0D0/
      DATA VOL/2.2D+09/
C     **PART OF THE CODE THAT CALCULATES THE DOSE DUE TO ESF LEAKAGE**
C
C     *****OUTER LOOP FOR ALL ISOTOPES*****
C
          DO 130 I=1,5
             T = 0.0
             EDOSESBT(I) = 0.0D0
             EDOSELPT(I) = 0.0D0
C
C     *******INNER LOOP FOR TIME 0 TO 30 DAYS**********************
C
10           XQSB = XQESFSB(1)
             IF (T.GT.24.0) XQSB = XQESFSB(2)
             IF( T.GT.120.0) XQSB = XQESFSB(3)
C
             XQLP = XQESFLP(1)
             IF (T.GT.24.0) XQLP = XQESFLP(2)
             IF( T.GT.120.0) XQLP = XQESFLP(3)
C
             DELTAT = 0.1D+0
             IF (T.GT. 48.0) DELTAT = 1.0D0
             EDOSESB(I)=ESFLEAK*ICI(I)/VOL*XQSB*BREATHE*IDCF(I)/PTFACT
     1       *DEXP(-ILAMB(I)*T)*DELTAT
             EDOSELP(I)=ESFLEAK*ICI(I)/VOL*XQLP*BREATHE*IDCF(I)/PTFACT
     1       *DEXP(-ILAMB(I)*T)*DELTAT
C
             EDOSESBT(I) = EDOSESBT(I)+EDOSESB(I)
             EDOSELPT(I) = EDOSELPT(I)+EDOSELP(I)
C
             IF ((T+DELTAT) .GT. 1.59 .AND. (T+DELTAT).LT. 2.01) THEN
```

mpa
1/28/94
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ATTACHMENT

CODE LISTING (RWST LEAKAGE = 10 GPM)

```
      REAL*8 EDOSESBT(5),EDOSELPT(5),XQSB,XQESFSB(3)
      REAL*8 XQLP,XQESFLP(3),DELTAT,EDOSESB(5),ESFLEAK
      REAL*8 ICI(5),VOL,BREATHE,IDCF(5),PTFACT,ILAMB(5),T
      REAL*8 EDOSELP(5),ESB2(5)
      REAL*8 ELP2(5),ELP24(5),ELP120(5),ELP720(5)
      REAL*8 RDOSESBT(5),RDOSELPT(5),XQRWSTSB(3),XQRWSTLP(3)
      REAL*8 RDOSESB(5),RWSTGPM,RWSTLEAK,RDOSELP(5),RSB2(5),RLP2(5)
      REAL*8 RLP24(5),RLP120(5),RLP720(5),TOTALESB,TOTALRSB,TOTALSB
      REAL*8 TOTLE2,TOTLE24,TOTLE120,TOTLE720
      REAL*8 TOTLR2,TOTLR24,TOTLR120,TOTLR720,TOTAL
      CHARACTER*4 NAME(5)
      DATA NAME/'I131','I132','I133','I134','I135'/
      DATA IDCF/1.07D+06,6.29D+03,1.81D+05,1.07D+03,3.14D+04/
      DATA BREATHE/3.47D-04/
      DATA XQESFSB/3.15D-04,2.5D-05,8.4D-06/
      DATA XQRWSTSB/3.15D-04,2.5D-05,8.4D-06/
      DATA XQESFLP/7.5D-05,2.6D-06,7.9D-07/
      DATA XQRWSTLP/7.5D-05,2.6D-06,7.9D-07/
      DATA ICI/5.0D+07,7.3D+07,1.0D+08,1.1D+08,1.9D+08/
      DATA ILAMB/3.59D-03,3.01D-01,3.33D-02,7.91D-01,1.05D-01/
      DATA ESFLEAK/4576.0D0/
      DATA RWSTGPM/10.0/
      DATA PTFACT/10000.0D0/
      DATA VOL/2.2D+09/

C     **PART OF THE CODE THAT CALCULATES THE DOSE DUE TO ESF LEAKAGE**
C

C     *****OUTER LOOP FOR ALL ISOTOPES*****
C
          DO 130 I=1,5
             T = 0.0
             EDOSESBT(I) = 0.0D0
             EDOSELPT(I) = 0.0D0
C
C     *******INNER LOOP FOR TIME 0 TO 30 DAYS**********************
C
10           XQSB = XQESFSB(1)
             IF (T.GT.24.0) XQSB = XQESFSB(2)
             IF( T.GT.120.0) XQSB = XQESFSB(3)
C
             XQLP = XQESFLP(1)
             IF (T.GT.24.0) XQLP = XQESFLP(2)
             IF( T.GT.120.0) XQLP = XQESFLP(3)
C
             DELTAT = 0.1D+0
             IF (T.GT. 48.0) DELTAT = 1.0D0
             EDOSESB(I)=ESFLEAK*ICI(I)/VOL*XQSB*BREATHE*IDCF(I)/PTFACT
     1       *DEXP(-ILAMB(I)*T)*DELTAT
             EDOSELP(I)=ESFLEAK*ICI(I)/VOL*XQLP*BREATHE*IDCF(I)/PTFACT
     1       *DEXP(-ILAMB(I)*T)*DELTAT
C
             EDOSESBT(I) = EDOSESBT(I)+EDOSESB(I)
             EDOSELPT(I) = EDOSELPT(I)+EDOSELP(I)
C
             IF ((T+DELTAT) .GT. 1.95 .AND. (T+DELTAT).LT. 2.05) THEN
               ESB2(I) = EDOSESBT(I)
               ELP2(I) = EDOSELPT(I)
```

```
            ENDIF
            IF ((T+DELTAT) .GT. 23.95.AND.(T+DELTAT).LT. 24.05) THEN
              ELP24(I) = EDOSELPT(I)
            ENDIF
            IF ((T+DELTAT) .GT. 119.5.AND.(T+DELTAT).LT. 120.5) THEN
              ELP120(I) = EDOSELPT(I)
            ENDIF
            IF ((T+DELTAT) .GT. 719.5 .AND.(T+DELTAT).LT.720.5) THEN
              ELP720(I) = EDOSELPT(I)
            ENDIF
C
            T = T+DELTAT
            IF (T.LE.720.0) GO TO 10
130         CONTINUE
C
C
C**PART OF THE CODE THAT CALCULATES THE DOSE DUE TO LEAKAGE TO RWST**
C
     RWSTLEAK = RWSTGPM*2.271258D+5
C   *****OUTER LOOP FOR ALL ISOTOPES*****
C
        DO 140 I=1,5
           T = 0.0
           RDOSESBT(I) = 0.0D0
           RDOSELPT(I) = 0.0D0
C
C   *******INNER LOOP FOR TIME 0 TO 30 DAYS**********************
C
20         XQSB = XQRWSTSB(1)
           IF (T.GT.24.0) XQSB = XQRWSTSB(2)
           IF (T.GT.120.0) XQSB = XQRWSTSB(3)
C
           XQLP = XQRWSTLP(1)
           IF (T.GT.24.0) XQLP = XQRWSTLP(2)
           IF (T.GT.120.0) XQLP = XQRWSTLP(3)
C
           DELTAT = 0.1D+0
          IF (T.GT. 48.0) DELTAT = 1.0D0
          RDOSESB(I)=RWSTLEAK*ICI(I)/VOL*XQSB*BREATHE*IDCF(I)/PTFACT
     1    *DEXP(-ILAMB(I)*T)*DELTAT
          RDOSEL..,I)=RWSTLEAK*ICI(I)/VOL*XQLP*BREATHE*IDCF(I)/PTFACT
     1    *DEXP(-ILAMB(I)*T)*DELTAT
C
           RDOSESBT(I) = RDOSESBT(I)+RDOSESB(I)
           RDOSELPT(I) = RDOSELPT(I)+RDOSELP(I)
C
           IF ((T+DELTAT) .GT. 1.95 .AND. (T+DELTAT).LT. 2.05) THEN
             RSB2(I) = RDOSESBT(I)
             RLP2(I) = RDOSELPT(I)
           ENDIF
           IF ((T+DELTAT) .GT.23.95 .AND.(T+DELTAT).LT. 24.05) THEN
             RLP24(I) = RDOSELPT(I)
           ENDIF
           IF ((T+DELTAT) .GT. 119.5 .AND.(T+DELTAT).LT. 120.5) THEN
             RLP120(I) = RDOSELPT(I)
           ENDIF
           IF ((T+DELTAT) .GT. 719.5 .AND.(T+DELTAT).LT. 720.5) THEN
             RLP720(I) = RDOSELPT(I)
           ENDIF
C
           T = T+DELTAT
           IF (T.LE.720.0) GO TO 20
140        CONTINUE
C
C
C  **PART OF THE CODE THAT OUTPUTS THE RESULTS**
```

```
      OPEN (UNIT =6, FILE = 'I:\NSL\MSA\ESFOUT10.MSA')
      WRITE (6,800) ESFLEAK
800      FORMAT('ESF LEAKAGE = ',F5.0, ' CC/HR')
      WRITE (6,810) RWSTGPM
810      FORMAT('RWST LEAKAGE = ',F5.2, ' GPM',//)
      WRITE (6,820)
820      FORMAT('SITE BOUNDARY DOSE (ESF LEAKAGE)',/)
      WRITE (6,830)
830      FORMAT('ISOTOPE',3X,'2-HR DOSE (REM)',/)
C
      DO 150 I = 1,5
         WRITE (6,840) NAME(I), ESB2(I)
840         FORMAT(A4,6X,D8.3)
150   CONTINUE
C
      TOTALESB = 0.0D0
      DO 160 I = 1,5
         TOTALESB = TOTALESB + ESB2(I)
160   CONTINUE
          WRITE (6,860) TOTALESB
860          FORMAT('TOTAL = ',2X,D8.3,//)
          WRITE (6,870)
870          FORMAT('SITE BOUNDARY DOSE (RWST LEAKAGE)',/)
          WRITE (6,880)
880          FORMAT('ISOTOPE',3X,'2-HR DOSE (REM)',/)
C
      DO 170 I = 1,5
         WRITE (6,890) NAME(I), RSB2(I)
890         FORMAT(A4,6X,D8.3)
170   CONTINUE
      TOTALRSB = 0.0D0
      DO 180 I = 1,5
         TOTALRSB =TOTALRSB + RSB2(I)
180   CONTINUE
         WRITE (6,900) TOTALRSB
900         FORMAT('TOTAL = ',2X,D8.3,//)
      TOTALSB = TOTALESB + TOTALRSB
         WRITE (6,910) TOTALSB
910            FORMAT('TOTAL ESF + RWST= ',D8.3,///)
C
C
      WRITE (6,915)
915      FORMAT('LPZ DOSE (ESF LEAKAGE) (REM)',/)
      WRITE (6,920)
920      FORMAT('ISOTOPE',1X,'2-HR',5X,'1-DAY',4X,'5-DAY',4X,
     1 '30-DAY',/)
      DO 190 I = 1,5
         WRITE (6,930) NAME(I),ELP2(I),ELP24(I),ELP120(I),ELP720(I)
930         FORMAT(A4,4X,D8.3,1X,D8.3,1X,D8.3,1X,D8.3)
190   CONTINUE
C
      TOTLE2 = 0.0D0
      TOTLE24 = 0.0D0
      TOTLE120 = 0.0D0
      TOTLE720 = 0.0D0
      DO 200 I = 1,5
         TOTLE2 = TOTLE2 + ELP2(I)
         TOTLE24 = TOTLE24 + ELP24(I)
         TOTLE120 = TOTLE120 + ELP120(I)
         TOTLE720 = TOTLE720 + ELP720(I)
200   CONTINUE
      WRITE (6,940) TOTLE2,TOTLE24,TOTLE120,TOTLE720
940      FORMAT('TOTAL = ',D8.3,1X,D8.3,1X,D8.3,1X,D8.3,//)
C
      WRITE (6,950)
950      FORMAT('LPZ DOSE (RWST LEAKAGE) (REM)',//)
```

```
      WRITE (6,920)
      DO 210 I = 1,5
         WRITE (6,930) NAME(I),RLP2(I),RLP24(I),RLP120(I),RLP720(I)
210   CONTINUE
C
      TOTLR2 = 0.0D0
      TOTLR24 = 0.0D0
      TOTLR120 = 0.0D0
      TOTLR720 = 0.0D0
      DO 220 I = 1,5
         TOTLR2 = TOTLR2 + RLP2(I)
         TOTLR24 = TOTLR24 + RLP24(I)
         TOTLR120 = TOTLR120 + RLP120(I)
         TOTLR720 = TOTLR720 + RLP720(I)
220   CONTINUE
      WRITE (6,940) TOTLR2,TOTLR24,TOTLR120,TOTLR720
      TOTAL = TOTLE720 + TOTLR720
      WRITE (6,960) TOTAL
960     FORMAT('TOTAL 30-DAY DOSE (ESF + RWST) = ',D8.3,1X,'REM')
      STOP
      END
```

SLC Verification

2 hour Site Boundary Dose

ESF Leakage (I-132)

$Dose_{0\text{-}2\ hrs}$ = (4576)*(7.3E+07/2.2E+09)*(3.15E-04)*(3.47E-04)*

(6.29E+03)*(1E-04)*(1/.301)*$(1-e^{-.301*2})$

$Dose_{0\text{-}2\ hrs}$ = .157E-04 which agrees with the calculated value of .159E-04 within roundoff

RWST Leakage = 10 gpm (I-132)

$Dose_{0\text{-}2\ hrs}$ = (2271258)*(7.3E+07/2.2E+09)*(3.15E-04)*(3.47E-04)*

(6.29E+03)*(1E-04)*(1/.301)*$(1-e^{-.301*2})$

$Dose_{0\text{-}2\ hrs}$ = .779E-02 which agrees with the calculated value of .790E-02 within roundoff

SLC verification

Low Population Zone 30 day dose

RWST Leakage = 1.0 GPM (I-134)

30 day dose = $Dose_{0\text{-}24\ hrs}$ + $Dose_{24\ hrs\text{-}5\ days}$ + $Dose_{5\text{-}30\ days}$

$Dose_{0\text{-}24\ hrs}$ = (227125.8)*(1.1E+08/2.2E+09)*(7.5E-5)*(3.47E-04)*
(1.07E+03)*(1E-04)*(1/.791)*(1-$e^{-.791*24}$)

$Dose_{0\text{-}24\ hrs}$ = 3.998E-05

Activity at 24 hours = 1.1E+08 $e^{-(.791*24)}$ = 6.26E-01

$Dose_{1\text{-}5\ days}$ = (227125.8)*(6.26E-01/2.2E+09)*(2.6E-06)*(3.47E-04)*
(1.07E+03)*(1E-04)*(1/.791)*(1-$e^{-.791*96}$)

$Dose_{1\text{-}5\ days}$ = 7.890E-15

Activity at 5 days = 1.1E+08 $e^{-(.791*96)}$ = 6.58E-34

$Dose_{5\text{-}30\ days}$ = (227125.8)*(6.58E-34/2.2E+09)*(7.9E-07)*(3.47E-04)*
(1.07E+03)*(1E-04)*(1/.791)*(1-$e^{-.791*96}$)

$Dose_{5\text{-}30\ days}$ = 2.519E-48

Total 30 day dose = 3.998E-05 + 7.890E-15 + 2.519E-48

Total 30 day I-134 dose = 3.998E-05 = .3998E-04, which agrees within roundoff error with the calculated value of .416E-04.

SLC Verification

Low Population Zone 30 Day Dose

ESF Leakage (I-132)

30 day dose = $Dose_{0\text{-}24\ hrs}$ + $Dose_{24\ hrs\text{-}5\ days}$ + $Dose_{5\text{-}30\ days}$

$Dose_{0\text{-}24\ hrs}$ = (4576)*(7.3E+07/2.2E+09)*(7.5E-5)*(3.47E-04)*
(6.29E+03)*(1E-04)*(1/.301)*(1-$e^{-.301*24}$)

$Dose_{0\text{-}24\ hrs}$ = 8.252E-06

Activity at 24 hours = 7.3E+07 $e^{-(.301*24)}$ = 5.32E+04

$Dose_{1\text{-}5\ days}$ = (4576)*(5.32E+04/2.2E+09)*(2.6E-06)*(3.47E-04)*
(6.29E+03)*(1E-04)*(1/.301)*(1-$e^{-.301*96}$)

$Dose_{1\text{-}5\ days}$ = 2.087E-10

Activity at 5 days = 7.3E+07 $e^{-(.301*96)}$ = 1.50E-08

$Dose_{5\text{-}30\ days}$ = (4576)*(1.50E-08/2.2E+09)*(7.9E-07)*(3.47E-04)*
(6.29E+03)*(1E-04)*(1/.301)*(1-$e^{-.301*96}$)

$Dose_{5\text{-}30\ days}$ = 1.781E-23

Total 30 day dose = 8.252E-06 + 2.087E-10 + 1.789E-23

Total 30 day I-132 dose = 8.252E-06 = .8252E-05, which agrees within roundoff error with the calculated value of .838E-05

ATTACHMENT 6 TO AEP:NRC:1238F1

CALCULATION NO. RD-88-01, REV. 2
"CONTROL ROOM DOSE TO OPERATORS FOLLOWING A LOCA"

0 0 2 0 0 1 3 0 0 0 1

American Electric Power Service Corporation

Nuclear Safety, Licensing & Assessment
Calculation Cover Sheet

Calculation No. RD 88-01 Rev. 2	Plant Cook Unit 1 & 2
Subject Control Room Dose to Operators Following a LOCA	Company AEP
	Calculated By Mark Ackerman/MEA
	Verified/Checked By [signature]
Safety Related System Yes X No ___	Method of Verification Review of Calculation
Supercedes Calc. No. RD 88-01 & 88-01 Rev. 1	Approved By [signature] 8/10/94

Problem Description:
Determine the 30-Day dose to control room operators following a LOCA, with TID 14844 source term. The calculation differs from Rev. 0 & Rev. 1 of this calc because it incorporates increased source terms based on an uprated power level (3588 MWt), a revised atmospheric dispersion factor, and daughter products of metastable forms of Krypton & Xenon

Design Basis Or References:
General Design Criterion 19 of 10 CFR 50 Appx A.

Executive Summary:
The dose to control room operators will be within 30 rem thyroid provided limits on intake are established as follows.

$y = -0.048x + 159$, where:
y = unfiltered inleakage (cfm)
x = filtered inleakage (cfm)

Superseded By Calculation No. _____ Dated _____

Reason: _____

0 0 1 0 0 1 3 0 0 0 1

7223(9-83)
FORM GE-8(C)
ENGINEERING DEPT.
AMERICAN ELECTRIC POWER SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OHIO

SHEET 2 OF 41
DATE 8-5-91 BY MRH CK. ASM
COMPANY G.O.
PLANT

SUBJECT

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7223(9-83)
FORM GE-8(C)
ENGINEERING DEPT.
AMERICAN ELECTRIC POWER SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OHIO

SHEET 3 OF 41
DATE 8-5-94 BY MLa CK. WSM
COMPANY G.O.
PLANT

SUBJECT

B. Statement of Purpose

Calc RD 88-01 determined skin, whole body, and thyroid dose for control room operators in the event of a LOCA. Calc RD 88-01 Rev. 1 was written to correct an error in the thyroid dose analysis of RD 88-01. This revision (Rev. 2) of RD 88-01 is performed to accomplish the following:

1) Use radioactive source-terms based on 3588 Mwt, versus the present 3411 Mwt, to bound a potential future power uprate for Cook Unit 2. (Applicable to thyroid, skin, and whole body doses.)

2) Enhance the calculational methodology by accounting for additional dose due to decay of metastable forms of Xenon's and Krypton's into normal forms. (Applicable to skin and whole body doses.)

7223(9-83)
FORM GE-8(C)

ENGINEERING DEPT.
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SHEET 4 OF 41
DATE 8-5-94 BY MLG CK. WRM
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3) Allow for an additional 10 gpm of leakage of radioactive fluids from ECCS systems outside containment. Specifically, the calculation will account for 10 gpm of back-leakage into the RWST. (Applicable to thyroid dose)

4) Correct a minor coding error for the whole body and skin dose code. Specifically, a spelling error was made in the original code ("Deltat" was misspelled as "Deldat"). The error affected only the portion of the code that calculated dose due to Krypton. The loop that did Xenon dose did not contain the error. The error was in the conservative direction.

5) Incorporate revised atmospheric dispersion factors ($\frac{\chi}{Q}$) into the code. These revised factors were developed by PLG, Inc. and have been factored into the plant operational limits via calculation RD-93-01. However, the actual codes were not previously modified.

7223(9-83)
FORM GE-8(C)

ENGINEERING DEPT.
AMERICAN ELECTRIC POWER SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OHIO

SHEET 5 OF 41
DATE 8-5-17 BY [illegible] CK. WRM
COMPANY G.O.
PLANT

SUBJECT

C Assumptions

1 Source Term

3588 MWt source terms from Ref: 1. (As in the RQ 88-01 Rev. 0 and Rev. 1,) 100% of the core noble gas inventory is released to the containment building and is available for leakage, 50% of the core iodine inventory is released to the containment building, and of this amount 50% plates out on the containment surfaces, leaving 25% of the core iodine inventory available for leakage.

Iodine Isotope	50% core (Ci)	25% core (Ci)
I-131	5.0×10^7	2.5×10^7
I-132	7.3×10^7	3.7×10^7
I-133	1.0×10^8	5.0×10^7
I-134	1.1×10^8	5.5×10^7
I-135	9.1×10^8	9.5×10^7

100% of Core see sheet 5a made 8-12-17

Noble Gas Isotope	100% core (Ci)
Kr 85m	2.6×10^7
Kr 85	8.3×10^5
Kr 87	4.8×10^7
Kr 88	6.8×10^7
Xe 131m	7.1×10^5
Xe 133m	2.9×10^7
Xe 133	2.0×10^8
Xe 135m	4.1×10^7
Xe 135	4.2×10^7
Xe 138	1.6×10^8

Actual values for I-135 are 50% ⇒ 9.5×10^7 Ci
25% ⇒ 4.8×10^7 Ci

ENGINEERING DEPT.
AMERICAN ELECTRIC POWER SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OHIO

0 0 2 0 0 1 3 0 0 0 3

SHEET 59 OF 41
DATE ____ BY ____ CK. WRM
COMPANY ____ G.O. ____
PLANT ____

SUBJECT ____

Note:

In the process of the calculation being independently verified, an error was discovered in Ref. 1. Specifically, Table S-3.8-1 of the document listed the 100% core I-135 source term as 1.9×10^8 Ci, while Table S-3.8-6 of the same document listed the 50% core value as 1.9×10^8 Ci. The calculation as originally performed used the 50% value as 1.9×10^8. The discrepancy was discussed with Ms. Robin Lapides of Westinghouse, who confirmed that 1.9×10^8 Ci was the value for 100% of the core I-135. Thus, the calculation was in error since the I-135 source term was a factor of 2 too high.

The final version of the code and the final output were modified to reflect the correct I-135 source term. The corrected version was used in developing the final term provided in the Executive Summary (p. 1 of this calc.). However, the thyroid code was developed in discrete steps and each of these steps verified as they were developed. The individual benchmarking runs were not redone, but the text has been footnoted where applicable to indicate that this problem existed.

0 0 1 4 0 3 0 0 0 3

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2. Atmospheric Dispersion Factors

The atmospheric dispersion factor (χ/Q) was taken from a special study conducted by PLG (Ref. 2). The baseline χ is $7.85 E-4 sec/m^3$. As is RD-88-01 Rev. 0, this value is adjusted downward for various time periods using the Murphy-Campe factors (Ref. 3)

Time (hr.)	Adjustment factor	χ/Q (sec/ft^3)	χ (sec/m^3)
0-8	1.00	6.17×10^{-9}	7.85 E-4
8-24	0.59	3.64×10^{-9}	4.63 E-4
24-96	0.23	1.42×10^{-9}	1.81 E-4
96-720	0.066	4.07×10^{-10}	5.18 E-5

3. ESF Leakage

Calc. RD 88-01 incorporated 4,576 cc/hr of leakage from ESF fluid systems outside containment. An additional 10 gpm of leakage to the RWST from failure or leakage of various valves in the ECCS (e.g., sump minflow valves) will be included in this calculation revision. The leakage previously accounted for (4576 cc/hr) was from components in the auxiliary buildings which would be enhanced through the unit vent located on top of the containment buildings. This is an elevated release compared

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to the containment leakage release which assumed a release over the entire containment surface. The calc FD 88-01 conservatively used the χ/Q for the containment leakage for the ESF leakage portion.

For the release from the RWST (10 gpm) modeled in this calc revision, the distances from the RWST to the control room is greater than that from the containment building to the control room. Per a discussion held with PLG (Ref FL4), the containment leakage χ/Q would be expected to bound the RWST release χ/Q and therefore it will be used. The leakage is conservatively assumed to exist from time zero vs. the post switchover to recirculation which occurs at approximately 20 minutes*.

The ESF leakage assumptions affect only the thyroid dose since the noble gases remain in the containment atmosphere.

Additionally, the calc will incorporate additional dilution of the ECCS recirculation fluid by the RWST.

(See Calc RD 94-01 for incorporation of additional 10 gpm into offsite dose calculations)

* [illegible]

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D. Analysis

The analyses for calculation RD 88-01 and RD 88-01 Rev.1 were performed using 2 computer programs that run in VS Fortran on the Canton mainframe computer. For this revision of the calculation, the program was retyped and compiled over to Microsoft Fortran for the IBM PC. The analysis was done as follows:

Step 1: Convert codes to Microsoft Fortran including correction of known error/deficiencies. Ensure codes give same results as VS Fortran version with the exception of the known error in the Krypton dose contribution to the whole body/skin dose.

Verify results of Krypton dose contribution using hand calculations.

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Step 2: Enter/work revised assumptions into codes

Step 3: Verify codes

Step 4: Using results of revised codes determine revised plant operating limits

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SUBJECT Sk. 1 : Code Conversion

Sk. 1.1 Conversion of Whole Body Skin Dose Code

Attachment 1 contains the PC-based Fortran program which is essentially the same as that written for the mainframe computer for Calculation RD-83-01A, discussed previously. The original program had an error (misidentified use of a variable name) that affected the calculation of whole body and skin dose due to Krypton isotopes. Direct comparison to the original code can be performed for Xenon isotopes but not for Krypton isotopes. (The purpose of this step is simply to verify the adequacy of the baseline code prior to making any mods associated with this revision.)

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Comparison of Xe-133 from the attachment 1 code vs. the RD 88-01 Rev. 0 code is presented in the tables below.

Flow Rate (CFM)	W.B. Dose (RD-88-01) (rem)	W.B. Dose (PC) (rem)	% diff
920	0.387	0.386	-0.26
1020	0.389	0.388	-0.26
1120	0.390	0.389	-0.26

Flow Rate (CFM)	Skin Dose (RD88-01) (rem)	Skin Dose (PC) (rem)	% diff
920	11.2	11.2	0
1020	11.3	11.2	-0.89
1120	11.3	11.3	0

Excellent agreement is demonstrated between the PC and Mainframe versions of the code.

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As a second check, the sum of the Xenon isotope contributions to the whole body and skin dose will be compared at one flow rate (920 cfm).

	Exes w.b (rem)	Exes sk. (rem)
RD 88-01	0.647	2.11
PC	0.647	2.11
%diff.	0	0

The agreement is exact to 3 significant figures.

Next a check will be made for 2 isotopes (Xe-133 and Kr-87) to check the PC program output versus an exact solution of the dose eqns. For calc RD 88-01, the exact soln of the dose eqn. for

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a particular isotope was shown to be:

$$\text{Dose}\Big|_0^T = (IA)(DCF)$$

where: $\text{Dose}\Big|_0^T$ = dose (whole body or skin) accumulated between time zero and T;

IA = Integrated activity;

$$= A_0\left[\frac{1}{\lambda_2}(1-e^{-\lambda_2 T}) - \frac{1}{(\lambda_1+\lambda_2)}(1-e^{-(\lambda_1+\lambda_2)T})\right]$$

$A_0 = S\,L\,\frac{\chi}{Q}$

where: S = Source at Time zero
L = Containment Initial Leak
$\frac{\chi}{Q}$ = Atmospheric dispersion

λ_2 = radioactive decay constant

λ_1 = Flowrate / control room volume

DCF = dose conversion factor (whole body or skin)

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The exact eqn must be solved over discrete time steps, since factors such as $\frac{\chi}{Q}$ and inlet change over time. The following 2 tables provide the exact solution dose tabulations for Xe 133 and Kr-85. Input parameters were derived from calc: RD-88-01. The calc is done for a flow rate of 1020 cfm (control room volume = 62,356 ft³, per RD 88-01)

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Isotope: Xe-133
Initial Activity: 1.85×10^{8} Ci
DCF (W.B): 1230 (rem-ft³)/(Ci-hr)
DCF (skin): 1190 (rem-ft³)/(Ci-hr)
λ_2: 5.51×10^{-3} hr^{-1}

Time Interval (hrs)	$\frac{\chi}{Q}$ (sec/ft³)	Leak Rate (hr^{-1})	W.B. Dose (rem)	skin dose (rem)
0-8	1.90×10^{-8}	1.04×10^{-4}	0.106	3.06
8-24	1.12×10^{-8}	1.04×10^{-4}	0.125	3.63
24-96	$.37 \times 10^{-9}$	5.20×10^{-5}	0.0914	2.64
96-720	1.25×10^{-9}	5.20×10^{-5}	0.0526	1.52
		Total (from spreadsheet)	0.375	10.9

	W.B.	skin
Exact soln:	0.375	10.9
PC output:	0.388	11.2
% Diff:	3.5	2.8

Very good agreement is demonstrated for Xe-133. The output agrees within 4% to the exact solution. Note that the PC output provides conservative results compared to the exact soln. The difference can be attributed to round off error, and the methodology used in the PC code which assumes radioactive decay occurs at the beginning of a time step which is conservative.

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Isotope: Kr-85
Initial Activity: 6.3×10^5 Ci
DCF (WB): 65 rem-ft^3/Ci-hr
DCF (Skin): 5400 rem-ft^3/Ci-hr
λ_2: 17.38×10^{-6} hr^{-1}

Time Interval (hrs)	χ/Q (hr/ft^3)	Leak Rate (hr^{-1})	WB Dose (rem)	Skin Dose (rem)
0-8	1.90×10^{-8}	1.04×10^{-4}	1.99×10^{-5}	4.61×10^{-2}
8-24	1.12×10^{-8}	1.04×10^{-4}	2.53×10^{-5}	5.87×10^{-2}
24-96	4.37×10^{-9}	5.20×10^{-5}	2.35×10^{-5}	5.48×10^{-2}
96-720	1.25×10^{-9}	5.20×10^{-5}	5.90×10^{-5}	1.37×10^{-1}
		Total (from spreadsheet)	1.28×10^{-4}	0.297

	WB	Skin
Exact Soln:	1.28×10^{-4}	0.297
PC Output:	1.31×10^{-4}	0.305
% Diff:	2.3	2.7

Again excellent agreement is demonstrated. This time the results agree within 3% with the PC version again being conservative.

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Step 1.2 Conversion of Thrail Code

Attachments 2 and 3 contain the PC-based Fortran programs which are essentially the same as those for the mainframe computer (i.e. calc RO 88-01 Rev 1 (Attachments 2 and 3 are identical except the one line is commented out in Attachment 2 that is not in Attachment 3. This line notes the single failure of the normal intake damper in Attachment 3) The programs in Attachments 2 and 3 consider values of filtered intake ranging from 900 to 2200 cfm and of unfiltered inleakage ranging from 10 to 40 cfm.

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A comparison of the program outputs for various combinations of filtered and unfiltered inleakage vs. the RD 88-01 test results are presented below

Flow filt (cfm) / Flow unfilt (cfm)	Base Case Dose RD/ Dose PC (rem)	% diff	Single failure Dose RD/ Dose PC (rem)	% diff
900/10	24.1 / 24.1	0	37.4 / 37.4	0
1000/30	35.0 / 35.0	0	48.1 / 48.1	0
1100/20	32.8 / 32.8	0	45.9 / 45.9	0
1200/40	43.5 / 43.6	0.2	56.6 / 56.6	0

It is demonstrated above that the program results are essentially identical

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SUBJECT

Step 2.1 Revise Whole Bod./Skin Code

There are 3 parts to this step:
i). Incorporation of 3588 MW source term.
ii) Incorporation of revised K/Q's
iii) Incorporation of complete probabilistic set of noble gases
i) Incorporate 3588 Mwt Source Term

From Ref. 1, the 3588 Mwt source term for the noble gases are:

Isotope	RD 88-01 Term (Ci)	3588 Mwt Term (Ci)	% diff. between source terms
Kr 85m	2.6×10^7	2.6×10^7	0
Kr 85	6.3×10^5	8.3×10^5	32
Kr 87	4.7×10^7	4.8×10^7	2.1
Kr 88	6.8×10^7	6.8×10^7	0
Xe 131m	6.6×10^5	7.1×10^5	7.6
Xe 133m	2.8×10^7	2.9×10^7	3.6
Xe 133	1.9×10^8	2.0×10^8	5.3
Xe 135m	3.8×10^7	4.1×10^7	7.9
Xe 135	4.2×10^7	4.2×10^7	0
Xe 138	1.5×10^8	1.6×10^8	6.7

The PC code was modified to incorporate the 3588 Mwt source term. The % diff between the base case and 3588 Mwt source terms are shown in the tables below, at 1020 cfm. Although exact agreement is not demonstrated, the values are reasonable in light of the loss of

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a significant digit with the 3588 MW source terms.

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Isotope	3598 MW WB (rem)	Base case WB (rem)	% diff Source terms	% diff Code
Kr 85m	.42E-1	.41E-1	0	2.4
Kr 85	.17E-3	.13E-3	32	31
Kr 87	.10 E0	.99E-1	2.1	1.0
Kr 88	.59 E0	.58 E0	0	1.1
Xe 131m	.59 E-3	.54E-3	7.6	9.2
Xe 133m	.37 E-1	.37 E-1	3.6	5.4
Xe 133	.42 E0	.39 E0	5.3	7.7
Xe 135m	.46 E-2	.43E-2	7.9	7.0
Xe 135	.18 E0	.18 E0	0	0
Xe 138	.46 E-1	.43E-1	6.7	7.0

Isotope	3598 MW Skin (rem)	Base case Skin (rem)	% diff source terms	% diff Code
Kr 85m	.15 E1	.14E1	0	7.1
Kr 85	.40E0	.30 E.0	32	33
Kr 87	.46 E1	.45 E1	2.1	2.2
Kr 88	.40 E1	.40 E1	0	0
Xe 131m	.95 E-1	.77E-1	7.6	7.6
Xe 133m	.44 E1	.41 E1	3.6	7.3
Xe 133	.12 E2	.11 E2	5.3	9.1
Xe 135m	.30 E-1	.27E-1	7.9	11
Xe 135	.52 E1	.52 E1	0	0
Xe 138	.6050	.5 E0	6.7	7.1

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Next, the revised $\frac{w}{\varphi}$'s were incorporated into the current code. The new $\frac{w}{\varphi}$ is lower than the RD 88-01 $\frac{w}{\varphi}$ by a factor of $\frac{6.17 \times 10^{-9}}{1.90 \times 10^{-8}} = 0.32$

The total whole body dose at 1020 cfm will be compared for the old and new $\frac{w}{\varphi}$ in the following table

Whole Body Dose (3588 mrt, old $\frac{w}{\varphi}$) / 1.72	Whole Body Dose (3588 mrt, new $\frac{w}{\varphi}$) / 0.5587	Ratio 0.32

Skin Dose (3588 mrt, old $\frac{w}{\varphi}$) / 32.85	Skin Dose (3588 mrt, new $\frac{w}{\varphi}$) / 10.67	Ratio 0.32

Thus, it is demonstrated that the new $\frac{w}{\varphi}$ values were properly input into the code

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Next, the daughter products of the metastable forms of the Xenon and Krypton isotopes will be incorporated into the whole body dose code.

The noble gas source term includes metastable forms of Xe and Kr isotopes. These metastable forms decay into the normal form of the isotope. Metastable forms of Xe-131, Xe-133, and Xe-135 are included in the source term (of these, the normal form of Xe-131 is stable).

Calc RP 88-01 "accounts for the decay of the original inventory of the metastable form of the isotopes, but did not account for the subsequent build-up of the normal form. Since this is conservative to account for the build-up, its effects are included in this version of the calculation.

From Ref. 3, the amount of the non-metastable form of the isotope at any time, t, is expressed by

$$(1) \quad N_2(t) = \left[N_2(0)\, e^{-\lambda_2 t}\right] + \left[\left(\frac{\lambda_1}{(\lambda_2 - \lambda_1)}\right) N_1(0)\left(e^{-\lambda_1 t} - e^{-\lambda_2 t}\right)\right]$$

where N_2 = activity of nonmetastable form of isotope (Ci)
λ_2 = radioactive decay constant of nonmetastable form ($time^{-1}$)
λ_1 = radioactive decay constant of metastable form of isotope ($time^{-1}$).
N_1 = activity of metastable form (Ci)
t = time

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The pair bracketed as b in this equation represents the additional activity of the non-metastable form introduced by decay of the metastable form. As discussed previously, this is applicable to Kr-85, Xe-133, and Xe-135.

Eqn. 1 is written in terms of # of atoms (N). Our input is in terms of activity, and activity is used in the Fortran program to determine dose. Activity = $N\lambda$, where λ = radioactive decay constant.

Rewriting part b of eqn 1 in terms of activity:

$$(2) \quad N_2(t) = \frac{\lambda_1 A_1(0)}{(\lambda_2 - \lambda_1)\lambda_1}\left(e^{-\lambda_1 t} - e^{-\lambda_2 t}\right)$$

Now, $A_2'(t) = N_2'(t)\lambda_2$

$$(3) \quad A_2'(t) = \frac{\lambda_2 A_1(0)}{(\lambda_2 - \lambda_1)}\left[e^{-\lambda_1 t} - e^{-\lambda_2 t}\right]$$

The PC code was modified to include the additional activity term represented by part b, above, for the applicable isotopes. Note that

Note that for Kr 85M, only 21.1% of the decays results in Kr 85 (Ref. 7). This factor was also applied in the PC program.

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Verification of Daughter Product Choices

In order to verify appropriate inclusion of the daughter product decay in exact solution of the dose rate will be sought, similar to the method used earlier to verify the PC burnup code.

The additional activity due to metastable decay is:

(a) $$A_2 = \frac{\lambda_2}{(\lambda_2 - \lambda_1)} \left[N_1 \left(e^{-\lambda_1 t} - e^{-\lambda_2 t} \right) \right]$$

The integrated activity over the time period $0 \rightarrow T$ is

(b) $$IA = \int_0^T \frac{\lambda_2}{(\lambda_2 - \lambda_1)} \left[N_1 \left(e^{-\lambda_1 t} - e^{-\lambda_2 t} \right) \right] dt$$

Rewriting (b),

$$IA = \frac{\lambda_2 N_1}{\lambda_2 - \lambda_1} \int_0^T \left(e^{-\lambda_1 t} - e^{-\lambda_2 t} \right) dt$$

$$IA = \frac{N_1 \lambda_2}{\lambda_2 - \lambda_1} \left[-\frac{1}{\lambda_1} e^{-\lambda_1 t} + \frac{1}{\lambda_2} e^{-\lambda_2 t} \right]_0^T$$

$$IA = -\frac{N_1 \lambda_2}{\lambda_2 - \lambda_1} \left[\left(-\frac{1}{\lambda_1} e^{-\lambda_1 T} + \frac{1}{\lambda_2} e^{-\lambda_2 T} \right) - \left(-\frac{1}{\lambda_1} + \frac{1}{\lambda_2} \right) \right]$$

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c) $\bar{I}A = \frac{N_1 \lambda_2}{\lambda_2 - \lambda_1} \left[\frac{1}{\lambda_1} (1 - e^{-\lambda_1 T}) - \frac{1}{\lambda_2} (1 - e^{-\lambda_2 T}) \right]$

The dose due to this activity in the time period $0 \rightarrow T$ is:

d) $Dose = (\bar{I}A)\left(\frac{\chi}{Q}\right)(L)(DCF)$

where $\frac{\chi}{Q}$ = atmos. disp. factor

L = cont. Leak Rate

DCF = Dose conv. factor

Note that eqn. d is actually a slight simplification, since the development neglected buildup. As discussed previously, the "buildup factor" expresses the relationship between the concentration in the control room and the concentration in the outside atmosphere. The concentration inside the control room "builds up" to that of the outside atmosphere by an exponential function dependent on the control room volume and the inleakage rate. Thus, the actual dose addition is reduced by the effect of the buildup factor.

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In order to verify that the code was properly accounting for the metastable daughter products, the code was temporarily modified. One version looked at the time period 0-8 hours, and accounted for daughter products. The other version commented out the daughter product decay lines, and also looked at the 0-8 hour time period. Both of these cases set the buildup factor equal to 1.0, with no effect due to buildup, the difference between the 2 cases for the 3 isotopes of interest should be equal to the solution at each d from the previous case. The results of these runs for skin dose are provided in the following tables for the 120 cfm case

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Isotope	skin dose w/ daughters	skin dose w/o daughters	Δ	Exact soln
Kr-85	.02330	.02329	1×10^{-5}	3.1×10^{-6}
Xe-133	.255	1.251	0.0040	0.0038
Xe-135	1.258	1.226	0.032	0.032

For Kr-85, the difference between the exact soln and the Δ can be attributed to round off. (We are looking at the 5th decimal place.) The additional slide due to this isotope is essentially zero. For the other 2 isotopes good agreement is demonstrated.

The final version of the code is contained in Attachment 4.

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SUBJECT

Step 2.2 Revise Thyroid Code

There are 3 parts to this step:
i) Incorporation of 3588 hr source term
ii) Incorporation of revised χ/Q's
iii) Incorporation of 10 gpm additional ECCS leakage outside containment

i) Incorporate 3588 hr source term

From ref. 1 the 3588 hr source term for the iodine isotopes are:

Isotope	RD 88-01 Term (Ci)	3588 hr term (Ci)	% Diff
I-131	3.33 E7	2.5×10^7	7.3
I-132	3.40 E7	3.17×10^7	8.5
I-133	4.80 E7	5.0×10^7	4.2
I-134	5.50 E7	5.5×10^7	0
I-135	4.45 F7	4.5×10^7	1.3

See discussion on page 5a
MdG 8-12-94

* 2% of core inventory
** Difference in part due to noble mobility methods. See discussion in Ref. 1.

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FORM GE-8(C)

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1 RIVERSIDE PLAZA
COLUMBUS, OHIO

SHEET 27 OF 41
DATE 6-5-94 BY [illegible] CK [illegible]
COMPANY G.O.
PLANT

SUBJECT

The new source terms were incorporated into the thyroid single failure base problem, and the results compared to the previous version for the case of 900 cfm filtered / 10 cfm unfiltered with elemental iodine

Isotope	30-Da, Dose (rem) Rev	30-Da, Dose (rem) 3588 MW source terms	% diff	% diff Codes
I-131	.124 E2	.123 E2	7.13	7.3
I-132	.638 E-1	.695 E-1	8.8	8.9
I-133	.338 E1	.352 E1	4.2	4.1
I-134	.157 E-1	.157 E-1	0	0
I-135	.473 E0	.101 E1	(11.3)	(11.4)

↓ See discussion on page 5a

Excellent agreement is demonstrated.

Next, the revised X/Q will be incorporated. The revised X/Qs as listed previously, are:

Time (hr.)	New X/Q (sec/m³)
0-8	6.17×10^{-9}
8-24	3.64×10^{-9}
24-96	1.42×10^{-9}
96-720	4.07×10^{-10}

The new X/Q is lower than the E.D. 82-01 Rev 1 X/Q by a factor of 0.32, as shown previously. The total thyroid dose for 900 cfm filtered/10 cfm unfiltered intake, single failure case is shown in the table below.

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DATE 8-5-94 BY MLL CK. [illegible]
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SUBJECT _____

Thyroid Dose Old X/Q (crem)	Thyroid Dose New X/Q (crem)	Ratio
40.8	13.3	0.33

see discussion page 5a of 12-94

This demonstrates that the new X/Q's were correctly input.

Next, the ESF release term will be increased.

In Calc RD 88-01, 4576 cc/hr of ESF release was accounted for (see page 12 of calc). The dilution volume was 2.2×10^9 cc and the fraction of the iodine retained was 1×10^{-4}. The leakage fraction was therefore:

$$\text{Source (Ci)} \times \frac{4576 \text{ cc/hr}}{2.2 \times 10^9 \text{ cc}} \times 10^{-4} = \text{(source)}\ (2.08 \times 10^{-10}/\text{hr})$$

We now wish to allow for an additional 10 gpm. The new term would therefore be:

$$\text{Source (Ci)} \times \frac{\left[4576 \text{ cc/hr} + 10 \text{ gal} \times \frac{60 \text{ min}}{\text{hr}} \times \frac{3785.43 \text{ cc}}{\text{gal}}\right]}{2.2 \times 10^9 \text{ cc}}$$

$$= \text{Source (Ci)} \left(\frac{1.03 \times 10^{-7}}{\text{hr}}\right)$$

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DATE 8-5-96 BY [illegible] CK [illegible]
COMPANY G.O.
PLANT

SUBJECT

The revised release term was incorporated in the case. A quick check of the input can be made by noting the following:

The dose is proportional to the source term leaking both inside and outside containment. The source term is comprised of the following two leakage factors:

a) Cont Leakrate and b) ECCS leakage spray Factor.

Item (b) has just been demonstrated to be 2.08×10^{-10}/hr. (Item (b) was essentially zero prior to incorporation of 10 gpm of leakage. For item (a), we will look at the dose from I-131 at 8 days (half life) between 2 and 8 hours. At this time period, the spray factor is constant at .125. Thus the ratio of (b) to (a) is

$$\frac{1.03 \times 10^{-7}/\text{hr}}{\left[\frac{1.0 \times 10^{-4}/\text{hr}}{12}\right]} = 0.124$$

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DATE 5-5-94 BY LLL CK WOM
COMPANY G.O.
PLANT

SUBJECT

For the 900/10 cfm case, the I-131 dose contributions for the old and new (10 gpm) runs are:

Old	New
2 hrs = 2.654 rem	2 hrs = 2.722 rem
8 hrs = 3.016 rem	8 hrs = 3.129 rem
Δ = 0.362 rem	Δ = 0.407 rem

These values diff. by (0.407 - 0.362) = 0.045 rem.

$\frac{0.045 \text{ rem}}{0.362 \text{ rem}} = 0.124$, which checks.

The final version of the thyroid code is provided in Attachment 5. This listing is for the case of single failure of the normal intake damper, since that is the case that is applicable to current plant operations.

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SHEET 31 OF 41
DATE 3-5-96 BY [illegible] CK. COPY
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SUBJECT _____

E verification

Verification of the color was performed at both of the analysis, and is described throughout the previous section.

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FORM GE-6(C)

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SHEET 32 OF 41
DATE 7-5-94 BY MEA CK. DM
COMPANY G.O.
PLANT

SUBJECT

F. Results

The output from the final version of the whole body/skin dose code is provided in Attachment 6. The output of the final version of the thyroid code is provided in Attachment 7.

The code runs provide the whole body, skin, and thyroid doses for various flow rates. For the thyroid dose, it is necessary to distinguish between filtered and unfiltered inleakage since the control room charcoal & HEPA filters are effective in removing radioactive iodine. For the whole body and skin dose, no distinction need be made since the dose is due to noble gases which are not removed by the filters. For the whole body and skin dose, only the total inleakage (filtered plus unfiltered) is important.

The thyroid dose results account for failure of the normal intake damper to isolate. Consistent with the methodology of calc RD 88-01 and RD 88-01 Rev 1, this amounts to an additional 200 cfm of unfiltered inleakage for the time period 0-2 hours, after which the damper is assumed to be manually isolated.

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SHEET 32 OF 41
DATE 7-5-84 BY [illegible] CK. [illegible]
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SUBJECT _____

For the whole body and skin dose, single failure was not specifically addressed. However, the flow rate only impacts the buildup factor, which expresses the ratio of the concentration of noble gases inside the control room to that outside the control room. The buildup factor is:

$$BUF = 1 - e^{-\left(\frac{\text{flow}}{\text{vol}}\right)t}$$

At a typical flow rate of 1200 cfm, the BUF at 2 hrs (120 minutes) is:

$$BUF(2\text{ hrs}) = 1 - e^{-\left(\frac{1200\text{ cfm}}{62,356\text{ ft}^3}\right)(120\text{ min.})}$$

$$= 0.90$$

So, at 2 hours the noble gas concentration inside the control room is about 90% of that outside the control room. Thus, the effect of a 2 hour failure of the normal intake damper to isolate is essentially the same as adding an additional 200 cfm to the inleakage. In other words, 1200 cfm of normal inleakage is equivalent to 1000 cfm of normal inleakage plus failure of the normal intake damper (200 cfm).

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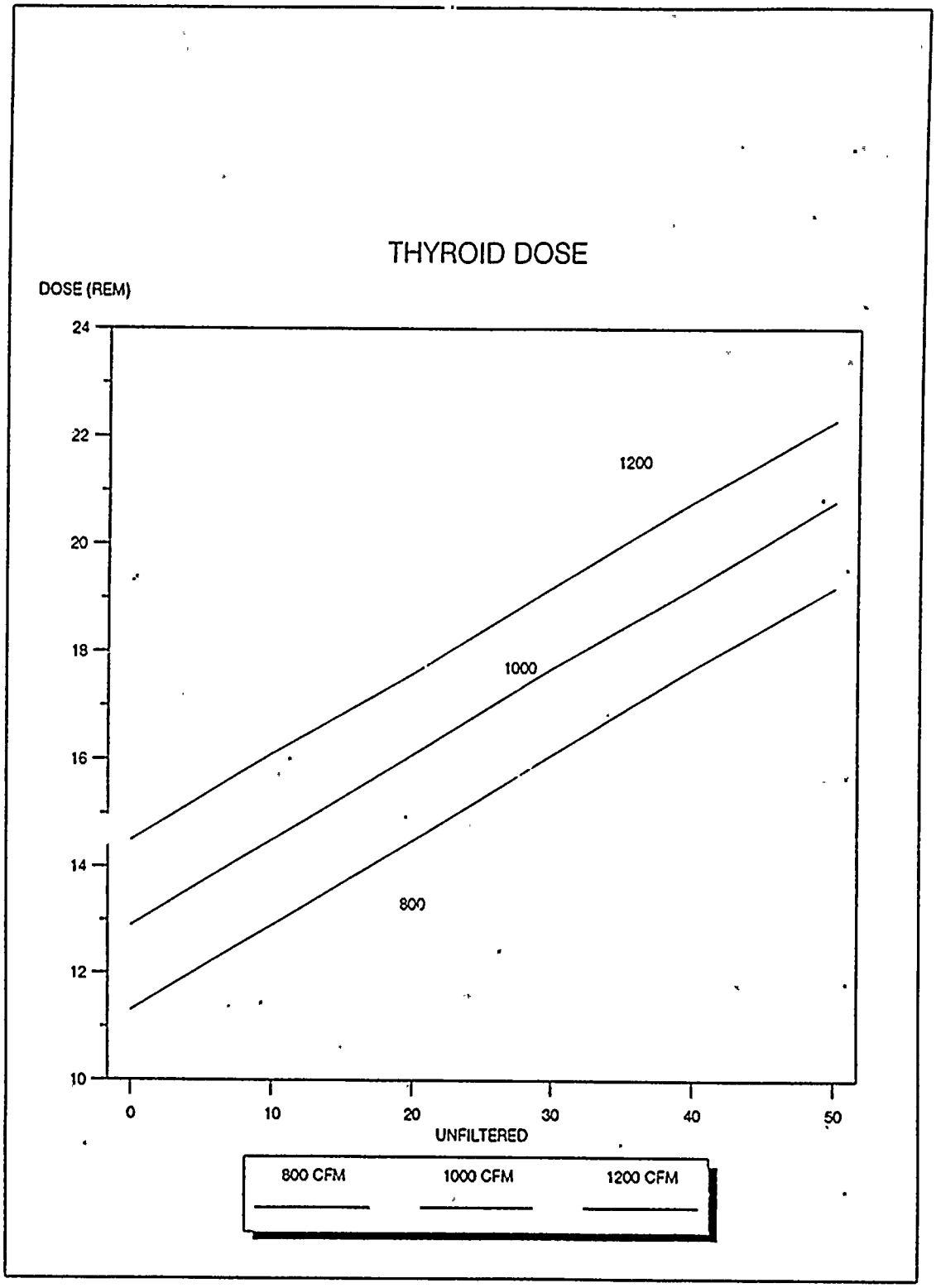
SHEET 34 OF 41
DATE 7-5-94 BY MMH CK. MOW
COMPANY G.O.
PLANT

SUBJECT

Per Ref 4, the applicable dose limits for control room operators are 30 rem thyroid 5 rem whole body, and 30 rem skin. The objective of this calculation revision is to establish limits on filtered and unfiltered inleakage for the plant such that adherence to the dose limits is assured. This will be done by establishing the equation of a line that expresses the relationship between filtered and unfiltered inleakage rates that would in a 30 rem thyroid dose. Then it will be demonstrated that the inleakage limits established for thyroid dose will bound the skin and whole body dose.

A plot of the thyroid dose vs unfiltered inleakage is provided in the following figure. The figure has lines for 800, 1000, and 1200 cfm. As seen in the figure, the dose varies linearly with both filtered and unfiltered inleakage. This is as expected, given the linear nature of the dose equation. The data for the figure is provided on the next page.


THYROID DOSE
DOSE (REM)
24
22
20
18
16
14
12
10
1200
1000
800
0
10
20
30
40
50
UNFILTERED
800 CFM
1000 CFM
1200 CFM

23(9-83)
ORM GE-8 (C)

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0 0 2

SHEET 56 OF 61
DATE 6-7-84 BY JPG CK [illegible]
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PLANT _____

OBJECT _____

Unfilled Interlace	800	1000	1200
0	11.1	12.6	14.2
10	12.6	14.2	15.7
20	14.2	15.7	7.3
30	15.8	17.3	18.8
40	17.3	18.9	20.4
50	18.9	20.4	21.9

8/5/94 mfa

0 0 2 0 0 1 3 0 0 4 1

7223(9-83)
FORM GE-8(C)

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SHEET 37 OF 41
DATE 8/5/94 BY mfa CK wsm
COMPANY G.O.
PLANT

SUBJECT

The next step is to determine the points which represent 2 combinations of filtered and unfiltered inleakage which yield a 30 rem thyroid dose. Since the dose varies linearly with filtered and unfiltered inleakage, 2 points are adequate. These 2 points will be used to determine the eqn. of a line in the form $y = mx + b$, where

x = filtered inleakage
y = unfiltered inleakage

800 cfm

Dose @ 50 cfm unfiltered = ~~19.2~~ 18.9 rem (mfa 8-3-94)
Dose @ 0 cfm unfiltered = ~~11.3~~ 11.1 rem

slope = $\frac{(19.2 - 11.3)}{50 \text{ cfm}}$, i.e. $= \frac{18.9 - 11.1}{50 \text{ cfm}} = 0.156$ rem/unfiltered cfm (mfa 8-3-94)

Extrapolate to 30 rem:

$30 \text{ rem} = (0.158)x + 11.3 \Rightarrow x = \frac{18.9}{0.156} = 118$ cfm unfiltered (mfa 8-3-94)

Point 1 = (800 cfm filtered, ~~118~~ 120 cfm unfiltered) (mfa 8-3-94)

1200 cfm (mfa 8-3-94)

Dose @ 50 cfm unfiltered = ~~22.3~~ 24.4 rem
Dose @ 0 cfm unfiltered = ~~14.5~~ 14.2 rem (mfa 8-3-94)

slope = $(22.3 - 14.5)/50 = \frac{24.4 - 14.2}{50} = 0.154$ rem/unfiltered cfm (mfa 8-3-94)

(very close to previous slope, well within round-off error)

0 0 1 0 0 1 3 0 0 4 1

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SHEET 38 OF 41
DATE 6/5/90 BY MAC CK. WRM
COMPANY G.O.
PLANT

SUBJECT

Extrapolate to 30 cfm:
30 cfm = (0.156) x + 14.5
x = 99.4 cfm unfiltered
101

Point 2 = (1200 cfm, 99.4 cfm unfiltered)
101

Now, use points 1 of 2 to determine the slope of the line.

m = slope = $\frac{y_2 - y_1}{y_2 - x_1}$ = $\frac{99.4 - 118}{1200 - 800}$ = $\frac{-18.6}{400}$ = -0.046

Next, determine y intercept (b)

$y = mx + b$

$99.4 = (-0.047)(1200) + b \Rightarrow b = 156$ cfm unfiltered
-0.046 159

So, the final equation of the line expressing combinations of filtered & unfiltered intake is:

~~$y = (-0.047)x + 156$~~ $y = -0.048x + 159$

where x = filtered intake (cfm)
y = unfiltered intake (cfm)

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SHEET 29 OF 41
DATE 8/11/94 BY MLG CK CDM
COMPANY G.O.
PLANT

SUBJECT

The final step is to ensure that the equation developed based on the thyroid close limit of 30 rem will bound the whole body and skin dose limit of 5 and 30 rem, respectively.

For the whole body and skin dose only the total inleakage matters, not the breakdown between filtered and unfiltered inleakage. We will first determine the maximum amount of total inleakage allowed by the thyroid dose limiting equation. This is found by setting the y intercept equal to zero and determining the corresponding value of x.

Thus, $y = mx + b$ $\quad$ 1.5 rem/R-3.34%

$0 = (-0.0478)x + 1.56$

$x = 33.19$ cfm

An additional 200 cfm must be added to this for Shield Filter The code contained in Attachment 4 was rerun with a flowrate of 33.19 cfm The output is contained in Attachment 8. The whole body dose was 0.655 rem and the skin dose was 12.2 rem. Both of these are well below the regulatory limits

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DATE 7/7/94 BY [illegible] CK. [illegible]
COMPANY _____ G.O. _____
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SUBJECT _____

G. Discussion of Results

The results demonstrate the adequacy of the Cook Nuclear Plant control room ventilation system for assuring control room doses to operators will be within regulatory limits. Typical values for inleakage are 10.00 cfm filtered and 20 cfm unfiltered. These result in a thyroid dose of approximately 16 rem, skin dose of approximately 17 rem, and whole body dose of approximately 0.7 rem. All of these are well within the limits of 30 rem thyroid, 5 rem whole body, and 30 rem skin.

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SHEET 41 OF 41
DATE 3/1/94 BY [illegible] CK. [illegible]
COMPANY _____ G.O. _____
PLANT _____

SUBJECT _____

H. References

1. IWCAP 11902 Supplement 1, "Rated Power and Rated Temperature and Pressure Operation for Donald C. Cook Nuclear Plant Units 1 and 2 Licensing Report" Westinghouse Elec. Corp., September 1989

2. Calc RD 93-01, including PLG Inc. report "Calculation of X/Q values for the Control Room Intakes," February 1993.

3. "Mathematical Theory of Radiation Dosimetry," Fitzgerald, Brownell, & Mahoney - authors Gordon & Breach Science Publishers, 1967

4. NUREG 0800 (Standard Review Plan) Section 6.4

5. E.G. Murph & K.M. Campbell, "Nuclear Power Plant Control Room Ventilation System Design for Meeting General Criterion 19" 13th AEC/ATE Meeting, Chalfont

6. Personal discussion, M.S. Ackerman with Neil Abrams (PLG), 1-28-94.

7. Kocher, D.C. "Radioactive Decay Data Tables," DOE/TIC 11026 1981.

7223(9-83)*
FORM GE-8(C)

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SHEET ____ OF ____
DATE 2/3/94 BY D.L.A CK. WRM
COMPANY ____ G.O. ____
PLANT ____

SUBJECT ____

Attachment 1: Baseline code for whole body (skin dose (Prior to changes made for this calc)

```
      REAL*8 LEAKRT, KRCI(4), XECI(6), T, DELTAT, XQ,S,
     1 BUF,SKINT,WBDST,WBDS1,WBDS2,LAMBKR(4),LAMBXE(6),
     2 VOL,FLRT,KDCFS(4),KDCFB(4),SKIN1,SKIN2,
     3 XDCFS(6),XDCFB(6),XQF(4)
      INTEGER I,J,L
      CHARACTER*6 NAMEKR(4),NAMEXE(6)
      DATA NAMEKR /'KR85M','KR85','KR87','KR88'/,
     1 NAMEXE /'XE131M','XE133M','XE133','XE135M','XE135','XE138'/,
     2 KRCI /2.57D7,6.3D5,4.74D7,6.75D7/,
     3 XECI /6.58D5,2.75D7,1.85D8,3.80D7,4.23D7,1.50D8/,
     4 LAMBKR /0.155D0,7.40D-06,0.545D0,0.244D0/,
     5 LAMBXE /2.43D-3,0.0132D0,5.51D-03,2.72D0,0.0763D0,2.93D0/
      DATA VOL /62356.0D0/,FLRT /920.0D0/,GF /28.0D0/
      DATA KDCFS /5.89D3,5.40D3,3.92D4,9.55D3/,
     1 KDCFB /4.72D3,65.0D0,2.39D4,5.93D4/,
     2 XDCFS /1.92D3,4.01D3,1.23D3,2.87D3,7.50D3,1.66D4/,
     3 XDCFB /370.0D0,1.01D3,1.19D3,1.26D4,7.3D3,3.56D4/
      DATA XQF /1.90D-8,1.12D-8,4.37D-9,1.25D-9/
      OPEN (UNIT = 6, FILE = 'I:\NSL\MSA\CTRLROOM\NOBLEGAS.OUT')
      DO 900  L = 1,3
          FLRT = DBLE(8.2D2+(DBLE(L)*100.0D0))
       WRITE(6,500) FLRT
500   FORMAT('  THE AIR FLOW TO THE CONTROL ROOM IS',F6.0,' CFM',/)
      WRITE(6,600)
600   FORMAT(' ISOTOPE  WHOLE BODY   BETA SKIN')
      SKINT=0.0D0
      WBDST=0.0D0
      DO 100 I=1,4
        SKIN1=0.0D0
        WBDS1=0.0D0
        T=0.0D0
        DELTAT=0.1D0
10      IF(T.GE.100.0) DELTAT=1.0D0
        XQ=XQF(1)
        IF (T.GT.8.0) XQ=XQF(2)
        IF (T.GT.24.0) XQ=XQF(3)
        IF (T.GT.96.0) XQ=XQF(4)
        LEAKRT=1.04D-4
        IF (T.GT.24.0) LEAKRT=5.21D-5
        IF (LAMBKR(I)*T.LT.100.0) GO TO 15
        S=0.0D0
        GO TO 17
15      S=KRCI(I)*DEXP(-LAMBKR(I)*T)*XQ*LEAKRT
17      BUF=1.0D0
        IF (T.LE.100.0) BUF=1.0D0-DEXP(-FLRT*60.0D0/VOL*(T+DELTAT))
        SKIN1=SKIN1+(S*BUF*KDCFS(I)*DELTAT)
        WBDS1=WBDS1+(S*BUF*KDCFB(I)*DELTAT)/GF
        T=T+DELTAT
        IF (T.LE.720.0) GO TO 10
        SKINT=SKINT+SKIN1
        WBDST=WBDST+WBDS1
        WRITE (6,800) NAMEKR(I),WBDS1,SKIN1
800     FORMAT ('   ',A6,2X,D10.4,2X,D10.4)
100   CONTINUE
```

```
C
C  LOOPS FOR XENON ISOTOPES
C
      DO 200 J=1,6
      SKIN2=0.0D0
      WBDS2=0.0D0
      T=0.0D0
20    DELTAT=0.1D0
      IF (T.GE.100.0) DELTAT=1.0D0
      LEAKRT=1.04D-4
      IF (T.GT.24.0) LEAKRT=5.21D-5
      XQ=XQF(1)
      IF (T.GT.8.0) XQ=XQF(2)
      IF (T.GT.24.0) XQ=XQF(3)
      IF (T.GT.96.0) XQ=XQF(4)
      IF (LAMBXE(J)*T.LE.100.0) GO TO 25
      S=0.0D0
      GO TO 27
25    S=XECI(J)*DEXP(-LAMBXE(J)*T)*XQ*LEAKRT
27    BUF=1.0D0
      IF (T.LE.100.0) BUF=1.0-DEXP(-FLRT*60.0D0/VOL*(T+DELTAT))
      SKIN2=SKIN2+(S*BUF*XDCFS(J)*DELTAT)
      WBDS2=WBDS2+(S*BUF*XDCFB(J)*DELTAT)/GF
      T=T+DELTAT
      IF (T.LE.720.0) GO TO 20
      SKINT=SKINT+SKIN2
      WBDST=WBDST+WBDS2
      WRITE (6,800) NAMEXE(J),WBDS2,SKIN2
200   CONTINUE
C
C  PRINT TOTAL DOSES
C
      WRITE (6,810) WBDST
810    FORMAT(/' TOTAL WHOLEBODY DOSE FOR 30 DAYS IS ',D10.4,'
REM')
      WRITE(6,820) SKINT
820   FORMAT(/' TOTAL SKINDOSE FOR 30 DAYS IS ',D10.4,' REM')
      WRITE (6,830)
8                          3                                    0
FORMAT('**************************************************')
900   CONTINUE
      STOP
      END
```

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FORM GE-8(C) ENGINEERING DEPT.
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DATE 6/13/94 BY MAG CK. WRM
COMPANY ____ G.O. ____
PLANT ____

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Attachment 2

Base Case Thyrid Calc.

No. Failures

Attachment 2

P. 1/4

```
      REAL*8 ILAMB(5),IDCF(5),PFACT(3),LEAKRT,LPART,
     1 SF,ICI(5),BREATH,F1,F2,F3,F30,ETA(3),IPF(3),
     2 DOSE,DOSET(7),T,DELTAT,XQF(4),S,DOSE05,
     3 DOSE10,DOSE20,DOSE80,DOSE96,TFLOW,XQ,F10
        CHARACTER*4 NAME(5)
        DATA DELTAT/1.0/
        DATA NAME/'I131','I132','I133','I134','I135'/
        DATA ILAMB/0.00359, 0.301, 0.0333, 0.791, 0.105/
        DATA ICI/ 2.33E+07,3.40E+07,4.80E+07,5.50E+07,4.45D+07/
        DATA IDCF/1.07E+06,6.29E+03,1.81E+05,1.07E+03,3.14E+04/
        DATA XQF/1.90D-08,1.12D-08,4.37D-09,1.25D-09/
        DATA BREATH/44.1/
        DATA LPART/6.7/
        DATA ETA/0.95,0.95,0.99/
        DATA PFACT/0.955,0.02,0.025/
      OPEN (UNIT = 6, FILE = 'I:\NSL\MSA\CTRLROOM\THYBASE.OUT')
C  VENTILATION SYSTEM FLOWRATE
      TFLOW=5400.0D0
C  LOOP TO USE VARIOUS FILTERED INTAKE RATES
      DO 130 I2=1,4
       F1=900.0D0
      IF(I2.EQ.2) F1=1000.0D0
      IF(I2.EQ.3) F1=1100.0D0
      IF(I2.EQ.4) F1=1200.0D0
         F10=4200.0
         F2=TFLOW-F1
C  LOOP TO USE VARIOUS UNFILTERED INLEAKAGE RATES
      DO 120 I3=1,4
      F3=10.0D0
      IF(I3.EQ.2) F3=20.0D0
      IF(I3.EQ.3) F3=30.0D0
      IF(I3.EQ.4) F3=40.0D0
       F30 = F3 + 200
      DOSET(I3) = 0.0D0
      WRITE (6,290)
290   FORMAT('INPUT I:\NSL\MSA\CTRLROOM\THYBASE.FOR')
      WRITE (6,295)
295   FORMAT('OUTPUT I:\NSL\MSA\CTRLROOM\THYBASE.OUT')
      WRITE (6,297)
```

```
297     FORMAT('BASE CASE, NO FA LURE')
        WRITE(6,12) F2,F1,F3
12      FORMAT ('1',4X,'RECIRCULATION FLOW FROM CONTROL ROOM(CFM)',
     1  E10.4,/,5X,'FILTERED INLEAKAGE(CFM) 'E10.4,/5X,
     2  'UNFILTERED INLEAKAGE(CFM)',E10.4,/13X,
     3  'ISOTOPE',1X,'.5 HOUR DOSE(REM)',1X,' 1 HOUR DOSE(REM)',
     4  1X,' 2 HOUR DOSE(REM)',1X,' 8 HOUR DOSE(REM)',
     5  1X,' 4 DAY DOSE(REM)',1X,' 30 DAY DOSE(REM)',/)
C  LOOP TO SUM DOSES AND DISTINGUISH ELEMENTAL=1 ORGANIC=2 PART=3
        DO 110 I = 1,3
C  LOOP FOR DIFFERENT ISOTOPES OF IODINE
        DO 100 K=1,5
        DOSE = 0.0D0
        T=0.0D0
90      DELTAT = 0.01D0
        IF(T.GE.1.0) DELTAT = 0.1D0
        IF(T.GE.24.0) DELTAT = 1.0D0
C  LOOP FOR TIME INCREMENTS TO SUM CONCENTRATIONS AND DOSES
        IF(I.EQ.1) THEN
         SF=125.0
         IF (T.LT.0.100) SF=1.0/DEXP(-17.0*T)
         IF (T.GT.0.100.AND.T.LT.0.167) SF=5.47/DEXP(-14.3*(T-0.100))
         IF (T.GT.0.167.AND.T.LT.0.333) SF=14.26/DEXP(-22.5*(T-0.167))
         GO TO 11
        ENDIF
        IF(I.EQ.2) THEN
           SF=1.0
           GO TO 11
        ENDIF
        IF(I.EQ.3) THEN
           SF=200.0
           IF (T.LT.0.584) SF=1.0/DEXP(-LPART*T)
           IF (T.GT.0.584.AND.T.LT.2.65) THEN
              SF = 50.0/DEXP((-LPART/10.0)*(T-0.584))
           ENDIF
           GO TO 11
         ENDIF
C  DISPERSION FACTORS
11      XQ=XQF(1)
```

```
            IF(T.GT.8.0) XQ=XQF(2)
            IF(T.GT.24.0) XQ=XQF(3)
            IF(T.GT.96.0) XQ=XQF(4)
            LEAKRT = 1.04D-04
            IF(T.GT.24.0) LEAKRT = 5.21D-05
            IF((ILAMB(K)*T).LT.100.0) GO TO 31
            S = 0.0D0
            GO TO 32
31        S = ICI(K)*(DEXP(-ILAMB(K)*T))*XQ*PFACT(I)*(LEAKRT/SF+
     1          2.08D-10)
          IPF(I)=(F1+ETA(I)*F2+F3)/((1.0-ETA(I))*F1+F3)
C          IF (T.LT.2.00) IPF(I)=(F1+ETA(I)*F2+F30)/((1.0-ETA(I))*F1+F30)
C          IF (T.LT.2.00) IPF(I)=(F10+F3)/((1.0-ETA(I))*F10+F3)
           DOSE = DOSE + (IDCF(K)*BREATH*S*DELTAT)/IPF(I)
32         IF(T.LT.0.51.AND.T.GT.0.49) DOSE05=DOSE
           IF(T.LT.1.01.AND.T.GT.0.99) DOSE10=DOSE
           IF(T.LT.2.05.AND.T.GT.1.95) DOSE20=DOSE
           IF(T.LT.8.05.AND.T.GT.7.95) DOSE80=DOSE
           IF(T.LT.96.1.AND.T.GT.95.9) DOSE96=DOSE
            T = T+DELTAT
34         IF(T.LE.720.0) GO TO 90
           IF(I.NE.1) GO TO 71
           WRITE(6,70) NAME(K),DOSE05,DOSE10,DOSE20,DOSE80,DOSE96,DOSE
70         FORMAT('   ELEMENTAL    ',A4,6(8X,E10.4))
71         IF(I.NE.2) GO TO 72
           WRITE(6,75) NAME(K),DOSE05,DOSE10,DOSE20,DOSE80,DOSE96,DOSE
75         FORMAT('   ORGANIC      ',A4,6(8X,E10.4))
72         IF(I.NE.3) GO TO 73
           WRITE(6,74) NAME(K),DOSE05,DOSE10,DOSE20,DOSE80,DOSE96,DOSE
74         FORMAT('   PARTICULATE ',A4,6(8X,E10.4))
73         DOSET(I3) = DOSET(I3) + DOSE
100        CONTINUE
110        CONTINUE
            WRITE(6,200) DOSET(I3)
200        FORMAT(' ',/,'TOTAL DOSE FOR 30 DAYS ',E10.4//)
120        CONTINUE
130        CONTINUE
           WRITE(6,140)
140        FORMAT(';')
```

```
STOP
END .
```

7223(9-83)
FORM GE-6 (C)

ENGINEERING DEPT.
AMERICAN ELECTRIC POWER SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OHIO

SHEET ____ OF ____
DATE 2/15/84 BY [illegible] CK. [illegible]
COMPANY ____ G.O. ____
PLANT ____

SUBJECT ____

Attachment 3

Base Case Thyroid Cooler Single Failure of Normal Inlet Damper.

Attachment 3

p. 1/4

```
      REAL*8 ILAMB(5),IDCF(5),PFACT(3),LEAKRT,LPART,
     1 SF,ICI(5),BREATH,F1,F2,F3,F30,ETA(3),IPF(3),
     2 DOSE,DOSET(7),T,DELTAT,XQF(4),S,DOSE05,
     3 DOSE10,DOSE20,DOSE80,DOSE96,TFLOW,XQ,F10
         CHARACTER*4 NAME(5)
         DATA DELTAT/1.0/
         DATA NAME/'I131','I132','I133','I134','I135'/
         DATA ILAMB/0.00359, 0.301, 0.0333, 0.791, 0.105/
         DATA ICI/ 2.33E+07,3.40E+07,4.80E+07,5.50E+07,4.45D+07/
         DATA IDCF/1.07E+06,6.29E+03,1.81E+05,1.07E+03,3.14E+04/
         DATA XQF/1.90D-08,1.12D-08,4.37D-09,1.25D-09/
         DATA BREATH/44.1/
         DATA LPART/6.7/
         DATA ETA/0.95,0.95,0.99/
         DATA PFACT/0.955,0.02,0.025/
       OPEN (UNIT = 6, FILE = 'I:\NSL\MSA\CTRLROOM\THYBASEF.OUT')
C  VENTILATION SYSTEM FLOWRATE
         TFLOW=5400.0D0
C  LOOP TO USE VARIOUS FILTERED INTAKE RATES
         DO 130 I2=1,4
          F1=900.0D0
         IF(I2.EQ.2) F1=1000.0D0
         IF(I2.EQ.3) F1=1100.0D0
         IF(I2.EQ.4) F1=1200.0D0
            F10=4200.0
            F2=TFLOW-F1
C  LOOP TO USE VARIOUS UNFILTERED INLEAKAGE RATES
         DO 120 I3=1,4
         F3=10.0D0
         IF(I3.EQ.2) F3=20.0D0
         IF(I3.EQ.3) F3=30.0D0
         IF(I3.EQ.4) F3=40.0D0
          F30 = F3 + 200
         DOSET(I3) = 0.0D0
         WRITE (6,290)
290      FORMAT('INPUT I:\NSL\MSA\CTRLROOM\THYBASEF.FOR')
         WRITE (6,295)
295      FORMAT('OUTPUT I:\NSL\MSA\CTRLROOM\THYBASEF.OUT')
         WRITE (6,297)
```

8151444

Attachment 3

p. 2/4

```
297     FORMAT('BASE CASE, NORMAL INTAKE DAMPER FAILURE')
        WRITE(6,12) F2,F1,F3
12      FORMAT ('1',4X,'RECIRCULATION FLOW FROM CONTROL ROOM(CFM) ',
     1  E10.4,/,5X,'FILTERED INLEAKAGE(CFM) 'E10.4,/5X,
     2  'UNFILTERED INLEAKAGE(CFM)',E10.4,/13X,
     3  'ISOTOPE',1X,'.5 HOUR DOSE(REM)',1X,' 1 HOUR DOSE(REM)',
     4  1X,' 2 HOUR DOSE(REM)',1X,' 8 HOUR DOSE(REM)',
     5  1X,' 4 DAY DOSE(REM)',1X,' 30 DAY DOSE(REM)',/)
C  LOOP TO SUM DOSES AND DISTINGUISH ELEMENTAL=1 ORGANIC=2 PART=3
        DO 110 I = 1,3
C  LOOP FOR DIFFERENT ISOTOPES OF IODINE
        DO 100 K=1,5
        DOSE = 0.0D0
        T=0.0D0
90      DELTAT = 0.01D0
        IF(T.GE.1.0) DELTAT = 0.1D0
        IF(T.GE.24.0) DELTAT = 1.0D0
C  LOOP FOR TIME INCREMENTS TO SUM CONCENTRATIONS AND DOSES
        IF(I.EQ.1) THEN
         SF=125.0
         IF (T.LT.0.100) SF=1.0/DEXP(-17.0*T)
         IF (T.GT.0.100.AND.T.LT.0.167) SF=5.47/DEXP(-14.3*(T-0.100))
         IF (T.GT.0.167.AND.T.LT.0.333) SF=14.26/DEXP(-22.5*(T-0.167))
         GO TO 11
        ENDIF
        IF(I.EQ.2) THEN
           SF=1.0
           GO TO 11
        ENDIF
        IF(I.EQ.3) THEN
           SF=200.0
           IF (T.LT.0.584) SF ..0/DEXP(-LPART*T)
           IF (T.GT.0.584.AND.T.LT.2.65) THEN
              SF = 50.0/DEXP((-LPART/10.0)*(T-0.584))
           ENDIF
           GO TO 11
         ENDIF
C  DISPERSION FACTORS
11      XQ=XQF(1)
```

0 0 1 0 0 1 3 0 0 3 6

0 0 2 0 0 1 3 0 0 3 6

8/5/4

Attachment 3

p. 3/4

```
            IF(T.GT.8.0) XQ=XQF(2)
            IF(T.GT.24.0) XQ=XQF(3)
            IF(T.GT.96.0) XQ=XQF(4)
            LEAKRT = 1.04D-04
            IF(T.GT.24.0) LEAKRT = 5.21D-05
            IF((ILAMB(K)*T).LT.100.0) GO TO 31
            S = 0.0D0
            GO TO 32
31        S = ICI(K)*(DEXP(-ILAMB(K)*T))*XQ*PFACT(I)*(LEAKRT/SF+
     1          2.08D-10)
          IPF(I)=(F1+ETA(I)*F2+F3)/((1.0-ETA(I))*F1+F3)
            IF (T.LT.2.00) IPF(I)=(F1+ETA(I)*F2+F30)/((1.0-ETA(I))*F1+F30)
C           IF (T.LT.2.00) IPF(I)=(F10+F3)/((1.0-ETA(I))*F10+F3)
            DOSE = DOSE + (IDCF(K)*BREATH*S*DELTAT)/IPF(I)
32          IF(T.LT.0.51.AND.T.GT.0.49) DOSE05=DOSE
            IF(T.LT.1.01.AND.T.GT.0.99) DOSE10=DOSE
            IF(T.LT.2.05.AND.T.GT.1.95) DOSE20=DOSE
            IF(T.LT.8.05.AND.T.GT.7.95) DOSE80=DOSE
            IF(T.LT.96.1.AND.T.GT.95.9) DOSE96=DOSE
            T = T+DELTAT
34          IF(T.LE.720.0) GO TO 90
            IF(I.NE.1) GO TO 71
            WRITE(6,70) NAME(K),DOSE05,DOSE10,DOSE20,DOSE80,DOSE96,DOSE
70          FORMAT('   ELEMENTAL    ',A4,6(8X,E10.4))
71          IF(I.NE.2) GO TO 72
            WRITE(6,75) NAME(K),DOSE05,DOSE10,DOSE20,DOSE80,DOSE96,DOSE
75          FORMAT('   ORGANIC      ',A4,6(8X,E10.4))
72          IF(I.NE.3) GO TO 73
            WRITE(6,74) NAME(K),DOSE05,DOSE10,DOSE20,DOSE80,DOSE96,DOSE
74          FORMAT('   PARTICULATE ',A4,6(8X,E10.4))
73          DOSET(I3) = DOSET(I3) + DOSE
100         CONTINUE
110         CONTINUE
            WRITE(6,200) DOSET(I3)
200         FORMAT(' ',/,'TOTAL DOSE FOR 30 DAYS ',E10.4//)
120         CONTINUE
130         CONTINUE
            WRITE(6,140)
140         FORMAT(';')
```

```
STOP
END
```

0 0 2 0 0 1 3 0 0 5 9

7223(9-83) -
FORM GE-8 (C)

ENGINEERING DEPT.
AMERICAN ELECTRIC POWER SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OHIO

SHEET _____ OF _____
DATE 6/5/94 BY [illegible] CK. [illegible]
COMPANY _____ G.O. _____
PLANT _____

SUBJECT _____

Attachment 4

Final Code Listing A-
whole Body / Skin Dose

0 0 1 0 0 1 3 0 0 5 9

```
      REAL*8 LEAKRT, KRCI(4), XECI(6), T, DELTAT, XQ,S,
     1 BUF,SKINT,WBDST,WBDS1,WBDS2,LAMBKR(4),LAMBXE(6),
     2 VOL,FLRT,KDCFS(4),KDCFB(4),SKIN1,SKIN2,
     3 XDCFS(6),XDCFB(6),XQF(4),XEMETA(6), KRMETA(5)
      INTEGER I,J,L
      CHARACTER*6 NAMEKR(4),NAMEXE(6)
      DATA NAMEKR /'KR85M','KR85','KR87','KR88'/,
     1 NAMEXE /'XE131M','XE133M','XE133','XE135M','XE135','XE138'/,
     2 KRCI /2.6D7,8.3D5,4.8D7,6.8D7/,
     3 XECI /7.1D5,2.9D7,2.0D8,4.1D7,4.2D7,1.6D8/,
     4 LAMBKR /0.155D0,7.40D-06,0.545D0,0.244D0/,
     5 LAMBXE /2.43D-3,0.0132D0,5.51D-03,2.72D0,0.0763D0,2.93D0/
      DATA VOL /62356.0D0/,FLRT /920.0D0/,GF /28.0D0/
      DATA KDCFS /5.89D3,5.40D3,3.92D4,9.55D3/,
     1 KDCFB /4.72D3,65.0D0,2.39D4,5.93D4/,
     2 XDCFS /1.92D3,4.01D3,1.23D3,2.87D3,7.50D3,1.66D4/,
     3 XDCFB /370.0D0,1.01D3,1.19D3,1.26D4,7.3D3,3.56D4/
      DATA XQF /6.17E-9,3.64E-9,1.42E-9,4.07E-10/
      OPEN (UNIT = 6, FILE = 'I:\NSL\MSA\CTRLROOM\NOBFINAL.OUT')
      DO 900  L = 1,3
          FLRT = DBLE(8.2D2+(DBLE(L)*100.0D0))
        WRITE(6,300)
300     FORMAT('INPUT:NOBFINAL.FOR; OUTPUT:NOBFINAL.OUT')
        WRITE(6,350)
350      FORMAT('3588 MWT, NEW X/Q, CORRECTED METASTABLE DECAY')
       WRITE(6,500) FLRT
500   FORMAT('  THE AIR FLOW TO THE CONTROL ROOM IS',F6.0,' CFM',/)
      WRITE(6,600)
60    FORMAT(' ISOTOPE  WHOLE BODY   BETA SKIN')
      SKINT=0.0D0
      WBDST=0.0D0
C
C  LOOPS FOR KRYPTON ISOTOPES
C
      DO 100 I=1,4
        SKIN1=0.0D0
        WBDS1=0.0D0
        T=0.0D0
        DELTAT=0.1D0
10      IF(T.GE.100.0) DELTAT=1.0D0
        XQ=XQF(1)
        IF (T.GT.8.0) XQ=XQF(2)
        IF (T.GT.24.0) XQ=XQF(3)
        IF (T.GT.96.0) XQ=XQF(4)
        LEAKRT=1.04D-4
        IF (T.GT.24.0) LEAKRT=5.21D-5
C       IF (LAMBKR(I)*T.LT.100.0) GO TO 15
C        S=0.0D0
C       GO TO 17
        IF (I.EQ.2) THEN
          KRMETA(I) = ((LAMBKR(I)/(LAMBKR(I)-LAMBKR(I-1)))*KRCI(I-1)*
     1     (DEXP(-LAMBKR(I-1)*T)-DEXP(-LAMBKR(I)*T)))*0.211D0
        ELSE
            KRMETA(I) = 0.0D0
        ENDIF
        S=(KRCI(I)*DEXP(-LAMBKR(I)*T)+KRMETA(I))*XQ*LEAKRT
17      BUF=1.0D0
        IF (T.LE.100.0) BUF=1.0D0-DEXP(-FLRT*60.0D0/VOL*(T+DELTAT))
        SKIN1=SKIN1+(S*BUF*KDCFS(I)*DELTAT)
        WBDS1=WBDS1+(S*BUF*KDCFB(I)*DELTAT)/GF
```

```
T=T+DELTAT
IF (T.LE.720.0) GO TO 10
```

```
        SKINT=SKINT+SKIN1
        WBDST=WBDST+WBDS1
        WRITE (6,800) NAMEKR(I),WBDS1,SKIN1
8       FORMAT ('  ',A6,2X,D10.4,2X,D10.4)
      CONTINUE
C
C  LOOPS FOR XENON ISOTOPES
C
        DO 200 J=1,6
        SKIN2=0.0D0
        WBDS2=0.0D0
        T=0.0D0
20      DELTAT=0.1D0
        IF (T.GE.100.0) DELTAT=1.0D0
        LEAKRT=1.04D-4
        IF (T.GT.24.0) LEAKRT=5.21D-5
        XQ=XQF(1)
        IF (T.GT.8.0) XQ=XQF(2)
        IF (T.GT.24.0) XQ=XQF(3)
        IF (T.GT.96.0) XQ=XQF(4)
C       IF (LAMBXE(J)*T.LE.100.0) GO TO 25
C        S=0.0D0
C       GO TO 27
         IF (J.EQ.3.OR.J.EQ.5) THEN
           XEMETA(J) = (LAMBXE(J)/(LAMBXE(J)-LAMBXE(J-1)))*XECI(J-1)*
     1      (DEXP(-LAMBXE(J-1)*T)-DEXP(-LAMBXE(J)*T))
         ELSE
             XEMETA(J) = 0.0D0
         ENDIF
        S=(XECI(J)*DEXP(-LAMBXE(J)*T)+XEMETA(J))*XQ*LEAKRT
        BUF=1.0D0
        IF (T.LE.100.0) BUF=1.0-DEXP(-FLRT*60.0D0/VOL*(T+DELTAT))
        SKIN2=SKIN2+(S*BUF*XDCFS(J)*DELTAT)
        WBDS2=WBDS2+(S*BUF*XDCFB(J)*DELTAT)/GF
        T=T+DELTAT
        IF (T.LE.720.0) GO TO 20
        SKINT=SKINT+SKIN2
        WBDST=WBDST+WBDS2
        WRITE (6,800) NAMEXE(J),WBDS2,SKIN2
200     CONTINUE
C
C  PRINT TOTAL DOSES
C
        WRITE (6,810) WBDST
810     FORMAT(/' TOTAL WHOLEBODY DOSE FOR 30 DAYS IS ',D10.4,' REM')
        WRITE(6,820) SKINT
820     FORMAT(/' TOTAL SKINDOSE FOR 30 DAYS IS ',D10.4,' REM')
        WRITE (6,830)
830     FORMAT('*****************************************************!')
900    CONTINUE
        STOP
        END
```

7223(9-83)
FORM GE-8(C)

ENGINEERING DEPT.
AMERICAN ELECTRIC POWER SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OHIO

SHEET 8 OF
DATE 1/5/94 BY DMA CK MDW
COMPANY G.O.
PLANT

SUBJECT

Attachment 5
Final Code Listing for
Thyroid Dose

```
      REAL*8 ILAMB(5),IDCF(5),PFACT(3),LEAKRT,LPART,
     1 SF,ICI(5),BREATH,F1,F2,F3,F30,ETA(3),IPF(3),
     2 DOSE,DOSET(7),T,DELTAT,XQF(4),S,DOSE05,
     3 DOSE10,DOSE20,DOSE80,DOSE96,TFLOW,XQ,F10
       CHARACTER*4 NAME(5)
       DATA DELTAT/1.0/
       DATA NAME/'I131','I132','I133','I134','I135'/
       DATA ILAMB/0.00359, 0.301, 0.0333, 0.791, 0.105/
       DATA ICI/ 2.5E+07,3.7E+07,5.0E+07,5.5E+07,4.8D+07/
       DATA IDCF/1.07E+06,6.29E+03,1.81E+05,1.07E+03,3.14E+04/
       DATA XQF/6.17D-9,3.64D-9,1.42D-9,4.07D-10/
       DATA BREATH/44.1/
       DATA LPART/6.7/
       DATA ETA/0.95,0.95,0.99/
       DATA PFACT/0.955,0.02,0.025/
     OPEN (UNIT = 6, FILE = 'I:\NSL\MSA\CTRLROOM\THYFINAL.OUT')
C  VENTILATION SYSTEM FLOWRATE
       TFLOW=5400.0D0
C  LOOP TO USE VARIOUS FILTERED INTAKE RATES
       DO 130 I2=1,8
        F1=800.0D0
       IF(I2.EQ.2) F1=900.0D0
       IF(I2.EQ.3) F1=1000.0D0
       IF(I2.EQ.4) F1=1100.0D0
       IF(I2.EQ.5) F1=1200.0D0
       IF(I2.EQ.6) F1=1300.0D0
       IF(I2.EQ.7) F1=1400.0D0
       IF(I2.EQ.8) F1=1500.0D0
          F10=4200.0
          F2=TFLOW-F1
C  LOOP TO USE VARIOUS UNFILTERED INLEAKAGE RATES
       DO 120 I3=1,6
       F3=0.0D0
       IF(I3.EQ.2) F3=10.0D0
       IF(I3.EQ.3) F3=20.0D0
       IF(I3.EQ.4) F3=30.0D0
       IF(I3.EQ.5) F3=40.0D0
       IF(I3.EQ.6) F3=50.0D0
        F30 = F3 + 200
       DOSET(I3) = 0.0D0
       WRITE (6,290)
290    FORMAT('INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR')
       WRITE (6,295)
295    FORMAT('OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT')
       WRITE (6,297)
297    FORMAT('FINAL CASE: NEW XQ, 3588,10 GPM, CORRECTED I-135 ')
       WRITE(6,12) F2,F1,F3
12     FORMAT ('1',4X,'RECIRCULATION FLOW FROM CONTROL ROOM(CFM) ',
     1 E10.4,/,5X,'FILTERED INLEAKAGE(CFM) 'E10.4,/5X,
     2 'UNFILTERED INLEAKAGE(CFM)',E10.4,/13X,
     3 'ISOTOPE',1X,'.5 HOUR DOSE(REM)',1X,' 1 HOUR DOSE(REM)',
     4 1X,' 2 HOUR DOSE(REM)',1X,' 8 HOUR DOSE(REM)',
     5 1X,' 4 DAY DOSE(REM)',1X,' 30 DAY DOSE(REM)',/)
C  LOOP TO SUM DOSES AND DISTINGUISH ELEMENTAL=1 ORGANIC=2 PART=3
       DO 110 I = 1,3
C  LOOP FOR DIFFERENT ISOTOPES OF IODINE
       DO 100 K=1,5
       DOSE = 0.0D0
       T=0.0D0
90     DELTAT = 0.01D0
```

Att 5 0 0 2 0 0 1 3 0 0 5 5 215
mjk
8-13-94
WTM

```
IF(T.GE.1.0) DELTAT = 0.1D0
IF(T.GE.24.0) DELTAT = 1.0D0
```

```
C  LOOP FOR TIME INCREMENTS TO SUM CONCENTRATIONS AND DOSES
        IF(I.EQ.1) THEN
         SF=125.0
         IF (T.LT.0.100) SF=1.0/DEXP(-17.0*T)
         IF (T.GT.0.100.AND.T.LT.0.167) SF=5.47/DEXP(-14.3*(T-0.100))
         IF (T.GT.0.167.AND.T.LT.0.333) SF=14.26/DEXP(-22.5*(T-0.167))
         GO TO 11
        ENDIF
        IF(I.EQ.2) THEN
           SF=1.0
           GO TO 11
        ENDIF
        IF(I.EQ.3) THEN
           SF=200.0
           IF (T.LT.0.584) SF=1.0/DEXP(-LPART*T
           IF (T.GT.0.584.AND.T.LT.2.65) THEN
              SF = 50.0/DEXP((-LPART/10.0)*(T-0
           ENDIF
           GO TO 11
         ENDIF
C  DISPERSION FACTORS
11       XQ=XQF(1)
         IF(T.GT.8.0) XQ=XQF(2)
         IF(T.GT.24.0) XQ=XQF(3)
         IF(T.GT.96.0) XQ=XQF(4)
         LEAKRT = 1.04D-04
         IF(T.GT.24.0) LEAKRT = 5.21D-05
         IF((ILAMB(K)*T).LT.100.0) GO TO 31
         S = 0.0D0
         GO TO 32
31      S = ICI(K)*(DEXP(-ILAMB(K)*T))*XQ*PFACT(I)*(LEAKRT/SF+
     1         1.03D-7)
        IPF(I)=(F1+ETA(I)*F2+F3)/((1.0-ETA(I))*F1+F3)
         IF (T.LT.2.00) IPF(I)=(F1+ETA(I)*F2+F30)/((1.0-ETA(I))*F1+F30)
C        IF (T.LT.2.00) IPF(I)=(F10+F3)/((1.0-ETA(I))*F10+F3)
         DOSE = DOSE + (IDCF(K)*BREATH*S*DELTAT)/IPF(I)
32       IF(T.LT.0.51.AND.T.GT.0.49) DOSE05=DOSE
         IF(T.LT.1.01.AND.T.GT.0.99) DOSE10=DOSE
         IF(T.LT.2.05.AND.T.GT.1.95) DOSE20=DOSE
         IF(T.LT.8.05.AND.T.GT.7.95) DOSE80=DOSE
         IF(T.LT.96.1.AND.T.GT.95.9) DOSE96=DOSE
          T = T+DELTAT
34       IF(T.LE.720.0) GO TO 90
         IF(I.NE.1) GO TO 71
         WRITE(6,70) NAME(K),DOSE05,DOSE10,DOSE20,DOSE80,DOSE96,DOSE
70       FORMAT('   ELEMENTAL   ',A4,6(8X,E10.4))
71       IF(I.NE.2) GO TO 72
         WRITE(6,75) NAME(K),DOSE05,DOSE10,DOSE20,DOSE80,DOSE96,DOSE
75       FORMAT('   ORGANIC     ',A4,6(8X,E10.4))
72       IF(I.NE.3) GO TO 73
         WRITE(6,74) NAME(K),DOSE05,DOSE10,DOSE20,DOSE80,DOSE96,DOSE
74       FORMAT('   PARTICULATE ',A4,6(8X,E10.4))
73       DOSET(I3) = DOSET(I3) + DOSE
100      CONTINUE
         CONTINUE
          WRITE(6,200) DOSET(I3)
200      FORMAT(' ',/,'TOTAL DOSE FOR 30 DAYS ',E10.4//)
120      CONTINUE
130      CONTINUE
         WRITE(6,140)
```

A+L 5 0 0 2 0 0 1 3 0 0 5 7

P. 41 9

9-13-94

mfh

wdw

```
140     FORMAT(';')
        STOP
```

A+1 0 5 2 0 0 1 3 0 0 5 3 8 7 5

END

8-13-94
mfa
wtw

0 0 1 0 0 1 3 0 0 6 8

7223(9-83)
FORM GE-8 (C)
ENGINEERING DEPT.
AMERICAN ELECTRIC POWER SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OHIO

SHEET ____ OF ____
DATE 6/15/94 BY J.L. CK. WTM
COMPANY ____ G.O. ____
PLANT ____

SUBJECT ____

Attachment 6

Output of Final Version of whole Body/Skin Dose Code

Attachment 6 0 0 2 0 0 1 3 0 0 7 0 6/11/84 mpc p. 1/1 wtw

INPUT:NOBFINAL.FOR; OUTPUT:NOBFINAL.OUT
3588 MWT, NEW X/Q, CORRECTED METASTABLE DECAY
THE AIR FLOW TO THE CONTROL ROOM IS 920. CFM

TOPE	WHOLE BODY	BETA SKIN
KR85M	.1333D-01	.4659D+00
KR85	.5598D-04	.1302D+00
KR87	.3126D-01	.1436D+01
KR88	.2819D+00	.1271D+01
XE131M	.1901D-03	.2762D-01
XE133M	.1265D-01	.1406D+01
XE133	.1391D+00	.4027D+01
XE135M	.1391D-02	.8874D-02
XE135	.5957D-01	.1714D+01
XE138	.1373D-01	.1792D+00

TOTAL WHOLEBODY DOSE FOR 30 DAYS IS .5532D+00 REM

TOTAL SKINDOSE FOR 30 DAYS IS .1067D+02 REM
****
INPUT:NOBFINAL.FOR; OUTPUT:NOBFINAL.OUT
3588 MWT, NEW X/Q, CORRECTED METASTABLE DECAY
THE AIR FLOW TO THE CONTROL ROOM IS 1020. CFM

ISOTOPE	WHOLE BODY	BETA SKIN
KR85M	.1357D-01	.4740D+00
KR85	.5612D-04	.1305D+00
KR87	.3248D-01	.1492D+01
[illegible]88	.2884D+00	.1301D+01
[illegible]31M	.1908D-03	.2772D-01
[illegible]133M	.1272D-01	.1414D+01
XE133	.1397D+00	.4044D+01
XE135M	.1502D-02	.9581D-02
XE135	.6026D-01	.1733D+01
XE138	.1484D-01	.1938D+00

TOTAL WHOLEBODY DOSE FOR 30 DAYS IS .5638D+00 REM

TOTAL SKINDOSE FOR 30 DAYS IS .1082D+02 REM
****
INPUT:NOBFINAL.FOR; OUTPUT:NOBFINAL.OUT
3588 MWT, NEW X/Q, CORRECTED METASTABLE DECAY
THE AIR FLOW TO THE CONTROL ROOM IS 1120. CFM

ISOTOPE	WHOLE BODY	BETA SKIN
KR85M	.1376D-01	.4808D+00
KR85	.5623D-04	.1308D+00
KR87	.3356D-01	.1541D+01
KR88	.2941D+00	.1326D+01
XE131M	.1913D-03	.2780D-01
XE133M	.1278D-01	.1421D+01
XE133	.1402D+00	.4058D+01
XE135M	.1607D-02	.1025D-01
XE135	.6083D-01	.1750D+01
[illegible]38	.1590D-01	.2076D+00

TOTAL WHOLEBODY DOSE FOR 30 DAYS IS .5730D+00 REM

TOTAL SKINDOSE FOR 30 DAYS IS .1095D+02 REM
****

7223(9-83)
FORM GE-8 (C)

ENGINEERING DEPT.
AMERICAN ELECTRIC POWER SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OHIO

SHEET _____ OF _____
DATE 7/15/94 BY JMC CK. WSM
COMPANY _____ G.O. _____
PLANT _____

SUBJECT _____

Attachment 7

Output of Final version of Thyroid Code

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588.10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4600E+04
FILTERED INLEAKAGE(CFM) .8000E+03
UNFILTERED INLEAKAGE(CFM) .0000E+00

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2132E+01	.2303E+01	.2568E+01	.2864E+01	.3686E+01	.4011E+01
ELEMENTAL I132	.1832E-01	.1839E-01	.2087E-01	.2152E-01	.2160E-01	.2160E-01
ELEMENTAL I133	.7200E+00	.7765E+00	.8622E+00	.9486E+00	.1071E+01	.1071E+01
ELEMENTAL I134	.4475E-02	.4678E-02	.4740E-02	.4887E-02	.4889E-02	.4889E-02
ELEMENTAL I135	.1194E+00	.1283E+00	.1410E+00	.1513E+00	.1571E+00	.1571E+00
ORGANIC I131	.3451E+00	.2436E+00	.1362E+01	.2052E+01	.3883E+01	.4565E+01
ORGANIC I132	.2790E-02	.5532E-02	.8975E-02	.1050E-01	.1068E-01	.1068E-01
ORGANIC I133	.1159E+00	.2476E+00	.4475E+00	.6490E+00	.9271E+00	.9287E+00
ORGANIC I134	.6278E-03	.1101E-02	.1525E-02	.1588E-02	.1589E-02	.1589E-02
ORGANIC I135	.1896E-01	.3968E-01	.6957E-01	.9328E-01	.1068E+00	.1068E+00
PARTICULATE I131	.1061E+00	.1141E+00	.1217E+00	.1228E+00	.1256E+00	.1267E+00
PARTICULATE I132	.8892E-03	.9449E-03	.9880E-03	.9903E-03	.9905E-03	.9905E-03
PARTICULATE I133	.3575E-01	.3841E-01	.4088E-01	.4118E-01	.4159E-01	.4160E-01
PARTICULATE I134	.2120E-03	.2217E-03	.2271E-03	.2272E-03	.2272E-03	.2272E-03
PARTICULATE I135	.5901E-02	.6320E-02	.6690E-02	.6725E-02	.6745E-02	.6745E-02

TOTAL DOSE FOR 30 DAYS .1106E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588.10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4600E+04
FILTERED INLEAKAGE(CFM) .8000E+03
UNFILTERED INLEAKAGE(CFM) .1000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2217E+01	.2394E+01	.2671E+01	.3041E+01	.4066E+01	.4471E+01
ELEMENTAL I132	.1894E-01	.2016E-01	.2170E-01	.2254E-01	.2261E-01	.2261E-01
ELEMENTAL I133	.7486E+00	.8073E+00	.8968E+00	.1005E+01	.1157E+01	.1158E+01
ELEMENTAL I134	.4653E-02	.4864E-02	.5054E-02	.5088E-02	.5088E-02	.5088E-02
ELEMENTAL I135	.1241E+00	.1334E+00	.1467E+00	.1594E+00	.1667E+00	.1667E+00
ORGANIC I131	.3588E+00	.2731E+00	.1418E+01	.2280E+01	.4564E+01	.5415E+01
ORGANIC I132	.2901E-02	.6252E-02	.9343E-02	.1125E-01	.1147E-01	.1147E-01
ORGANIC I133	.1205E+00	.2574E+00	.4660E+00	.7174E+00	.1064E+01	.1066E+01
ORGANIC I134	.6528E-03	.1145E-02	.1586E-02	.1666E-02	.1666E-02	.1666E-02
ORGANIC I135	.1971E-01	.4126E-01	.7244E-01	.1020E+00	.1189E+00	.1189E+00
PARTICULATE I131	.1110E+00	.1194E+00	.1274E+00	.1297E+00	.1360E+00	.1386E+00
PARTICULATE I132	.9302E-03	.9885E-03	.1034E-02	.1039E-02	.1039E-02	.1039E-02
PARTICULATE I133	.3741E-01	.4019E-01	.4278E-01	.4345E-01	.4438E-01	.4439E-01
PARTICULATE I134	.2217E-03	.2319E-03	.2376E-03	.2378E-03	.2378E-03	.2378E-03
PARTICULATE I135	.6173E-02	.6612E-02	.7001E-02	.7080E-02	.7124E-02	.7124E-02

TOTAL DOSE FOR 30 DAYS .1263E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588.10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4600E+04
FILTERED INLEAKAGE(CFM) .8000E+03
UNFILTERED INLEAKAGE(CFM) .2000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2301E+01	.2486E+01	.2774E+01	.3216E+01	.4444E+01	.4929E+01
ELEMENTAL I132	.1966E-01	.2093E-01	.2253E-01	.2351E-01	.2363E-01	.2363E-01
ELEMENTAL I133	.7771E+00	.8380E+00	.9312E+00	.1060E+01	.1243E+01	.1244E+01
ELEMENTAL I134	.4830E-02	.5050E-02	.5216E-02	.5287E-02	.5288E-02	.5288E-02
ELEMENTAL I135	.1288E+00	.1384E+00	.1524E+00	.1676E+00	.1763E+00	.1763E+00
ORGANIC I131	.3725E+00	.2826E+00	.1474E+01	.2507E+01	.5242E+01	.6262E+01
ORGANIC I132	.3011E-02	.6471E-02	.9710E-02	.1199E-01	.1226E-01	.1226E-01
ORGANIC I133	.1251E+00	.2677E+00	.4845E+00	.7856E+00	.1201E+01	.1204E+01
ORGANIC I134	.6776E-03	.1189E-02	.1648E-02	.1743E-02	.1744E-02	.1744E-02
ORGANIC I135	.2046E-01	.4283E-01	.7531E-01	.1107E+00	.1310E+00	.1310E+00
PARTICULATE I131	.1159E+00	.1246E+00	.1330E+00	.1366E+00	.1464E+00	.1505E+00
PARTICULATE I132	.9712E-03	.1032E-02	.1079E-02	.1087E-02	.1088E-02	.1088E-02
PARTICULATE I133	.3905E-01	.4195E-01	.4467E-01	.4571E-01	.4716E-01	.4716E-01
PARTICULATE I134	.2315E-03	.2421E-03	.2481E-03	.2484E-03	.2484E-03	.2484E-03
PARTICULATE I135	.6445E-02	.6902E-02	.7310E-02	.7433E-02	.7501E-02	.7501E-02

.2700211

TOTAL DOSE FOR 30 DAYS .1420E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ, 3588.10 GPM, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4600E+04
FILTERED INLEAKAGE(CFM) .8000E+03
UNFILTERED INLEAKAGE(CFM) .3000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2385E+01	.2576E+01	.2876E+01	.3391E+01	.4821E+01	.5386E+01
ELEMENTAL I132	.2038E-01	.2169E-01	.2338E-01	.2450E-01	.2463E-01	.2463E-01
ELEMENTAL I133	.8055E+00	.8687E+00	.9656E+00	.1116E+01	.1328E+01	.1329E+01
ELEMENTAL I134	.5007E-02	.5234E-02	.5439E-02	.5486E-02	.5486E-02	.5486E-02
ELEMENTAL I135	.1336E+00	.1435E+00	.1580E+00	.1757E+00	.1858E+00	.1858E+00
ORGANIC I131	.3861E+00	.8319E+00	.1530E+01	.2732E+01	.5917E+01	.7105E+01
ORGANIC I132	.3191E-02	.6189E-02	.1008E-01	.1273E-01	.1304E-01	.1304E-01
ORGANIC I133	.1297E+00	.2770E+00	.5029E+00	.8535E+00	.1337E+01	.1340E+01
ORGANIC I134	.7024E-03	.1238E-02	.1709E-02	.1820E-02	.1821E-02	.1821E-02
ORGANIC I135	.2121E-01	.4439E-01	.7816E-01	.1194E+00	.1430E+00	.1430E+00
PARTICULATE I131	.1207E+00	.1299E+00	.1386E+00	.1434E+00	.1568E+00	.1622E+00
PARTICULATE I132	.1012E-02	.1075E-02	.1125E-02	.1136E-02	.1137E-02	.1137E-02
PARTICULATE I133	.4069E-01	.4371E-01	.4655E-01	.4796E-01	.4992E-01	.4993E-01
PARTICULATE I134	.2412E-03	.2523E-03	.2585E-03	.2590E-03	.2590E-03	.2590E-03
PARTICULATE I135	.6716E-02	.7192E-02	.7618E-02	.7784E-02	.7877E-02	.7877E-02

TOTAL DOSE FOR 30 DAYS .1576E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ, 3588.10 GPM, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4600E+04
FILTERED INLEAKAGE(CFM) .8000E+03
UNFILTERED INLEAKAGE(CFM) .4000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2469E+01	.2667E+01	.2978E+01	.3566E+01	.5197E+01	.5841E+01
ELEMENTAL I132	.2109E-01	.2246E-01	.2419E-01	.2549E-01	.2564E-01	.2564E-01
ELEMENTAL I133	.8338E+00	.8992E+00	.9998E+00	.1171E+01	.1413E+01	.1415E+01
ELEMENTAL I134	.5183E-02	.5418E-02	.5630E-02	.5684E-02	.5685E-02	.5685E-02
ELEMENTAL I135	.1382E+00	.1485E+00	.1636E+00	.1838E+00	.1953E+00	.1953E+00
ORGANIC I131	.3997E+00	.8611E+00	.1586E+01	.2957E+01	.6590E+01	.7945E+01
ORGANIC I132	.3231E-02	.6406E-02	.1044E-01	.1347E-01	.1382E-01	.1382E-01
ORGANIC I133	.1342E+00	.2867E+00	.5213E+00	.9212E+00	.1473E+01	.1476E+01
ORGANIC I134	.7270E-03	.1275E-02	.1770E-02	.1897E-02	.1897E-02	.1897E-02
ORGANIC I135	.2196E-01	.4595E-01	.8100E-01	.1281E+00	.1550E+00	.1550E+00
PARTICULATE I131	.1256E+00	.1357E+00	.1442E+00	.1503E+00	.1672E+00	.1740E+00
PARTICULATE I132	.1053E-02	.1119E-02	.1170E-02	.1184E-02	.1185E-02	.1185E-02
PARTICULATE I133	.4233E-01	.4547E-01	.4843E-01	.5020E-01	.5268E-01	.5269E-01
PARTICULATE I134	.2509E-03	.2624E-03	.2689E-03	.2695E-03	.2695E-03	.2695E-03
PARTICULATE I135	.6985E-02	.7481E-02	.7925E-02	.8135E-02	.3252E-02	.8252E-02

TOTAL DOSE FOR 30 DAYS .1731E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ, 3588.10 GPM, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4600E+04
FILTERED INLEAKAGE(CFM) .8000E+03
UNFILTERED INLEAKAGE(CFM) .5000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2552E+01	.2757E+01	.3079E+01	.3740E+01	.5571E+01	.6295E+01
ELEMENTAL I132	.2181E-01	.2322E-01	.2501E-01	.2647E-01	.2664E-01	.2664E-01
ELEMENTAL I133	.8620E+00	.9296E+00	.1034E+01	.1226E+01	.1498E+01	.1500E+01
ELEMENTAL I134	.5358E-02	.5601E-02	.5821E-02	.5882E-02	.5882E-02	.5882E-02
ELEMENTAL I135	.1429E+00	.1536E+00	.1691E+00	.1918E+00	.2048E+00	.2048E+00
ORGANIC I131	.4132E+00	.8902E+00	.1642E+01	.3187E+01	.7260E+01	.8782E+01
ORGANIC I132	.3340E-02	.6623E-02	.1080E-01	.1421E-01	.1460E-01	.1460E-01
ORGANIC I133	.1387E+00	.2964E+00	.5395E+00	.9886E+00	.1608E+01	.1612E+01
ORGANIC I134	.7516E-03	.1318E-02	.1831E-02	.1973E-02	.1974E-02	.1974E-02
ORGANIC I135	.2270E-01	.4751E-01	.8384E-01	.1367E+00	.1669E+00	.1669E+00
PARTICULATE I131	.1304E+00	.1403E+00	.1498E+00	.1571E+00	.1775E+00	.1857E+00
PARTICULATE I132	.1093E-02	.1165E-02	.1218E-02	.1232E-02	.1234E-02	.1234E-02
PARTICULATE I133	.4395E-01	.4722E-01	.5030E-01	.5244E-01	.5542E-01	.5544E-01

0 0 0 2 7 0 0 1 3 0 0 0 7 3

0 0 0 2 7 0 0 1 3 0 0 0 7 3.2

attn

PARTICULATE	134	.2606E-03	.2725E-03	.2793E-03	.2800E-03	.2800E-03	.2800E-03
PARTICULATE	135	.7254E-02	.7769E-02	.8231E-02	.8484E-02	.8625E-02	.8625E-02

TOTAL DOSE FOR 30 DAYS .1886E+02

1

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588.10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4500E+04
FILTERED INLEAKAGE(CFM) .9000E+03
UNFILTERED INLEAKAGE(CFM) .0000E+00

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL 131	.2174E+01	.2349E+01	.2620E+01	.2953E+01	.3876E+01	.4241E+01
ELEMENTAL 132	.1858E-01	.1878E-01	.3129E-01	.2202E-01	.2211E-01	.2211E-01
ELEMENTAL 133	.7343E+00	.7919E+00	.8757E+00	.9766E+00	.1114E+01	.1115E+01
ELEMENTAL 134	.4564E-02	.4771E-02	.4957E-02	.4988E-02	.4988E-02	.4988E-02
ELEMENTAL 135	.1218E+00	.1308E+00	.1439E+00	.1553E+00	.1619E+00	.1619E+00
ORGANIC 131	.3520E+00	.2584E+00	.1390E+01	.2166E+01	.4223E+01	.4991E+01
ORGANIC 132	.2846E-02	.5642E-02	.9159E-02	.1088E-01	.1107E-01	.1107E-01
ORGANIC 133	.1182E+00	.3525E+00	.4567E+00	.6832E+00	.9958E+00	.9976E+00
ORGANIC 134	.6403E-03	.1123E-02	.1552E-02	.1627E-02	.1628E-02	.1628E-02
ORGANIC 135	.1934E-01	.4047E-01	.1101E-01	.9766E-01	.1129E+00	.1129E+00
PARTICULATE 131	.1066E+00	.1146E+00	.1422E+00	.1235E+00	.1266E+00	.1279E+00
PARTICULATE 132	.8933E-03	.9492E-03	.9925E-03	.9951E-03	.9954E-03	.9954E-03
PARTICULATE 133	.3592E-01	.3859E-01	.4107E-01	.4141E-01	.4187E-01	.4188E-01
PARTICULATE 134	.2129E-03	.2227E-03	.2282E-03	.2283E-03	.2283E-03	.2283E-03
PARTICULATE 135	.5928E-02	.6349E-02	.6721E-02	.6761E-02	.6783E-02	.6783E-02

TOTAL DOSE FOR 30 DAYS .1184E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588.10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4500E+04
FILTERED INLEAKAGE(CFM) .9000E+03
UNFILTERED INLEAK/GE(CFM) .1000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	3 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL 131	.2259E+01	.2440E+01	.2722E+01	.3129E+01	.4255E+01	.4700E+01
ELEMENTAL 132	.1830E-01	.2055E-01	.2212E-01	.2302E-01	.2312E-01	.2312E-01
ELEMENTAL 133	.7628E+00	.8227E+00	.9140E+00	.1032E+01	.1200E+01	.1201E+01
ELEMENTAL 134	.4742E-02	.4957E-02	.5150E-02	.5188E-02	.5188E-02	.5188E-02
ELEMENTAL 135	.1265E+00	.1359E+00	.1496E+00	.1615E+00	.1715E+00	.1715E+00
ORGANIC 131	.3657E+00	.2879E+00	.1446E+01	.2397E+01	.4907E+01	.5839E+01
ORGANIC 132	.2956E-02	.5862E-02	.9527E-02	.1162E-01	.1188E-01	.1188E-01
ORGANIC 133	.1228E+00	.2623E+00	.4753E+00	.7515E+00	.1133E+01	.1135E+01
ORGANIC 134	.6652E-03	.1167E-02	.1617E-02	.1705E-02	.1705E-02	.1705E-02
ORGANIC 135	.2009E-01	.4204E-01	.7388E-01	.1064E+00	.1250E+00	.1250E+00
PARTICULATE 131	.1115E+00	.1199E+00	.1280E+00	.1304E+00	.1371E+00	.1398E+00
PARTICULATE 132	.9343E-03	.9928E-03	.1038E-02	.1044E-02	.1044E-02	.1044E-02
PARTICULATE 133	.3757E-01	.4036E-01	.4297E-01	.4367E-01	.4466E-01	.4466E-01
PARTICULATE 134	.2227E-03	.2330E-03	.2387E-03	.2388E-03	.2388E-03	.2388E-03
PARTICULATE 135	.6201E-02	.6641E-02	.7032E-02	.7115E-02	.7167E-02	.7162E-02

TOTAL DOSE FOR 30 DAYS .1341E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588.10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTRN. ROOM(CFM) .4500E+04
FILTERED INLEAKAGE(CFM) .9000E+03
UNFILTERED INLEAKAGE(CFM) .2000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL 131	.2343E+01	.2531E+01	.2825E+01	.3104E+01	.4633E+01	.5158E+01
ELEMENTAL 132	.2002E-01	.2131E-01	.2295E-01	.2401E-01	.2413E-01	.2413E-01
ELEMENTAL 133	.7913E+00	.8534E+00	.9484E+00	.1088E+01	.1285E+01	.1287E+01
ELEMENTAL 134	.4919E-02	.5142E-02	.5343E-02	.5387E-02	.5387E-02	.5387E-02
ELEMENTAL 135	.1312E+00	.1410E+00	.1552E+00	.1716E+00	.1811E+00	.1811E+00
ORGANIC 131	.3793E+00	.8172E+00	.1502E+01	.2620E+01	.6580E+01	.6684E+01
ORGANIC 132	.3066E-02	.6080E-02	.9893E-02	.1236E-01	.1265E-01	.1265E-01
ORGANIC 133	.1274E+00	.2721E+00	.4937E+00	.8196E+00	.1269E+01	.1272E+01
ORGANIC 134	.6900E-03	.1210E-02	.1678E-02	.1782E-02	.1782E-02	.1782E-02
ORGANIC 135	.2084E-01	.4361E-01	.7674E-01	.1151E+00	.1370E+00	.1370E+00

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PARTICULATE	I131	.1164E+00	.1252E+00	.1336E+00	.1373E+00	.1475E+00	.1516E+00
PARTICULATE	I132	.9752E-03	.1036E-02	.1084E-02	.1092E-02	.1093E-02	.1093E-02
PARTICULATE	I133	.3922E-01	.4213E-01	.4486E-01	.4593E-01	.4743E-01	.4744E-01
PARTICULATE	I134	.2325E-03	.2432E-03	.2491E-03	.2495E-03	.2495E-03	.2495E-03
PARTICULATE	I135	.6472E-02	.6932E-02	.7341E-02	.7468E-02	.7539E-02	.7539E-02

TOTAL DOSE FOR 30 DAYS .1497E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588 10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4500E+04
FILTERED INLEAKAGE(CFM) .9000E+03
UNFILTERED INLEAKAGE(CFM) .3000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2427E+01	.2622E+01	.2927E+01	.3479E+01	.5009E+01	.5614E+01
ELEMENTAL I132	.2074E-01	.2208E-01	.2377E-01	.2499E-01	.2513E-01	.2513E-01
ELEMENTAL I133	.8196E+00	.8839E+00	.9827E+00	.1144E+01	.1371E+01	.1372E+01
ELEMENTAL I134	.5095E-02	.5326E-02	.5534E-02	.5585E-02	.5586E-02	.5586E-02
ELEMENTAL I135	.1359E+00	.1460E+00	.1608E+00	.1797E+00	.1906E+00	.1906E+00
ORGANIC I131	.3929E+00	.8465E+00	.1558E+01	.2845E+01	.6254E+01	.7525E+01
ORGANIC I132	.3176E-02	.6298E-02	.1026E-01	.1310E-01	.1343E-01	.1343E-01
ORGANIC I133	.1319E+00	.2818E+00	.5121E+00	.8874E+00	.1405E+01	.1408E+01
ORGANIC I134	.7147E-03	.1254E-02	.1739E-02	.1858E-02	.1859E-02	.1859E-02
ORGANIC I135	.2158E-01	.4517E-01	.7958E-01	.1237E+00	.1490E+00	.1490E+00
PARTICULATE I131	.1212E+00	.1304E+00	.1392E+00	.1441E+00	.1579E+00	.1634E+00
PARTICULATE I132	.1016E-02	.1080E-02	.1129E-02	.1140E-02	.1142E-02	.1142E-02
PARTICULATE I133	.4086E-01	.4389E-01	.4674E-01	.4818E-01	.5020E-01	.5021E-01
PARTICULATE I134	.2422E-03	.2533E-03	.2596E-03	.2600E-03	.2600E-03	.2600E-03
PARTICULATE I135	.6743E-02	.7221E-02	.7649E-02	.7819E-02	.7915E-02	.7915E-02

TOTAL DOSE FOR 30 DAYS .1653E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588 10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4500E+04
FILTERED INLEAKAGE(CFM) .9000E+03
UNFILTERED INLEAKAGE(CFM) .4000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2611E+01	.2712E+01	.3029E+01	.3653E+01	.5384E+01	.6068E+01
ELEMENTAL I132	.2145E-01	.2284E-01	.2460E-01	.2598E-01	.2614E-01	.2614E-01
ELEMENTAL I133	.8479E+00	.9144E+00	.1017E+01	.1199E+01	.1456E+01	.1457E+01
ELEMENTAL I134	.5270E-02	.5510E-02	.5725E-02	.5785E-02	.5783E-02	.5783E-02
ELEMENTAL I135	.1406E+00	.1510E+00	.1664E+00	.1878E+00	.2001E+00	.2001E+00
ORGANIC I131	.4064E+00	.8757E+00	.1614E+01	.3070E+01	.6926E+01	.8364E+01
ORGANIC I132	.3286E-02	.6515E-02	.1062E-01	.1384E-01	.1421E-01	.1421E-01
ORGANIC I133	.1365E+00	.2915E+00	.5304E+00	.9549E+00	.1541E+01	.1544E+01
ORGANIC I134	.7393E-03	.1297E-02	.1800E-02	.1935E-02	.1936E-02	.1936E-02
ORGANIC I135	.2233E-01	.4673E-01	.8242E-01	.1324E+00	.1609E+00	.1609E+00
PARTICULATE I131	.1261E+00	.1356E+00	.1448E+00	.1510E+00	.1682E+00	.1752E+00
PARTICULATE I132	.1057E-02	.1123E-02	.1175E-02	.1188E-02	.1190E-02	.1190E-02
PARTICULATE I133	.4248E-01	.4565E-01	.4862E-01	.5043E-01	.5295E-01	.5297E-01
PARTICULATE I134	.2519E-03	.2635E-03	.2699E-03	.2706E-03	.2706E-03	.2706E-03
PARTICULATE I135	.7012E-02	.7510E-02	.7956E-02	.8169E-02	.8289E-02	.8289E-02

TOTAL DOSE FOR 30 DAYS .1808E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588 10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4500E+04
FILTERED INLEAKAGE(CFM) .9000E+03
UNFILTERED INLEAKAGE(CFM) .5000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2594E+01	.2802E+01	.3130E+01	.3826E+01	.5758E+01	.6521E+01
ELEMENTAL I132	.2216E-01	.2359E-01	.2542E-01	.2696E-01	.2713E-01	.2713E-01
ELEMENTAL I133	.8760E+00	.9447E+00	.1051E+01	.1254E+01	.1540E+01	.1542E+01
ELEMENTAL I134	.5445E-02	.5692E-02	.5916E-02	.5980E-02	.5980E-02	.5980E-02
ELEMENTAL I135	.1452E+00	.1561E+00	.1719E+00	.1958E+00	.2095E+00	.2095E+00
ORGANIC I131	.4100E+00	.9047E+00	.1670E+01	.3203E+01	.7591E+01	.9163E+01
ORGANIC I132	.3395E-02	.6731E-02	.1098E-01	.1457E-01	.1499E-01	.1499E-01

ORGANIC	133	.1410E+00	.3012E+00	.5486E+00	.1022E+01	.1676E+01	.1680E+01
ORGANIC	134	.7639E-03	.1340E-02	.1861E-02	.2011E-02	.2012E-02	.2012E-02
ORGANIC	135	.2307E-01	.4828E-01	.8525E-01	.1410E+00	.1728E+00	.1728E+00
PARTICULATE	131	.1309E+00	.1408E+00	.1504E+00	.1578E+00	.1785E+00	.1869E+00
PARTICULATE	132	.1097E-02	.1166E-02	.1220E-02	.1236E-02	.1238E-02	.1238E-02
PARTICULATE	133	.4412E-01	.4749E-01	.5049E-01	.5266E-01	.5570E-01	.5572E-01
PARTICULATE	134	.2615E-03	.2735E-03	.2803E-03	.2810E-03	.2810E-03	.2810E-03
PARTICULATE	135	.7281E-02	.7798E-02	.8262E-02	.8518E-02	.8663E-02	.8663E-02

TOTAL DOSE FOR 30 DAYS .1963E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XO. 3588.10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4400E+04
FILTERED INLEAKAGE(CFM) .1000E+04
UNFILTERED INLEAKAGE(CFM) .0000E+00

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2217E+01	.2394E+01	.2671E+01	.3041E+01	.4066E+01	.4471E+01
ELEMENTAL I132	.1894E-01	.2016E-01	.2170E-01	.2252E-01	.2261E-01	.2261E-01
ELEMENTAL I133	.7486E+00	.8073E+00	.8968E+00	.1005E+01	.1157E+01	.1158E+01
ELEMENTAL I134	.4653E-02	.4864E-02	.5054E-02	.5088E-02	.5088E-02	.5088E-02
ELEMENTAL I135	.1241E+00	.1334E+00	.1467E+00	.1594E+00	.1667E+00	.1667E+00
ORGANIC I131	.3588E+00	.3731E+00	.3918E+00	.4280E+00	.5464E+00	.5415E+00
ORGANIC I132	.3901E-02	.5754E-02	.9343E-02	.1125E-01	.1147E-01	.1147E-01
ORGANIC I133	.1205E+00	.2574E+00	.4660E+00	.1174E+01	.1064E+01	.1066E+01
ORGANIC I134	.6528E-03	.1145E-02	.1586E-02	.1666E-02	.1666E-02	.1666E-02
ORGANIC I135	.1971E-01	.4126E-01	.7244E-01	.1020E+00	.1189E+00	.1189E+00
PARTICULATE I131	.1071E+00	.1152E+00	.1229E+00	.1241E+00	.1277E+00	.1291E+00
PARTICULATE I132	.8974E-03	.9536E-03	.9971E-03	.1000E-02	.1000E-02	.1000E-02
PARTICULATE I133	.3609E-01	.3872E-01	.4126E-01	.4163E-01	.4215E-01	.4216E-01
PARTICULATE I134	.2139E-03	.2297E-03	.2427E-03	.2293E-03	.2293E-03	.2293E-03
PARTICULATE I135	.5955E-02	.6378E-02	.6752E-02	.6796E-02	.6821E-02	.6821E-02

TOTAL DOSE FOR 30 DAYS .1262E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XO. 3588.10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4400E+04
FILTERED INLEAKAGE(CFM) .1000E+04
UNFILTERED INLEAKAGE(CFM) .1000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2301E+01	.2486E+01	.2774E+01	.3216E+01	.4444E+01	.4929E+01
ELEMENTAL I132	.1966E-01	.2093E-01	.2253E-01	.2351E-01	.2363E-01	.2363E-01
ELEMENTAL I133	.7771E+00	.8380E+00	.9312E+00	.1064E+01	.1243E+01	.1244E+01
ELEMENTAL I134	.4830E-02	.5050E-02	.5246E-02	.5287E-02	.5288E-02	.5288E-02
ELEMENTAL I135	.1288E+00	.1384E+00	.1524E+00	.1676E+00	.1763E+00	.1763E+00
ORGANIC I131	.3725E+00	.3026E+00	.1474E+01	.2507E+01	.5242E+01	.6262E+01
ORGANIC I132	.3011E-02	.5971E-02	.9710E-02	.1199E-01	.1226E-01	.1226E-01
ORGANIC I133	.1251E+00	.2672E+00	.4845E+00	.1856E+00	.1201E+01	.1204E+01
ORGANIC I134	.6779E-03	.1189E-02	.1648E-02	.1743E-02	.1744E-02	.1744E-02
ORGANIC I135	.2046E-01	.4283E-01	.7531E-01	.1107E+00	.1310E+00	.1310E+00
PARTICULATE I131	.1120E+00	.1204E+00	.1285E+00	.1311E+00	.1381E+00	.1410E+00
PARTICULATE I132	.9384E-03	.9972E-03	.1043E-02	.1049E-02	.1049E-02	.1049E-02
PARTICULATE I133	.3774E-01	.4054E-01	.4316E-01	.4390E-01	.4494E-01	.4494E-01
PARTICULATE I134	.2237E-03	.2340E-03	.2397E-03	.2400E-03	.2400E-03	.2400E-03
PARTICULATE I135	.6228E-02	.6670E-02	.7063E-02	.7150E-02	.7200E-02	.7200E-02

TOTAL DOSE FOR 30 DAYS .1418E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XO. 3588.10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4400E+04
FILTERED INLEAKAGE(CFM) .1000E+04
UNFILTERED INLEAKAGE(CFM) .2000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2385E+01	.2576E+01	.2876E+01	.3391E+01	.4821E+01	.5386E+01
ELEMENTAL I132	.2038E-01	.2169E-01	.2336E-01	.2450E-01	.2463E-01	.2463E-01
ELEMENTAL I133	.8055E+00	.8687E+00	.9656E+00	.1116E+01	.1328E+01	.1329E+01
ELEMENTAL I134	.5007E-02	.5234E-02	.5439E-02	.5486E-02	.5486E-02	.5486E-02

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ELEMENTAL	I135	.1336E+00	.1435E+00	.1580E+00	.1757E+00	.1858E+00	.1858E+00
ORGANIC	I131	.3861E+00	.8319E+00	.1530E+01	.2732E+01	.5917E+01	.7105E+01
ORGANIC	I132	.3121E-02	.6189E-02	.1008E-01	.1273E-01	.1304E-01	.1304E-01
ORGANIC	I133	.1267E+00	.2770E+00	.5029E+00	.8535E+00	.1337E+01	.1340E+01
ORGANIC	I134	.1024E-03	.1232E-02	.1709E-02	.1820E-02	.1821E-02	.1821E-02
ORGANIC	I135	.2121E-01	.4439E-01	.7816E-01	.1194E+00	.1430E+00	.1430E+00
PARTICULATE	I131	.1168E+00	.1257E+00	.1342E+00	.1380E+00	.1485E+00	.1638E+00
PARTICULATE	I132	.9793E-03	.1041E-02	.1088E-02	.1097E-02	.1098E-02	.1098E-02
PARTICULATE	I133	.3938E-01	.4231E-01	.4505E-01	.4616E-01	.4771E-01	.4772E-01
PARTICULATE	I134	.2334E-03	.2442E-03	.2502E-03	.2506E-03	.2506E-03	.2506E-03
PARTICULATE	I135	.6499E-02	.6961E-02	.7372E-02	.7503E-02	.7577E-02	.7577E-02

TOTAL DOSE FOR 30 DAYS .1574E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588.10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4400E+04
FILTERED INLEAKAGE(CFM) .1000E+04
UNFILTERED INLEAKAGE(CFM) .3000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2469E+01	.2667E+01	.2978E+01	.3566E+01	.5197E+01	.5841E+01
ELEMENTAL I132	.2109E-01	.2246E-01	.2419E-01	.2549E-01	.2564E-01	.2564E-01
ELEMENTAL I133	.8338E+00	.8992E+00	.9998E+00	.1171E+01	.1413E+01	.1415E+01
ELEMENTAL I134	.5183E-02	.5418E-02	.5630E-02	.5684E-02	.5685E-02	.5685E-02
ELEMENTAL I135	.1382E+00	.1485E+00	.1636E+00	.1838E+00	.1953E+00	.1953E+00
ORGANIC I131	.3997E+00	.8611E+00	.1586E+01	.2857E+01	.6590E+01	.7945E+01
ORGANIC I132	.3231E-02	.6406E-02	.1044E-01	.1347E-01	.1382E-01	.1382E-01
ORGANIC I133	.1342E+00	.2867E+00	.5213E+00	.9212E+00	.1473E+01	.1476E+01
ORGANIC I134	.7270E-03	.1275E-02	.1770E-02	.1897E-02	.1897E-02	.1897E-02
ORGANIC I135	.2196E-01	.4595E-01	.8100E-01	.1281E+00	.1550E+00	.1550E+00
PARTICULATE I131	.1217E+00	.1309E+00	.1398E+00	.1448E+00	.1589E+00	.1646E+00
PARTICULATE I132	.1020E-02	.1084E-02	.1134E-02	.1145E-02	.1147E-02	.1147E-02
PARTICULATE I133	.4102E-01	.4407E-01	.4693E-01	.4841E-01	.5047E-01	.5049E-01
PARTICULATE I134	.2432E-03	.2543E-03	.2606E-03	.2611E-03	.2611E-03	.2611E-03
PARTICULATE I135	.6770E-02	.7250E-02	.7680E-02	.7854E-02	.7952E-02	.7952E-02

TOTAL DOSE FOR 30 DAY: .1730E+02

6.57 9.17 15.28 17.30

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588.10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4400E+04
FILTERED INLEAKAGE(CFM) .1000E+04
UNFILTERED INLEAKAGE(CFM) .4000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2552E+01	.2757E+01	.3079E+01	.3740E+01	.5571E+01	.6295E+01
ELEMENTAL I132	.2181E-01	.2322E-01	.2501E-01	.2647E-01	.2664E-01	.2664E-01
ELEMENTAL I133	.8620E+00	.9296E+00	.1034E+01	.1226E+01	.1498E+01	.1500E+01
ELEMENTAL I134	.5358E-02	.5601E-02	.5821E-02	.5882E-02	.5882E-02	.5882E-02
ELEMENTAL I135	.1429E+00	.1536E+00	.1691E+00	.1918E+00	.2048E+00	.2048E+00
ORGANIC I131	.4132E+00	.8902E+00	.1642E+01	.3162E+01	.7260E+01	.8782E+01
ORGANIC I132	.3340E-02	.6623E-02	.1080E-01	.1421E-01	.1460E-01	.1460E-01
ORGANIC I133	.1387E+00	.2964E+00	.5395E+00	.9886E+00	.1608E+01	.1612E+01
ORGANIC I134	.7516E-03	.1318E-02	.1831E-02	.1973E-02	.1974E-02	.1974E-02
ORGANIC I135	.2270E-01	.4751E-01	.8384E-01	.1367E+00	.1669E+00	.1669E+00
PARTICULATE I131	.1265E+00	.1361E+00	.1453E+00	.1517E+00	.1692E+00	.1763E+00
PARTICULATE I132	.1061E-02	.1127E-02	.1179E-02	.1193E-02	.1195E-02	.1195E-02
PARTICULATE I133	.4265E-01	.4582E-01	.4881E-01	.5065E-01	.5323E-01	.5324E-01
PARTICULATE I134	.2528E-03	.2645E-03	.2710E-03	.2716E-03	.2716E-03	.2716E-03
PARTICULATE I135	.7039E-02	.7539E-02	.7987E-02	.8204E-02	.8327E-02	.8327E-02

TOTAL DOSE FOR 30 DAYS .1885E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588.10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4400E+04
FILTERED INLEAKAGE(CFM) .1000E+04
UNFILTERED INLEAKAGE(CFM) .5000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2636E-01	.2847E+01	.3181E+01	.3913E+01	.5944E+01	.6746E+01

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4 4 0 2 0 0 1 3 0 0 7 7 1 1 4

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ELEMENTAL	I131	.2252E-01	.2397E-01	.2583E-01	.2745E-01	.2763E-01	.2763E-01
ELEMENTAL	I132	.8800E+00	.8938E+00	.1068E+01	.1281E+01	.1583E+01	.1584E+01
ELEMENTAL	I133	.5532E-02	.5783E-02	.6011E-02	.6078E-02	.6078E-02	.6078E-02
ELEMENTAL	I134	.1476E+00	.1586E+00	.1747E+00	.1998E+00	.2143E+00	.2143E+00
ELEMENTAL	I135	.4266E+00	.9192E+00	.1697E+01	.3405E+01	.7928E+01	.9615E+01
ORGANIC	I131	.3449E-02	.6839E-02	.1116E-01	.1494E-01	.1537E-01	.1537E-01
ORGANIC	I132	.1433E+00	.3060E+00	.5577E+00	.1056E+01	.1743E+01	.1747E+01
ORGANIC	I133	.2761E-03	.1361E-02	.3891E-02	.2049E-02	.2050E-02	.2050E-02
ORGANIC	I134	.2344E-01	.4905E-01	.8666E-01	.1453E+00	.1788E+00	.1788E+00
ORGANIC	I135	.1314E+00	.1413E+00	.1509E+00	.1585E+00	.1795E+00	.1880E+00
PARTICULATE	I131	.1101E-02	.1170E-02	.1224E-02	.1241E-02	.1243E-02	.1243E-02
PARTICULATE	I132	.4428E-01	.4757E-01	.5068E-01	.5288E-01	.5597E-01	.5599E-01
PARTICULATE	I133	.2625E-03	.2746E-03	.2813E-03	.2821E-03	.2821E-03	.2821E-03
PARTICULATE	I135	.7308E-02	.7826E-02	.8292E-02	.8553E-02	.8700E-02	.8700E-02

TOTAL DOSE FOR 30 DAYS .2039E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XO. 3588.10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4300E+04
FILTERED INLEAKAGE(CFM) .1100E+04
UNFILTERED INLEAKAGE(CFM) .0000E+00

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL	I131	.2259E+01	.2440E+01	.2722E+01	.3129E+01	.4255E+01	.4700E+01
ELEMENTAL	I132	.1930E-01	.2055E-01	.2212E-01	.2302E-01	.2312E-01	.2312E-01
ELEMENTAL	I133	.7628E+00	.8227E+00	.9140E+00	.1032E+01	.1200E+01	.1201E+01
ELEMENTAL	I134	.4742E-02	.4957E-02	.5150E-02	.5188E-02	.5188E-02	.5188E-02
ELEMENTAL	I135	.1265E+00	.1359E+00	.1496E+00	.1635E+00	.1715E+00	.1715E+00
ORGANIC	I131	.3627E+00	.7879E+00	.1446E+01	.2393E+01	.4903E+01	.5839E+01
ORGANIC	I132	.1738E-02	.3962E-02	.6927E-02	.1162E-01	.1186E-01	.1186E-01
ORGANIC	I133	.1228E+00	.2623E+00	.4753E+00	.7515E+00	.1134E+01	.1137E+01
ORGANIC	I134	.6652E-03	.1167E-02	.1617E-02	.1705E-02	.1705E-02	.1705E-02
ORGANIC	I135	.2009E-01	.4204E-01	.7388E-01	.1064E+00	.1250E+00	.1250E+00
PARTICULATE	I131	.1076E+00	.1157E+00	.1234E+00	.1248E+00	.1287E+00	.1303E+00
PARTICULATE	I132	.4015E-03	.9580E-03	.1002E-02	.1005E-02	.1005E-02	.1005E-02
PARTICULATE	I133	.3625E-01	.3894E-01	.4145E-01	.4186E-01	.4243E-01	.4243E-01
PARTICULATE	I134	.2148E-03	.2248E-03	.2303E-03	.2304E-03	.2304E-03	.2304E-03
PARTICULATE	I135	.5983E-02	.6407E-02	.6784E-02	.6832E-02	.6859E-02	.6859E-02

TOTAL DOSE FOR 30 DAYS .1339E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XO. 3588.10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4300E+04
FILTERED INLEAKAGE(CFM) .1100E+04
UNFILTERED INLEAKAGE(CFM) .1000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL	I131	.2343E+01	.2531E+01	.2825E+01	.3304E+01	.4633E+01	.5158E+01
ELEMENTAL	I132	.2002E-01	.2133E-01	.2296E-01	.2401E-01	.2413E-01	.2413E-01
ELEMENTAL	I133	.7913E+00	.8534E+00	.9484E+00	.1088E+01	.1285E+01	.1287E+01
ELEMENTAL	I134	.4919E-02	.5142E-02	.5343E-02	.5387E-02	.5387E-02	.5387E-02
ELEMENTAL	I135	.1312E+00	.1410E+00	.1552E+00	.1716E+00	.1811E+00	.1811E+00
ORGANIC	I131	.3793E+00	.8172E+00	.1502E+01	.2620E+01	.5580E+01	.6684E+01
ORGANIC	I132	.3066E-02	.6080E-02	.9893E-02	.1236E-01	.1265E-01	.1265E-01
ORGANIC	I133	.1274E+00	.2721E+00	.4937E+00	.8196E+00	.1268E+01	.1272E+01
ORGANIC	I134	.8300E-03	.1210E-02	.1678E-02	.1782E-02	.1782E-02	.1782E-02
ORGANIC	I135	.2084E-01	.4361E-01	.7674E-01	.1151E+00	.1370E+00	.1370E+00
PARTICULATE	I131	.1125E+00	.1210E+00	.1291E+00	.1318E+00	.1392E+00	.1422E+00
PARTICULATE	I132	.9425E-03	.1002E-02	.1047E-02	.1053E-02	.1054E-02	.1054E-02
PARTICULATE	I133	.3790E-01	.4072E-01	.4335E-01	.4413E-01	.4521E-01	.4522E-01
PARTICULATE	I134	.2247E-03	.2350E-03	.2408E-03	.2410E-03	.2410E-03	.2410E-03
PARTICULATE	I135	.6255E-02	.6699E-02	.7094E-02	.7186E-02	.7237E-02	.7237E-02

TOTAL DOSE FOR 30 DAYS .1496E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XO. 3588.10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4300E+04
FILTERED INLEAKAGE(CFM) .1100E+04
UNFILTERED INLEAKAGE(CFM) .2000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL [131]	.2427E+01	.2622E+01	.2927E+01	.3479E+01	.5009E+01	.5614E+01
ELEMENTAL [132]	.2074E-01	.2208E-01	.2377E-01	.2499E-01	.2513E-01	.2513E-01
ELEMENTAL [133]	.8196E+00	.8839E+00	.9827E+00	.1144E+01	.1371E+01	.1372E+01
ELEMENTAL [134]	.5095E-02	.5326E-02	.5534E-02	.5585E-02	.5586E-02	.5586E-02
ELEMENTAL [135]	.1359E+00	.1460E+00	.1608E+00	.1797E+00	.1906E+00	.1906E+00
ORGANIC [131]	.3929E+00	.8465E+00	.1558E+01	.2845E+01	.6254E+01	.7525E+01
ORGANIC [132]	.3176E-02	.6298E-02	.1026E-01	.1310E-01	.1343E-01	.1343E-01
ORGANIC [133]	.1318E+00	.2818E+00	.5121E+00	.8874E+00	.1405E+01	.1408E+01
ORGANIC [134]	.7147E-03	.1454E-02	.1739E-02	.1858E-02	.1859E-02	.1859E-02
ORGANIC [135]	.2158E-01	.4517E-01	.7958E-01	.1237E+00	.1490E+00	.1490E+00
PARTICULATE [131]	.1173E+00	.1262E+00	.1347E+00	.1386E+00	.1496E+00	.1540E+00
PARTICULATE [132]	.9834E-03	.1045E-02	.1093E-02	.1102E-02	.1103E-02	.1103E-02
PARTICULATE [133]	.3954E-01	.4248E-01	.4524E-01	.4638E-01	.4799E-01	.4800E-01
PARTICULATE [134]	.2344E-03	.2452E-03	.2512E-03	.2516E-03	.2516E-03	.2516E-03
PARTICULATE [135]	.6526E-02	.6990E-02	.7403E-02	.7538E-02	.7614E-02	.7614E-02

TOTAL DOSE FOR 30 DAYS .1652E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588.10 GPM, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4300E+04
FILTERED INLEAKAGE(CFM) .1100E+04
UNFILTERED INLEAKAGE(CFM) .3000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL [131]	.2511E+01	.2712E+01	.3029E+01	.3653E+01	.5384E+01	.6068E+01
ELEMENTAL [132]	.2146E-01	.2284E-01	.2460E-01	.2598E-01	.2614E-01	.2614E-01
ELEMENTAL [133]	.8478E+00	.9144E+00	.1017E+01	.1199E+01	.1456E+01	.1457E+01
ELEMENTAL [134]	.5270E-02	.5510E-02	.5725E-02	.5783E-02	.5783E-02	.5783E-02
ELEMENTAL [135]	.1406E+00	.1510E+00	.1664E+00	.1878E+00	.2001E+00	.2001E+00
ORGANIC [131]	.4064E+00	.8757E+00	.1614E+01	.3070E+01	.6926E+01	.8364E+01
ORGANIC [132]	.3286E-02	.6515E-02	.1062E-01	.1384E-01	.1421E-01	.1421E-01
ORGANIC [133]	.1365E+00	.2915E+00	.5304E+00	.9549E+00	.1541E+01	.1544E+01
ORGANIC [134]	.7393E-03	.1297E-02	.1800E-02	.1935E-02	.1936E-02	.1936E-02
ORGANIC [135]	.2233E-01	.4673E-01	.8242E-01	.1324E+00	.1609E+00	.1609E+00
PARTICULATE [131]	.1214E+00	.1314E+00	.1403E+00	.1455E+00	.1599E+00	.1658E+00
PARTICULATE [132]	.1024E-02	.1088E-02	.1138E-02	.1150E-02	.1151E-02	.1151E-02
PARTICULATE [133]	.4118E-01	.4424E-01	.4712E-01	.4963E-01	.5075E-01	.5076E-01
PARTICULATE [134]	.2441E-03	.2554E-03	.2616E-03	.2621E-03	.2622E-03	.2622E-03
PARTICULATE [135]	.6797E-02	.7279E-02	.7710E-02	.7889E-02	.7990E-02	.7990E-02

TOTAL DOSE FOR 30 DAYS .1807E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588.10 GPM, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4300E+04
FILTERED INLEAKAGE(CFM) .1100E+04
UNFILTERED INLEAKAGE(CFM) .4000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL [131]	.2594E+01	.2802E+01	.3130E+01	.3776E+01	.5758E+01	.6521E+01
ELEMENTAL [132]	.2216E-01	.2359E-01	.2542E-01	.2696E-01	.2713E-01	.2713E-01
ELEMENTAL [133]	.8760E+00	.9447E+00	.1051E+01	.1254E+01	.1540E+01	.1542E+01
ELEMENTAL [134]	.5445E-02	.5692E-02	.5916E-02	.5980E-02	.5980E-02	.5980E-02
ELEMENTAL [135]	.1452E+00	.1561E+00	.1719E+00	.1958E+00	.2095E+00	.2095E+00
ORGANIC [131]	.4199E+00	.9047E+00	.1670E+01	.3293E+01	.7585E+01	.9168E+01
ORGANIC [132]	.3395E-02	.6731E-02	.1098E-01	.1457E-01	.1499E-01	.1499E-01
ORGANIC [133]	.1410E+00	.3012E+00	.5 66E+00	.1022E+01	.1676E+01	.1680E+01
ORGANIC [134]	.7639E-03	.1340E-02	.1861E-02	.2011E-02	.2012E-02	.2012E-02
ORGANIC [135]	.2307E-01	.4828E-01	.8525E-01	.1410E+00	.1728E+00	.1728E+00
PARTICULATE [131]	.1270E+00	.1366E+00	.1459E+00	.1523E+00	.1702E+00	.1775E+00
PARTICULATE [132]	.1065E-02	.1131E-02	.1184E-02	.1198E-02	.1200E-02	.1200E-02
PARTICULATE [133]	.4282E-01	.4600E-01	.4899E-01	.5087E-01	.5350E-01	.5352E-01
PARTICULATE [134]	.2538E-03	.2655E-03	.2720E-03	.2727E-03	.2727E-03	.2727E-03
PARTICULATE [135]	.7066E-02	.7568E-02	.8017E-02	.8239E-02	.8364E-02	.8364E-02

TOTAL DOSE FOR 30 DAYS .1961E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588.10 GPM, CORRECTED I-135

1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4300E+04
FILTERED INLEAKAGE(CFM) .1100E+04
UNFILTERED INLEAKAGE(CFM) .5000E+02

	ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
1	ELEMENTAL ||31	.2677E+01	.2892E+01	.3231E+01	.3999E+01	.6130E+01	.6971E+01
	ELEMENTAL ||32	.2267E-01	.2435E-01	.2623E-01	.2793E-01	.2813E-01	.2813E-01
	ELEMENTAL ||33	.9040E+00	.9749E+00	.1085E+01	.1309E+01	.1625E+01	.1627E+01
	ELEMENTAL ||34	.5619E-02	.5874E-02	.6105E-02	.6176E-02	.6177E-02	.6177E-02
	ELEMENTAL ||35	.1499E+00	.1611E+00	.1775E+00	.2038E+00	.2190E+00	.2190E+00
	ORGANIC ||31	.4333E+00	.9337E+00	.1725E+01	.3516E+01	.8261E+01	.1003E+02
	ORGANIC ||32	.3503E-02	.6946E-02	.1134E-01	.1530E-01	.1576E-01	.1576E-01
	ORGANIC ||33	.1455E+00	.3109E+00	.5[illegible]68E+00	.1089E+01	.1810E+01	.1814E+01
	ORGANIC ||34	.7883E-03	.1383E-02	.[illegible]31E-02	.2087E-02	.2088E-02	.2088E-02
	ORGANIC ||35	.2381E-01	.4982E-01	.8407E-01	.1495E+00	.1847E+00	.1847E+00
	PARTICULATE ||31	.1319E+00	.1418E+00	.1515E+00	.1592E+00	.1805E+00	.1892E+00
	PARTICULATE ||32	.1105E-02	.1174E-02	.1229E-02	.1246E-02	.1248E-02	.1248E-02
	PARTICULATE ||33	.4444E-01	.4774E-01	.5086E-01	.5311E-01	.5624E-01	.5626E-01
	PARTICULATE ||34	.2634E-03	.2756E-03	.2824E-03	.2831E-03	.2831E-03	.2831E-03
	PARTICULATE ||35	.7334E-02	.7855E-02	.8323E-02	.8588E-02	.8737E-02	.8737E-02

TOTAL DOSE FOR 30 DAYS .2116E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588.10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4200E+04
FILTERED INLEAKAGE(CFM) .1200E+04
UNFILTERED INLEAKAGE(CFM) .0000E+00

	ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
	ELEMENTAL ||31	.2301E+01	.2486E+01	.2774E+01	.3216E+01	.4444E+01	.4929E+01
	ELEMENTAL ||32	.1966E-01	.2093E-01	.2253E-01	.2351E-01	.2363E-01	.2363E-01
	ELEMENTAL ||33	.7771E+00	.8380E+00	.9312E+00	.1060E+01	.1243E+01	.1244E+01
	ELEMENTAL ||34	.4830E-02	.5050E-02	.5246E-02	.5287E-02	.5288E-02	.5288E-02
	ELEMENTAL ||35	.1288E+00	.1384E+00	.1524E+00	.1676E+00	.1763E+00	.1763E+00
	ORGANIC ||31	.3725E+00	.8026E+00	.1474E+01	.2907E+01	.6242E+01	.6262E+01
	ORGANIC ||32	.3011E-02	.5971E-02	.9710E-02	.1199E-01	.1226E-01	.1226E-01
	ORGANIC ||33	.1251E+00	.2672E+00	.4845E+00	.7856E+00	.1201E+01	.1204E+01
	ORGANIC ||34	.6776E-03	.1189E-02	.1648E-02	.1743E-02	.1744E-02	.1744E-02
	ORGANIC ||35	.2046E-01	.4283E-01	.7231E-01	.1107E+00	.1310E+00	.1310E+00
	PARTICULATE ||31	.1080E+00	.1162E+00	.1240E+00	.1255E+00	.1298E+00	.1315E+00
	PARTICULATE ||32	.9056E-03	.9623E-03	.1006E-02	.1010E-02	.1010E-02	.1010E-02
	PARTICULATE ||33	.3642E-01	.3912E-01	.4164E-01	.4209E-01	.4271E-01	.4271E-01
	PARTICULATE ||34	.2158E-03	.2258E-03	.2312E-03	.2315E-03	.2315E-03	.2315E-03
	PARTICULATE ||35	.6010E-02	.6437E-02	.6815E-02	.6867E-02	.6897E-02	.6897E-02

TOTAL DOSE FOR 30 DAYS .1417E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588.10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4200E+04
FILTERED INLEAKAGE(CFM) .1200E+04
UNFILTERED INLEAKAGE(CFM) .1000E+02

	ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
	ELEMENTAL ||31	.2385E+01	.2576E+01	.2876E+01	.3391E+01	.4821E+01	.5386E+01
	ELEMENTAL ||32	.2038E-01	.2169E-01	.2336E-01	.2450E-01	.2463E-01	.2463E-01
	ELEMENTAL ||33	.8055E+00	.8687E+00	.9656E+00	.1116E+01	.1328E+01	.1329E+01
	ELEMENTAL ||34	.5007E-02	.5234E-02	.5439E-02	.5486E-02	.5486E-02	.5486E-02
	ELEMENTAL ||35	.1336E+00	.1435E+00	.1580E+00	.1757E+00	.1858E+00	.1858E+00
	ORGANIC ||31	.3861E+00	.8319E+00	.1530E+01	.3032E+01	.6917E+01	.7105E+01
	ORGANIC ||32	.3121E-02	.6189E-02	.1008E-01	.1273E-01	.1304E-01	.1304E-01
	ORGANIC ||33	.1297E+00	.2770E+00	.5039E+00	.8535E+00	.1337E+01	.1340E+01
	ORGANIC ||34	.7024E-03	.1232E-02	.1709E-02	.1820E-02	.1821E-02	.1821E-02
	ORGANIC ||35	.2121E-01	.4439E-01	.7816E-01	.1194E+00	.1430E+00	.1430E+00
	PARTICULATE ||31	.1129E+00	.1215E+00	.1297E+00	.1324E+00	.1402E+00	.1434E+00
	PARTICULATE ||32	.9466E-03	.1006E-02	.1052E-02	.1058E-02	.1059E-02	.1059E-02
	PARTICULATE ||33	.3807E-01	.4089E-01	.4354E-01	.4435E-01	.4549E-01	.4550E-01
	PARTICULATE ||34	.2256E-03	.2360E-03	.2418E-03	.2421E-03	.2421E-03	.2421E-03
	PARTICULATE ||35	.6282E-02	.6728E-02	.7125E-02	.7221E-02	.7275E-02	.7275E-02

TOTAL DOSE FOR 30 DAYS .1573E+02

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0 0 2 0 0 1 3 0 0 1 0 0

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INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588 10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4200E+04
FILTERED INLEAKAGE(CFM) .1200E+04
UNFILTERED INLEAKAGE(CFM) .2000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2469E+01	.2667E+01	.2978E+01	.3566E+01	.5197E+01	.5841E+01
ELEMENTAL I132	.2109E-01	.2946E-01	.3419E-01	.3549E-01	.3564E-01	.3564E-01
ELEMENTAL I133	.8338E+00	.8993E+00	.9998E+00	.1171E+01	.1413E+01	.1413E+01
ELEMENTAL I134	.5183E-02	.5418E-02	.5630E-02	.5684E-02	.5685E-02	.5685E-02
ELEMENTAL I135	.1382E+00	.1485E+00	.1636E+00	.1838E+00	.1953E+00	.1953E+00
ORGANIC I131	.3997E+00	.8611E+00	.1586E+01	.2957E+01	.6590E+01	.7945E+01
ORGANIC I132	.3231E-02	.6406E-02	.1044E-01	.1347E-01	.1382E-01	.1382E-01
ORGANIC I133	.1342E+00	.2867E+00	.5213E+00	.9212E+00	.1473E+01	.1476E+01
ORGANIC I134	.7710E-03	.1275E-02	.1770E-02	.1897E-02	.1897E-02	.1897E-02
ORGANIC I135	.2196E-01	.4559E-01	.8100E-01	.1281E+00	.1550E+00	.1550E+00
PARTICULATE I131	.1178E+00	.1267E+00	.1383E+00	.1393E+00	.1506E+00	.1522E+00
PARTICULATE I132	.9875E-03	.1049E-02	.1098E-02	.1101E-02	.1108E-02	.1108E-02
PARTICULATE I133	.3971E-01	.4266E-01	.4542E-01	.4661E-01	.4826E-01	.4827E-01
PARTICULATE I134	.2354E-03	.2462E-03	.2523E-03	.2527E-03	.2527E-03	.2527E-03
PARTICULATE I135	.6553E-02	.7019E-02	.7433E-02	.7573E-02	.7652E-02	.7652E-02

TOTAL DOSE FOR 30 DAYS .1729E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588 10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4200E+04
FILTERED INLEAKAGE(CFM) .1200E+04
UNFILTERED INLEAKAGE(CFM) .3000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2552E+01	.2757E+01	.3079E+01	.3740E+01	.5571E+01	.6295E+01
ELEMENTAL I132	.2181E-01	.3322E-01	.3501E-01	.3647E-01	.3664E-01	.3664E-01
ELEMENTAL I133	.8620E+00	.9296E+00	.1034E+01	.1226E+01	.1498E+01	.1500E+01
ELEMENTAL I134	.5358E-02	.5601E-02	.5871E-02	.5882E-02	.5882E-02	.5882E-02
ELEMENTAL I135	.1429E+00	.1536E+00	.1691E+00	.1918E+00	.2048E+00	.2048E+00
ORGANIC I131	.4132E+00	.8902E+00	.1642E+01	.3187E+01	.7260E+01	.8782E+01
ORGANIC I132	.3340E-02	.6623E-02	.1080E-01	.1421E-01	.1460E-01	.1460E-01
ORGANIC I133	.1387E+00	.2964E+00	.5395E+00	.9886E+00	.1608E+01	.1612E+01
ORGANIC I134	.7516E-03	.1318E-02	.1831E-02	.1973E-02	.1974E-02	.1974E-02
ORGANIC I135	.2270E-01	.4715E-01	.8384E-01	.1367E+00	.1669E+00	.1669E+00
PARTICULATE I131	.1227E+00	.1320E+00	.1409E+00	.1462E+00	.1610E+00	.1669E+00
PARTICULATE I132	.1028E-02	.1093E-02	.1143E-02	.1155E-02	.1156E-02	.1156E-02
PARTICULATE I133	.4136E-01	.4442E-01	.4731E-01	.4886E-01	.5102E-01	.5104E-01
PARTICULATE I134	.2451E-03	.2564E-03	.2627E-03	.2632E-03	.2632E-03	.2632E-03
PARTICULATE I135	.6824E-02	.7308E-02	.7741E-02	.7924E-02	.8027E-02	.8027E-02

TOTAL DOSE FOR 30 DAYS .1884E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588 10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4200E+04
FILTERED INLEAKAGE(CFM) .1200E+04
UNFILTERED INLEAKAGE(CFM) .4000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2636E+01	.2847E+01	.3181E+01	.3913E+01	.5944E+01	.6746E+01
ELEMENTAL I132	.2252E-01	.2397E-01	.2583E-01	.2745E-01	.2763E-01	.2763E-01
ELEMENTAL I133	.8900E+00	.9598E+00	.1068E+01	.1281E+01	.1583E+01	.1585E+01
ELEMENTAL I134	.5532E-02	.5783E-02	.6011E-02	.6078E-02	.6079E-02	.6079E-02
ELEMENTAL I135	.1476E+00	.1586E+00	.1747E+00	.1998E+00	.2143E+00	.2143E+00
ORGANIC I131	.4266E+00	.9192E+00	.1697E+01	.3405E+01	.7928E+01	.9615E+01
ORGANIC I132	.3449E-02	.6839E-02	.1116E-01	.1494E-01	.1537E-01	.1537E-01
ORGANIC I133	.1433E+00	.3060E+00	.5571E+00	.1056E+01	.1743E+01	.1747E+01
ORGANIC I134	.7761E-03	.1361E-02	.1891E-02	.2049E-02	.2050E-02	.2050E-02
ORGANIC I135	.2344E-01	.4905E-01	.8666E-01	.1453E+00	.1788E+00	.1788E+00
PARTICULATE I131	.1275E+00	.1372E+00	.1465E+00	.1530E+00	.1713E+00	.1787E+00
PARTICULATE I132	.1069E-02	.1136E-02	.1188E-02	.1203E-02	.1205E-02	.1205E-02
PARTICULATE I133	.4298E-01	.4617E-01	.4918E-01	.5110E-01	.5378E-01	.5378E-01
PARTICULATE I134	.2548E-03	.2668E-03	.2731E-03	.2747E-03	.2731E-03	.2731E-03
PARTICULATE I135	.7093E-02	.7596E-02	.8048E-02	.8274E-02	.8401E-02	.8401E-02

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TOTAL DOSE FOR 30 DAYS .2038E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ, 3588 10 GPM, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4200E+04
FILTERED INLEAKAGE(CFM) .1200E+04
UNFILTERED INLEAKAGE(CFM) .5000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL [131]	.2718E+01	.2936E+01	.3281E+01	.4085E+01	.6315E+01	.7196E+01
ELEMENTAL [132]	.2323E-01	.2473E-01	.2664E-01	.2842E-01	.2863E-01	.2863E-01
ELEMENTAL [133]	.9180E+00	.9900E+00	.1102E+01	.1336E+01	.1667E+01	.1669E+01
ELEMENTAL [134]	.5706E-02	.5965E-02	.6200E-02	.6274E-02	.6275E-02	.6275E-02
ELEMENTAL [135]	.1522E+00	.1635E+00	.1802E+00	.2078E+00	.2237E+00	.2237E+00
ORGANIC [131]	.2400E+00	.9481E+00	.1753E+01	.3627E+01	.8594E+01	.1045E+02
ORGANIC [132]	.3558E-02	.7092E-02	.1126E-01	.1567E-01	.1615E-01	.1615E-01
ORGANIC [133]	.1478E+00	.3157E+00	.5759E+00	.1123E+01	.1877E+01	.1882E+01
ORGANIC [134]	.8005E-03	.1404E-02	.1952E-02	.2125E-02	.2126E-02	.2126E-02
ORGANIC [135]	.2418E-01	.5060E-01	.8947E-01	.1538E+00	.1906E+00	.1906E+00
PARTICULATE [131]	.1323E+00	.1424E+00	.1520E+00	.1598E+00	.1816E+00	.1904E+00
PARTICULATE [132]	.1109E-02	.1179E-02	.1233E-02	.1251E-02	.1253E-02	.1253E-02
PARTICULATE [133]	.4460E-01	.4792E-01	.5105E-01	.5334E-01	.5652E-01	.5654E-01
PARTICULATE [134]	.2644E-03	.2766E-03	.2834E-03	.2842E-03	.2842E-03	.2842E-03
PARTICULATE [135]	.7361E-02	.7884E-02	.8353E-02	.8623E-02	.8774E-02	.8774E-02

TOTAL DOSE FOR 30 DAYS .2192E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ, 3588 10 GPM, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4100E+04
FILTERED INLEAKAGE(CFM) .1300E+04
UNFILTERED INLEAKAGE(CFM) .0000E+00

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL [131]	.2343E+01	.2531E+01	.2825E+01	.3304E+01	.4633E+01	.5158E+01
ELEMENTAL [132]	.2007E-01	.2131E-01	.2295E-01	.2401E-01	.2413E-01	.2413E-01
ELEMENTAL [133]	.7913E+00	.8534E+00	.9484E+00	.1088E+01	.1285E+01	.1287E+01
ELEMENTAL [134]	.4919E-02	.5142E-02	.5343E-02	.5387E-02	.5387E-02	.5387E-02
ELEMENTAL [135]	.1312E+00	.1410E+00	.1552E+00	.1716E+00	.1811E+00	.1811E+00
ORGANIC [131]	.3793E+00	.8172E+00	.1502E+01	.2620E+01	.5580E+01	.6684E+01
ORGANIC [132]	.3066E-02	.6080E-02	.9893E-02	.1236E-01	.1265E-01	.1265E-01
ORGANIC [133]	.1274E+00	.2721E+00	.4937E+00	.8196E+00	.1269E+01	.1272E+01
ORGANIC [134]	.6900E-03	.1210E-02	.1678E-02	.1782E-02	.1782E-02	.1782E-02
ORGANIC [135]	.2084E-01	.4361E-01	.7674E-01	.1151E+00	.1370E+00	.1370E+00
PARTICULATE [131]	.1085E+00	.1168E+00	.1246E+00	.1262E+00	.1308E+00	.1327E+00
PARTICULATE [132]	.9097E-03	.9667E-03	.1011E-02	.1015E-02	.1015E-02	.1015E-02
PARTICULATE [133]	.3658E-01	.3930E-01	.4183E-01	.4231E-01	.4299E-01	.4299E-01
PARTICULATE [134]	.2169E-03	.2268E-03	.2324E-03	.2325E-03	.2325E-03	.2325E-03
PARTICULATE [135]	.6037E-02	.6466E-02	.6846E-02	.6903E-02	.6935E-02	.6935E-02

TOTAL DOSE FOR 30 DAYS .1495E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ, 3588 10 GPM, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4100E+04
FILTERED INLEAKAGE(CFM) .1300E+04
UNFILTERED INLEAKAGE(CFM) .1000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL [131]	.2427E+01	.2622E+01	.2927E+01	.3479E+01	.5009E+01	.5614E+01
ELEMENTAL [132]	.2074E-01	.2208E-01	.2377E-01	.2499E-01	.2513E-01	.2513E-01
ELEMENTAL [133]	.8196E+00	.8839E+00	.9827E+00	.1144E+01	.1371E+01	.1372E+01
ELEMENTAL [134]	.5095E-02	.5326E-02	.5534E-02	.5585E-02	.5586E-02	.5586E-02
ELEMENTAL [135]	.1359E+00	.1460E+00	.1608E+00	.1797E+00	.1906E+00	.1906E+00
ORGANIC [131]	.3929E+00	.8465E+00	.1558E+01	.2845E+01	.6254E+01	.7525E+01
ORGANIC [132]	.3176E-02	.6298E-02	.1026E-01	.1310E-01	.1343E-01	.1343E-01
ORGANIC [133]	.1319E+00	.2818E+00	.5121E+00	.8874E+00	.1405E+01	.1408E+01
ORGANIC [134]	.7147E-03	.1254E-02	.1739E-02	.1858E-02	.1859E-02	.1859E-02
ORGANIC [135]	.2158E-01	.4517E-01	.7958E-01	.1237E+00	.1490E+00	.1490E+00
PARTICULATE [131]	.1134E+00	.1220E+00	.1302E+00	.1331E+00	.1412E+00	.1445E+00
PARTICULATE [132]	.9507E-03	.1010E-02	.1057E-02	.1063E-02	.1064E-02	.1064E-02
PARTICULATE [133]	.3823E-01	.4107E-01	.4373E-01	.4458E-01	.4577E-01	.4578E-01

PARTICULATE	I134	.2266E-03	.2370E-03	.2429E-03	.2431E-03	.2431E-03	.2431E-03
PARTICULATE	I135	.6309E-02	.6757E-02	.7155E-02	.7256E-02	.7313E-02	.7313E-02

TOTAL DOSE FOR 30 DAYS .1650E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588.10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4100E+04
FILTERED INLEAKAGE(CFM) .1300E+04
UNFILTERED INLEAKAGE(CFM) .2000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2511E+01	.2712E+01	.3029E+01	.3653E+01	.5384E+01	.6068E+01
ELEMENTAL I132	.2145E-01	.2284E-01	.2460E-01	.2598E-01	.2614E-01	.2614E-01
ELEMENTAL I133	.8479E+00	.9144E+00	.1017E+01	.1199E+01	.1456E+01	.1457E+01
ELEMENTAL I134	.5270E-02	.5510E-02	.5725E-02	.5783E-02	.5783E-02	.5783E-02
ELEMENTAL I135	.1406E+00	.1510E+00	.1664E+00	.1878E+00	.2001E+00	.2001E+00
ORGANIC I131	.4064E+00	.4357E+00	.4614E+01	.3070E+01	.6926E+01	.8364E+01
ORGANIC I132	.3286E-02	.6515E-02	.1062E-01	.1384E-01	.1421E-01	.1421E-01
ORGANIC I133	.1365E+00	.2215E+00	.5304E+00	.9549E+00	.1541E+01	.1574E+01
ORGANIC I134	.7393E-03	.1297E-02	.1800E-02	.1935E-02	.1936E-02	.1936E-02
ORGANIC I135	.2233E-01	.4673E-01	.8242E-01	.1324E+00	.1609E+00	.1609E+00
PARTICULATE I131	.1183E+00	.1273E+00	.1358E+00	.1400E+00	.1516E+00	.1564E+00
PARTICULATE I132	.9916E-03	.1054E-02	.1102E-02	.1112E-02	.1113E-02	.1113E-02
PARTICULATE I133	.3987E-01	.4283E-01	.4561E-01	.4683E-01	.4854E-01	.4855E-01
PARTICULATE I134	.2364E-03	.2472E-03	.2533E-03	.2537E-03	.2537E-03	.2537E-03
PARTICULATE I135	.6581E-02	.7048E-02	.7461E-02	.7608E-02	.7689E-02	.7689E-02

TOTAL DOSE FOR 30 DAYS .1806E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588.10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4100E+04
FILTERED INLEAKAGE(CFM) .1300E+04
UNFILTERED INLEAKAGE(CFM) .3000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2594E+01	.2802E+01	.3130E+01	.3826E+01	.5758E+01	.6521E+01
ELEMENTAL I132	.3216E-01	.3359E-01	.3542E-01	.3696E-01	.3713E-01	.3713E-01
ELEMENTAL I133	.1276E+01	.1376E+01	.1531E+01	.1754E+01	.2140E+01	.2143E+01
ELEMENTAL I134	.7945E-02	.8692E-02	.8916E-02	.8980E-02	.8980E-02	.8980E-02
ELEMENTAL I135	.2452E+00	.2561E+00	.2719E+00	.2958E+00	.3095E+00	.3095E+00
ORGANIC I131	.4199E+00	.9047E+00	.1670E+01	.3293E+01	.7595E+01	.9199E+01
ORGANIC I132	.3395E-02	.6731E-02	.1098E-01	.1457E-01	.1499E-01	.1499E-01
ORGANIC I133	.1410E+00	.3012E+00	.5486E+00	.1022E+01	.1676E+01	.1680E+01
ORGANIC I134	.7639E-03	.1340E-02	.1861E-02	.2011E-02	.2012E-02	.2012E-02
ORGANIC I135	.2307E-01	.4828E-01	.8525E-01	.1410E+00	.1728E+00	.1728E+00
PARTICULATE I131	.1232E+00	.1325E+00	.1414E+00	.1469E+00	.1620E+00	.1681E+00
PARTICULATE I132	.1032E-02	.1097E-32	.1147E-02	.1160E-02	.1161E-02	.1161E-02
PARTICULATE I133	.4151E-01	.4459E-01	.4749E-01	.4908E-01	.5130E-01	.5131E-01
PARTICULATE I134	.2461E-03	.2574E-03	.2637E-03	.2643E-03	.2643E-03	.2643E-03
PARTICULATE I135	.6851E-02	.7337E-02	.7772E-02	.7959E-02	.8065E-02	.8065E-02

TOTAL DOSE FOR 30 DAYS .1960E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588.10 GPM. CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4100E+04
FILTERED INLEAKAGE(CFM) .1300E+04
UNFILTERED INLEAKAGE(CFM) .4000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2677E+01	.2892E+01	.3231E+01	.3999E+01	.6130E+01	.6971E+01
ELEMENTAL I132	.4287E-01	.4435E-01	.4623E-01	.4793E-01	.4813E-01	.4813E-01
ELEMENTAL I133	.9040E+00	.9749E+00	.1085E+01	.1309E+01	.1625E+01	.1627E+01
ELEMENTAL I134	.5619E-02	.5874E-02	.6105E-02	.6176E-02	.6177E-02	.6177E-02
ELEMENTAL I135	.1499E+00	.1611E+00	.1775E+00	.2038E+00	.2190E+00	.2190E+00
ORGANIC I131	.4333E+00	.9337E+00	.1725E+01	.3516E+01	.8261E+01	.1003E+02
ORGANIC I132	.3503E-02	.6946E-02	.1134E-01	.1530E-01	.1576E-01	.1576E-01
ORGANIC I133	.1455E+00	.3109E+00	.5668E+00	.1089E+01	.1810E+01	.1814E+01
ORGANIC I134	.7883E-03	.1383E-02	.1921E-02	.2087E-02	.2088E-02	.2088E-02
ORGANIC I135	.2331E-01	.4982E-01	.8807E-01	.1495E+00	.1847E+00	.1847E+00

PARTICULATE	[131]	.1280E+00	.1377E+00	.1470E+00	.1537E+00	.1723E+00	.1798E+00
PARTICULATE	[132]	.1073E-02	.1140E-02	.1193E-02	.1208E-02	.1209E-02	.1209E-02
PARTICULATE	[133]	.4314E-01	.4635E-01	.4937E-01	.5132E-01	.5405E-01	.5407E-01
PARTICULATE	[134]	.2557E-03	.2675E-03	.2741E-03	.2747E-03	.2748E-03	.2748E-03
PARTICULATE	[135]	.7120E-02	.7625E-02	.8078E-02	.8309E-02	.8439E-02	.8439E-02

TOTAL DOSE FOR 30 DAYS .2114E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ 3588 10 GPM CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4100E+04
FILTERED INLEAKAGE(CFM) .1300E+04
UNFILTERED INLEAKAGE(CFM) .5000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL [131]	.2760E+01	.2981E+01	.3332E+01	.4171E+01	.6500E+01	.7420E+01
ELEMENTAL [132]	.2358E-01	.2510E-01	.2705E-01	.2891E-01	.2912E-01	.2912E-01
ELEMENTAL [133]	.9320E+00	.1005E+01	.1118E+01	.1363E+01	.1709E+01	.1711E+01
ELEMENTAL [134]	.5793E-02	.6056E-02	.6294E-02	.6372E-02	.6372E-02	.6372E-02
ELEMENTAL [135]	.1545E+00	.1660E+00	.1830E+00	.2118E+00	.2283E+00	.2283E+00
ORGANIC [131]	.4467E+00	.9629E+00	.1780E+01	.3738E+01	.8925E+01	.1086E+02
ORGANIC [132]	.3612E-02	.7161E-02	.1170E-01	.1603E-01	.1653E-01	.1653E-01
ORGANIC [133]	.1500E+00	.3205E+00	.5849E+00	.1156E+01	.1944E+01	.1949E+01
ORGANIC [134]	.8127E-03	.1426E-02	.1982E-02	.2163E-02	.2164E-02	.2164E-02
ORGANIC [135]	.2454E-01	.5136E-01	.9087E-01	.1581E+00	.1965E+00	.1965E+00
PARTICULATE [131]	.1328E+00	.1429E+00	.1526E+00	.1605E+00	.1826E+00	.1915E+00
PARTICULATE [132]	.1113E-02	.1185E-02	.1238E-02	.1256E-02	.1258E-02	.1258E-02
PARTICULATE [133]	.4477E-01	.4809E-01	.5124E-01	.5355E-01	.5679E-01	.5681E-01
PARTICULATE [134]	.2654E-03	.2776E-03	.2844E-03	.2852E-03	.2852E-03	.2852E-03
PARTICULATE [135]	.7388E-02	.7912E-02	.8384E-02	.8658E-02	.8811E-02	.8811E-02

TOTAL DOSE FOR 30 DAYS .2268E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ 3588 10 GPM CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4000E+04
FILTERED INLEAKAGE(CFM) .1400E+04
UNFILTERED INLEAKAGE(CFM) .0000E+00

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL [131]	.2385E+01	.2576E+01	.2876E+01	.3391E+01	.4821E+01	.5386E+01
ELEMENTAL [132]	.2038E-01	.2168E-01	.2336E-01	.2450E-01	.2463E-01	.2463E-01
ELEMENTAL [133]	.8055E+00	.8687E+00	.9656E+00	.1116E+01	.1328E+01	.1329E+01
ELEMENTAL [134]	.5007E-02	.5234E-02	.5439E-02	.5486E-02	.5486E-02	.5486E-02
ELEMENTAL [135]	.1336E+00	.1435E+00	.1580E+00	.1757E+00	.1858E+00	.1858E+00
ORGANIC [131]	.3861E+00	.8319E+00	.1530E+01	.2732E+01	.5917E+01	.7105E+01
ORGANIC [132]	.3121E-02	.6189E-02	.1008E-01	.1273E-01	.1304E-01	.1304E-01
ORGANIC [133]	.1297E+00	.2770E+00	.5029E+00	.8535E+00	.1337E+01	.1340E+01
ORGANIC [134]	.7024E-03	.1232E-02	.1707E-02	.1820E-02	.1821E-02	.1821E-02
ORGANIC [135]	.2121E-01	.4439E-01	.7816E-01	.1194E+00	.1430E+00	.1430E+00
PARTICULATE [131]	.1090E+00	.1173E+00	.1251E+00	.1269E+00	.1319E+00	.1339E+00
PARTICULATE [132]	.9138E-03	.9711E-03	.1015E-02	.1019E-02	.1020E-02	.1020E-02
PARTICULATE [133]	.3675E-01	.3948E-01	.4202E-01	.4754E-01	.4327E-01	.4327E-01
PARTICULATE [134]	.2178E-03	.2278E-03	.2334E-03	.2336E-03	.2336E-03	.2336E-03
PARTICULATE [135]	.6065E-02	.6495E-02	.6877E-02	.6938E-02	.6973E-02	.6973E-02

TOTAL DOSE FOR 30 DAYS .1572E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ 3588 10 GPM CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4000E+04
FILTERED INLEAKAGE(CFM) .1400E+04
UNFILTERED INLEAKAGE(CFM) .1000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL [131]	.2469E+01	.2667E+01	.2978E+01	.3566E+01	.5197E+01	.5841E+01
ELEMENTAL [132]	.2109E-01	.2246E-01	.2418E-01	.2549E-01	.2564E-01	.2564E-01
ELEMENTAL [133]	.8338E+00	.8992E+00	.9998E+00	.1171E+01	.1413E+01	.1415E+01
ELEMENTAL [134]	.5183E-02	.5418E-02	.5630E-02	.5684E-02	.5685E-02	.5685E-02
ELEMENTAL [135]	.1382E+00	.1485E+00	.1636E+00	.1838E+00	.1953E+00	.1953E+00
ORGANIC [131]	.3997E+00	.8611E+00	.1586E+01	.2957E+01	.6590E+01	.7945E+01
ORGANIC [132]	.3231E-02	.6406E-02	.1044E-01	.1347E-01	.1382E-01	.1382E-01

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   ORGANIC     I133          .1342E+00         .2867E+00         .5213E+00         .9212E+00         .1473E+01         .1476E+01
   ORGANIC     I134          .7270E-03         .1275E-02         .1770E-02         .1897E-02         .1897E-02         .1897E-02
   ORGANIC     I135          .2196E-01         .4595E-01         .8100E-01         .1281E+00         .1550E+00         .1550E+00
   PARTICULATE I131          .1139E+00         .1225E+00         .1308E+00         .1338E+00         .1423E+00         .1457E+00
   PARTICULATE I132          .9548E-03         .1015E-02         .1061E-02         .1068E-02         .1069E-02         .1069E-02
   PARTICULATE I133          .3839E-01         .4125E-01         .4391E-01         .4480E-01         .4605E-01         .4605E-01
   PARTICULATE I134          .2276E-03         .2381E-03         .2439E-03         .2442E-03         .2442E-03         .2442E-03
   PARTICULATE I135          .6337E-02         .6786E-02         .7186E-02         .7292E-02         .7351E-02         .7351E-02
TOTAL DOSE FOR 30 DAYS  .1728E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588 10 GPM. CORRECTED I-135
1     RECIRCULATION FLOW FROM CONTROL ROOM(CFM)  .4000E+04
      FILTERED INLEAKAGE(CFM)  .1400E+04
      UNFILTERED INLEAKAGE(CFM)  .2000E+02
              ISOTOPE .5 HOUR DOSE(REM)  1 HOUR DOSE(REM)  2 HOUR DOSE(REM)  8 HOUR DOSE(REM)  4 DAY DOSE(REM)  30 DAY DOSE(REM)

   ELEMENTAL   I131          .2552E+01         .2757E+01         .3079E+01         .3740E+01         .5571E+01         .6295E+01
   ELEMENTAL   I132          .2181E-01         .2322E-01         .2501E-01         .2647E-01         .2664E-01         .2664E-01
   ELEMENTAL   I133          .8620E+00         .9296E+00         .1034E+01         .1226E+01         .1498E+01         .1500E+01
   ELEMENTAL   I134          .5358E-02         .5601E-02         .5821E-02         .5882E-02         .5882E-02         .5882E-02
   ELEMENTAL   I135          .1429E+00         .1536E+00         .1691E+00         .1918E+00         .2048E+00         .2048E+00
   ORGANIC     I131          .4132E+00         .8902E+00         .1642E+01         .3182E+01         .7260E+01         .8782E+01
   ORGANIC     I132          .3340E-02         .6623E-02         .1080E-01         .1421E-01         .1460E-01         .1460E-01
   ORGANIC     I133          .1387E+00         .2964E+00         .5395E+00         .9886E+00         .1608E+01         .1612E+01
   ORGANIC     I134          .7516E-03         .1318E-02         .1831E-02         .1973E-02         .1974E-02         .1974E-02
   ORGANIC     I135          .2270E-01         .4751E-01         .8384E-01         .1367E+00         .1669E+00         .1669E+00
   PARTICULATE I131          .1188E+00         .1278E+00         .1364E+00         .1407E+00         .1527E+00         .1575E+00
   PARTICULATE I132          .9956E-03         .1058E-02         .1107E-02         .1116E-02         .1117E-02         .1117E-02
   PARTICULATE I133          .4004E-01         .4301E-01         .4580E-01         .4706E-01         .4882E-01         .4883E-01
   PARTICULATE I134          .2373E-03         .2482E-03         .2544E-03         .2548E-03         .2548E-03         .2548E-03
   PARTICULATE I135          .6608E-02         .7076E-02         .7495E-02         .7644E-02         .7727E-02         .7727E-02
TOTAL DOSE FOR 30 DAYS  .1882E+02

INPUT I:\NSL\MSA\CTRLR OM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRL :OOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588 10 GPM. CORRECTED I-135
1     RECIRCULATION FLOW FROM CONTROL ROOM(CFM)  .4000E+04
      FILTERED INLEAKAGE(CFM)  .1400E+04
      UNFILTERED INLEAKAGE(CFM)  .3C 'E+02
              ISOTOPE .5 HOUR DOSE(._M)  i HOUR DOSE(REM)  2 HOUR DOSE(REM)  8 HOUR DOSE(REM)  4 DAY DOSE(REM)  30 DAY DOSE(REM)

   ELEMENTAL   I131          .2636E+01         .2847E+01         .3181E+01         .3913E+01         .5944E+01         .6746E+01
   ELEMENTAL   I132          .2252E-01         .2397E-01         .2583E-01         .2745E-01         .2763E-01         .2763E-01
   ELEMENTAL   I133          .8900E+00         .9598E+00         .1068E+01         .1281E+01         .1583E+01         .1585E+01
   ELEMENTAL   I134          .5532E-02         .5783E-02         .6011E-02         .6078E-02         .6079E-02         .6079E-02
   ELEMENTAL   I135          .1476E+00         .1586E+00         .1747E+00         .1998E+00         .2143E+00         .2143E+00
   ORGANIC     I131          .4266E+00         .9192E+00         .1697E+01         .3405E+01         .7928E+01         .9615E+01
   ORGANIC     I132          .3449E-02         .6839E-02         .1116E-01         .1494E-01         .1537E-01         .1537E-01
   ORGANIC     I133          .1433E+00         .3060E+00         .5577E+00         .1056E+01         .1743E+01         .1747E+01
   ORGANIC     I134          .7761E-03         .1361E-02         .1891E-02         .2049E-02         .2050E-02         .2050E-02
   ORGANIC     I135          .2344E-01         .4905E-01         .8666E-01         .1453E+00         .1788E+00         .1788E+00
   PARTICULATE I131          .1236E+00         .1330E+00         .1420E+00         .1476E+00         .1630E+00         .1693E+00
   PARTICULATE I132          .1036E-02         .1101E-02         .1152E-02         .1165E-02         .1166E-02         .1166E-02
   PARTICULATE I133          .4167E-01         .4477E-01         .4768E-01         .4931E-01         .5158E-01         .5159E-01
   PARTICULATE I134          .2470E-03         .2584E-03         .2648E-03         .2653E-03         .2653E-03         .2653E-03
   PARTICULATE I135          .6878E-02         .7366E-02         .7803E-02         .7995E-02         .8102E-02         .8102E-02
TOTAL DOSE FOR 30 DAYS  .2037E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ. 3588 10 GPM. CORRECTED I-135
1     RECIRCULATION FLOW FROM CONTROL ROOM(CFM)  .4000E+04
      FILTERED INLEAKAGE(CFM)  .1400E+04
      UNFILTERED INLEAKAGE(CFM)  .4000E+02
              ISOTOPE .5 HOUR DOSE(REM)  1 HOUR DOSE(REM)  2 HO'' DOSE(REM)  8 HOUR DOSE(REM)  4 DAY DOSE(REM)  30 DAY DOSE(REM)

   ELEMENTAL   I131          .2718E+01         .2936E+01         .3281E+01         .4085E+01         .6315E+01         .7196E+01
   ELEMENTAL   I132          .2323E-01         .2473E-01         .2664E-01         .2842E-01         .2863E-01         .2863E-01
   ELEMENTAL   I133          .9180E+00         .9900E+00         .1102E+01         .1336E+01         .1667E+01         .1669E+01
   ELEMENTAL   I134          .5706E-02         .5965E-02         .6200E-02         .6274E-02         .6275E-02         .6275E-02
```

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ELEMENTAL	I135	.1522E+00	.1635E+00	.1802E+00	.2078E+00	.2237E+00	.2237E+00
ORGANIC	I131	.4400E+00	.9481E+00	.1753E+01	.3627E+01	.8694E+01	.1045E+02
ORGANIC	I132	.3558E-02	.7084E-02	.1153E-01	.1567E-01	.1619E-01	.1619E-01
ORGANIC	I133	.1478E+00	.3157E+00	.5759E+00	.1122E+01	.1877E+01	.1882E+01
ORGANIC	I134	.8005E-03	.1404E-02	.1952E-02	.2125E-02	.2126E-02	.2126E-02
ORGANIC	I135	.2418E-01	.5060E-01	.8947E-01	.1538E+00	.1906E+00	.1906E+00
PARTICULATE	I131	.1285E+00	.1382E+00	.1476E+00	.1544E+00	.1733E+00	.1810E+00
PARTICULATE	I132	.1077E-02	.1144E-02	.1197E-02	.1213E-02	.1214E-02	.1214E-02
PARTICULATE	I133	.4330E-01	.4652E-01	.4956E-01	.5155E-01	.5433E-01	.5434E-01
PARTICULATE	I134	.2567E-03	.2685E-03	.2751E-03	.2758E-03	.2758E-03	.2758E-03
PARTICULATE	I135	.7147E-02	.7654E-02	.8109E-02	.8344E-02	.8476E-02	.8476E-02

TOTAL DOSE FOR 30 DAYS .2191E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ 3588 10 GPM CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .4000E+04
FILTERED INLEAKAGE(CFM) .1400E+04
UNFILTERED INLEAKAGE(CFM) .5000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2801E+01	.3025E+01	.3382E+01	.4257E+01	.6685E+01	.7644E+01
ELEMENTAL I132	.2398E-01	.2548E-01	.2744E-01	.2939E-01	.2981E-01	.2981E-01
ELEMENTAL I133	.9459E+00	.1020E+01	.1135E+01	.1391E+01	.1751E+01	.1753E+01
ELEMENTAL I134	.5880E-02	.6146E-02	.6389E-02	.6470E-02	.6470E-02	.6470E-02
ELEMENTAL I135	.1568E+00	.1685E+00	.1857E+00	.2158E+00	.2330E+00	.2330E+00
ORGANIC I131	.4534E+00	.9769E+00	.1808E+01	.3849E+01	.9256E+01	.1127E+02
ORGANIC I132	.3666E-02	.7268E-02	.1188E-01	.1640E-01	.1692E-01	.1692E-01
ORGANIC I133	.1523E+00	.3252E+00	.5940E+00	.1189E+01	.2011E+01	.2016E+01
ORGANIC I134	.8248E-03	.1447E-02	.2012E-02	.2200E-02	.2201E-02	.2201E-02
ORGANIC I135	.2491E-01	.5213E-01	.9227E-01	.1623E+00	.2024E+00	.2024E+00
PARTICULATE I131	.1333E+00	.1434E+00	.1531E+00	.1612E+00	.1836E+00	.1927E+00
PARTICULATE I132	.1117E-02	.1187E-02	.1242E-02	.1260E-02	.1262E-02	.1262E-02
PARTICULATE I133	.4493E-01	.4827E-01	.5142E-01	.5378E-01	.5706E-01	.5709E-01
PARTICULATE I134	.2663E-03	.2786E-03	.2855E-03	.2863E-03	.2863E-03	.2863E-03
PARTICULATE I135	.7415E-02	.7941E-02	.8414E-02	.8692E-02	.8849E-02	.8849E-02

TOTAL DOSE FOR 30 DAYS .2344E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ 3588 10 GPM CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .3900E+04
FILTERED INLEAKAGE(CFM) .1500E+04
UNFILTERED INLEAKAGE(CFM) .0000E+00

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2427E+01	.2622E+01	.2927E+01	.3479E+01	.5009E+01	.5614E+01
ELEMENTAL I132	.2074E-01	.2208E-01	.2377E-01	.2499E-01	.2513E-01	.2513E-01
ELEMENTAL I133	.8196E+00	.8839E+00	.9827E+00	.1144E+01	.1321E+01	.1323E+01
ELEMENTAL I134	.5095E-02	.5326E-02	.5534E-02	.5585E-02	.5586E-02	.5586E-02
ELEMENTAL I135	.1359E+00	.1460E+00	.1608E+00	.1797E+00	.1906E+00	.1906E+00
ORGANIC I131	.3929E+00	.8465E+00	.1558E+01	.2845E+01	.6254E+01	.7525E+01
ORGANIC I132	.3176E-02	.6298E-02	.1026E-01	.1310E-01	.1343E-01	.1343E-01
ORGANIC I133	.1319E+00	.2818E+00	.5121E+00	.8874E+00	.1405E+01	.1408E+01
ORGANIC I134	.7147E-03	.1254E-02	.1739E-02	.1858E-02	.1859E-02	.1859E-02
ORGANIC I135	.2158E-01	.4517E-01	.7958E-01	.1237E+00	.1490E+00	.1490E+00
PARTICULATE I131	.1095E+00	.1178E+00	.1257E+00	.1276E+00	.1328E+00	.1351E+00
PARTICULATE I132	.9173E-03	.9754E-03	.1020E-02	.1024E-02	.1025E-02	.1025E-02
PARTICULATE I133	.3691E-01	.3965E-01	.4221E-01	.4277E-01	.4355E-01	.4355E-01
PARTICULATE I134	.2188E-03	.2289E-03	.2345E-03	.2347E-03	.2347E-03	.2347E-03
PARTICULATE I135	.6092E-02	.6524E-02	.6908E-02	.6974E-02	.7010E-02	.7010E-02

TOTAL DOSE FOR 30 DAYS .1649E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ 3588 10 GPM CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .3900E+04
FILTERED INLEAKAGE(CFM) .1500E+04
UNFILTERED INLEAKAGE(CFM) .1000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL I131	.2511E+01	.2712E+01	.3029E+01	.3653E+01	.5384E+01	.6068E+01

ELEMENTAL	132	.2145E-01	.2284E-01	.2460E-01	.2598E-01	.2614E-01	.2614E-01
ELEMENTAL	133	.8479E+00	.9144E+00	.1017E+01	.1199E+01	.1456E+01	.1457E+01
ELEMENTAL	134	.5270E-02	.5510E-02	.5725E-02	.5783E-02	.5783E-02	.5783E-02
ELEMENTAL	135	.1406E+00	.1510E+00	.1664E+00	.1878E+00	.2001E+00	.2001E+00
ORGANIC	131	.4064E+00	.4757E+00	.6141E+01	.3070E+01	.6926E+01	.8364E+01
ORGANIC	132	.3286E-02	.6515E-02	.1062E-01	.1384E-01	.1421E-01	.1421E-01
ORGANIC	133	.1365E+00	.2915E+00	.5304E+00	.9549E+00	.1841E+01	.1844E+01
ORGANIC	134	.7393E-03	.1297E-02	.1800E-02	.1935E-02	.1936E-02	.1936E-02
ORGANIC	135	.2233E-01	.4673E-01	.8242E-01	.1324E+00	.1609E+00	.1609E+00
PARTICULATE	131	.1144E+00	.1231E+00	.1313E+00	.1345E+00	.1433E+00	.1469E+00
PARTICULATE	132	.9589E-03	.1019E-02	.1066E-02	.1073E-02	.1074E-02	.1074E-02
PARTICULATE	133	.3856E-01	.4142E-01	.4410E-01	.4503E-01	.4632E-01	.4633E-01
PARTICULATE	134	.2286E-03	.2391E-03	.2450E-03	.2453E-03	.2453E-03	.2453E-03
PARTICULATE	135	.6364E-02	.6815E-02	.7217E-02	.7327E-02	.7388E-02	.7388E-02

TOTAL DOSE FOR 30 DAYS .1804E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ, 3588.10 GPM, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .3900E+04
FILTERED INLEAKAGE(CFM) .1500E+04
UNFILTERED INLEAKAGE(CFM) .2000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL	131	.2594E+01	.2802E+01	.3130E+01	.3826E+01	.5758E+01	.6521E+01
ELEMENTAL	132	.2316E-01	.2358E-01	.2547E-01	.2696E-01	.2713E-01	.2713E-01
ELEMENTAL	133	.8760E+00	.9447E+00	.1051E+01	.1254E+01	.1540E+01	.1542E+01
ELEMENTAL	134	.5445E-02	.5692E-02	.5916E-02	.5980E-02	.5980E-02	.5980E-02
ELEMENTAL	135	.1452E+00	.1561E+00	.1719E+00	.1958E+00	.2095E+00	.2095E+00
ORGANIC	131	.4199E+00	.9047E+00	.1670E+01	.3293E+01	.7595E+01	.9199E+01
ORGANIC	132	.3395E-02	.6731E-02	.1098E-01	.1457E-01	.1499E-01	.1499E-01
ORGANIC	133	.1410E+00	.3012E+00	.5486E+00	.1022E+01	.1676E+01	.1680E+01
ORGANIC	134	.7638E-03	.1340E-02	.1861E-02	.2011E-02	.2012E-02	.2012E-02
ORGANIC	135	.2307E-01	.4828E-01	.8525E-01	.1410E+00	.1728E+00	.1728E+00
PARTICULATE	131	.1193E+00	.1283E+00	.1370E+00	.1414E+00	.1537E+00	.1587E+00
PARTICULATE	132	.9997E-03	.1062E-02	.1111E-02	.1121E-02	.1122E-02	.1122E-02
PARTICULATE	133	.4020E-01	.4319E-01	.4599E-01	.4728E-01	.4909E-01	.4910E-01
PARTICULATE	134	.2383E-03	.2493E-03	.2554E-03	.2558E-03	.2558E-03	.2558E-03
PARTICULATE	135	.6635E-02	.7105E-02	.7526E-02	.7679E-02	.7765E-02	.7765E-02

TOTAL DOSE FOR 30 DAYS .1959E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ, 3588.10 GPM, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .3900E+04
FILTERED INLEAKAGE(CFM) .1500E+04
UNFILTERED INLEAKAGE(CFM) .3000E+02

ISOTOPE	.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL	131	.2677E+01	.2892E+01	.3231E+01	.3999E+01	.6130E+01	.6971E+01
ELEMENTAL	132	.2287E-01	.2435E-01	.2623E-01	.2793E-01	.2813E-01	.2813E-01
ELEMENTAL	133	.9040E+00	.9749E+00	.1085E+01	.1309E+01	.1625E+01	.1627E+01
ELEMENTAL	134	.5619E-02	.5874E-02	.6105E-02	.6176E-02	.6177E-02	.6177E-02
ELEMENTAL	135	.1499E+00	.1611E+00	.1775E+00	.2038E+00	.2190E+00	.2190E+00
ORGANIC	131	.4333E+00	.9337E+00	.1725E+01	.3516E+01	.8261E+01	.1003E+02
ORGANIC	132	.3503E-02	.6946E-02	.1134E-01	.1530E-01	.1576E-01	.1576E-01
ORGANIC	133	.1455E+00	.3109E+00	.5668E+00	.1089E+01	.1810E+01	.1814E+01
ORGANIC	134	.7883E-03	.1383E-02	.1921E-02	.2087E-02	.2088E-02	.2088E-02
ORGANIC	135	.2381E-01	.4982E-01	.8797E-01	.1495E+00	.1847E+00	.1847E+00
PARTICULATE	131	.1241E+00	.1335E+00	.1426E+00	.1482E+00	.1641E+00	.1705E+00
PARTICULATE	132	.1040E-02	.1106E-02	.1157E-02	.1169E-02	.1171E-02	.1171E-02
PARTICULATE	133	.4184E-01	.4494E-01	.4787E-01	.4953E-01	.5185E-01	.5187E-01
PARTICULATE	134	.2480E-03	.2594E-03	.2658E-03	.2664E-03	.2664E-03	.2664E-03
PARTICULATE	135	.6905E-02	.7395E-02	.7833E-02	.8030E-02	.8140E-02	.8140E-02

TOTAL DOSE FOR 30 DAYS .2113E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ, 3588.10 GPM, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .3900E+04
FILTERED INLEAKAGE(CFM) .1500E+04
UNFILTERED INLEAKAGE(CFM) .4000E+02

0 0 0 3 1 6 0 0 3 7

0 0 0 3 1 6 0 0 3 7

ISOTOPE		.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL	I131	.2760E+01	.2981E+01	.3332E+01	.4171E+01	.6500E+01	.7420E+01
ELEMENTAL	I132	.2338E-01	.2510E-01	.2705E-01	.2691E-01	.2912E-01	.2912E-01
ELEMENTAL	I133	.9320E+00	.1005E+01	.1118E+01	.1364E+01	.1709E+01	.1711E+01
ELEMENTAL	I134	.5793E-02	.6056E-02	.6294E-02	.6374E-02	.6374E-02	.6374E-02
ELEMENTAL	I135	.1545E+00	.1660E+00	.1830E+00	.2118E+00	.2283E+00	.2283E+00
ORGANIC	I131	.4467E+00	.9625E+00	.1780E+01	.3738E+01	.8925E+01	.1086E+02
ORGANIC	I132	.3612E-02	.7161E-02	.1170E-01	.1603E-01	.1653E-01	.1653E-01
ORGANIC	I133	.1501E+00	.3205E+00	.5849E+00	.1156E+01	.1944E+01	.1949E+01
ORGANIC	I134	.8127E-03	.1426E-02	.1982E-02	.2163E-02	.2164E-02	.2164E-02
ORGANIC	I135	.2454E-01	.5136E-01	.9087E-01	.1681E+00	.1965E+00	.1965E+00
PARTICULATE	I131	.1290E+00	.1387E+00	.1 31E+00	.1551E+00	.1744E+00	.1822E+00
PARTICULATE	I132	.1081E-02	.1149E-02	.1 32E-02	.1217E-02	.1219E-02	.1219E-02
PARTICULATE	I133	.4347E-01	.4670E-01	.4974E-01	.5177E-01	.5460E-01	.5462E-01
PARTICULATE	I134	.2577E-03	.2695E-03	.2762E-03	.2768E-03	.2768E-03	.2768E-03
PARTICULATE	I135	.7174E-02	.7683E-02	.8140E-02	.8379E-02	.8513E-02	.8513E-02

TOTAL DOSE FOR 30 DAYS .2267E+02

INPUT I:\NSL\MSA\CTRLROOM\THYFINAL.FOR
OUTPUT I:\NSL\MSA\CTRLROOM\THYFINAL.OUT
FINAL CASE: NEW XQ, 3588.10 GPM, CORRECTED I-135
1 RECIRCULATION FLOW FROM CONTROL ROOM(CFM) .3900E+04
FILTERED INLEAKAGE(CFM) .1500E+04
UNFILTERED INLEAKAGE(CFM) .5000E+02

ISOTOPE		.5 HOUR DOSE(REM)	1 HOUR DOSE(REM)	2 HOUR DOSE(REM)	8 HOUR DOSE(REM)	4 DAY DOSE(REM)	30 DAY DOSE(REM)
ELEMENTAL	I131	.2842E+01	.3070E+01	.3432E+01	.4343E+01	.6870E+01	.7868E+01
ELEMENTAL	I132	.2428E-01	.2585E-01	.2786E-01	.2987E-01	.3011E-01	.3011E-01
ELEMENTAL	I133	.9598E+00	.1035E+01	.1152E+01	.1418E+01	.1793E+01	.1795E+01
ELEMENTAL	I134	.5966E-02	.6237E-02	.6483E-02	.6567E-02	.6567E-02	.6567E-02
ELEMENTAL	I135	.1591E+00	.1710E+00	.1 35E+00	.2197E+00	.2377E+00	.2377E+00
ORGANIC	I131	.4601E+00	.9912E+00	.1 33E+01	.3959E+01	.9587E+01	.1169E+02
ORGANIC	I132	.3719E-02	.7375E-02	.1206E-01	.1676E-01	.1730E-01	.1730E-01
ORGANIC	I133	.1545E+00	.3300E+00	.6030E+00	.1222E+01	.2078E+01	.2083E+01
ORGANIC	I134	.8369E-03	.1468E-02	.2042E-02	.2238E-02	.2239E-02	.2239E-02
ORGANIC	I135	.2528E-01	.5290E-01	.9367E-01	.1666E+00	.2082E+00	.2082E+00
PARTICULATE	I131	.1338E+00	.1439E+00	.1537E+00	.1619E+00	.1846E+00	.1939E+00
PARTICULATE	I132	.1121E-02	.1192E-02	.1247E-02	.1265E-02	.1267E-02	.1267E-02
PARTICULATE	I133	.4509E-01	.4844E-01	.5161E-01	.5400E-01	.5734E-01	.5736E-01
PARTICULATE	I134	.2673E-03	.2796E-03	.2865E-03	.2873E-03	.2873E-03	.2873E-03
PARTICULATE	I135	.7442E-02	.7970E-02	.8445E-02	.8727E-02	.8886E-02	.8886E-02

TOTAL DOSE FOR 30 DAYS .2419E+02

0 0 1 0 0 1 3 0 0 0 3 8

0 0 2 1 3 0 0 0 3 8

P.17/1

Mary C.
Dan
8-12-

ENGINEERING DEPT.
AMERICAN ELECTRIC POWER SERVICE CORP.
1 RIVERSIDE PLAZA
COLUMBUS, OHIO

0 0 2 0 0 1 3 0 0 SHEET 9 OF
DATE 8/5/94 BY MLA CK. WSM
COMPANY G.O.
PLANT

SUBJECT

Attachment 8

Whole Body / Skin Dose Results

@ 3519 cfm Inleakage

INPUT:NOBFlim.FOR; OUTPUT:NOBFlim.OUT
final code, run at 3313+200 cfm
THE AIR FLOW TO THE CONTROL ROOM IS 3513. CFM

NUCLIDE	WHOLE BODY	BETA SKIN
KR85M	.1527D-01	.5334D+00
KR85	.5701D-04	.1326D+00
KR87	.4354D-01	.2000D+01
KR88	.3394D+00	.1530D+01
XE131M	.1951D-03	.2834D-01
XE133M	.1320D-01	.1467D+01
XE133	.1436D+00	.4157D+01
XE135M	.3122D-02	.1991D-01
XE135	.6499D-01	.1870D+01
XE138	.3150D-01	.4113D+00

TOTAL WHOLEBODY DOSE FOR 30 DAYS IS .6549D+00 REM

TOTAL SKINDOSE FOR 30 DAYS IS .1215D+02 REM

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