

Pennsylvania Power & Light Company

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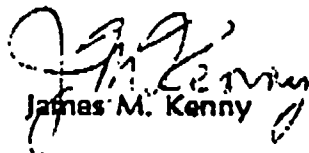
February 2, 1994

Mr. Joseph W. Shea
U.S. Nuclear Regulatory Commission

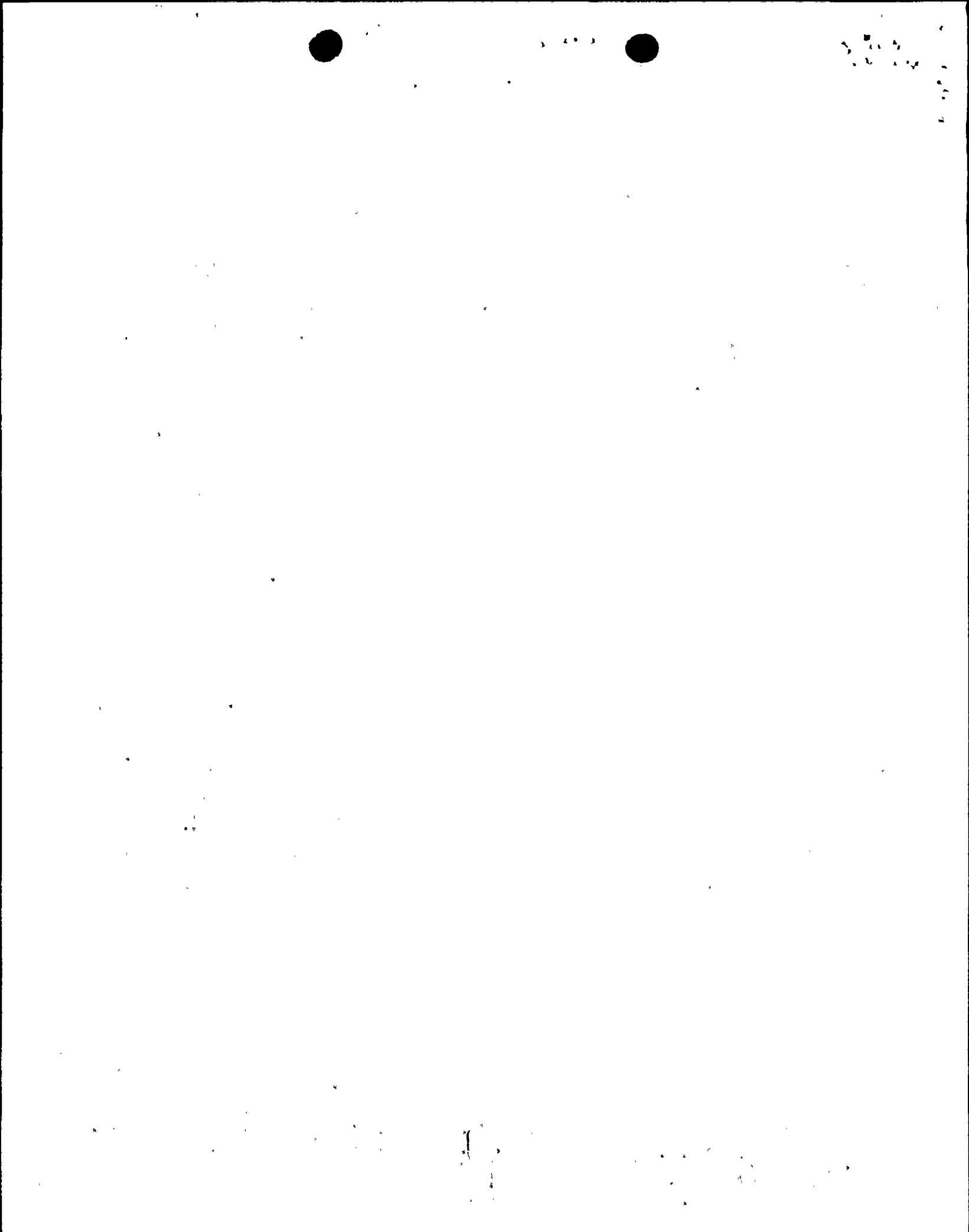
Attached is our response to three of the four requests for information on our analysis of radiological impacts resulting from the loss of spent fuel pool cooling postulated events. We are working on the question of impact of refueling floor drains on operator exposure and expect to have results by the end of the week.

You will note some of the information is draft in that it is not in a finished calculation. If there are substantive changes in the finished calculation, I will provide you with a revised document.

Any questions please call me at 610-774-7904.


James M. Kenny

Attachment



SUSQUEHANNA STEAM ELECTRIC STATION UNITS 1 & 2

CONTAINMENT ILRT RESULTS BASED ON TOTAL TIME @ 95% UPPER CONFIDENCE LIMIT

UNIT 1 CONTAINMENT ILRT RESULTS		
ILRT TEST DATE	AS-FOUND CONTAINMENT LEAKAGE RATE (%/day)	AS-LEFT CONTAINMENT LEAKAGE RATE (%/day)
5/5/92	0.715	0.606
5/30/89	0.745	0.665
6/1/85	0.755	0.425

UNIT 2 CONTAINMENT ILRT RESULTS		
ILRT TEST DATE	AS-FOUND CONTAINMENT LEAKAGE RATE (%/day)	AS-LEFT CONTAINMENT LEAKAGE RATE (%/day)
10/31/92	0.481	0.337
11/3/89	0.515	0.471
6/10/86	2.6	0.629
11/2/83	----	0.432

The primary containment design leakage rate is 1 %/day. For the FSAR licensing basis DBA-LOCA analysis this leakage rate is assumed for the duration of the accident. For the analysis of operator access doses inside the reactor building to address postulated post-LOCA fuel pool boiling concerns, a time dependent realistic containment leakage rate based on containment Integrated Leakage Rate Testing (ILRT) results and the calculated containment post-LOCA pressure response is used for both the clad damage and 100% fuel melt cases. The ILRT test pressure corresponds to the maximum calculated containment post-LOCA pressure with a design margin applied. The realistic containment leakage rate was calculated by reducing the ILRT measured leakage rate proportionately to the ILRT test pressure and the calculated containment pressure response for a LOCA.

A comparison of ILRT test results for Units 1 and 2 for leakage tests performed since 1983 is given in the above Tables. It can be seen that measured leakage rates vary between 0.337 %/day and 2.60 %/day. For the analysis of operator access doses inside the reactor building to address postulated post-LOCA fuel pool boiling concerns, the most up-to-date leakage rate data was used so that the dose estimates reflect the most up-to-date containment leakage conditions. Therefore, the measured leakage rate of 0.606%/day from the Unit 1 ILRT performed 5/5/92 was assumed. With the exception of the Unit 2 test dated 6/10/86 where two containment isolation valves failed to seal, 0.606%/day is also representative of typical measured leakage rates at SSES Units 1 & 2 as can be seen by comparing the test results given above.

SUMMARY OF CALCULATED OPERATOR ACCESS DOSES TO CHECK SPENT FUEL POOL WATER LEVEL

-- REACTOR BUILDING UNITS 1 & 2 -- REFUELING FLOOR ELEVATION 818'-1"

DOSE LOCATION/ SOURCE	OPERATOR ACCESS DOSES AT 24 HOURS POST-LOCA (R)					
	100% CLAD DAMAGE		1% CLAD DAMAGE (1)		100% FUEL MELT	
	Dose From Airborne Activity	Dose From Contained Sources	Dose From Airborne Activity	Dose From Contained Sources	Dose From Airborne Activity	Dose From Contained Sources
Ingress/Egress To Refueling Floor -- Elev. 818'-1"	0.0584	0.0144	5.84-4	1.44-4	1.598	0.146
Operator Stay Time On Refueling Floor -- Elev. 818'-1" (2)	0.0973	0.	9.73-4	0.	2.66	0.
Totals	0.156	0.0144	1.56-3	1.44-4	4.258	0.146
Total Ingress/Egress	0.0728		7.28-4		1.744	
Total Operator Stay Time	0.0973		9.73-4		2.66	
TOTAL ACCESS DOSE	0.17		1.70-3		4.40	

- NOTES:
- (1) Post-LOCA radiation doses for the 1% clad damage case are obtained by multiplying the 100% clad damage doses by a factor of 0.01 .
 - (2) A total stay time at the spent fuel pools of two minutes is used and is based on conservatively assuming that one minute is required at each spent fuel pool to check the water level.

POST-LOCA ACTIVITY SOURCE TERMS IN REACTOR BUILDING AND SUPPRESSION POOL

Summary Of TACT5 Computer Code Output Edit At End Of 24 Hours

CONTAINMENT LEAKAGE = 0.0371%/DAY @ CONTAINMENT TEST PRESSURE OF 45. PSIG
(BASED ON MEASURED DATA WITH AIR SEAL LEAKAGE ONLY;
LEAKAGE REDUCED FOR CONTAINMENT PRESSURE DECAY)

CONTAINMENT POST-LOCA PRESSURE & TEMPERATURE: FSAR FIGURES 6.2-2, 6.2-3

POST-LOCA ACTIVITY RELEASE: REGULATORY GUIDE 1.3

ESF LEAKAGE INSIDE REACTOR BUILDING: NONE

REACTOR BUILDING NODE IS LABELED SEC CONT
SUPPRESSION POOL NODE IS LABELED SUP POOL

NOTE: The TACT5 activity source terms listed below for this case were used to evaluate operator access doses inside the reactor building.

ACTIVITY RELEASED TO ENVIRONMENT AND IN EACH NODE AT END OF... 2.400E+01 (HRS)

ISO NAM	ENV.	PRI CONT	SEC CONT	SUP POOL
I 131	1.736E+03	1.808E+07	7.645E+03	3.621E+07
I 131	7.631E+01	7.949E+05	3.360E+02	1.591E+06
I 131	9.539E+01	9.936E+05	4.200E+02	1.989E+06
I 132	3.708E+02	2.361E+04	9.979E+00	4.726E+04
I 132	1.630E+01	1.038E+03	4.387E-01	2.078E+03
I 132	2.037E+01	1.297E+03	5.483E-01	2.597E+03
I 133	2.786E+03	1.992E+07	8.421E+03	3.988E+07
I 133	1.224E+02	8.756E+05	3.702E+02	1.753E+06
I 133	1.531E+02	1.095E+06	4.627E+02	2.191E+06
I 134	2.348E+02	2.255E-01	9.532E-05	4.514E-01
I 134	1.032E+01	9.911E-03	4.190E-06	1.984E-02
I 134	1.290E+01	1.239E-02	5.237E-06	2.480E-02
I 135	1.342E+03	3.377E+06	1.428E+03	6.761E+06
I 135	5.898E+01	1.484E+05	6.275E+01	2.972E+05
I 135	7.372E+01	1.855E+05	7.844E+01	3.715E+05
KR 83M	4.269E+02	1.875E+03	7.926E-01	4.618E-28
KR 85M	4.768E+03	1.014E+06	4.285E+02	1.665E-25
KR 85	9.100E+02	1.417E+06	5.989E+02	6.409E-22
KR 87	1.333E+03	1.610E+02	6.807E-02	5.452E-29
KR 88	6.166E+03	2.909E+05	1.230E+02	5.796E-26
KR 89	4.191E+01	0.000E-01	0.000E-01	0.000E-01
XE 131M	5.561E+02	8.461E+05	3.577E+02	1.265E-24
XE 133M	2.568E+03	3.536E+06	1.495E+03	1.266E-24
XE 133	1.153E+05	1.703E+08	7.198E+04	1.136E-22
XE 135M	9.892E+01	9.196E-21	3.888E-24	0.000E-01
XE 135	4.475E+04	3.039E+07	1.285E+04	4.782E-24
XE 137	6.668E+01	0.000E-01	0.000E-01	0.000E-01
XE 138	3.374E+02	5.208E-18	2.202E-21	0.000E-01

POST-LOCA ACTIVITY SOURCE TERMS IN REACTOR BUILDING AND SUPPRESSION POOL

Summary Of TACT5 Computer Code Output Edit At End Of 24 Hours

CONTAINMENT LEAKAGE - 0.0371%/DAY @ CONTAINMENT TEST PRESSURE OF 45. PSIG
(BASED ON MEASURED DATA WITH AIR SEAL LEAKAGE ONLY;
LEAKAGE REDUCED FOR CONTAINMENT POST-LOCA PRESSURE
DECAY)

CONTAINMENT POST-LOCA PRESSURE & TEMPERATURE: FSAR FIGURES 6.2-2, 6.2-3

POST-LOCA ACTIVITY RELEASE: REGULATORY GUIDE 1.3

ESF LEAKAGE INSIDE REACTOR BUILDING: 5 gpm

REACTOR BUILDING NODE IS LABELED SEC CONT
SUPPRESSION POOL NODE IS LABELED SUP POOL

NOTE: The TACT5 activity source terms listed below for this case were not used to evaluate operator access doses inside the reactor building and are provided for information only.

ACTIVITY RELEASED TO ENVIRONMENT AND IN EACH NODE AT END OF... 2.400E+01 (HRS)

ISO NAM	ENV.	PRI CONT	SEC CONT	SUP POOL
I 131	1.896E+03	1.808E+07	1.936E+04	3.593E+07
I 131	8.332E+01	7.949E+05	8.509E+02	1.580E+06
I 131	1.042E+02	9.936E+05	1.064E+03	1.974E+06
I 132	3.847E+02	2.361E+04	2.527E+01	4.691E+04
I 132	1.691E+01	1.038E+03	1.111E+00	2.062E+03
I 132	2.114E+01	1.297E+03	1.389E+00	2.577E+03
I 133	3.021E+03	1.992E+07	2.133E+04	3.959E+07
I 133	1.328E+02	8.756E+05	9.374E+02	1.740E+06
I 133	1.660E+02	1.095E+06	1.172E+03	2.175E+06
I 134	2.390E+02	2.255E-01	2.414E-04	4.481E-01
I 134	1.050E+01	9.911E-03	1.061E-05	1.969E-02
I 134	1.313E+01	1.239E-02	1.326E-05	2.462E-02
I 135	1.432E+03	3.377E+06	3.615E+03	6.710E+06
I 135	6.294E+01	1.484E+05	1.589E+02	2.950E+05
I 135	7.868E+01	1.855E+05	1.986E+02	3.687E+05
KR 83M	4.269E+02	1.875E+03	7.926E-01	0.000E-01
KR 85M	4.768E+03	1.014E+06	4.285E+02	5.874E-29
KR 85	9.100E+02	1.417E+06	5.989E+02	8.205E-30
KR 87	1.333E+03	1.610E+02	6.807E-02	0.000E-01
KR 88	6.166E+03	2.909E+05	1.230E+02	3.157E-29
KR 89	4.191E+01	0.000E-01	0.000E-01	0.000E-01
XE 131M	5.561E+02	8.461E+05	3.577E+02	5.185E-30
XE 133M	2.568E+03	3.536E+06	1.495E+03	3.229E-29
XE 133	1.153E+05	1.703E+08	7.198E+04	1.373E-27
XE 135M	9.892E+01	9.196E-21	3.888E-24	0.000E-01
XE 135	4.475E+04	3.039E+07	1.285E+04	7.679E-28
XE 137	6.668E+01	0.000E-01	0.000E-01	0.000E-01
XE 138	3.374E+02	5.208E-18	2.202E-21	0.000E-01

POST-LOCA ACTIVITY SOURCE TERMS IN REACTOR BUILDING AND SUPPRESSION POOL

Summary Of TACT5 Computer Code Output Edit At End Of 24 Hours

CONTAINMENT LEAKAGE = 1.0%/DAY @ CONTAINMENT DESIGN PRESSURE OF 53. PSIG
(DESIGN LEAKAGE REDUCED FOR CONTAINMENT PRESSURE
DECAY)

CONTAINMENT POST-LOCA PRESSURE & TEMPERATURE: FSAR FIGURES 6.2-2, 6.2-3

POST-LOCA ACTIVITY RELEASE: REGULATORY GUIDE 1.3

ESF LEAKAGE INSIDE REACTOR BUILDING: NONE

REACTOR BUILDING NODE IS LABELED SEC CONT
SUPPRESSION POOL NODE IS LABELED SUP POOL

NOTE: The TACT5 activity source terms listed below for this case were not used to evaluate operator access doses inside the reactor building and are provided for information only.

ACTIVITY RELEASED TO ENVIRONMENT AND IN EACH NODE AT END OF... 2.400E+01 (HRS)

ISO NAM	ENV.	PRI CONT	SEC CONT	SUP POOL
I 131	2.475E+03	1.796E+07	6.202E+04	3.621E+07
I 131	1.088E+02	7.893E+05	2.726E+03	1.591E+06
I 131	1.360E+02	9.867E+05	3.408E+03	1.989E+06
I 132	4.366E+02	2.344E+04	8.096E+01	4.726E+04
I 132	1.919E+01	1.030E+03	3.559E+00	2.078E+03
I 132	2.399E+01	1.288E+03	4.449E+00	2.597E+03
I 133	3.876E+03	1.978E+07	6.832E+04	3.988E+07
I 133	1.704E+02	8.695E+05	3.003E+03	1.753E+06
I 133	2.129E+02	1.087E+06	3.754E+03	2.191E+06
I 134	2.552E+02	2.239E-01	7.733E-04	4.514E-01
I 134	1.122E+01	9.842E-03	3.399E-05	1.984E-02
I 134	1.402E+01	1.230E-02	4.249E-05	2.480E-02
I 135	1.762E+03	3.353E+06	1.158E+04	6.761E+06
I 135	7.744E+01	1.474E+05	5.091E+02	2.972E+05
I 135	9.680E+01	1.842E+05	6.363E+02	3.715E+05
KR 83M	2.517E+03	1.862E+03	6.430E+00	4.821E-28
KR 85M	3.190E+04	1.007E+06	3.477E+03	1.733E-25
KR 85	6.545E+03	1.407E+06	4.859E+03	6.679E-22
KR 87	7.175E+03	1.599E+02	5.523E-01	5.704E-29
KR 88	3.911E+04	2.889E+05	9.978E+02	6.038E-26
KR 89	7.638E+01	0.000E-01	0.000E-01	0.000E-01
XE 131M	3.997E+03	8.402E+05	2.902E+03	1.318E-24
XE 133M	1.840E+04	3.512E+06	1.213E+04	1.319E-24
XE 133	8.278E+05	1.691E+08	5.840E+05	1.184E-22
XE 135M	2.992E+02	9.132E-21	3.154E-23	0.000E-01
XE 135	3.126E+05	3.018E+07	1.042E+05	4.974E-24
XE 137	1.267E+02	0.000E-01	0.000E-01	0.000E-01
XE 138	1.057E+03	5.172E-18	1.786E-20	0.000E-01

1956

1956

POST-LOCA ACTIVITY SOURCE TERMS IN REACTOR BUILDING AND SUPPRESSION POOL

Summary of TACT5 Computer Code Output Edit At End Of 24 Hours

CONTAINMENT LEAKAGE = 0.606%/DAY @ CONTAINMENT TEST PRESSURE OF 45. PSIG
(BASED ON MEASURED ILRT DATA; LEAKAGE REDUCED FOR
CONTAINMENT POST-LOCA PRESSURE DECAY)

CONTAINMENT POST-LOCA PRESSURE & TEMPERATURE: FSAR FIGURES 6.2-2, 6.2-3

POST-LOCA ACTIVITY RELEASE: REGULATORY GUIDE 1.3

ESF LEAKAGE INSIDE REACTOR BUILDING: NONE

REACTOR BUILDING NODE IS LABELED SEC CONT
SUPPRESSION POOL NODE IS LABELED SUP POOL

NOTE: The TACT5 activity source terms listed below for this case were not used to evaluate operator access doses inside the reactor building and are provided for information only.

ACTIVITY RELEASED TO ENVIRONMENT AND IN EACH NODE AT END OF... 2.400E+01 (HRS)

ISO NAM	ENV.	PRI CONT	SEC CONT	SUP POOL
I 131	2.173E+03	1.801E+07	3.989E+04	3.621E+07
I 131	9.554E+01	7.916E+05	1.754E+03	1.591E+06
I 131	1.194E+02	9.895E+05	2.192E+03	1.989E+06
I 132	4.097E+02	2.351E+04	5.208E+01	4.726E+04
I 132	1.801E+01	1.033E+03	2.289E+00	2.078E+03
I 132	2.251E+01	1.292E+03	2.861E+00	2.597E+03
I 133	3.431E+03	1.984E+07	4.395E+04	3.988E+07
I 133	1.508E+02	8.720E+05	1.932E+03	1.753E+06
I 133	1.885E+02	1.090E+06	2.415E+03	2.191E+06
I 134	2.468E+02	2.245E-01	4.974E-04	4.514E-01
I 134	1.085E+01	9.870E-03	2.186E-05	1.984E-02
I 134	1.356E+01	1.234E-02	2.733E-05	2.480E-02
I 135	1.590E+03	3.363E+06	7.450E+03	6.761E+06
I 135	6.990E+01	1.478E+05	3.275E+02	2.972E+05
I 135	8.738E+01	1.848E+05	4.093E+02	3.715E+05
KR 83M	1.662E+03	1.867E+03	4.136E+00	4.802E-28
KR 85M	2.081E+04	1.010E+06	2.236E+03	1.726E-25
KR 85	4.246E+03	1.411E+06	3.125E+03	6.641E-22
KR 87	4.785E+03	1.604E+02	3.552E-01	5.681E-29
KR 88	2.564E+04	2.897E+05	6.418E+02	6.013E-26
KR 89	6.228E+01	0.000E-01	0.000E-01	0.000E-01
XE 131M	2.593E+03	8.426E+05	1.867E+03	1.310E-24
XE 133M	1.194E+04	3.522E+06	7.801E+03	1.312E-24
XE 133	5.371E+05	1.696E+08	3.756E+05	1.177E-22
XE 135M	2.173E+02	9.158E-21	2.029E-23	0.000E-01
XE 135	2.033E+05	3.027E+07	6.705E+04	4.952E-24
XE 137	1.022E+02	0.000E-01	0.000E-01	0.000E-01
XE 138	7.625E+02	5.186E-18	1.149E-20	0.000E-01

