Sequoyah Nuclear Plant

Enclosure II

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TVA REP - IMPLEMENTING PROCEDURES DOCUMENT

IP-18

PLANT RELEASE RATE CALCULATIONS

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PLANT RELEASE RATE CALCULATIONS

1.0 Purpose

This procedure describes the methodology used to calculate and predict the plant release rate of noble gases, iodine & particulates during accident conditions.

PART A

PLANT PARAMETERS REQUIRED FOR RELEASE RATE CALCULATION

2.0 Determine which isotope spectrum to use based on the latest primary coolant measurement.

2.1 On Worksheet 1-A record the latest measured primary coolant activity (per SI-50 for noniodine isotopes and SI-55 for radioiodine, or post-accident measurement) and calculate the activity ratios. Record ratios on worksheet 1-A, step 1.0.

2.2 On Worksheet 1-A, Step 1.1 circle the entries corresponding to the ratios calculated in 2.1.

2.3 On Worksheet 1-A, step 1.2 check the isotope spectrum on the line with the most circled entries. This isotope spectrum will be used in steps 2.0 through 7.2 of this procedure.

IMPORTANT: A POWER CHANGE OF MORE THAN 15 PERCENT WITHIN 2-8 HOURS BEFORE THE PRIMARY COOLANT SAMPLE WAS TAKEN INVALIDATES THE RATIOS INVOLVING IODINE (I). IN SUCH A CASE, RELY ON THE C/R RATIO.

3.0 Determine severity of fuel failure

Note: The information labeled "Expected: and "Design" is based on 1 percent failed fuel; the "Modified TID-14844" information is based on 1 percent of the total radioactivity inventory of an equilibrium reactor core.

3.1 On Worksheet 1-A, circle the calculated specific activities for each of the isotopes (I-131, Cs-137, Rb-88) given in Worksheet 1-A, step 1.3 for the isotope spectrum chosen in 2.3.

3.2 Calculate and record on worksheet 1-A, step 1.4, the ratio of the measured specific activity (from step 2.1) to the circled calculated values of Worksheet 1-A, step 1.3.

3.3 Select a normalization factor corresponding most closely to two of the three ratios. Record this on worksheet 1-A, step 1.5.

NOTE: For "Expected" and "Design" isotope spectra, the normalization factor corresponds to the failed fuel fraction; for the "Modified TID-14844" spectrum, the normalization factor corresponds to the percentage of equilibrium core inventory.

4.0 Determine primary coolant leak rate into containment.

Use worksheets 1-B and 1-C. Record readings of radiation monitors 1-RM-90-100, 1-RM-90-112, 1-RM-90-106 on worksheet 1-B, step 1.0. If 1-RM-90-112 and/or 1-RM-90-106 readings are off-scale, record 1-RM-90-2. Record the time the readings are taken on worksheet 1-B, steps 1.0 and 1.1.

4.1 From the last detector efficiency verification (TI-18, Worksheet 18-C.1B), convert cpm readings to μCi/cc. Record on worksheet 1-B, step 1.0.

4.2 Calculate the elapsed time from reactor shutdown to the recording of monitor readings. Record on worksheet 1-B, step 1.1.

4.3 If both radiation monitors 1-RM-90-112 and 1-RM-90-106 readings are off scale, skip to 4.12; otherwise, continue with 4.4.

4.4 From the last detector efficiency verification (TI-18, Worksheet 18-C.1B) calculate the ratio of Xe-133 specific activity to total specific activity for 1-RM-90-112, 1-RM-90-106. Record on worksheet 1-B, step 1.2.

4.5 Calculate the Xe-133 specific activity in upper containment by multiplying the specific activity derived from the radiation monitor 1-RM-90-112 reading (in step 4.1) by its Xe-133/total ratio (in step 4.4). Record on worksheet 1-B, step 1.3.

4.6 Calculate the Xe-133 specific activity in lower containment by multiplying the specific activity derived from the radiation monitor 1-RM-90-106 reading (in step 4.1) by its Xe-133/total ratio (in step 4.4). Record on worksheet 1-B, step 1.3.

4.7 Determine the primary coolant leak rate into lower containment as follows:

Note: Use data based on radiation monitor 1-RM-90-106 readings if on scale. Use data based on radiation monitor 1-RM-90-112 readings if 1-RM-90-106 is off scale.

4.8 For isotopic spectrum:

Expected - Use Figure 1a with 1-RM-90-106 data; use Figure 2a with 1-RM-90-112 data.

Design - Use Figure 1b with 1-RM-90-106 data; use Figure 2b with 1-RM-90-112 data.

Modified TID-14844 - Use Figure 1c with 1-RM-90-106 data; use Figure 2c with 1-RM-90-112 data.

4.0 Determine primary coolant leak rate into containment (Cont.)

4.9 Norr lize the measured Xe-133 specific activity by dividing by the normaliza on factor determined in step 3.3. Record on worksheet 1-C, step 1.5.

4.10 Using the elapsed time from step 4.2, estimate a primary coolant leak rate by visually interpolating between the applicable curves in Figures 1 or 2. Record on worksheet 1-C, step 1.6, the value of the specific activity from the curves above and below the normalized measured value and the corresponding primary coolant leak rate.

4.11 Record on Worksheet 1-C, step 1.7 the estimated primary coolant leak rate.

4.12 If the readings for both 1-RM-90-106 and 1-RM-90-112 are off scale, do the following:

4.12.1 Select Figure 3a, 3b, or 3c depending on the isotope spectrum chosen ("Expected," "Design," or "Modified TID-14844," respectively).

4.12.2 Normalize the measured exposure rate at monitor 1-RM-90-2 location by dividing by the normalization factor determined in step 3.3. Record on Worksheet 1-C, step 1.8.1.

4.12.3 Using the elapsed time from step 1.1, estimate a primary coolant leak rate by visually interpolating between the applicable curves of Figure 3. Record on worksheet 1-C, step 1.8.2, the value of the calculated monitor reading from the curves above and below the normalized measured value and the corresponding primary coolant leak rate.

4.12.4 Record on Worksheet 1-C, ste. .8.3, the estimated primary coolant leak rate.

5.0 Determine containment leak rate.

Use worksheet 1-D. Obtain flow from SI-2 for the shield building exhaust and record in step 1.0. Also, record containment pressure and the time of reading in step 1.1.

5.1 Calculate the radioactivity release rate by multiplying the specific activity from 1-RM-90-100 (worksheet 1-B, step 1.0) by the vent flow from step 5.0 and by 472 (unit conversion factor):

Release Rate = 472 x Activity x Vent Flow
Record on Worksheet 1-D, step 1.3.

5.0 Determine containment leak rate.(Cont.)

5.2 Select from Figure 4 the sheet corresponding to the isotope spectrum (worksheet 1-A, step 2.3) and primary coolant leak rate (worksheet 1-C, step 1.7 or 1.8.3) determined earlier.

5.3 Divide this measured rate by the normalization factor from Worksheet 1-A, step 1.5. Record on Worksheet 1-D, step 1.4.

5.4 Using the elapsed time from Worksheet 1-B step 1.1, estimate a gaseous leak rate by visually interpolating between the curves of Figure 4. Record on Worksheet 1-D step 1.5, the value of the calculated vent release rate from the curves above and below the normalized measured value and the corresponding gaseous leak rates.

5.5 Record on Worksheet 1-D, step 1.6 the estimated gaseous leak rate.

5.6 From Figure 5, for the containment pressure determined in step 5.0 and the calculated leak rate, obtain an equivalent hole size.

PART B

PREDICATED VENT RELEASE RATE--NO CHANGE IN PLANT CONDITIONS

6.0 Calculate noble gas vent release rate

Use worksheet 2-A.

6.1 Use the me sheet of Figure 4 selected in Step 5.2.

6.2 Use the containment leak rate determined in Step 5.4.

6.3 Select the time for which the vent release rate is desired.

6.4 Obtain the noble gas vent release rate by interpolation between the curves on Figure 4:

6.4.1 Determine interpolation fraction = $\frac{LRD - LR(L)}{LR(U) - LR(L)}$

where: LRD = containment leak rate from Step 5.4
LR = containment leak rate for which curve is calculated.
(U),(L) = value of LR immediately (above) (below) LRD

6.4.2 Determine the difference between vent release rates corresponding to LR(U) and LR(L) at the desired time, multiply by the interpolation fraction, and add to the vent release rate corresponding to LR(L).

6.0 Calculate noble gas vent release rate (Cont.)

6.4.3 Multiply by the normalization factor from Worksheet 1-A, Step 1.5. Record on Worksheet 2-A, steps 1.0, 1.1 and 1.2.

7.0 Calculate the iodine vent release rate.

Use Worksheet 2-B.

7.1 Use the sheet of Figure 6 corresponding to the one of Figure 4 selected in Step 6.1.

7.2 Follow procedure 6.0. Substitute Figure 6 for Figure 4.

NOTE: It is not necessary to recalculate the interpolation fraction (Step 6.4.1) since it will be unchanged. Record on Worksheet 2-B, step 1.0.

8.0 PREDICTED VENT RELEASE RATE--CHANGING PLANT CONDITIONS

8.1 For a different postulated primary coolant activity:

8.1.1 Consider which isotope spectrum ("Expected," "Design," "Modified TID-14844") was chosen in Step 2.0.

8.1.2 Consider the magnitude of the normalization factor determined in Step 3.0.

8.1.3 Decide on a new primary coolant activity by increasing the normalization factor (fuel failure) or changing the isotope spectrum based on plausible developments in the condition of the plant. In order of increasing severity, isotope spectra rank as follows:

(1) Expected

(2) Design

(3) Modified TID-14844

If the isotope spectrum is "Expected," do not increase the normalization factor to more than 2; instead, change the spectrum to "Design."

If the isotope spectrum is "Design," do not increase the normalization factor to more than 15; instead, change the spectrum to "Modified TID-14844."

8.2 <u>For a different postulated containment leak rate</u>

8.2.1 For an anticipated change in containment pressure with no additional containment degradation, use Figure 5 with the equivalent hole size determined in Step 5.5.

8.2.2 For anticipated containment degradation, use Figure 5 with an appropriately chosen hole size.

8.2.3 Determine the new containment leak rate from Figure 5.

8.3 <u>For an anticipated degradation of the primary coolant loop.</u>

Change the primary coolant leak rate to containment.

8.4 <u>For the postulated changed plant parameters, recalculate future vent releases using the methods given in part 2.0.</u>

NOTE: Part B is based on unchanged plant parameters. If the postulated conditions are more severe than those determined to exist in part A, the part B methods with the changed parameters will result in release rates which are too high; conversely, in the unlikely event that the postulated conditions are less severe, the estimated release rates will be too low.

GASEOUS RELEASES WORKSHEET
1-A

1.0 Determination of Isotopic spectrum

I_m = I-131 specific activity ______________ µCi/g
C_m = Cs-137 specific activity ______________ µCi/g
R_m = Rb-88 specific activity ______________ µCi/g

I_m/C_m = __________ I_m/R_m = __________ C_m/R_m = __________

1 Selection of Isotope Sepctrum

I/C	I/R	C/R	Appropriate Isoptope Spectrum
8.5 < I/C ≦ 18.5	1.0 < I/R ≦ 10	C/R ≦ 0.18	Expected
I/C ≦ 8.5	I/R ≦ 1 ^	0.18 < C/R ≤ 1.0	Design
I/C > 18.5	I/R > 20	C/R > 1.0	Modified TID-14844

1.2 Chosen distribution is (check one).

______ "Expected"

______ "Design"

______ "Modified TID-14844"

1.3 Specific Activity in Primary Coolant (Prior to Incident) for Three Isoptopic Spectra

Isotope	Specific Activity Level (µCi/g)		
	Expected	Design	Modified TID-14844
I_c = I-131	2.3	2.5	9.33×10^6
C_c = Cs-137	0.16	1.0	4.15×10^5
R_c = Rb-88	1.9	3.7	2.38×10^5

GASEOUS RELEASES WORKSHEET
1-A (Continued)

1.4 Subscript m denotes measured specific activity.
Subscript c denotes claculated specific activity from Table 2.

I_m/I_c = __________ C_m/C_c = __________ R_m/R_c = __________

1.5 Select a normalization factor corresponding most closely to two of the three ratios:

Normalization Factor F = ________

GASEOUS RELEASES WORKSHEET
1-B

1.0 Radiation Monitor Readings @ ______________________________
Time and Date

1-RM-90-100: ____________ cpm = ______________ μCi/cc
1-RM-90-112: ____________ cpm = ______________ μCi/cc
1-RM-90-106: ____________ cpm = ______________ μCi/cc

1-RM-90-2 ____________ mr/hr

1.1 Reactor shutdown date and time ________________
Monitor reading date and time ________________
Elapsed time t_e = __________ hr __________ min = __________ hrs

1.2 Detector Efficiency Verification Date and Time: ______________

1-RM-90-112: Xe-133 __________ μCi/cc
(Upper Containment) Total __________ μCi/cc

Ratio (Xe-133/Total) = ______________

1-RM-90-106: Xe-133 __________ μCi/cc
(Lower Containment) Total __________ μCi/cc

Ratio (Xe-133/Total) = ______________

1.3 Measured containment Xe-133 specific activity:

Xe-133 in Upper Containment:

________________ μCi/cc x __________ = ____________ μCi/cc = MXe
(1-RM-90-112) (Ratio)

Xe-133 in Lower Containment:

________________ μCi/cc x __________ = ____________ μCi/cc = MXe
(1-RM-90-106) (Ratio)

GASEOUS RELEASES WORKSHEET
1-C

1.4 Calculate primary coolant leak rate using monitor 1-RM-90-106 or 1-RM-90-112 from Figure 1.a (lower containment, monitor 1-RM-90-106) or Figure 2.a (upper containment, monitor 1-RM-90-112) for "Expected," Figure 1.b or 2.b for "Design," or Figure 1.c or Figure 2.c for "Modified TID-14844."

1.5 From step 1.3 worksheet 1-B.

MXe = ______________ μCi/cc (1-RM-90-106) or MXe = ______________ μCi/cc (1-RM-90-112)

where MXe is the measured Xe-133 specific activity at t_e.

Normalization factor (from 1.5, worksheet 1-A) F = __________

MxeN = ______________ μCi/cc (1-RM-90-106) or = ______________ μCi/cc (1-RM-90-112)

1.6 Calculated specific activity from Figure ______ (Record figure used).

CXe(U) = ______________ μCi/cc CXe(L) = ______________ μCi/cc
PCL(U) = ______________ gpm PCL(L) = ______________ gpm

where: CXe(U) = Calculated Xe-133 activity greater than MXeN
CXe(L) = Calculated Xe-133 activity smaller than MXeN
PCL(U) = Primary coolant leak rate corresponding to CXe(U)
PCL(L) = Primary coolant leak rate corresponding to CXe(L)

1.7 Estimated primary coolant leak rate: ____________ gpm

1.8 Calculate primary coolant leak rate using monitor 1-RM-90-2:

1.8.1 From step 1.0, worksheet 1-B, 1-RM-90-2

MER = ______________ mR/H

where MER is the measured exposure rate at t_e

Normalization factor (from 1.5, worksheet 1-A) F = ________

MERN = MER/F: __________ mR/h

GASEOUS RELEASES WORKSHEET
1-C (Continued)

1.8.2 Calculated monitor reading from applicable curve Figure 3 _______ (Record figure used).

CDR(U) = ___________ mR/h CDR(L) = _____________ mR/h
PCL(U) = ___________ gpm PCL(L) = _____________ gpm

where: CDR(U) = Calculated monitor reading greater than MERN
CDR(L) = Calculated monitor reading smaller than MERN
PCL(U) = Primary coolant leak rate corresponding to CDR(U)
PCL(L) = Primary coolant leak rate corresponding to CDR(L)

1.8.3 Estimated primary coolant leak rate: ___________ gpm

GASEOUS RELEASES WORKSHEET
1-D

1.0 Obtain flow from SI-2 for Shielding Building Exhaust: _______________

Time and Date

1.1 Containment Pressure PdI-30-42: _________ psi _______________
PdI-30-43: _________ psi _______________
PdI-30-44: _________ psi _______________
PdI-30-45: _________ psi _______________

1.2 From worksheet 1-B, step 1.0

1-RM-90-100: _______________ μCi/cc

1.3 Measured Shield Building Vent Release Rate:

VRR = 472 x _____________ x _______________ = ___________ μCi/s
1-RM-90-100 Value from 1.0

1.4 Normalization factor (from 1.5, worksheet 1-A) F = __________

VRRN = VRR/F: __________________ μCi/s

1.5 Calculated vent release rate from Figure 4 _______ (Record figure used).

CRR(U) ______________ μCi/s CRR(L) ________________ μCi/s
LR(U) ______________ scfh LR(L) ________________ scfh

where: CRR(U) = Calculated vent release rate greater than VRRN
CRR(L) = Calculated vent release rate smaller than VRRN
LR(U) = Gaseous leak rate corresponding to CRR(U)
LR(L) = Gaseous leak rate corresponding to CRR(L)

1.6 Containment gaseous leak rate:

LRD = ____________ scfh

1.7 Containment equivalent hole size (diameter)

CEHS = __________ inches

GASEOUS RELEASES WORKSHEET
2-A

Containment Noble Gas Release Rate

Containment Leak Rate from Worksheet 1-D, step 1.6

LRD = __________ cfh

1.0 From Figure 4 ________ (Record figure used)

LR(U) = _________scfh LR(L) = _________scfh

where: LR = Containment leak rate used in procedure Step 5.4

1.1 Time elapsed since reactor shutdown t: __________ hours

1.2 Interpolation Fraction:

$$IF = \frac{LRD - LR(L)}{LR(U) - LR(L)}$$

$$= \frac{(\qquad) - (\qquad)}{(\qquad) - (\qquad)} = \_\_\_\_\_\_\_\_\_\_$$

From applicable Figure 4, at t, determine CRR(U) corresponding to LR(U):

CRR(U) = __________ μCi/s

From applicable Figure 4, at t, determine CRR(L) corresponding to LR(L):

CRR(L) = __________ μCi/s

Normalization factor (from step 1.5, worksheet 1-A) F = __________

Future noble gas release rate =

{ IF x [CRR(U) - CRR(L)] + CRR(L) } x F

= { ______ x [_______ - _______] + ______ } x _______

= ________ μCi/s

NOTE: Same nomenclature as on worksheet 1-D.

GASEOUS RELEASES WORKSHEET
2-A

Containment Noble Gas Release Rate

Containment Leak Rate from Worksheet 1-D, step 1.6

LRD = __________ cfh

1.0 From Figure 4 ________ (Record figure used)

LR(U) = __________scfh LR(L) = __________scfh

where: LR = Containment leak rate used in procedure Step 5.4

1.1 Time elapsed since reactor shutdown t: ____________ hours

1.2 Interpolation Fraction:

$$IF = \frac{LRD - LR(L)}{LR(U) - LR(L)}$$

$$= \frac{(\qquad) - (\qquad)}{(\qquad) - (\qquad)} = \_\_\_\_\_\_\_\_\_\_$$

From applicable Figure 4, at t, determine CRR(U) corresponding to LR(U):

CRR(U) = ___________ μCi/s

From applicable Figure 4, at t, determine CRR(L) corresponding to LR(L):

CRR(L) = ___________ μCi/s

Normalization factor (from step 1.5, worksheet 1-A) F = ___________

Future noble gas release rate =

{ IF x [CRR(U) - CRR(L)] + CRR(L) } x F

= { ______ x [_______ - _______] + ______ } x _______

= ________ μCi/s

NOTE: Same nomenclature as on worksheet 1-D.

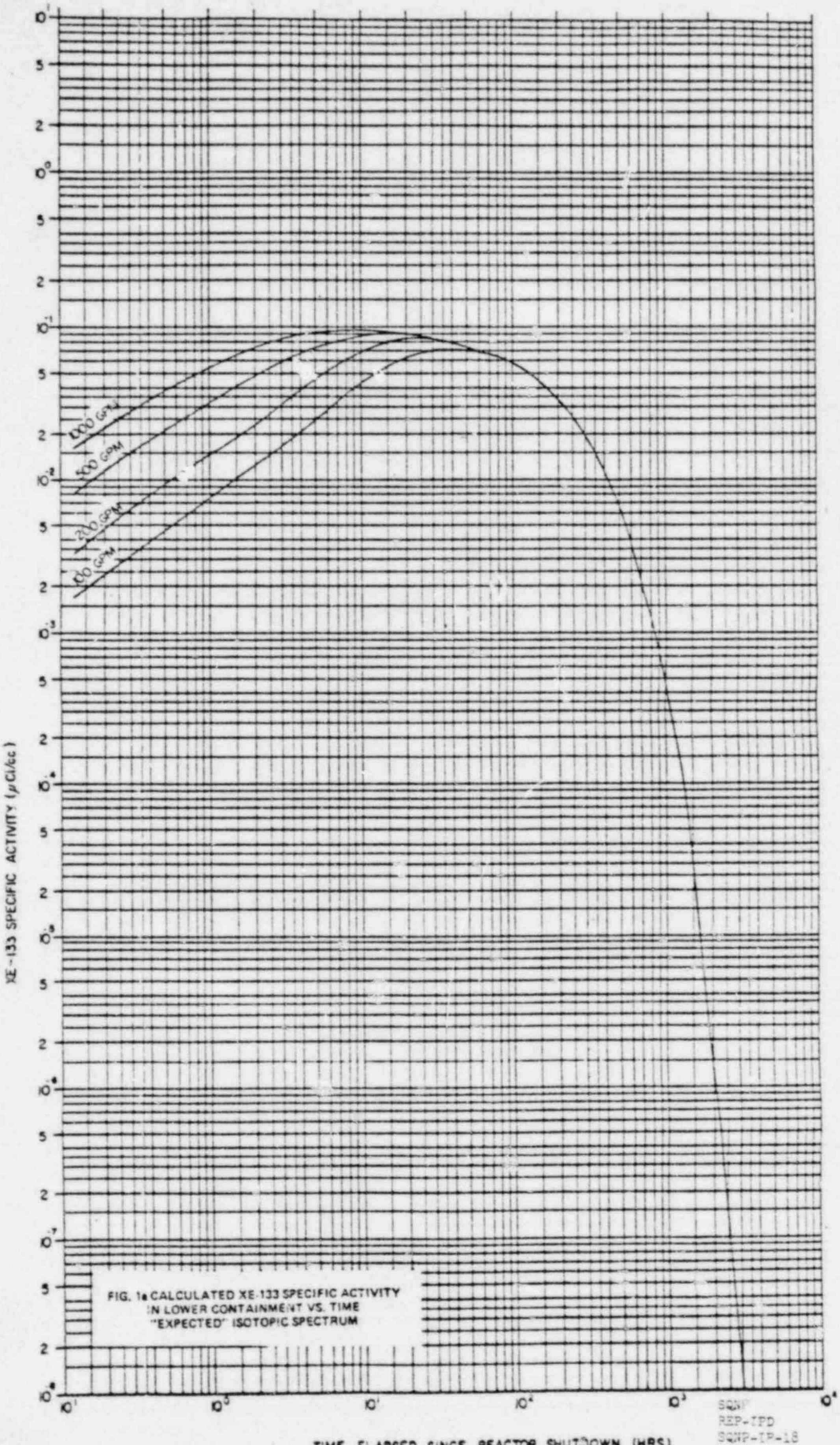

FIG. 1a CALCULATED XE-133 SPECIFIC ACTIVITY IN LOWER CONTAINMENT VS. TIME "EXPECTED" ISOTOPIC SPECTRUM

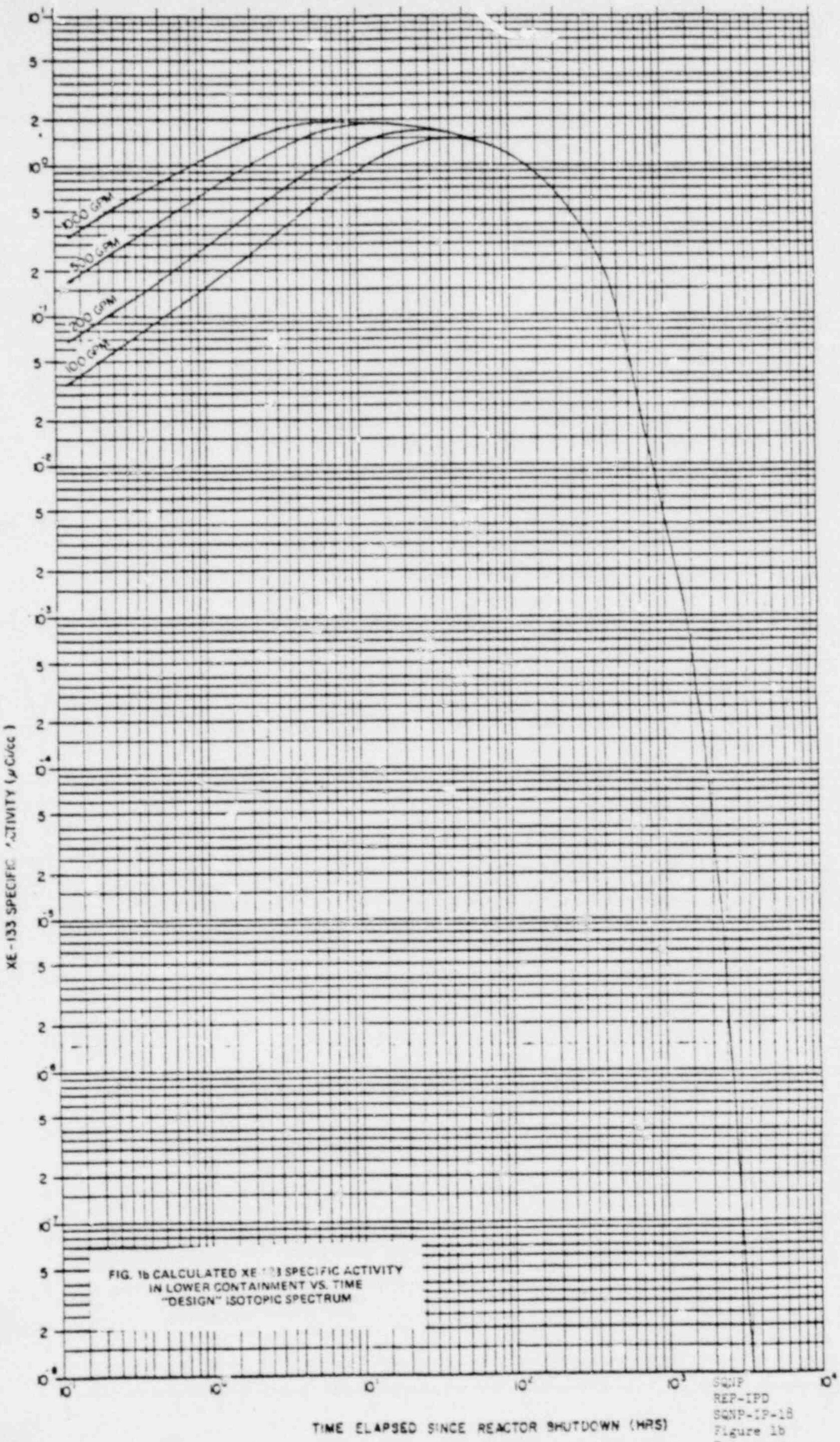

FIG. 1b CALCULATED XE-133 SPECIFIC ACTIVITY IN LOWER CONTAINMENT VS. TIME "DESIGN" ISOTOPIC SPECTRUM

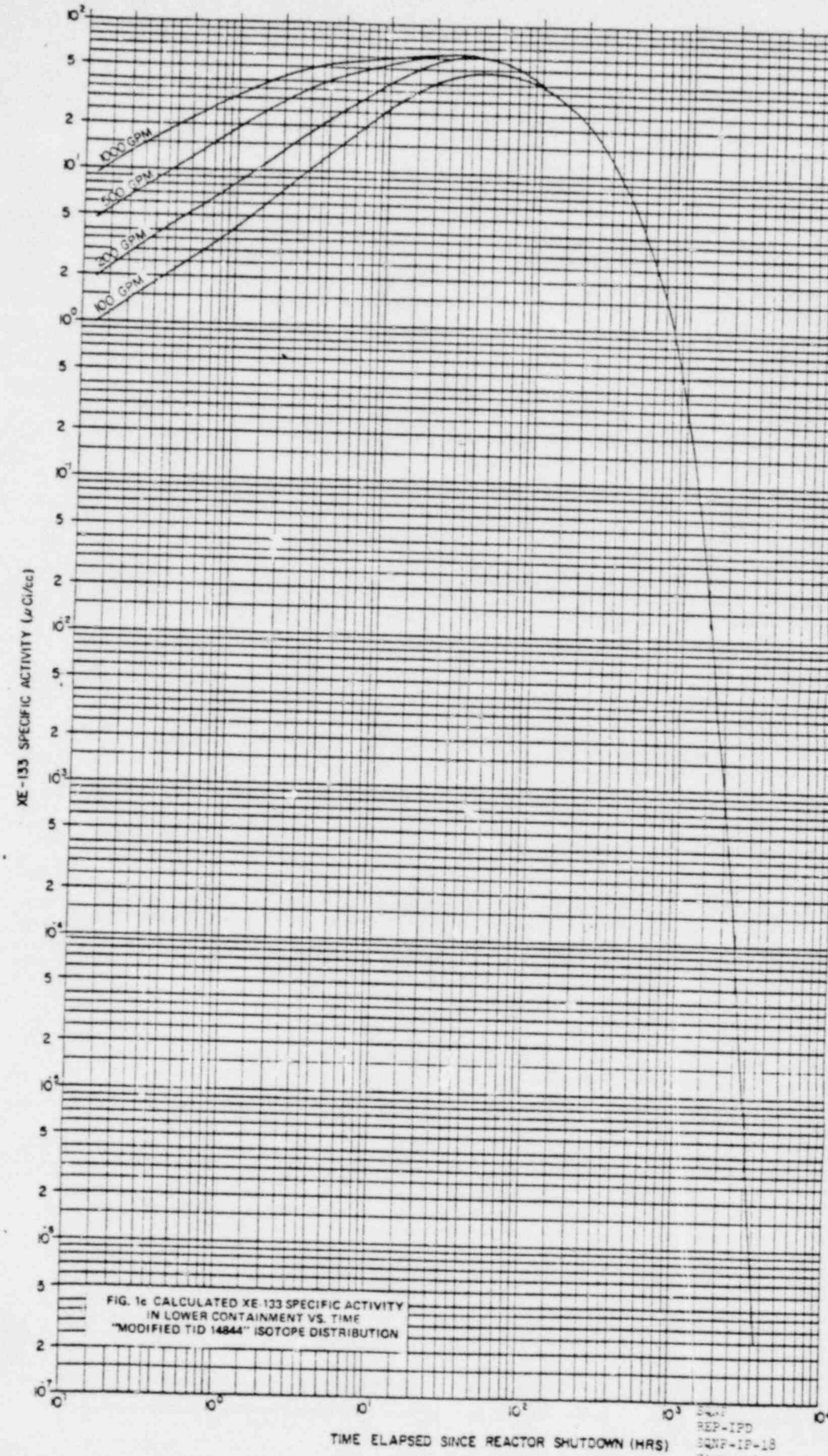

FIG. 1c CALCULATED XE-133 SPECIFIC ACTIVITY IN LOWER CONTAINMENT VS. TIME "MODIFIED TID 14844" ISOTOPE DISTRIBUTION

SQNP
REP-IPD
SQNP-IP-18
Figure 1c
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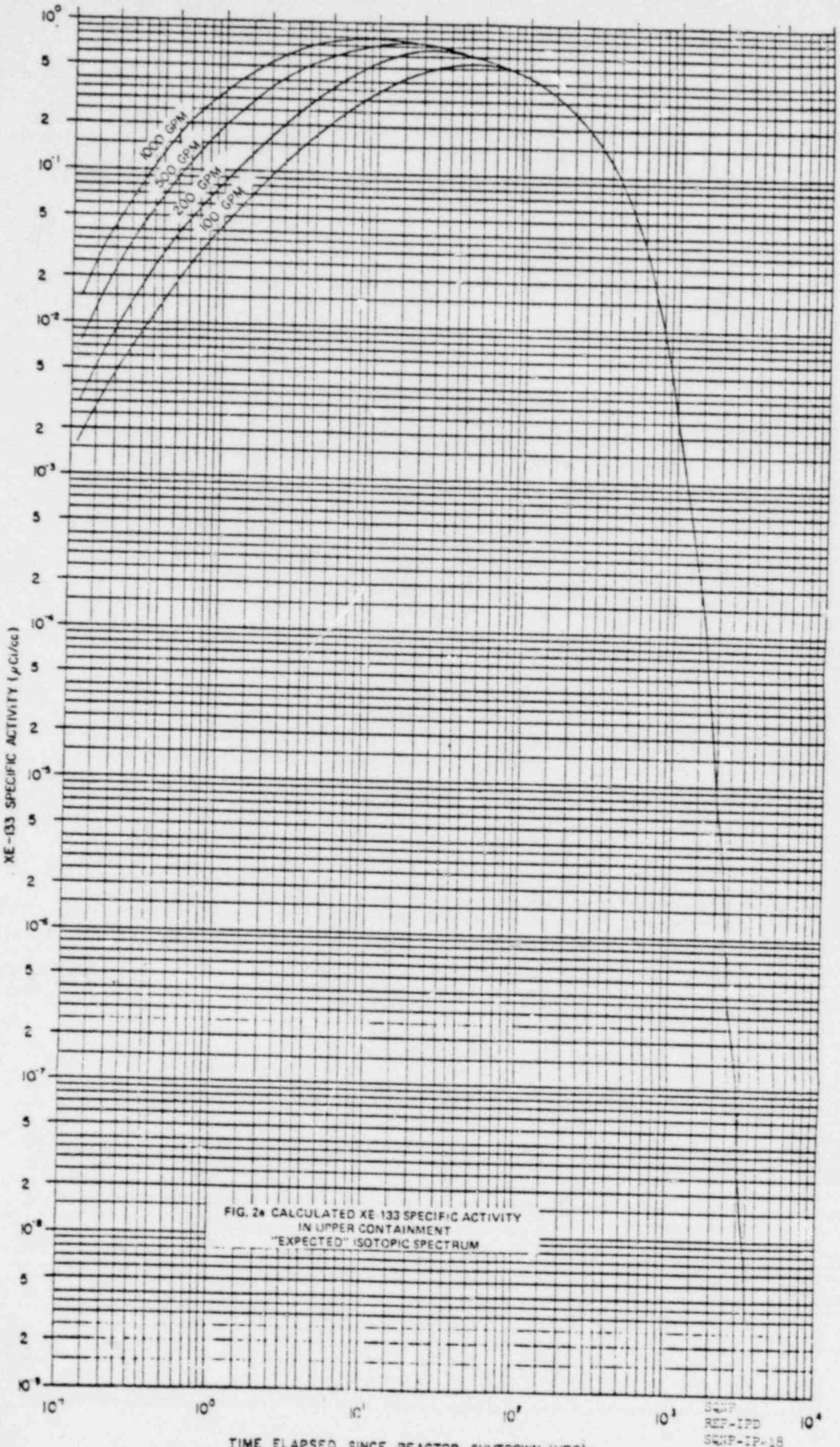

FIG. 2a CALCULATED XE 133 SPECIFIC ACTIVITY
IN UPPER CONTAINMENT
"EXPECTED" ISOTOPIC SPECTRUM

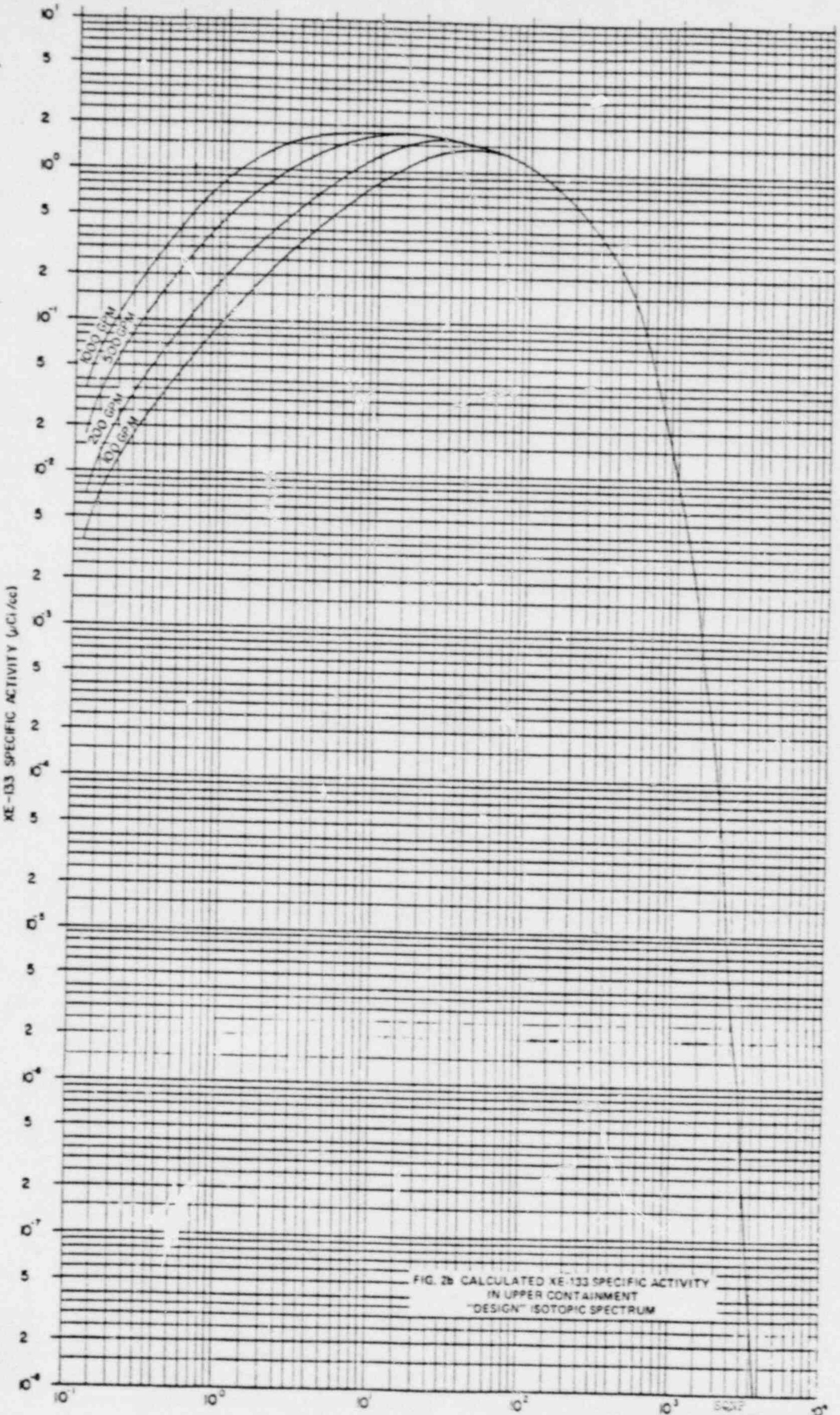

FIG. 2b CALCULATED XE-133 SPECIFIC ACTIVITY IN UPPER CONTAINMENT "DESIGN" ISOTOPIC SPECTRUM

SQNP
REP-IPD
SQNP-IP-18
Figure 2b
Page 1 of 1

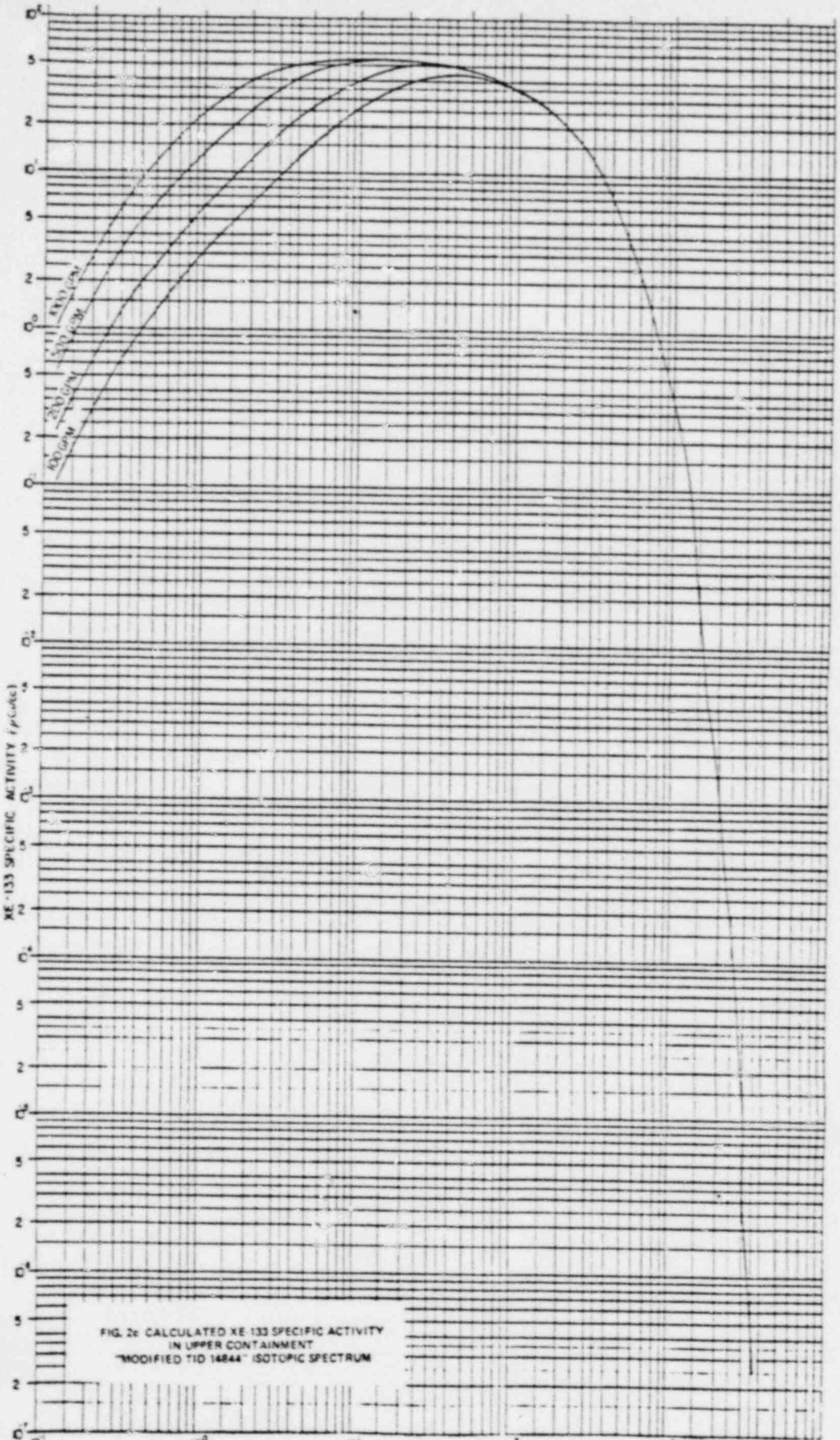

FIG. 2e CALCULATED XE-133 SPECIFIC ACTIVITY IN UPPER CONTAINMENT "MODIFIED TID 14844" ISOTOPIC SPECTRUM

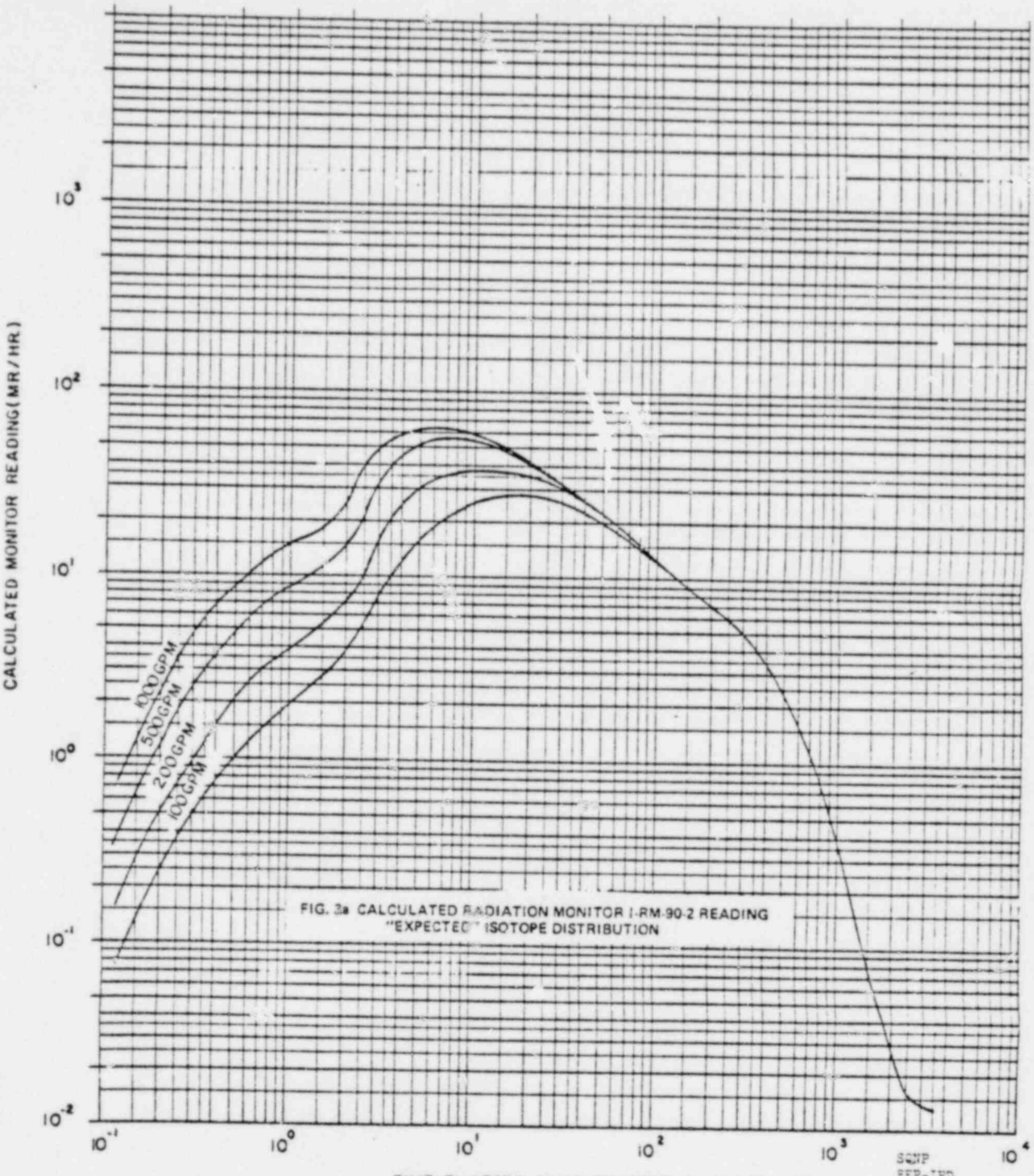

FIG. 3a CALCULATED RADIATION MONITOR 1-RM-90-2 READING
"EXPECTED" ISOTOPE DISTRIBUTION

SQNP
REP-IPD
SQNP-IP-18
Figure 3a
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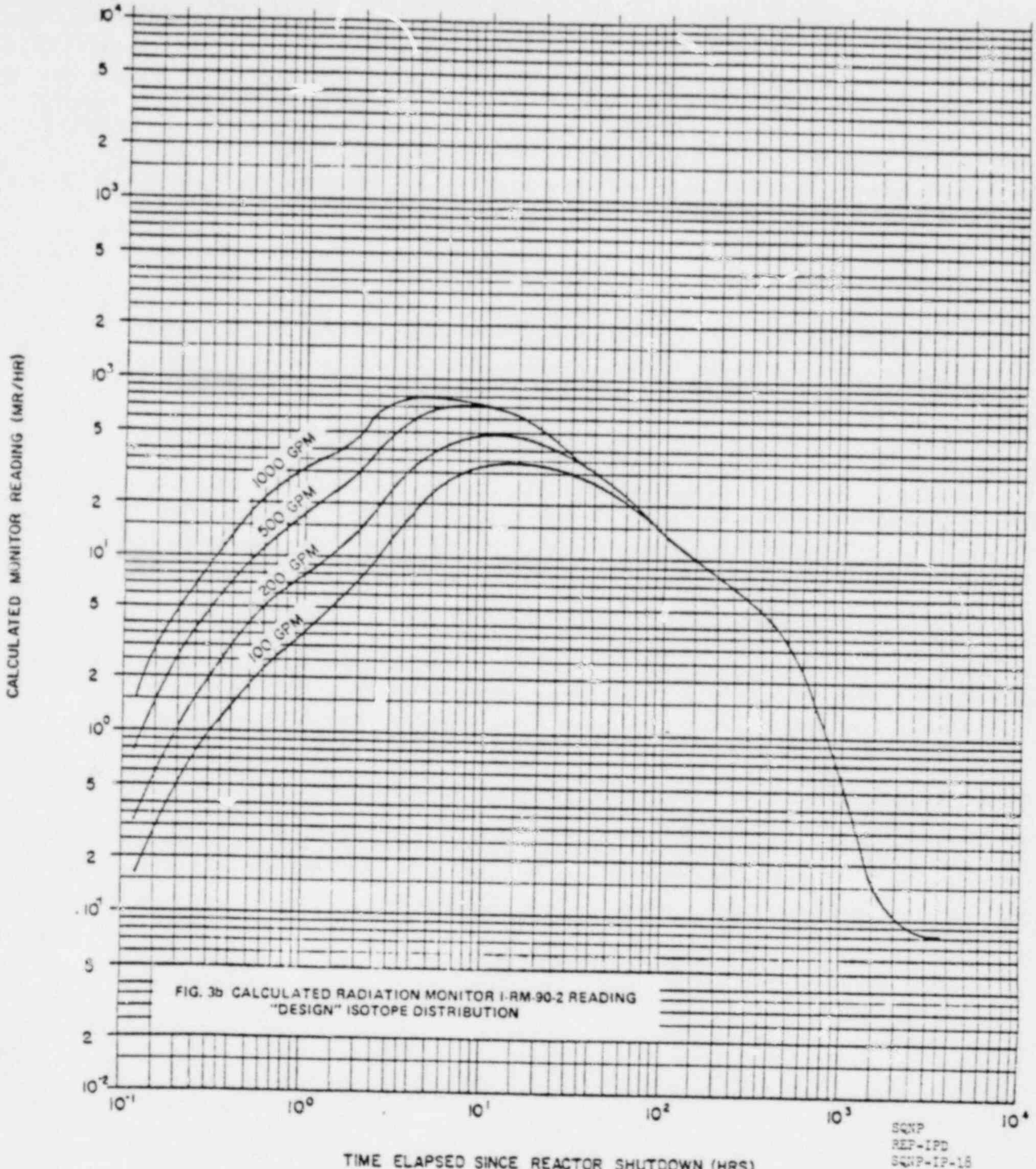

FIG. 3b CALCULATED RADIATION MONITOR I-RM-90-2 READING "DESIGN" ISOTOPE DISTRIBUTION

SQNP
REP-IPD
SQNP-IP-18
Figure 3b
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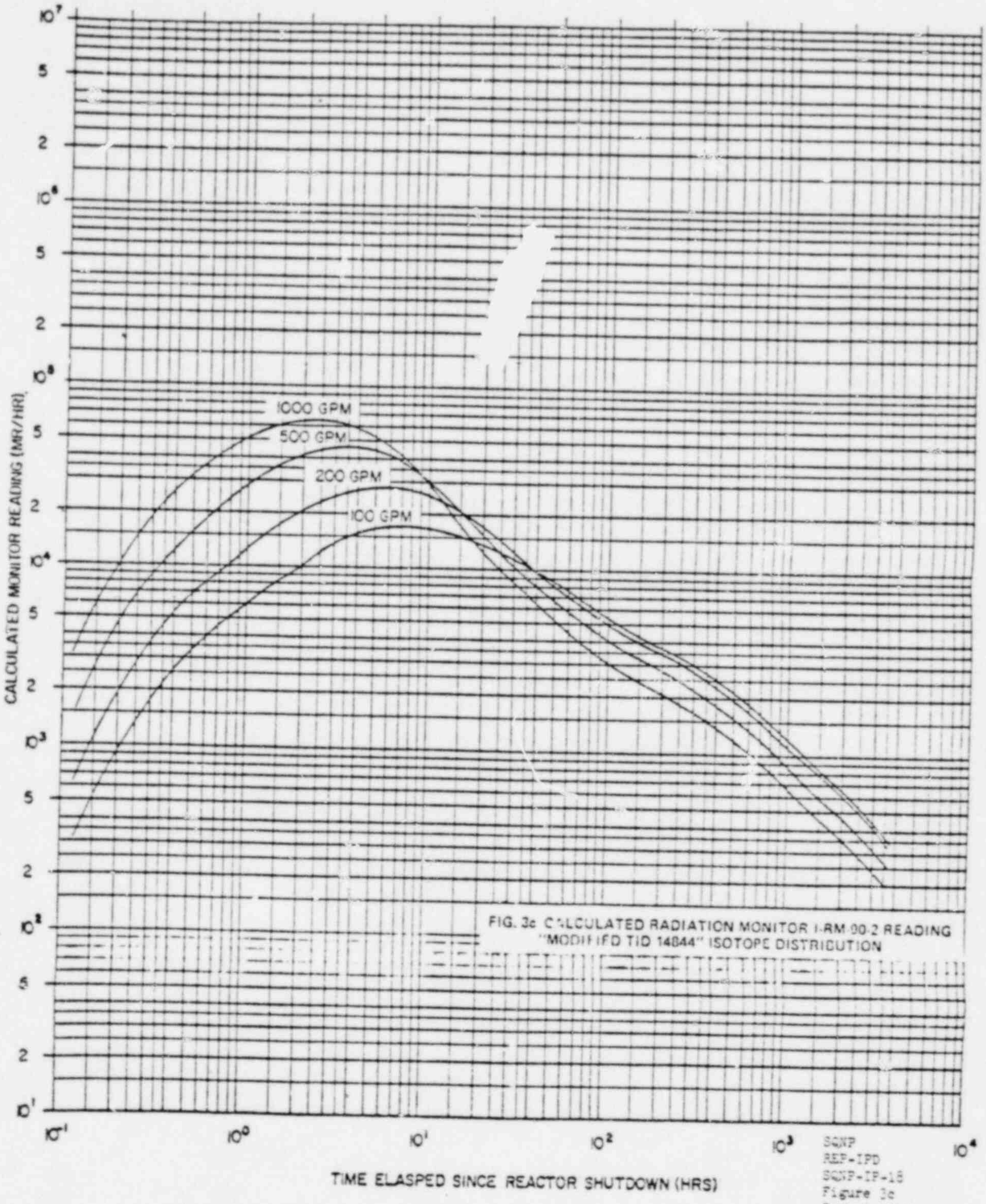

FIG. 3c CALCULATED RADIATION MONITOR 1-RM-90-2 READING "MODIFIED TID 14844" ISOTOPE DISTRIBUTION

SQNP
REP-IPD
SQNP-IP-18
Figure 3c
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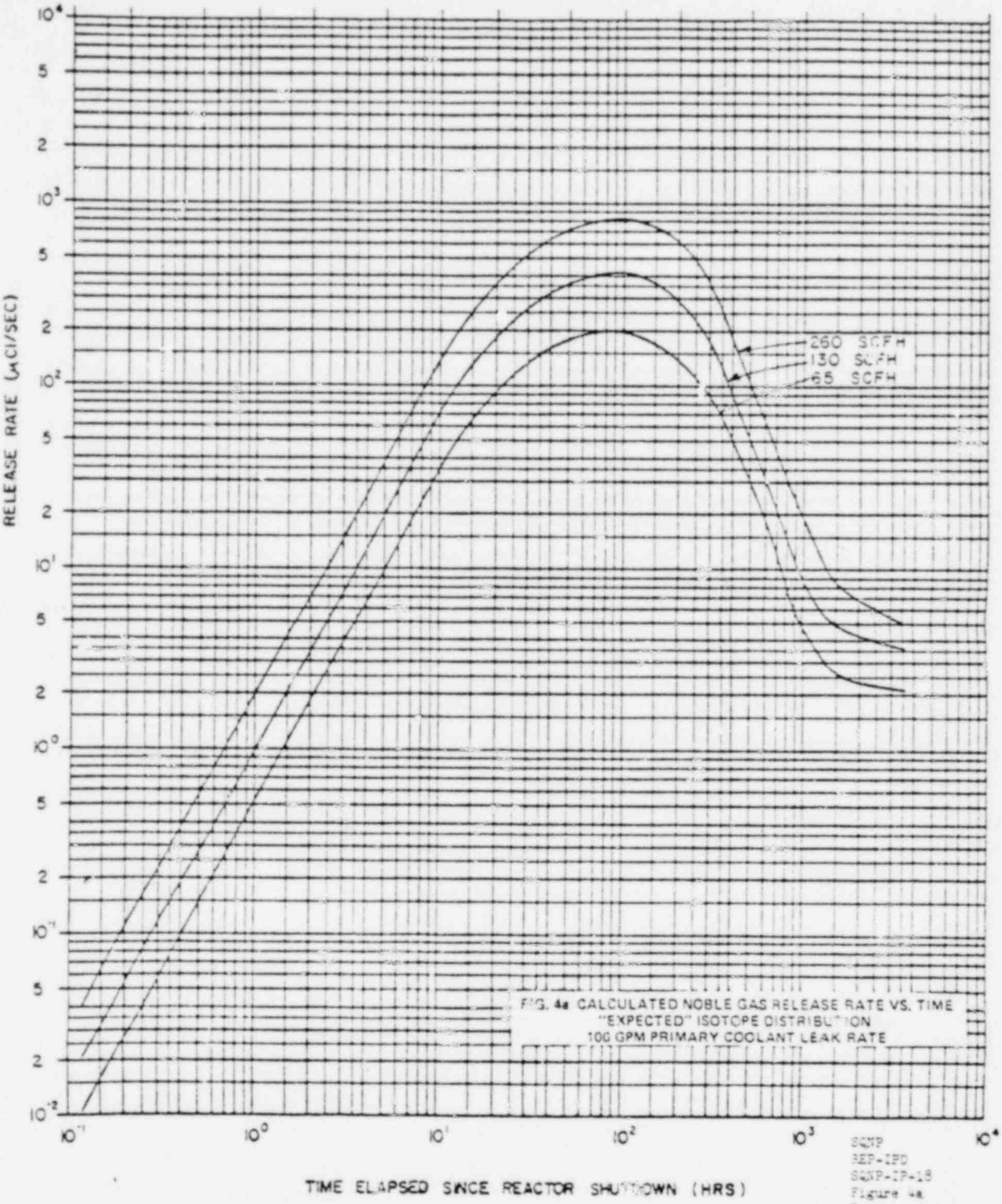

FIG. 4a CALCULATED NOBLE GAS RELEASE RATE VS. TIME
"EXPECTED" ISOTOPE DISTRIBUTION
100 GPM PRIMARY COOLANT LEAK RATE

SQNP
REP-IPD
SQNP-IP-18
Figure 4a
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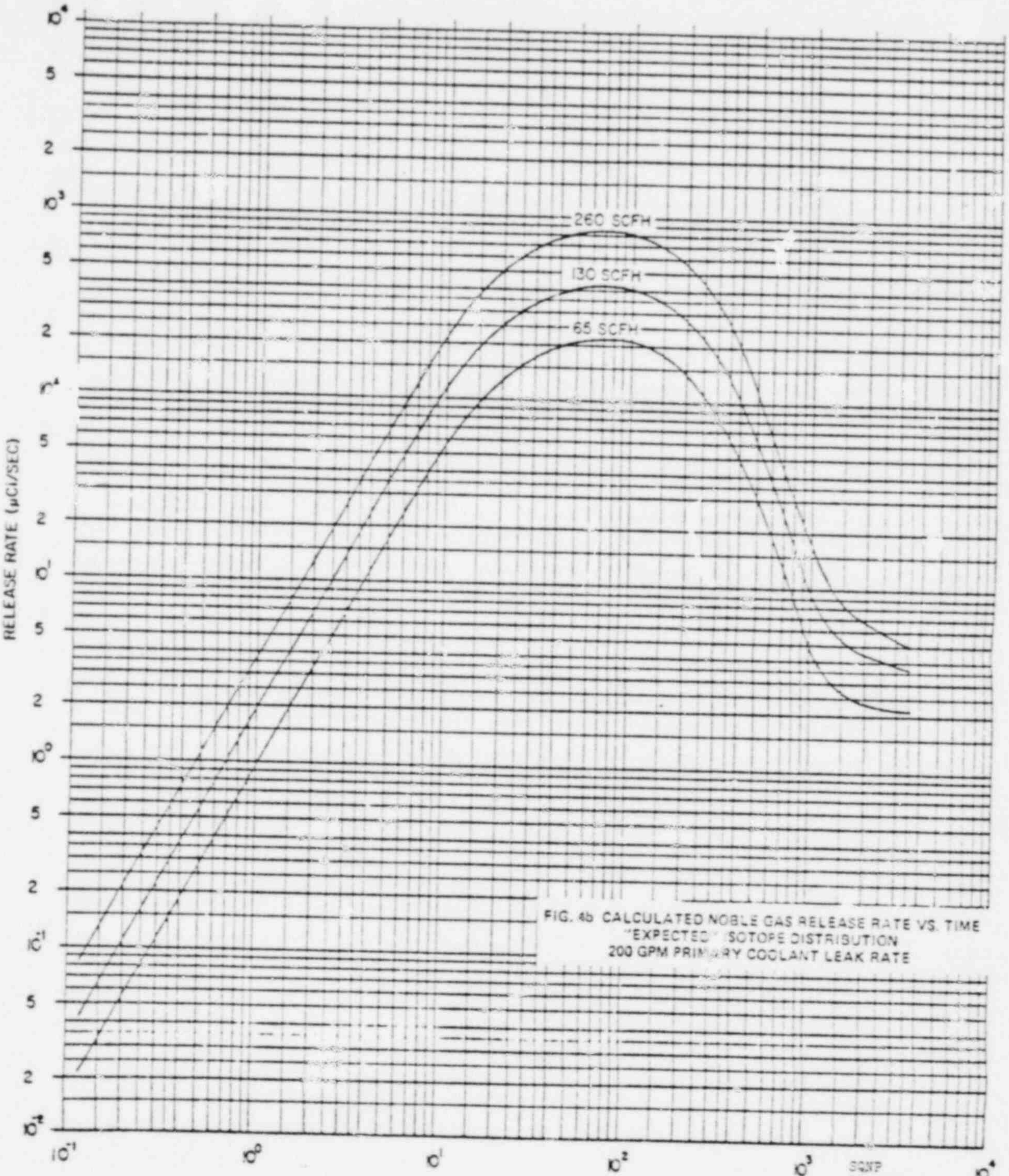

FIG. 4b CALCULATED NOBLE GAS RELEASE RATE VS. TIME
"EXPECTED" ISOTOPE DISTRIBUTION
200 GPM PRIMARY COOLANT LEAK RATE

SQNP
REP-IPD
SQNP-IP-18
Figure 4b
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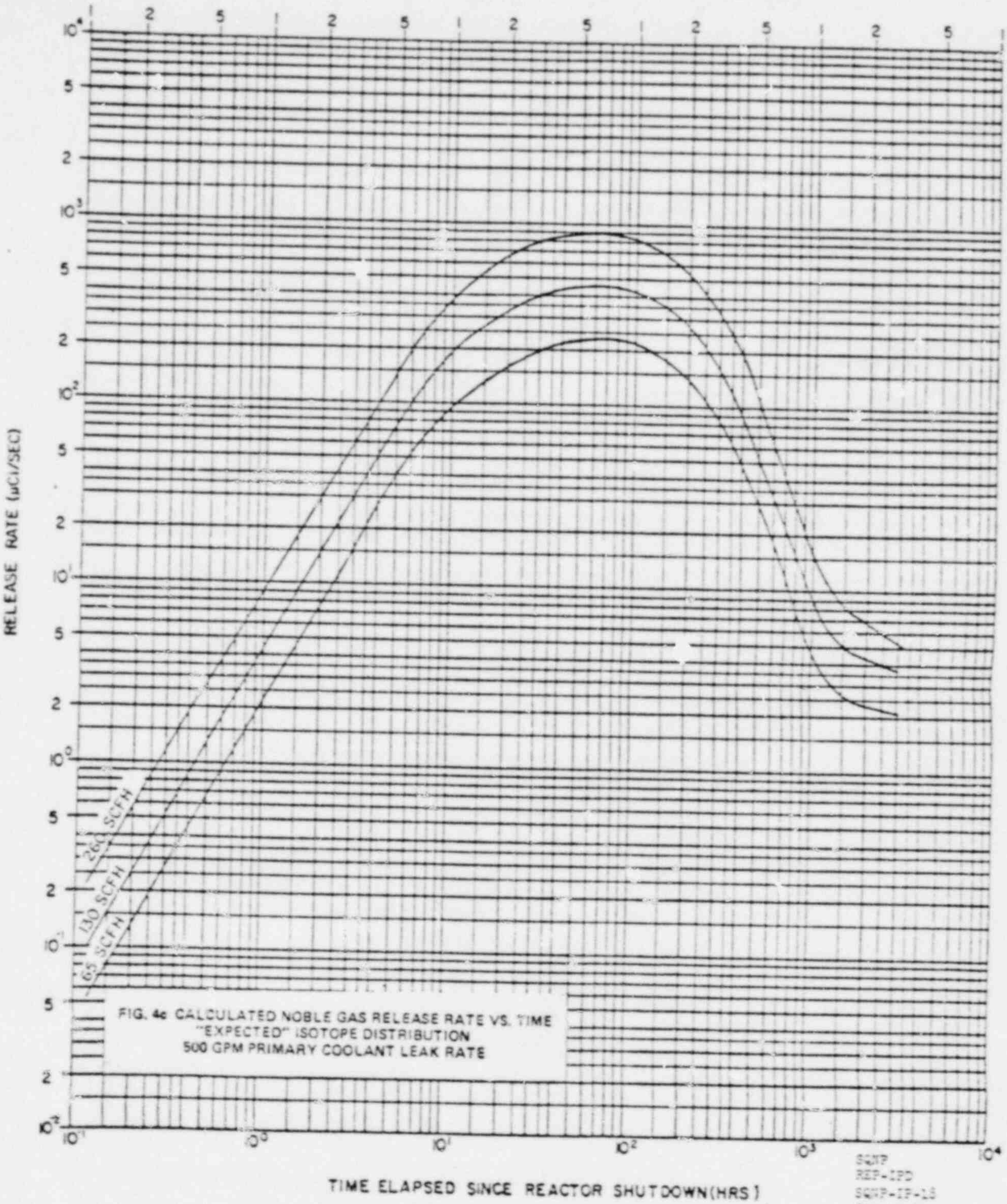


FIG. 4c CALCULATED NOBLE GAS RELEASE RATE VS. TIME
"EXPECTED" ISOTOPE DISTRIBUTION
500 GPM PRIMARY COOLANT LEAK RATE

SQNP
REP-IPD
SQNP-IP-13
Figure 4c
Page 1 of 1
Rev. 0

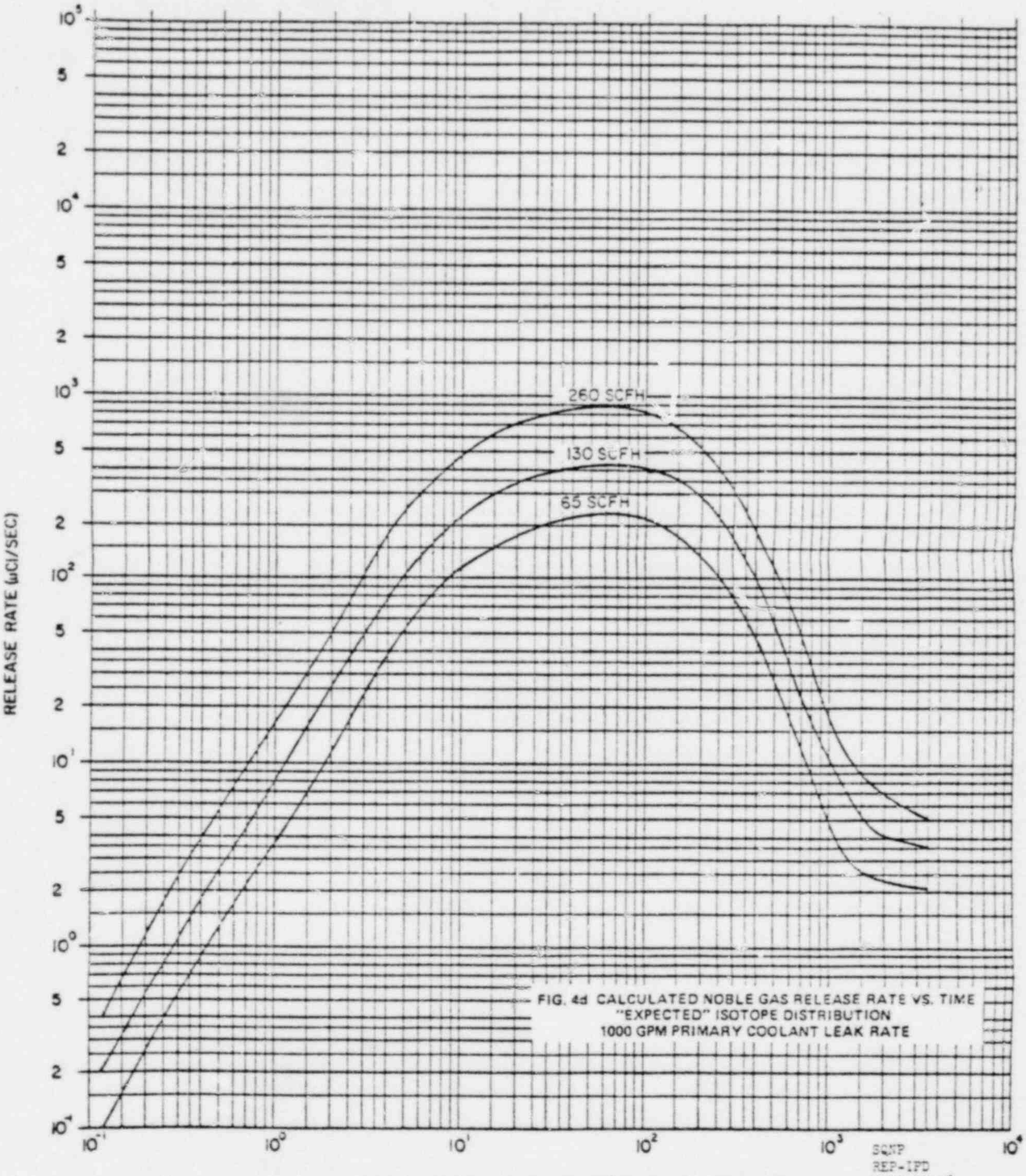


FIG. 4d CALCULATED NOBLE GAS RELEASE RATE VS. TIME
"EXPECTED" ISOTOPE DISTRIBUTION
1000 GPM PRIMARY COOLANT LEAK RATE

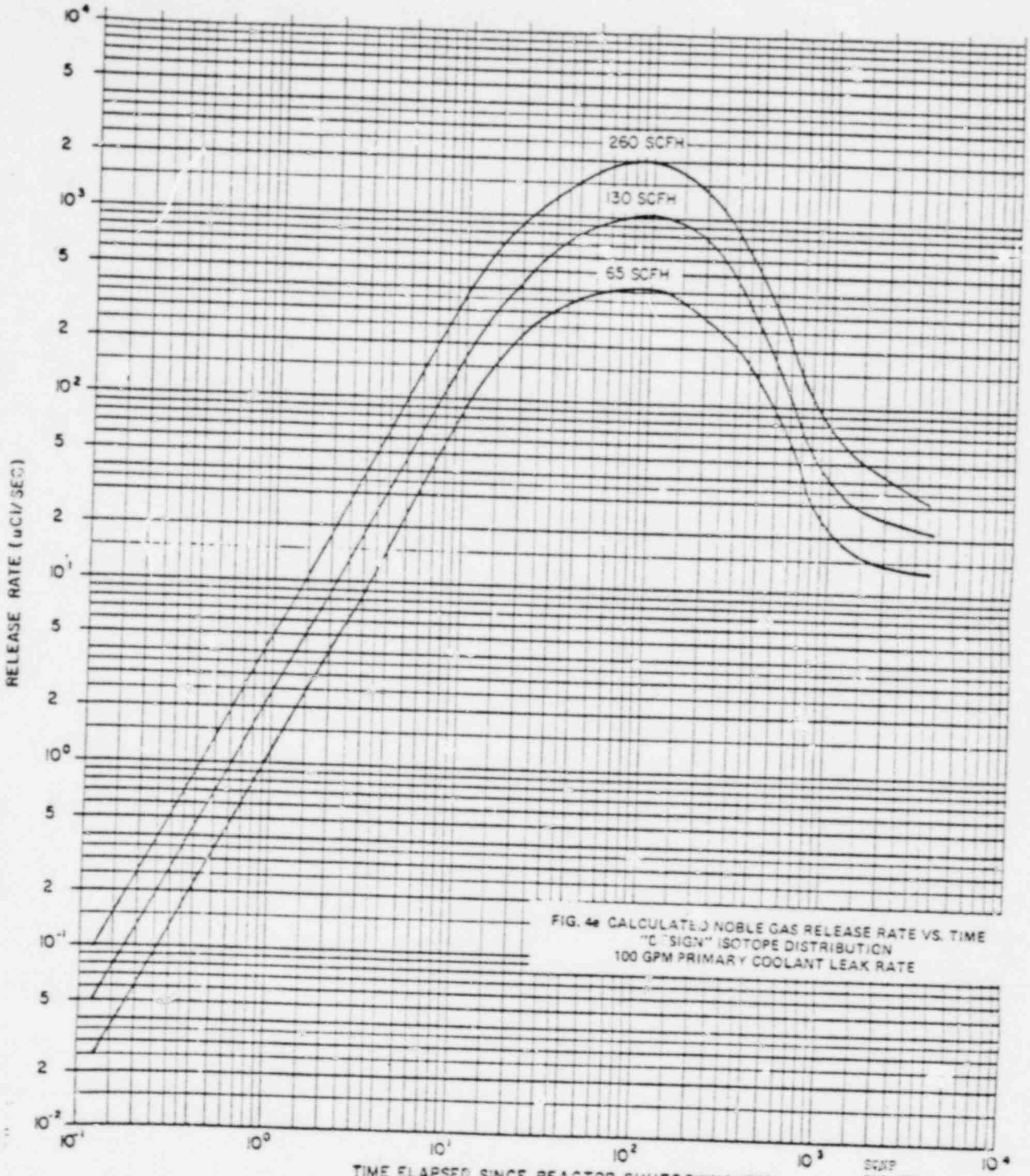


FIG. 4e CALCULATED NOBLE GAS RELEASE RATE VS. TIME
"D`SIGN" ISOTOPE DISTRIBUTION
100 GPM PRIMARY COOLANT LEAK RATE

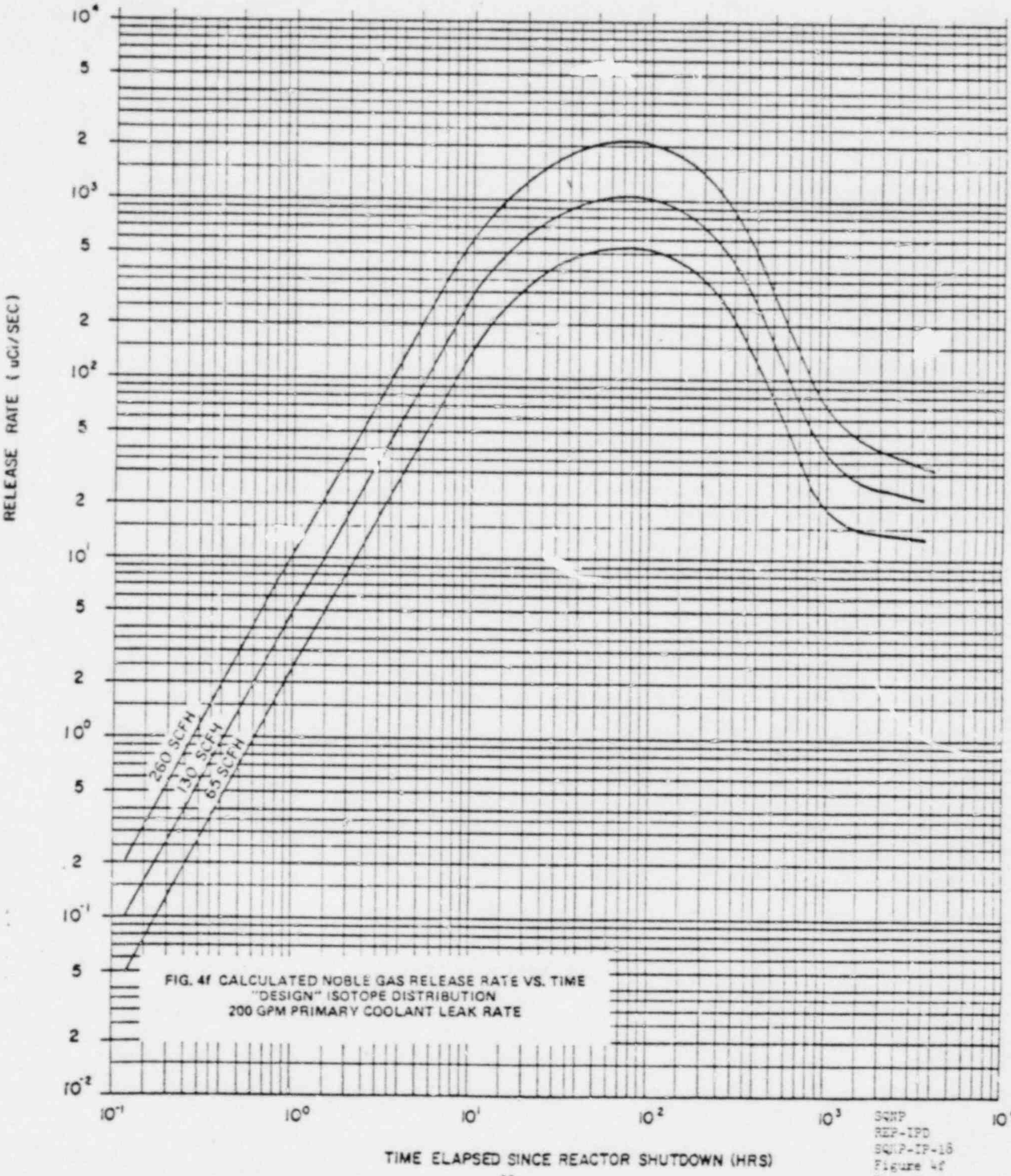


FIG. 4f CALCULATED NOBLE GAS RELEASE RATE VS. TIME
"DESIGN" ISOTOPE DISTRIBUTION
200 GPM PRIMARY COOLANT LEAK RATE

SQNP
REP-IPD
SQIP-IP-16
Figure 4f
Rev. 0
Page 1 of 1

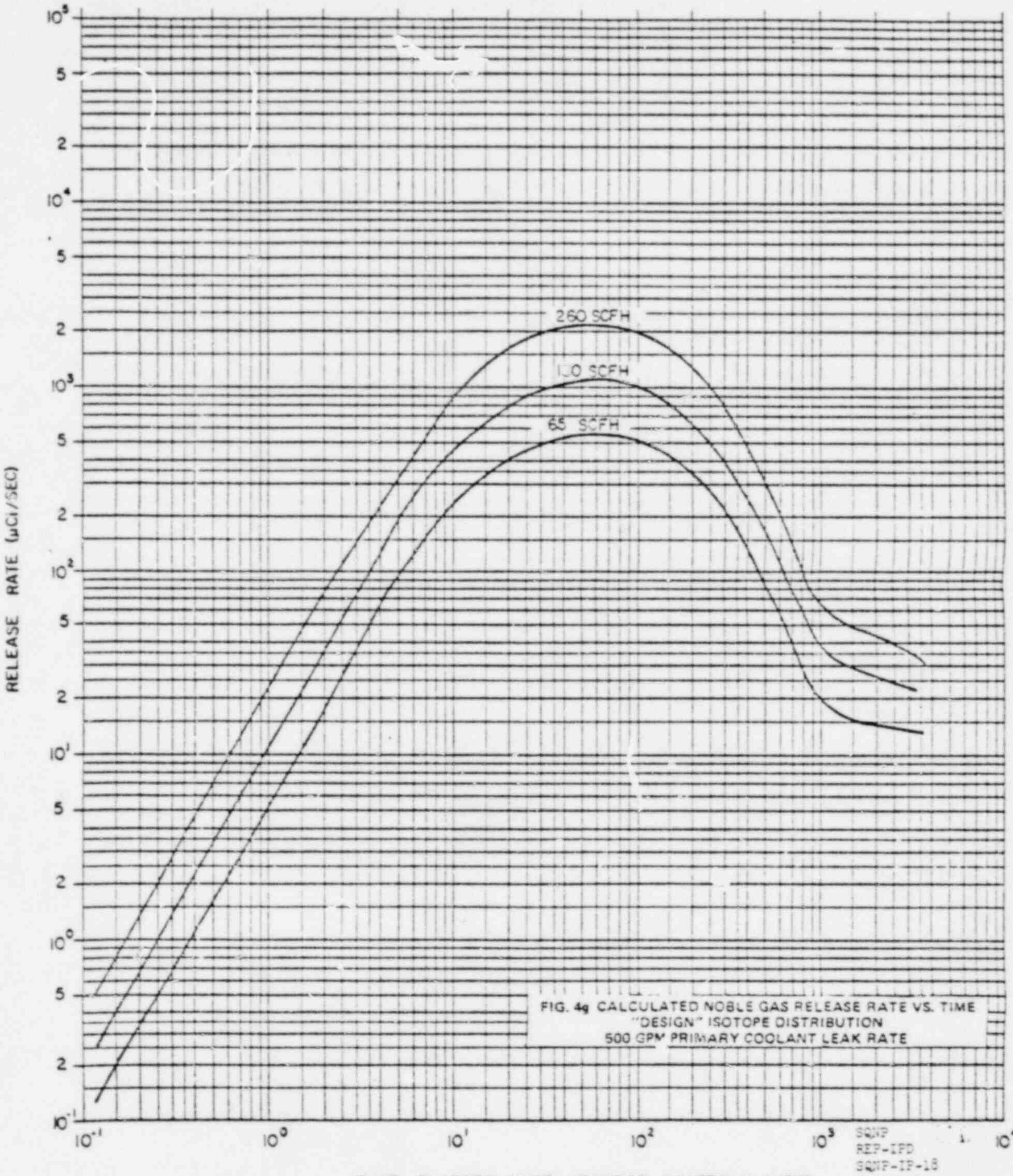


FIG. 4g CALCULATED NOBLE GAS RELEASE RATE VS. TIME
"DESIGN" ISOTOPE DISTRIBUTION
500 GPM PRIMARY COOLANT LEAK RATE

SQNP
REP-IPD
SQNP-IP-18
Figure 4g
Page 1 of 1
Rev. 0

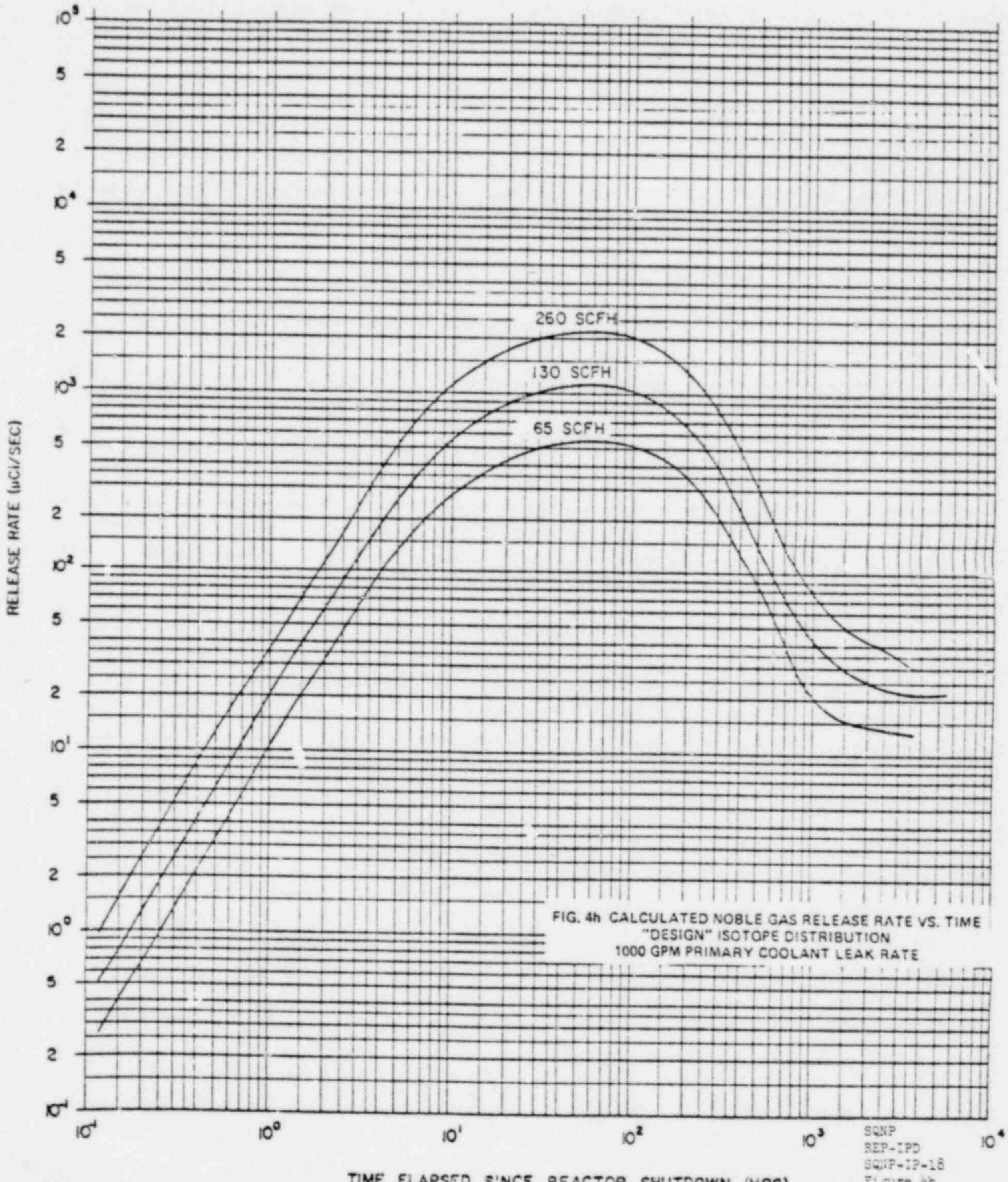
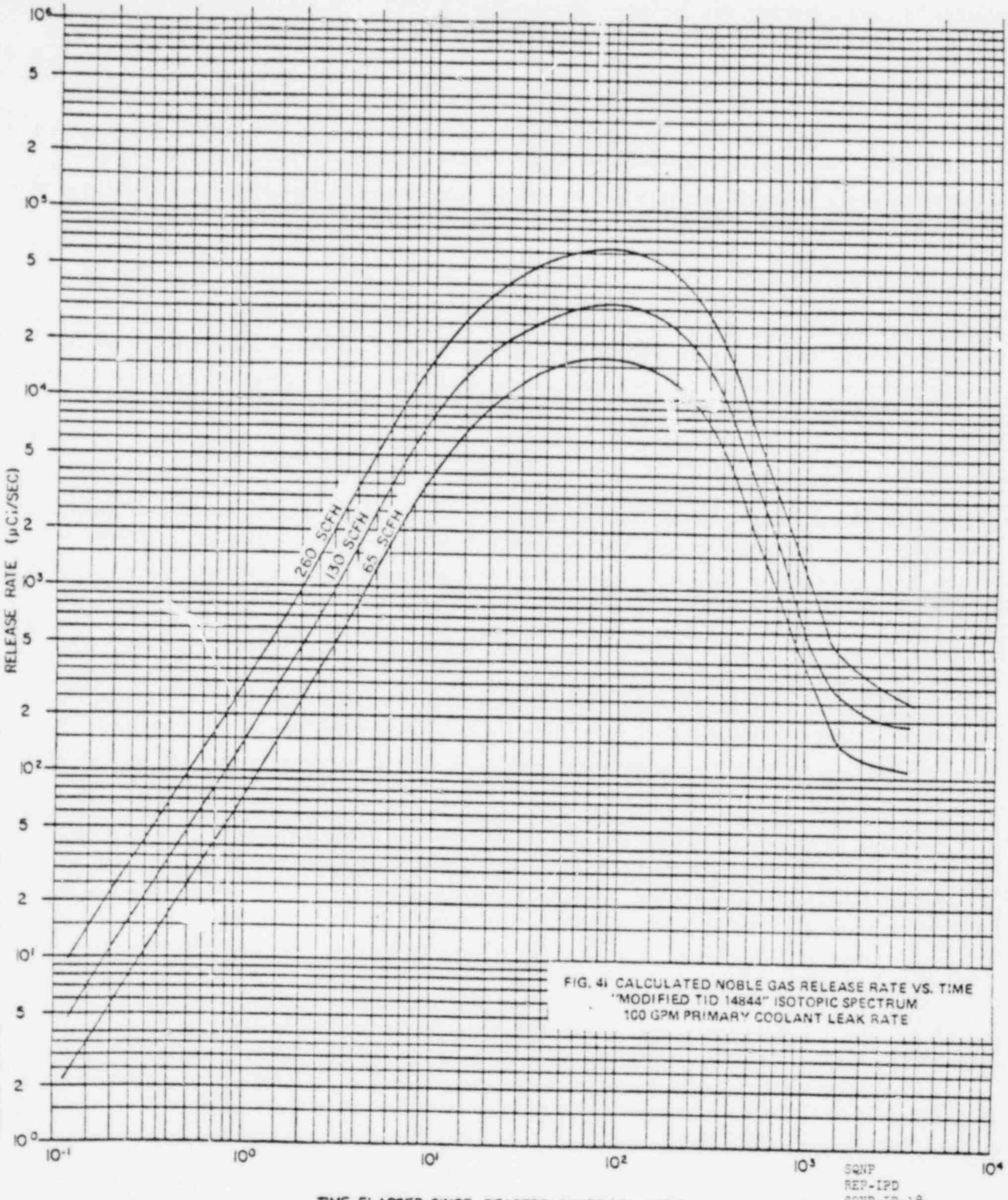


FIG. 4h CALCULATED NOBLE GAS RELEASE RATE VS. TIME
"DESIGN" ISOTOPE DISTRIBUTION
1000 GPM PRIMARY COOLANT LEAK RATE



SQNP
REP-IPD
SQNP-IP-18
Figure 41
Page 1 of 1
Rev. 0

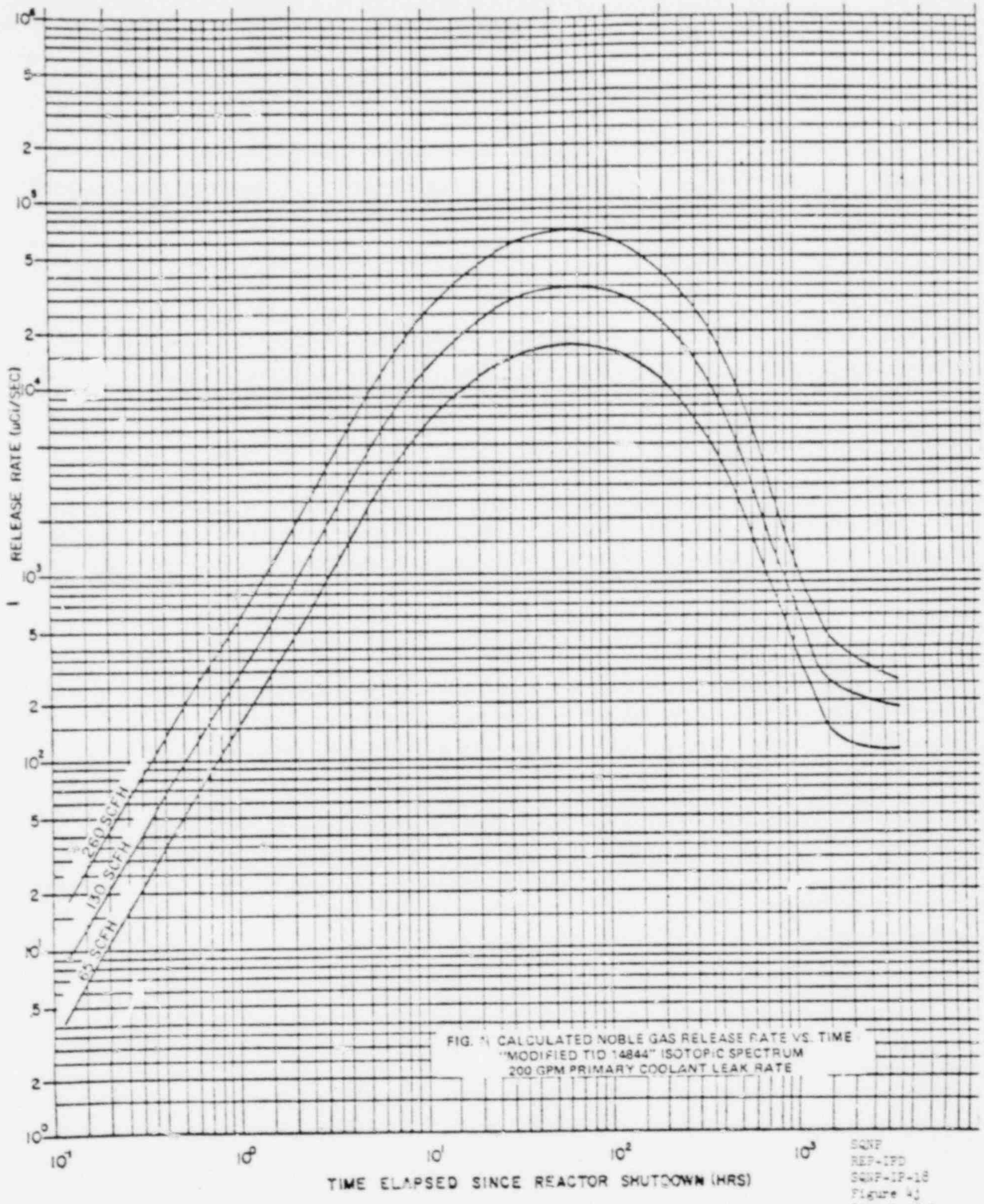
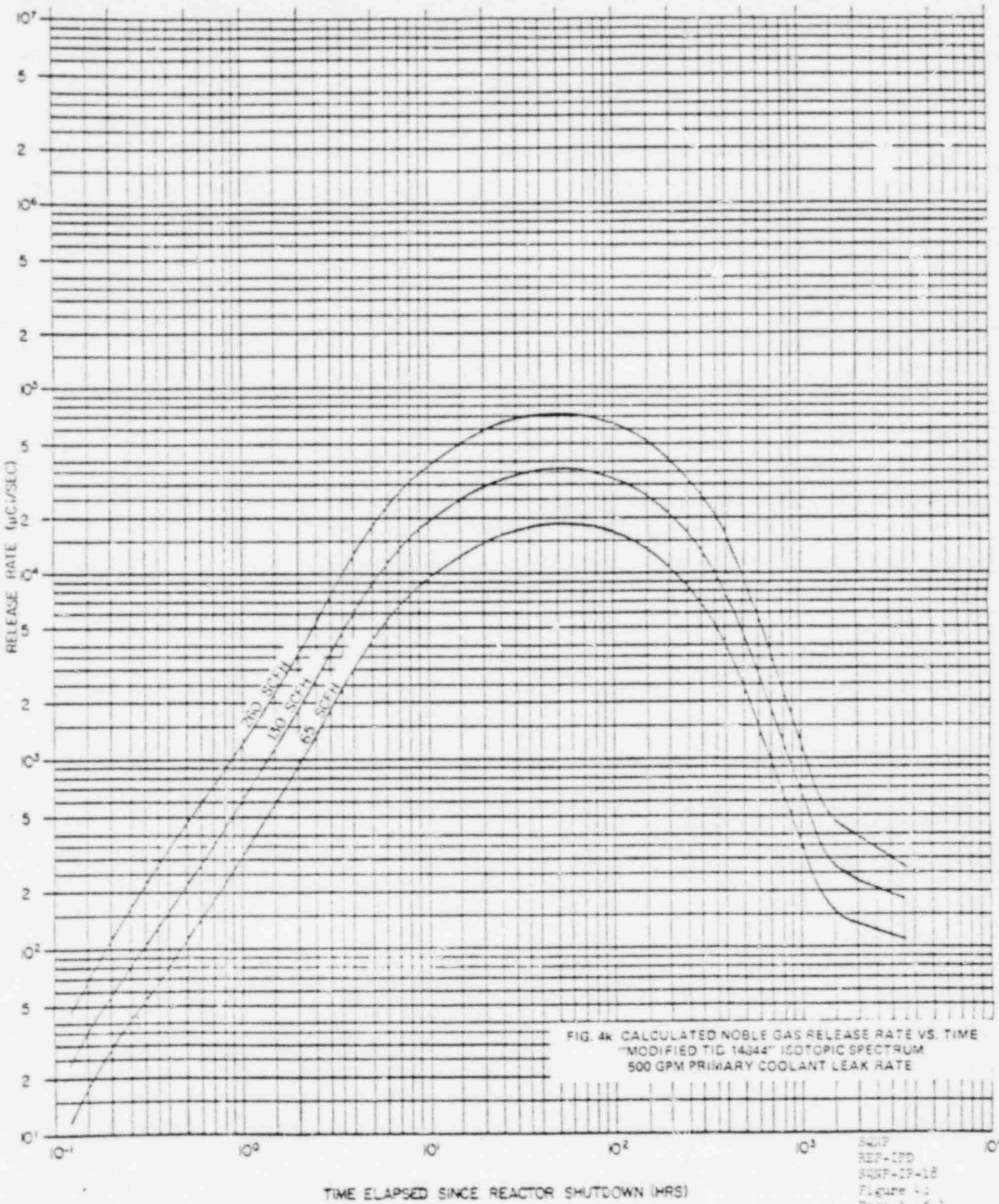
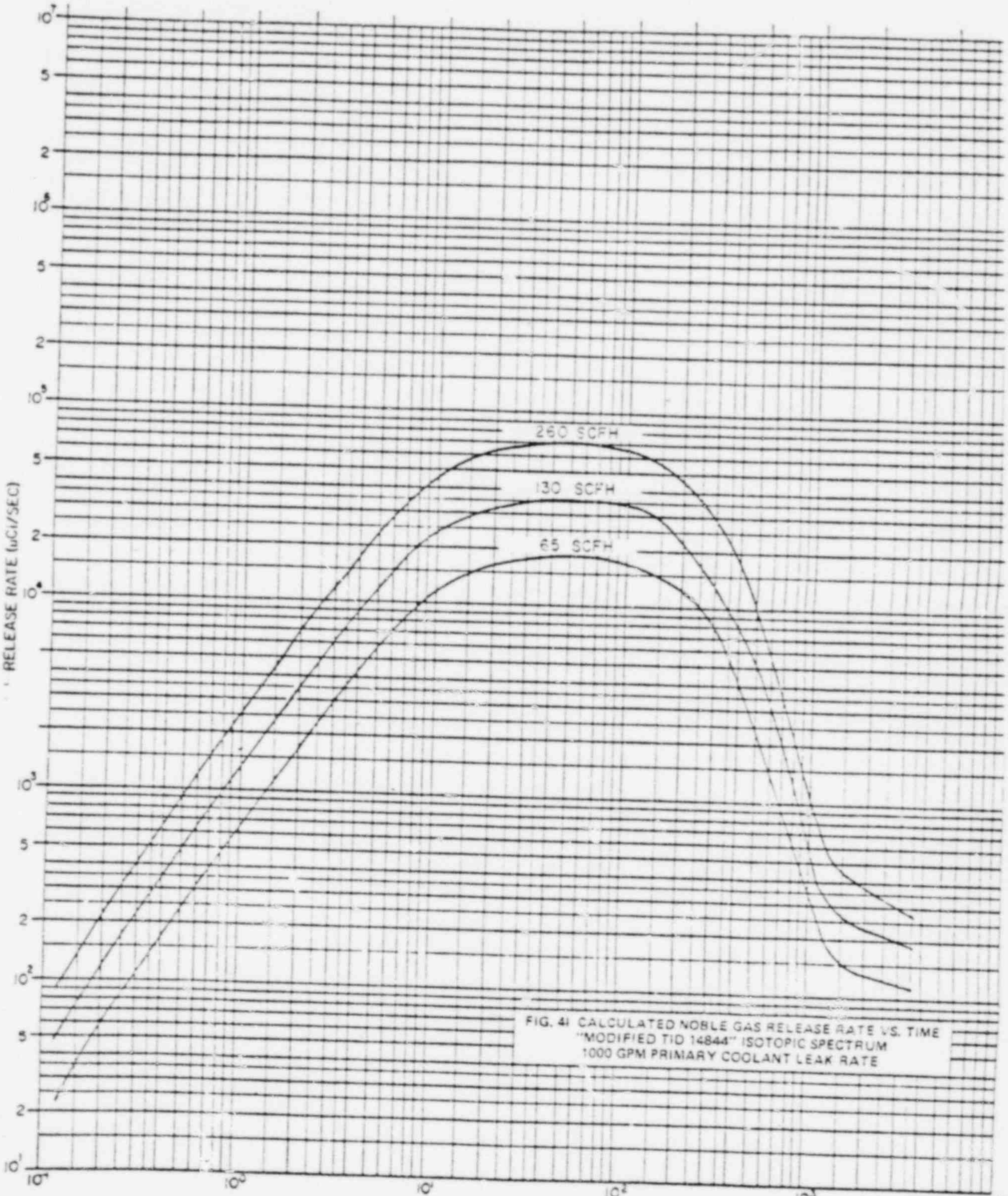


FIG. ?? CALCULATED NOBLE GAS RELEASE RATE VS. TIME
"MODIFIED TID 14844" ISOTOPIC SPECTRUM
200 GPM PRIMARY COOLANT LEAK RATE

SQNP
REP-IPD
SQNP-IP-18
Figure 4j
Page 1 of 1
Rev. 0



SQNP
REP-IPD
SQNP-IP-18
Figure 4k
Page 1 of 1
Rev. 0


260 SCFH
130 SCFH
65 SCFH
FIG. 41 CALCULATED NOBLE GAS RELEASE RATE VS. TIME
"MODIFIED TID 14844" ISOTOPIC SPECTRUM
1000 GPM PRIMARY COOLANT LEAK RATE
RELEASE RATE (uCi/SEC)
TIME ELAPSED SINCE REACTOR SHUTDOWN (HRS)

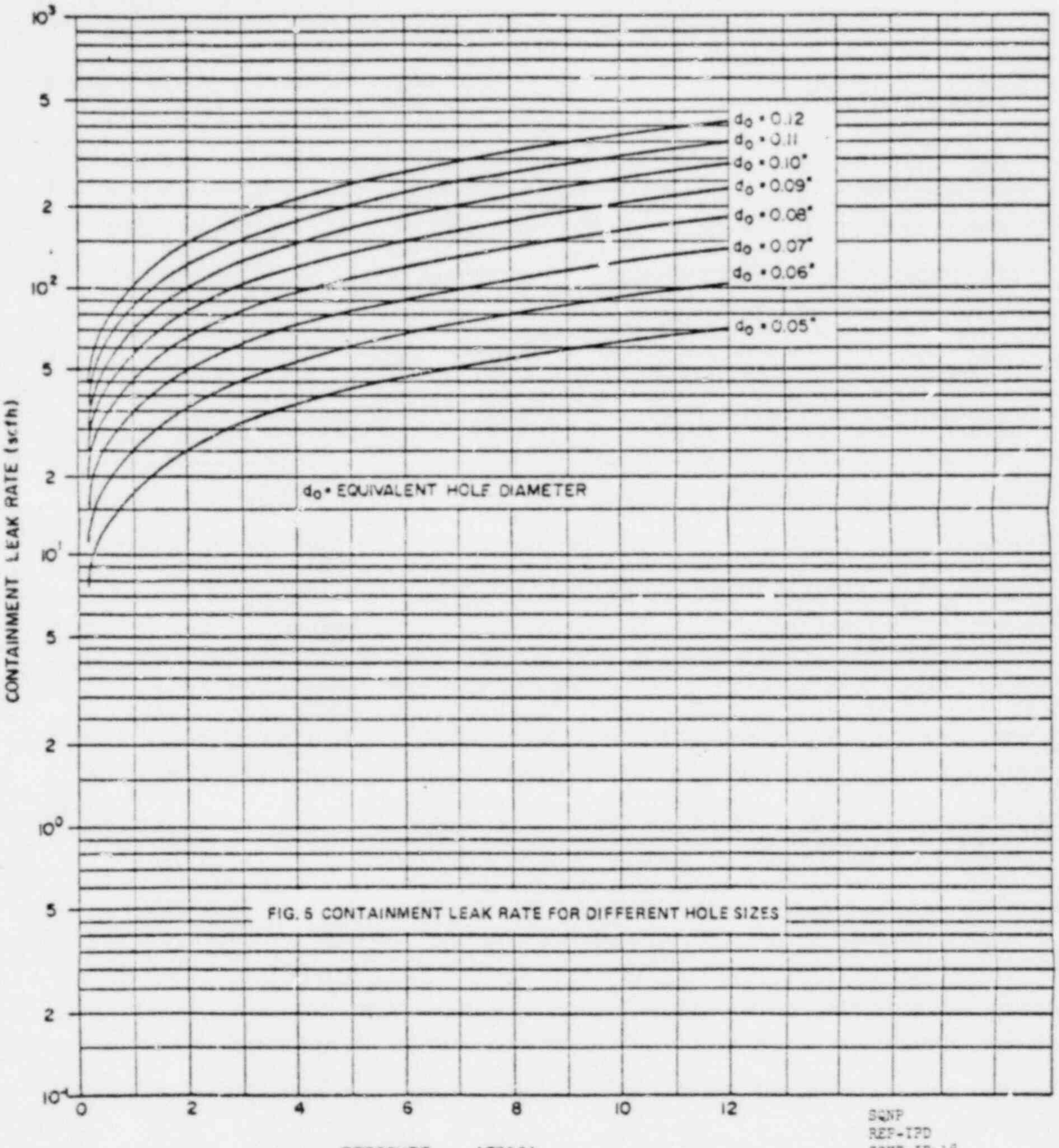


FIG. 5 CONTAINMENT LEAK RATE FOR DIFFERENT HOLE SIZES

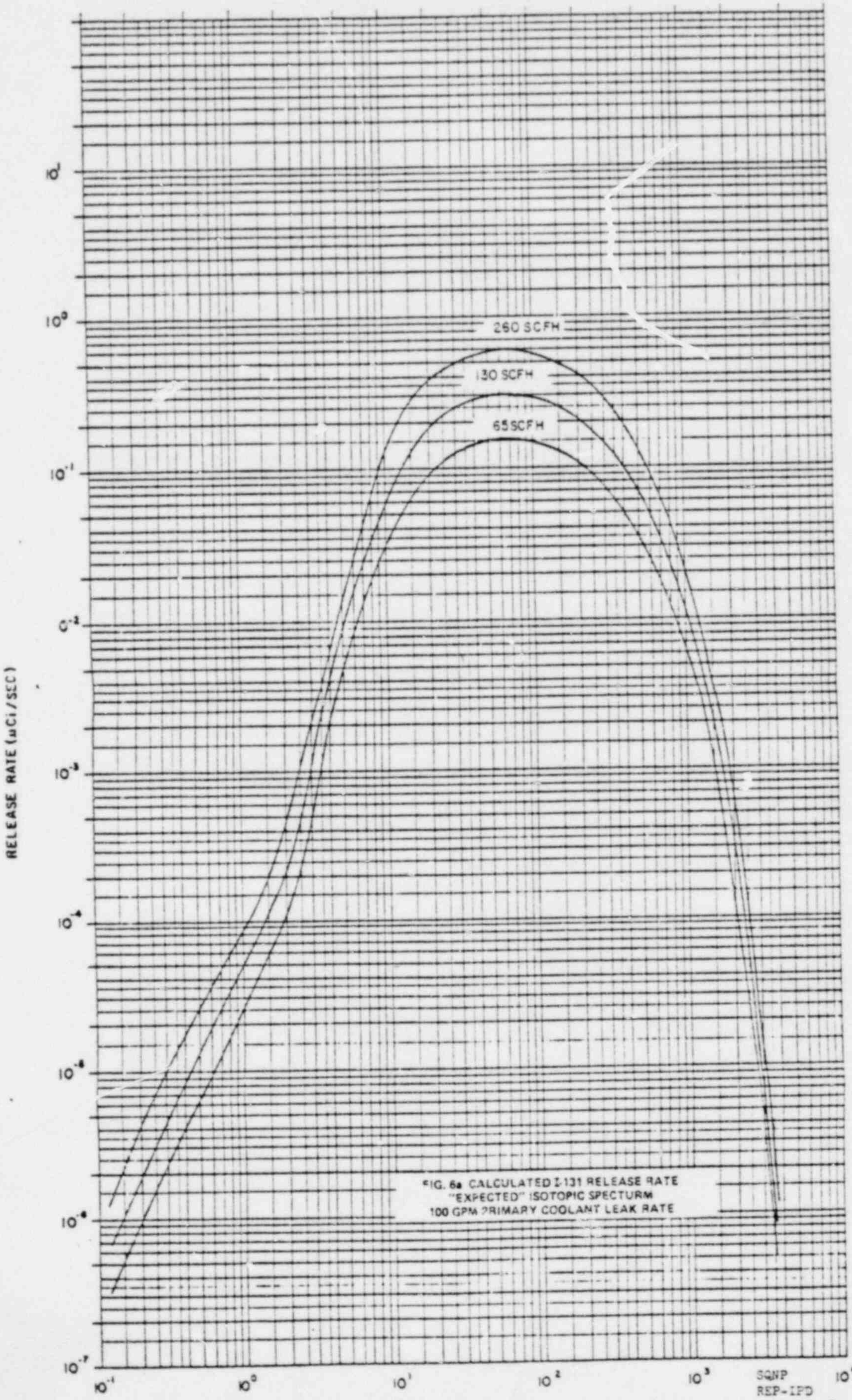


FIG. 6a CALCULATED I-131 RELEASE RATE
"EXPECTED" ISOTOPIC SPECTURM
100 GPM PRIMARY COOLANT LEAK RATE

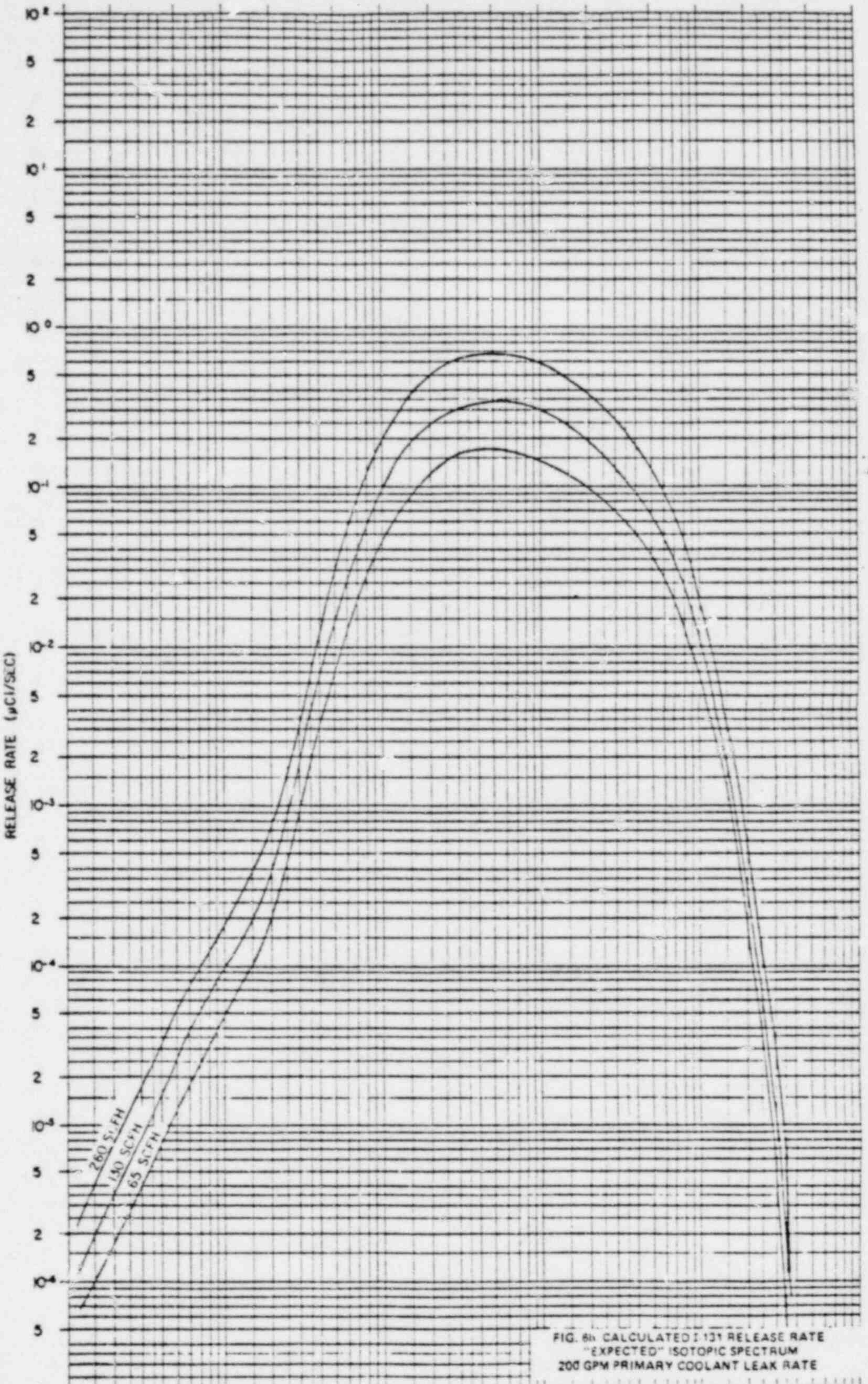


FIG. 6b CALCULATED I 131 RELEASE RATE
"EXPECTED" ISOTOPIC SPECTRUM
200 GPM PRIMARY COOLANT LEAK RATE

SQNP
RZP-IPD
SQNP-IP-18
Figure 6b
Page 1 of 1
Rev. 0

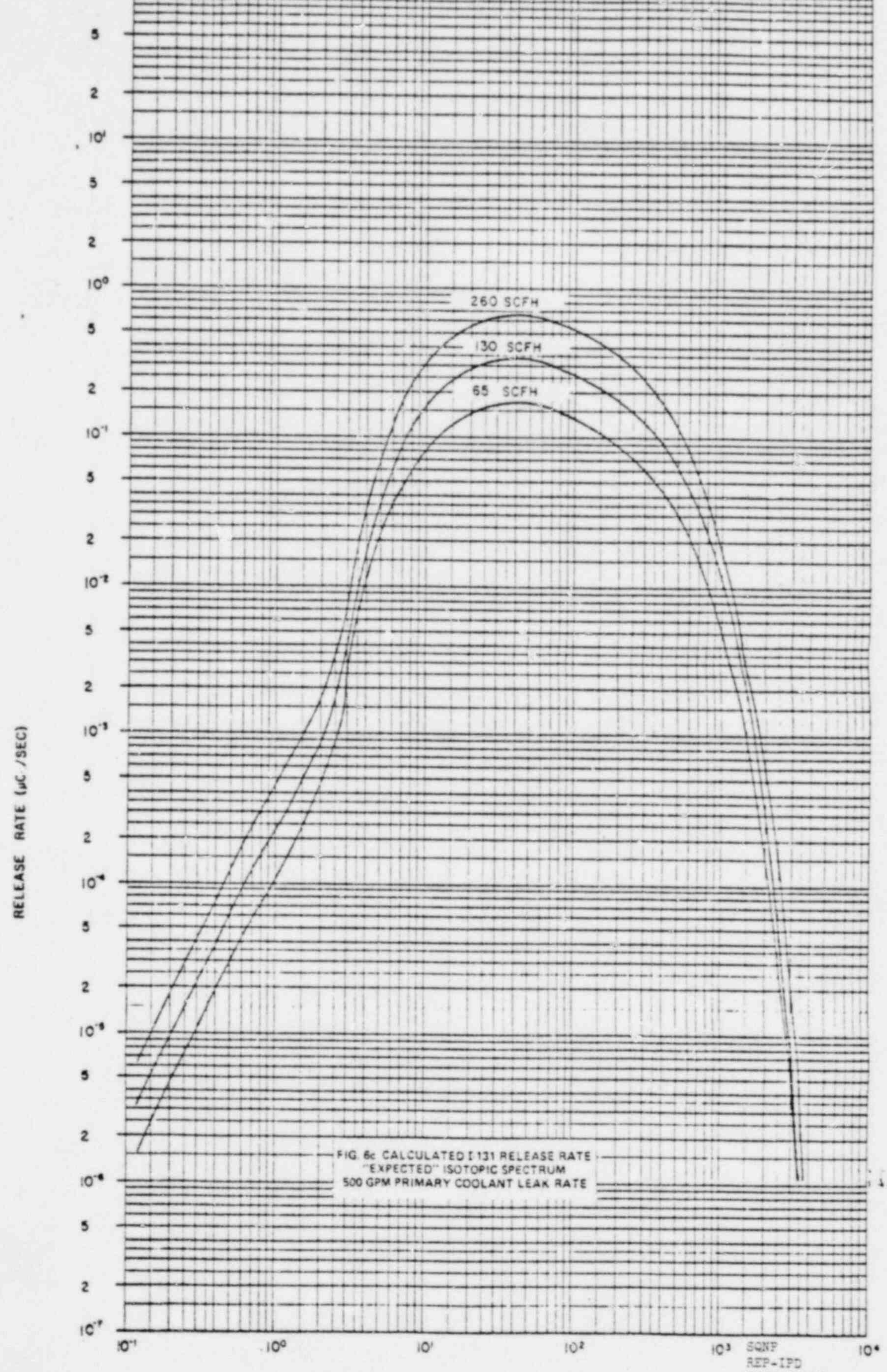


FIG. 6c CALCULATED I-131 RELEASE RATE
"EXPECTED" ISOTOPIC SPECTRUM
500 GPM PRIMARY COOLANT LEAK RATE

SQNP
REP-IPD
SQNP-IP-18
Figure 6c
Page 1 of 1
Rev. 0

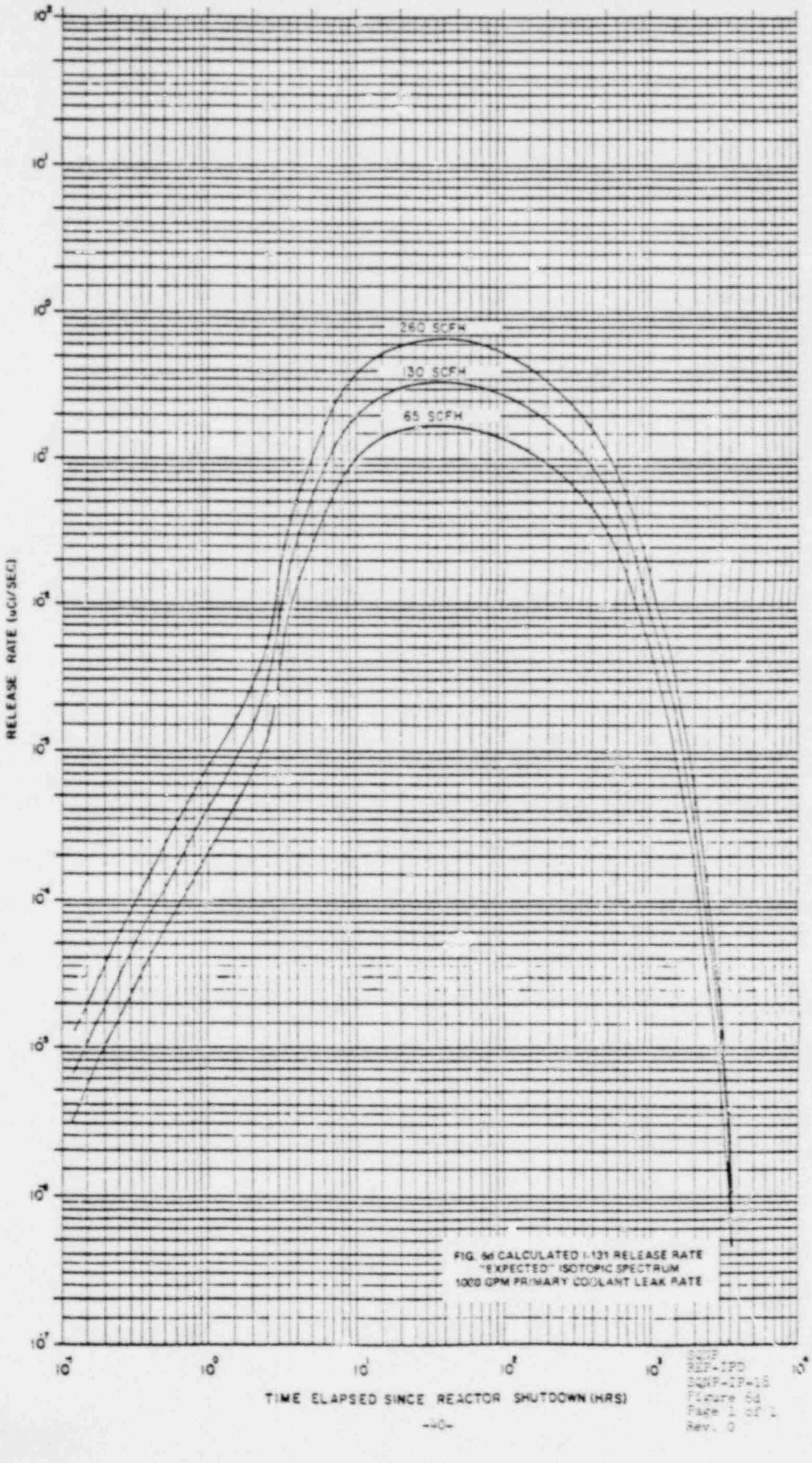


FIG. 6d CALCULATED I-131 RELEASE RATE
"EXPECTED" ISOTOPIC SPECTRUM
1000 GPM PRIMARY COOLANT LEAK RATE

SQNP
REP-IPD
SQNP-IP-16
Figure 6d
Page 1 of 1
Rev. 0

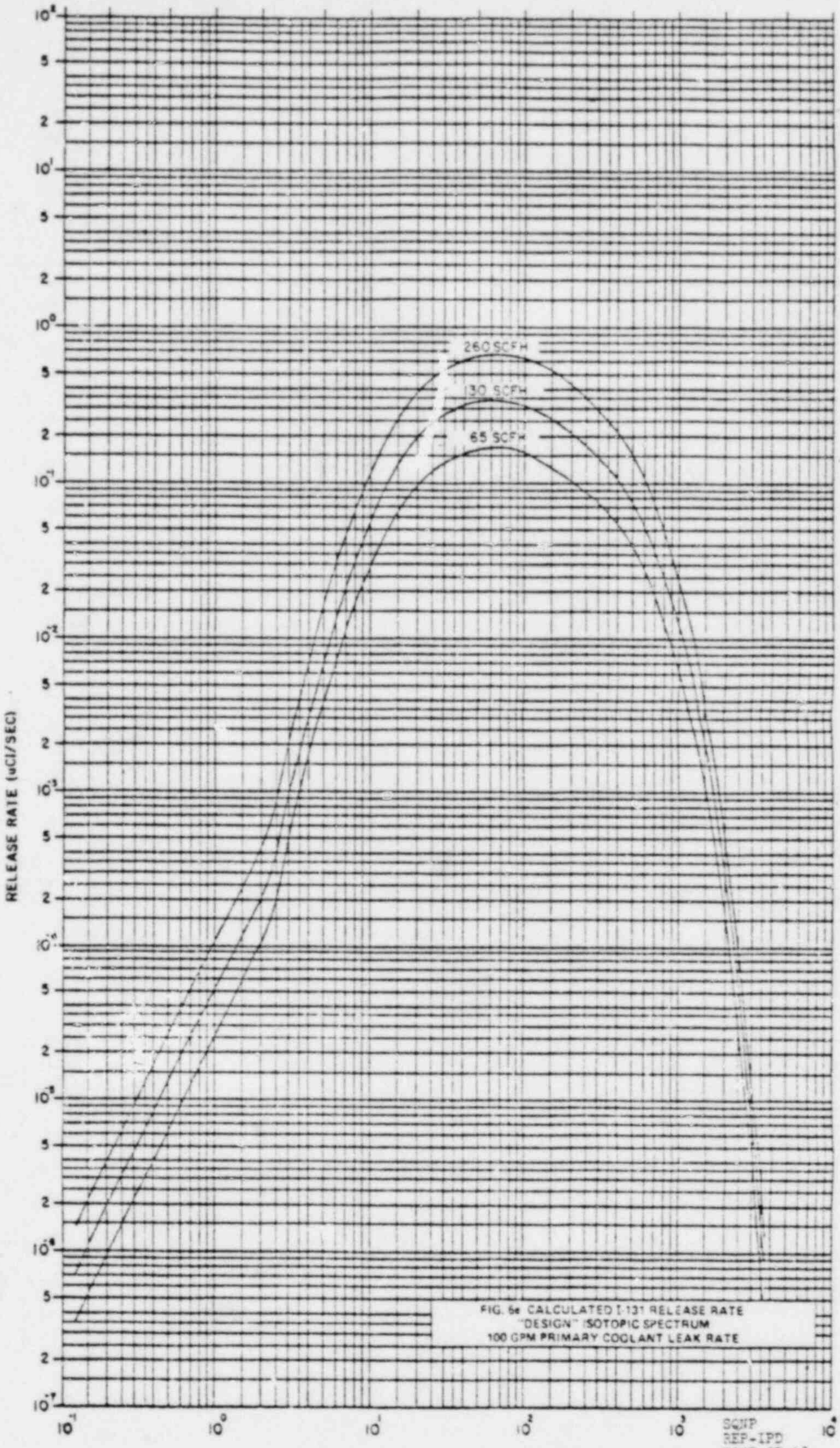


FIG. 6e CALCULATED I-131 RELEASE RATE
"DESIGN" ISOTOPIC SPECTRUM
100 GPM PRIMARY COOLANT LEAK RATE

SQNP
REP-IPD
SQNP-IP-18
Figure 6e
Page 1 of 1
Rev. 0

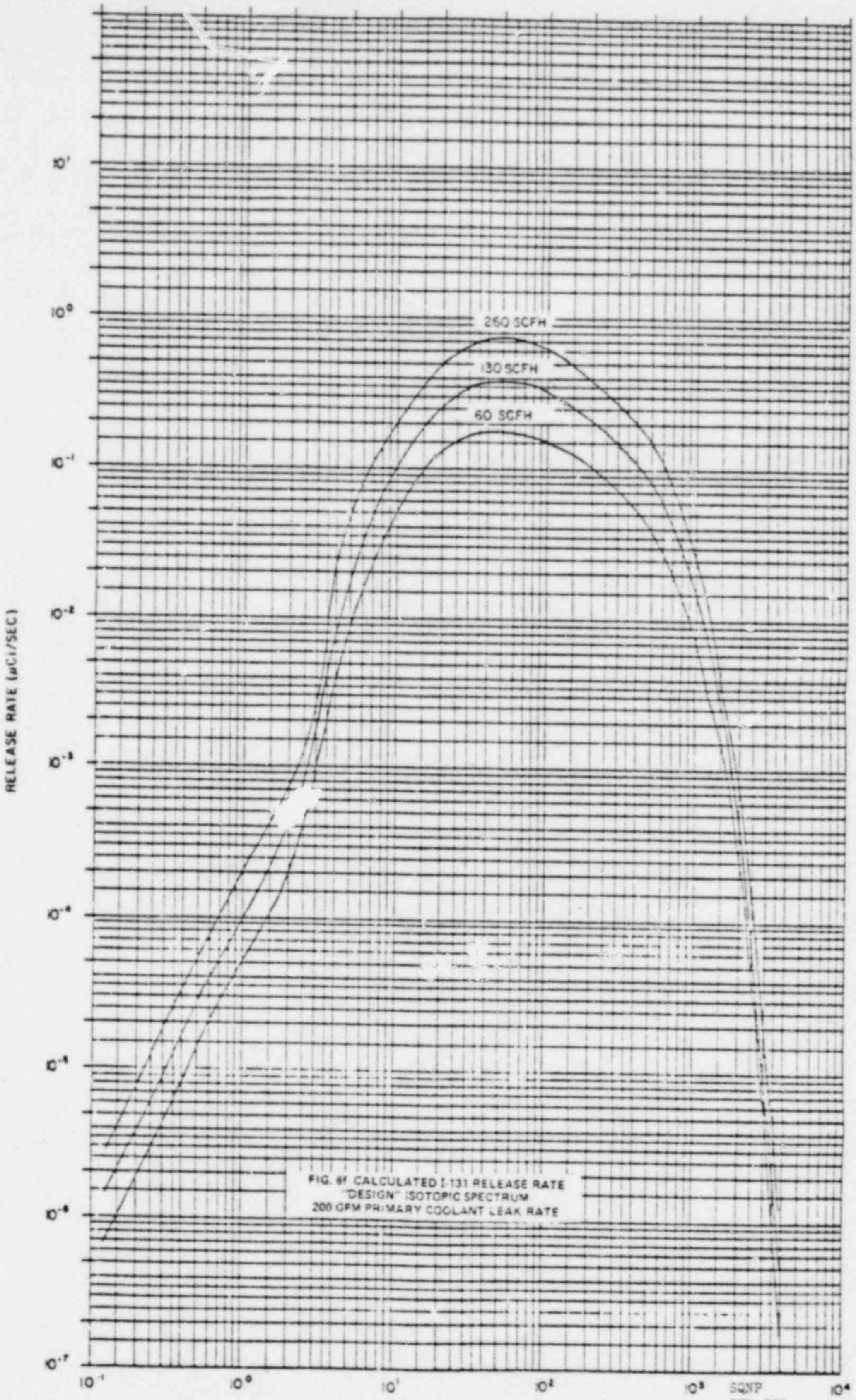


FIG. 6f CALCULATED I-131 RELEASE RATE
"DESIGN" ISOTOPIC SPECTRUM
200 GPM PRIMARY COOLANT LEAK RATE

SQNP
REP-IPD
SQNP-IP-18
Figure 6f
Page 1 of 1
Rev. 0

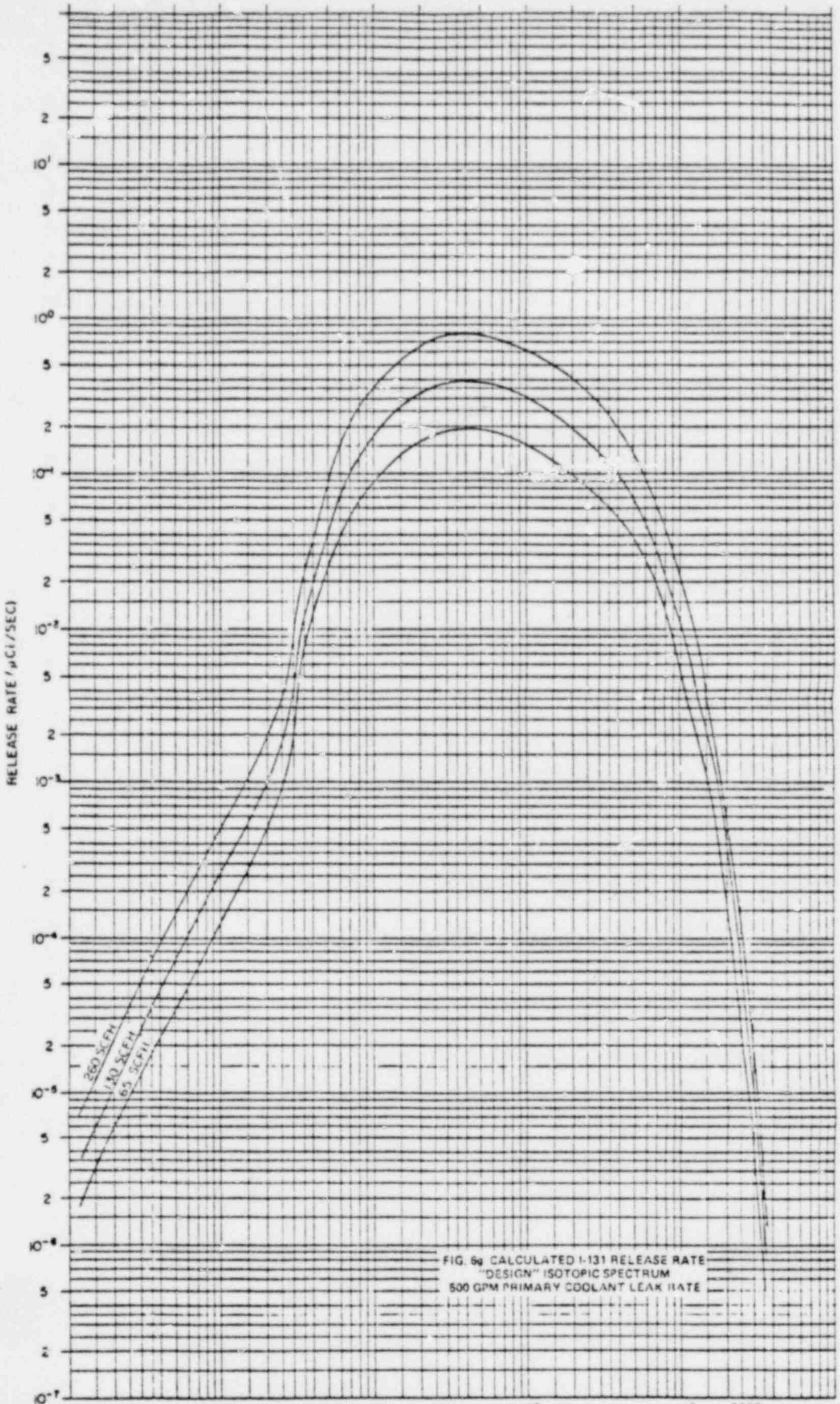


FIG. 6g CALCULATED I-131 RELEASE RATE
"DESIGN" ISOTOPIC SPECTRUM
500 GPM PRIMARY COOLANT LEAK RATE

SQNP
REP-IPD
SQNP-IP-18
Figure 6g
Page 1 of 1
Rev. 0

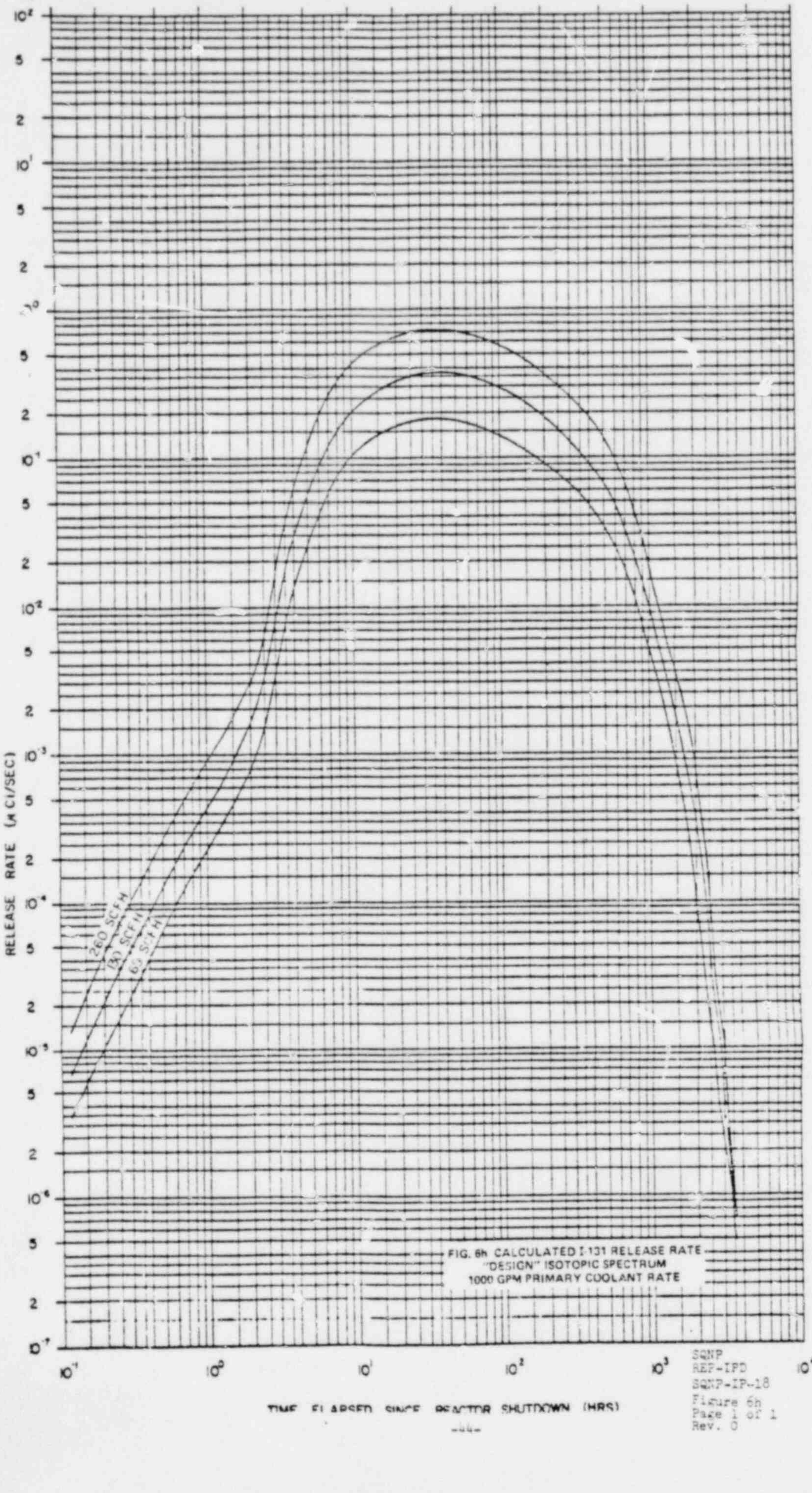


FIG. 6h CALCULATED I-131 RELEASE RATE
"DESIGN" ISOTOPIC SPECTRUM
1000 GPM PRIMARY COOLANT RATE

SQNP
REP-IPD
SQNP-IP-18
Figure 6h
Page 1 of 1
Rev. 0

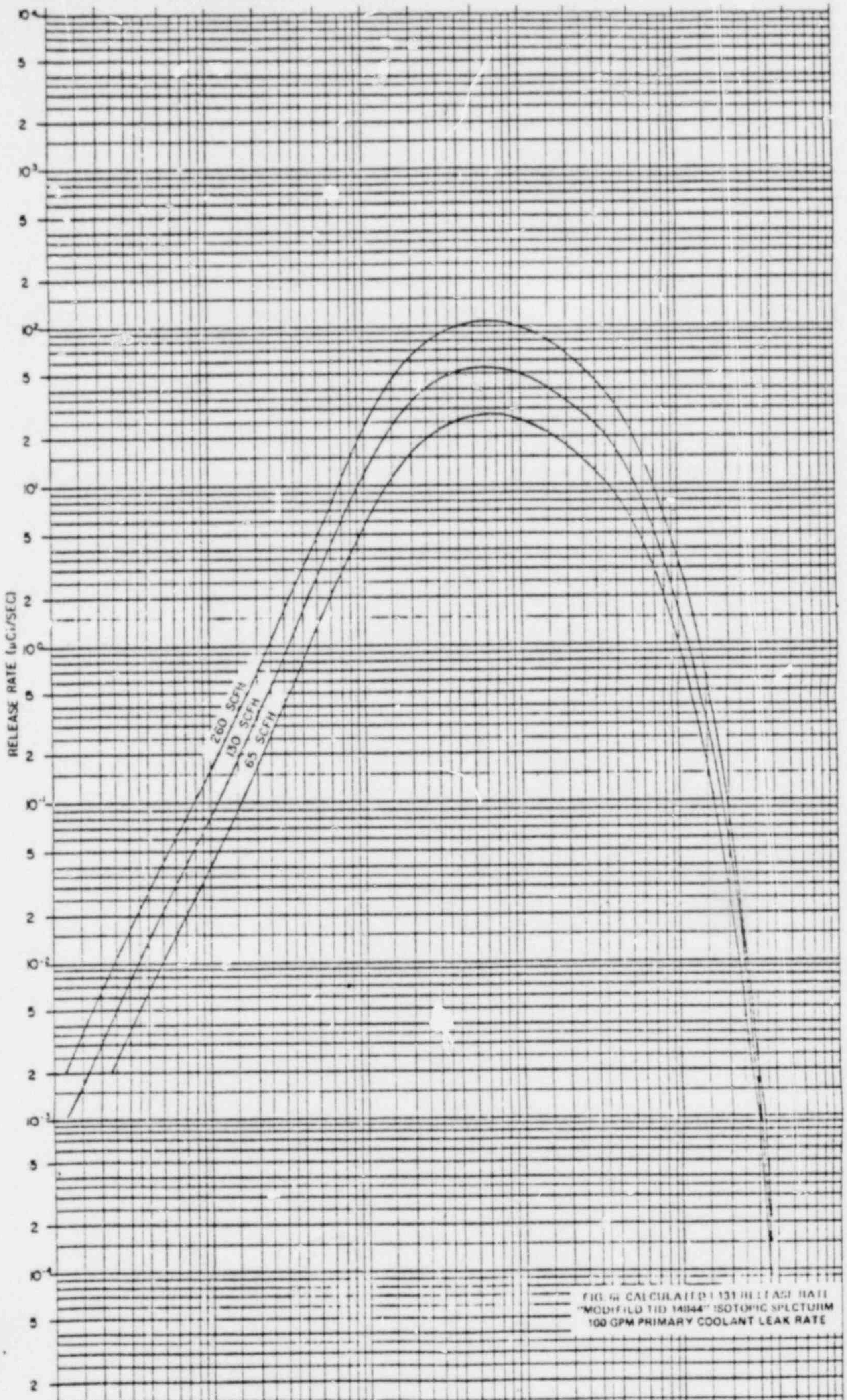


FIG. 61 CALCULATED I 131 RELEASE RATE
"MODIFIED TID 14844" ISOTOPIC SPECTRUM
100 GPM PRIMARY COOLANT LEAK RATE

SQNP
REP-IPD
SQNP-IP-18
Figure 61
Page 1 of 1
Rev. 0

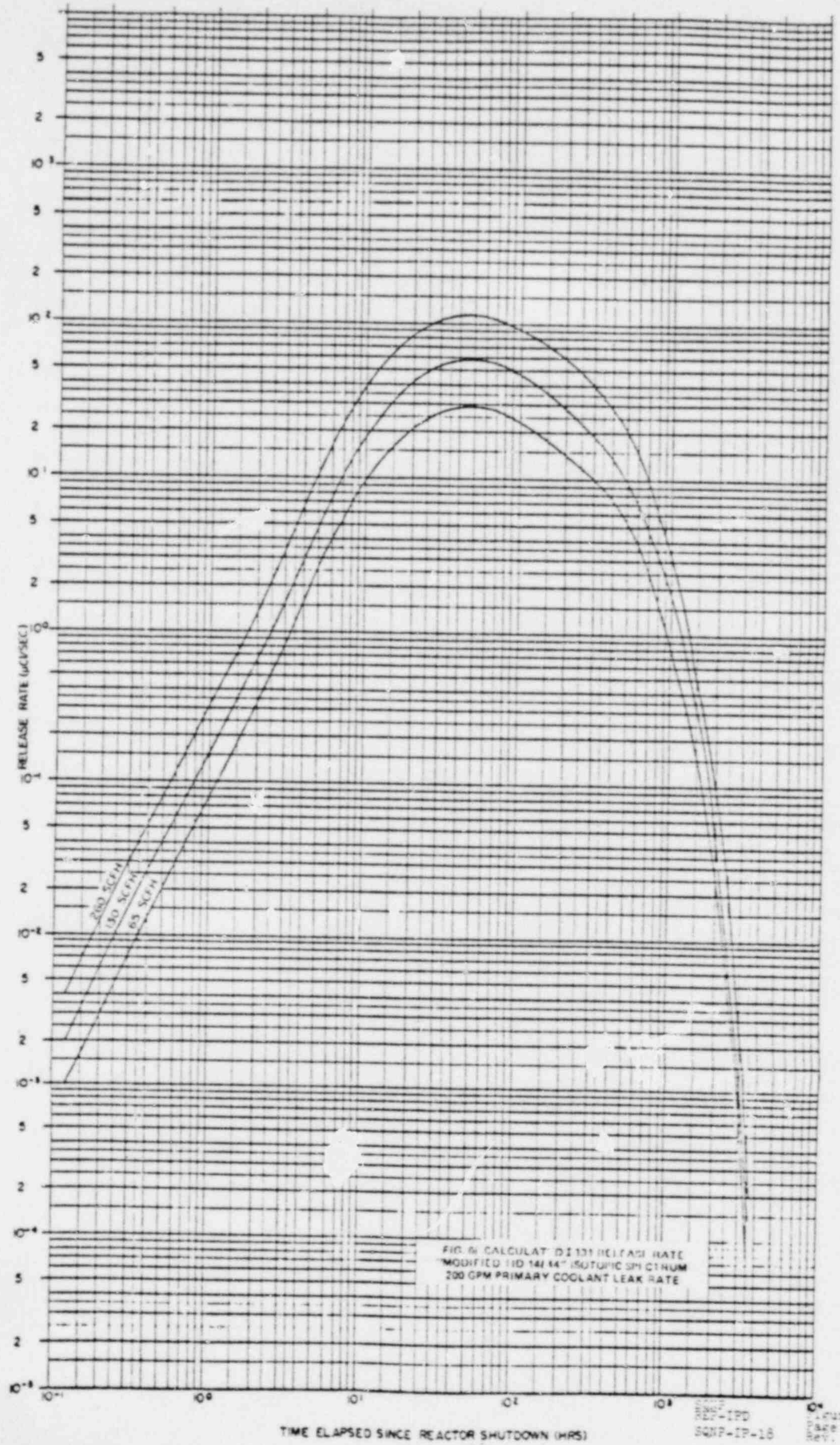


FIG. 6 CALCULAT D I 131 RELEASE RATE "MODIFIED TID 14844" ISOTOPIC SPECTRUM 200 GPM PRIMARY COOLANT LEAK RATE