MEETING SUMMARY DISTRIBUTION

Docket File
NRC/PDR
Local PDR
TIC/NSIC/TERA
LB #4 r/f
H. Denton
E. Case
D. Eisenhut
R. Purple
B. J. Youngblood
A. Schwencer
F. Miraglia
J. Miller
G. Lainas
R. Vollmer
J. P. Knight
R. Bosnak
F. Schauer
R. L. Jackson
Attorney, OELD
OIE (3)
ACRS (16)
R. Tedesco
N. Hughes

NRC Participants:

J. Kimball
W. Paton

bcc: Applicant & Service List

G. Lear
S. Pawlicki
V. Benaroya
Z. Rosztoczy
W. Haass
D. Muller
R. Ballard
W. Regan
R. Mattson
P. Check
O. Parr
F. Rosa
W. Butler
W. Kreger
R. Houston
W. Gammill
L. Rubenstein
T. Speis
W. Johnston
S. Hanauer
T. Murley
F. Schroeder
D. Skovholt
M. Ernst
K. Kniel
G. Knighton
A. Thadani
D. Tondi
J. Kramer
D. Vassallo
P. Collins
D. Ziemann
F. Congel
J. Stolz
M. Srinivasan
R. Baer
C. Berlinger
E. Adensam
Project Manager D. Hood
Licensing Assistant M. Duncan

DEC 3 1981

Docket Nos.: 50-329
and 50-330 OM, OL

APPLICANT: Consumers Power Company

FACILITY: Midland Plant, Units 1 and 2

SUBJECT: Summary of September 8, 1981 Meeting on Seismic Input Parameters

On September 8, 1981, the NRC staff met in Bethesda, Maryland with Consumers Power Company (the applicant) to discuss Part III of a report on the Midland site specific response spectra, "Seismic Hazard Analysis", February 1981. Staff review of this report was requested by the applicants letter of August 11, 1981. Also represented were members of the applicants consultant, Weston Geophysical Corporation. Meeting attendees are listed by Enclosure 1. The meeting agenda consisted of nine questions raised by the staff during its review and attached to the September 8, 1981 meeting notice.

Handout material presented to the staff during the meeting are shown in Enclosure 3. This material completed the information the staff needed in order to prepare testimony for an October OM-OL hearing session on seismological issues. The applicants consultant also presented preliminary information on ongoing geological studies near the site. This material will be given to the staff as a special report and submitted in a future FSAR amendment.

Darl Hood, Project Manager
Licensing Branch No.4
Division of Licensing

Enclosure(s):
As stated

cc: See next page

OFFICE	DL:LB#4	DL:LB#4					
SURNAME	DHood:eb	EAdensam					
DATE	11/23/81	11/25/81					

MIDLAND

Mr. J. W. Cook
Vice President
Consumers Power Company
1945 West Parnall Road
Jackson, Michigan 49201

cc: Michael I. Miller, Esq.
Ronald G. Zamarin, Esq.
Alan S. Farnell, Esq.
Isham, Lincoln & Beale
Suite 4200
1 First National Plaza
Chicago, Illinois 60603

James E. Brunner, Esq.
Consumers Power Company
212 West Michigan Avenue
Jackson, Michigan 49201

Myron M. Cherry, Esq.
1 IBM Plaza
Chicago, Illinois 60611

Ms. Mary Sinclair
5711 Summerset Drive
Midland, Michigan 48640

Stewart H. Freeman
Assistant Attorney General
State of Michigan Environmental
Protection Division
720 Law Building
Lansing, Michigan 48913

Mr. Wendell Marshall
Route 10
Midland, Michigan 48640

Mr. Steve Gadler
2120 Carter Avenue
St. Paul, Minnesota 55108

Mr. Roger W. Huston
Suite 220
7910 Woodmont Avenue
Bethesda, Maryland 20814

Mr. Don van Farrowe, Chief
Division of Radiological Health
Department of Public Health
P.O. Box 33035
Lansing, Michigan 48909

William J. Scanlon, Esq.
2034 Pauline Boulevard
Ann Arbor, Michigan 48103

U.S. Nuclear Regulatory Commission
Resident Inspectors Office
Route 7
Midland, Michigan 48640

Ms. Barbara Stamiris
5795 N. River
Freeland, Michigan 48623

Mr. Paul A. Perry, Secretary
Consumers Power Company
212 W. Michigan Avenue
Jackson, Michigan 49201

Mr. Walt Apley
c/o Mr. Max Clausen
Battelle Pacific North West Labs (PNWL)
Battelle Blvd.
SIGMA IV Building
Richland, Washington 99352

Mr. I. Charak, Manager
NRC Assistance Project
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439

Mr. R. B. Borsum
Nuclear Power Generation Division
Babcock & Wilcox
7910 Woodmont Avenue, Suite 220
Bethesda, Maryland 20814

cc: Commander, Naval Surface Weapons Center
ATTN: P. C. Huang
White Oak
Silver Spring, Maryland 20910

Mr. L. J. Auge, Manager
Facility Design Engineering
Energy Technology Engineering Center
P.O. Box 1449
Canoga Park, California 91304

Mr. William Lawhead
U.S. Corps of Engineers
NCEED - T
7th Floor
477 Michigan Avenue
Detroit, Michigan 48226

Charles Bechhoefer, Esq.
Atomic Safety & Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Mr. Ralph S. Decker
Atomic Safety & Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dr. Frederick P. Cowan
Apt. B-125
6125 N. Verde Trail
Boca Raton, Florida 33433

Jerry Harbour, Esq.
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

ENCLOSURE 1

September 16, 1981 - NRC - CONSUMERS POWER

Dino Scaletti, LB#4 - 492-8443
Thiru Thinuvengadam, Consumers Power Company
Dennis M. Budzik, Consumers Power Company
Ann Hodgdon, OELD, NRC
Jeff Kimball, GSB, NRC
Gus Giese-Koch, GSB, NRC
William Paton, OELD, NRC
Michael Wilber, OGLB, NRC
P. Shunmugavel, Bechtel
J. C. Johnston, Weston Geophysical
Zenou Cybriwsky, Weston Geophysical
Lane Schultz, Weston Geophysical
Steve Tedesco, Weston Geophysical
Richard Holt, Weston Geophysical
Philip Steptoe, Isham, Lincoln & Beale (CPCo)
Edward Levine, Weston Geophysical
Leon Reiter, GSB, NRC
Robert E. Jackson, GSB, NRC
Stephan Brown, GSB, NRC
A. K. Ibrahim, GSB, NRC
G. Leblanc, Weston Geophysical
Robert Teifke, Weston Geophysical
J. W. Cook, Consumers Power
George C. Kimkiewicz, Weston Geophysical

ENCLOSURE 2

Attachment
Midland Nuclear Plant
Draft Agenda for Meeting on Part III
Seismic Hazard Analysis

The information (tables, computer output) that is requested below should be initially provided to the staff at the forthcoming meeting. If this material needs to be docketed the staff will issue a formal request after the meeting (where the below listed topics will be discussed).

1. Provide tables similar to table 1 for the following source zones.

   Model 1 - Michigan Basin
   Central Province
   Attica

   Model 2 - Central Province
   Anna
   Niagara Peninsula

   Model 3 - Central Province

2. Provide plots of the annual number of earthquakes versus magnitude (it is not necessary to normalize to a uniform area) for all source zones similar to figures 5-8. These plots should show the actual data points along with the regression best fit line.

3. Provide tables or the direct computer output of the various source zone models (similar to tables 5-8) for the following points in the Central United States.

   $43^{\circ}N 79^{\circ}W$; $41^{\circ}N 81^{\circ}W$, $41^{\circ}N$, $84^{\circ}W$

   $43^{\circ}N$ $88^{\circ}W$; $40.5^{\circ}N$ $88^{\circ}W$

Weston Commitments
21st - 23rd

Sept 17th meeting - date #s 1-3 can be completed by -

16th is a posibility

DICK HOLT WILL BE TESTIFYING

These runs should be made using the same input parameters as used in Part III. These runs are necessary to provide the staff with relative comparisons of seismicity throughout the Central United States.

4. Prepare a brief discussion on how uncertainty is accounted for in the assumed attenuation relationship including the following topics:
   a) limiting dispersion at close distances
   b) limiting the likelihood of certain intensities for the maximum magnitude
   c) using a diff ent attenuation relationship such as Gupta and Nuttli (1976) which has a different estimate of standard deviation of intensity.
5. On page 22 of the Part II report you discuss further constraints on the seismic hazard results. Were these constraints placed on all models? no! If so what effect does removing these constraints have on the annual exceedence probabilities.
6. In which source zones was the maximum earthquake (where it had only one occurrence) not given equal weight in the regression analysis (page 9).
7. Provide a brief discussion (elaboration of pages 17 & 18) on why the ground motion was not directly assimilated into the attenuation relationship (p. 15). How is uncertainty in ground motion parameters taken into account?
8. Provide a brief discussion on your approach to estimating or calculating the following parameters. This topic is necessary in order to discuss how much uncertainty is involved in the actual input parameters.

plots for question 5

a) Upper Magnitude cutoff- how was this picked? How does it compare to the 1000 year return period outlined by Nuttli (1978) using 100,000 km^2 as the uniform area?

b) Beta-value- was this value a result of a regression analysis? The staff is particularly concerned with high b-values such as found in Table 3 for the Central Province. How would the regression curve change if one chooses, a best fit line with a constant slope of .92 to fit the actual data. Provide at least one example using the Central Province in Table 3 (show recurrence curve with b=1.18 and best fit b=.92 lines on one graph).

9. What value is used for "Background seismicity" in the McGuire/Cornell risk analysis program? Please explain choice of parameters.

ENCLOSURE 3

MEETING HANDOUTS

SEPTEMBER 8, 1981

TABLE Q1-1

EARTHQUAKE OCCURRENCES IN THE MICHIGAN BASIN

	0.8 TO 1.2	1.3 TO 1.7	1.8 TO 2.2	2.3 TO 2.7	2.8 TO 3.2	3.3 TO 3.7	3.8 TO 4.2	4.3 TO 4.7	4.8 TO 5.2	5.3 TO 5.7
1800-1809	0	0	0	0	0	0	0	0	0	0
1810-1819	0	0	0	0	0	0	0	0	0	0
1820-1829	0	0	0	0	0	0	0	0	0	0
1830-1839	0	0	0	0	0	0	0	0	0	0
1840-1849	0	0	0	0	0	0	0	0	0	0
1850-1859	0	0	0	0	0	0	0	0	0	0
1860-1869	0	0	0	0	0	0	0	0	0	0
1870-1879	2	0	0	0	0	0	1	0	0	0
1880-1889	0	0	0	0	0	1	0	1	0	0
1890-1899	1	0	0	0	0	1	0	0	0	0
1900-1909	3	0	0	0	0	0	0	0	0	0
1910-1919	0	0	0	0	0	1	0	0	0	0
1920-1929	0	0	0	0	1	0	0	0	0	0
1930-1939	0	0	0	0	1	1	0	0	0	0
1940-1949	0	0	0	0	0	0	0	1	0	0
1950-1959	0	0	0	0	0	2	0	0	0	0
1960-1969	0	0	0	0	0	1	0	0	0	0
1970-1979	1	0	0	0	0	0	0	0	0	0

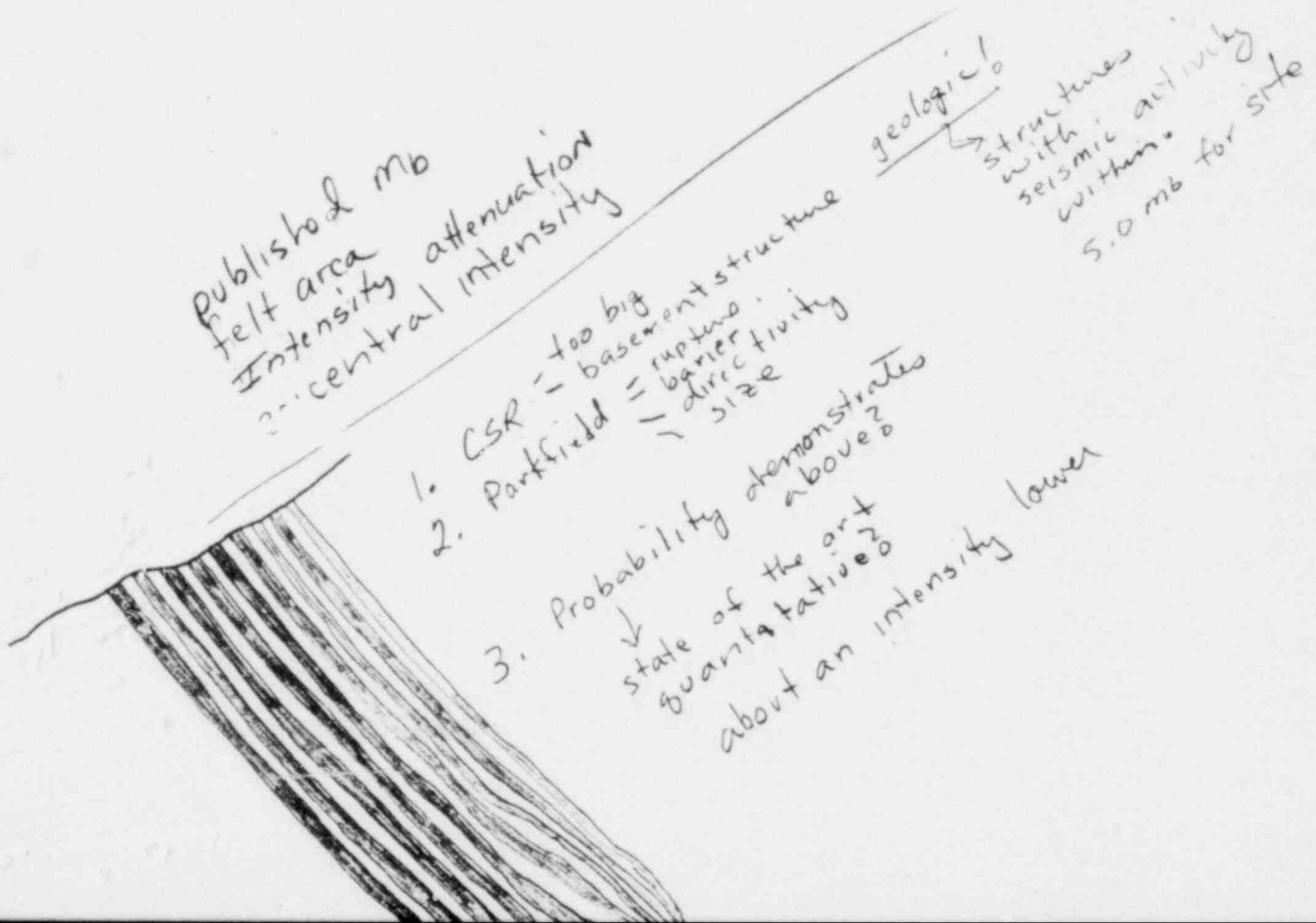


TABLE Q1-1A

MICHIGAN BASIN
EARTHQUAKE RECURRENCE INTERPRETATION

Magnitude-m_b	3.5	4.0	4.5
No./time (yr.)			2/180*
	7/150	1/150*	2/150*
	7/100*	1/110*	2/100
	4/50*		
Incremental Rates			.0111*
	.0467	.0067*	.0133*
	.0700*	.0091*	.0200
	.0800*		
Cumulative Rates	.0878	.0178	.0111
	.1024	.0224	.0133

* - Interpreted mean annual rates and time intervals over which rates are computed.

TABLE Q1-2

CENTRAL PROVINCE-MODEL 1

Time Interval	Magnitude-m_b 3.3-3.7	3.8-4.2	4.3-4.7	4.8-5.2	5.3-5.7
1800-1809	-	-	-	-	-
1810-1819	1	-	-	-	-
1820-1829	1	-	2	-	-
1830-1839	-	1	-	-	-
1840-1849	-	1	1	-	-
1850-1859	-	3	1	-	-
1860-1869	-	-	-	-	-
1870-1879	2	1	1	-	-
1880-1889	6	-	2	-	-
1890-1899	2	-	-	1	-
1900-1909	9	9	-	2	-
1910-1919	5	2	-	-	-
1920-1929	4	3	-	2	-
1930-1939	4	2	1	-	-
1940-1949	3	2	-	-	
1950-1959	10	4	1	-	-
1960-1969	4	2	2	-	-
1970-1979	3	-	-	-	-

TABLE Q1-2A

CENTRAL PROVINCE - MODEL 1
EARTHQUAKE RECURRENCE INTERPRETATION

Magnitude	3.5	4.0	4.5	5.0
No./time (yr.)			11/180	5/180*
		30/150	9/150*	5/150*
	52/110*	25/110*	7/110*	
	42/80*	24/80*	4/80	
		10/50*		
Incremental Rates			.0611	.0278*
		.2000	.0600*	.0333*
	.4727*	.2273	.0636*	
	.5250*	.3000*	.0500	
		.2000*		
Cumulative Rates	.7605	.2878	.0878	.0278
	.9219	.3969	.0969	.0333

* - Interpreted mean annual rates and time intervals over which rates are computed.

TABLE Q1-3

EARTHQUAKE OCCURRENCES IN THE ATTICA, NEW YORK REGION

	0.8 TO 1.2	1.3 TO 1.7	1.8 TO 2.2	2.3 TO 2.7	2.8 TO 3.2	3.3 TO 3.7	3.8 TO 4.2	4.3 TO 4.7	4.8 TO 5.2	5.3 TO 5.7
1750-1759	0	0	0	0	0	0	0	0	0	0
1760-1769	0	0	0	0	0	0	0	0	0	0
1770-1779	0	0	0	0	0	0	0	0	0	0
1780-1789	0	0	0	0	0	0	0	0	0	0
1790-1799	0	0	0	0	0	0	0	0	0	0
1800-1809	0	0	0	0	0	0	0	0	0	0
1810-1819	0	0	0	0	0	0	0	0	0	0
1820-1829	0	0	0	0	0	0	0	0	0	0
1830-1839	0	0	0	0	0	0	0	0	0	0
1840-1849	0	0	0	0	0	0	0	0	0	0
1850-1859	0	0	0	0	1	0	0	0	0	0
1860-1869	0	0	0	0	0	0	0	0	0	0
1870-1879	0	0	0	0	0	0	0	0	0	0
1880-1889	0	0	0	0	0	0	0	0	0	0
1890-1899	0	0	0	0	0	0	0	0	0	0
1900-1909	0	0	0	0	0	0	0	0	0	0
1910-1919	0	0	0	0	0	0	0	0	0	0
1920-1929	0	0	0	0	0	1	1	0	1	0
1930-1939	0	0	0	1	1	0	0	0	0	0
1940-1949	0	0	0	0	0	0	0	0	0	0
1950-1959	0	0	0	0	0	0	1	0	0	0
1960-1969	0	0	0	1	1	2	1	1	0	0
1970-1979	0	1	1	3	0	0	0	0	0	0

TABLE Q1-3A

ATTICA, NEW YORK REGION
EARTHQUAKE RECURRENCE INTERPRETATION

Magnitude	3.5	4.0	4.5	5.0
No./time (yr.)			1/180	1/180
		3/150	1/150	1/150
	3/60	3/60		
	2/20			
Incremental Rates			.0056	.0056
		.0200	.0067	.0067
	.0500	.0500		
	.1000			
Cumulative Rates	.0812	.0312	.0112	.0056
	.1634	.0634	.0134	.0067

TABLE Q1-4

CENTRAL PROVINCE-MODEL 2

Time Interval	Magnitude-m_b 3.3-3.7	3.8-4.2	4.3-4.7	4.8-5.2	5.3-5.7
1800-1809	-	-	1	-	-
1810-1819	1	-	-	-	-
1820-1829	2	2	2	-	-
1830-1839	1	1	-	-	-
1840-1849	-	-	1	-	-
1850-1859	3	3	-	-	-
1860-1869	-	1	-	-	-
1870-1879	1	2	1	-	-
1880-1889	8	-	3	-	-
1890-1899	3	-	-	1	-
1900-1909	13	10	-	3	-
1910-1919	7	2	1	-	-
1920-1929	4	4	-	1	-
1930-1939	7	5	1	-	-
1940-1949	8	4	1	-	-
1950-1959	16	3	1	-	-
1960-1969	3	1	1	-	-
1970-1979	4	-	-	-	-
1980-1981	*	*	*	1	-

* - Earthquake Catalog not updated after 1/1/80, except for July 27, 1980 Kentucky earthquake.

TABLE Q1-4A

CENTRAL PROVINCE - MODEL 2
EARTHQUAKE RECURRENCE INTERPRETATION

Magnitude	3.5	4.0	4.5	5.0
No./time (yr.)	81/180	38/180	13/180	6/180*
		36/150	10/150*	6/150*
	74/110*	31/110*	9/110*	
	61/80*	29/80*		
Incremental Rates	.45	.2111	.0778	.0333*
		.2400	.0667*	.0400*
	.6727*	.2818*	.0818*	
	.7625*	.3625*		
Cumulative Rates	1.0545	.3818	.1000	.0333
	1.2468	.4843	.1218	.0400

* - Interpreted mean annual rates and time intervals over which rates are computed.

TABLE Q1-5

EARTHQUAKE OCCURRENCES IN THE ANNA, OHIO REGION

	0.8 TO 1.2	1.3 TO 1.7	1.8 TO 2.2	2.3 TO 2.7	2.8 TO 3.2	3.3 TO 3.7	3.8 TO 4.2	4.3 TO 4.7	4.8 TO 5.2	5.3 TO 5.7	5.8 TO 6.2
1750-1759	0	0	0	0	0	0	0	0	0	0	0
1760-1769	0	0	0	0	0	0	0	0	0	0	0
1770-1779	0	0	0	0	0	0	0	0	0	0	0
1780-1789	0	0	0	0	0	0	0	0	0	0	0
1790-1799	0	0	0	0	0	0	0	0	0	0	0
1800-1809	0	0	0	0	0	0	0	0	0	0	0
1810-1819	0	0	0	0	0	0	0	0	0	0	0
1820-1829	0	0	0	0	0	0	0	0	0	0	0
1830-1839	0	0	0	0	0	0	0	0	0	0	0
1840-1849	0	0	0	0	1	0	0	0	0	0	0
1850-1859	0	0	0	0	0	0	0	0	0	0	0
1860-1869	0	0	0	0	0	0	0	0	0	0	0
1870-1879	0	0	0	0	0	1	0	0	1	0	0
1880-1889	0	0	0	0	2	0	1	1	0	0	0
1890-1899	0	0	0	0	0	2	0	0	0	0	0
1900-1909	0	0	0	0	0	0	0	0	0	0	0
1910-1919	0	0	0	0	1	0	0	0	0	0	0
1920-1929	0	0	0	0	2	0	1	0	0	0	0
1930-1939	0	0	0	3	7	7	1	1	3	1	0
1940-1949	0	0	0	0	1	0	0	0	0	0	0
1950-1959	0	0	0	0	0	0	1	0	0	0	0
1960-1969	0	0	0	0	0	0	0	0	0	0	0
1970-1979	0	0	0	1	1	0	0	0	0	0	0

TABLE Q1-5A

ANNA, OHIO REGION
EARTHQUAKE RECURRENCE INTERPRETATION

Magnitude	3.5	4.0	4.5	5.0	5.5
No./time (yr.)				4/180*	1/180*
			2/150*	4/150	1/150*
	10/110*	4/110*	2/110	4/110*	
	7/60*	3/60*	1/50*		
Incremental Rates			.0133*	.0222*	.0056*
	.091*	.0364*	.0182	.0267	.0067*
	.1167*	.0500*	.0200*	.0364*	
Cumulative Rates	.1685	.0775	.0411	.0278	.0056
	.2298	.1131	.0631	.0431	.0067

* - Interpreted mean annual rates and time intervals over which rates are computed.

TABLE Q1-6

EARTHQUAKE OCCURRENCES IN THE NIAGARA PENINSULA

	0.8 TO 1.2	1.3 TO 1.7	1.8 TO 2.2	2.3 TO 2.7	2.8 TO 3.2	3.3 TO 3.7	3.8 TO 4.2	4.3 TO 4.7	4.8 TO 5.2	5.3 TO 5.7
1750-1759	0	0	0	0	0	0	0	0	0	0
1760-1769	0	0	0	0	0	0	0	0	0	0
1770-1779	0	0	0	0	0	0	0	0	0	0
1780-1789	0	0	0	0	0	0	0	0	0	0
1790-1799	0	0	0	0	0	1	0	0	0	0
1800-1809	0	0	0	0	0	0	0	0	0	0
1810-1819	0	0	0	0	0	0	0	0	0	0
1820-1829	0	0	0	0	0	0	0	0	0	0
1830-1839	0	0	0	0	0	0	0	0	0	0
1840-1849	0	0	0	0	0	0	1	0	0	0
1850-1859	0	0	0	1	0	1	1	1	0	0
1860-1869	0	0	0	0	1	0	0	0	0	0
1870-1879	0	0	0	1	0	2	0	1	0	0
1880-1889	0	0	0	2	1	1	0	0	0	0
1890-1899	0	0	0	0	0	1	0	0	0	0
1900-1909	0	0	0	0	0	0	0	0	0	0
1910-1919	0	0	0	0	0	1	1	0	0	0
1920-1929	0	0	0	0	0	1	0	0	0	0
1930-1939	0	0	0	0	1	1	0	0	0	0
1940-1949	0	0	1	0	0	0	0	0	0	0
1950-1959	0	0	0	0	0	3	1	0	0	0
1960-1969	0	0	0	0	1	0	1	0	0	0
1970-1979	0	0	3	1	4	0	0	0	0	0

TABLE Q1-6A

NIAGARA PENINSULA REGION
EARTHQUAKE RECURRENCE INTERPRETATION

Magnitude-m_b	3.5	4.0	4.5
No./time (yr.)	12/190	5/180	2/180*
	11/130*	5/140*	2/130*
	6/70*	3/70*	
Incremental Rates	.0632	.0278	.0111*
	.0846*	.0357*	.0154*
	.0857*	.0429*	
Cumulative Rates	.1314	.0468	.0111
	.1440	.0583	.0154

* - Interpreted mean annual rates and time intervals over which rates are computed.

TABLE Q1-7

EARTHQUAKE OCCURRENCES IN THE CENTRAL PROVINCE - MODEL 3

	0.8 TO 1.2	1.3 TO 1.7	1.8 TO 2.2	2.3 TO 2.7	2.8 TO 3.2	3.3 TO 3.7	3.8 TO 4.2	4.3 TO 4.7	4.8 TO 5.2	5.3 TO 5.7	5.8 TO 6.2
1750-1759	0	0	0	0	0	0	0	0	0	0	0
1760-1769	0	0	0	0	0	0	0	0	0	0	0
1770-1779	0	0	0	0	0	0	0	1	0	0	0
1780-1789	0	0	0	0	0	0	0	0	0	0	0
1790-1799	0	0	0	0	0	1	0	0	0	0	0
1800-1809	0	0	0	0	0	0	0	1	0	0	0
1810-1819	0	0	0	0	0	1	0	0	0	0	0
1820-1829	0	0	0	0	1	2	2	2	0	0	0
1830-1839	0	0	0	0	0	1	1	0	0	0	0
1840-1849	0	0	0	0	3	0	1	1	0	0	0
1850-1859	0	0	0	1	1	4	4	1	0	0	0
1860-1869	0	0	0	0	3	0	1	0	0	0	0
1870-1879	2	0	0	1	3	4	2	1	1	0	0
1880-1889	0	0	0	6	10	9	1	4	0	0	0
1890-1899	4	0	0	1	3	6	0	0	1	0	0
1900-1909	13	0	0	1	5	13	10	0	3	0	0
1910-1919	0	0	0	1	3	8	3	1	0	0	0
1920-1929	0	0	0	2	13	6	6	0	2	0	0
1930-1939	1	0	1	13	31	15	6	2	3	1	0
1940-1949	0	0	1	3	13	8	4	1	0	0	0
1950-1959	2	0	0	1	7	19	6	1	0	0	0
1960-1969	1	0	1	1	9	5	3	2	0	0	0
1970-1979	3	1	9	11	10	4	0	0	0	0	0
1980-1981	0	0	0	0	0	0	0	0	1	0	0

TABLE Q1-7A

CENTRAL PROVINCE - MODEL 3
EARTHQUAKE RECURRENCE INTERPRETATION

Magnitude	3.5	4.0	4.5	5.0	5.5
No./time (yr.)		50/180	17/180	11/180	1/180*
		48/150	14/150*	11/150*	1/150*
	97/110*	41/110*	12/110*	11/110*	
	78/80	38/80*			
	51/50*				
Incremental Rates		.2778	.0944	.0611	.0056*
		.3200	.0933*	.0733*	.0067*
	.8818*	.3727*	.1091*	.1000*	
	.9750	.4750*			
	1.0200*				
Cumulative Rates	1.4267	.5449	.1722	.0789	.0056
	1.7108	.6908	.2158	.1067	.0067

* - Interpreted mean annual rates and time intervals over which rates are computed.

TABLE Q1-8

EARTHQUAKE OCCURRENCES IN THE CINCINNATI ARCH STRUCTURE

	0.8 TO 1.2	1.3 TO 1.7	1.8 TO 2.2	2.3 TO 2.7	2.8 TO 3.2	3.3 TO 3.7	3.8 TO 4.2	4.3 TO 4.7	4.8 TO 5.2	5.3 TO 5.7	5.8 TO 6.2
1750-1759	0	0	0	0	0	0	0	0	0	0	0
1760-1769	0	0	0	0	0	0	0	0	0	0	0
1770-1779	0	0	0	0	0	0	0	0	0	0	0
1780-1789	0	0	0	0	0	0	0	0	0	0	0
1790-1799	0	0	0	0	0	0	0	0	0	0	0
1800-1809	0	0	0	0	0	0	0	1	0	0	0
1810-1819	0	0	0	0	0	0	0	0	0	0	0
1820-1829	0	0	0	0	1	1	2	0	0	0	0
1830-1839	0	0	0	0	0	1	0	0	0	0	0
1840-1849	0	0	0	0	1	0	0	0	0	0	0
1850-1859	0	0	0	0	0	5	1	0	0	0	0
1860-1869	0	0	0	0	1	0	1	0	0	0	0
1870-1879	0	0	0	0	2	2	0	0	1	0	0
1880-1889	0	0	0	1	3	2	1	1	0	0	0
1890-1899	3	0	0	0	3	3	0	0	0	0	0
1900-1909	1	0	0	0	3	4	1	0	1	0	0
1910-1919	0	0	0	1	1	2	1	1	0	0	0
1920-1929	0	0	0	1	5	2	3	0	0	0	0
1930-1939	0	0	0	4	13	10	4	1	3	1	0
1940-1949	0	0	0	0	5	3	2	0	0	0	0
1950-1959	0	0	0	1	1	7	2	0	0	0	0
1960-1969	0	0	0	0	0	0	1	0	0	0	0
1970-1979	0	0	0	2	4	1	0	0	0	0	0
1980-1981	0	0	0	0	0	0	0	0	1	0	0

TABLE Q1-8A

CINCINNATI ARCH
EARTHQUAKE RECURRENCE INTERPRETATION

Magnitude	3.5	4.0	4.5	5.0	5.5
No./time (yr.)	43/180	19/180	4/180	6/180*	1/180*
	36/110	15/110*	3/110*	6/110*	1/150*
	23/60*	12/60*	2/70*		
	21/50*				
Incremental Rates	.2389	.1056	.0222	.0333*	.0056*
	.3273	.1364*	.0273*	.0545*	.0067*
	.3833*	.200*	.0288*		
	.4200*				
Cumulative Rates	.5859	.2026	.0662	.0389	.0056
	.7100	.2900	.0900	.0612	.0067

* - Interpreted mean annual rates and time intervals over which rates are computed.

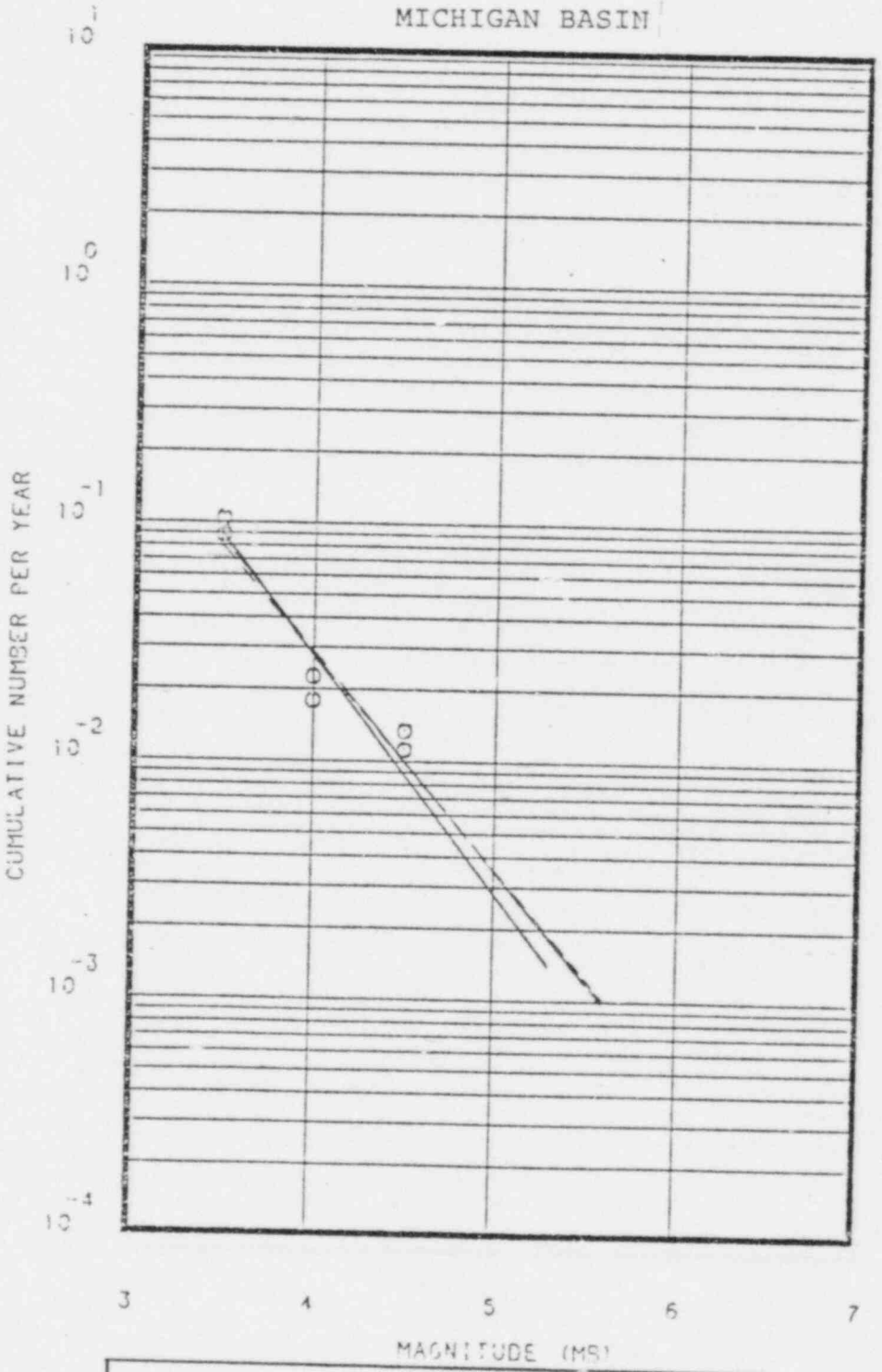

MICHIGAN BASIN
CUMULATIVE NUMBER PER YEAR
10^1
10^0
10^-1
10^-2
10^-3
10^-4
3
4
5
6
7
MAGNITUDE (MB)
Recurrence Model used in Part III Report
Regression best fit mag ≥ 3.5
Regression Best Fit b= -.92

FIGURE Q2-1

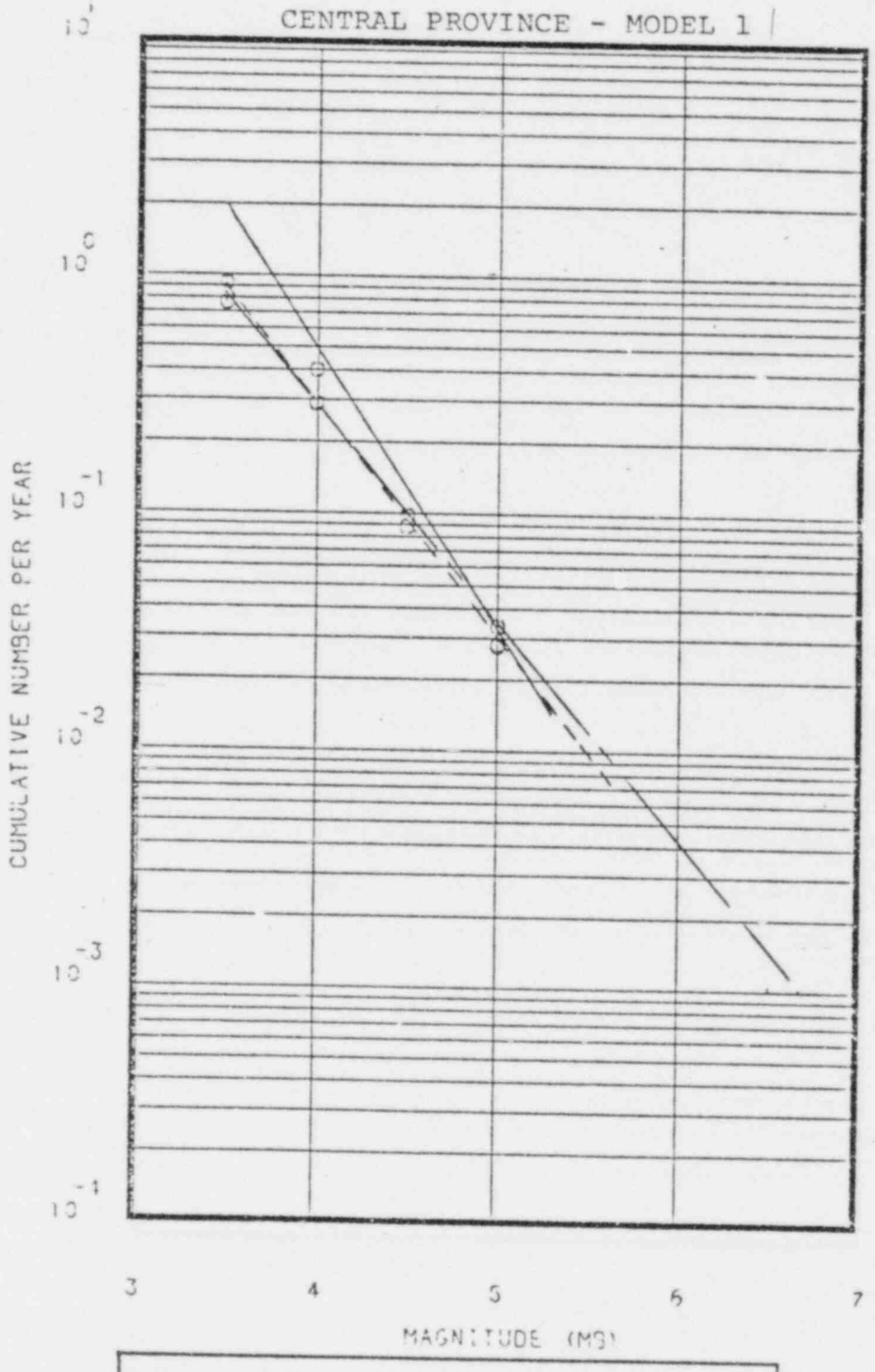

CENTRAL PROVINCE - MODEL 1
CUMULATIVE NUMBER PER YEAR
10^0
10^-1
10^-2
10^-3
10^-4
3
4
5
6
7
MAGNITUDE (MS)
Recurrence Model used in Part III Report
Regression best fit mag ≥ 3.5
Regression Best Fit b= -.92

FIGURE Q2-2

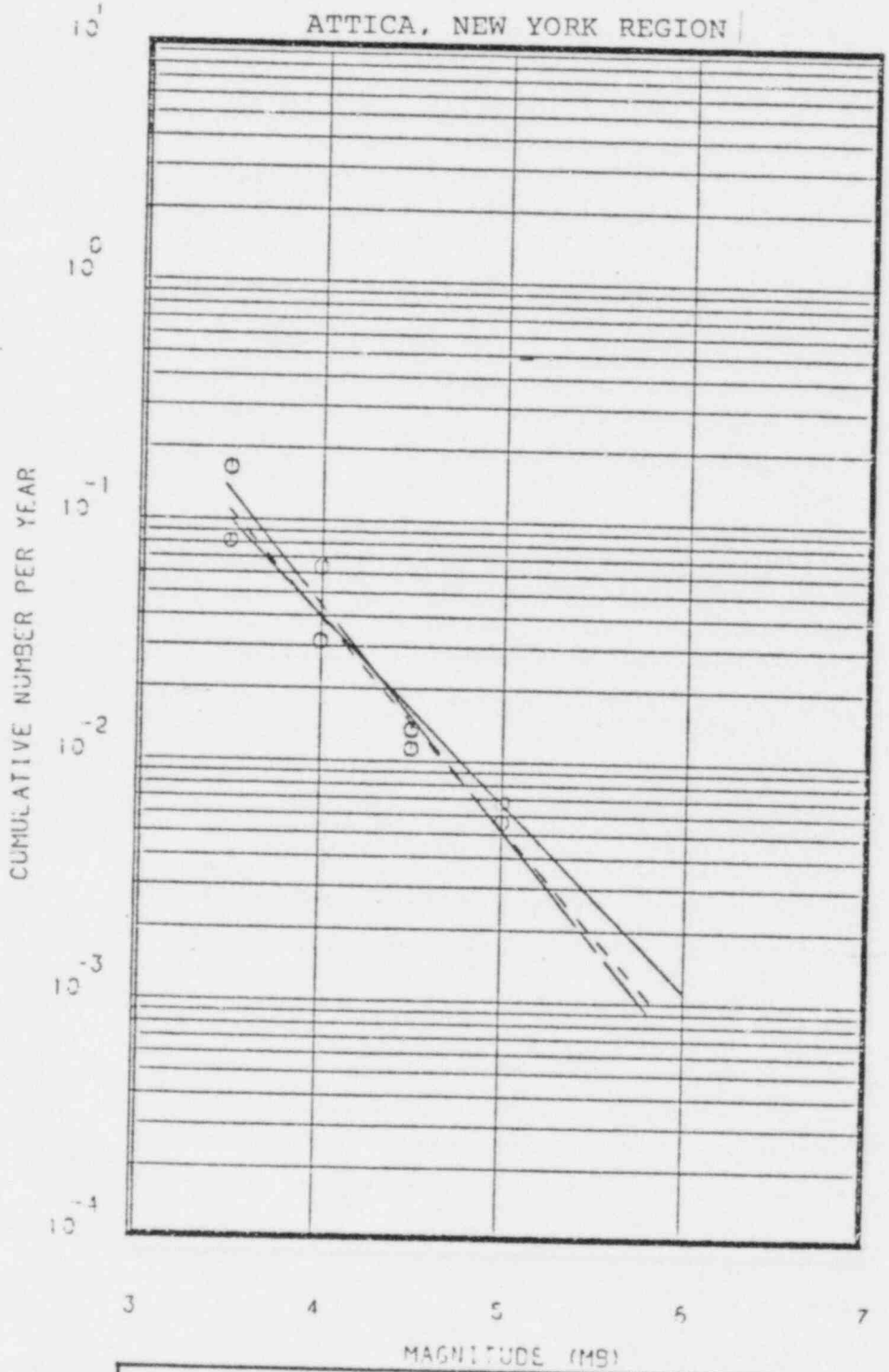

ATTICA, NEW YORK REGION
CUMULATIVE NUMBER PER YEAR
10^1
10^0
10^-1
10^-2
10^-3
10^-4
3
4
5
6
7
MAGNITUDE (MB)
Recurrence Model used in Part III Report
Regression best fit mag ≥ 3.5
Regression Best Fit b= -.92

FIGURE Q2-3

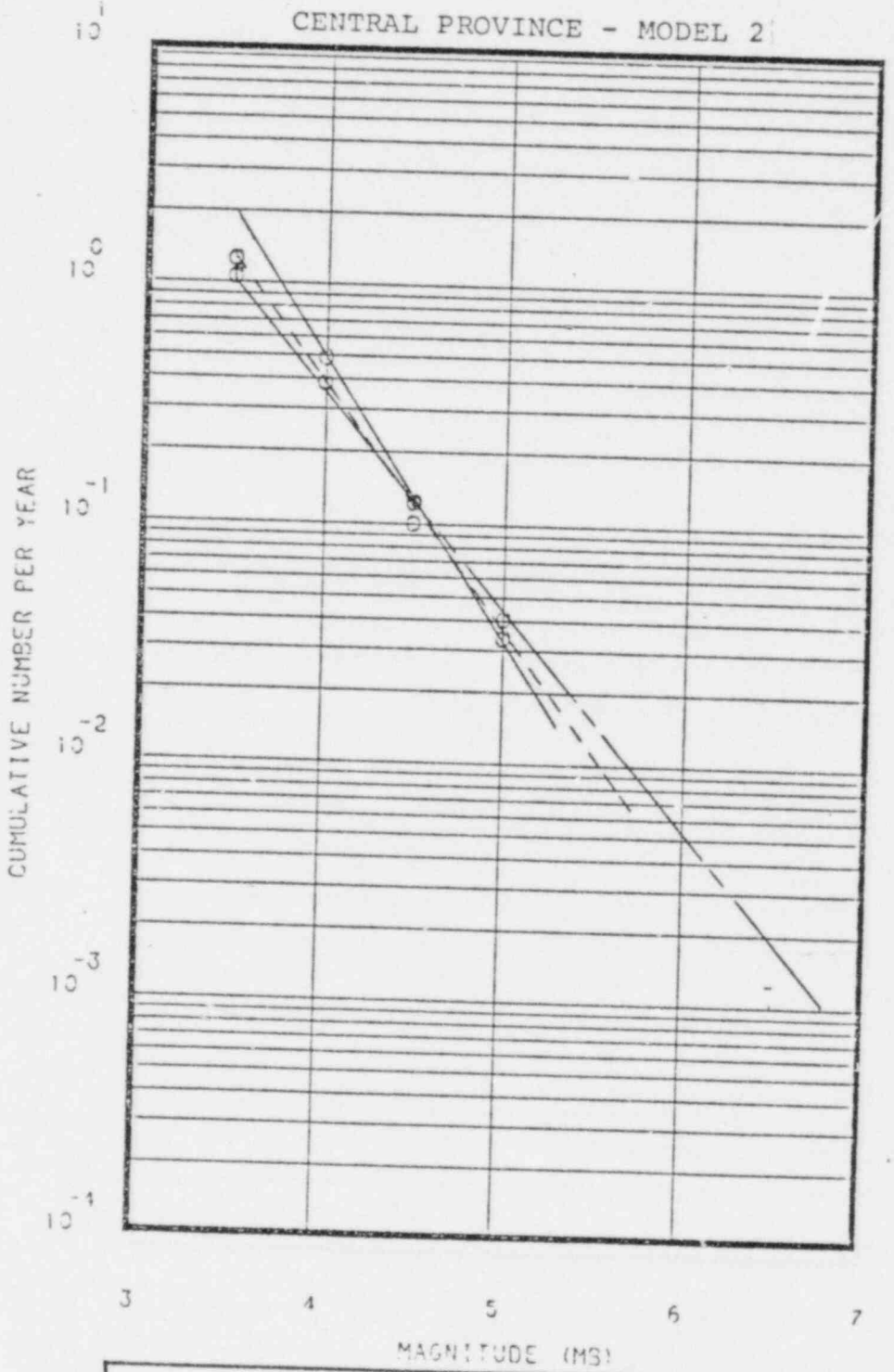

CENTRAL PROVINCE - MODEL 2
CUMULATIVE NUMBER PER YEAR
10^1
10^0
10^-1
10^-2
10^-3
10^-4
3
4
5
6
7
MAGNITUDE (MS)
Recurrence Model used in Part III Report
Regression best fit mag ≥ 3.5
Regression Best Fit b= -.92

FIGURE Q2-4

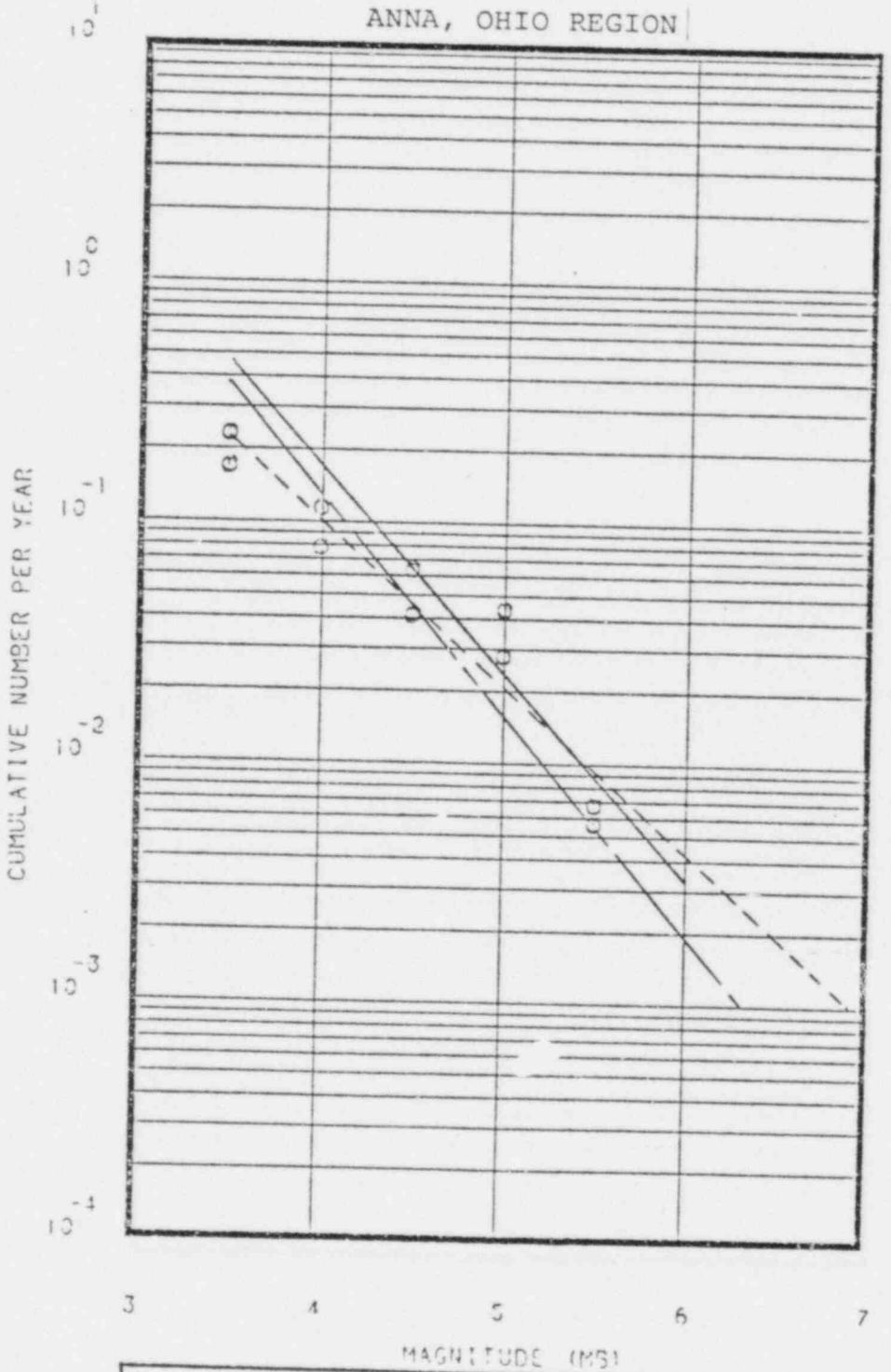

ANNA, OHIO REGION
CUMULATIVE NUMBER PER YEAR
10^1
10^0
10^-1
10^-2
10^-3
10^-4
3
4
5
6
7
MAGNITUDE (MB)
Recurrence Model used in Part III Report
Regression best fit mag ≥ 3.5
Regression Best Fit b= -.92

FIGURE Q2-5

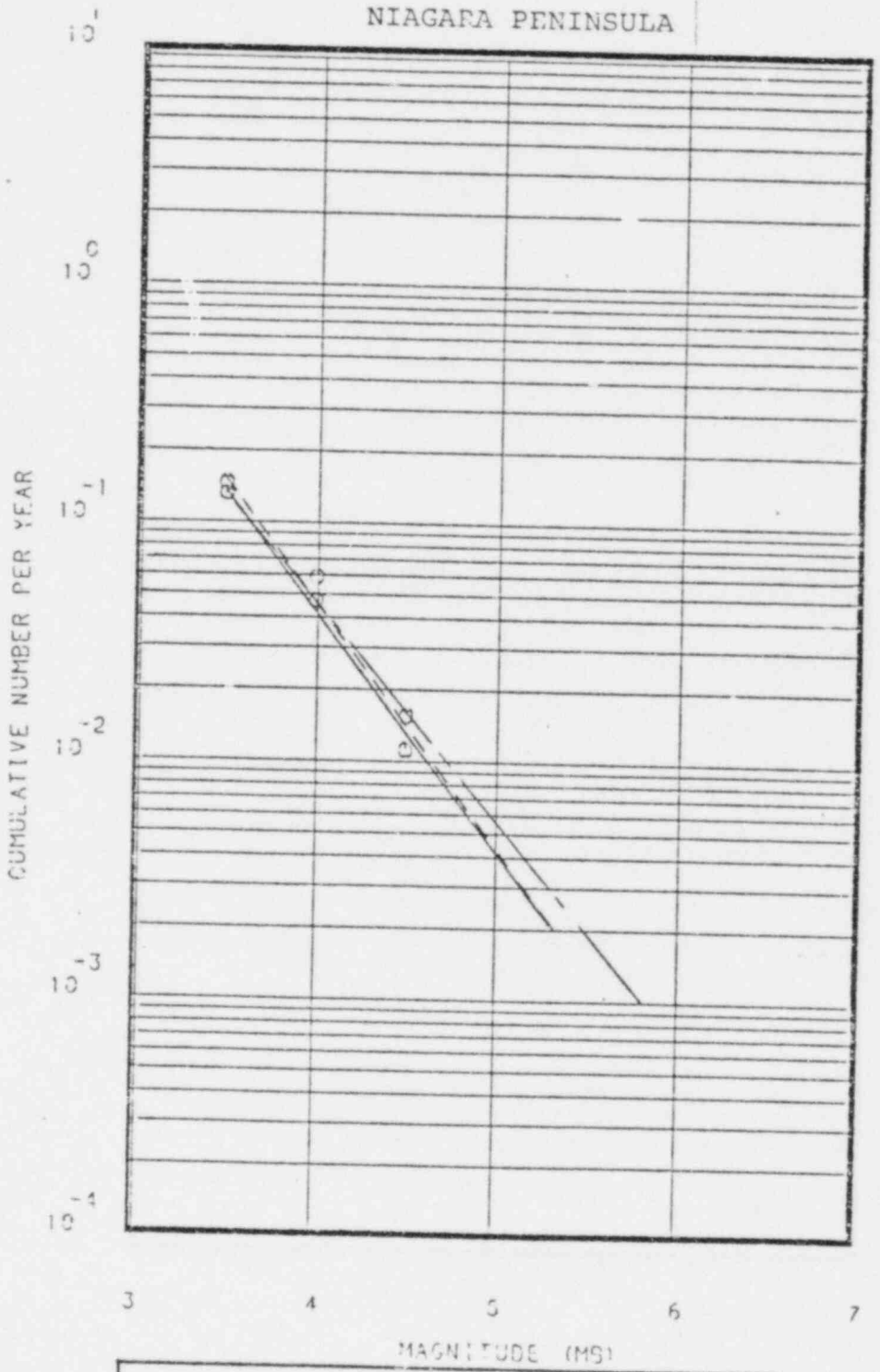

NIAGARA PENINSULA
CUMULATIVE NUMBER PER YEAR
MAGNITUDE (MS)
3
4
5
6
7
Recurrence Model
used in Part III Report
Regression best fit
mag ≥ 3.5
Regression Best Fit
b= -.92

FIGURE Q2-6

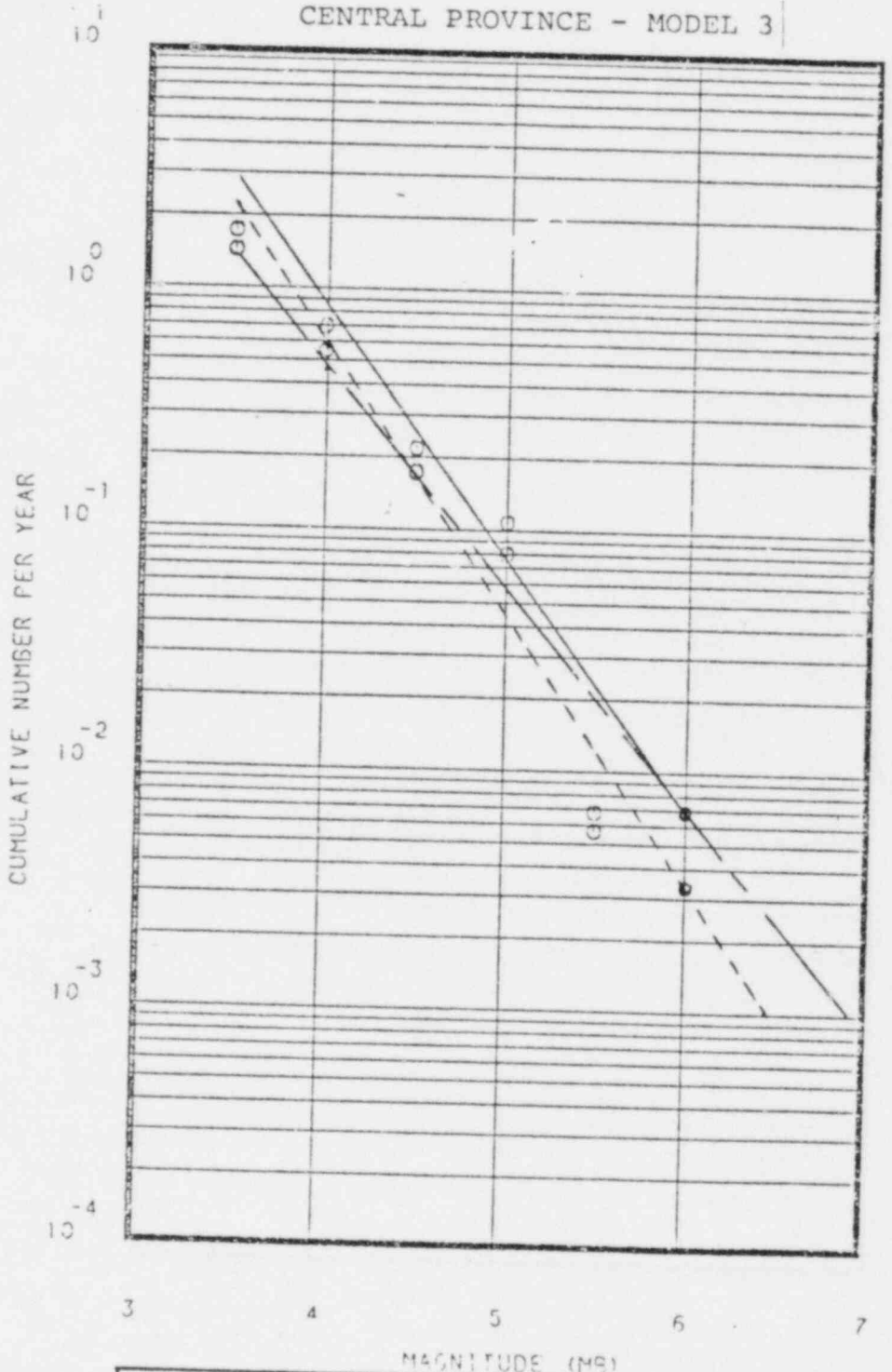

CENTRAL PROVINCE - MODEL 3
CUMULATIVE NUMBER PER YEAR
10^1
10^0
10^-1
10^-2
10^-3
10^-4
3
4
5
6
7
MAGNITUDE (MB)
Recurrence Model used in Part III Report
Regression best fit mag ≥ 3.5
Regression Best Fit b= -.92

FIGURE Q2-7

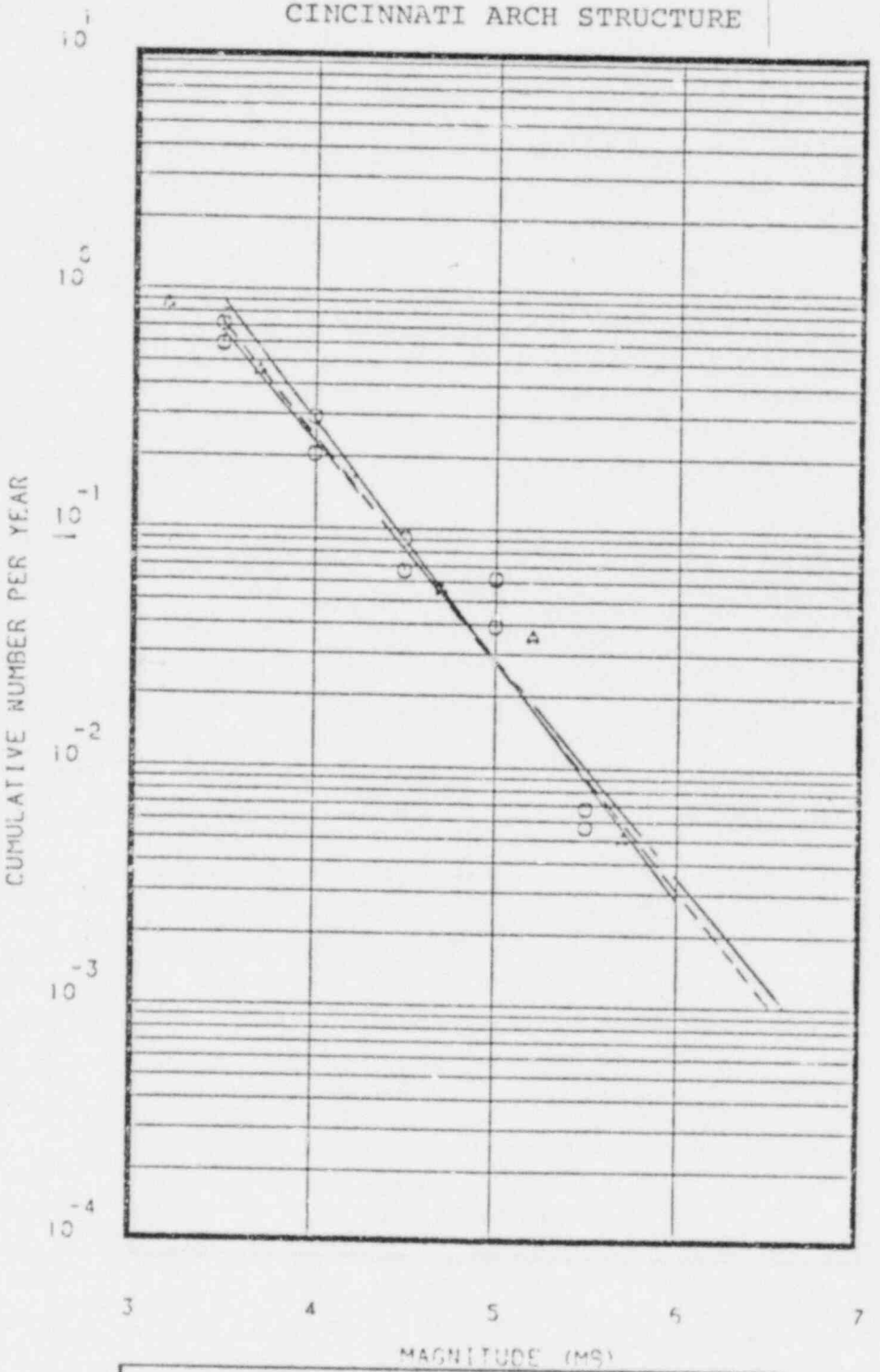
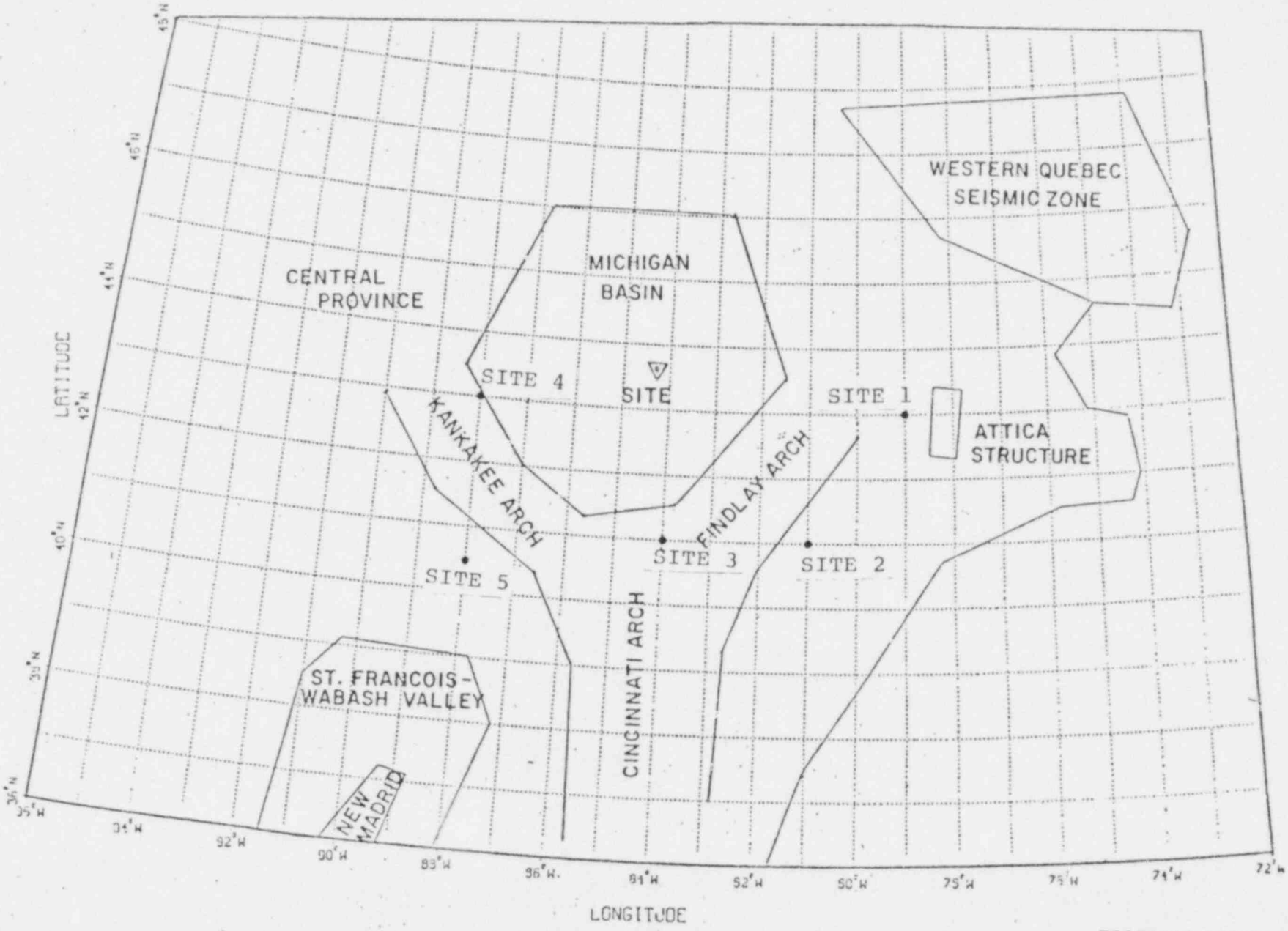

CINCINNATI ARCH STRUCTURE
CUMULATIVE NUMBER PER YEAR
10^0
10^-1
10^-2
10^-3
10^-4
3
4
5
6
7
MAGNITUDE (MS)
Recurrence Model used in Part III Report
Regression best fit mag ≥ 3.5
Regression Best Fit b= -.92

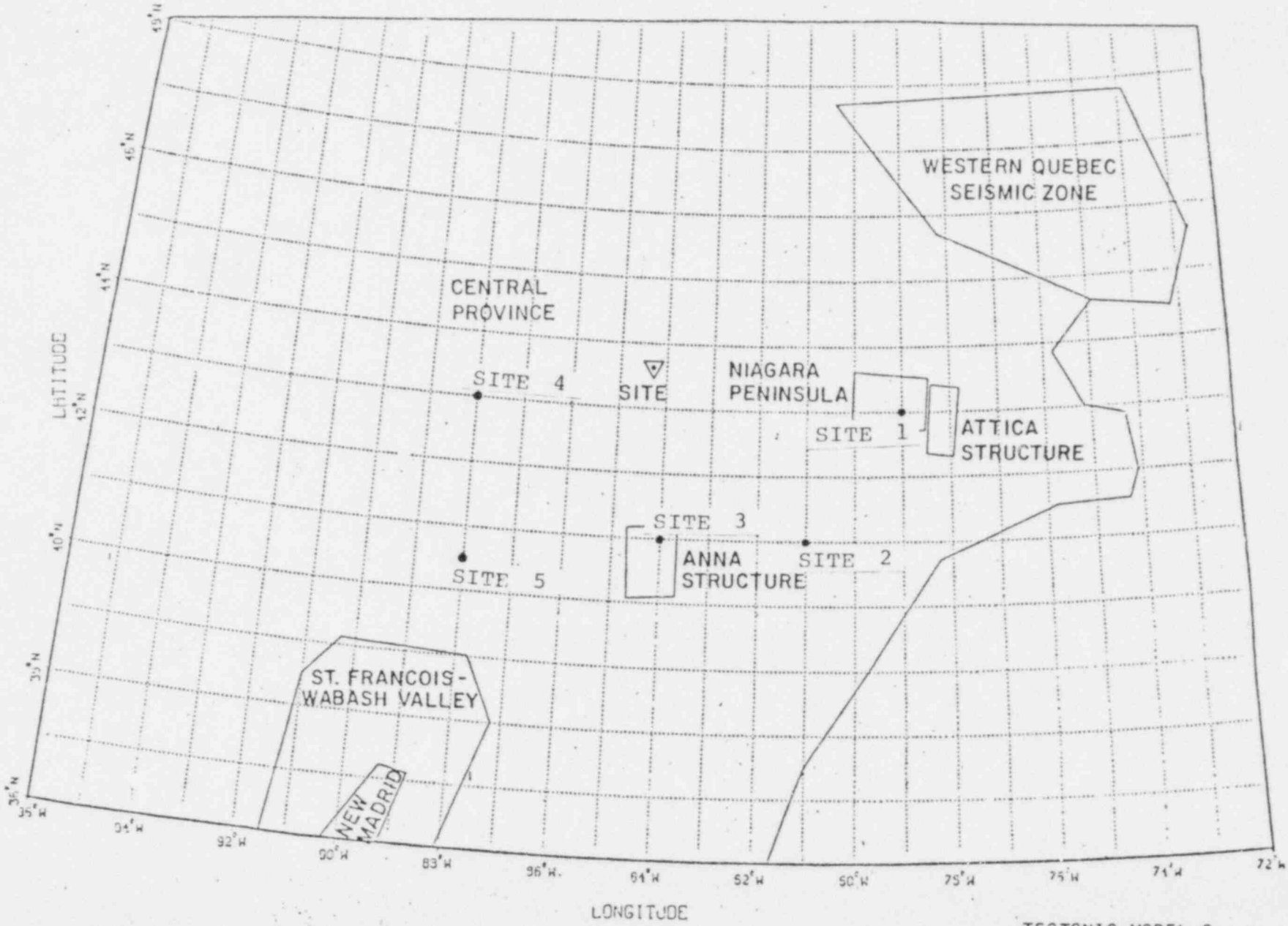
FIGURE Q2-8



TECTONIC MODEL 1
MICHIGAN BASIN-CINCINNATI
ARCH STRUCTURE

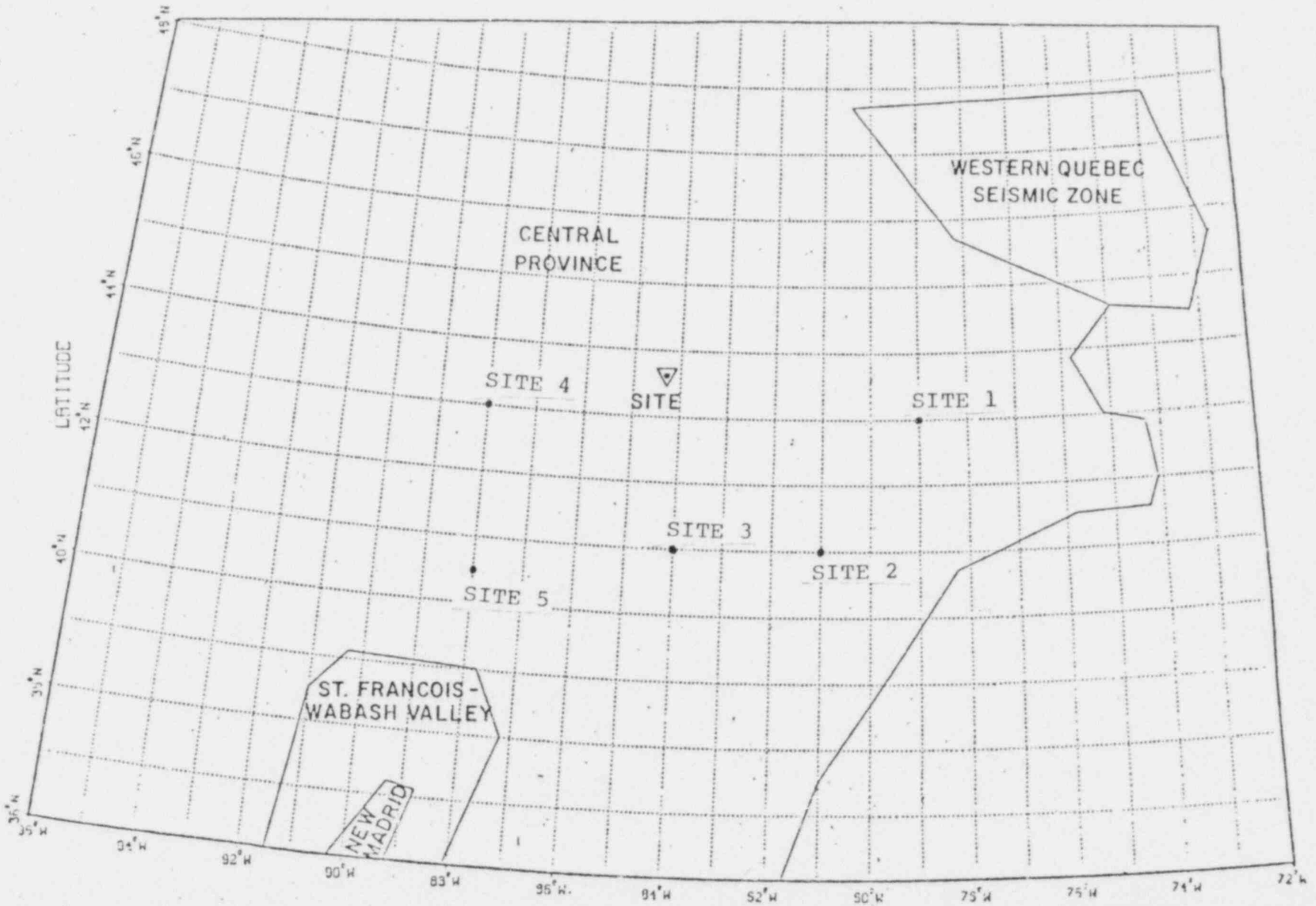
FIGURE Q3-1

Wisconsin Geophysical



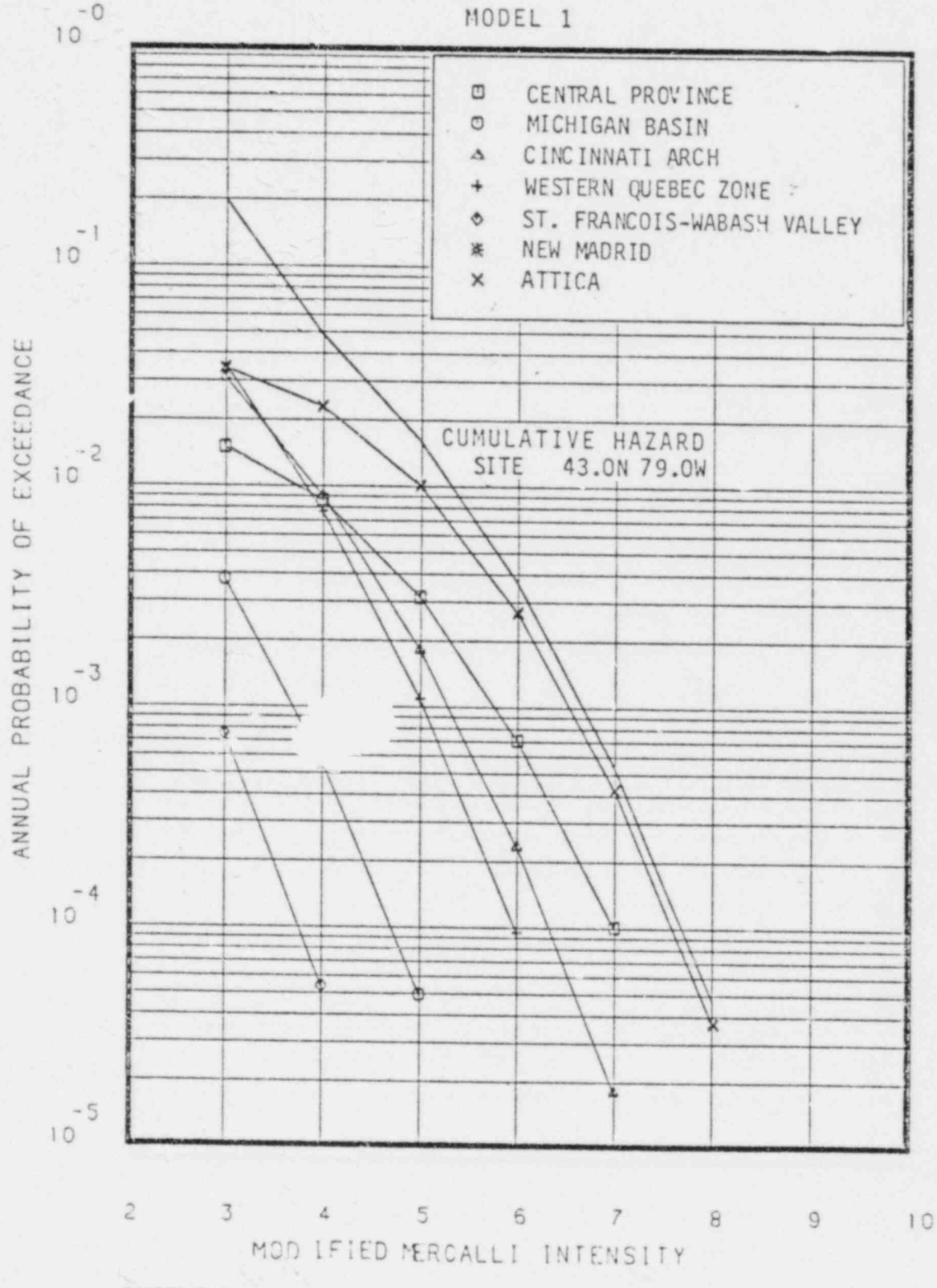
TECTONIC MODEL 2
CENTRAL PROVINCE - ANNA, OHIO
AND ATTICA, N.Y. TECTONIC STRUCTURES

FIGURE Q3-2



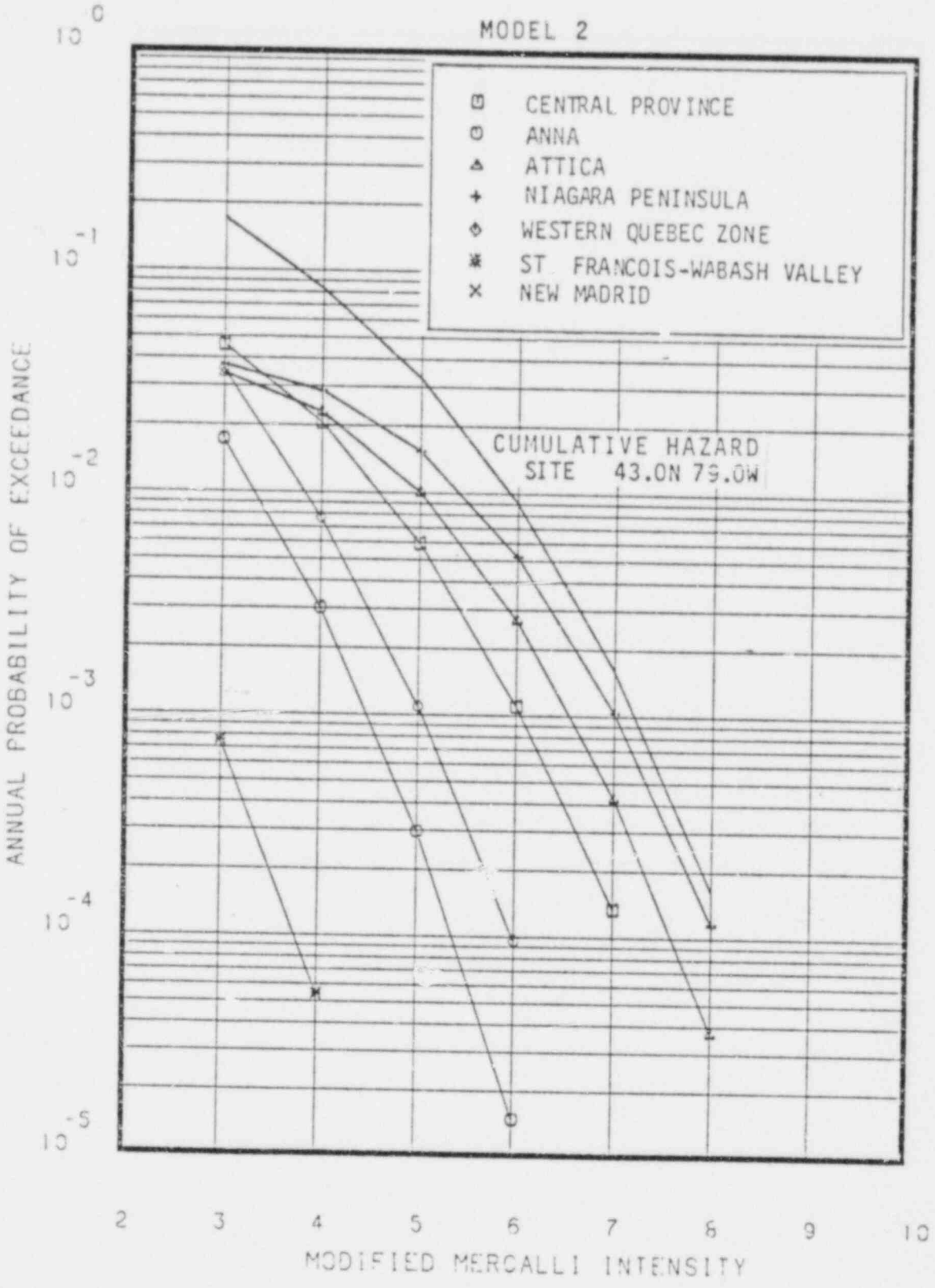
TECTONIC MODEL 3
CENTRAL PROVINCE - ANNA, OHIO
AND ATTICA, N.Y. NOT CONSTRAINED
TO STRUCTURES

FIGURE Q3-3



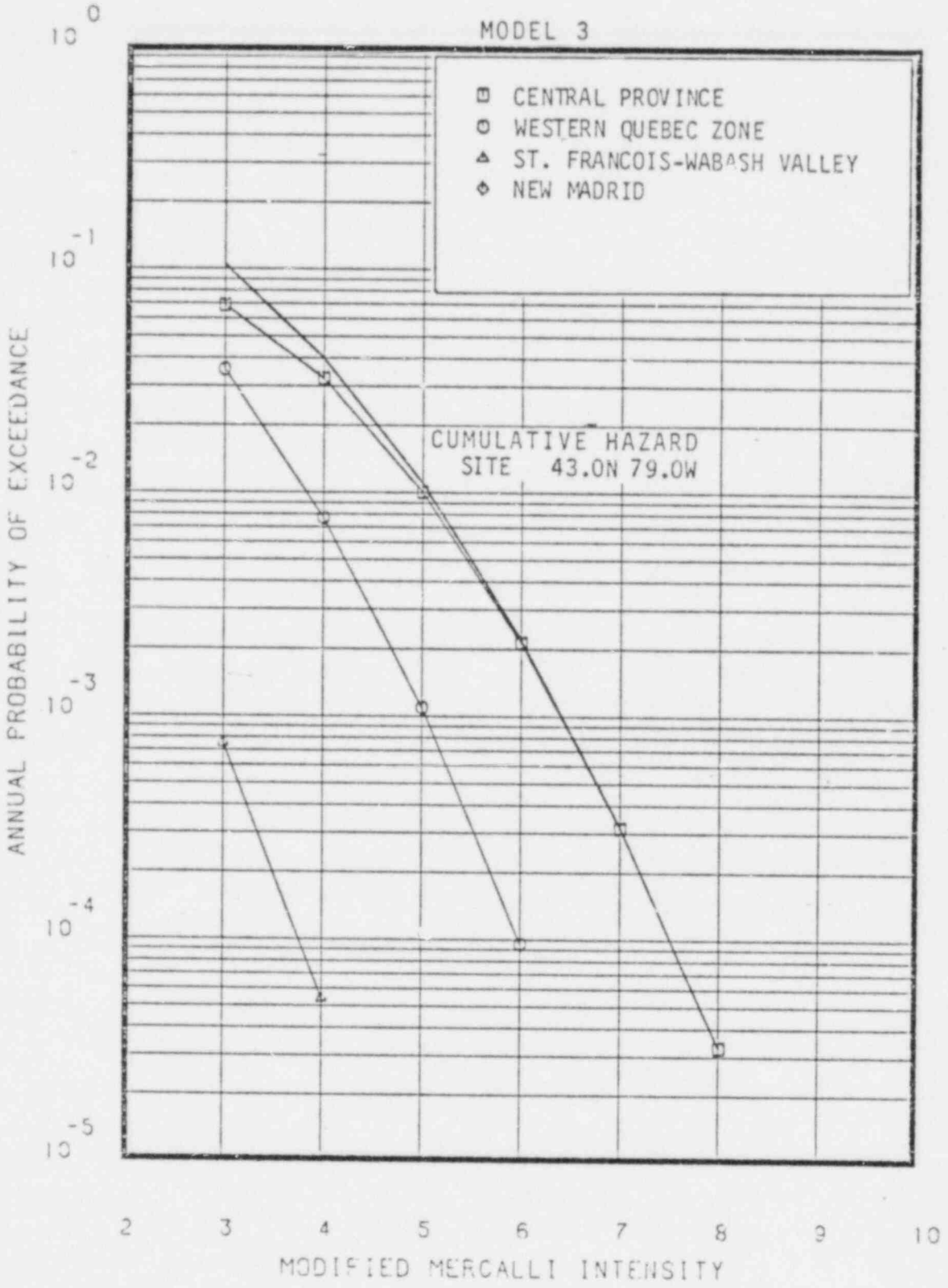
Q3M3ZT.BUF
Q3M3Z1.ALL
Q3M3Z2.BUF
Q3M3Z3.BUF
Q3M3Z4.BUF
Q3M3Z5.BUF
Q3M3Z7.BUF

FIGURE Q3-4



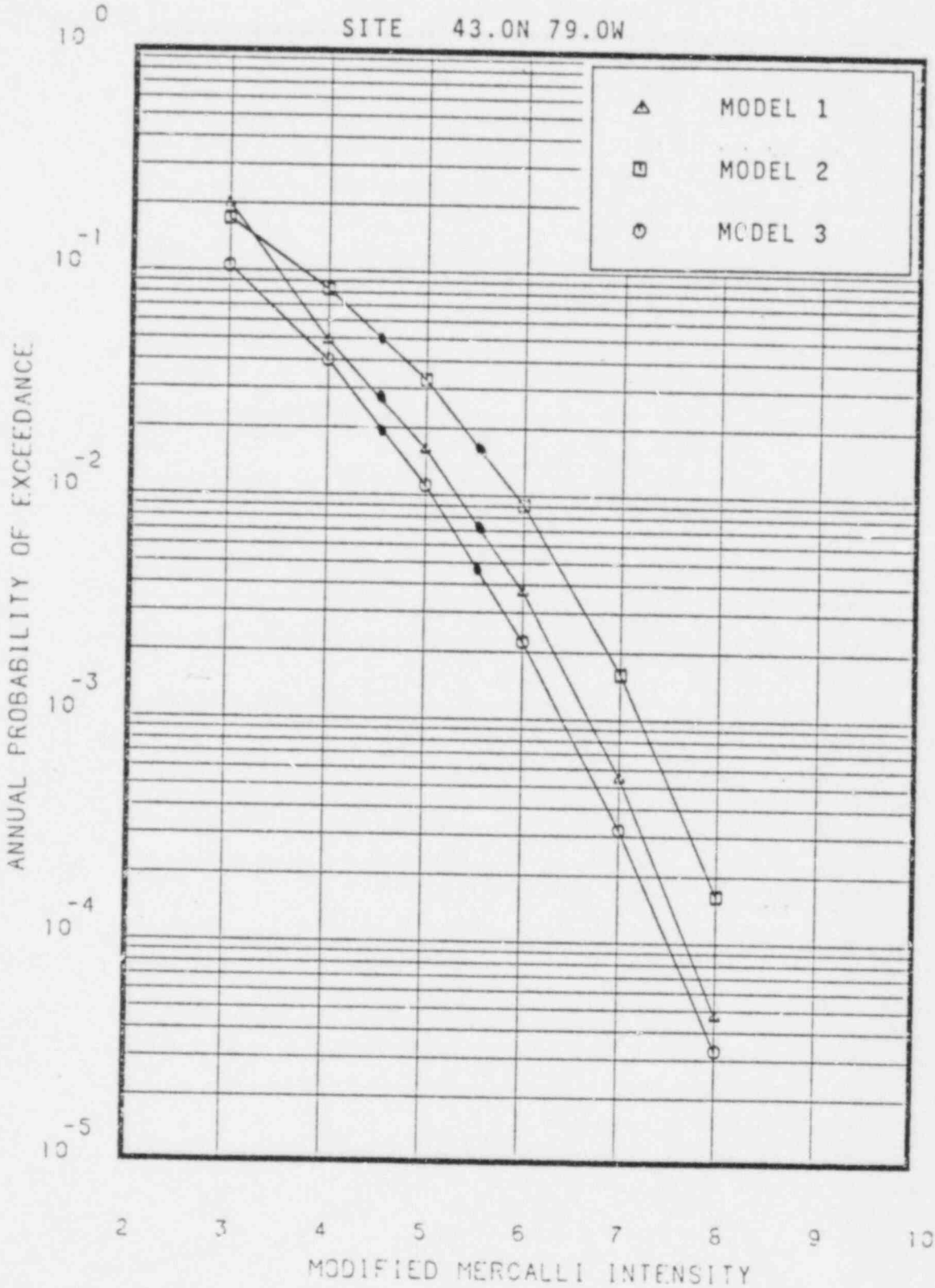
Q3M1Z1.BUF
Q3M1Z1.BUF
Q3M1Z2.BUF
Q3M1Z3.BUF
Q3M1Z4.BUF
Q3M1Z5.BUF
Q3M1Z6.BUF

FIGURE Q3-5



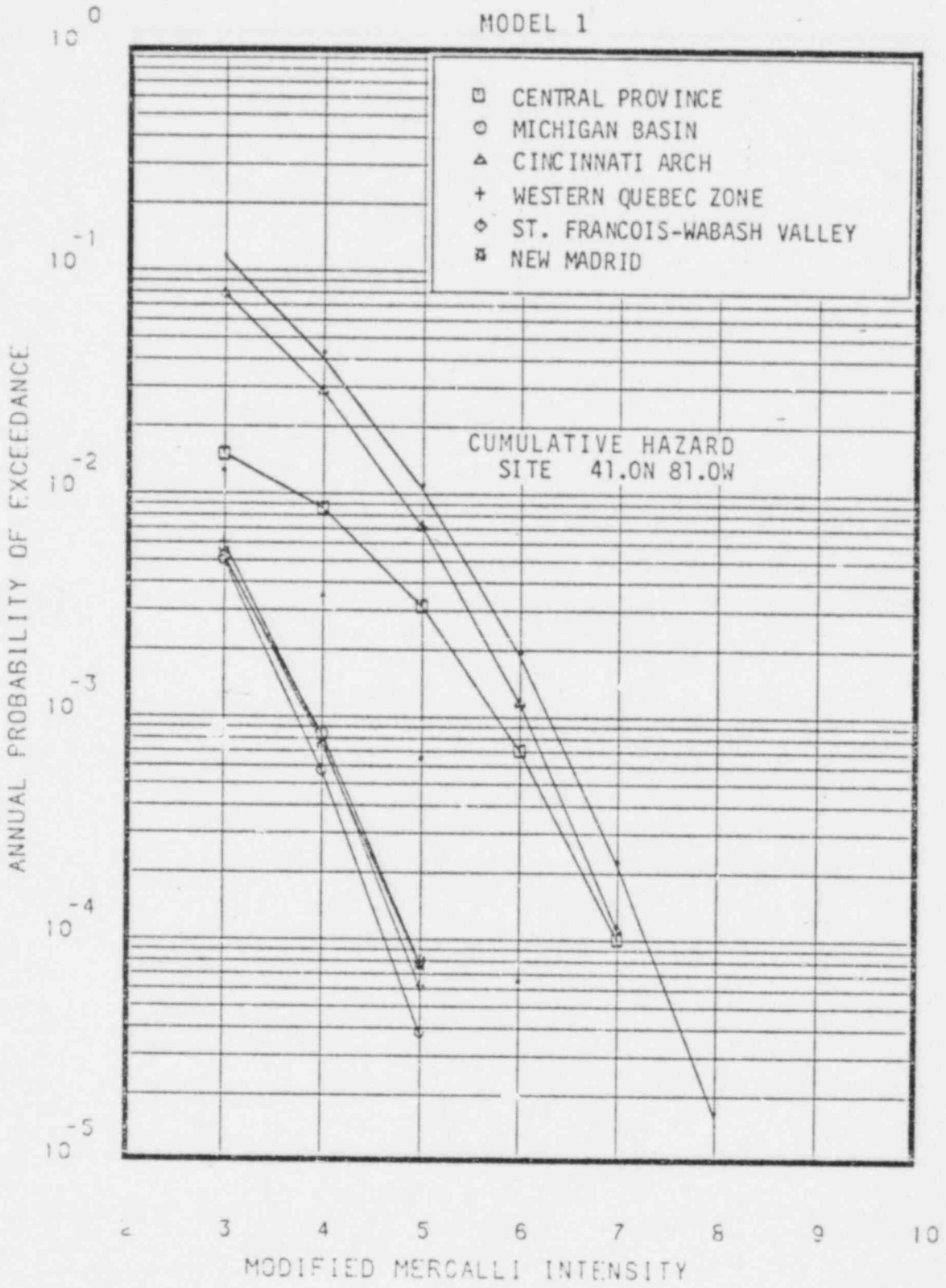
QJM2Z1.BUF
QJM2Z1.3UF
QJM2Z2.PUF
QJM2Z3.BUF

FIGURE Q3-6



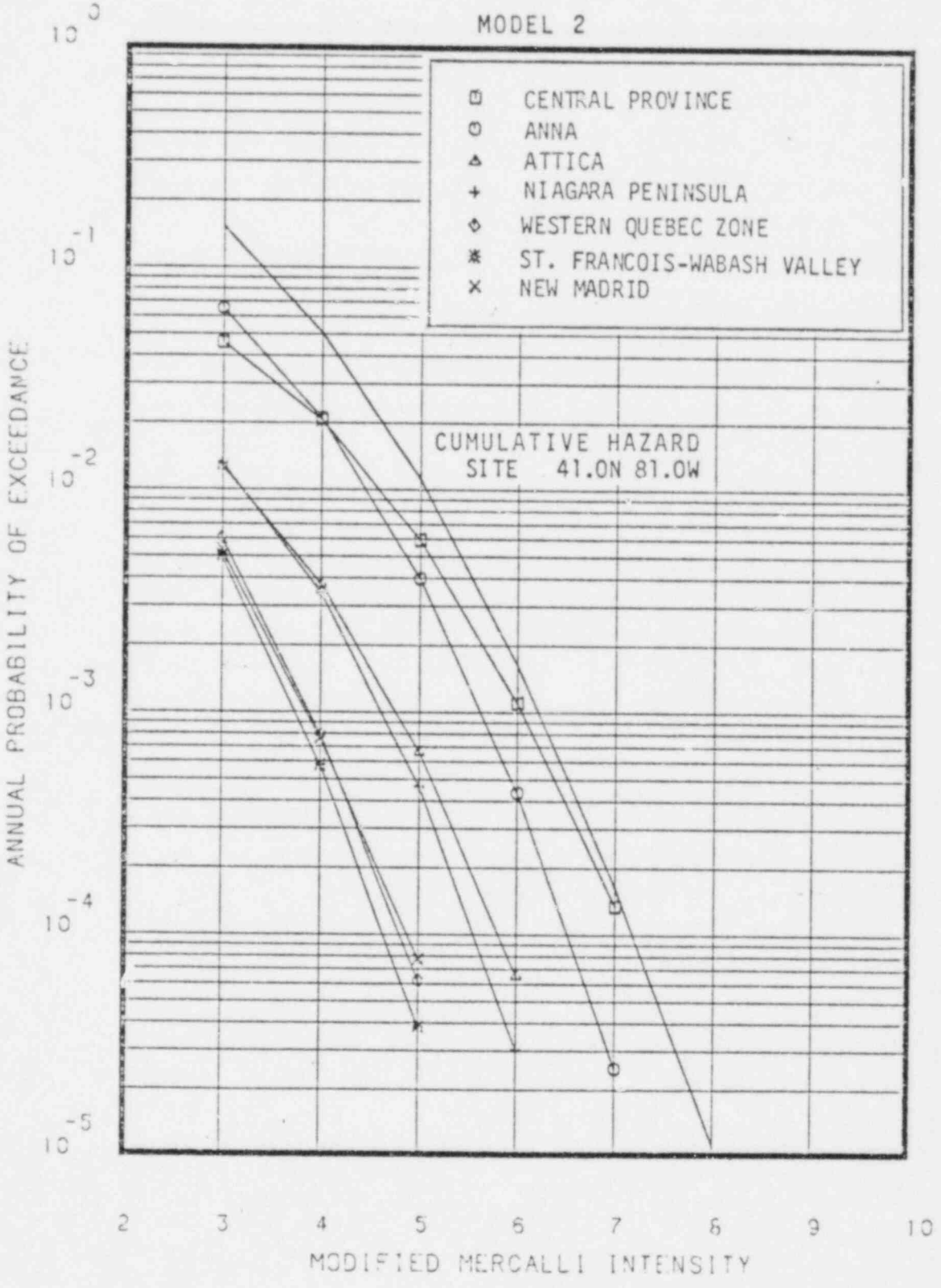
Q3M1ZT.BUF
Q3M2ZT.BUF
Q3M3ZT.BUF

FIGURE Q3-7



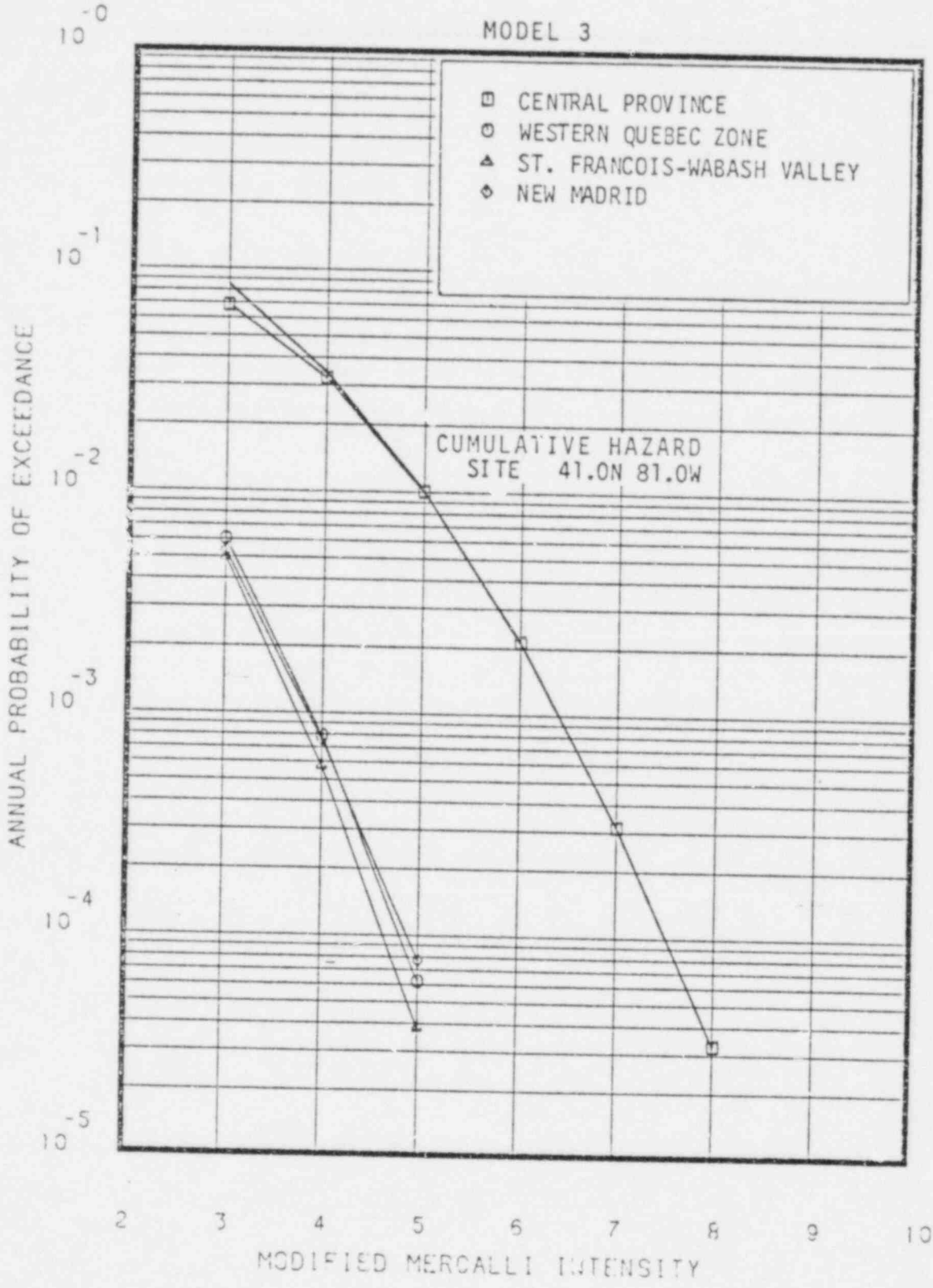
GJM327.CAN
GJM321.ALL
GJM322.CAN
GJM323.CAN
GJM324.CAN
GJM325.CAN
GJM326.CAN

FIGURE Q3-8



Q3M1Z5.CAN
Q3M1Z1.BUF
Q3M1Z2.CAN
Q3M1Z3.CAN
Q3M1Z4.CAN
Q3M1Z5.CAN
Q3M1Z6.CAN
Q3M1Z7.CAN

FIGURE Q3-9



Q3M2ZT.CAN
Q3M2Z1.BUF
Q3M2Z2.CAN
Q3M2Z3.CAN
Q3M2Z4.CAN

FIGURE Q3-10

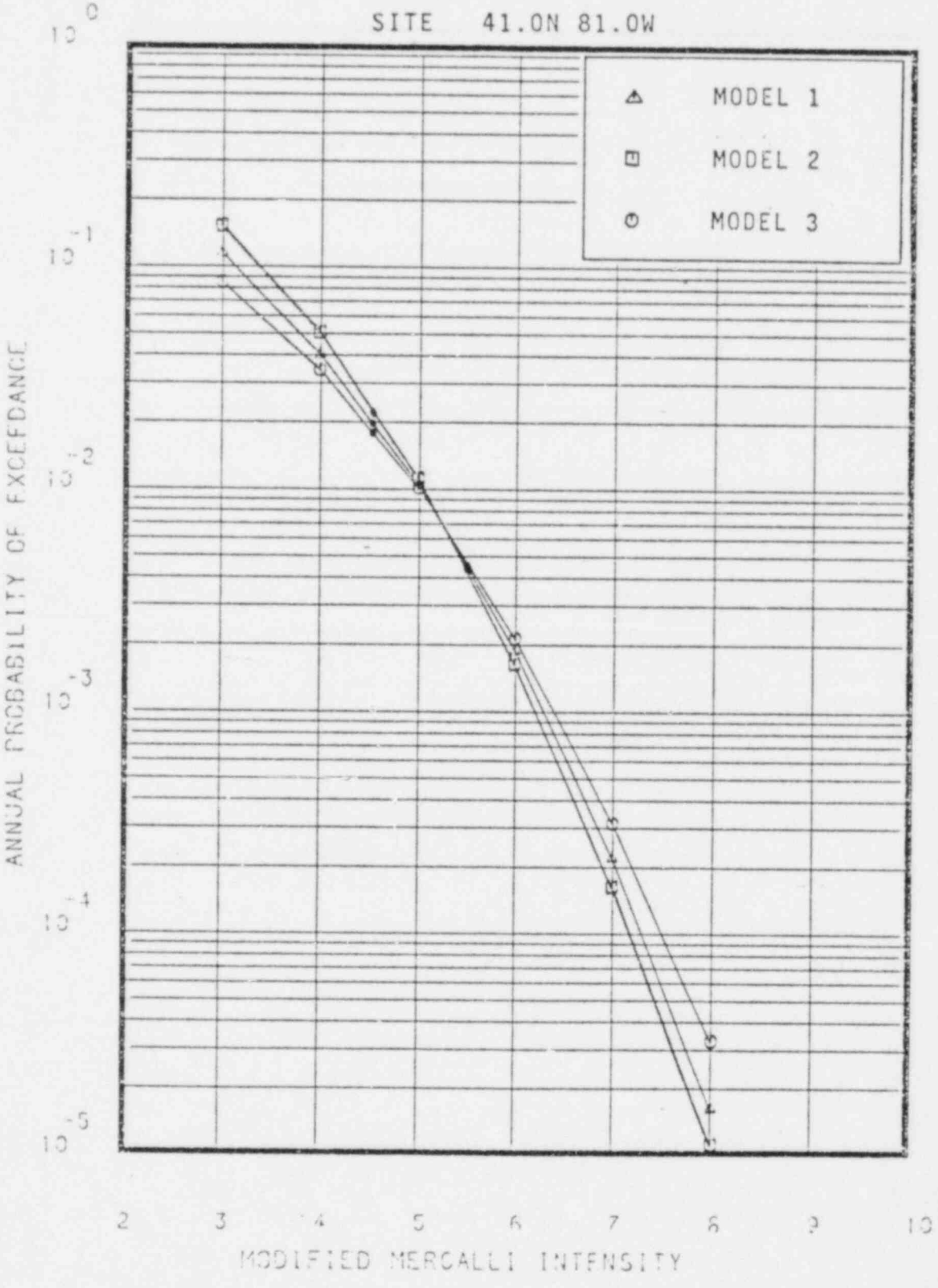
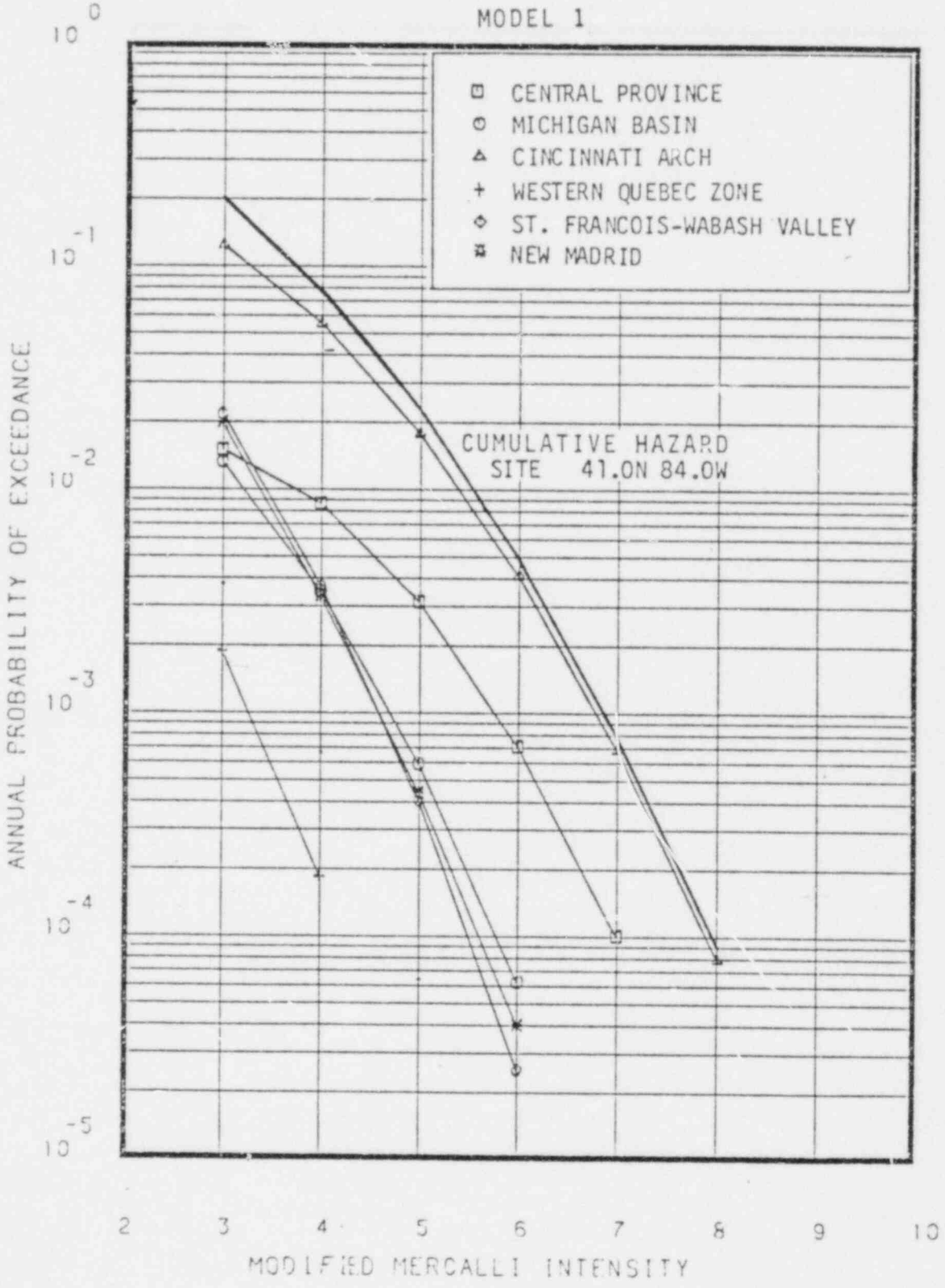
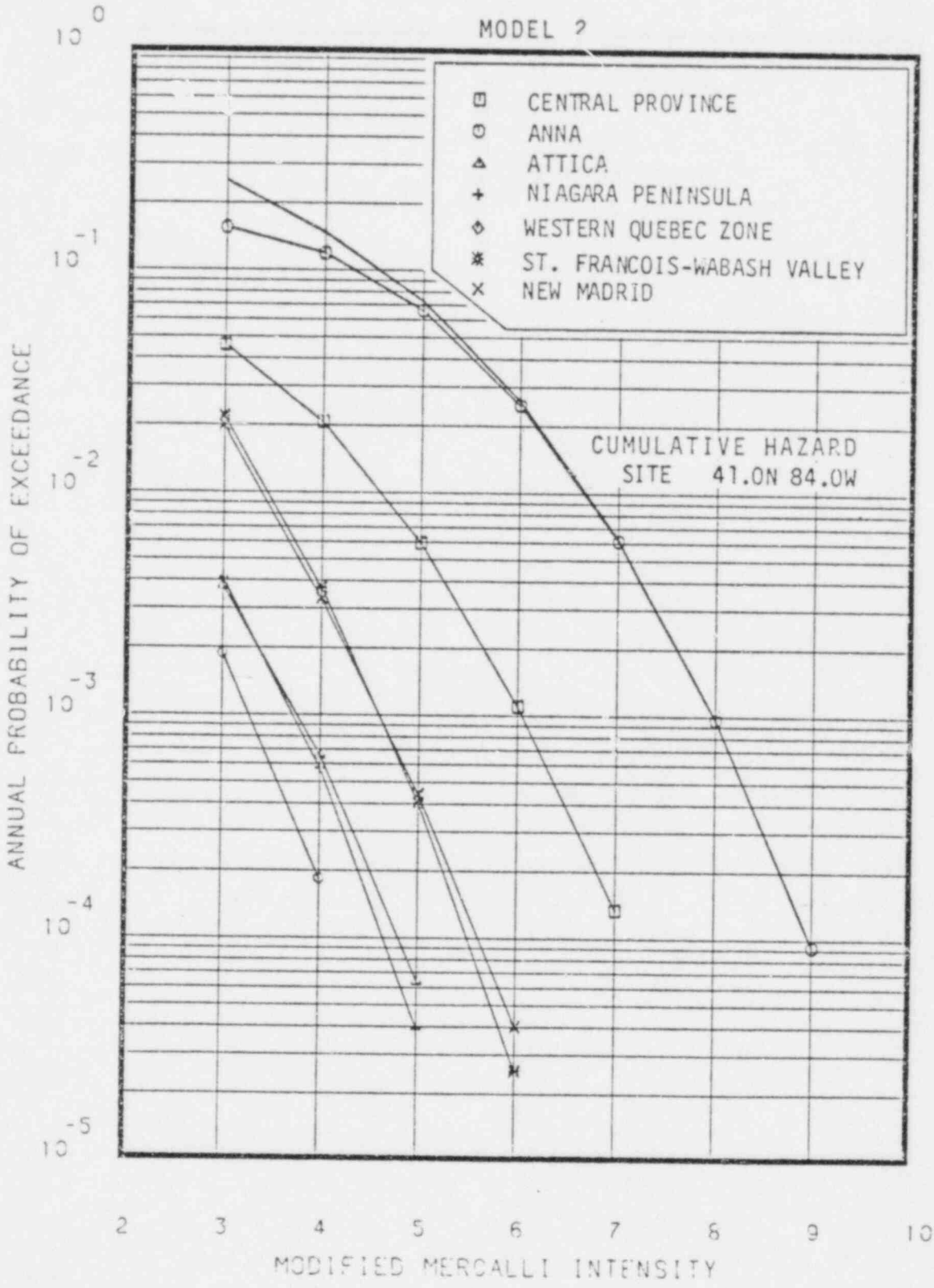

SITE 41.0N 81.0W
MODEL 1
MODEL 2
MODEL 3
ANNUAL PROBABILITY OF EXCEEDANCE
10 0
10 -1
10 -2
10 -3
10 -4
10 -5
2
3
4
5
6
7
8
9
10
MODIFIED MERCALLI INTENSITY

FIGURE Q3-11



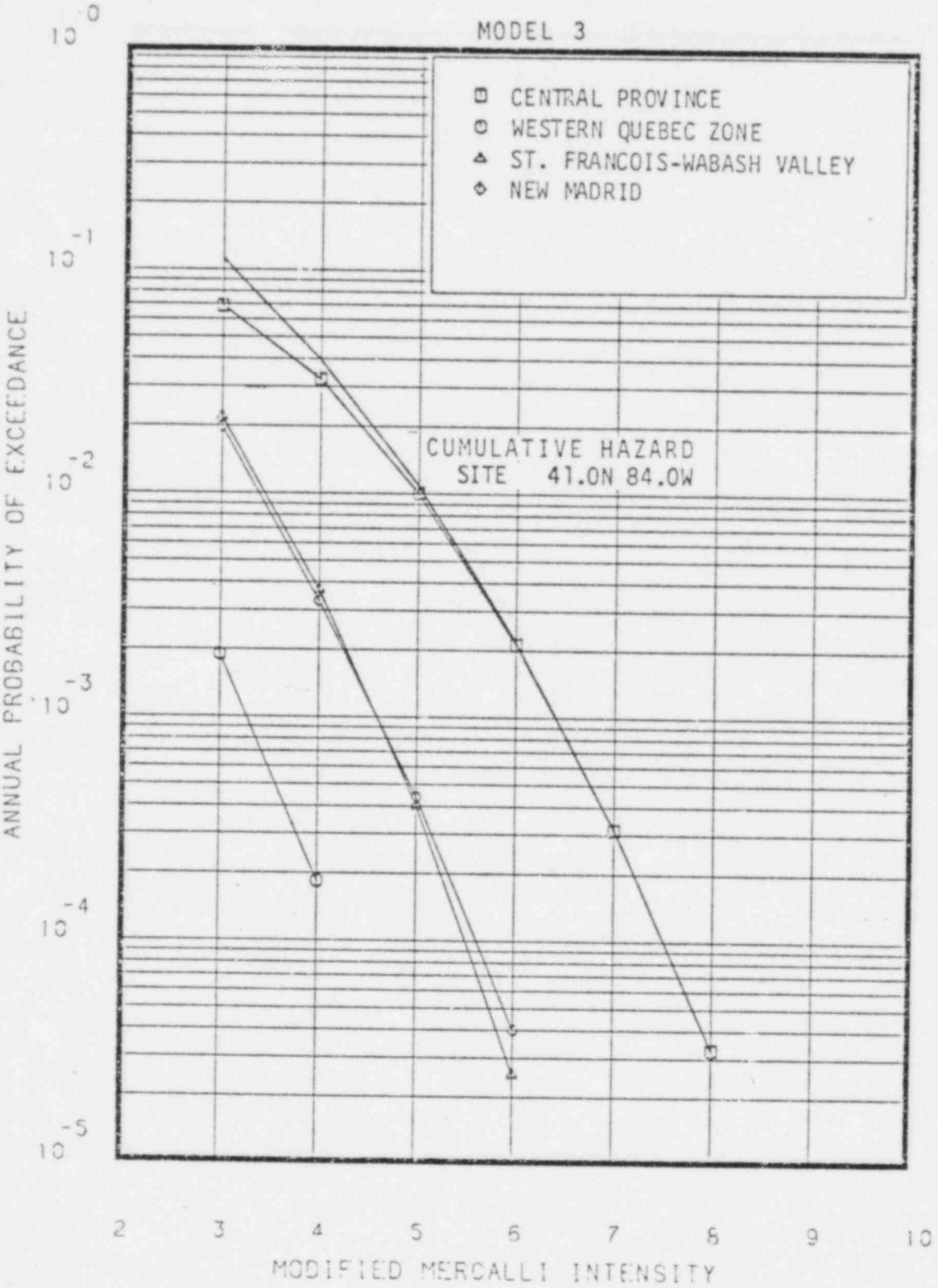
Q3M327.NAN
Q3M321.ALL
Q3M322.NAN
Q3M323.NAN
Q3M324.NAN
Q3M325.NAN
Q3M326.NAN

FIGURE Q3-12



03M1ZT.NAN
03M1Z1.SUF
03M1Z2.NAN
03M1Z3.NAN
03M1Z4.NAN
03M1Z5.NAN
03M1Z6.NAN
03M1Z7.NAN

FIGURE Q3-13



03M2ZT.NAN
03M2Z1.BUF
03M2Z2.NAN
03M2Z3.NAN
03M2Z4.NAN

FIGURE Q3-14

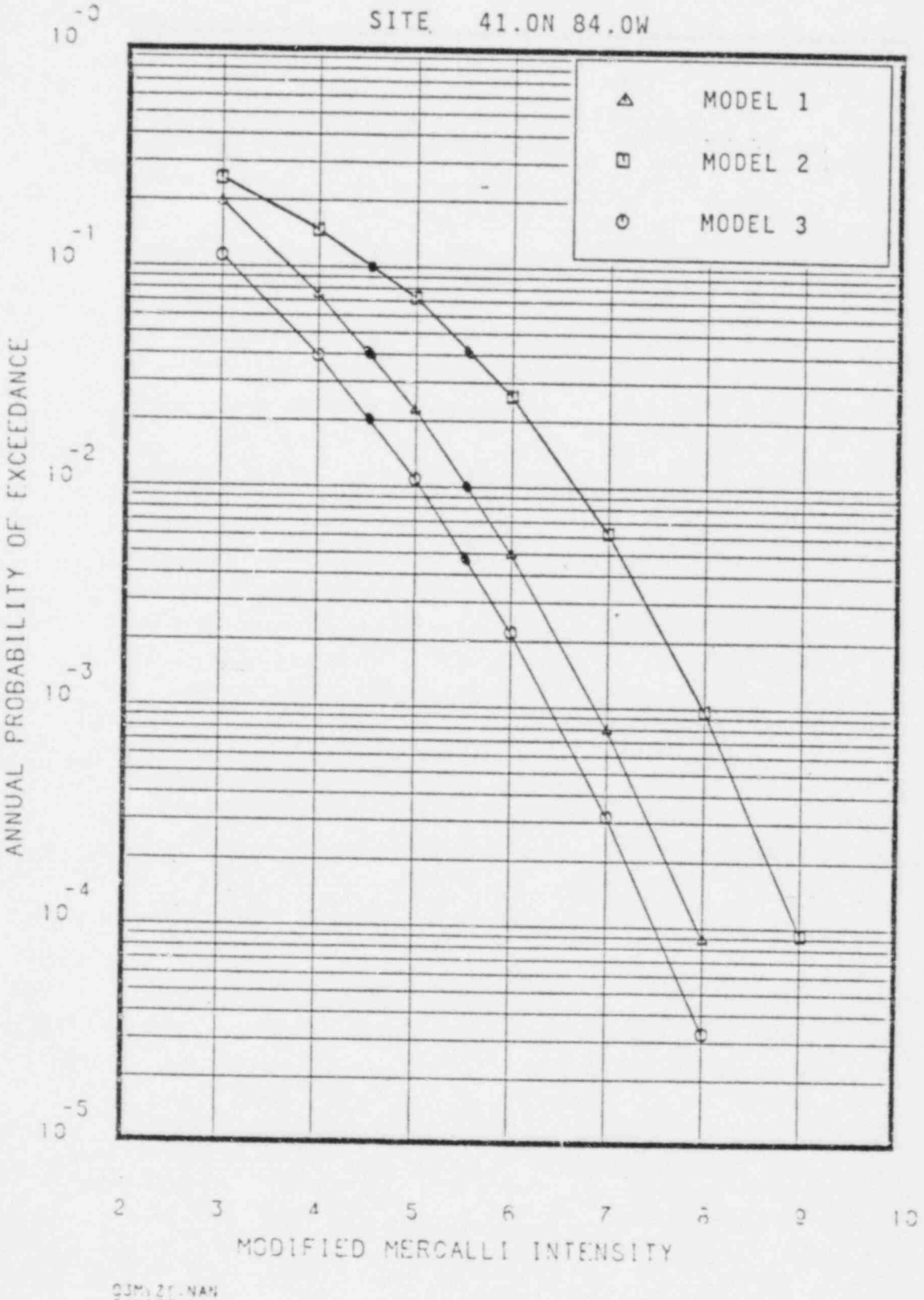

SITE 41.0N 84.0W
MODEL 1
MODEL 2
MODEL 3
ANNUAL PROBABILITY OF EXCEEDANCE
10^-0
10^-1
10^-2
10^-3
10^-4
10^-5
2
3
4
5
6
7
8
9
10
MODIFIED MERCALLI INTENSITY
Q3M1ZT.NAN
Q3M2ZT.NAN
Q3M3ZT.NAN

FIGURE Q3-15

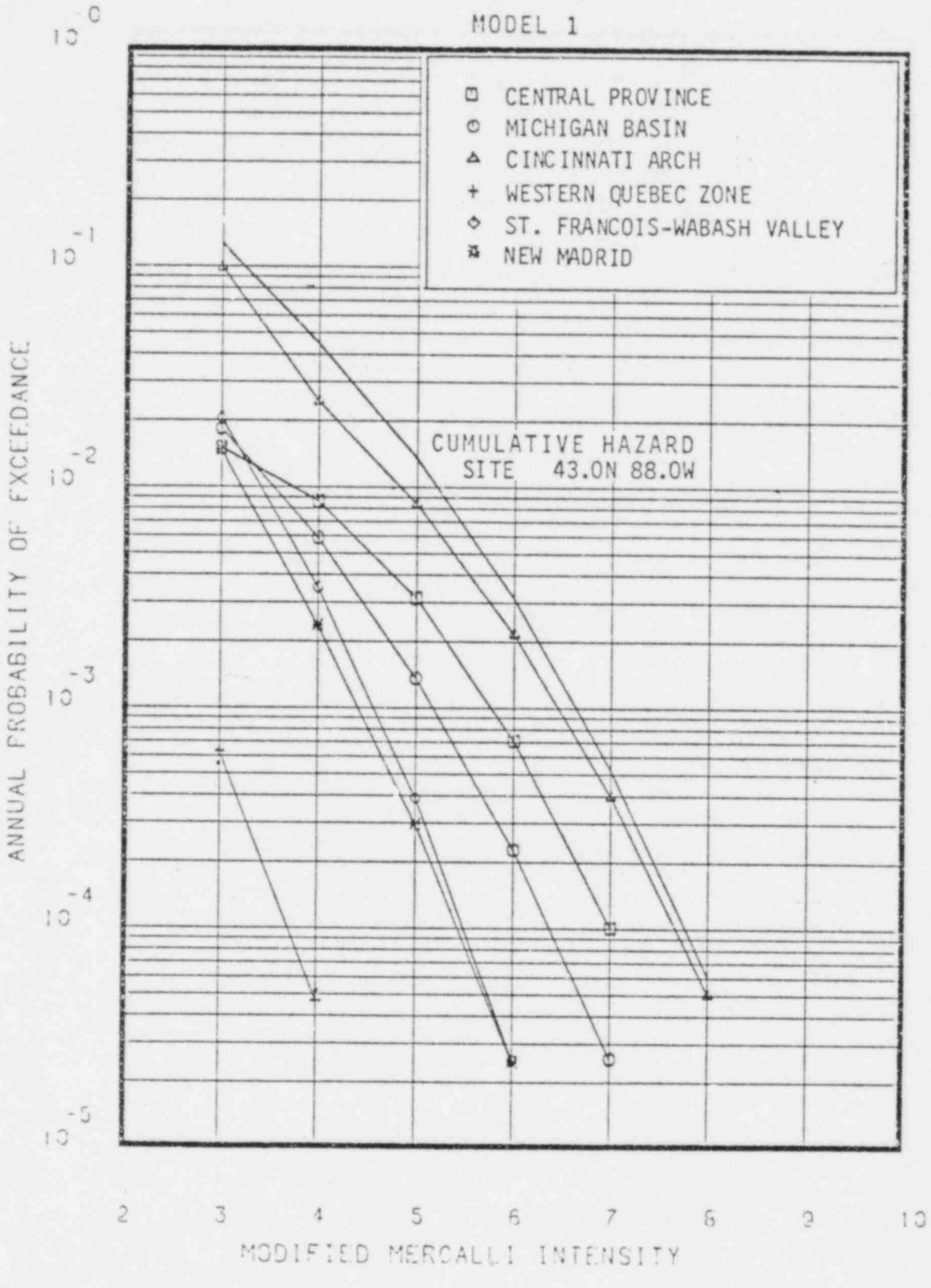

MODEL 1
CENTRAL PROVINCE
MICHIGAN BASIN
CINCINNATI ARCH
WESTERN QUEBEC ZONE
ST. FRANCOIS-WABASH VALLEY
NEW MADRID
CUMULATIVE HAZARD
SITE 43.0N 88.0W
ANNUAL PROBABILITY OF EXCEEDANCE
10^0
10^-1
10^-2
10^-3
10^-4
10^-5
2
3
4
5
6
7
8
9
10
MODIFIED MERCALLI INTENSITY

FIGURE Q3-16

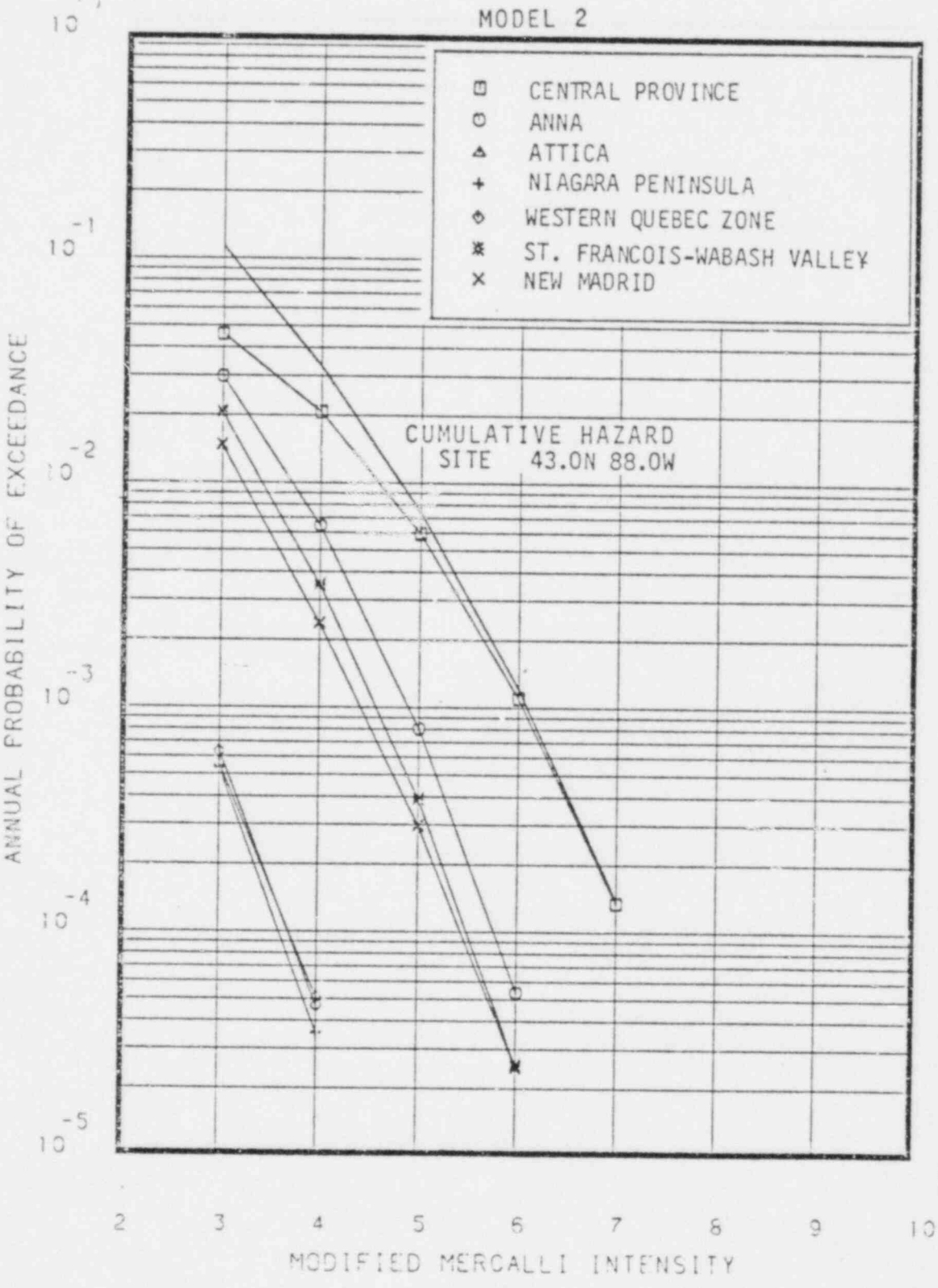
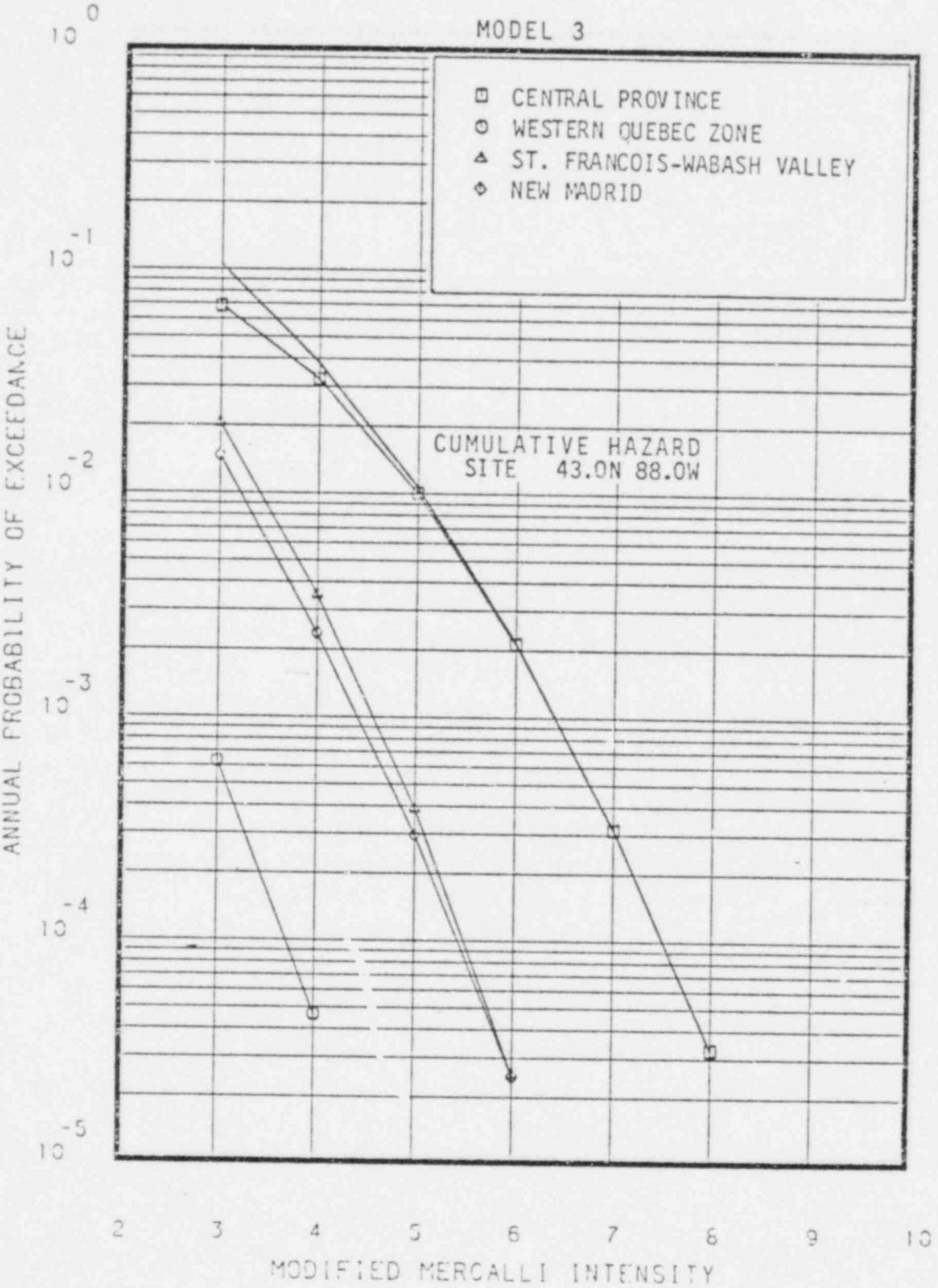
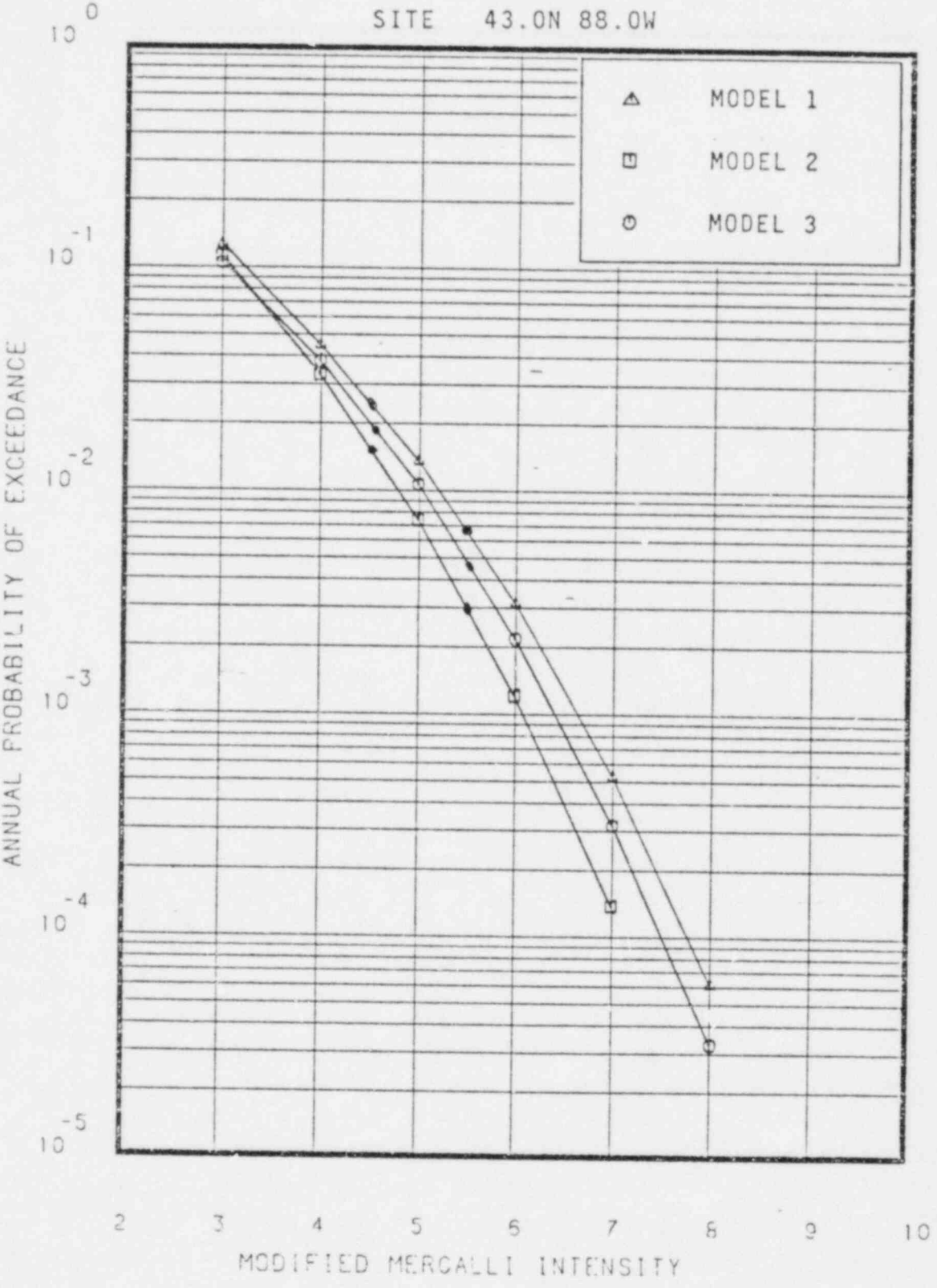

MODEL 2
CENTRAL PROVINCE
ANNA
ATTICA
NIAGARA PENINSULA
WESTERN QUEBEC ZONE
ST. FRANCOIS-WABASH VALLEY
NEW MADRID
CUMULATIVE HAZARD
SITE 43.0N 88.0W
ANNUAL PROBABILITY OF EXCEEDANCE
10 -1
10 -2
10 -3
10 -4
10 -5
2
3
4
5
6
7
8
9
10
MODIFIED MERCALLI INTENSITY

FIGURE Q3-17



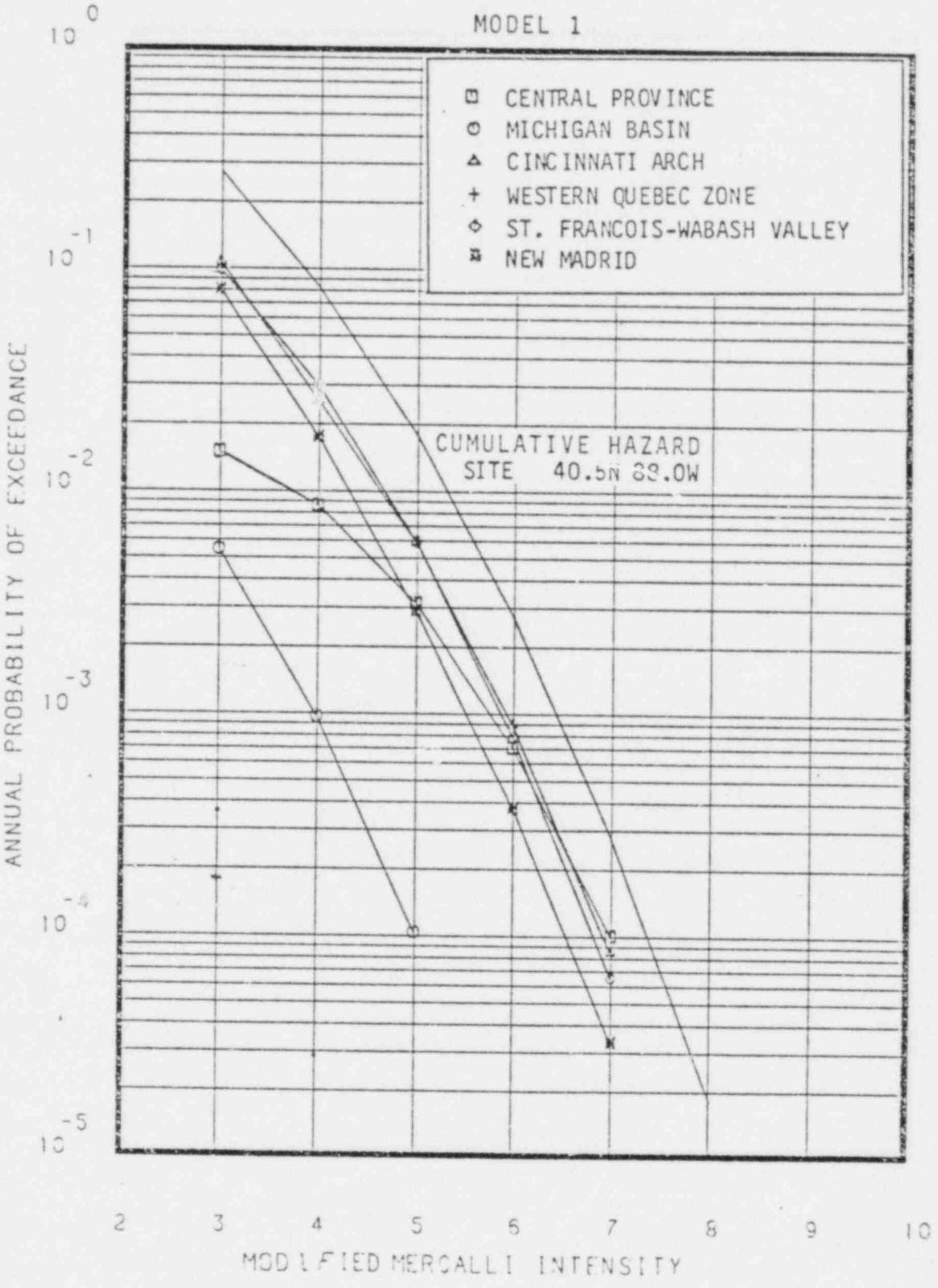
Q3M2ZT.MIL
Q3M2Z1.SUF
Q3M2Z2.MIL
Q3M2Z3.MIL
Q3M2Z4.MIL

FIGURE Q3-18



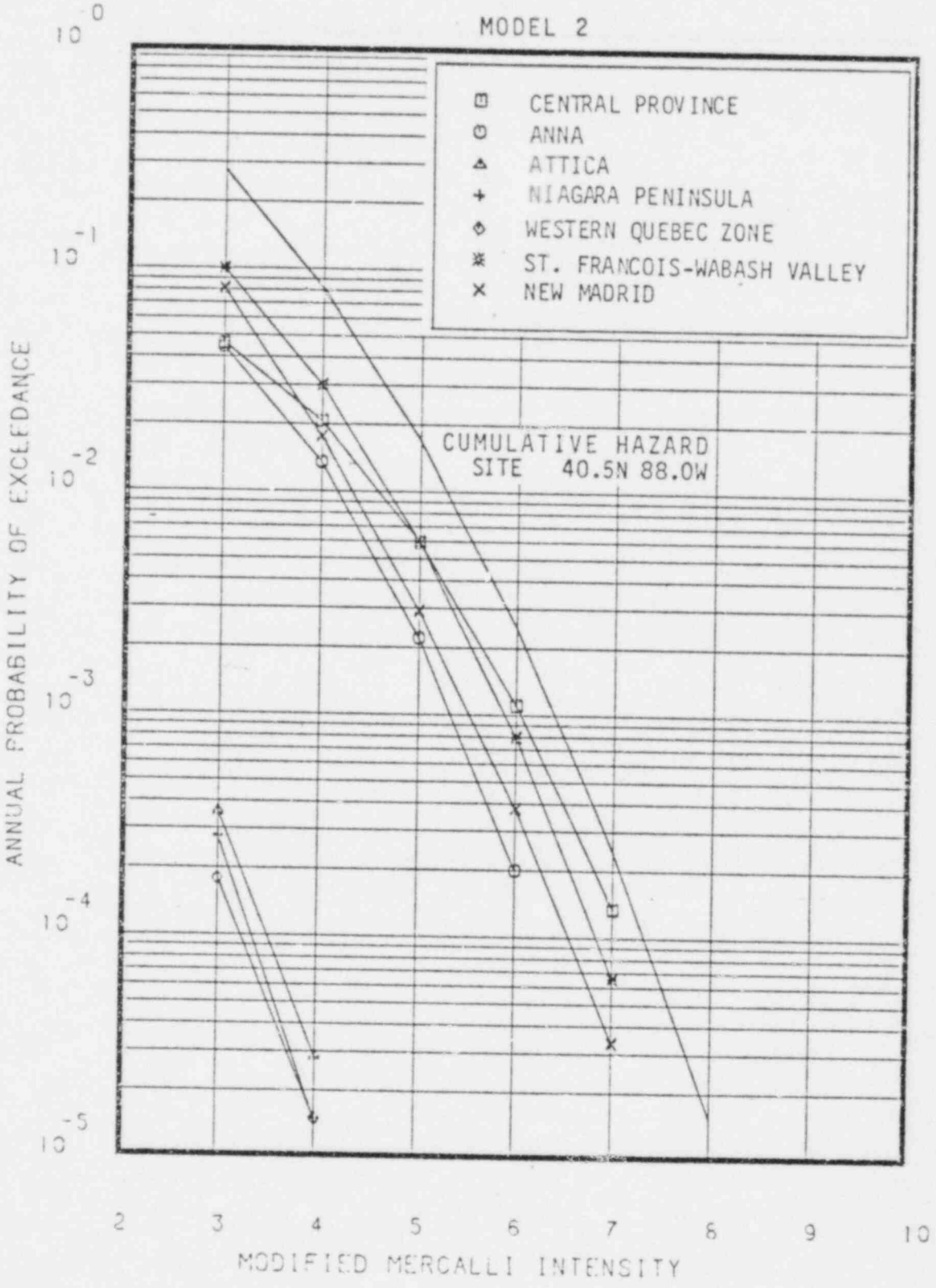
Q3M12T.MIL
Q3M22T.MIL
Q3M32T.MIL

FIGURE Q3-19



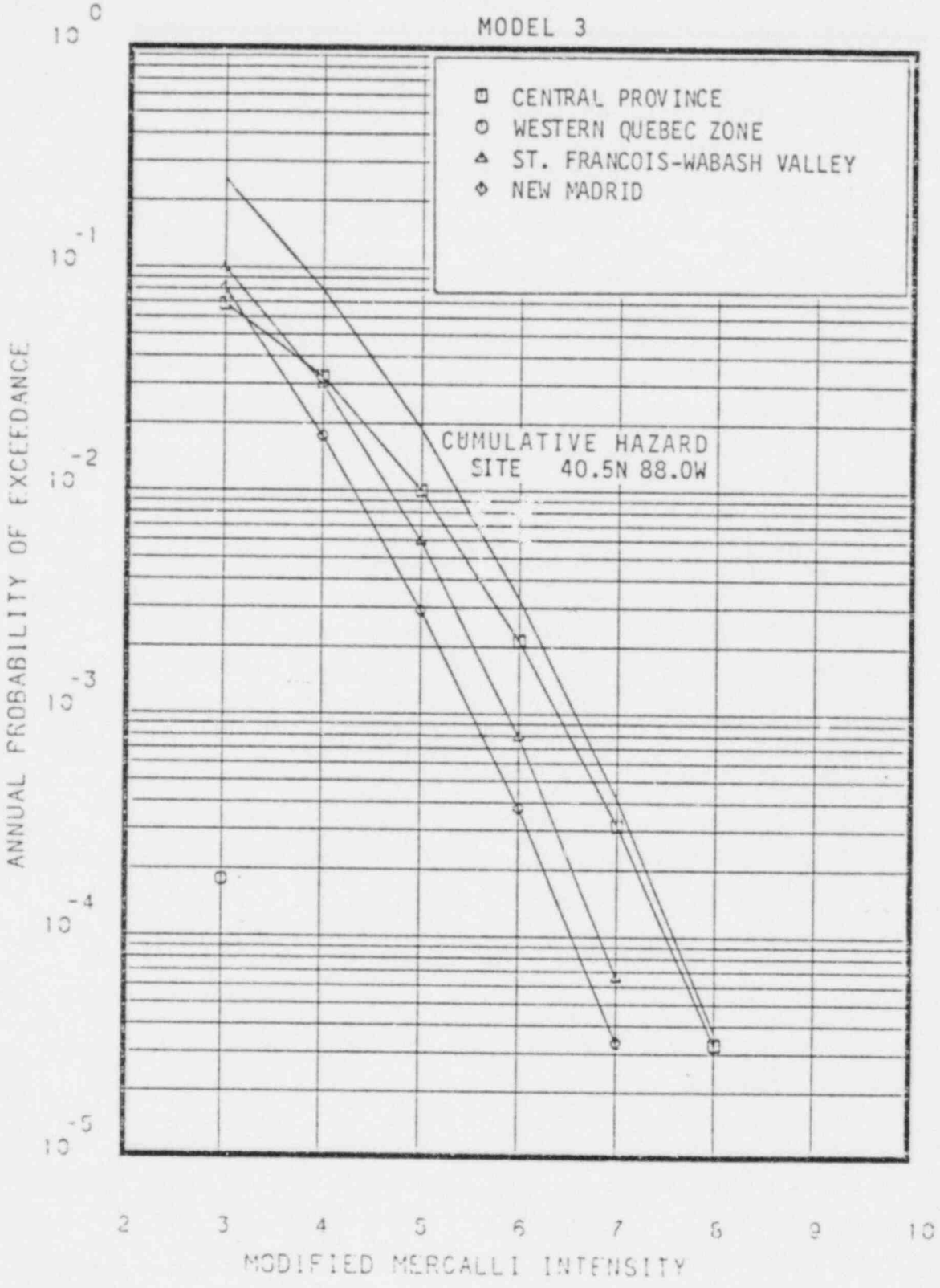
03M327.KAN
03M321.ALL
03M323.KAN
03M323.KAN
03M321.KAN
03M325.KAN
03M325.KAN

FIGURE Q3-20



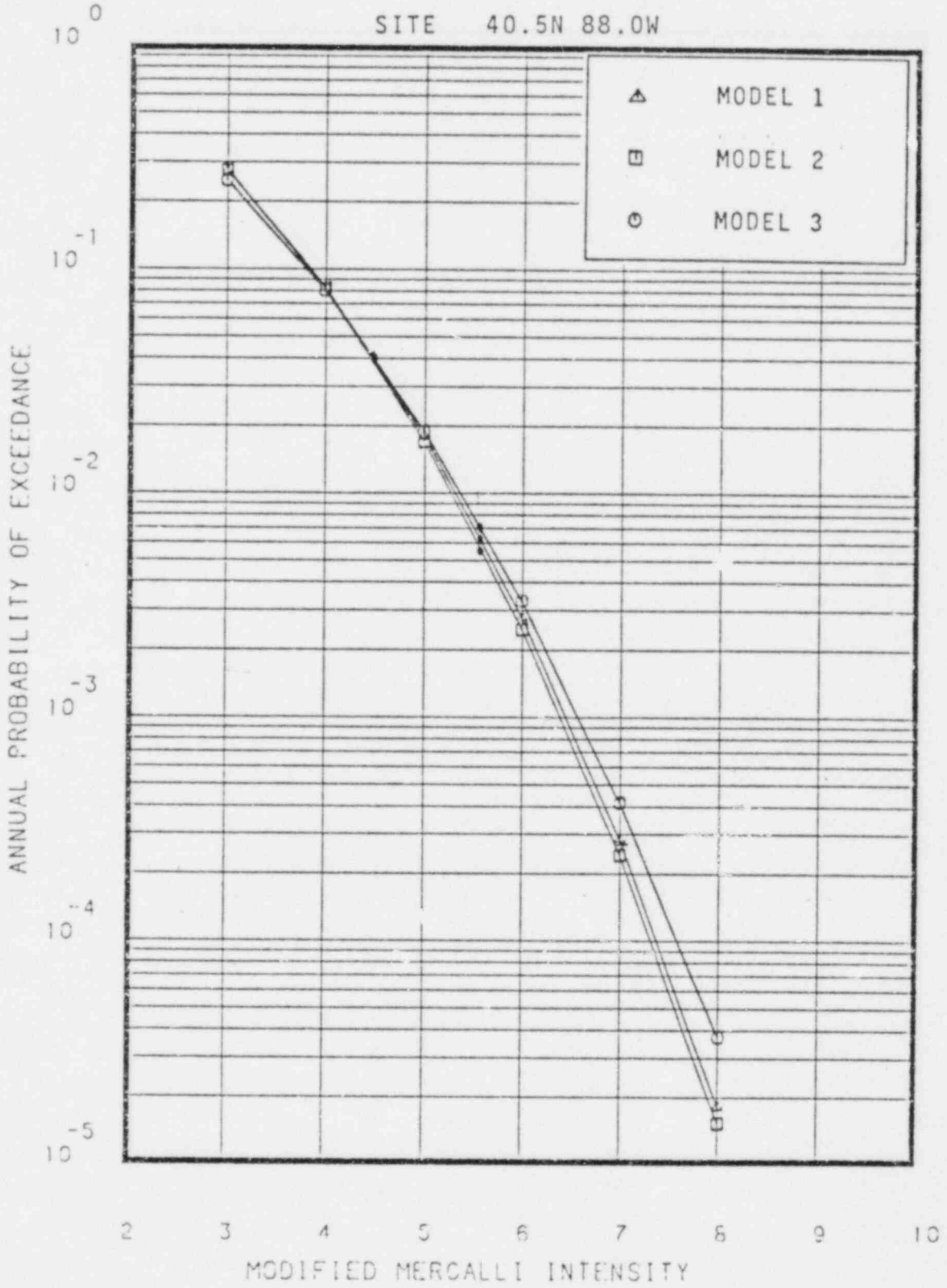
03M1Z7.KAN
03M1Z1.BUF
03M1Z2.KAN
03M1Z3.KAN
03M1Z4.KAN
03M1Z6.KAN
03M1Z5.KAN
03M1Z7.KAN

FIGURE Q3-21



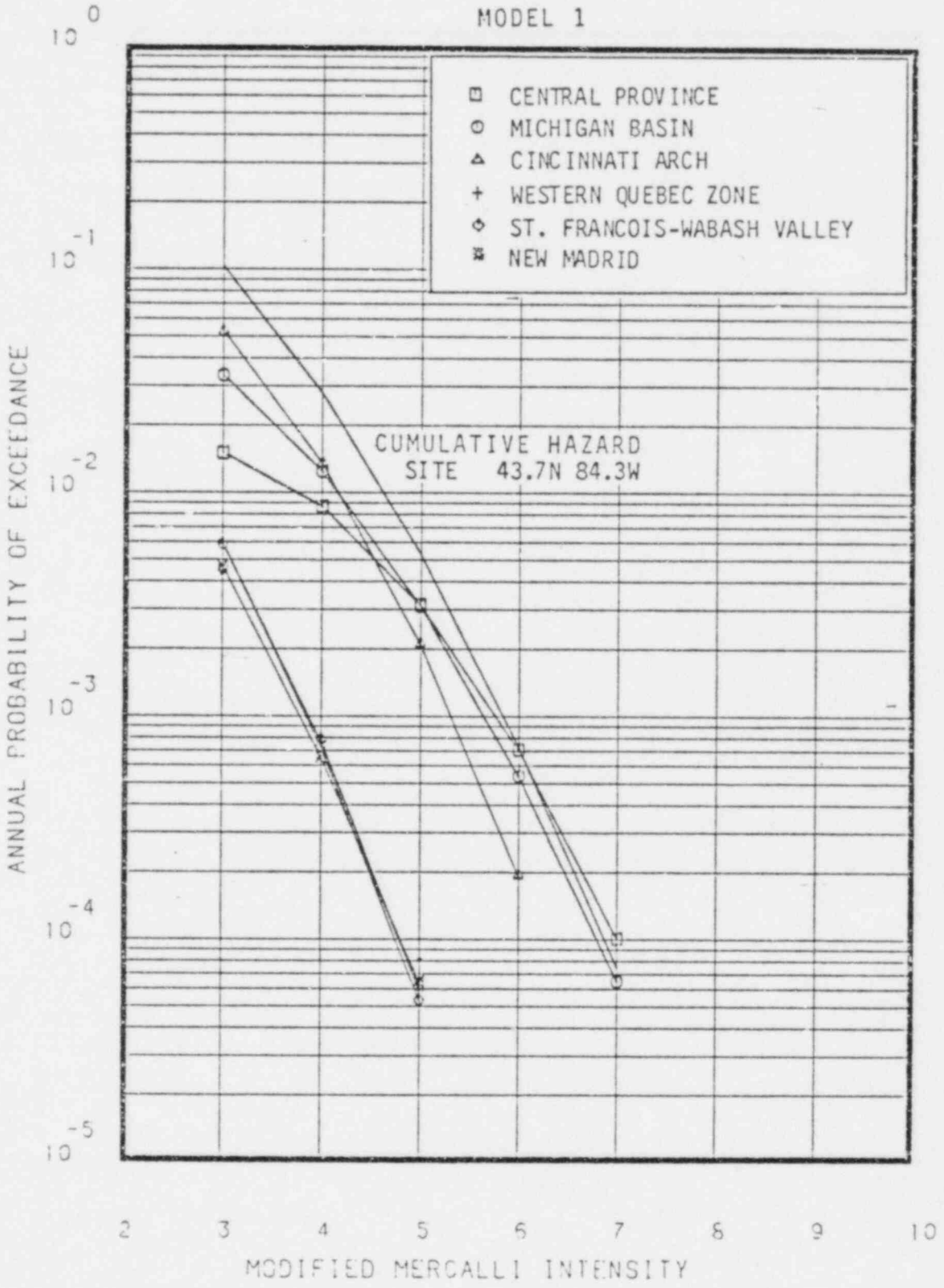
03M2Z1.KAN
03M2Z1.DOF
03M2Z2.KAN
03M2Z3.KAN
03M2Z1.KAN

FIGURE Q3-22



Q3M2ZT.KAN
Q3M1ZT.KAN
Q3M3ZT.KAN

FIGURE Q3-23



Q3M327.MID
Q3M321.ALL
Q3M322.MID
Q3M323.MID
Q3M324.MID
Q3M325.MID
Q3M326.MID

FIGURE Q3-24

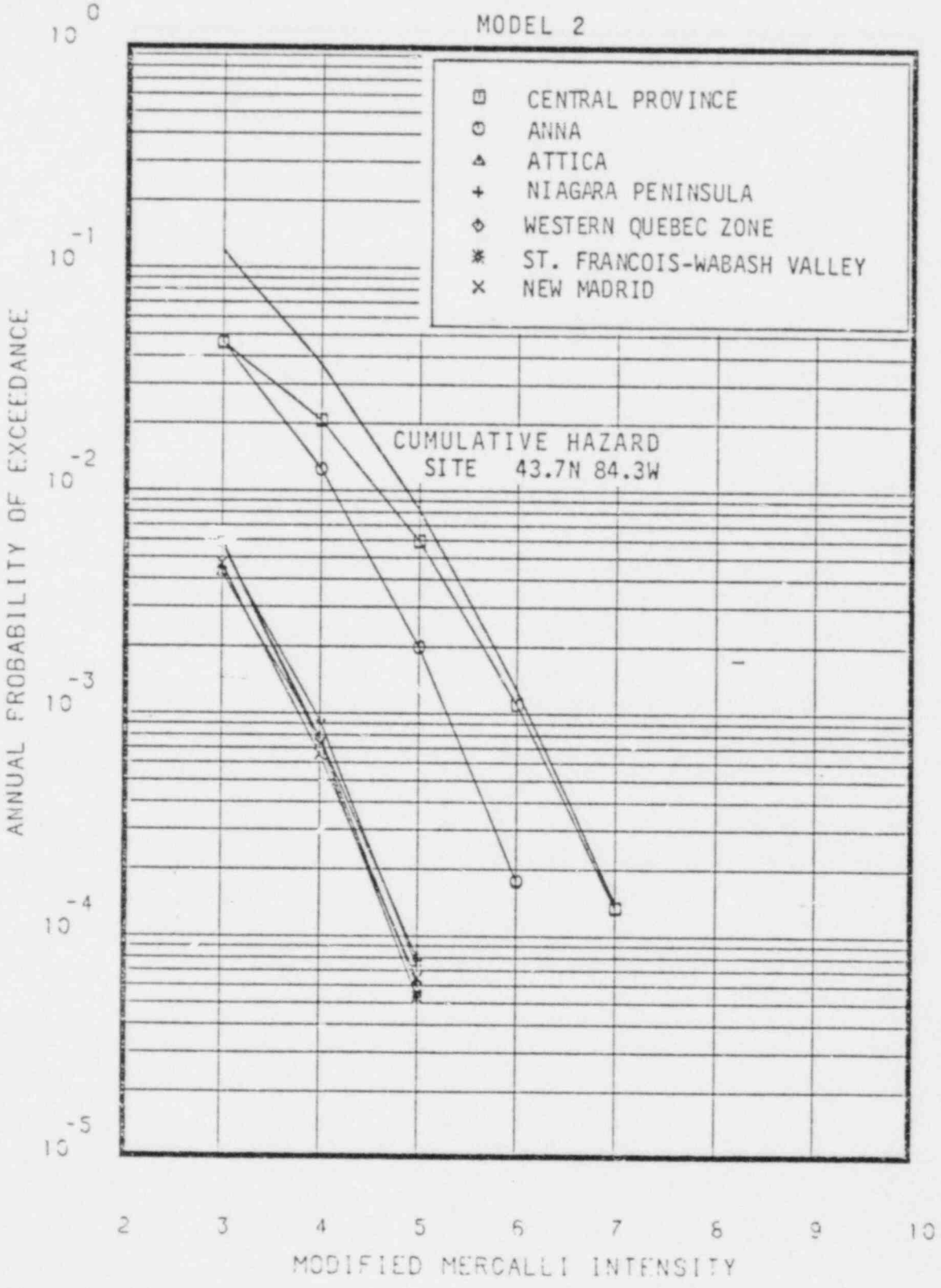
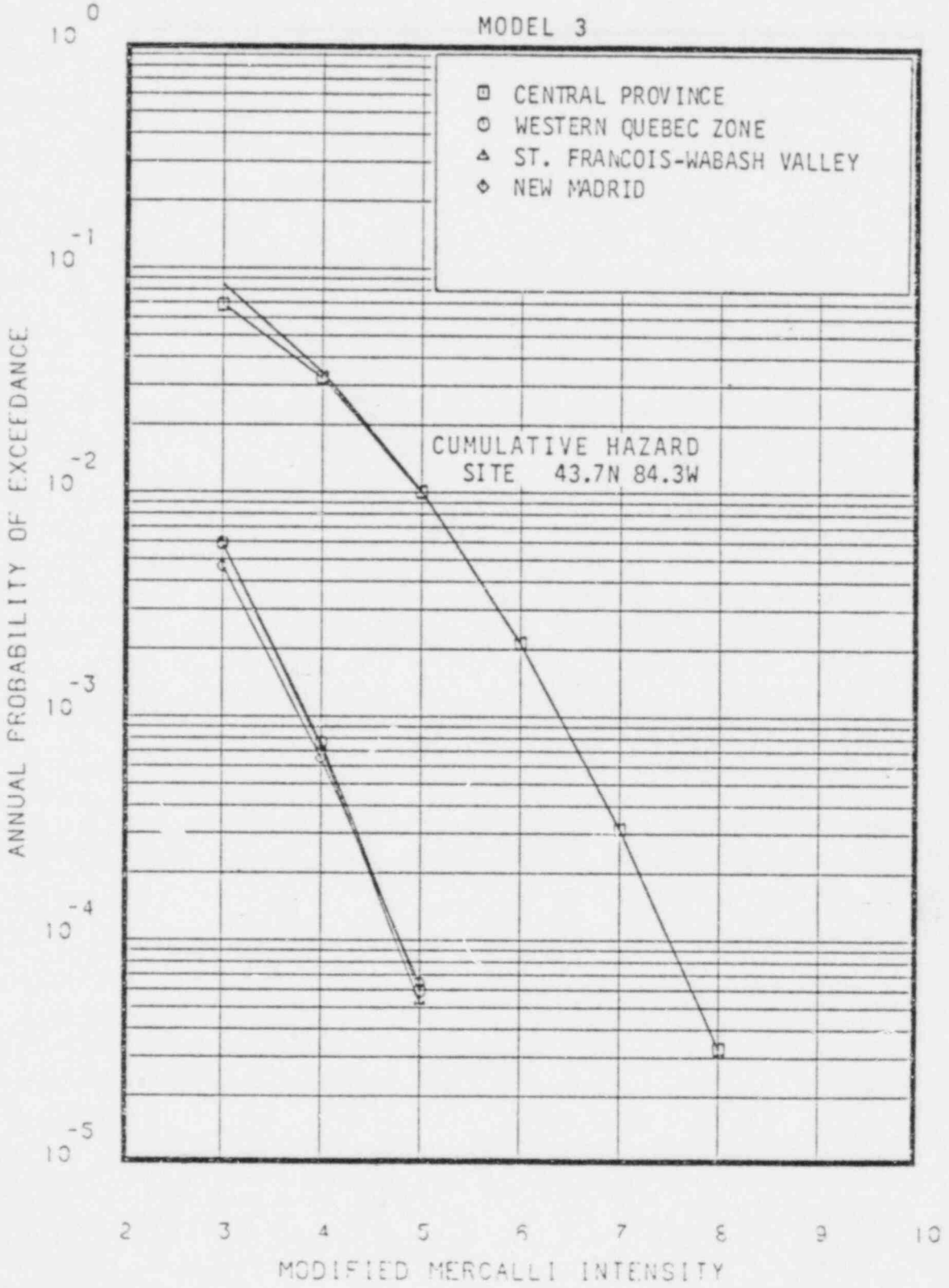

MODEL 2
CENTRAL PROVINCE
ANNA
ATTICA
NIAGARA PENINSULA
WESTERN QUEBEC ZONE
ST. FRANCOIS-WABASH VALLEY
NEW MADRID
CUMULATIVE HAZARD
SITE 43.7N 84.3W
ANNUAL PROBABILITY OF EXCEEDANCE
10^0
10^-1
10^-2
10^-3
10^-4
10^-5
2
3
4
5
6
7
8
9
10
MODIFIED MERCALLI INTENSITY

FIGURE Q3-25



Q3M22F.MID
Q3M22L.SUF
Q3M22S.MID
Q3M22J.MID
Q3M22I.MID

FIGURE Q3-26

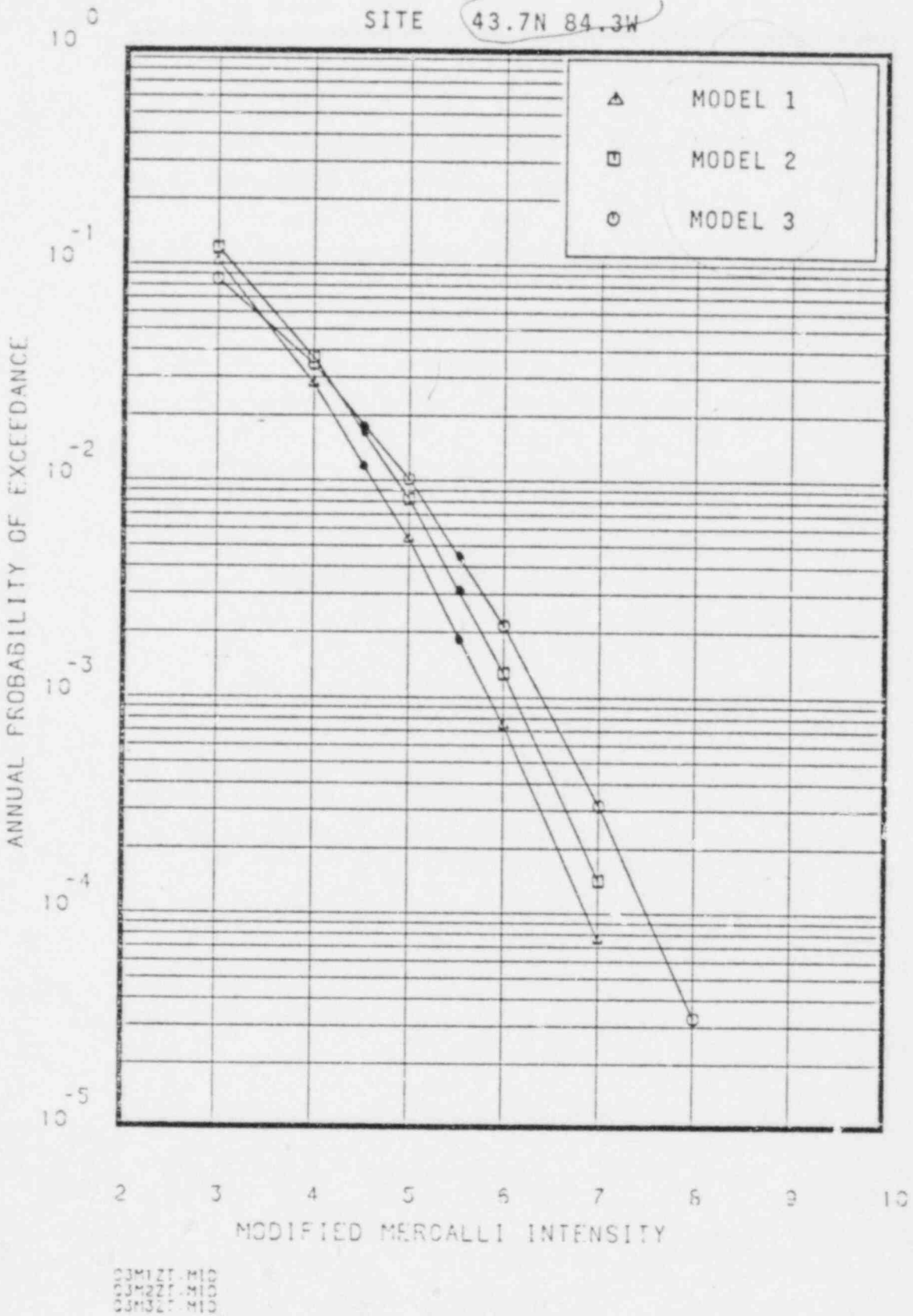
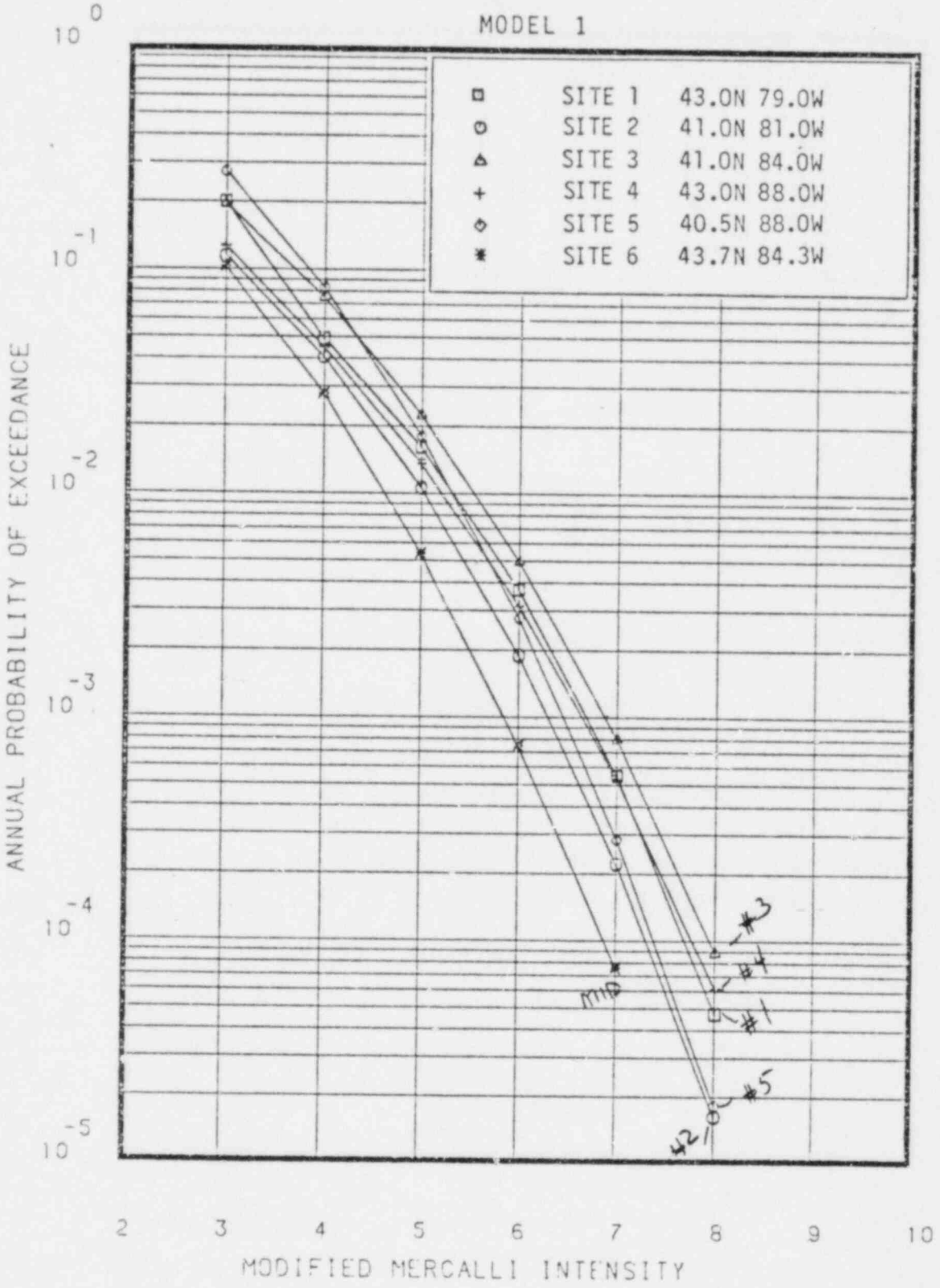

SITE 43.7N 84.3W
MODEL 1
MODEL 2
MODEL 3
ANNUAL PROBABILITY OF EXCEEDANCE
10^0
10^-1
10^-2
10^-3
10^-4
10^-5
2
3
4
5
6
7
8
9
10
MODIFIED MERCALLI INTENSITY

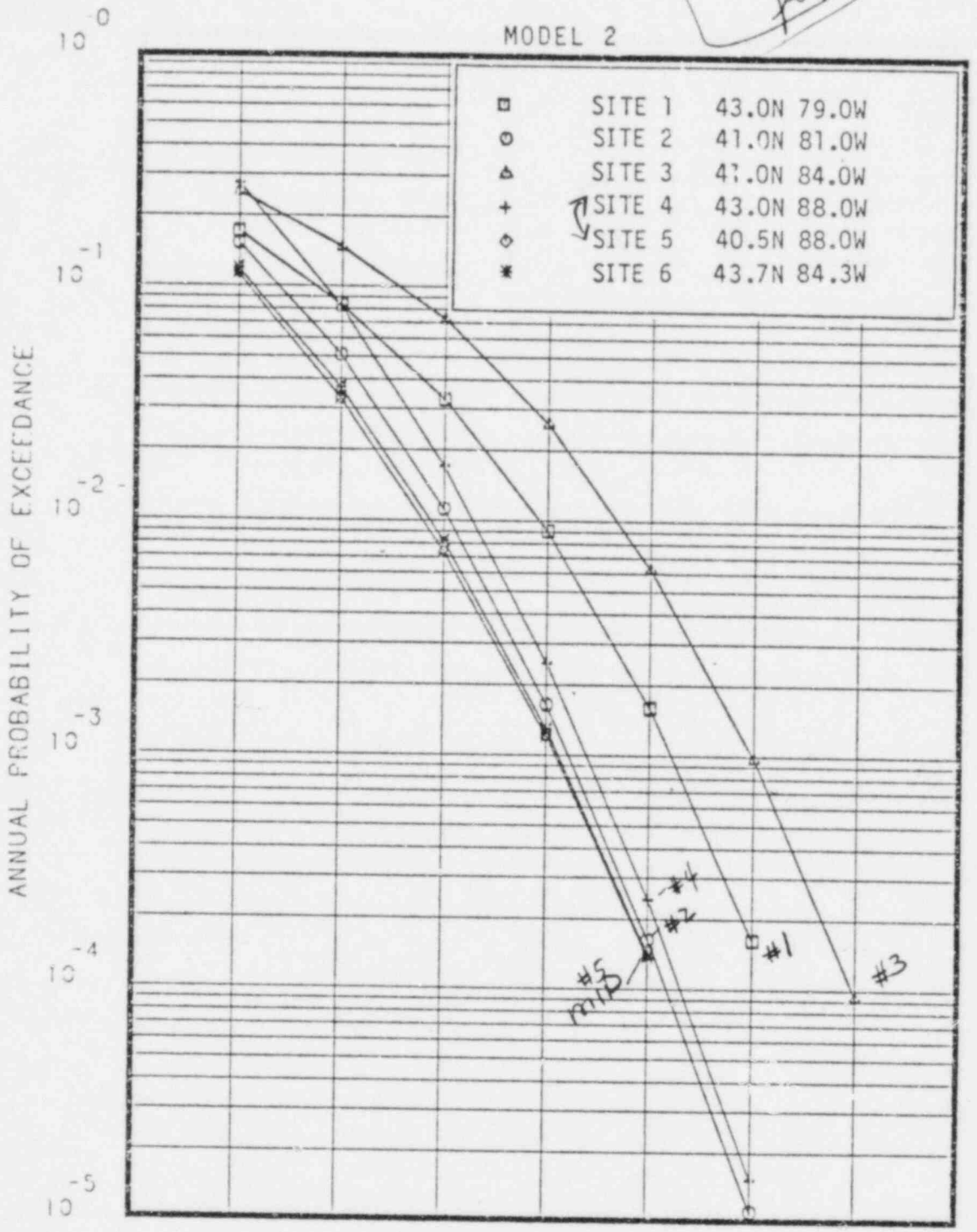
FIGURE Q3-27



Q3M3ZT.BUF
Q3M3ZT.CAN
Q3M3ZT.NAN
Q3M3ZT.MIL
Q3M3ZT.KAN
Q3M3ZT.MID

FIGURE Q3-28

4 and 5 flipped

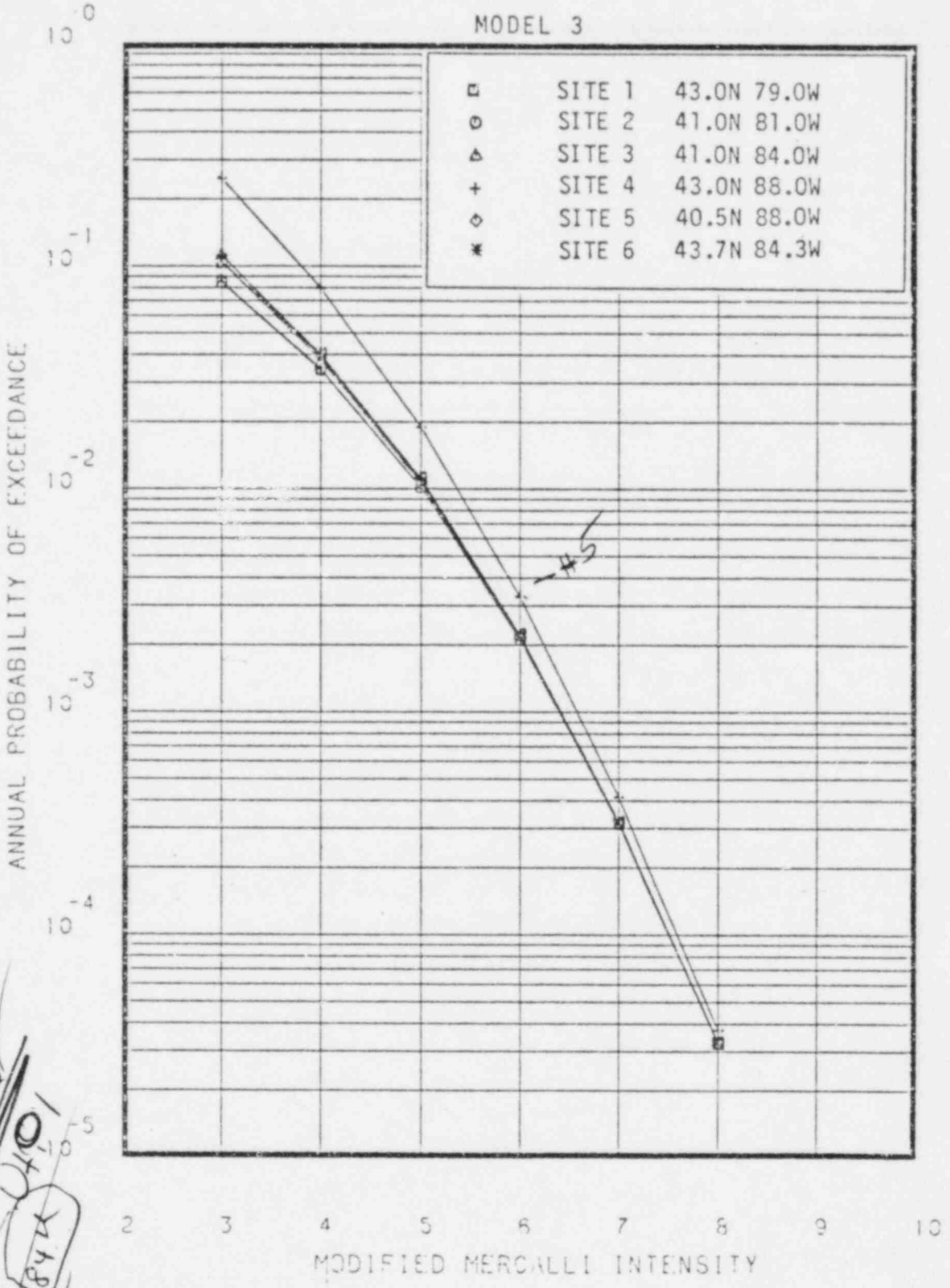


G3M1ZT.BUF
G3M1ZT.CAN
G3M1ZT.NAN
G3M1ZT.KAN
G3M1ZT.M1L
G3M1ZT.M10

5.0 DICK HOLT

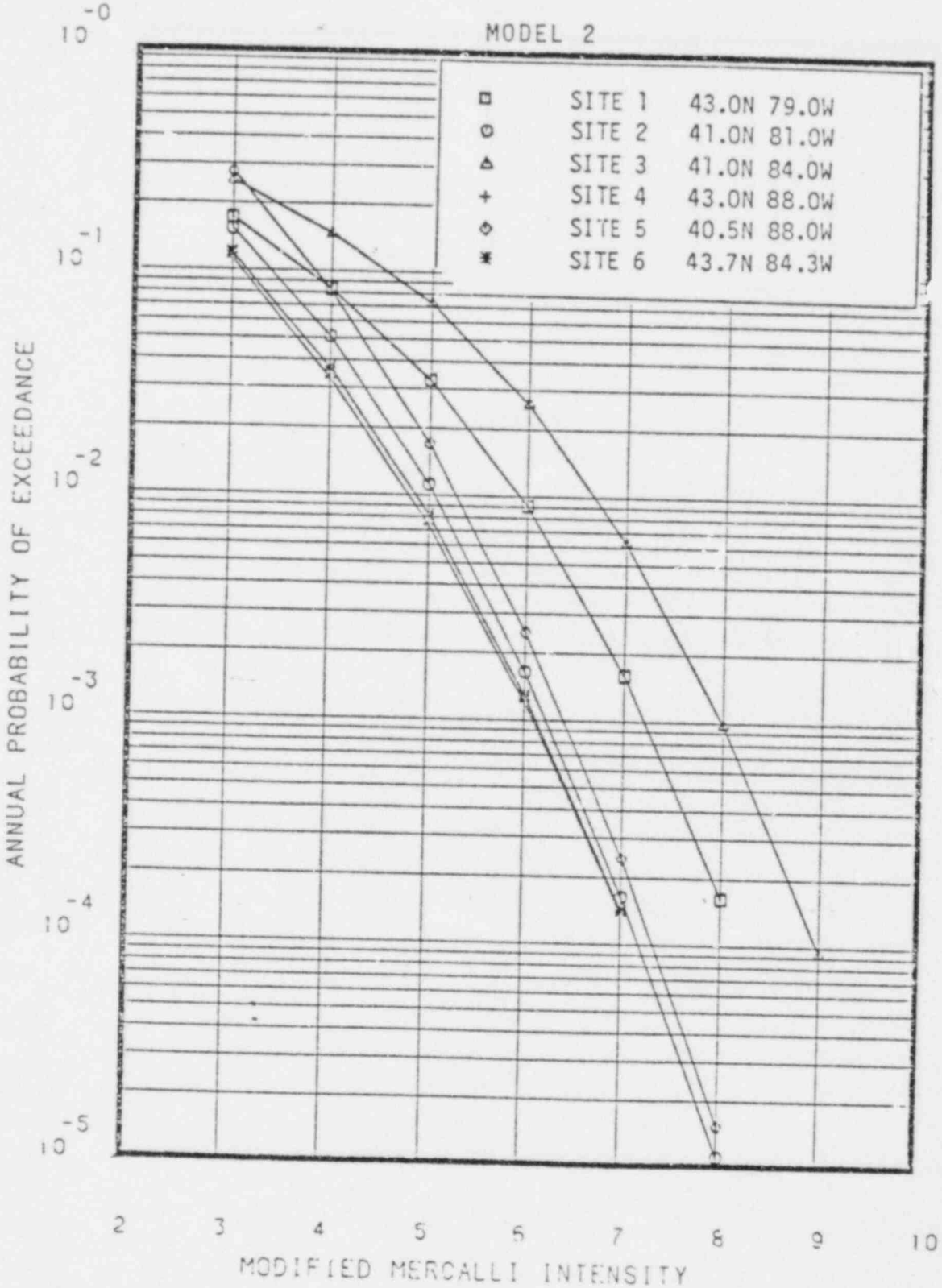
4.8 → 5.2

FIGURE Q3-29



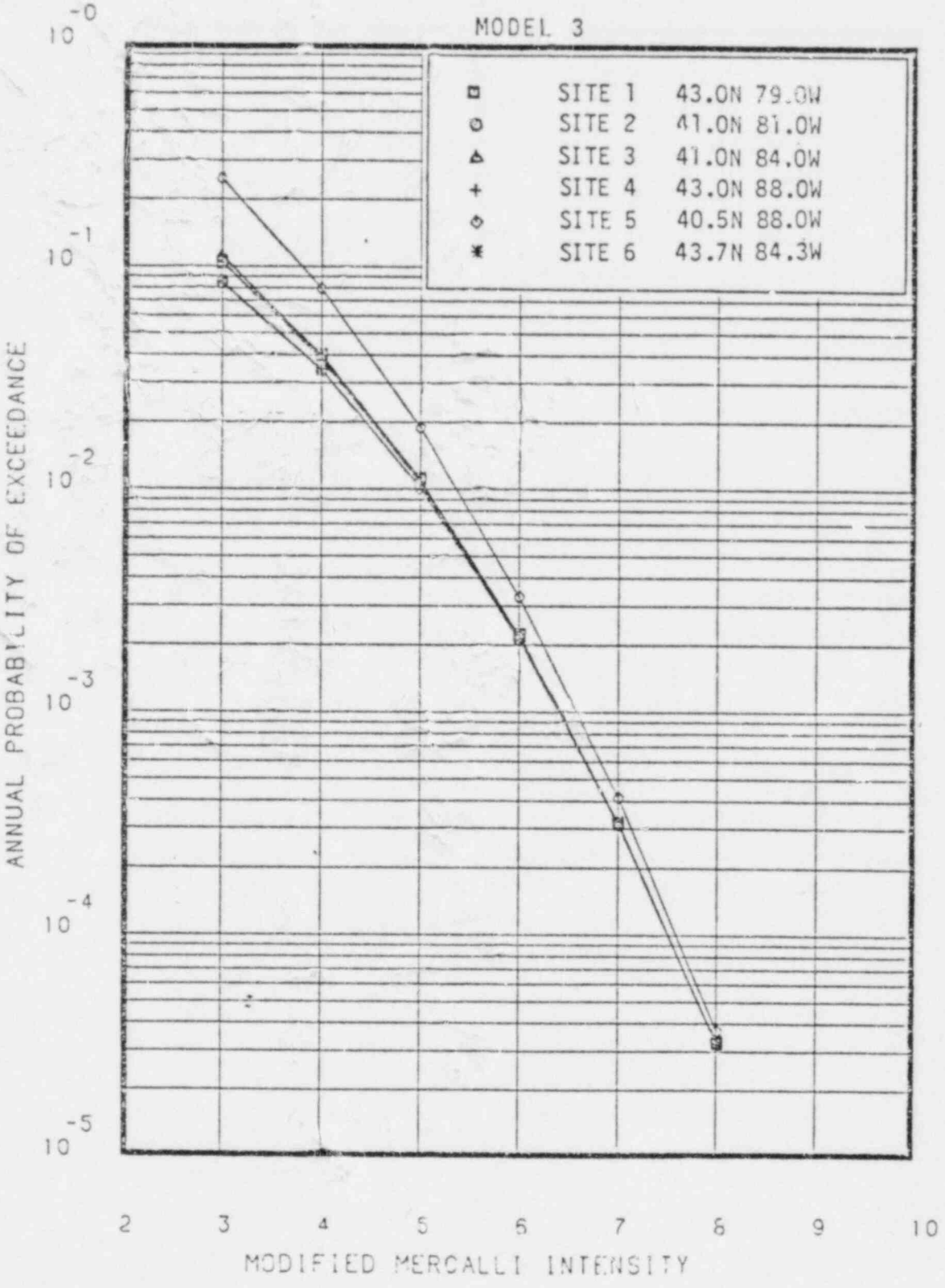
03M221 BUF
03M221 CAN
03M221 NAN
03M221 KAN
03M221 MIC
03M221 MID

FIGURE Q3-30



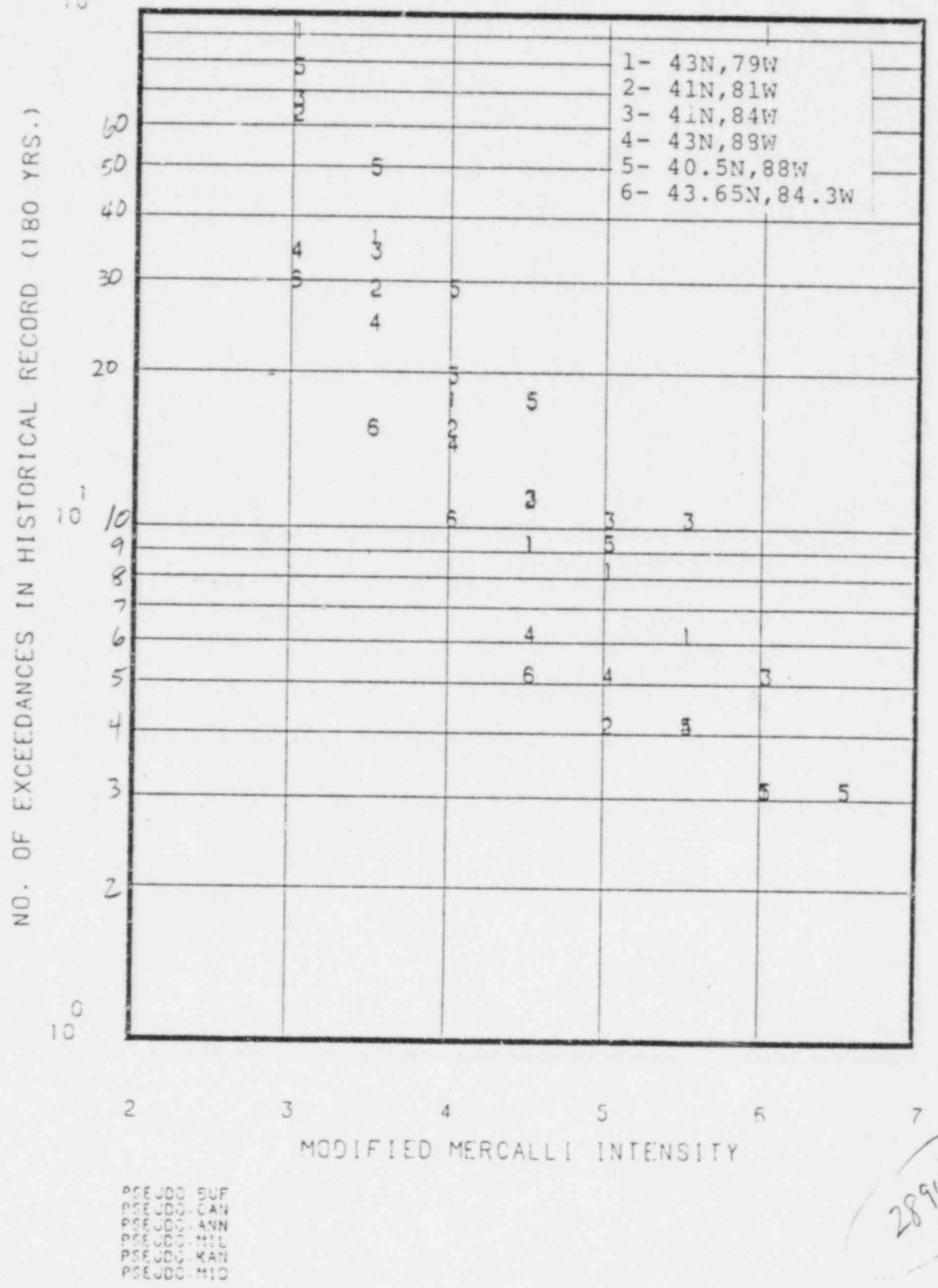
GJMIZT.BUF
GJMIZT.CAN
GJMIZT.NAN
GJMIZT.MIL
GJMIZT.KAN
GJMIZT.MID

FIGURE Q3-29



Q3M2ZT.BUF
Q3M2ZT.CAN
Q3M2ZT.NAN
Q3M2ZT.MIL
Q3M2ZT.KAN
Q3M2ZT.MID

FIGURE Q3-30



PSEJDD:BUF
PSEJDD:CAN
PSEJDD:ANN
PSEJDD:MIL
PSEJDD:KAN
PSEJDD:MID

28948

Figure Q3-31

TABLE Q3-1

ANNUAL EXCEEDANCE PROBABILITIES
OF MODIFIED MERCALLI INTENSITY AT
43.0°N 79.0°W

MODEL	III	IV	V	VI	VII	VIII	IX	X
1	1.19E-1	4.86E-2	1.60E-2	3.69E-3	5.43E-4	4.67E-5	2.11E-6	4.56E-8
2	1.70E-1	8.24E-2	3.26E-2	9.01E-3	1.58E-3	1.61E-4	8.95E-6	2.51E-7
3	1.04E-1	3.97E-2	1.10E-2	2.20E-3	3.18E-4	3.26E-5	2.29E-6	1.02E-7
1S	7.60E-2	2.19E-2	4.92E-3	8.27E-4	9.86E-5	2.81E-5	1.09E-6	2.16E-8
2S	1.52E-1	7.87E-2	3.29E-2	9.80E-3	1.93E-3	2.41E-4	1.84E-5	7.95E-7
3S	7.08E-2	2.44E-2	6.40E-3	1.22E-3	1.63E-4	1.49E-5	8.67E-7	2.86E-8

180 yrs

TABLE Q3-2

ANNUAL EXCEEDANCE PROBABILITIES
OF MODIFIED MERCALLI INTENSITY AT
41.0°N 81.0°W

#2

MODEL	III	IV	V	VI	VII	VIII	IX	X
1	1.14E-1	4.02E-2	1.05E-2	1.87E-3	2.18E-4	1.61E-5	7.06E-7	1.68E-8
2	1.52E-1	5.05E-2	1.11E-2	1.63E-3	1.62E-4	1.11E-5	5.02E-7	1.30E-8
3	8.44E-2	3.42E-2	1.01E-2	2.12E-3	3.13E-4	3.25E-5	2.29E-8	1.02E-7
1S	9.78E-2	3.38E-2	8.92E-3	1.65E-3	2.03E-4	1.58E-5	7.24E-7	1.77E-8
2S	1.20E-1	3.83E-2	8.47E-3	1.31E-3	1.43E-4	1.10E-5	5.68E-7	1.70E-8
3S	5.11E-2	1.89E-2	5.50E-3	1.13E-3	1.59E-4	1.48E-5	8.66E-7	2.86E-8

$R_A \times N$

TABLE Q3-3

ANNUAL EXCEEDANCE PROBABILITIES
OF MODIFIED MERCALLI INTENSITY AT
41.0°N 84.0°W

MODEL	III	IV	V	VI	VII	VIII	IX	X
1	1.95E-1	7.43E-2	2.23E-2	4.93E-3	7.87E-4	8.76E-5	6.48E-6	2.93E-7
2	2.50E-1	1.46E-1	7.22E-2	2.58E-2	6.19E-3	9.69E-4	9.23E-5	5.00E-6
3	1.11E-1	3.92E-2	1.08E-2	2.17E-3	3.16E-4	3.25E-5	2.29E-6	1.02E-7
1S	1.70E-1	6.39E-2	1.94E-2	4.43E-3	7.42E-4	8.82E-5	7.07E-6	3.52E-7
2S	1.97E-1	1.12E-1	5.49E-2	1.97E-2	4.80E-3	7.87E-4	8.40E-5	5.93E-6
3S	7.80E-2	2.39E-2	6.17E-3	1.19E-3	1.62E-4	1.49E-5	8.67E-7	2.86E-8

TABLE Q3-4

ANNUAL EXCEEDANCE PROBABILITIES
OF MODIFIED MERCALLI INTENSITY AT
43.0°N 88.0°W

MODEL	III	IV	V	VI	VII	VIII	IX	X
1	1.26E-1	4.46E-2	1.35E-2	3.12E-3	5.21E-4	6.06E-5	4.67E-6	2.20E-7
2	1.12E-1	3.29E-2	7.37E-2	1.20E-3	1.37E-4	1.04E-5	4.94E-7	1.30E-8
3	1.04E-1	3.79E-2	1.06E-2	2.16E-3	3.15E-4	3.25E-5	2.29E-6	1.02E-7
1S	1.12E-1	3.82E-2	1.15E-2	2.73E-3	4.83E-4	6.09E-5	5.23E-6	2.82E-7
2S	8.52E-2	2.34E-2	5.29E-3	9.17E-3	1.16E-4	1.01E-5	5.53E-7	1.69E-8
3S	7.04E-2	2.27E-2	6.01E-3	1.17E-3	1.61E-4	1.49E-5	8.67E-7	2.86E-8

TABLE Q3-5

ANNUAL EXCEEDANCE PROBABILITIES
OF MODIFIED MERCALLI INTENSITY AT
40.5°N 88.0°W

MODEL	III	IV	V	VI	VII	VIII	IX	X
1	2.72E-1	8.21E-2	1.79E-2	2.76E-3	2.82E-4	1.81E-5	7.02E-7	1.56E-8
2	2.74E-1	8.12E-2	1.69E-2	2.45E-3	2.40E-4	1.52E-5	5.99E-7	1.40E-8
3	2.47E-1	7.93E-2	1.88E-2	3.27E-3	4.11E-4	3.70E-5	2.40E-6	1.03E-7
1S	2.56E-1	7.61E-2	1.65E-2	2.55E-3	2.65E-4	1.73E-5	6.79E-7	1.52E-8
2S	2.43E-1	7.00E-2	1.45E-2	2.15E-3	2.20E-4	1.49E-5	6.59E-7	1.79E-8
3S	2.14E-1	6.40E-2	1.41E-2	2.28E-3	2.57E-4	1.94E-5	9.70E-7	2.96E-8

TABLE Q3-6

ANNUAL EXCEEDANCE PROBABILITIES
OF MODIFIED MERCALLI INTENSITY AT
43.65°N 84.30°W

MODEL	III	IV	V	VI	VII	VIII	IX	X
1	1.02E-1	2.76E-2	5.25E-3	6.90E-4	6.43E-5	4.09E-6	1.41E-7	-
2	1.17E-1	3.66E-2	8.09E-3	1.23E-3	1.26E-4	8.11E-6	2.54E-7	-
3	8.41E-2	3.41E-2	1.01E-2	2.08E-3	2.97E-4	2.85E-5	1.69E-6	4.88E-8
1S	9.79E-2	2.70E-2	5.33E-3	7.54E-4	7.54E-5	5.30E-6	2.43E-7	6.20E-9
2S	8.84E-2	2.61E-2	5.90E-3	9.95E-4	1.21E-4	1.03E-5	5.55E-7	1.69E-8
3S	5.11E-2	1.89E-2	5.50E-3	1.13E-3	1.59E-4	1.48E-5	8.66E-7	2.87E-8

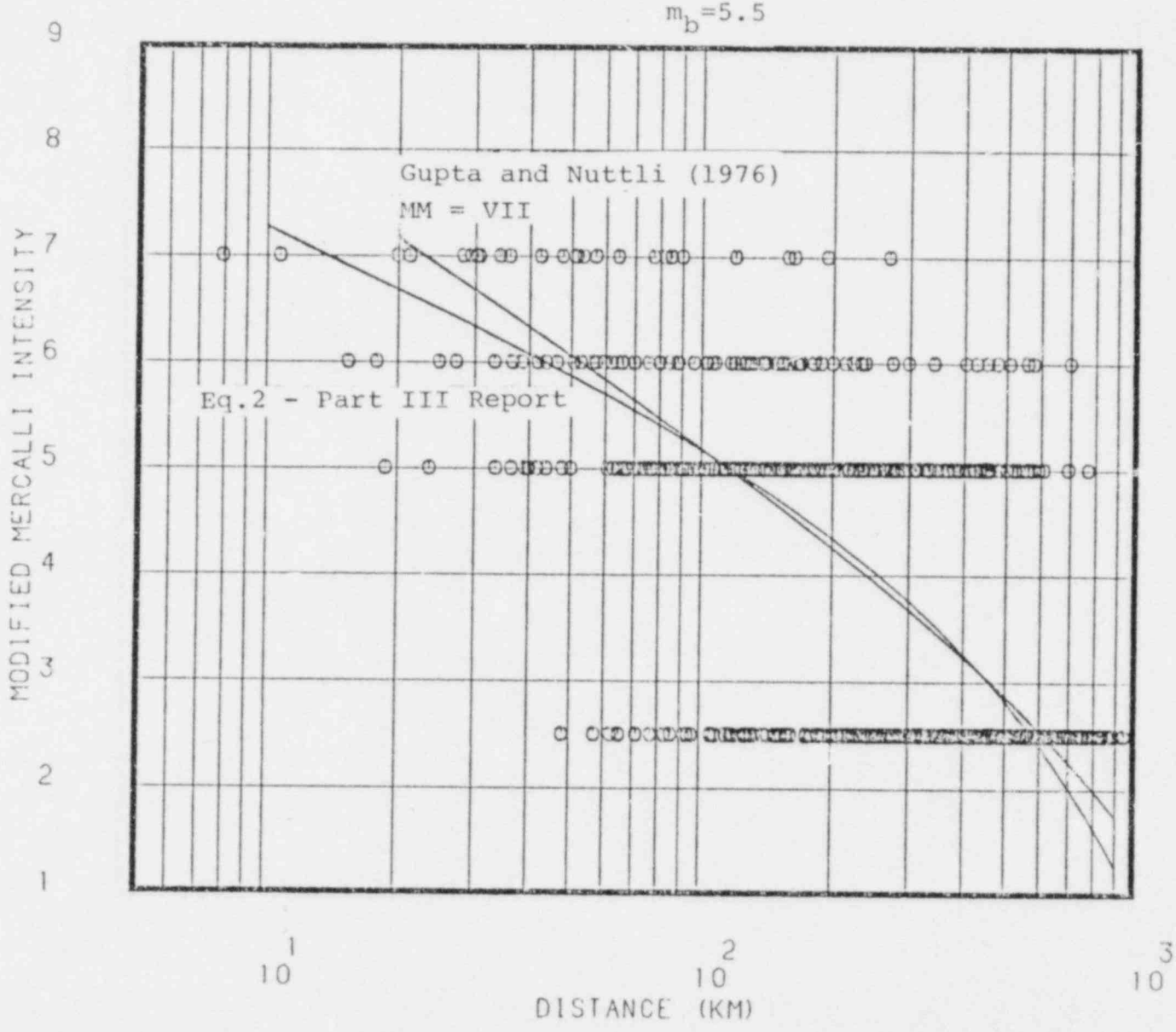

1968 S. Illinois Earthquake
m_b=5.5
Gupta and Nuttli (1976)
MM = VII
Eq.2 - Part III Report
MODIFIED MERCALLI INTENSITY
9
8
7
6
5
4
3
2
1
10^1
10^2
10^3
DISTANCE (KM)
ILLINOIS.DAT
GUPTA7.ATT
MGCSS.ATT

Figure Q4-C1

TABLE Q8-b1

RECURRENCE STATISTICS FOR SOURCE MODEL 1

	Area $X10^3$ km^2	$LogN_c=a-bm_b$ a	b	S.E.E.	Upper Bound	Annual Rates $\geq$ 3.5	$\geq$ U.B. straight line upper bound	.001 Event per 10^5 km^2	(1)=Part III (2)=Best Fit (3)=Best Fit -.92
Michigan Basin	212.	2.44	1.0	-	5.3	.087	.0014		(1)
	100.	2.11	1.0	-				5.11	
	212.	2.02	0.89	.142		.079	.0020		(2)
	100.	1.69	0.89					5.27	
	212.	2.13	0.92	.143		.082	.0018		
	100.	1.80	0.92					5.22	(3)
Arch Structure	242.	3.45	1.0	-	6.0	.891	.0028		(1)
	100.	3.07	1.0	-				6.07	
	242.	3.18	0.95	.174		.724	.0030		(2)
	100.	2.80	0.95					6.11	
	242.	3.05	0.92	.175		.676	.0034		
	100.	2.67	0.92					6.16	(3)
Central Province	1734.	4.42	1.18	-	5.3	1.95	.0147		(1)
	100.	3.18	1.18					5.24	
	1734.	3.38	0.98	.068		.907	.0153		
	100.	2.14	0.98					5.18	(2)
	1734.	3.14	0.92	.077		.822	.0184		
	100.	1.90	0.92					5.33	(3)

TABLE Q8-b2

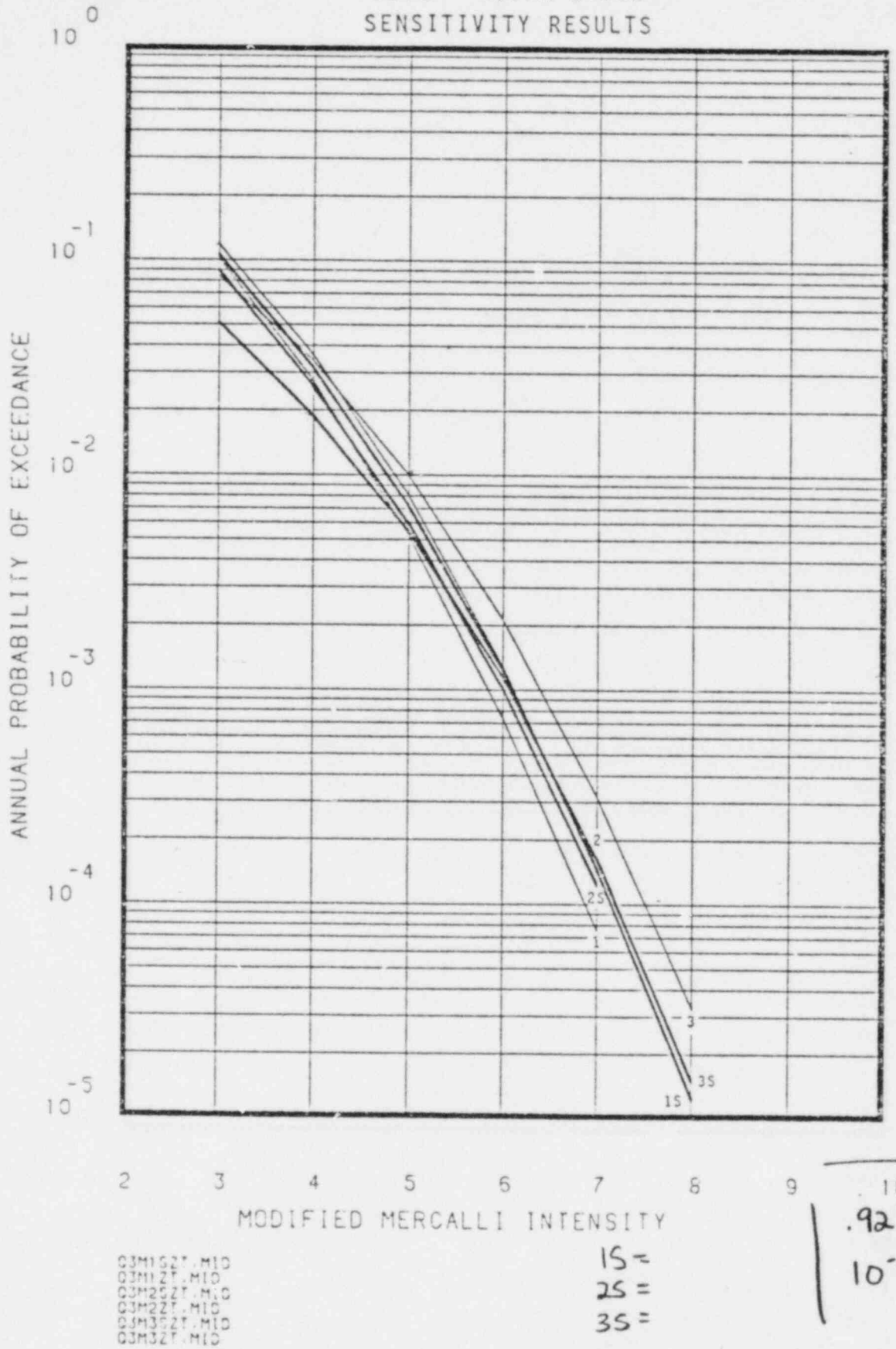
RECURRENCE STATISTICS FOR SOURCE MODEL 2

	Area $X10^3$ km^2	$LogN_c=a-bm_b$ a	b	S.E.E.	Upper Bound	Annual Rates $\geq$ 3.5	$\geq$ U.B.	.001 Event per 10^5 km^2	(1)=Part III (2)=Best Fit (3)=Best Fit -.92
Anna, Ohio	10.6	2.67	0.86	-	6.0	.460	.0032		(1)
		1.76	0.69	.174		.223	.0042	6.9	(2)
		2.80	0.92	.252		.380		6.3	(3)
Attica, New York	5.5	1.73	0.78	-	6.0	.098	.0011		(1)
		2.12	0.88	.143		.113	.00069	5.82	(2)
		2.31	0.92	.146		.122		5.78	(3)
Niagara Peninsula	11.5	2.61	1.0	-	5.3	.131	.002		(1)
		2.75	1.02	.081		.148	.0022		(2)
		2.34	0.92	.096		.131		5.80	(3)
Central Province	1734.	4.42	1.18	-	5.3	1.95	.0147		
	100.	3.18	1.18					5.24	(1)
	1734.	3.64	1.02	.063		1.22	.0171		(2)
	100.	2.40	1.02					5.29	
	1734.	3.23	0.92	.089		1.03	.0226		
	100.	1.99	0.92					5.42	(3)

TABLE Q8-b3

RECURRENCE STATISTICS FOR SOURCE MODEL 3

	Area $X10^3$ km^2	$LogN_c=a-bm_b$ a	b	S.E.E.	Upper Bound	Annual Rates $\geq$ - 3.5	$\geq$ - U.B.	.001 Event per 10^5 km^2	(1)=Part III (2)=Best Fit (3)=Best Fit -.92
Central Province	1762.	4.13	1.05	-	6.0	2.85	.0068		
	100.	2.88	1.05					5.64	(1)
	1762.	4.28	1.13	.238		2.14	.0032		
	100.	3.03	1.13					5.34	(2)
	1762..	3.34	0.92	.289		1.33	.0066		
	100.	2.09	0.92					5.54	(3)



.92b
10^{-3} upper bound

Figure Q3-b1

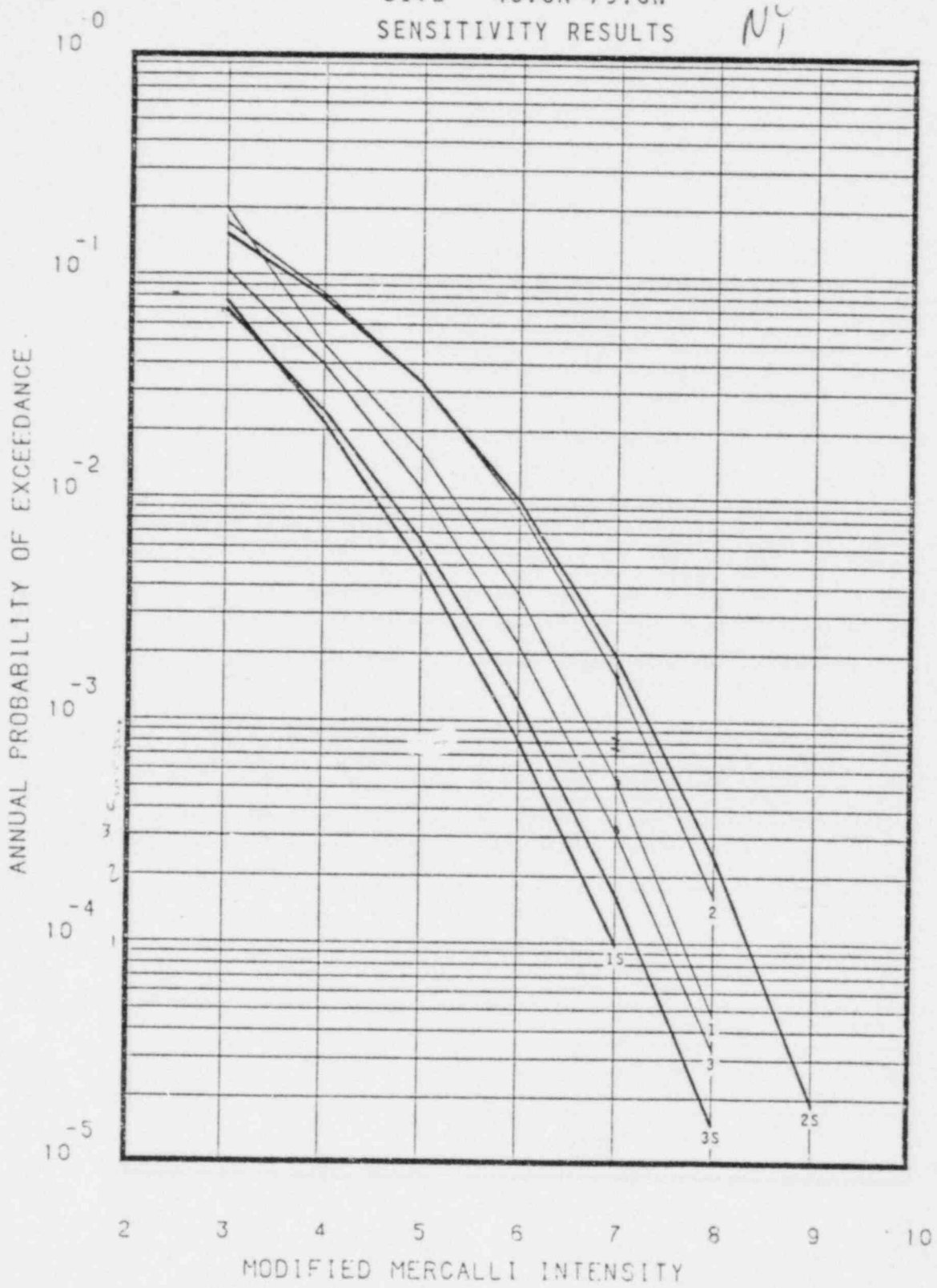
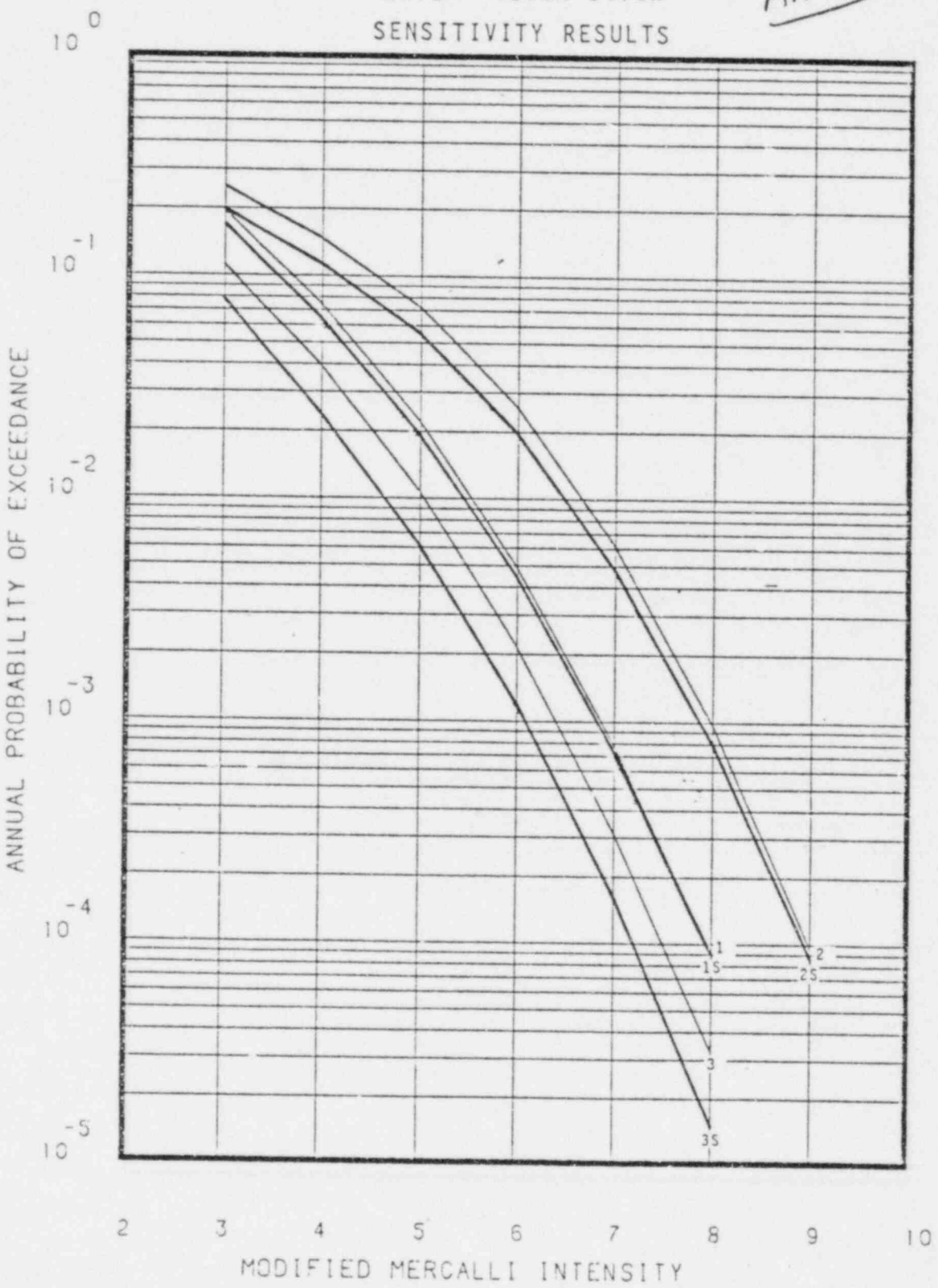

SITE 43.0N 79.0W
SENSITIVITY RESULTS
NY
ANNUAL PROBABILITY OF EXCEEDANCE
10^0
10^-1
10^-2
10^-3
10^-4
10^-5
1S
2
1
3
3S
2S
2 3 4 5 6 7 8 9 10
MODIFIED MERCALLI INTENSITY
Q3M1SZT.BUF
Q3M1SZT.BUF
Q3M1ZT.BUF
Q3M2SZT.BUF
Q3M2ZT.BUF
Q3M3SZT.BUF
Q3M3ZT.BUF

Figure Q8-b2



Anna

Figure Q3-b3