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CRUTCHFIELD,D. Operating Reactors Branch 5

SUBJECT: Forwards results of independent review of draft safety evaluation of SEP Topic II-2.C, "Atmospheric Transport & Diffusion Characteristics for Accident Analysis." Suggested dispersion coefficients provided.

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JOHN E. MAIER
VICE PRESIDENT

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June 30, 1981

Director of Nuclear Reactor Regulation
Attention: Mr. Dennis M. Crutchfield, Chief
Operating Reactors Branch No. 5
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: SEP Topic II-2.C, "Atmospheric Transport and Diffusion Characteristics for Accident Analysis"
R. E. Ginna Nuclear Power Plant
Docket No. 50-244

Dear Mr. Crutchfield:

As indicated in our May 22, 1981 letter to you, enclosed please find the results of our independent review of the draft safety evaluation of SEP Topic II-2.C "Atmospheric Transport and Diffusion Characteristics for Accident Analysis" for the Ginna Nuclear Power Plant site previously transmitted to us on April 9, 1981.

Please note that revised Exclusion Area Boundary distances used in this analysis have been defined in our June 26, 1981 letter to you relative to SEP Topic II-1.A "Exclusion Area Authority and Control". The revised Exclusion Area Boundary is shown in the enclosed Ginna site map.

The values for X/Q dispersion coefficients provided in our assessment are considered appropriate for use in estimating offsite radiological exposures from hypothetical accidents.

Very truly yours,

John E. Maier

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Enclosure

SEP Topic II-2.C

Atmospheric Transport and Diffusion Characteristics for Accident Analysis
June 30, 1981

1. Introduction

This analysis provides an independent review of the NRC Staff's assumptions and results presented in the draft safety evaluation for SEP Topic II-2.C, dated April 9, 1981. The objective is to determine appropriate short-term ground level dispersion coefficients (X/Q) in accordance with more recent NRC meteorological diffusion methodology. Such dispersion coefficients are determined for use in the assessment of offsite exposures from hypothetical accidents at the Ginna Nuclear Power Plant.

2. Methodology

Table 1 summarizes the dispersion analysis performed for the Ginna site using the direction-dependent methodology specified in Regulatory Guide 1.145 (0.5% probability). Also shown in Table 1 are the results of X/Q values calculated using direction-independent methodology (5.0% probability). For each model, separate calculations are presented for the revised Exclusion Area Boundary (EAB) in each of 16 directions, and for a 450-meter circle, corresponding to the former Ginna EAB, to enable comparison with the NRC Staff's draft SEP safety evaluation. Minimum distances assumed in the revised EAB calculations are given in Table 2. See also attached site map, Figure 11.

Additional considerations used in this analysis included:

a. Lateral plume meander (as defined in draft SEP Topic II-2.C assessment);

b. Atmospheric dispersion conditions when the wind is blowing in each specific onshore direction using hourly meteorological data in the WINDOW program (reference a);

c. For calculational purposes, EAB distances offshore were assumed to be 8000m;

d. The release is assumed to be ground level;

e. A building wake factor has been applied (cA = 440 m^2);

f. The assumed distance to the Low Population Zone (LPZ) is 4827 meters;

g. Three years of Ginna meteorological data (1966, 1967 and 1973-74) were used for each of the three sets of distances assumed in this analysis;

h. The averaging time periods for this assessment are: 1 hour, for the EAB; 8, 16, 72 and 624 hours for the LPZ.

3. Results and Discussion

The results of this analysis are plotted on Figures 1-10 and summarized in Table 1. The peak value, 5.8E-4 sec/m^3, occurred in the West sector in 1967, assuming the former 450-meter EAB circle and a 0.5% probability. This compares with the peak value of 2.7 E-4 sec/m^3 which occurred in the same year in the SSW sector, assuming the revised EAB distances and a 0.5% probability. It appears that the peak X/Q value of 1.0 E-3 sec/m^3 given in the SEP draft safety evaluation resulted from the 1967 data at a 450-meter distance, but at a probability level of 0.312%. The assumed 0.312% probability requirement has been revised up to 0.5% in Regulatory Guide 1.145.

The average value of 2.2 E-4 sec/m^3 for the three-year composite data (1966, 1967, and 1973-74) at the revised EAB is in our estimation appropriate for all future licensing purposes.

The values of X/Q for the LPZ distance are also included on Table 1 and are computed at probability levels of 0.5% and 50%. In all cases these are less than the LPZ X/Q values presented in the SEP draft safety evaluation. It is conceivable that the NRC Staff may have also assumed a probability lower than 0.5% in its assessment. In accordance with the results of our assessment and the current requirements of Regulatory Guide 1.145 we would consider the 0.5% probability LPZ values contained in Table 1 appropriate for all future licensing purposes.

In summary, we would consider the following dispersion coefficients appropriate for use in offsite dose assessments from hypothetical accidents:

Time Period	Location	X/Q (sec/m^3)
0-2 hr.	EAB	2.2 E-4
0-8 hr.	LPZ	2.3 E-5
8-24 hr.	LPZ	7.0 E-6
1-4 days	LPZ	2.7 E-6
4-30 days	LPZ	1.1 E-6

4. References

a. Woodard, K. "Accounting for Wind Meander and Site Shape in Probablistic Atmospheric Dispersion Models", Transactions of the American Nuclear Society 1975 Winter Meeting; ANS 22, 365, (1975).

b. Letter from J. E. Maier, RG&E, to D. M. Crutchfield, NRC, dated June 26, 1981. SEP Topic II-1.A, "Exclusion Area Authority and Control."

c. Regulatory Guide 1.145, (For Comment), "Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants", August, 1979.

d. Letter from L. D. White, Jr., RG&E, to A. Schwencer, NRC, dated October 25, 1976. Response to NRC Additional Information Requests, Appendix I, Ginna Meteorological Data.

Table 1

Summary of Accident X/Q Values (s/m^3)
Based on Three Years of Ginna Site Data

Averaging Time Period After Accident (hours)		0.5% Probable Direction-Dependent		5% Probable Direction-Independent		LPZ 0.5% Probable	LPZ 50% Probable
		Revised EAB	450m EAB	Revised EAB	450m EAB		
1	1966	2.2E-4	5.0E-4	1.6E-4	5.0E-4	-	-
	1967	2.7E-4	5.8E-4	2.1E-4	7.1E-4	-	-
	1973-74	1.8E-4	5.0E-4	1.5E-4	4.6E-4	-	-
	3-yr avg	2.2E-4	5.3E-4	1.7E-4	5.6E-4	-	-
8	1973-74	-	-	-	-	2.3E-5	2.7E-6
16	1973-74	-		-	-	7.0E-6	8.5E-7
72	1973-74	-	-	-	-	2.7E-6	6.1E-7
624	1973-74	-	-	-	-	1.1E-6	4.6E-7

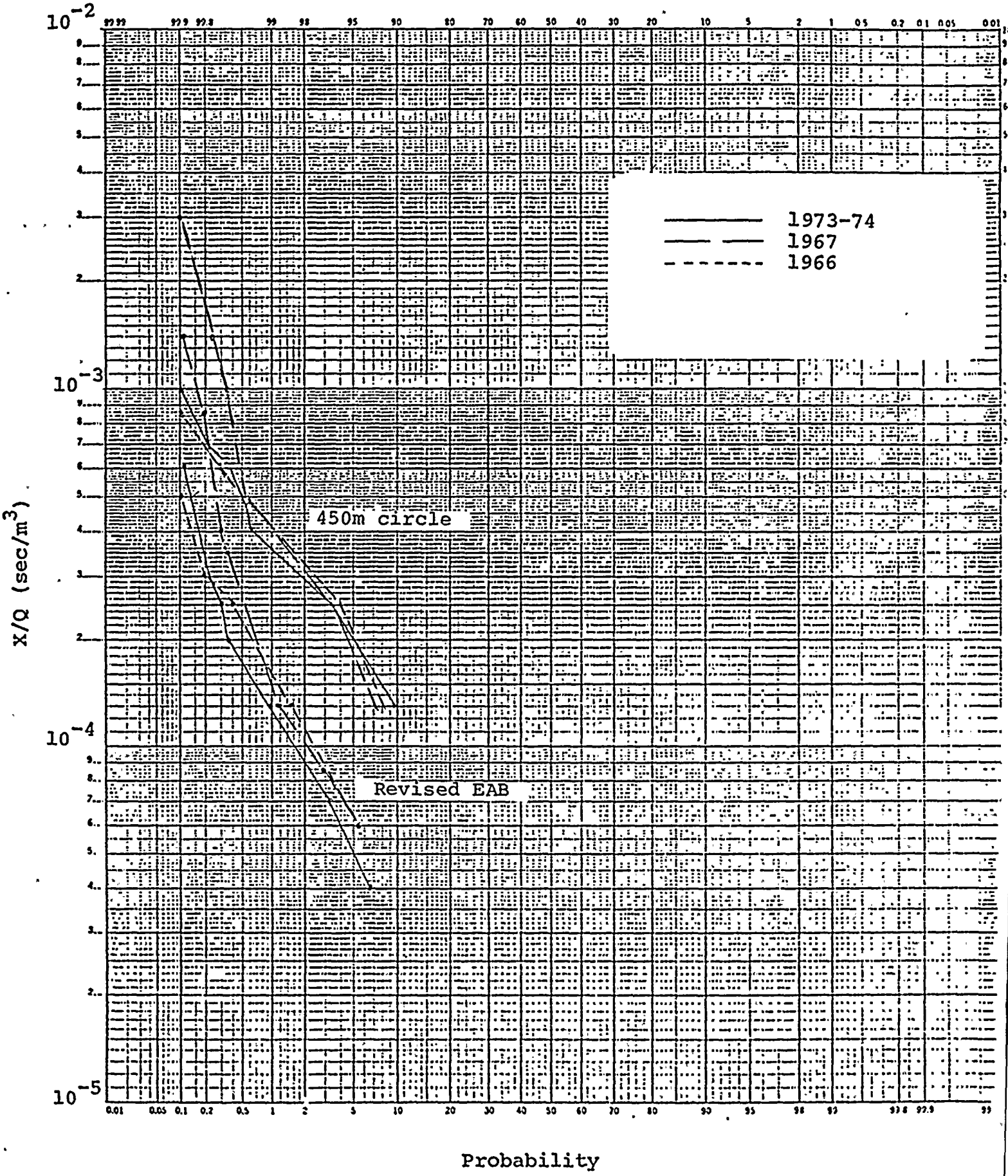
Table 2

Ginna Revised Exclusion Area Boundary Distances

Direction (From Plant Toward)	Distance (m)
N	8000
NNE	8000
NE	8000
ENE	8000
E	747
ESE	640
SE	503
SSE	450
S	450
SSW	450
SW	503
WSW	915
W	945
WNW	701
NW	8000
NNW	8000

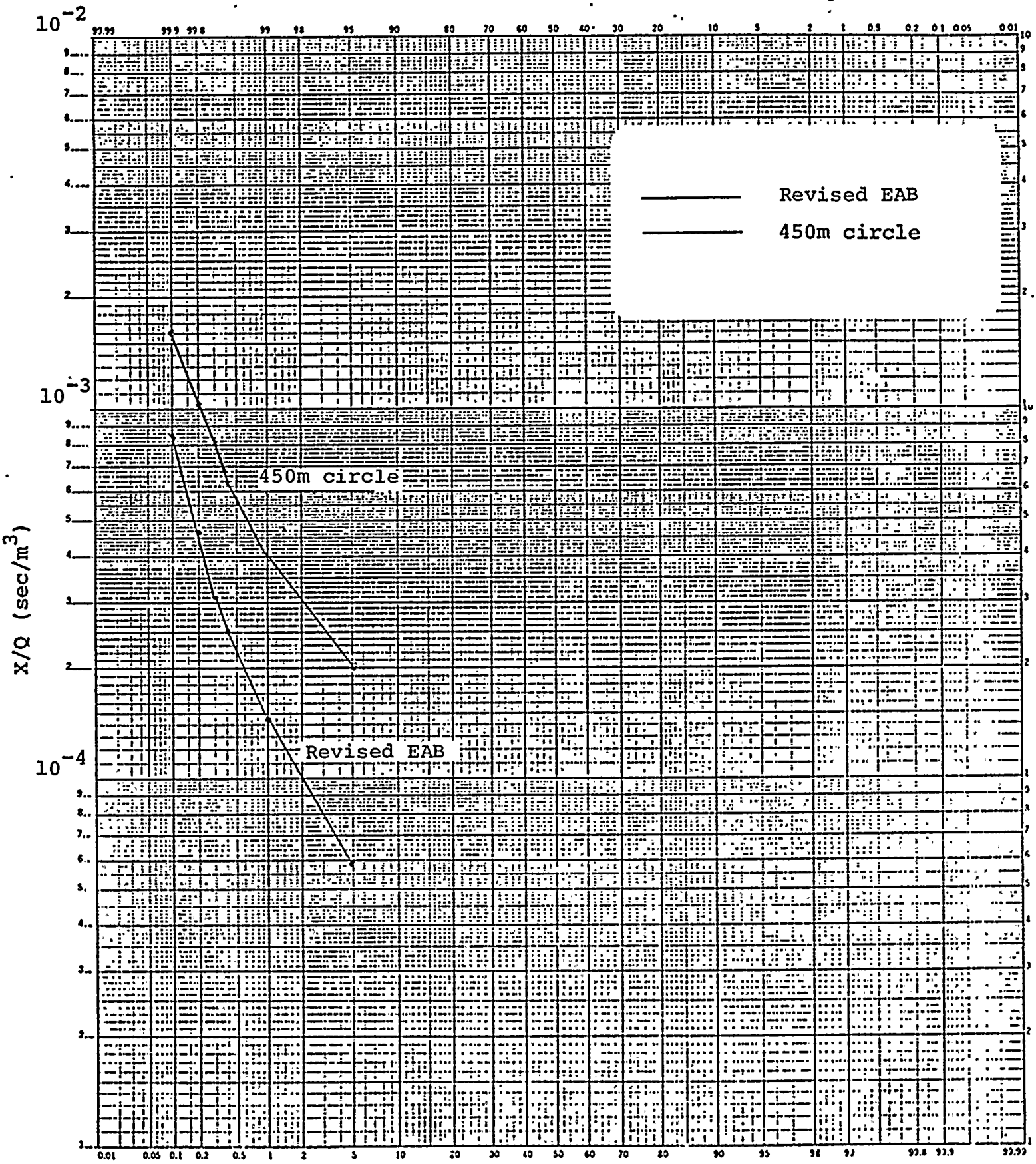
Ginna Direction Dependent - One Hour

Figure 1



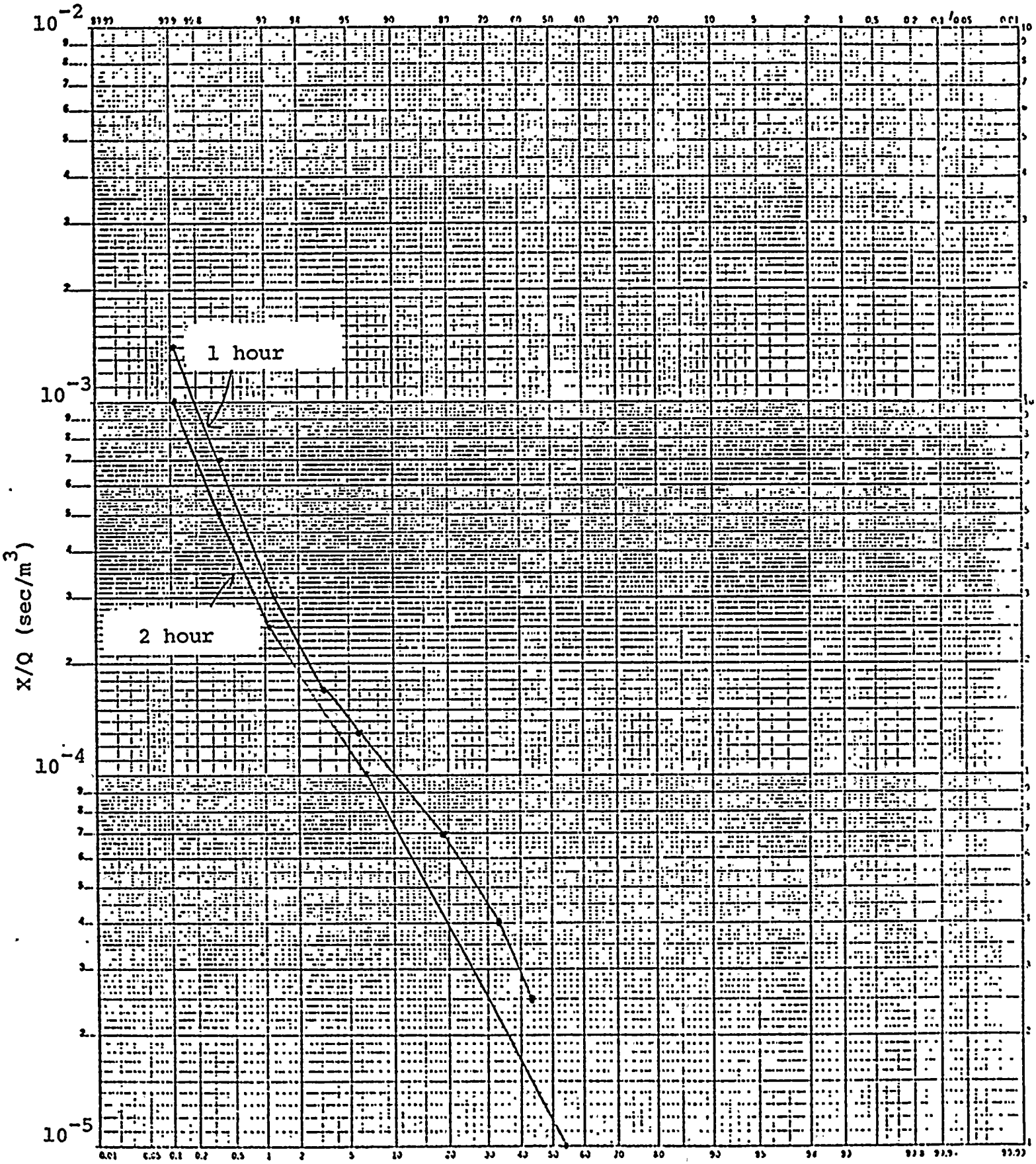
Ginna Direction Dependent
Average of Three Years

Figure 2



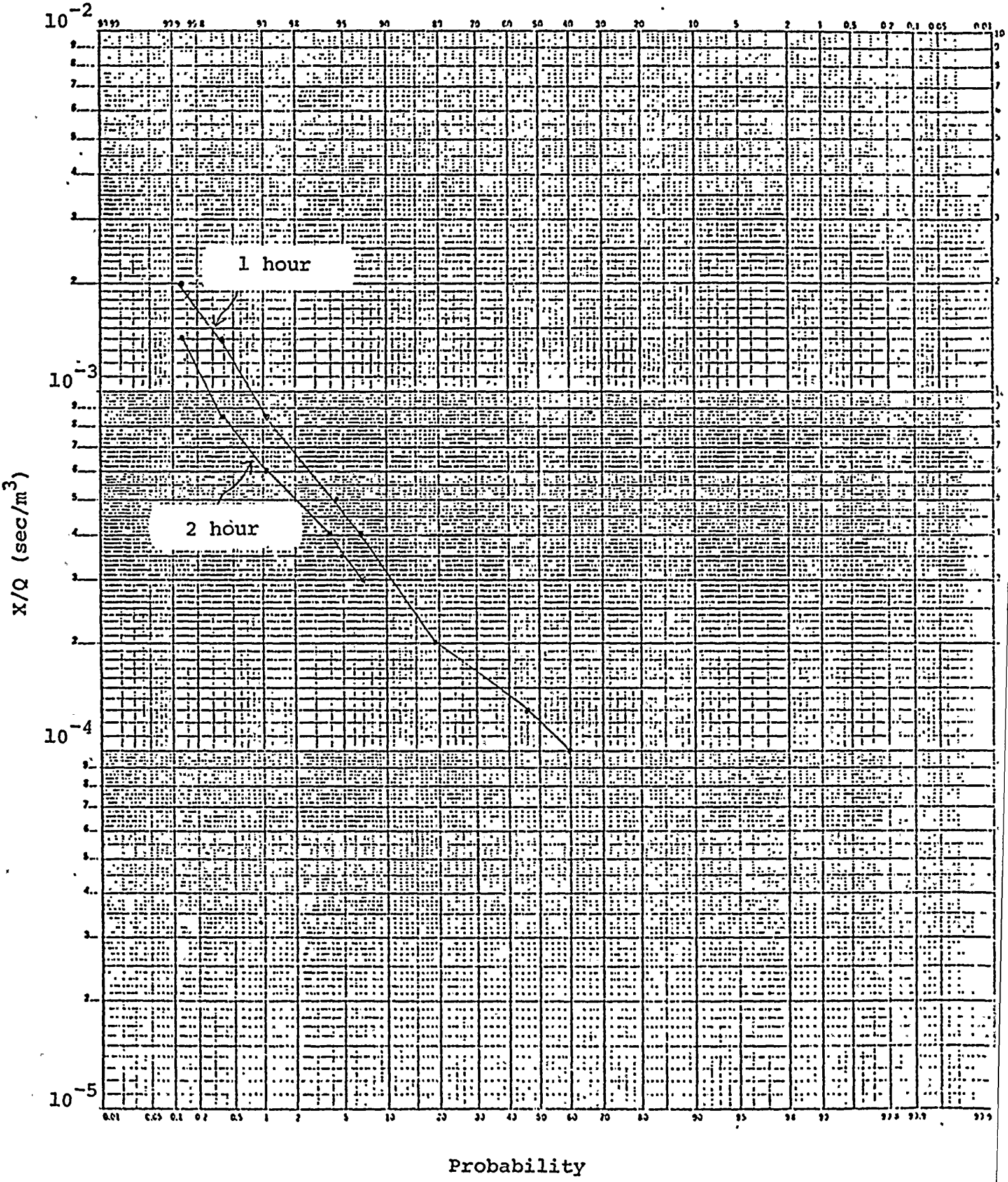
Ginna Ground 1973-74
Revised EAB - Direction Independent

Figure 3



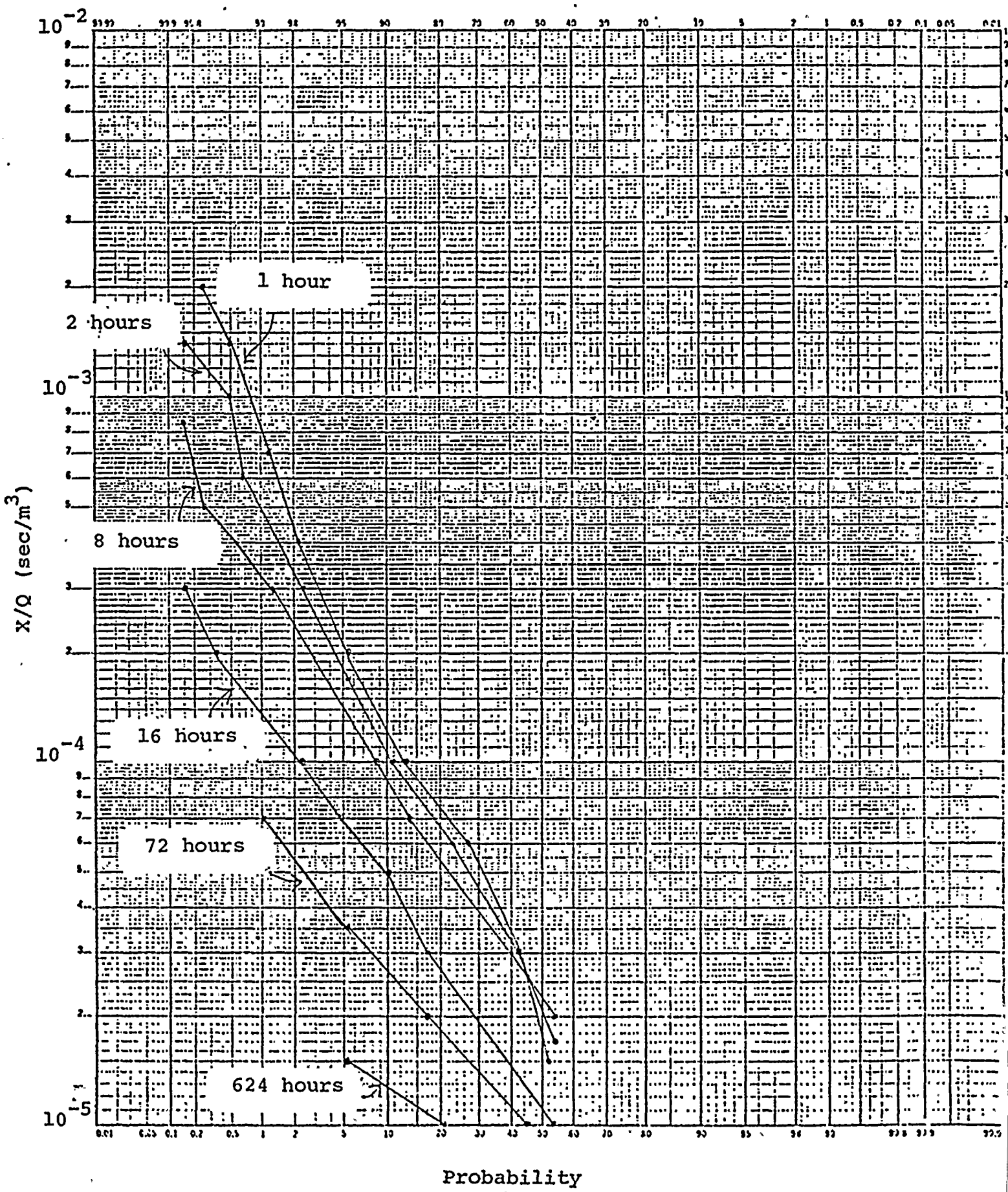
Ginna 1973-74 450m Circle
Direction Independent

Figure 4



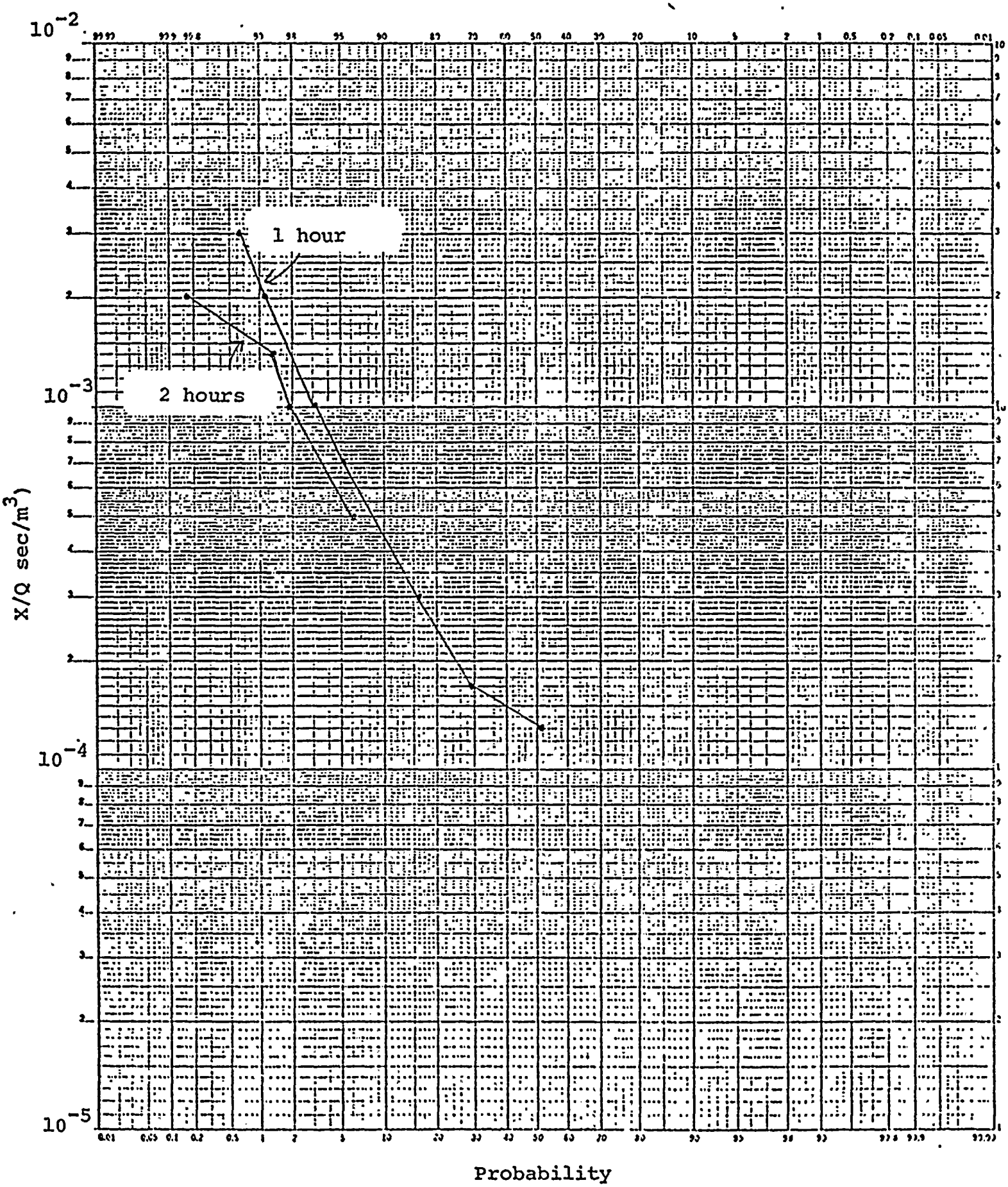
Ginna Ground 1967
Revised EAB - Direction Independent

Figure 5



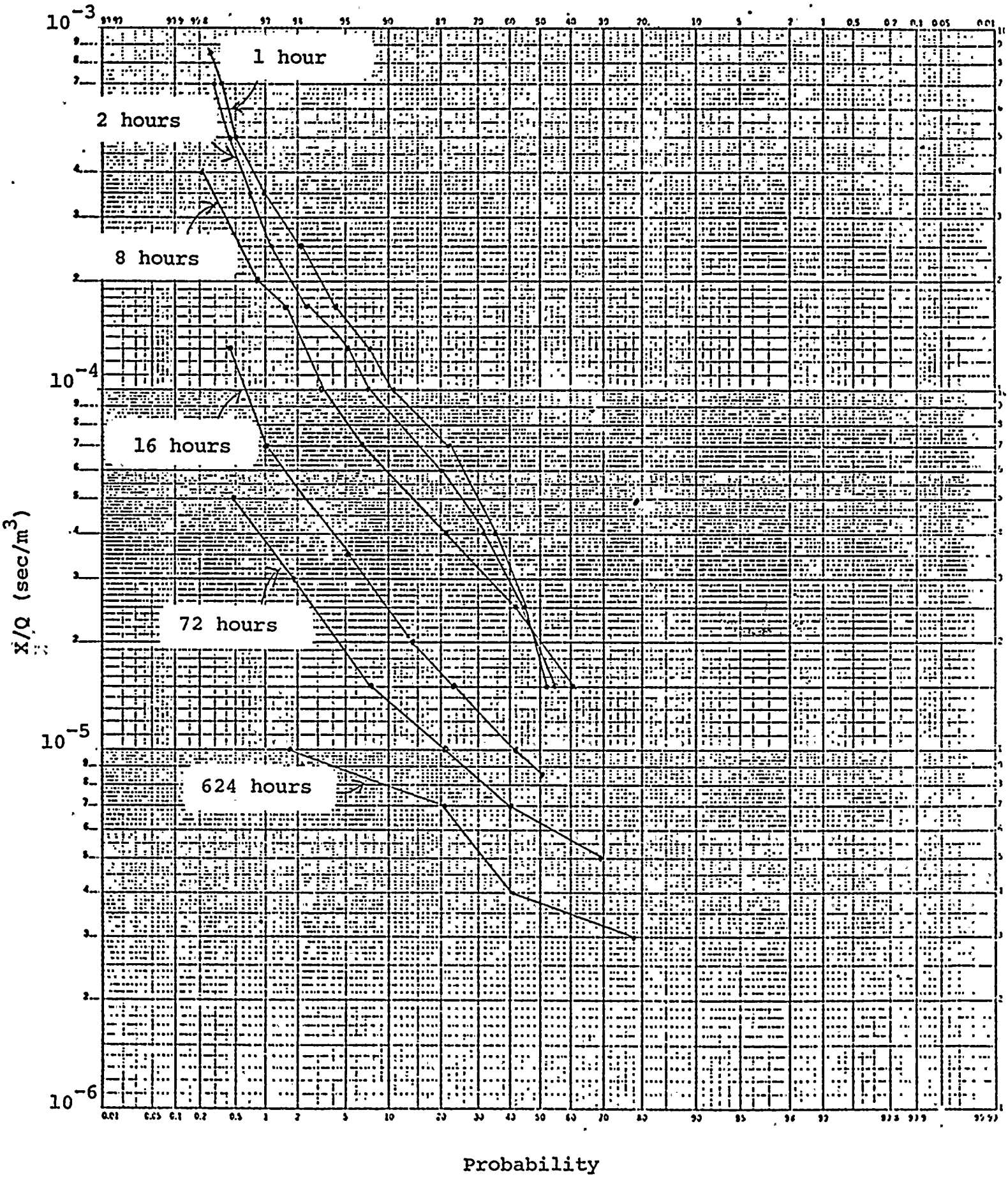
Ohna 1967 450m Circle
Direction Independent

Figure 6



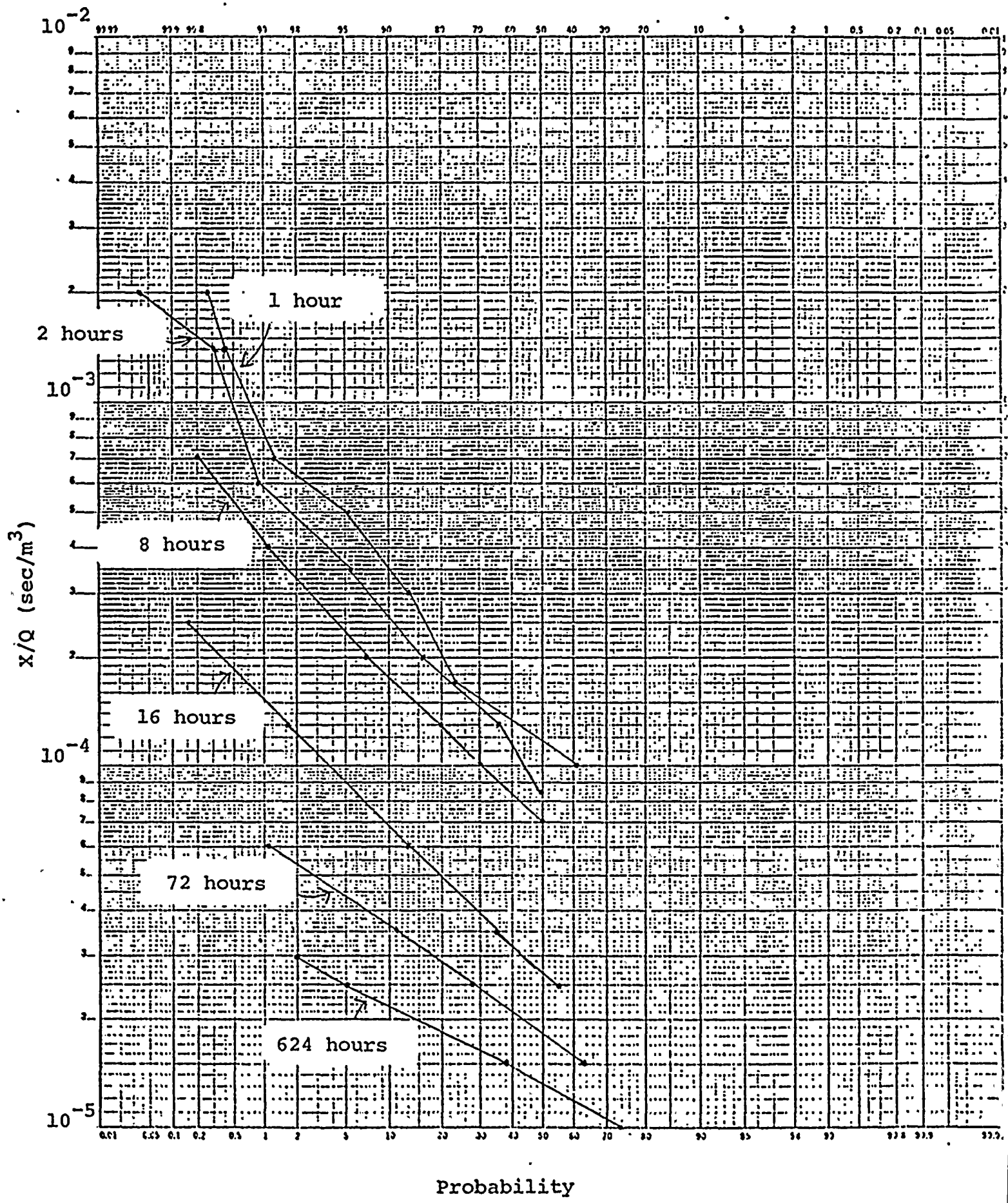
nna Revised EAB 1966
Direction Independent

Figure 7



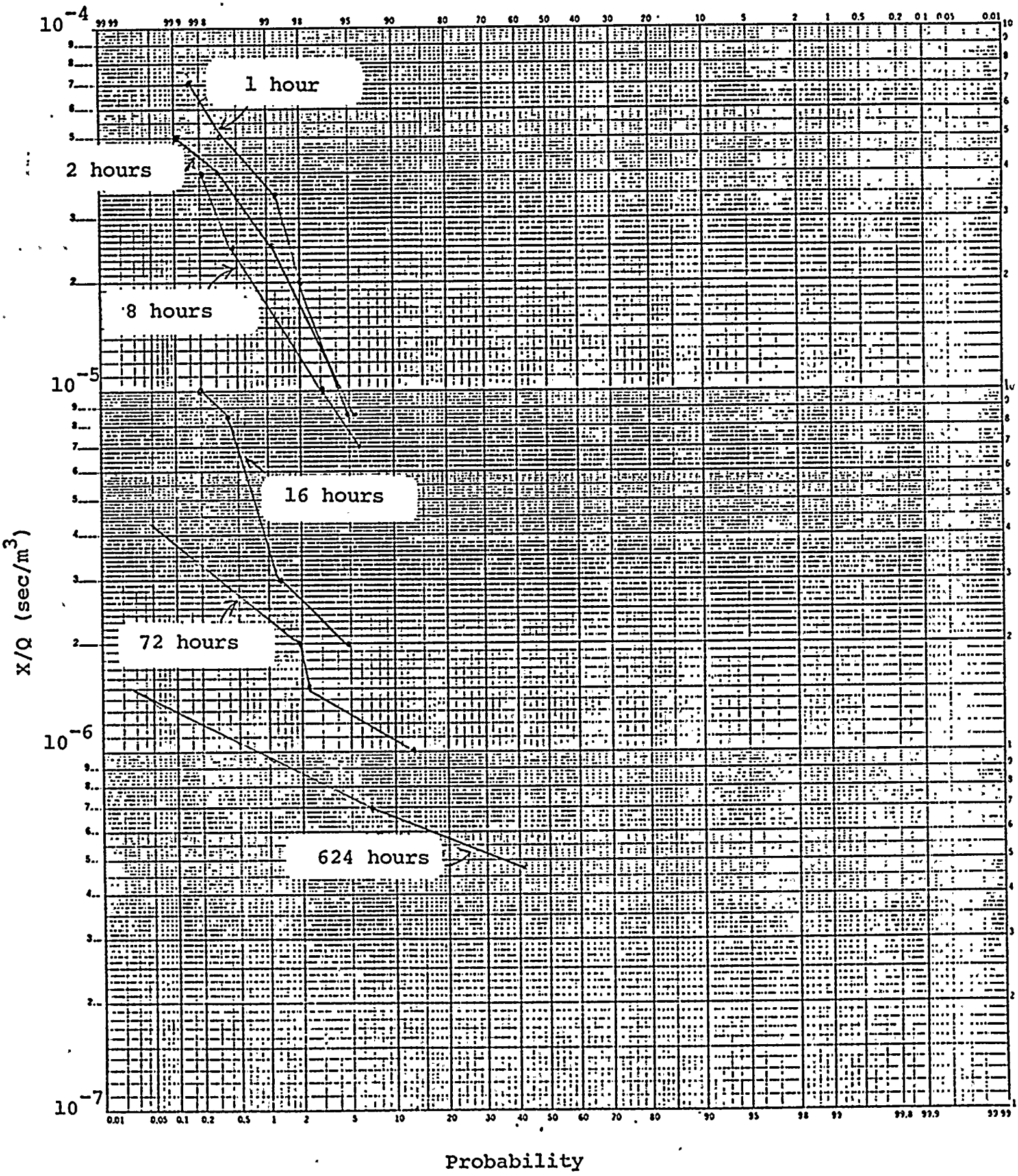
Ginna 450m Circle 1966
Direction Independent

Figure 8



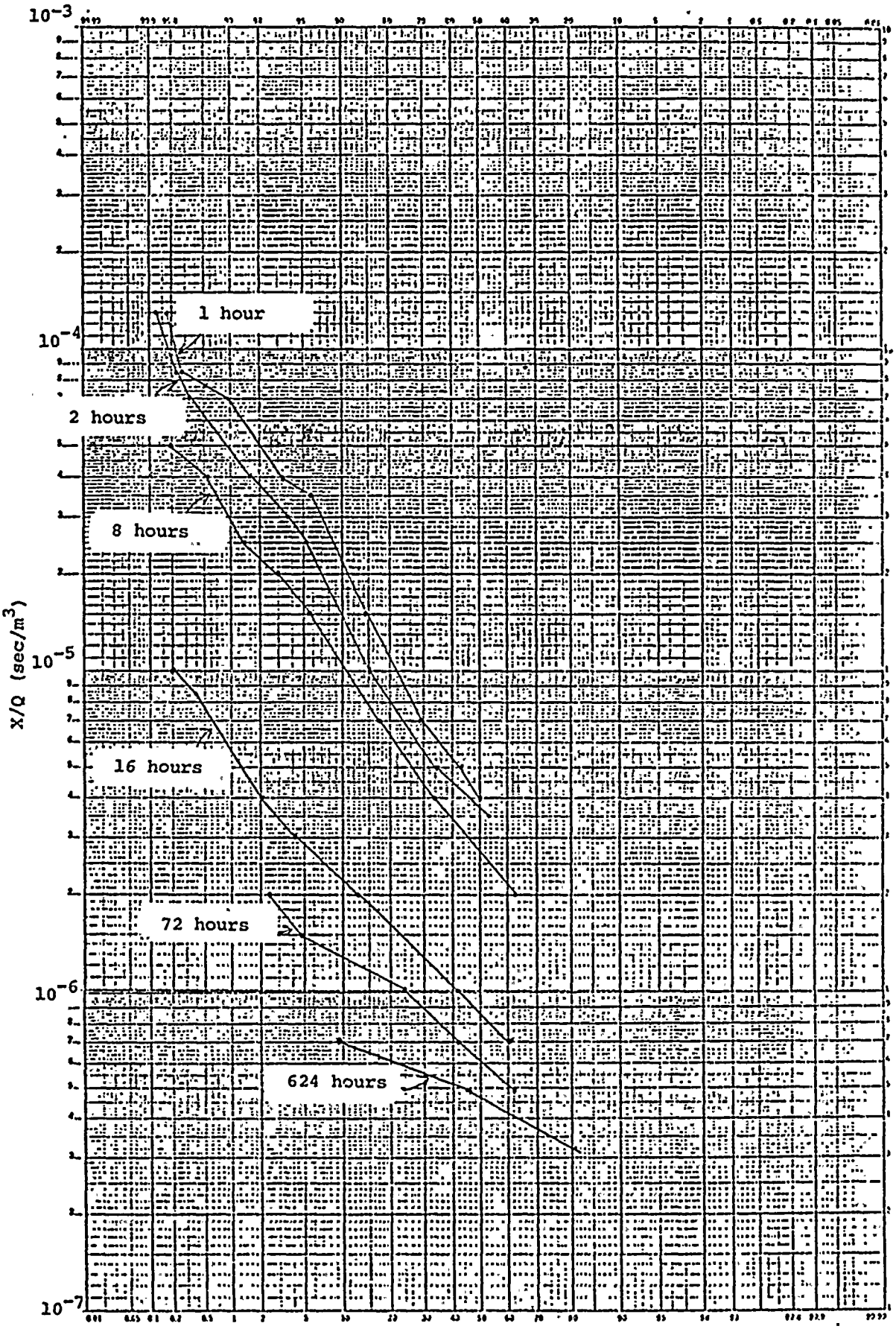
Ginna 1973-74 LPZ
Direction Dependent

Figure 9



Ginna LPZ 1973-74
Direction Independent

Figure 10



Probability

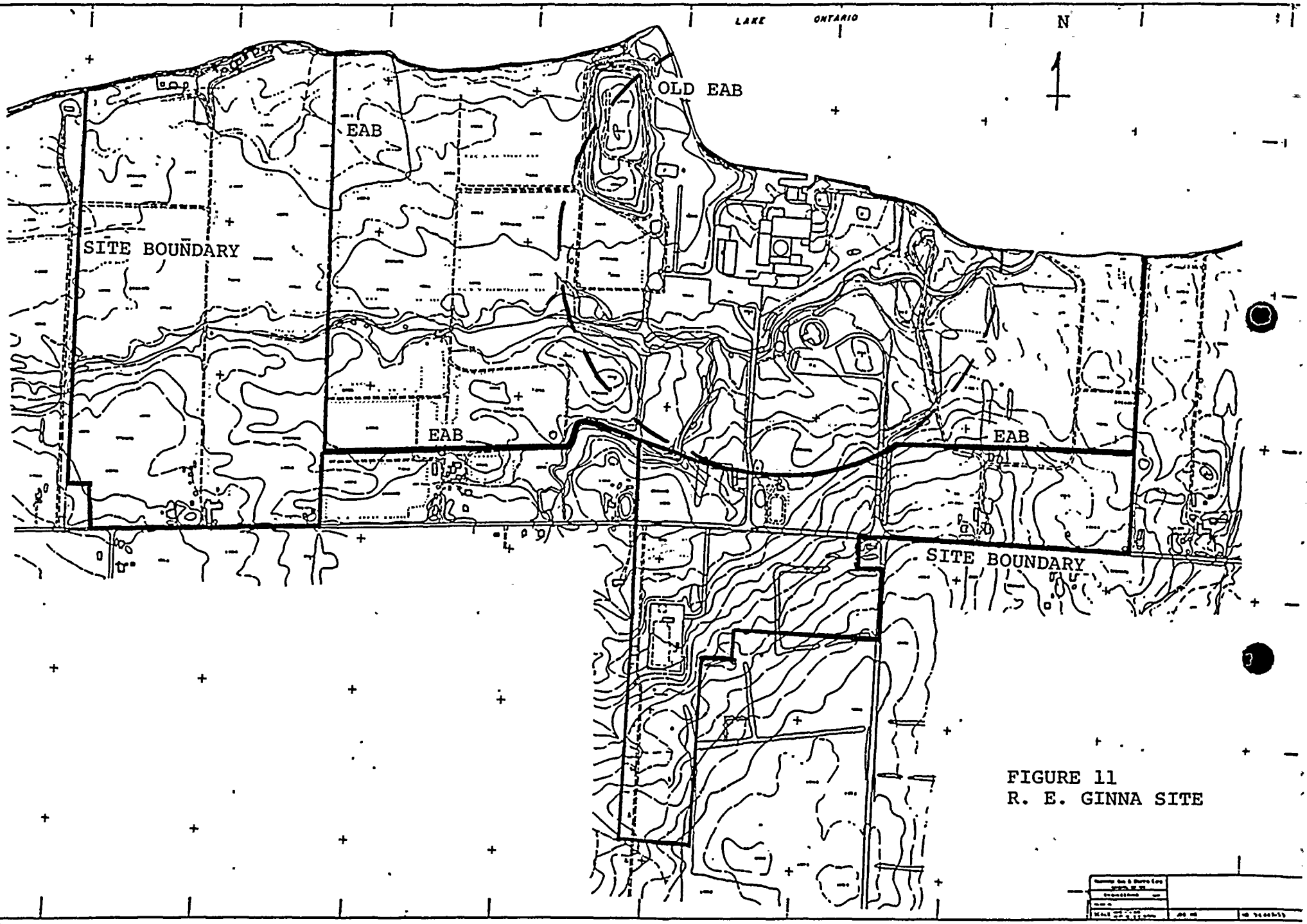


FIGURE 11
R. E. GINNA SITE