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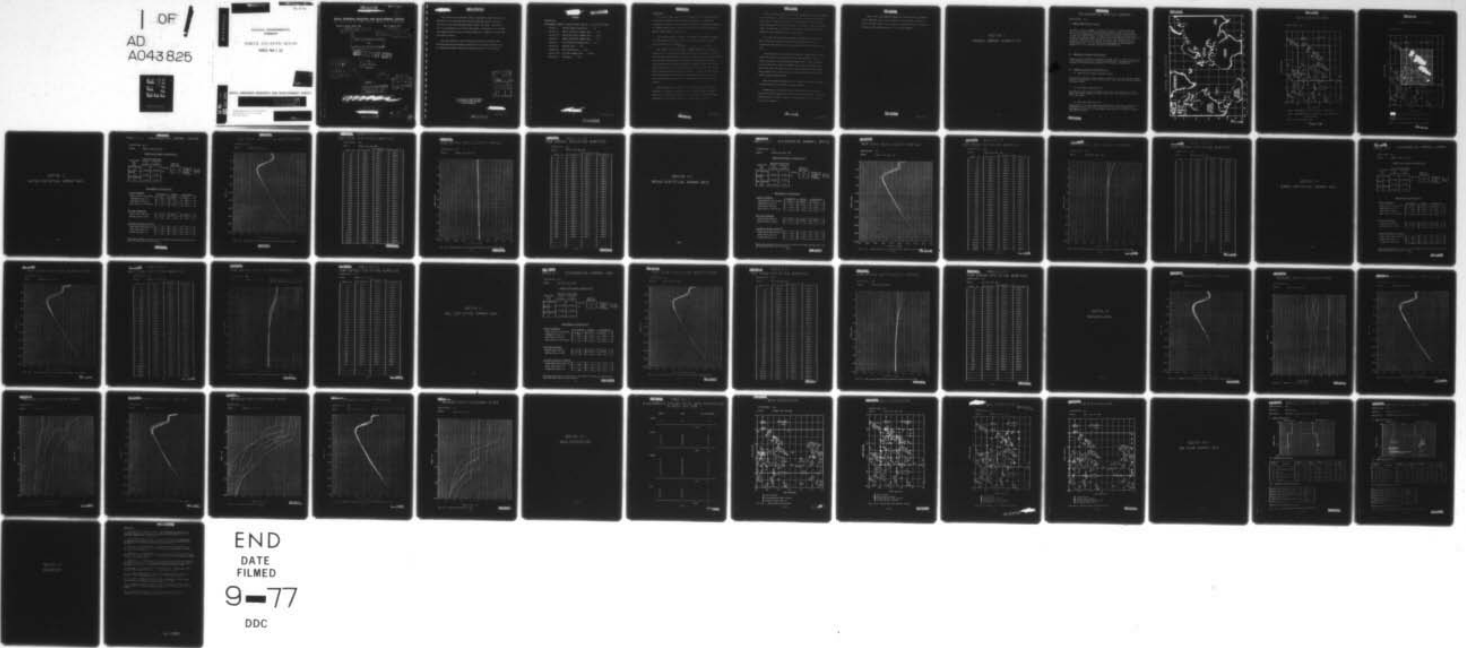
NAVAL UNDERSEA RESEARCH AND DEVELOPMENT CENTER SAN D--ETC F/6 20/1
ACOUSTIC ENVIRONMENTAL SUMMARY FOR NORTH ATLANTIC OCEAN AREA NA--ETC(U)
JUN '69 J J RUSSELL

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An activity of the Naval Material Command

Charles B. Bishop, Captain, USN
Commander

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Technical Director

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9 Technical Note

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ACOUSTIC ENVIRONMENTAL SUMMARY
FOR
NORTH ATLANTIC OCEAN AREA NA-1.4

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This technical note presents summary oceanographic data which has been generated by the Performance Modeling and Operations Analysis Division, Code 556, of the Naval Underseas Warfare Center, San Diego. This note is not to be considered as an official NUWC report. Its purpose is to document environmental studies which are being carried out in support of current Navy ASW acoustic studies.

The work described in this technical note has been supported under NAVSHIPS Exploratory Development subproject SF 11-121-500, Task 8704, and by Independent Research funds under subproject ZR 011 01 01, Task 0401.

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ENVIRONMENTAL SUMMARY OF NORTH ATLANTIC AREA NA-1. 32°-38°N x 56°-62°W

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INTRODUCTION

This report forms a part of a continuing series of reports published by Code 556 to provide acoustic system oriented users a concise but comprehensive analysis of acoustically significant oceanographic parameters. The analysis approach and a detailed description of the methods employed appears in NUC Technical Paper No. 115.

→ This report presents a seasonal oceanographic environmental summary for North Atlantic area NA-1. Figure I.1 shows the region from which data was taken for this analysis.

Northwest of Bermuda -- 33-38 deg N x 56-62 deg W.

→ The contents of this environmental summary represent a statistical cross section of the conditions which can exist in this region. Velocity structure data resulted from an analysis of Nansen cast and bathythermograph data from the Code 556 digital oceanographic data bank, which includes 260,000 Nansen cast stations and 304,000 BT stations. Additional environmental data from Code 556 files, NAVOCEANO publications and from various other sources provided additional information. Special Code 556 computer processing programs, which determine layer depth, gradients, and other profile characteristics, were used in carrying out the velocity profile analysis.

→ Data generated for this report is primarily for use by NUC system analysts in selecting environmental inputs to sonar system performance predictions. They are also available to other Navy activities requiring information of this type in support of system analysis studies.

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Sufficient data exists so that a high confidence level can be assigned to the statistical validity of velocity profile information presented in this report. We may also establish a high confidence level in the sea surface parameters since sufficient data is available. Lack of good data limits our knowledge of scattering coefficients, and we must therefore ascribe a lower confidence level to these values.

Core and other ocean bottom sediment information provided by the Marine Geophysical Survey and other surveys furnished data for a satisfactory description of acoustic properties of the sea floor in the area.

Values appearing in the Statistical Quartile Summary Tables are not always consistent with the layer depth (ZL) and gradient (γ_0 and γ_1) values presented in the Environmental Summary Table. This is expected since the Statistical Quartile Summary Table values result from using all station data sets available, while values appearing in the Environmental Summary Table utilize only those station data sets which display surface channel characteristics.

These environmental summaries will be updated at periodic intervals as additional data or information becomes available.

Depending upon the application, the acoustician utilizing these statistical profiles may desire to make a slight modification of the near surface profile in order to exhibit the sound channel which he desires to use in his analysis.

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Users of this environmental summary must realize that all parameter values appearing in this report represent a cross section of possible values one might expect to occur based on a complete review of available historical data and consideration of local area dynamics.

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SECTION I
GENERAL SUMMARY DESCRIPTION

I.1

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ENVIRONMENTAL PROFILE SUMMARY

LOCATION/AREA: NA-1

I. GENERAL DESCRIPTION OF REGION:

Area NA-1, located northeast of Bermuda, is south of the Gulf Stream and out of the influence of this strong current system. Sound velocity data derived from oceanographic station data display relatively uniform profiles in winter and summer seasons. Spring and fall are transition seasons and display the pronounced effect of surface cooling and warming in the variability of surface temperature (SST) and velocity (CS), layer depth (ZL) and the probability of surface sound channel occurrence. Bottom depths generally exceed 16,000 feet. The two significant physiographic provinces are the Bermuda Rise to the southwest and the Sohm Abyssal Plain.

II. TECHNIQUE OF ANALYSIS AND DATA BASE:

Adequate data is available for spring and summer seasons. Winter data includes only 6 observations and fall includes 14 observations. Supplementary BT data confirms the analysis values presented in the seasons of sparse data.

III. SUMMARY OCEANOGRAPHIC CHARACTERISTICS:

A. SOUND VELOCITY PROFILE CHARACTERISTICS:

Sound velocity profiles reflect seasonal changes with well defined deep surface channels occurring most of the time in winter. Much shallower channels dominate the summer season.

B. SEA SURFACE CHARACTERISTICS:

Sea surface characteristics adequately define the four seasons of the area. Annual sea surface temperature range is 62°F-80°F. Low variability occurs in winter and summer.

C. SEA FLOOR CHARACTERISTICS:

Bottom depth in the area is generally greater than 16,000 feet rising in the southwest section of the area to about 15,000 feet over the Bermuda Rise physiographic province. The Sohm Abyssal Plain province occupies the deepest portions of the area.

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GENERAL AREA LOCATION

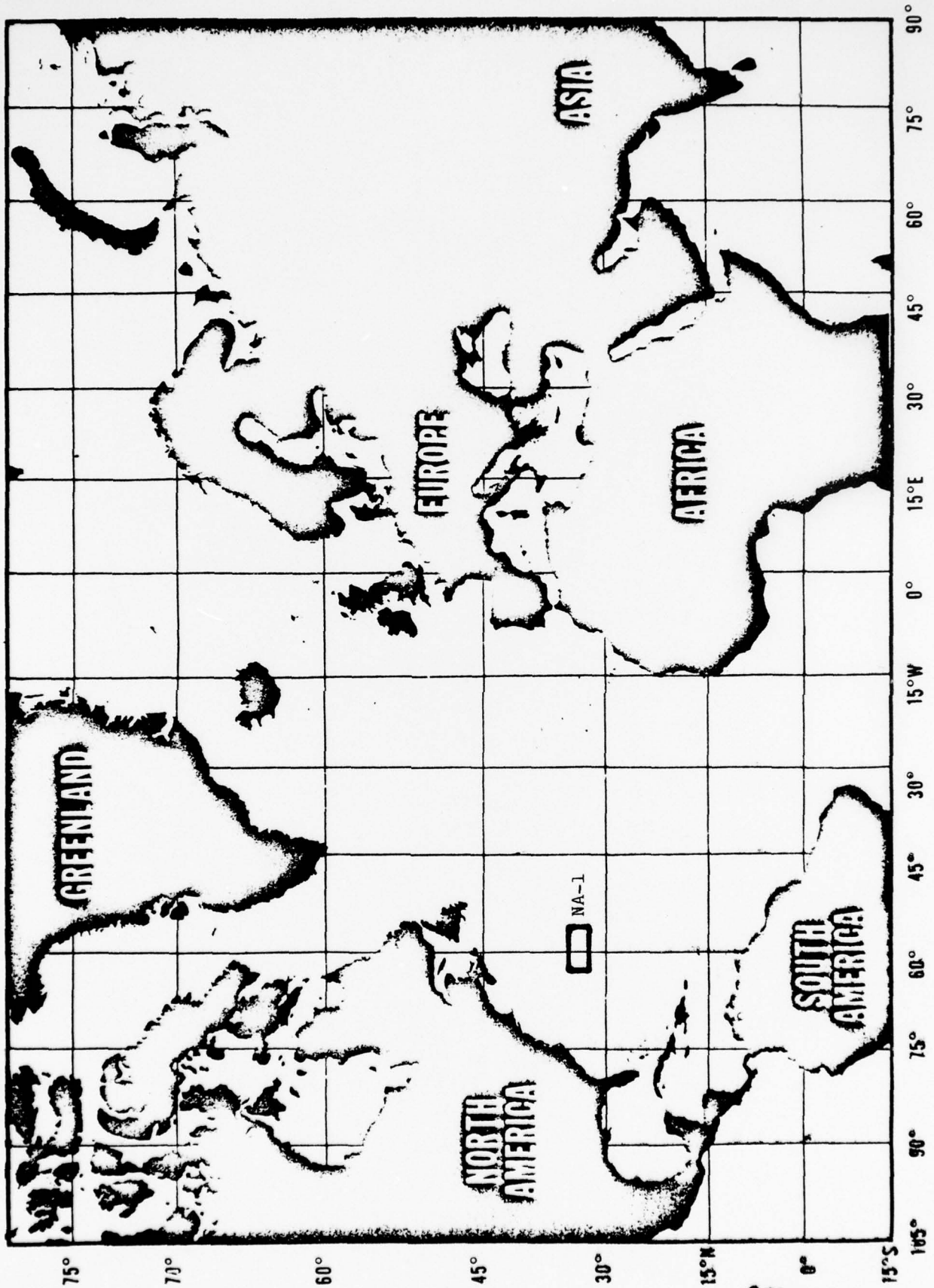


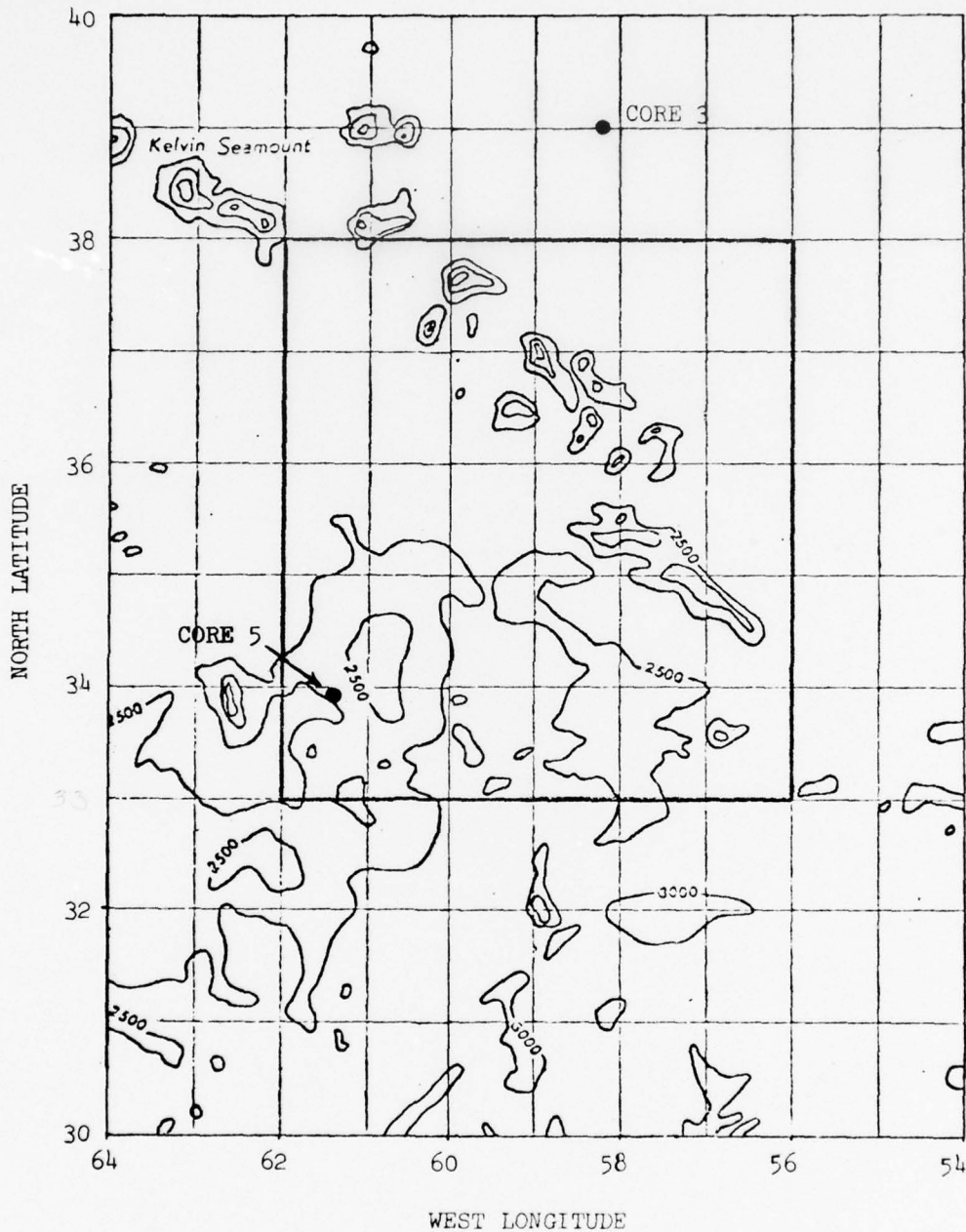
Figure I-1. Location map for area NA-1.

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DATA ANALYSIS AREA

LOCATION/AREA: NA-1



CORE 3 - NAVOCEANO SP 96-1-5, MGS Area 1, Bermuda Rise

CORE 5 - NAVOCEANO SP 96-1-5, MGS Area 1, Sohm Abyssal Rise

CORE LOCATIONS

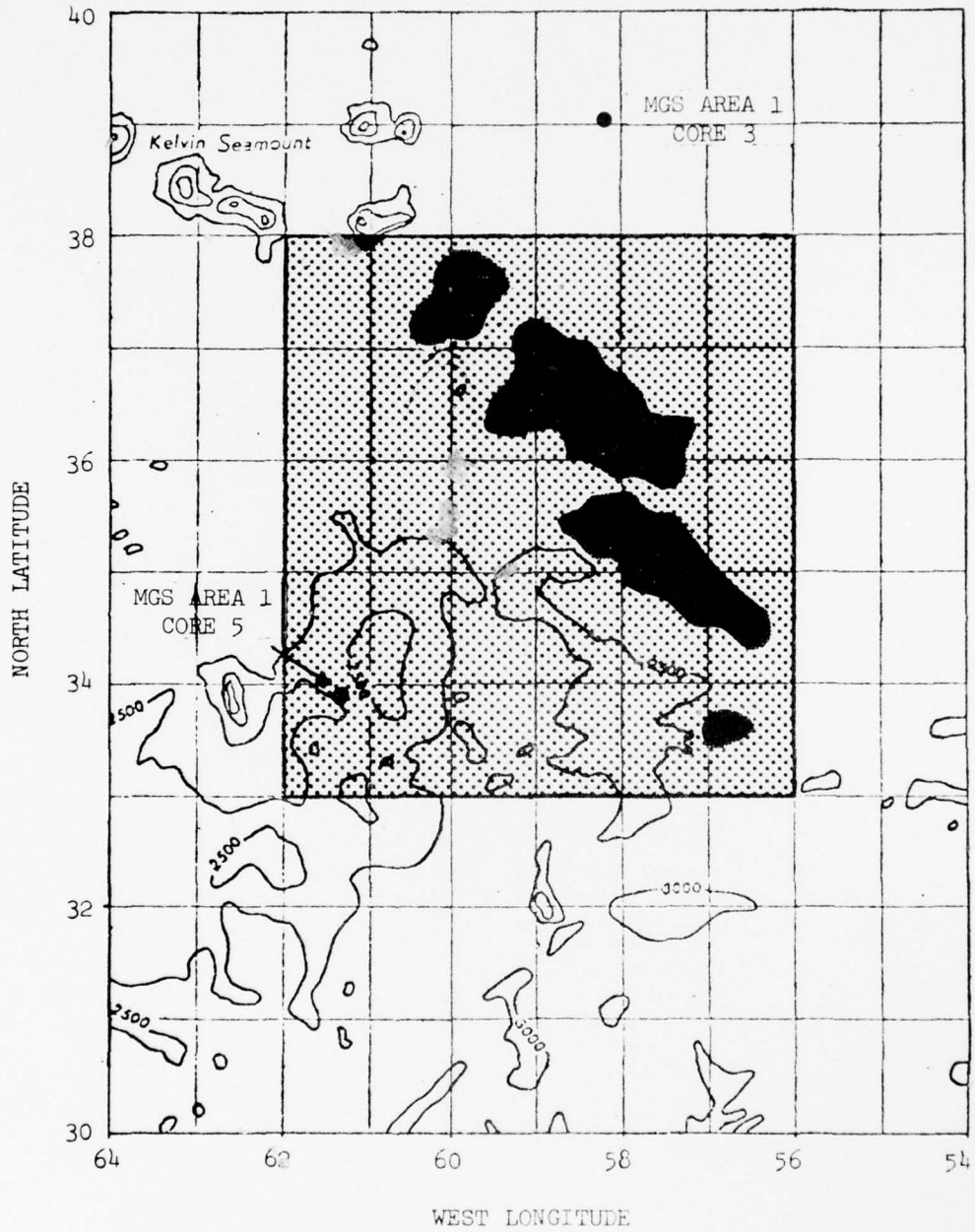
FIG. I.2 Data Analysis Area

I.4 **CONFIDENTIAL**

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DATA ANALYSIS AREA

LOCATION/AREA: NA-1





-  Indicates bottom slope greater than 6°.
-  Indicates bottom slope less than 6°.

FIG. I.3. General Bottom Relief and Roughness

SECTION II
WINTER STATISTICAL SUMMARY DATA

II.1

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TABLE II.1 ENVIRONMENTAL SUMMARY, WINTER

LOCATION/AREA: NA-1

SEASON: WINTER (JAN, FEB, MAR)

SURFACE SOUND CHANNEL CHARACTERISTICS

LAYER DEPTH (ZL) (FT)	ASSOCIATED GRADIENTS*		STATION	AMOUNT OF DATA USED	PROBABILITY OF SURFACE CHANNEL OCCURRENCE
	IN-LAYER (γ_0) (FT/SEC/FT)	BELOW-LAYER (γ_1) (FT/SEC/FT)			
1ST QUARTILE 1126	+0.0160	-0.0226	BT	6	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> >90% </div>
MEDIAN 1358	+0.0160	-0.0385		200	
3RD QUARTILE 1676	+0.0075	-0.0577			

ENVIRONMENTAL CHARACTERISTICS

SURFACE PARAMETERS

	1ST QUARTILE	MEDIAN	3RD QUARTILE
SOUND VELOCITY (CS)(FT/SEC)	4979.1	4982.4	4985.4
TEMPERATURE (SST)(°F)	64.1	64.7	65.3
WAVE HEIGHT (LWA)(FT)	3.0	5.6	10.6
WIND VELOCITY (VWI)(KNOTS)	17.0	22.0	27.0

SEA FLOOR PARAMETERS

BOTTOM DEPTH (ZBM)(FT)	15,500	16,250	16,800
BOTTOM POROSITY (PORB)	.55	.70	.75

SCATTERING STRENGTH PARAMETERS

OCEAN BOTTOM (MUB)(dB/SQ YD)	-20	-17	-14
LAYER (MUVL)(dB/CU YD)	-85	-79	-73
VOLUME (MUV)(dB/CU YL)	-85	-80	-75

*Associated gradients are medians for that 50% of the data centered about the specified layer depth quartile values.

II.2

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DEEP OCEAN STATISTICAL QUARTILE PLOT

LOCATION/AREA: NA-1

SEASON: WINTER (JAN, FEB, MAR)

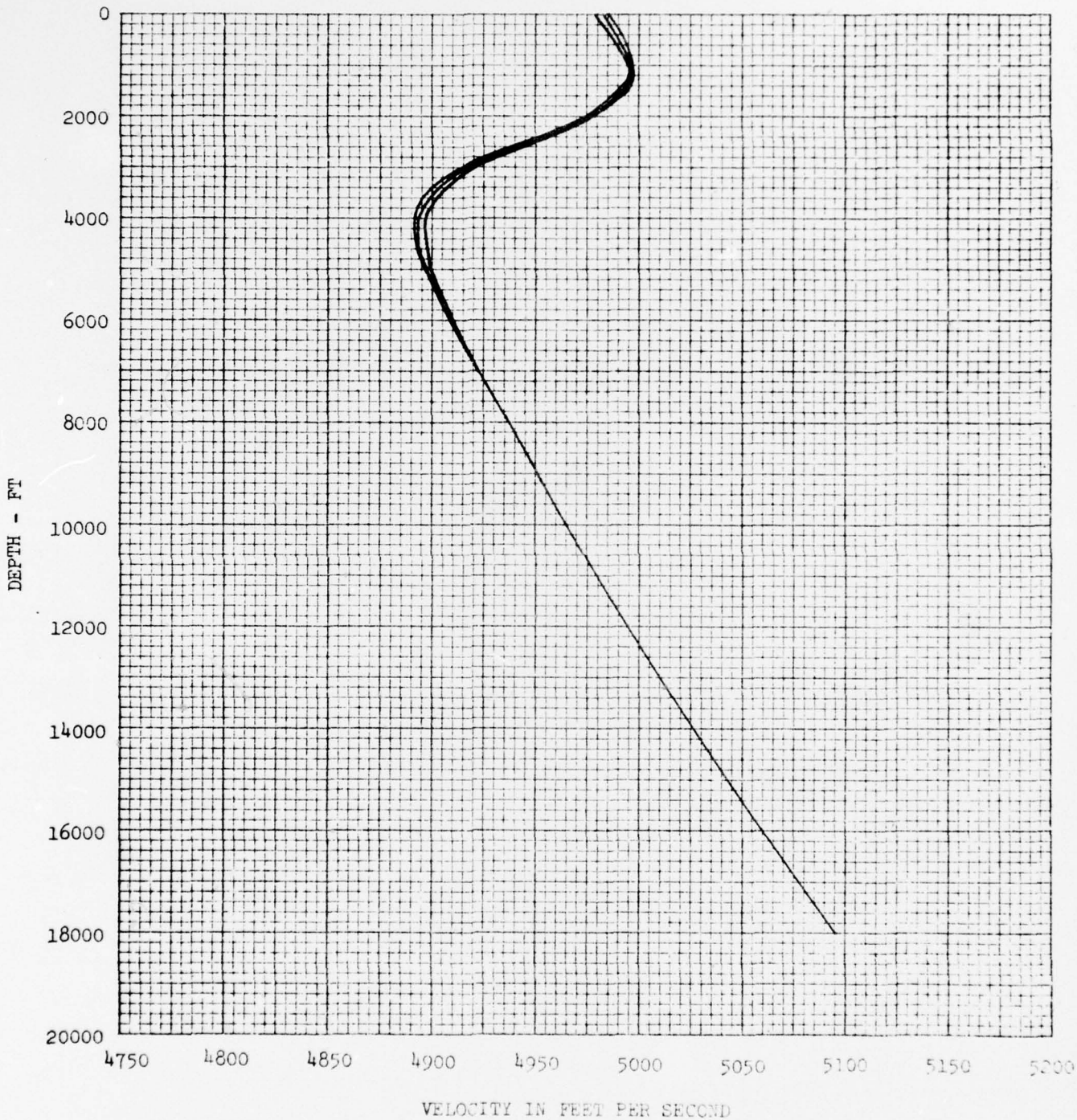


FIG. II.1. Deep Ocean Sound Velocity Statistical Quartile Plot, Winter

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CONFIDENTIAL TABLE II.11
DEEP OCEAN STATISTICAL QUANTILES

LOCATION/AREA: NA-1

SEASON: WINTER (JAN, FEB, MAR)

DEPTH - FT	SOUND VELOCITY - FPS		
	1ST QUANTILE	MEDIAN	3RD QUANTILE
0	4979.1	4982.4	4985.4
200	4982.7	4985.5	4988.6
400	4986.1	4988.4	4991.2
600	4989.3	4991.0	4993.7
800	4992.4	4993.7	4995.3
1000	4994.7	4996.1	4996.8
1200	4995.8	4996.8	4997.3
1400	4991.8	4994.5	4997.0
1600	4987.0	4989.7	4991.2
1800	4981.6	4983.8	4985.1
2000	4975.0	4976.9	4978.6
2200	4962.6	4966.2	4968.2
2400	4950.3	4954.1	4956.6
2600	4938.1	4940.5	4944.2
2800	4926.0	4927.6	4931.5
3000	4914.9	4916.3	4919.9
3200	4906.9	4909.6	4912.1
3400	4900.8	4904.0	4906.4
3600	4895.9	4899.3	4902.2
3800	4893.5	4896.0	4898.6
4000	4891.9	4893.8	4896.4
4200	4891.6	4893.9	4896.8
4400	4892.4	4894.0	4897.3
4600	4893.6	4894.1	4897.8
5000	4896.8	4897.4	4900.1
5400	4901.1	4901.5	4903.9
6000	4908.1	4908.4	4909.9
7000	4921.7	4922.4	4922.4
8000	4936.6	4937.1	4937.2
9000	4950.8	4950.8	4950.8
10,000	4965.4	4965.4	4965.4
12,000	4994.3	4994.3	4994.3
14,000	5026.2	5026.2	5026.2
16,000	5060.0	5060.0	5060.0
18,000	5095.5	5095.5	5095.5

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NEAR SURFACE SOUND VELOCITY PROFILE

LOCATION/AREA: NA-1

SEASON: WINTER (JAN, FEB, MAR)

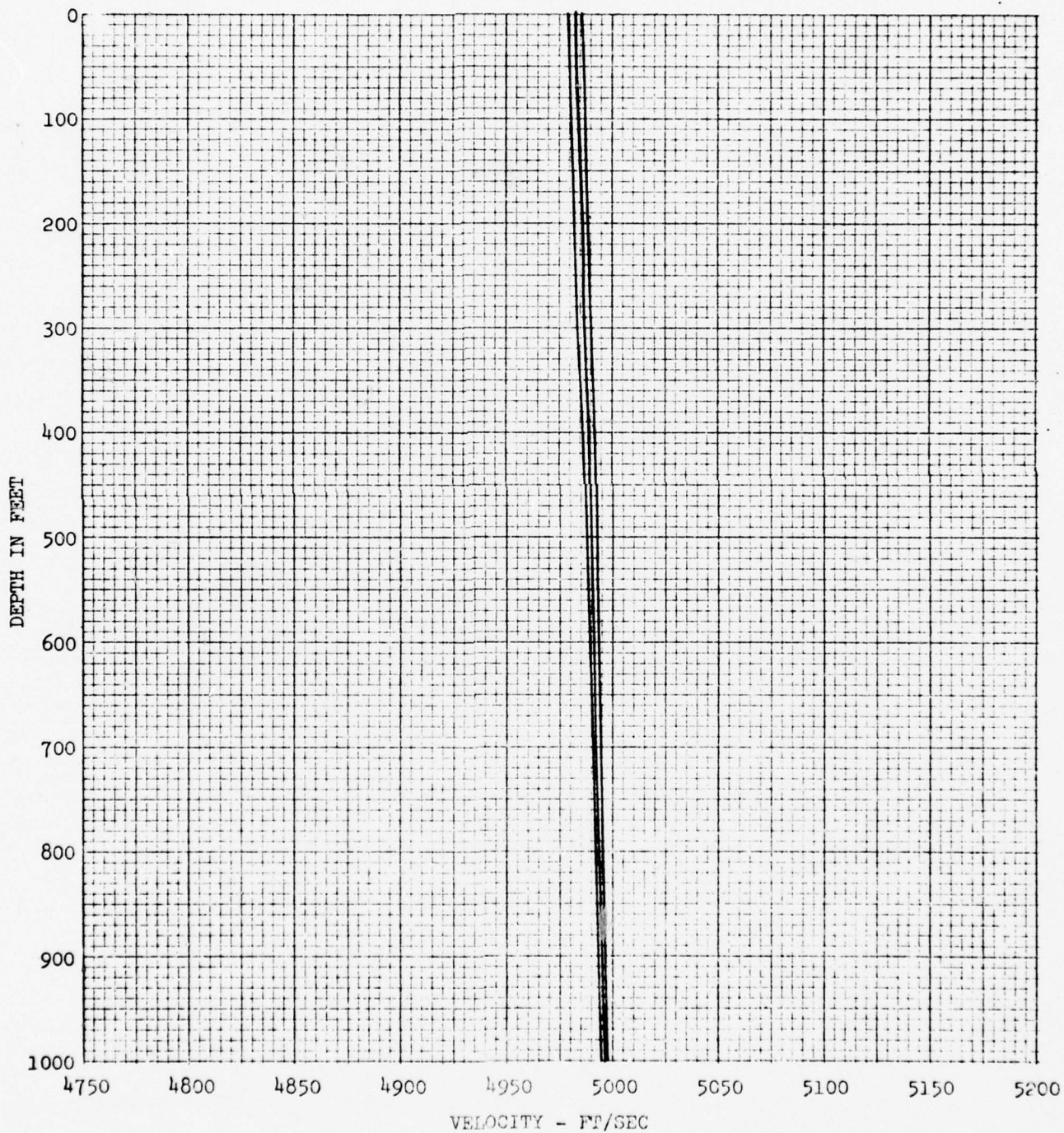


FIG. II.2. Near Surface Sound Velocity Statistical Quartile Plot, Winter
II.5

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CONFIDENTIAL TABLE II.111
NEAR SURFACE STATISTICAL QUARTILES

LOCATION/AREA: NA-1

SEASON: WINTER (JAN, FEB, MAR)

DEPTH - FT	SOUND VELOCITY - FPS		
	1ST QUARTILE	MEDIAN	3RD QUARTILE
0	4979.1	4982.4	4985.4
20	4979.5	4982.9	4985.8
40	4979.8	4983.3	4986.2
60	4980.1	4983.6	4986.6
80	4980.5	4983.9	4987.0
100	4980.8	4984.1	4987.4
120	4981.2	4984.4	4987.6
140	4981.6	4984.7	4987.9
160	4981.9	4985.0	4988.2
180	4982.3	4985.2	4988.4
200	4982.7	4985.5	4988.6
240	4983.4	4986.1	4989.0
280	4984.0	4986.7	4989.6
320	4984.7	4987.3	4990.1
360	4985.4	4987.9	4990.7
400	4986.1	4988.4	4991.2
440	4986.7	4989.0	4991.8
480	4987.4	4989.4	4992.3
520	4988.0	4990.0	4992.8
560	4988.6	4990.5	4993.3
600	4989.3	4991.0	4993.7
640	4989.9	4991.5	4994.2
680	4990.6	4992.0	4994.5
720	4991.2	4992.6	4994.8
760	4991.8	4993.2	4995.0
800	4992.4	4993.7	4995.3
840	4992.9	4994.3	4995.6
880	4993.4	4994.8	4995.9
920	4993.8	4995.2	4996.2
960	4994.3	4995.7	4996.5
1000	4994.7	4996.1	4996.8

SECTION III
SPRING STATISTICAL SUMMARY DATA

III.1

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TABLE III.1 ENVIRONMENTAL SUMMARY, SPRING

LOCATION/AREA: NA-1
 SEASON: SPRING (APR, MAY, JUN)

SURFACE SOUND CHANNEL CHARACTERISTICS

LAYER DEPTH (ZL) (FT)	ASSOCIATED GRADIENTS*		STATION	AMOUNT OF DATA USED	PROBABILITY OF SURFACE CHANNEL OCCURRENCE
	IN-LAYER (γ_0) (FT/SEC/FT)	BELOW-LAYER (γ_1) (FT/SEC/FT)			
1ST QUARTILE 157	+0.0121	-0.0270	BT	61	48%
MEDIAN 267	+0.0101	-0.0201		200	
3RD QUARTILE 1328	+0.0100	-0.0307			

ENVIRONMENTAL CHARACTERISTICS

SURFACE PARAMETERS

	1ST QUARTILE	MEDIAN	3RD QUARTILE
SOUND VELOCITY (CS)(FT/SEC)	4989.3	5007.7	5034.6
TEMPERATURE (SST)(°F)	66.1	69.8	75.8
WAVE HEIGHT (LWA)(FT)	3.2	5.8	10.8
WIND VELOCITY (VWI)(KNOTS)	7.0	14.0	21.0

SEA FLOOR PARAMETERS

BOTTOM DEPTH (ZBM)(FT)	15,500	16,250	16,800
BOTTOM POROSITY (PORB)	.55	.70	.75

SCATTERING STRENGTH PARAMETERS

OCEAN BOTTOM (MUB)(dB/SQ YD)	-20	-17	-14
LAYER (MUVL)(dB/CU YD)	-85	-76	-67
VOLUME (MUV)(dB/CU YD)	-85	-80	-75

*Associated gradients are medians for that 50% of the data centered about the specified layer depth quartile values.

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DEEP OCEAN SOUND VELOCITY PROFILE

LOCATION/AREA: NA-1

SEASON: SPRING (APR, MAY, JUN)

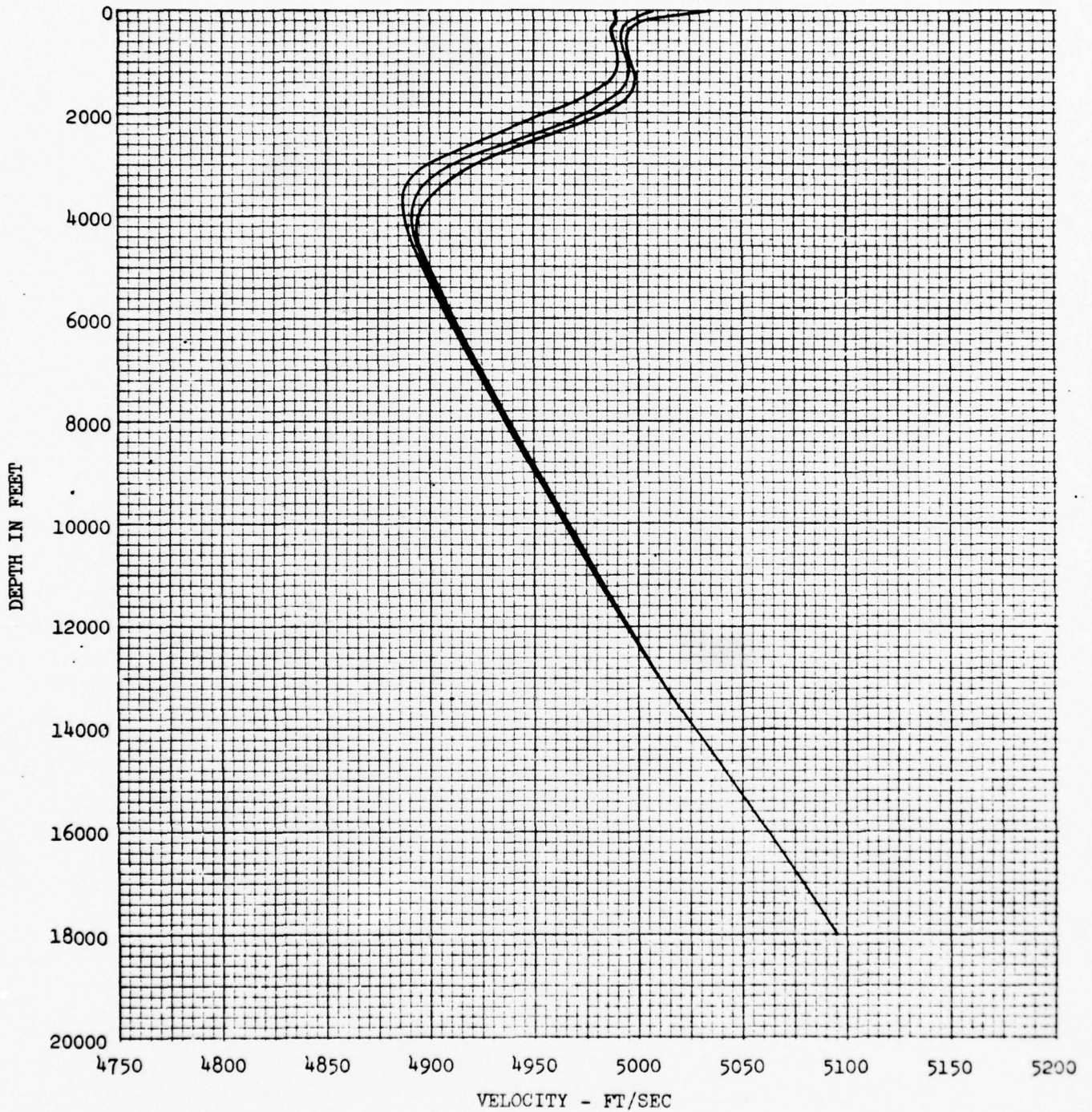


FIG. III.1 Deep Ocean Sound Velocity Statistical Quartile Plot, Spring
III.3

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CONFIDENTIAL TABLE III.11
DEEP OCEAN STATISTICAL QUANTILES

LOCATION/AREA: NA-1

SEASON: SPRING (APR, MAY, JUN)

DEPTH - FT	SOUND VELOCITY - FPS		
	1ST QUANTILE	MEDIAN	3RD QUANTILE
0	4989.3	5007.7	5034.6
200	4989.8	4996.7	5004.0
400	4987.3	4992.2	4995.9
600	4989.4	4992.4	4994.7
800	4990.7	4993.6	4995.4
1000	4990.4	4995.4	4997.0
1200	4990.4	4996.0	4998.3
1400	4985.4	4994.8	4998.8
1600	4978.2	4991.4	4997.7
1800	4967.2	4984.0	4992.2
2000	4955.4	4975.2	4984.7
2200	4945.1	4963.0	4972.8
2400	4933.2	4950.0	4960.1
2600	4919.8	4936.1	4946.5
2800	4908.8	4923.3	4933.5
3000	4899.0	4911.7	4921.8
3200	4892.0	4903.3	4914.1
3400	4888.4	4897.6	4907.3
3600	4887.1	4893.7	4901.1
3800	4886.9	4891.7	4897.5
4000	4887.3	4890.8	4895.0
4200	4888.8	4891.6	4894.7
4400	4890.4	4892.8	4895.1
4600	4892.1	4894.2	4896.0
5000	4896.4	4898.0	4900.1
5400	4901.3	4902.6	4904.2
6000	4908.9	4910.0	4911.0
7000	4922.6	4923.5	4924.3
8000	4936.6	4937.4	4938.4
9000	4950.3	4951.3	4952.3
10,000	4964.2	4965.3	4966.2
12,000	4994.2	4995.1	4995.7
14,000	5026.5	5027.1	5027.5
16,000	5061.7	5062.0	5062.4
18,000	5095.2	5095.2	5095.2

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NEAR SURFACE SOUND VELOCITY PROFILE

LOCATION/AREA: NA-1

SEASON: SPRING (APR, MAY, JUN)

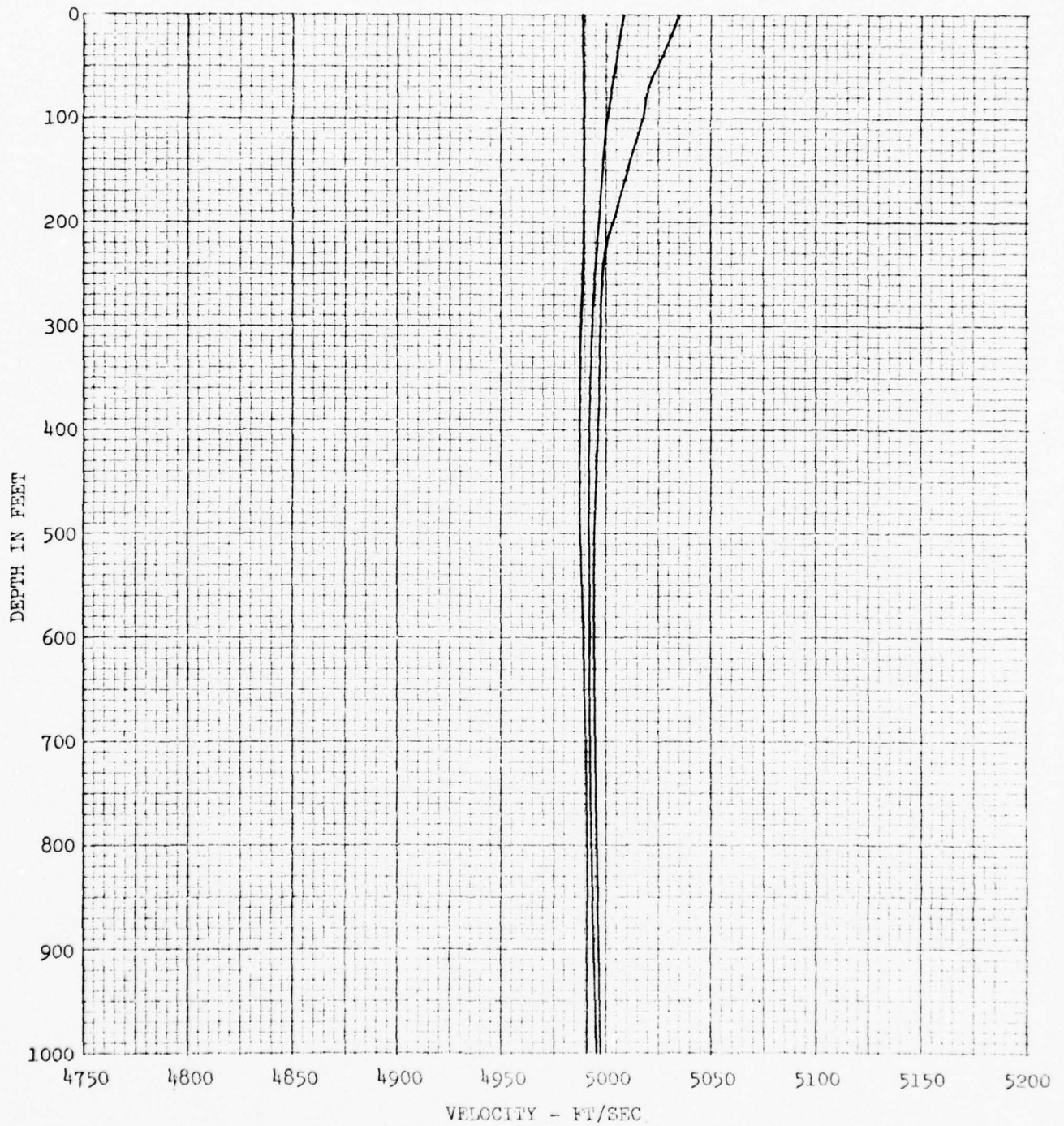


FIG. III.2. Near Surface Sound Velocity Statistical Quartile Plot, Spring

SECTION IV
SUMMER STATISTICAL SUMMARY DATA

IV.1

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TABLE IV.1

ENVIRONMENTAL SUMMARY, SUMMER

LOCATION/AREA: NA-1

SEASON: SUMMER (JUL, AUG, SEP)

SURFACE SOUND CHANNEL CHARACTERISTICS

LAYER DEPTH (ZL) (FT)	ASSOCIATED GRADIENTS*		STATION	AMOUNT OF DATA USED	PROBABILITY OF SURFACE CHANNEL OCCURRENCE
	IN-LAYER (γ_0) (FT/SEC/FT)	BELOW-LAYER (γ_1) (FT/SEC/FT)			
1ST QUARTILE 78	+0.0195	-0.3687	BT	26	69%
MEDIAN 105	+0.0169	-0.1836		200	
3RD QUARTILE 160	+0.0164	-0.2317			

ENVIRONMENTAL CHARACTERISTICS

SURFACE PARAMETERS

	1ST QUARTILE	MEDIAN	3RD QUARTILE
SOUND VELOCITY (CS)(FT/SEC)	5042.4	5044.4	5046.6
TEMPERATURE (SST)(°F)	77.7	78.1	79.5
WAVE HEIGHT (LWA)(FT)	3.2	5.8	9.4
WIND VELOCITY (VWI)(KNOTS)	4.0	11.0	18.0

SEA FLOOR PARAMETERS

BOTTOM DEPTH (ZBM)(FT)	15,500	16,250	16,800
BOTTOM POROSITY (PORB)	.55	.70	.75

SCATTERING STRENGTH PARAMETERS

OCEAN BOTTOM (MUB)(dB/SQ YD)	-20	-17	-14
LAYER (MUVL)(dB/CU YD)	-85	-74	-62
VOLUME (MUV)(dB/CU YD)	-85	-80	-75

*Associated gradients are medians for that 50% of the data centered about the specified layer depth quartile values.

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DEEP OCEAN STATISTICAL QUARTILE PLOT

LOCATION/AREA: NA-1

SEASON: SUMMER (JUL, AUG, SEP)

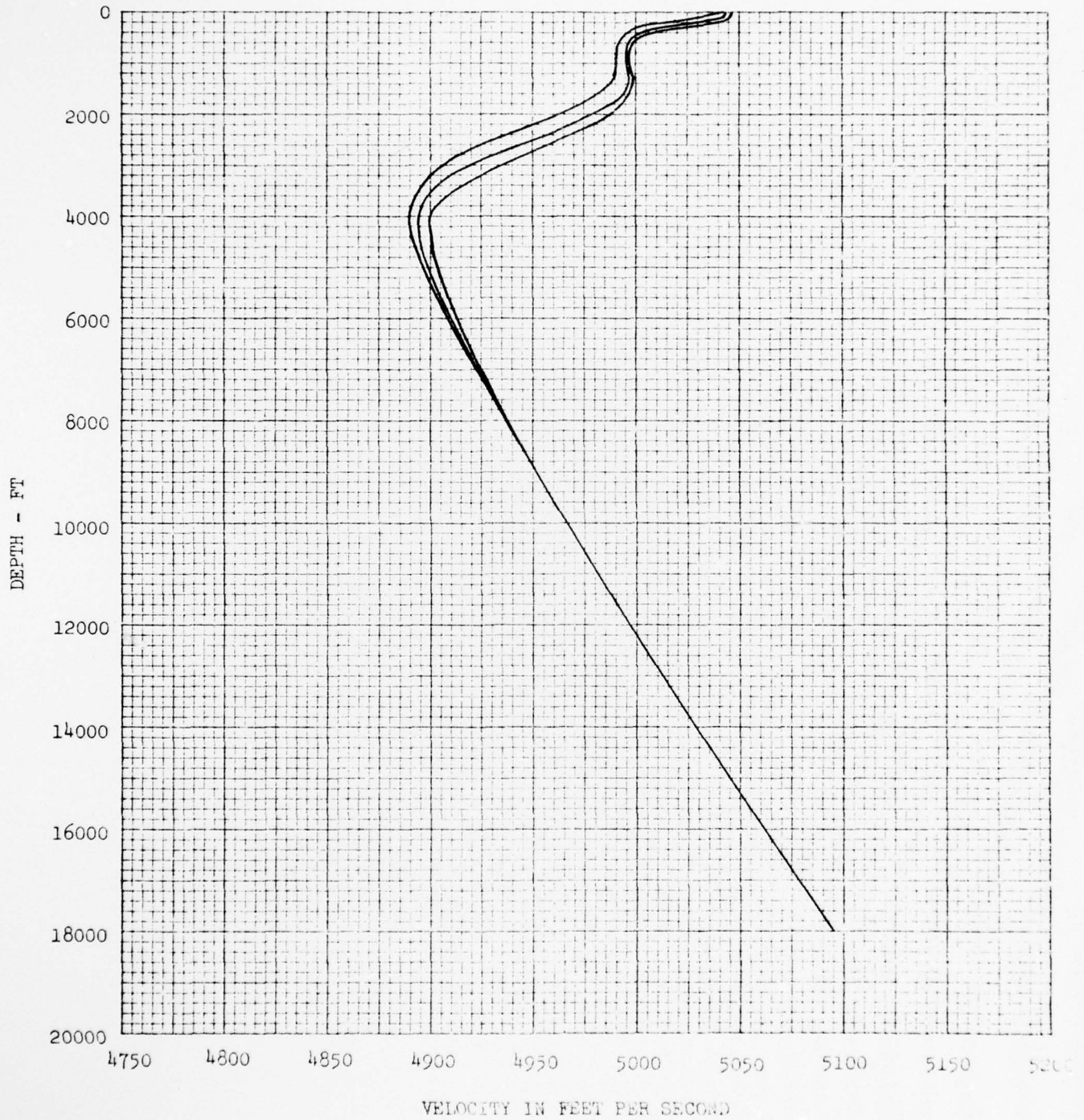


FIG. IV.1. Deep Ocean Sound Velocity Statistical Quartile Plot, Summer

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TABLE IV.11

DEEP OCEAN STATISTICAL QUANTILES

LOCATION/AREA: NA-1

SEASON: SUMMER (JUL, AUG, SEP)

DEPTH - FT	SOUND VELOCITY - FPS		
	1ST QUANTILE	MEDIAN	3RD QUANTILE
0	5042.4	5044.4	5046.6
200	5018.5	5027.1	5034.1
400	4996.1	5002.9	5007.8
600	4992.0	4996.2	4998.2
800	4991.0	4995.4	4997.0
1000	4990.5	4995.6	4997.4
1200	4990.5	4996.4	4997.8
1400	4987.2	4996.4	4997.5
1600	4981.0	4994.7	4996.7
1800	4972.8	4987.4	4993.2
2000	4963.3	4978.7	4988.1
2200	4949.7	4969.3	4978.7
2400	4936.4	4957.2	4968.2
2600	4923.4	4942.5	4956.5
2800	4913.6	4930.4	4945.5
3000	4905.2	4919.3	4934.6
3200	4899.5	4910.9	4924.2
3400	4895.7	4904.0	4915.9
3600	4893.1	4898.2	4909.0
3800	4891.0	4896.0	4903.7
4000	4889.7	4894.3	4900.1
4200	4889.9	4893.6	4900.1
4400	4891.1	4894.3	4900.5
4600	4892.8	4895.7	4901.1
5000	4896.8	4898.9	4902.8
5400	4901.4	4903.3	4906.6
6000	4908.8	4910.2	4912.7
7000	4922.7	4923.1	4924.8
8000	4937.3	4937.5	4938.1
9000	4951.4	4951.7	4952.1
10,000	4965.6	4966.0	4966.4
12,000	4996.0	4996.2	4996.9
14,000	5027.8	5027.8	5027.8
16,000	5061.1	5061.1	5061.1
18,000	5095.2	5095.2	5095.2

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NEAR SURFACE SOUND VELOCITY PROFILE

LOCATION/AREA: NA-1

SEASON: SUMMER (JUL, AUG, SEP)

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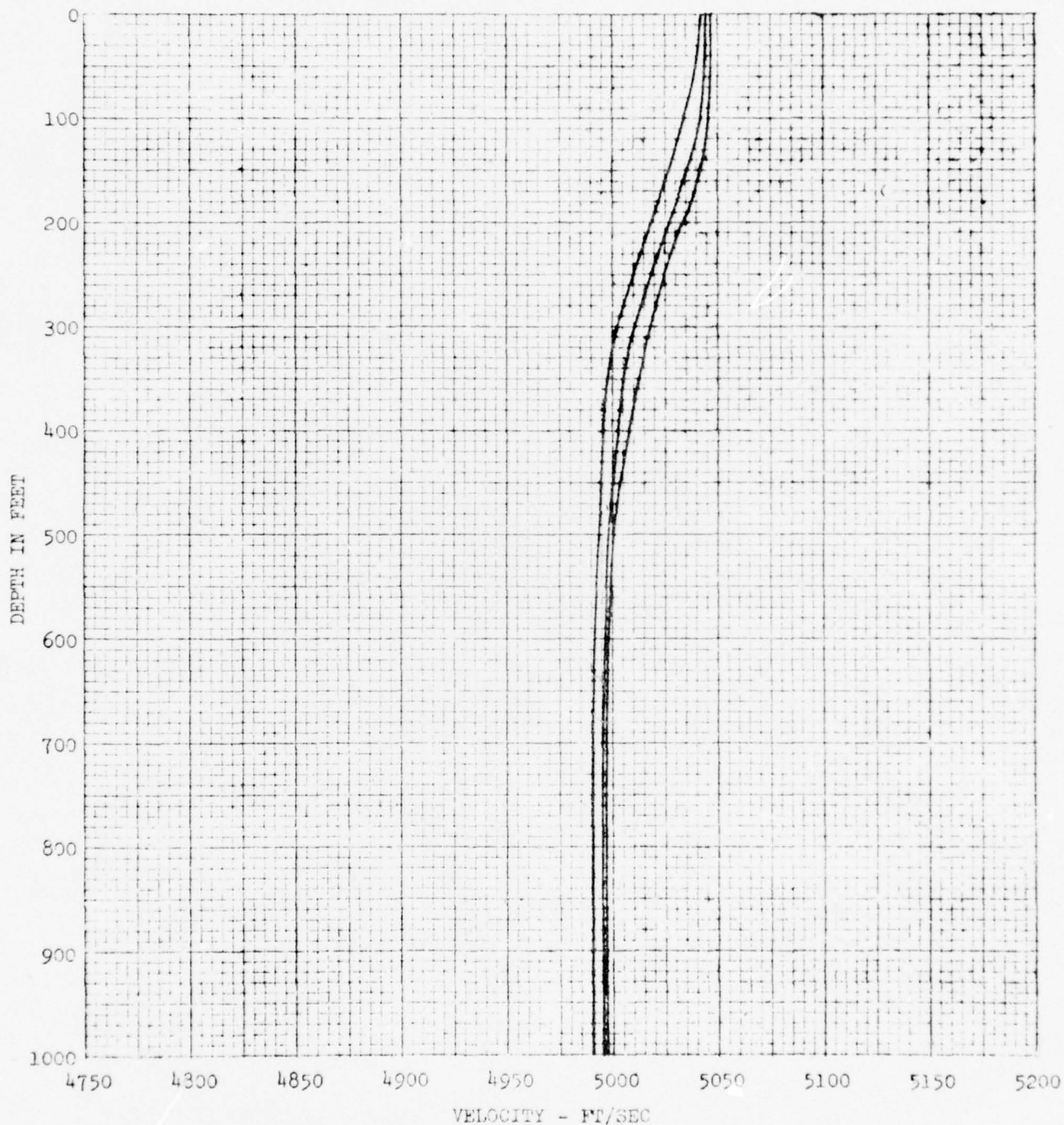


FIG. IV.2. Near Surface Sound Velocity Statistical Quartile Plot, Summer

IV.5

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SECTION V
FALL STATISTICAL SUMMARY DATA

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TABLE V.1

ENVIRONMENTAL SUMMARY, FALL

LOCATION/AREA: NA-1

SEASON: FALL (OCT, NOV, DEC)

SURFACE SOUND CHANNEL CHARACTERISTICS

LAYER DEPTH (ZL) (FT)	ASSOCIATED GRADIENTS*	
	IN-LAYER (γ_0) (FT/SEC/FT)	BELOW-LAYER (γ_1) (FT/SEC/FT)
1ST QUARTILE 159	+0.0163	-0.1531
MEDIAN 202	+0.0172	-0.0679
3RD QUARTILE 307	+0.0167	-0.0392

STATION
BT

AMOUNT OF
DATA USED

14
200

PROBABILITY
OF SURFACE
CHANNEL
OCCURRENCE

>85%

ENVIRONMENTAL CHARACTERISTICS

SURFACE PARAMETERS

	1ST QUARTILE	MEDIAN	3RD QUARTILE
SOUND VELOCITY (CS)(FT/SEC)	5004.7	5015.0	5030.5
TEMPERATURE (SST)(°F)	69.1	70.3	75.0
WAVE HEIGHT (LWA)(FT)	2.7	4.4	8.5
WIND VELOCITY (VWI)(KNOTS)	9.0	18.0	26.0

SEA FLOOR PARAMETERS

BOTTOM DEPTH (ZBM)(FT)	15,500	16,250	16,800
BOTTOM POROSITY (PORB)	.55	.70	.75

SCATTERING STRENGTH PARAMETERS

OCEAN BOTTOM (MUB)(dB/SQ YD)	-20	-17	-14
LAYER (MUVL)(dB/CU YD)	-85	-75	-65
VOLUME (MUV)(dB/CU YD)	-85	-80	-75

*Associated gradients are medians for that 50% of the data centered about the specified layer depth quartile values.

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DEEP OCEAN STATISTICAL QUARTILE PLOT

LOCATION/AREA: NA-1

SEASON: FALL (OCT, NOV, DEC)

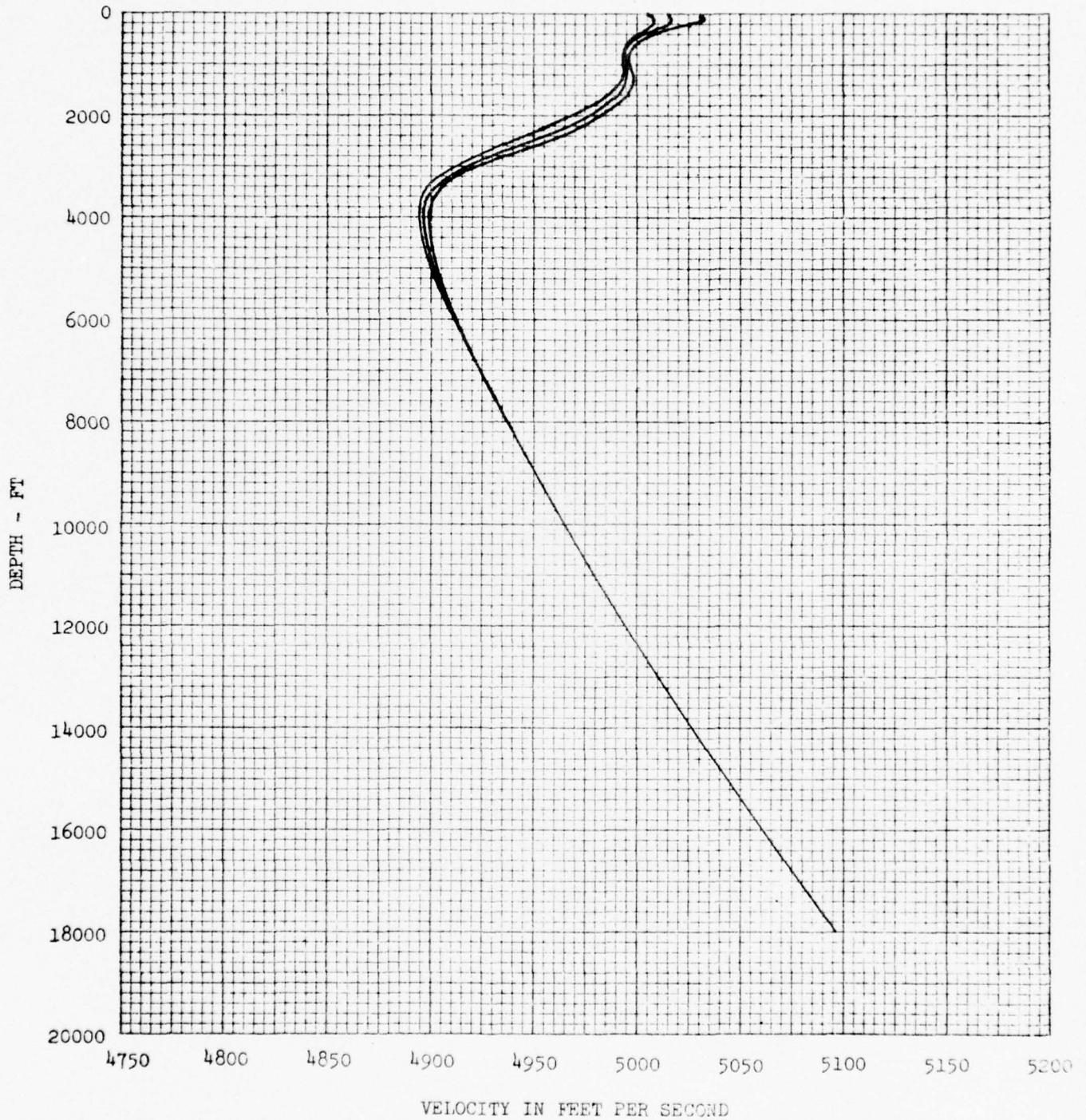


FIG. V.1. Deep Ocean Sound Velocity Statistical Quartile Summary, Fall

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TABLE V.11

DEEP OCEAN STATISTICAL QUANTILES

LOCATION/AREA: NA-1

SEASON: FALL (OCT, NOV, DEC)

DEPTH - FT	SOUND VELOCITY - FPS		
	1ST QUANTILE	MEDIAN	3RD QUANTILE
0	5004.7	5015.0	5030.5
200	5007.6	5015.4	5025.0
400	5000.6	5003.4	5006.3
600	4994.8	4995.9	4998.7
800	4993.8	4994.5	4996.4
1000	4994.4	4995.2	4996.7
1200	4993.5	4995.5	4998.0
1400	4990.7	4994.4	4998.1
1600	4986.0	4990.9	4996.0
1800	4977.3	4983.8	4989.4
2000	4967.5	4975.7	4981.8
2200	4956.6	4966.2	4973.3
2400	4944.6	4954.8	4962.7
2600	4931.6	4941.7	4950.2
2800	4921.2	4928.6	4935.4
3000	4911.8	4916.7	4921.6
3200	4904.2	4909.0	4912.2
3400	4899.0	4902.9	4906.0
3600	4895.5	4898.0	4901.9
3800	4895.0	4897.1	4899.5
4000	4895.1	4896.8	4898.0
4200	4895.8	4897.1	4898.3
4400	4896.2	4897.8	4898.8
4600	4896.6	4898.7	4899.4
5000	4899.8	4901.1	4902.4
5400	4903.7	4904.7	4906.0
6000	4910.2	4911.0	4912.0
7000	4923.0	4923.6	4924.3
8000	4936.2	4936.9	4937.8
9000	4949.7	4950.8	4951.5
10,000	4963.5	4965.0	4965.5
12,000	4993.6	4994.6	4995.1
14,000	5025.7	5026.6	5027.0
16,000	5060.4	5061.5	5061.8
18,000	5095.5	5095.5	5095.5

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NEAR SURFACE SOUND VELOCITY PROFILE

LOCATION/AREA: NA-1

SEASON: FALL (OCT, NOV, DEC)

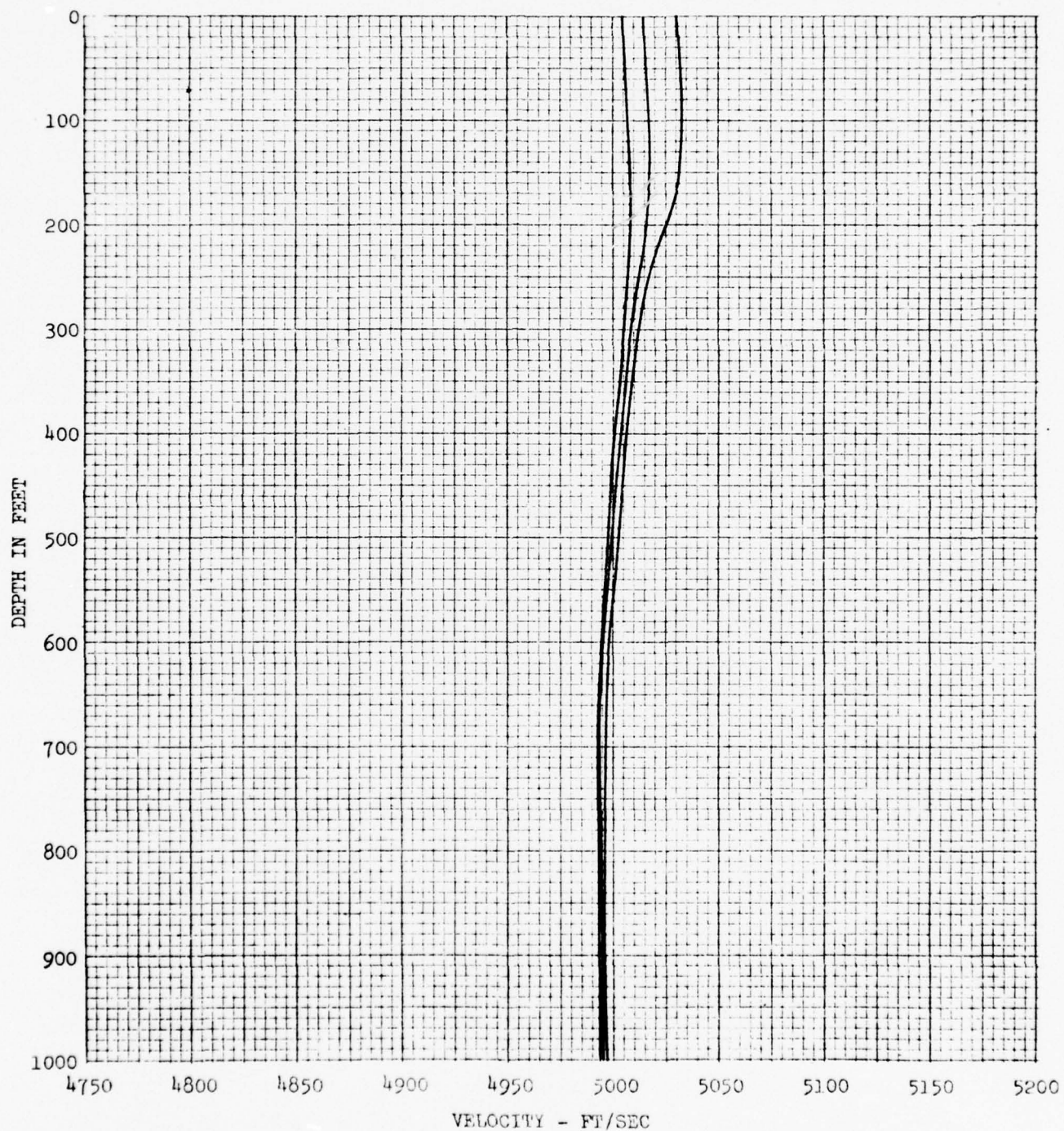


FIG. V.2. Near Surface Sound Velocity Statistical Quartile Plot, Fall

V.5

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SECTION VI
MEASURED DATA

VI.1

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MEASURED VELOCITY PROFILES

LOCATION/AREA: NA-1

SEASON: WINTER (JAN, FEB, MAR)

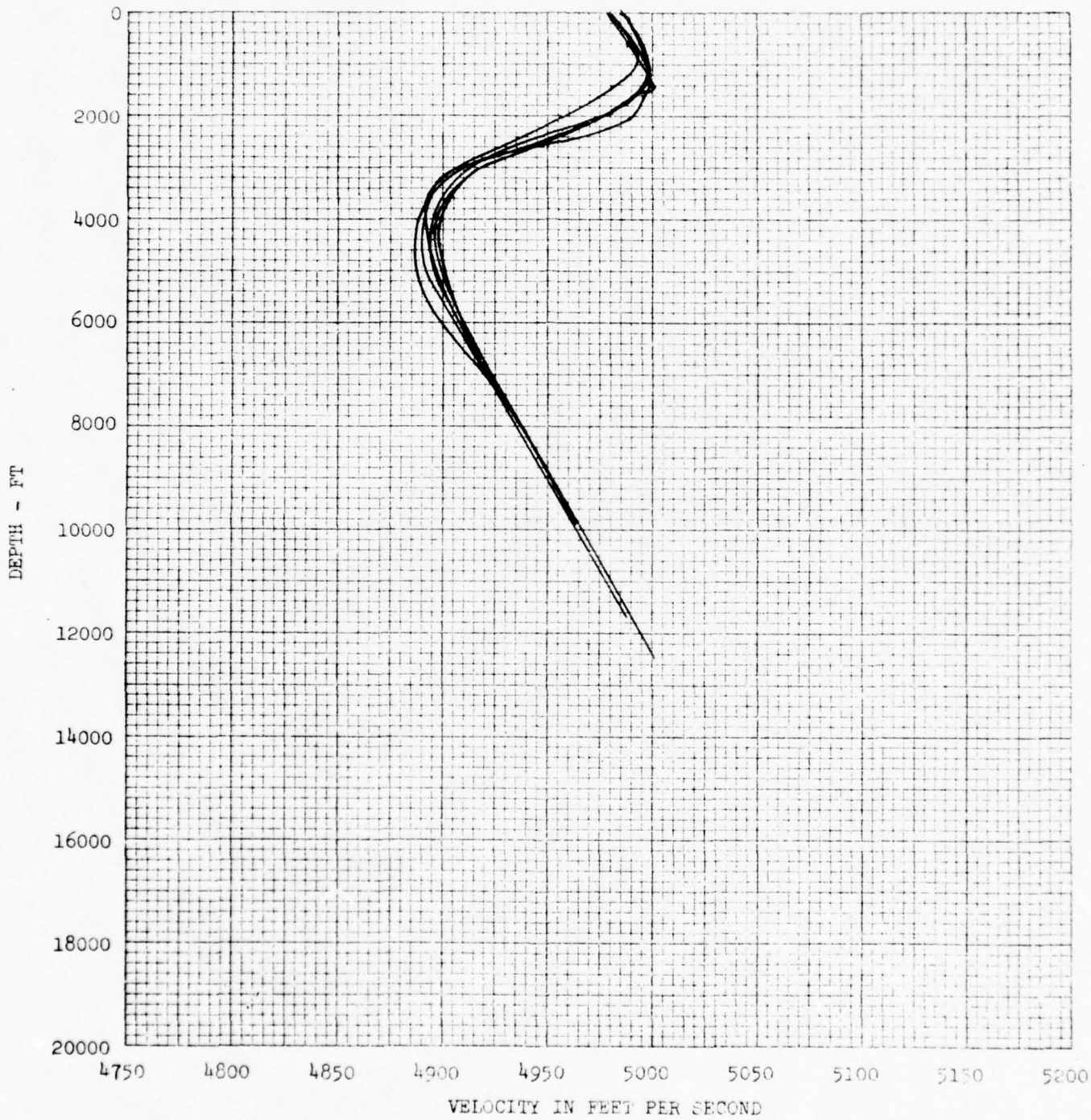


FIG. VI.1. Measured Sound Velocity Profiles from Station Data, Winter

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MEASURED BATHYTHERMOGRAPH PLOTS

LOCATION/AREA: NA-1

SEASON: WINTER (JAN, FEB, MAR)

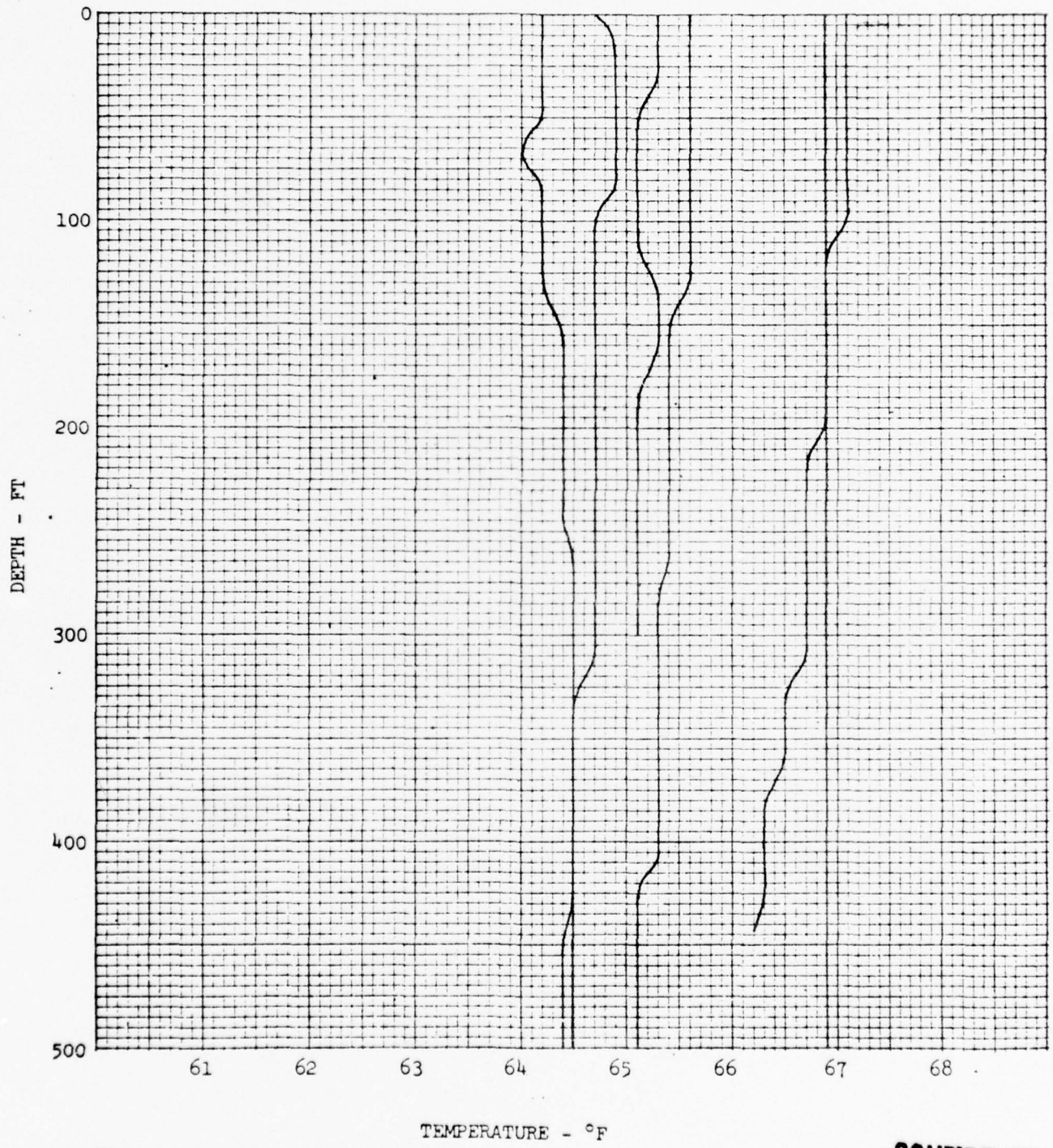


FIG. VI.2. Measured BT soundings, Winter

VI.3

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CONFIDENTIAL MEASURED VELOCITY PROFILES

LOCATION/AREA: NA-1

SEASON: SPRING (APR, MAY, JUN)

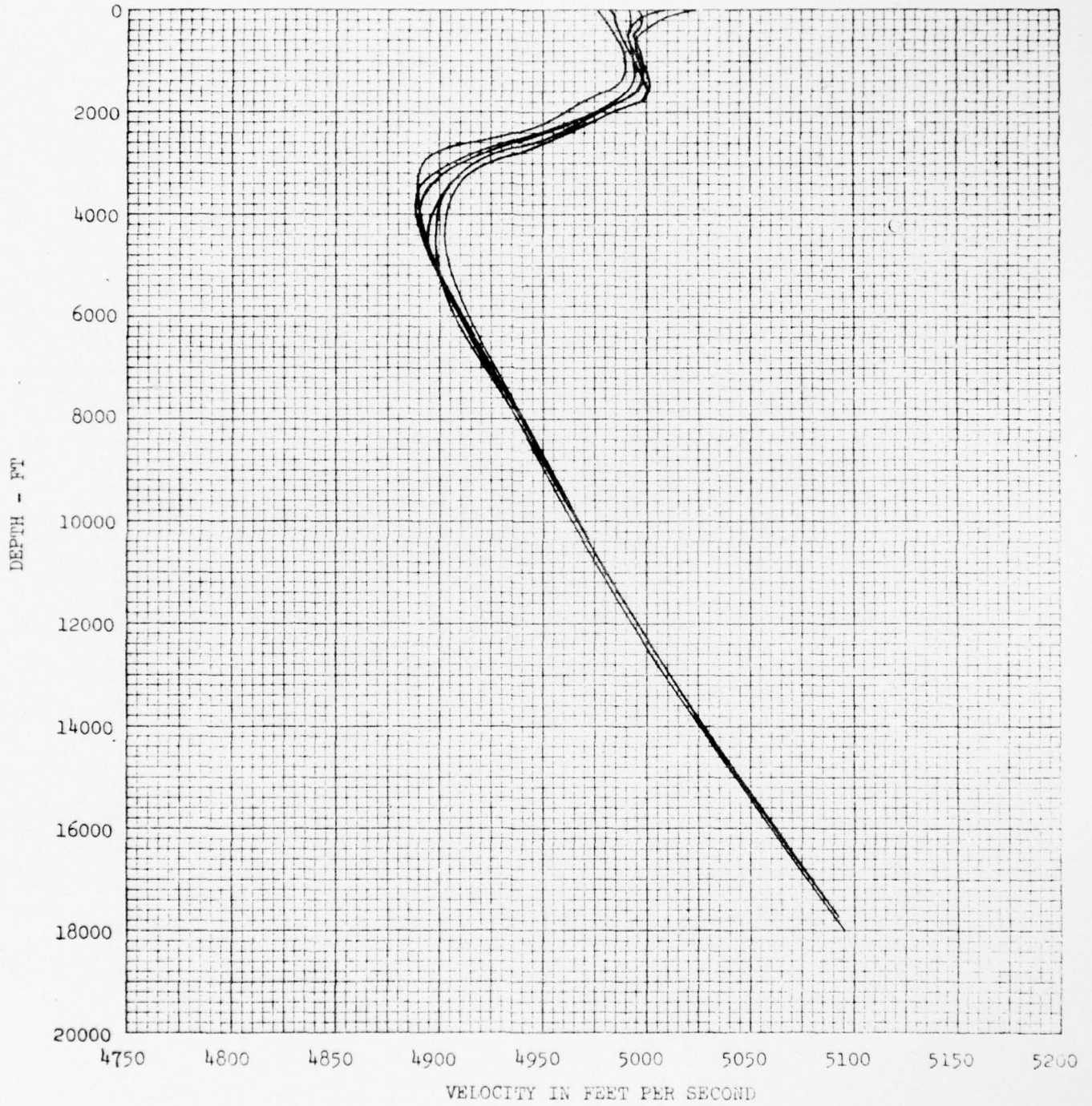


FIG. VI.3. Measured Sound Velocity Profiles from Station Data, Spring

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MEASURED BATHYTHERMOGRAPH PLOTS

LOCATION/AREA: NA-1

SEASON: SPRING (APR, MAY, JUN)

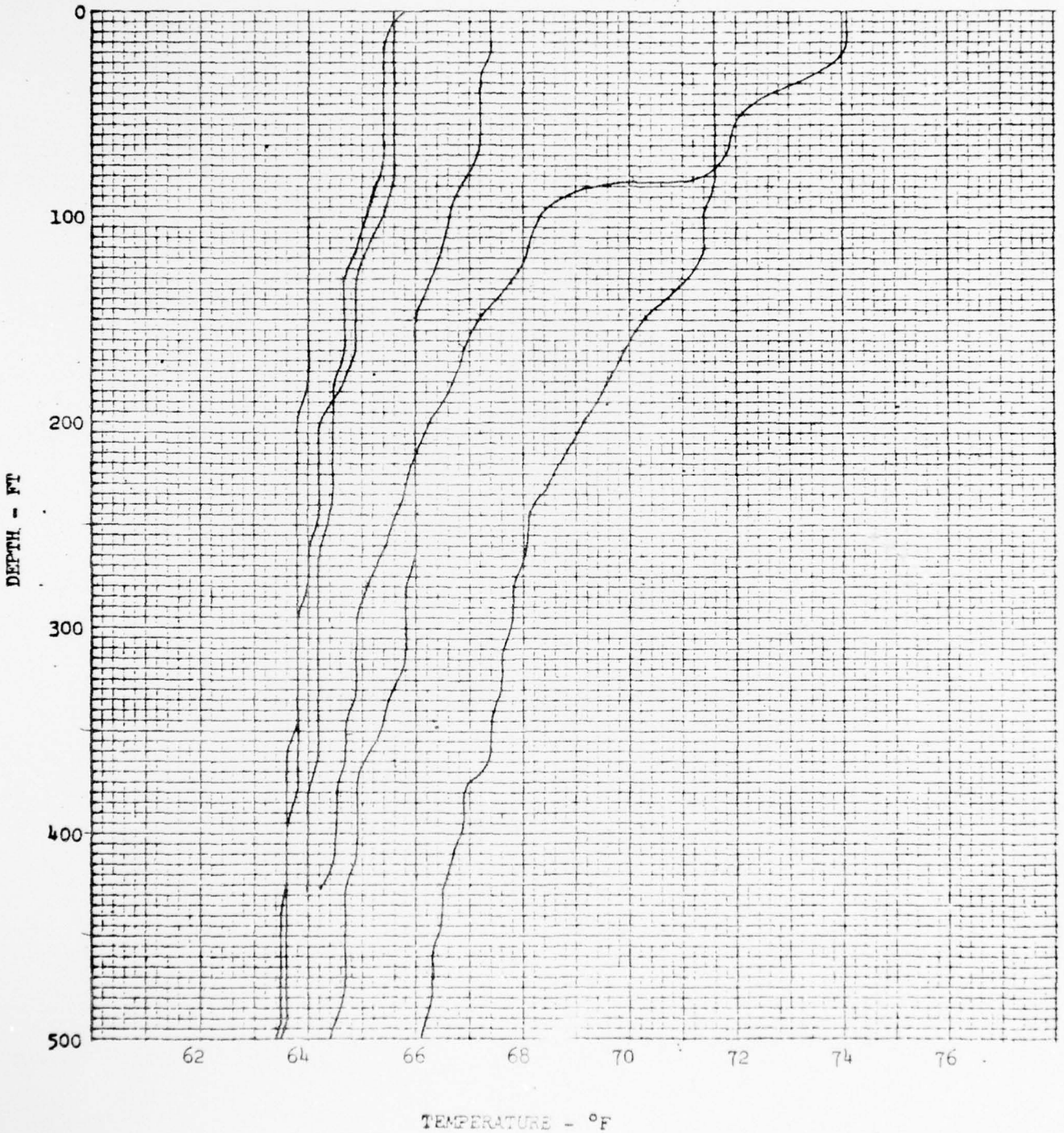


FIG. VI.4. Measured BT Soundings, Spring

VI.5

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CONFIDENTIAL MEASURED VELOCITY PROFILES

LOCATION/AREA: NA-1

SEASON: SUMMER (JUL, AUG, SEP)

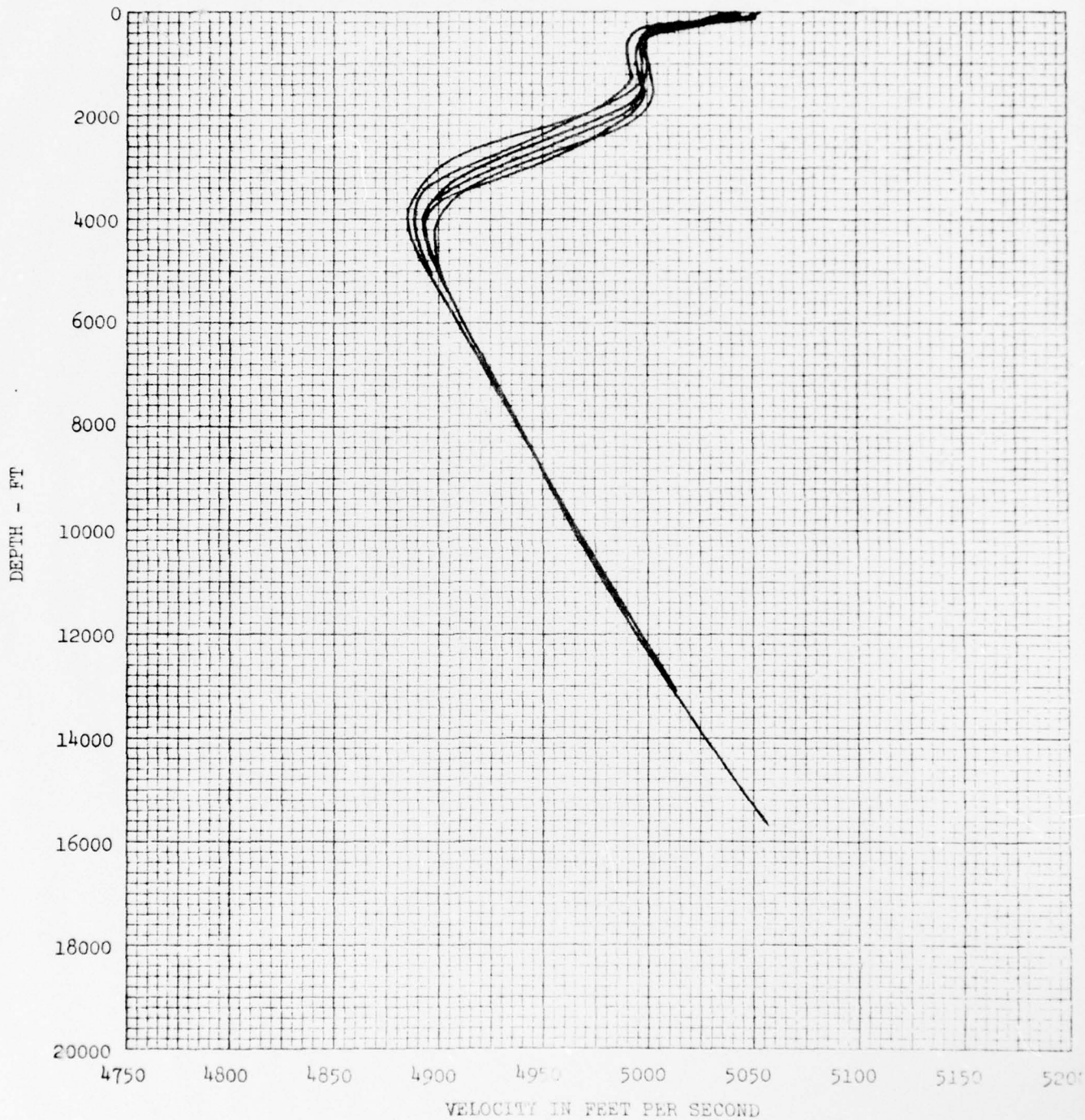


FIG. VI.5. Measured Sound Velocity Profiles from Station Data, Summer

VI.6

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MEASURED BATHYTHERMOGRAPH PLOTS

LOCATION/AREA: NA-1

SEASON: SUMMER (JUL, AUG, SEP)

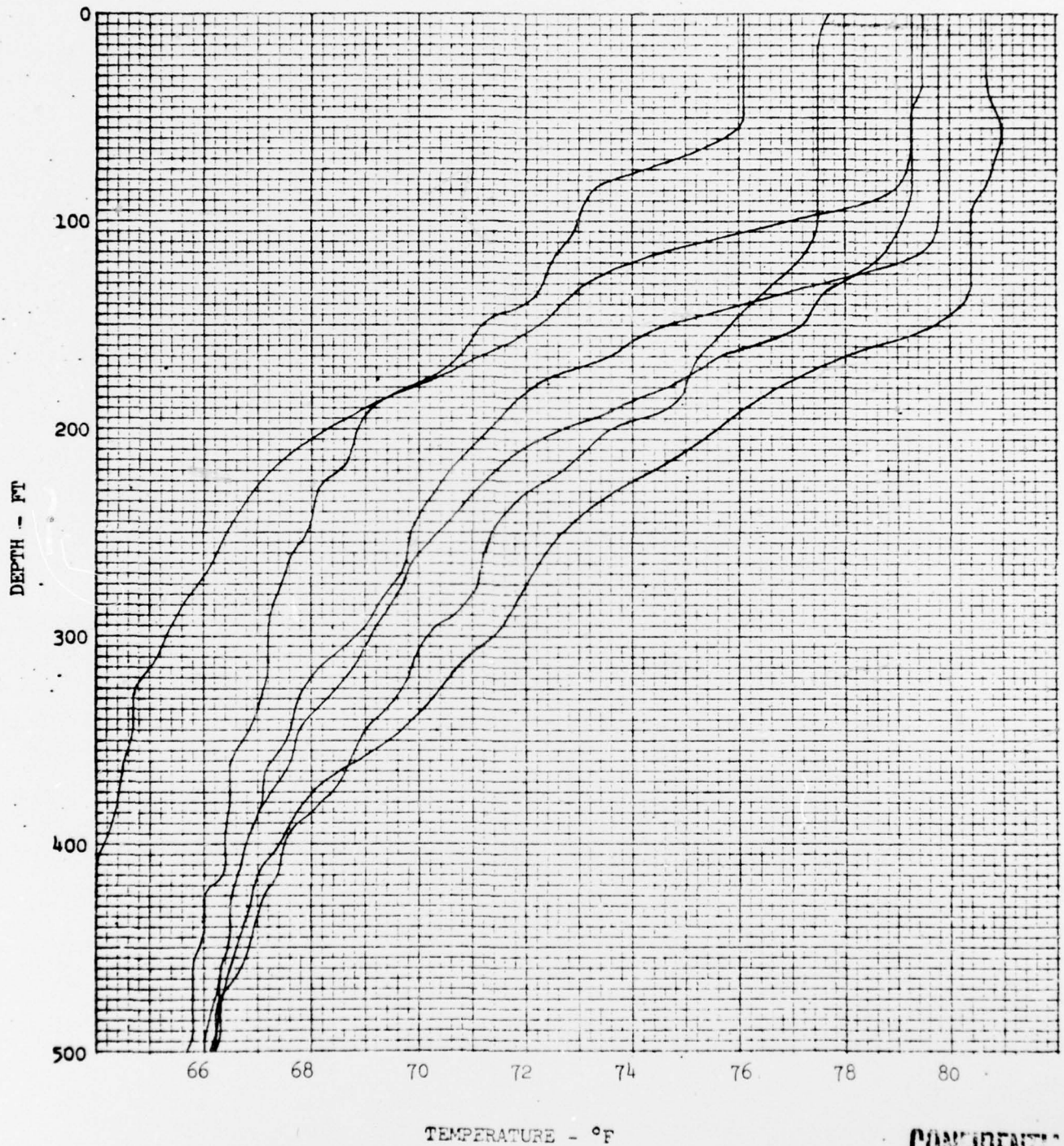


FIG. VI.6. Measured BT Soundings, Summer

VI.7

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MEASURED VELOCITY PROFILES

LOCATION/AREA: NA-1

SEASON: FALL (OCT, NOV, DEC)

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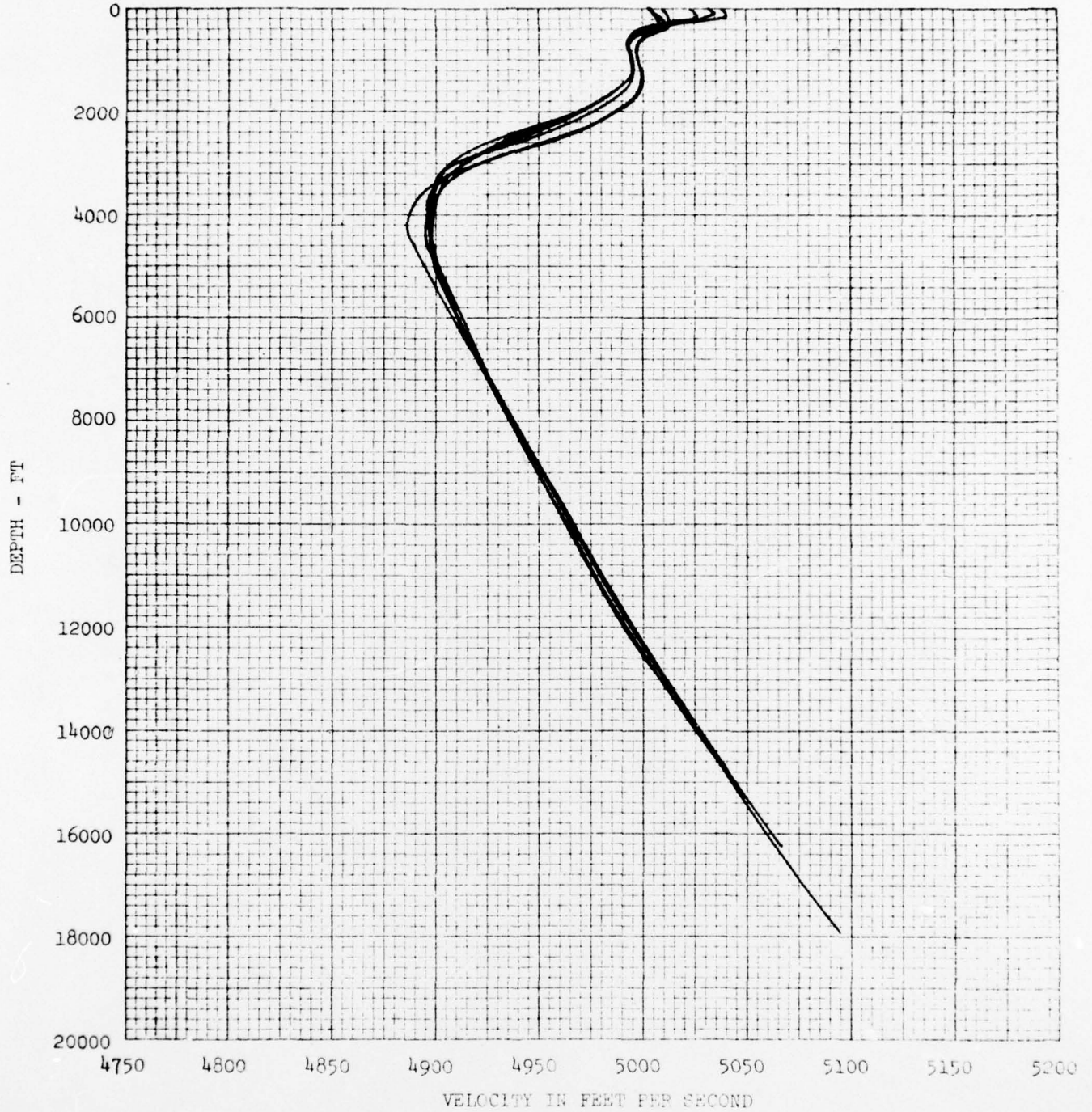


FIG. VI.7. Measured Sound Velocity Profiles from Station Data, Fall

VI.8

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MEASURED BATHYTHERMOGRAPH PLOTS

LOCATION/AREA: NA-1

SEASON: FALL (OCT, NOV, DEC)

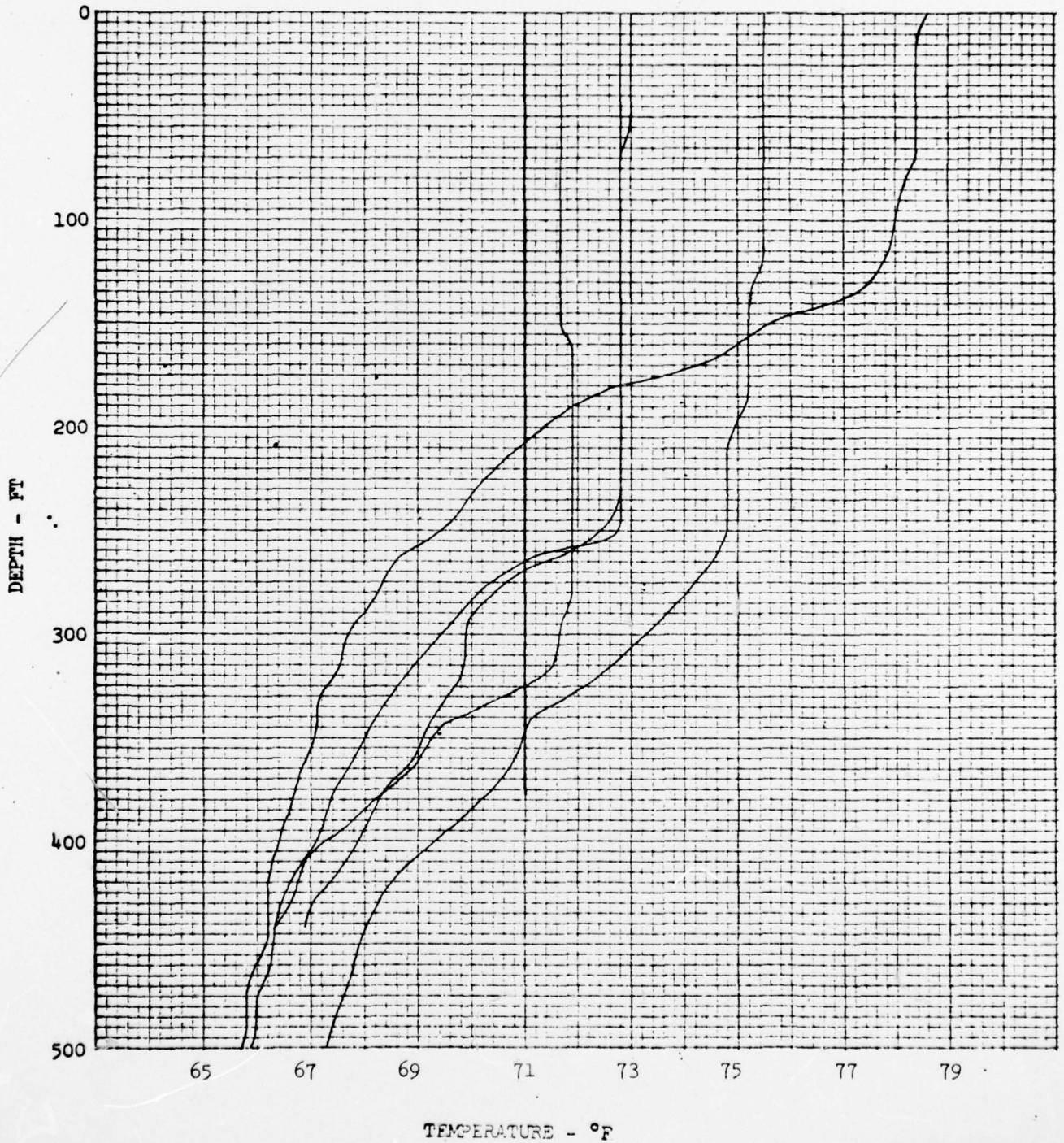


FIG. VI.8. Measured BT Soundings, Fall

VI.9

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SECTION VII
DATA DISTRIBUTION

VII.1

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TABLE VII.1

OCEANOGRAPHIC STATION AND BT DATA DISTRIBUTION
BY MONTH AND YEAR

	<u>Month</u>	<u>Year</u>	<u>No. of Stations</u>
WINTER	2	32	6
			TOTAL 6
SPRING	4	59	4
	4	60	22
	5	60	12
	6	57	8
	6	60	12
	6	64	3
			TOTAL 61
SUMMER	7	57	1
	7	58	1
	8	31	5
	8	41	3
	8	56	2
	9	49	2
	9	57	1
	9	59	6
	9	60	1
	9	61	4
			TOTAL 26
FALL	11	54	3
	11	55	1
	11	56	7
	11	57	1
	11	59	2
			TOTAL 14

VII.2

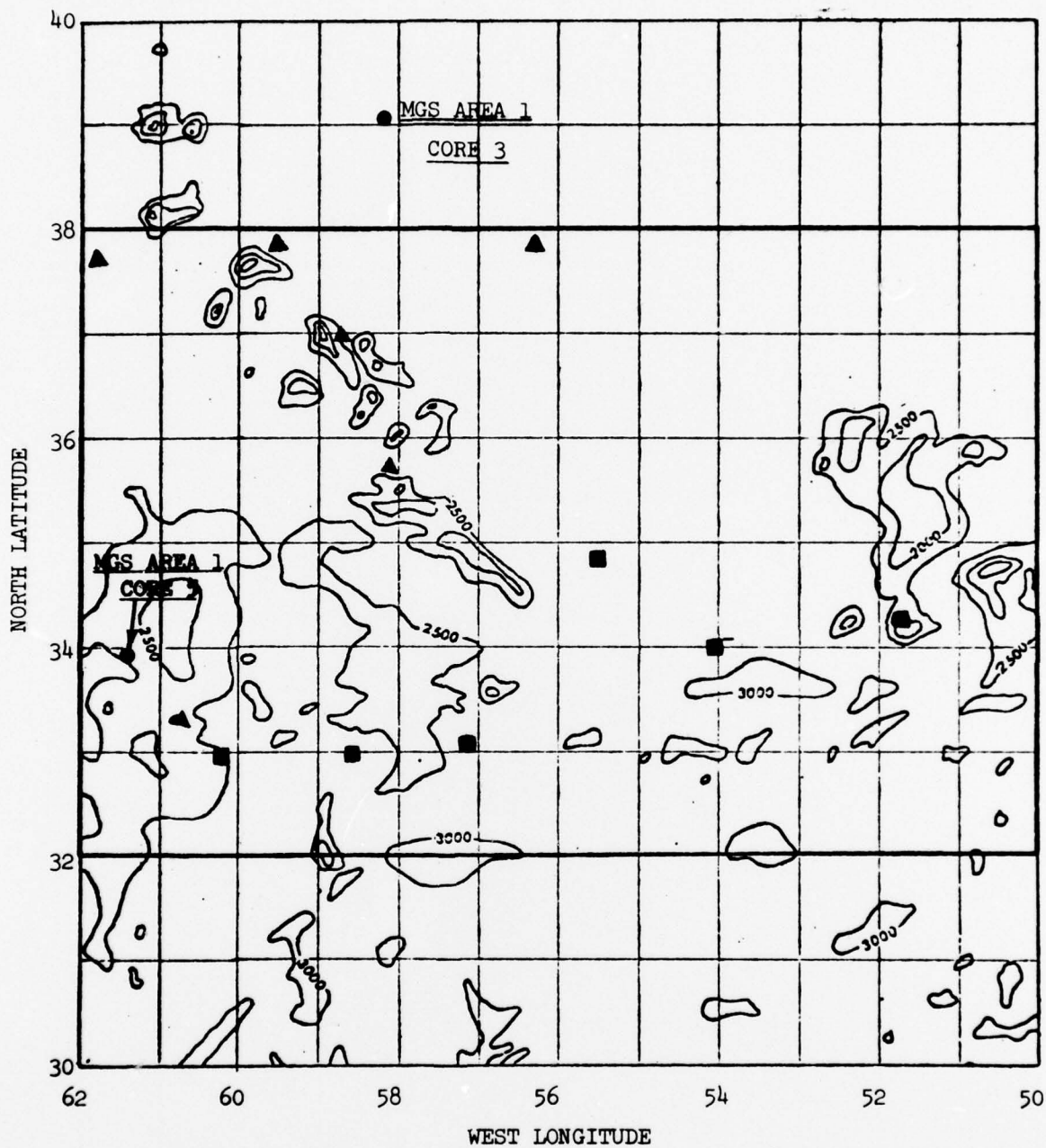
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DATA DISTRIBUTION

LOCATION/AREA: NA-1

SEASON: WINTER (JAN, FEB, MAR)



- Core location
- Plotted station data location
- ▲ Plotted BT data location

FIG. VII.1. Station Data Distribution

VII.3

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CONFIDENTIAL DATA DISTRIBUTION

LOCATION/AREA: NA-1

SEASON: SPRING (APR, MAY, JUN)

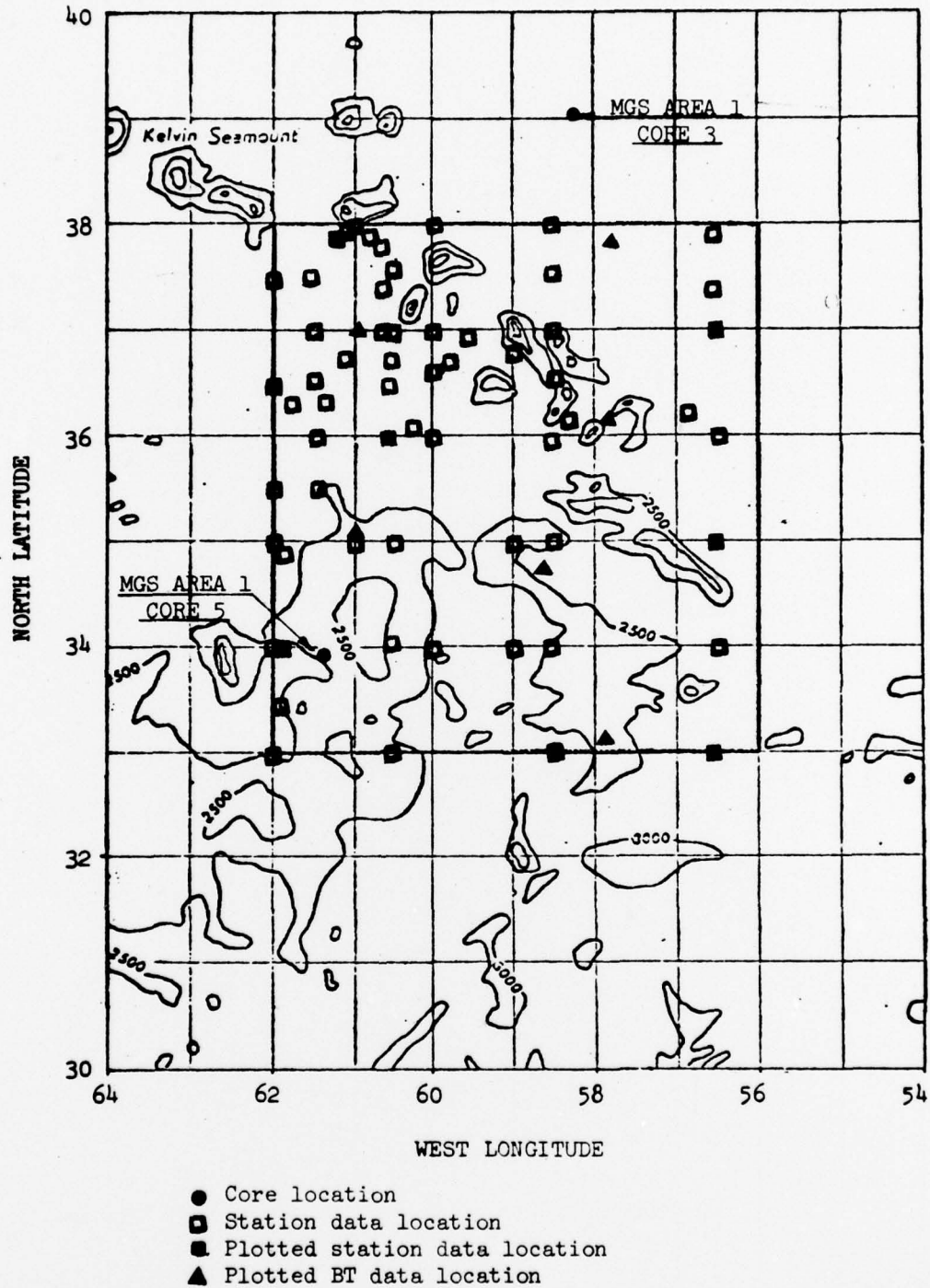


FIG. VII.2. Station Data Distribution, Spring

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DATA DISTRIBUTION

UNCLASSIFIED

LOCATION/AREA: NA-1

SEASON: SUMMER (JUL, AUG, SEP)

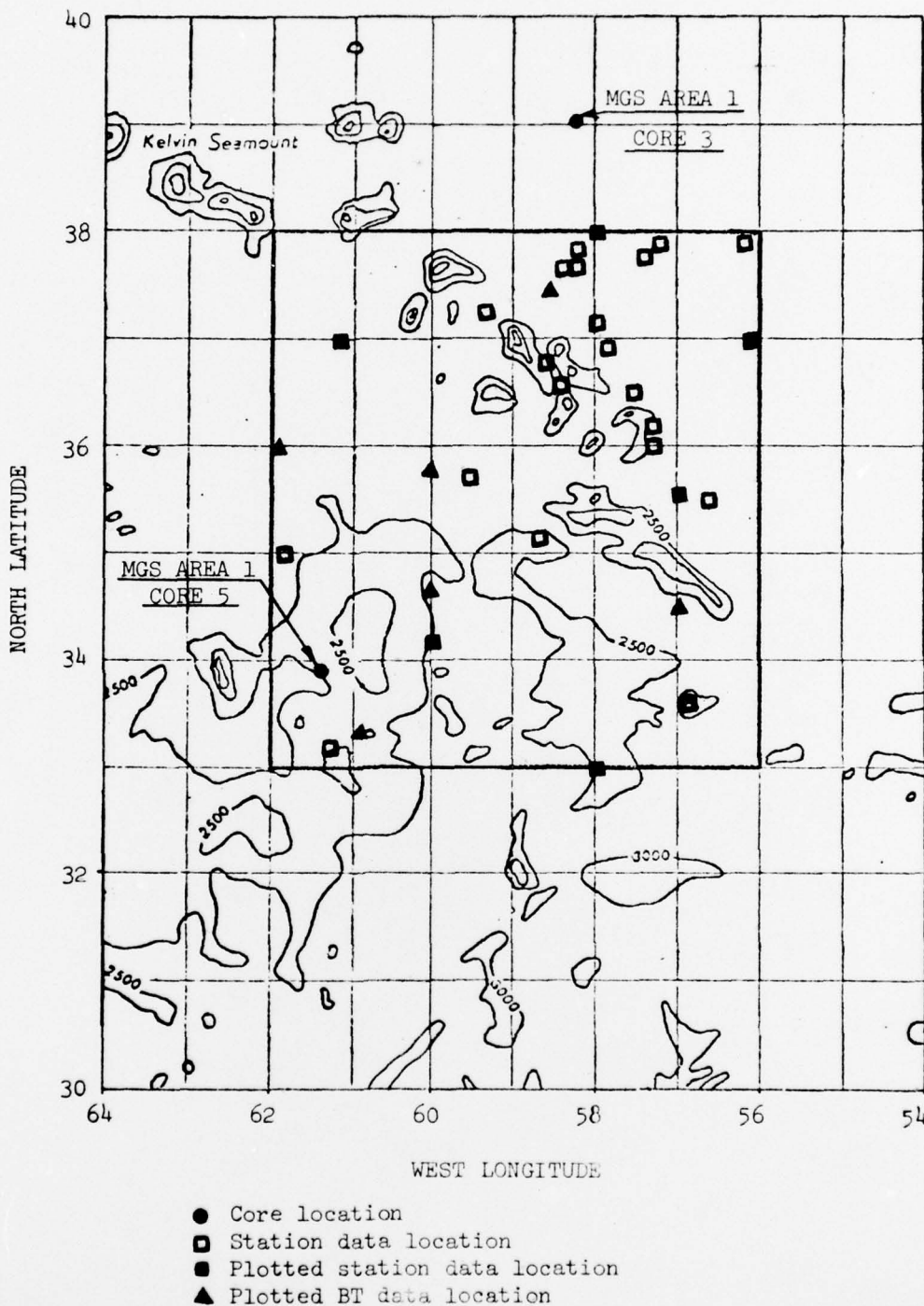


FIG. VII.3. Station Data Distribution, Summer

VII.5

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CONFIDENTIAL DATA DISTRIBUTION

LOCATION/AREA: NA-1

SEASON: FALL (OCT, NOV, DEC)

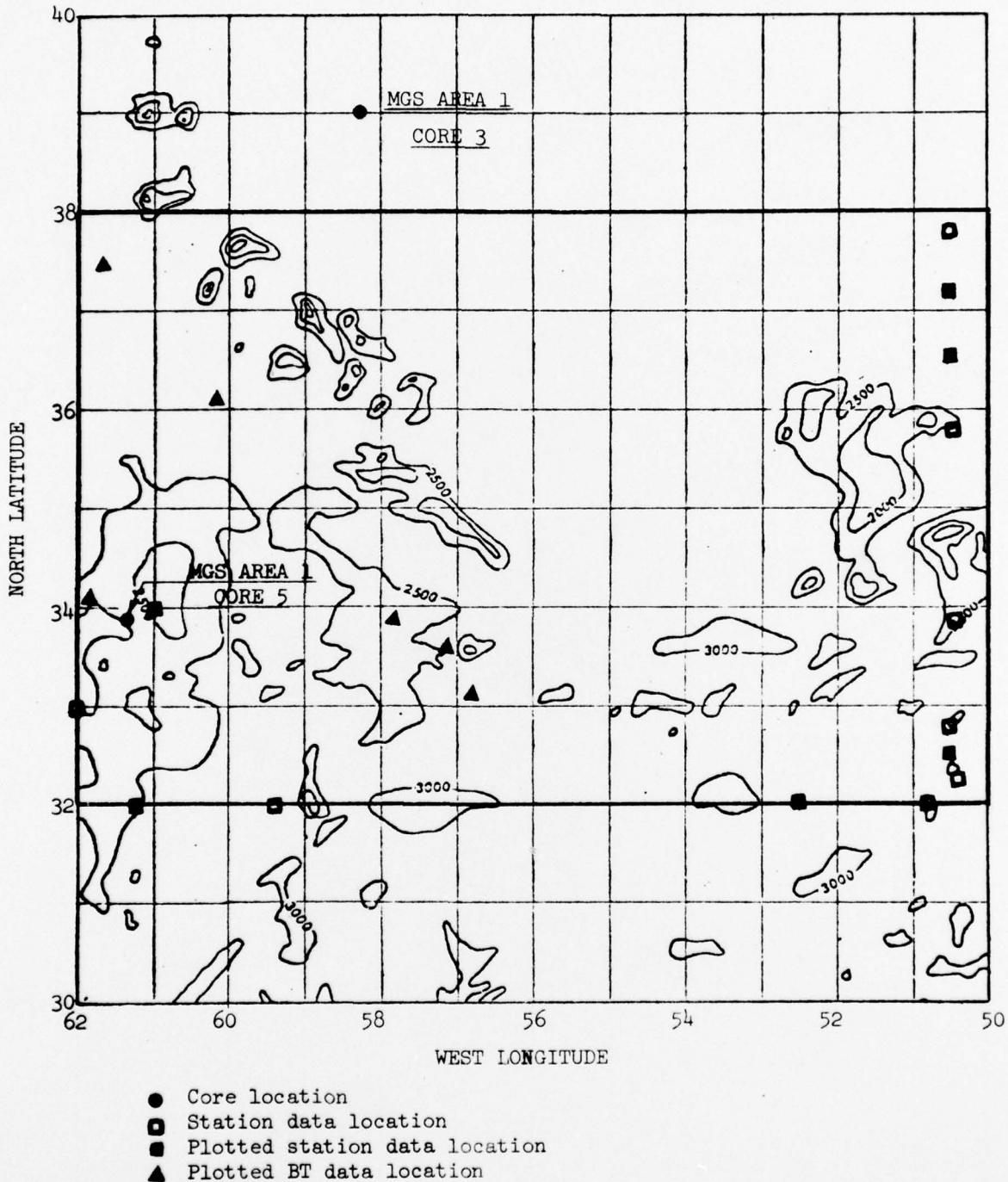


FIG. VII.4. Station Data Distribution, Fall

SECTION VIII
SEA FLOOR SUMMARY DATA

VIII.1

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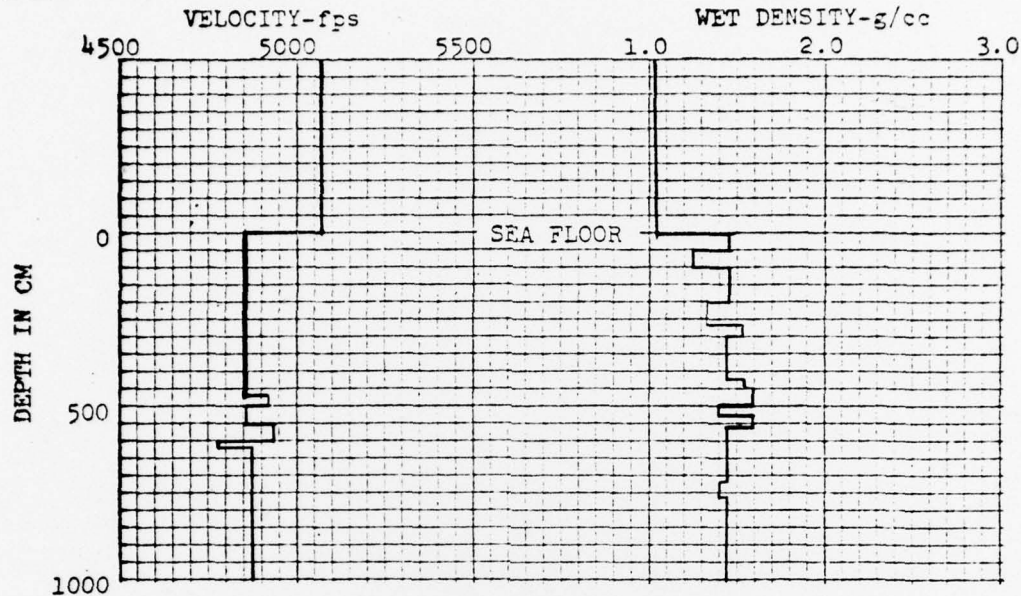
ACOUSTIC SEA FLOOR SUMMARY

LOCATION/AREA: NA-1

PROVINCE: Bermuda Rise

DATA SOURCE: NAVOCEANO SP 96-1-5, MGS Area 1 Core 5

I. DEPTH DISTRIBUTION:



II. LAYER CHARACTERISTICS:

LAYER NUMBER	MATERIAL	LAYER DEPTH-cm*	LAYER THICKNESS cm	VELOCITY fps	POROSITY	WET DENSITY g/cc
1	Loose silty clay	0	475	4860	.75	1.466
2	Silt	475	50	4930	.60	1.60
3	Silty clay	525	50	4860	.77	1.40
4	Silt	575	100	4940	.60	1.60

III. SEA FLOOR INTERFACE VALUES:

BOTTOM WATER VELOCITY - fps	5075
BOTTOM WATER DENSITY - g/cc	1.0514
SURFACE SEDIMENT DENSITY - g/cc	1.46
SURFACE SEDIMENT TO BOTTOM WATER VELOCITY RATIO	.958
BOTTOM DEPTH - ft	16,800

*DEPTH TO UPPER SURFACE OF LAYER

FIG. VIII.1. Ocean Bottom and Sediment Characteristics

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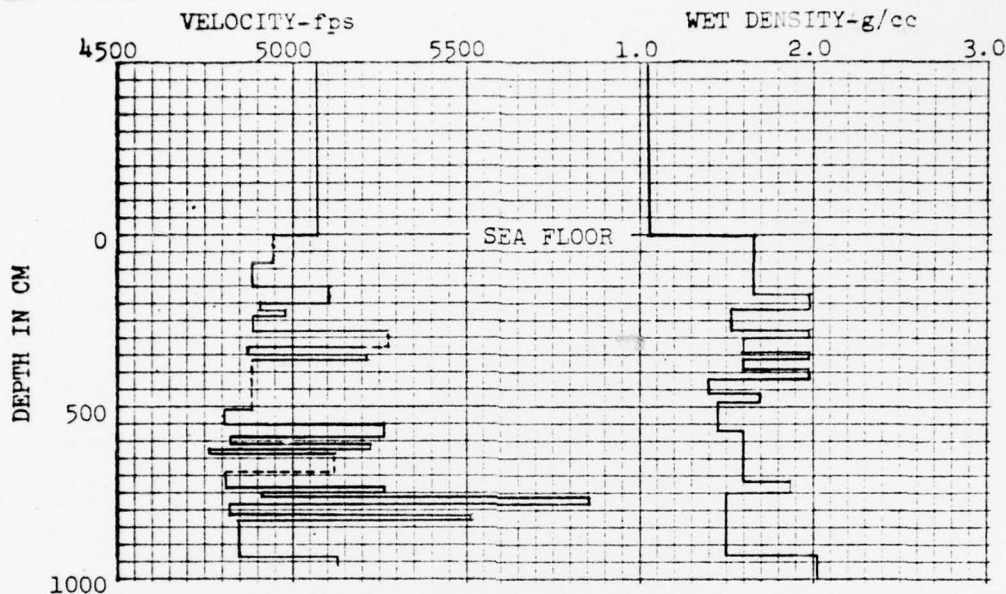
ACOUSTIC SEA FLOOR SUMMARY

LOCATION/AREA: NA-1,

PROVINCE: Sohm Abyssal Plain

DATA SOURCE: NAVOCEANO SP 96-1-5, MGS Area 1 Core 3

I. DEPTH DISTRIBUTION:



II. LAYER CHARACTERISTICS:

LAYER NUMBER	MATERIAL	LAYER DEPTH-cm*	LAYER THICKNESS cm	VELOCITY fps	POROSITY	WET DENSITY g/cc
1	Sandy clay	0	175	4940	.65	1.66
2	Silty clay	175	50	5120	.40	2.00
3	Clayey silt	225	50	4890	.68	1.55
4	Clay	275	325	5275	.40	2.00

III. SEA FLOOR INTERFACE VALUES:

BOTTOM WATER VELOCITY - fps	5070
BOTTOM WATER DENSITY - g/cc	1.0514
SURFACE SEDIMENT DENSITY - g/cc	1.66
SURFACE SEDIMENT TO BOTTOM WATER VELOCITY RATIO	.973
BOTTOM DEPTH - ft	16,800

*DEPTH TO UPPER SURFACE OF LAYER

FIG. VIII.2: Marine Geophysical Survey Area 2 Core No. AS2-8

VIII.3

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SECTION IX
REFERENCES

IX.1

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