MAY 17 1985

Docket No. 50-263

Northern States Power Company
ATTN: Mr. C. E. Larson
Director of Nuclear
Generation
414 Nicollet Mall
Minneapolis, MN 55401

Gentlemen:

We have received the attached Federal Emergency Management Agency (FEMA) letter dated April 25, 1985, and associated evaluation of the Alert and Notification System for the Monticello Nuclear Generating Plant in Monticello, Minnesota.

The evaluation states that based on the engineering design review and the results of the demonstration of the system conducted on October 3, 1984, FEMA has determined that the Alert and Notification System installed around the Monticello Nuclear Generating Plant meets the guidance of NUREG-0654/ FEMA-REP-1, Revision 1, and FEMA-43, and that there is reasonable assurance that the system is adequate to promptly alert and notify the public in the event of a radiological emergency at the site. A complete review of the offsite plans and preparedness for the Monticello Nuclear Generating Plant under FEMA rule 44, CFR 350, will be completed at a later date.

In accordance with 10 CFR 2.790 of the Commission's regulations, a copy of this letter and the enclosure will be placed in the NRC's Public Document Room.

Sincerely,

C. J. Paperiello

C. J. Paperiello, Chief
Emergency Preparedness and
Radiological Protection Branch

Enclosure: As stated

cc w/enclosure:
W. A. Shamla, Plant Manager
DMB/Document Control Desk (RIDS)
Resident Inspector, RIII
Prairie Island
Resident Inspector, RIII
Monticello
John W. Ferman, Ph.D.
Nuclear Engineer, MPCA
D. Matthews, EPB, OIE
W. Weaver, FEMA Region V

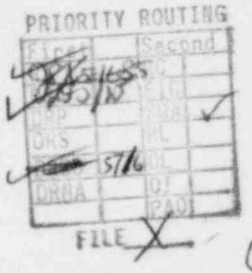
IE35
1/1

RIII	RIII	RIII	RIII
Patterson/kja	Phillips	Boyd	Paperiello
05/17/85			5/17/85

Federal Emergency Management Agency

Washington, D.C. 20472

APR 25 1985



Mr. William J. Dircks
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Dircks:

The Federal Emergency Management Agency (FEMA) has completed an analysis of the prompt alert and notification system for the Monticello Nuclear Generating Plant in Monticello, Minnesota. This review has been completed pursuant to FEMA rule 44 CFR 350; selected evaluative criteria and Appendix 3 in NUREG-0654/FEMA-REP-1, Rev. 1; and FEMA-43, the "Standard Guide for the Evaluation of Alert and Notification Systems for Nuclear Power Plants." The enclosed report entitled "Monticello Nuclear Generating Plant Site-Specific Offsite Radiological Emergency Preparedness Alert and Notification System Quality Assurance Verification," summarizes the engineering design review, incorporates the results of the telephone survey of the public conducted immediately following the alert and notification system activation on October 3, 1984, and includes the results of the review of the other applicable evaluative criteria from NUREG-0654/FEMA-REP-1, Rev.1, and FEMA-43.

Based on the aforementioned review and the results of the alert and notification system activation, FEMA has determined that the prompt alert and notification system installed around the Monticello Nuclear Generating Plant meets the specific design requirements of NUREG-0654/FEMA-REP-1, Rev. 1, and FEMA-43, and that there is reasonable assurance that the system is adequate to promptly alert and notify the public in the event of an accident at the site. A complete review of the offsite plans and preparedness for the Monticello Nuclear Generating Plant under FEMA rule 44 CFR 350 will be completed at a later date.

Sincerely,

Samuel W. Speck

Samuel W. Speck
Associate Director
State and Local Programs
and Support

Enclosure

50-263

MAY 15 1985

MONTICELLO NUCLEAR GENERATING PLANT
SITE-SPECIFIC OFFSITE RADIOLOGICAL EMERGENCY PREPAREDNESS ALERT AND NOTIFICATION SYSTEM
QUALITY ASSURANCE VERIFICATION

Prepared for

Federal Emergency Management Agency
Washington, D.C. 20472
Under Contract No. EMW-83-C-1217

April 5, 1985

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Sherburne County

I. INTRODUCTION

A. Identification

1. Site Information

The Monticello Nuclear Generating Plant, operated by the Northern States Power Company, consists of a 536 MWe (net) General Electric boiling water reactor electric generating unit that began commercial operation in 1971.[1]

The Monticello Nuclear Generating Plant is located on the south bank of the Mississippi River within the city limits of Monticello, Wright County, Minnesota. The land surrounding the Monticello Nuclear Generating Plant is predominately rural. There are a few small villages and many small lakes located within a 15-mile radius of the site. Along the Mississippi River, the terrain is heavily wooded; away from the river, the land is cultivated and used for dairy farming.

2. Governments Within The 10-Mile Emergency Planning Zone

The emergency planning zone (EPZ) for the Monticello Nuclear Generating Plant, located entirely in the

State of Minnesota, is defined by a 10-mile-radius circle with the Monticello Nuclear Generating Plant as the center point. The Mississippi River, flowing west-northwest to east-southeast, bisects the EPZ. Local government jurisdictions within the EPZ include Wright County (occupying the southern portion of the EPZ) and Sherburne County (occupying the northern portion of the EPZ).

The total 1980 population within the EPZ was estimated to be 28,770 persons. The main residential and business district of Monticello (with a 1980 population of 3095 persons) is about three miles southeast of the site. Other nearby communities include: Becker (with a 1980 population of 599 persons) about four miles northwest; Big Lake (with a 1980 population of 2185 persons) about five miles east; Maple Lake (with a 1980 population of 1136 persons) about 10 miles southwest; and Buffalo (with a 1980 population of 4502 persons) about 10 miles south.[2]

B. Scope Of Review

1. Emergency Plans For Offsite Response Organizations

The Northern States Power Company's Monticello Nuclear Generating Plant public alert and notification system is documented in the following:

. Northern States Power Company, Letter from Gary Hudson, Administrator, Emergency Preparedness, Nuclear Generation Department, to Thomas Motherway, Director, Minnesota Division of Emergency Services, dated June 1, 1984. Subject:

FEMA Evaluation of the Monticello Area Public Alert and Notification System. (This letter and its corresponding enclosures are hereinafter referred to as the Design Report.)[3]

The following State of Minnesota emergency plans and implementing instructions are applicable to this review:

- State of Minnesota, "Minnesota Emergency Response Plan for Nuclear Power Plants," Revision 0, Division of Emergency Services, February 1, 1983;[4] and

- State of Minnesota, "Minnesota Local Governments Emergency Response Plans for Nuclear Power Plants," Revision 0, Division of Emergency Services, February 1, 1983.[5]

Additionally, the Design Report includes references to, and excerpts from, the following county emergency plans and implementing instructions within the Monticello Nuclear Generating Plant EPZ:

- Sherburne County Emergency Response Plan for the Monticello Nuclear Generating Plant; and

- Wright County Emergency Response Plan for the Monticello Nuclear Generating Plant.

References 3, 4, and 5 document the administrative means established for notifying and providing prompt instructions to the public within the Monticello Nuclear Generating Plant EPZ.

2. Alert And Notification System Design Report

The physical means established for alerting the public within the Monticello Nuclear Generating Plant EPZ is documented in the following Design Report enclosures:

. Wyle Laboratories, "Final Design of Prompt Notification System for Monticello Nuclear Generating Plant," Wyle Research Report WR 81-53, February 1982;

. Wyle Laboratories, "Final Design of Prompt Notification System for Monticello Nuclear Generating Plant," Addendum to Wyle Research Report WR 81-53, May 1984, as amended by a letter from Thomas Motherway, Minnesota Division of Emergency Services, to Ed Robinson, FEMA Region V, dated March 12, 1985; and

. Wyle Laboratories, Letter from John R. Stearns, Manager, El Secundo Operations, to Gary Hudson, Administrator, Emergency Preparedness, Nuclear Generation Department, Northern States Power Company, May 31, 1984. Subject: Information on Siren Output Levels.

These three documents are hereinafter collectively referred to as the Wyle Report.

3. FEMA Evaluation Findings

FEMA Region V and the Regional Assistance Committee (RAC) have evaluated three offsite emergency preparedness exercises for the Monticello Nuclear Generating Plant:

- FEMA, "Post-Exercise Evaluation, State of Minnesota and Sherburne and Wright Counties Exercise of the Minnesota Radiological Emergency Response Plan for Monticello Nuclear Power Plant, January 7, 1981," (No date);[6]

- FEMA, "Final Report on the Monticello Nuclear Power Plant Full-Scale Joint Emergency Exercise, March 2, 1982," April 12, 1982;[7] and

- FEMA, "Final Report on the Monticello Nuclear Power Plant Full-Scale Joint Emergency Exercise Conducted February 23, 1983," (No date).[8]

II. FINDINGS FOR EVALUATION CRITERION E.6

The Design Report describing the alert and notification system for the Monticello Nuclear Generating Plant was reviewed against evaluation criterion E.6 and Appendix 3 of NUREG-0654/FEMA-REP-1, Revision 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants" (hereinafter referred to as NUREG-0654/FEMA-REP-1, Rev. 1). This evaluation criterion states:

> Each organization shall establish administrative and physical means, and the time required for notifying and providing prompt instructions to the public within the plume exposure pathway Emergency Planning Zone. (See Appendix 3.) It shall be the licensee's responsibility to demonstrate that such means exist, regardless of who implements this requirement. It shall be the responsibility of the State and local governments to activate such a system.[9]

The bases for review against this evaluation criterion were the corresponding acceptance criteria of FEMA-43, "Standard Guide for the Evaluation of Alert and Notification Systems for Nuclear Power Plants" (hereinafter referred to as FEMA-43).[10] This quality assurance verification review was performed to make a determination of the alert and notification system adequacy prior to conducting a demonstration of this system on October 3, 1984.

Based upon this quality assurance verification review and public survey results, International Energy Associates Limited concludes that the design and implementation of the alert and notification system for the Monticello Nuclear Generating Plant and its supporting procedures conform sufficiently to the acceptance criteria, as stated in FEMA-43, for evaluation criterion E.6 of NUREG-0654/FEMA-REP-1, Rev. 1, to support a FEMA finding that the alert and notification system is adequate.

This portion of the quality assurance verification review discusses the Monticello Nuclear Generating Plant alert and notification system against FEMA-43 acceptance criteria in the following areas: the administrative means of alerting, the physical means of alerting, and the special alerting methods (utilization of institutional alerting systems).

A. Administrative Means Of Alerting (E.6.1, FEMA-43)

The Design Report specifies those organizations or individuals within the state and local governments responsible for recommending the activation of the Monticello Nuclear Generating Plant alert and notification system. The decision logic as shown in Figure 1 was developed after a review of the current emergency procedures and implementing instructions for the State of Minnesota and Sherburne and Wright Counties.

As Figure 1 indicates, these emergency procedures and implementing instructions satisfy the FEMA-43 acceptance criteria. This documentation specifies the alert and notification system activation process in Minnesota from the time it is conveyed by the Northern States Power Company Emergency Director/Manager to the Minnesota Division of Emergency Services Duty Officer. The State Duty Officer simultaneously notifies the Sheriffs of Sherburne and Wright Counties who are responsible for simultaneously activating all sirens.

As stated, the decision to activate the alert and notification system is made by the State Duty Officer upon the recommendation of the Northern States Power (NSP) Emergency Director/Manager. If time permits, the State Duty Officer consults with the Department of Health

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Radiation Section Chief regarding activation and obtains the Governor's (or appropriate designee's) order. However, if the State Duty Officer cannot be reached and the emergency requires immediate activation, the NSP Emergency Director/Manager makes the activation recommendation directly to the Sheriffs of both Sherburne and Wright Counties.

Upon receipt of the recommendation to activate the alert and notification system from the NSP Emergency Director/Manager or State Duty Officer, the County Sheriffs immediately call the State Duty Officer to verify the request and ensure that the Emergency Broadcast System (EBS) and the National Oceanic and Atmospheric Administration (NOAA) Weather Service have been activated. If unable to contact the State Duty Officer, the County Sheriffs call the National Weather Service Forecast Office (NWSFO) and request activation of NOAA tone alert radios and the Metropolitan and East Central EBS. After coordination with the neighboring affected county, the County Sheriffs simultaneously activate the fixed sirens. Route alerting emergency vehicles with sirens are dispatched to notify isolated residents within the 5- to 10-mile area. The sirens are activated three times, each time with a steady alert for three minutes and a 15-minute break to coincide with the 45-minute period for the EBS messages and route alerting schedules.

The EBS radio stations use prewritten emergency public information broadcast messages. These prewritten messages preclude the possibility of an error in the announcements and streamline the notification process. Unless an updated message is received from the State Duty Officer, these messages are repeated at 15-minute intervals for a minimum of 45 minutes.

FEMA exercise evaluations (references 6, 7, and 8) have demonstrated that the administrative mechanisms are in place to provide prompt notification to the general public in the event of an emergency situation at the Monticello Nuclear Generating Plant.

B. Physical Means Of Alerting (E.6.2, FEMA-43)

As described in the Design Report, the physical means of alerting for the Monticello Nuclear Generating Plant consists of 58 fixed siren units providing coverage to essentially 100% of the populated area within a 5-mile radius of the plant as well as selected populated areas within a 5- to 10-mile radius. Rural areas within the 5- to 10-mile radius that do not lie within an effective siren range are alerted through the use of vehicles operated by county law enforcement agencies.

Approximately 50 commercial-grade tone alert receivers have been placed in institutional and commercial facilities to help provide supplemental alerting notification capability for large concentrations of people.

1. Sirens (E.6.2.1, FEMA-43)

The Monticello Nuclear Generating Plant siren warning system was evaluated in accordance with the design evaluation methodology as detailed in "Analysis of Siren System Pilot Test."[11]

The siren system as analyzed consisted of 59* sirens:

---

*Subsequent to this analysis, the Design Report was amended to show that siren NSP-1, a Thunderbolt Model 1000, was removed from service. Therefore, the current system consists of 58 sirens.

46* Federal Signal (FS) Thunderbolt Model 1000 (125 dBC);
11 FS Model 2 (113 dBC); and
2 FS Model 3 (113 dBC).

The Wyle Report states that a derated value of 122 dBC was utilized in the design procedure for the FS Thunderbolt Model 1000 sirens.

Sections 2 and 3 of an enclosure to the Design Report, "Monticello Area Public Alert and Notification System (PANS), Implementing Procedures, Supplementary Documents," describes the testing and maintenance requirements for the PANS. Section 2 of the enclosure states that complete cycle tests of all system components, via activation from the control centers, are conducted once a month. The Design Report contains a monthly availability summary for the 58 sirens in service between April 1983 and April 1984, which indicated an availability in excess of 90%, based on siren days out of service.

Anechoic-chamber measured octave band sound pressure level spectrums (supplied by the siren manufacturer) were used to verify the rated output of all of the sirens.

The evaluation of the Monticello Nuclear Generating Plant siren warning system design calculation procedure was conducted by:

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*See footnote on previous page.

- Verifying the design calculation procedure as presented in the Wyle Report against the 10 dB loss per distance doubled attenuation rate in the absence of special conditions; and

- Ascertaining the adequacy of the design procedure in the presence of site-specific topographical and meteorological conditions through comparisons of the design procedure with the Outdoor Sound Propagation Model (OSPM)[11] results for specific sirens.

The Monticello Nuclear Generating Plant siren warning system design procedure, as described in Appendix A of the Wyle Report, accounted for the principal elements of sound propagation loss (i.e., spherical spreading, atmospheric absorption, and excess attenuation). Topographical barriers were accounted for via the Kurze-Anderson attenuation procedure.

Table B-1 of the Wyle Report summarizes average maximum propagation ranges, in the absence of barrier losses, as follows:

	70 dBC	60 dBC
FS 1000	3600 ft.	6700 ft.
FS Models 2 & 3	1700 ft.	3800 ft.

Sound contours were calculated by computer for the 59 siren locations to generate the 60 dBC and 70 dBC coverage map, Map 1, in the Wyle Report. Population distributions within the EPZ were described in section 4 of the Wyle Report. The Wyle Report states that there are a few areas within a 5-mile radius of the plant that do not have 60 dBC coverage and are uninhabited.

This quality assurance verification review seeks to ascertain whether the design procedure used adequately accounts for the site-specific terrain and weather conditions and whether the siren warning system as designed does indeed meet the FEMA-43 acceptance criteria.

Fourteen sirens that influence the sound coverage, as depicted on the U.S. Geological Survey's Monticello and Buffalo quadrangle maps (see Figures 2 and 3), were selected for this quality assurance verification review. Eleven of these sirens are located in the Monticello area and three are located in the Buffalo area. This selection (comprised of 12 FS 1000 sirens and 2 FS Model 2 sirens) is representative of the site-specific topographical conditions around the more populated areas within the Monticello Nuclear Generating Plant EPZ.

Surface weather parameters, representative of site prevailing summer daytime conditions, were used in the OSPM calculations. Appendix A of this report contains topographical profile charts, topographical input, sound pressure level input, meteorological input, and sound pressure level output versus distance for each of the 14 individual siren runs.

The predicted siren sound pressure levels vary and do not exhibit the usual smooth decay with distance, principally because of the varied terrain conditions within the EPZ. To compare the ranging estimates of OSPM with the design procedure, the output dBC levels for the 14 analyzed sirens were classified into three categories according to terrain profiles: hilly (major physical obstruction within 4000 ft.),

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partially hilly (minor physical obstructions), and relatively flat (generally unobstructed line-of-sight within 10,000 ft.). Regressions of dBC versus the logarithm of distance were performed for the siren types over varying terrain conditions. The FS 1000 sirens were analyzed over all three catergories while the FS Model 2 sirens were analyzed over the relatively flat and partially hilly categories. The results of the comparison of the OSPM and design procedure (the average maximum ranges for 70 dBC and 60 dBC from Table B-1 of the Wyle Report) are depicted in Figures 4 through 8. Also depicted is the 10 dB loss per distance doubled attenuation rate as recommended in NUREG-0654/FEMA-REP-1, Rev. 1. The regressed range estimates from the OSPM data indicate that the 10 dB loss per distance doubled attenuation rate is conservative. The 10 dB loss per distance doubled attenuation rate yields 70 dBC and 60 dBC ranges of 3600 and 7200 ft. for the FS 1000 sirens and 1950 and 3900 ft. for the FS Model 2 sirens; thus, the design procedure, per Table B-1, yields slightly more conservative results than does the 10 dB loss per distance doubled attenuation rate.

The results of the individual OSPM runs were combined to generate a comprehensive overview of the siren sound pressure levels over both the Monticello and Buffalo areas as depicted in Figures 2 and 3. A surface interpolation and contouring program utilizing the output results of the 14 sirens was used to generate the sound pressure level contour overlays. These contours account for site-specific topographical and meteorological effects. Comparisons of the OSPM predicted 70 dBC and 60 dBC

FIGURE 4

COMPARATIVE OSPM RESULTS, HILLY TERRAIN (FS 1000 SIREN)

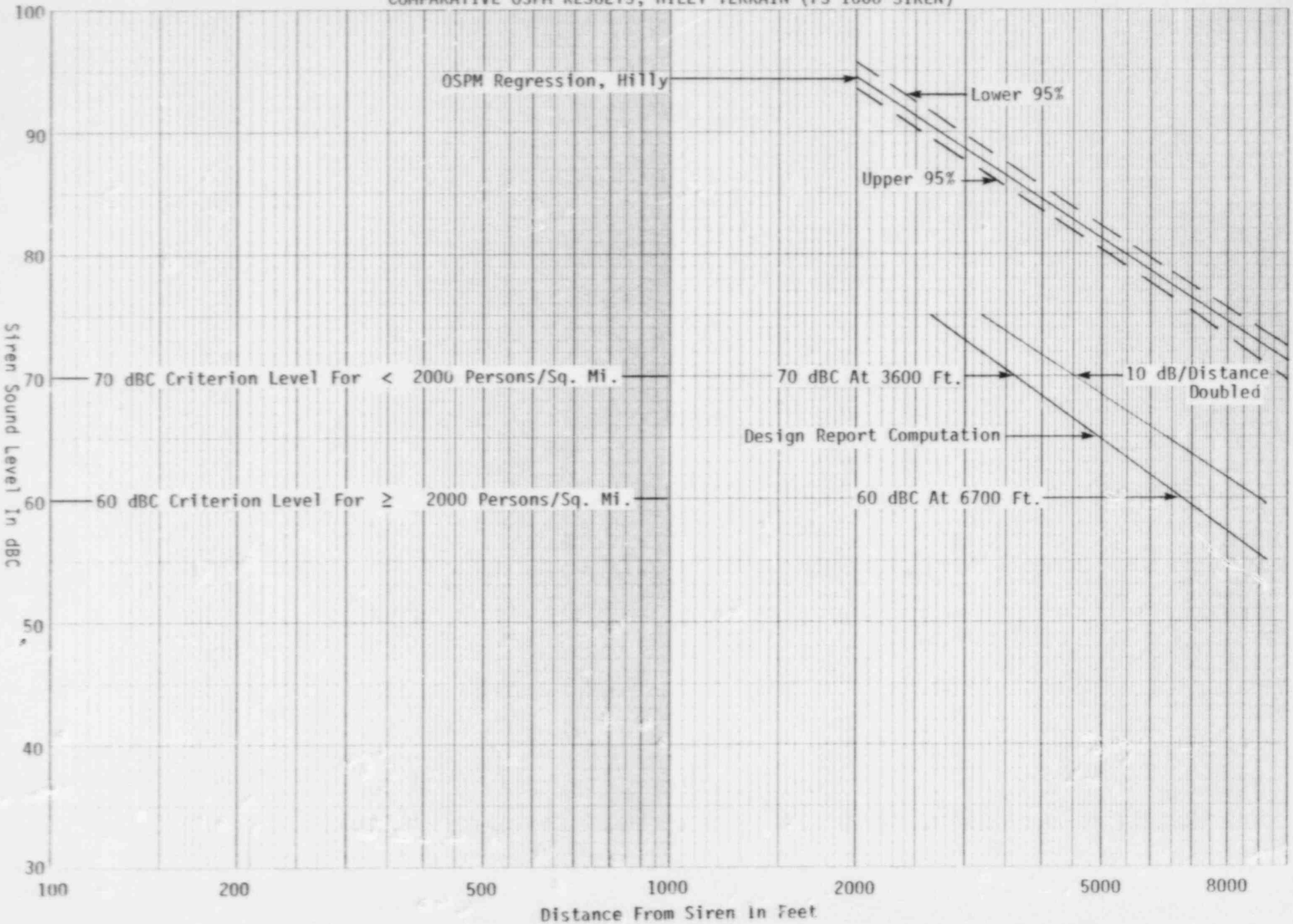


FIGURE 5

COMPARATIVE OSPM RESULTS, PARTIALLY HILLY TERRAIN (FS 1000 SIREN)

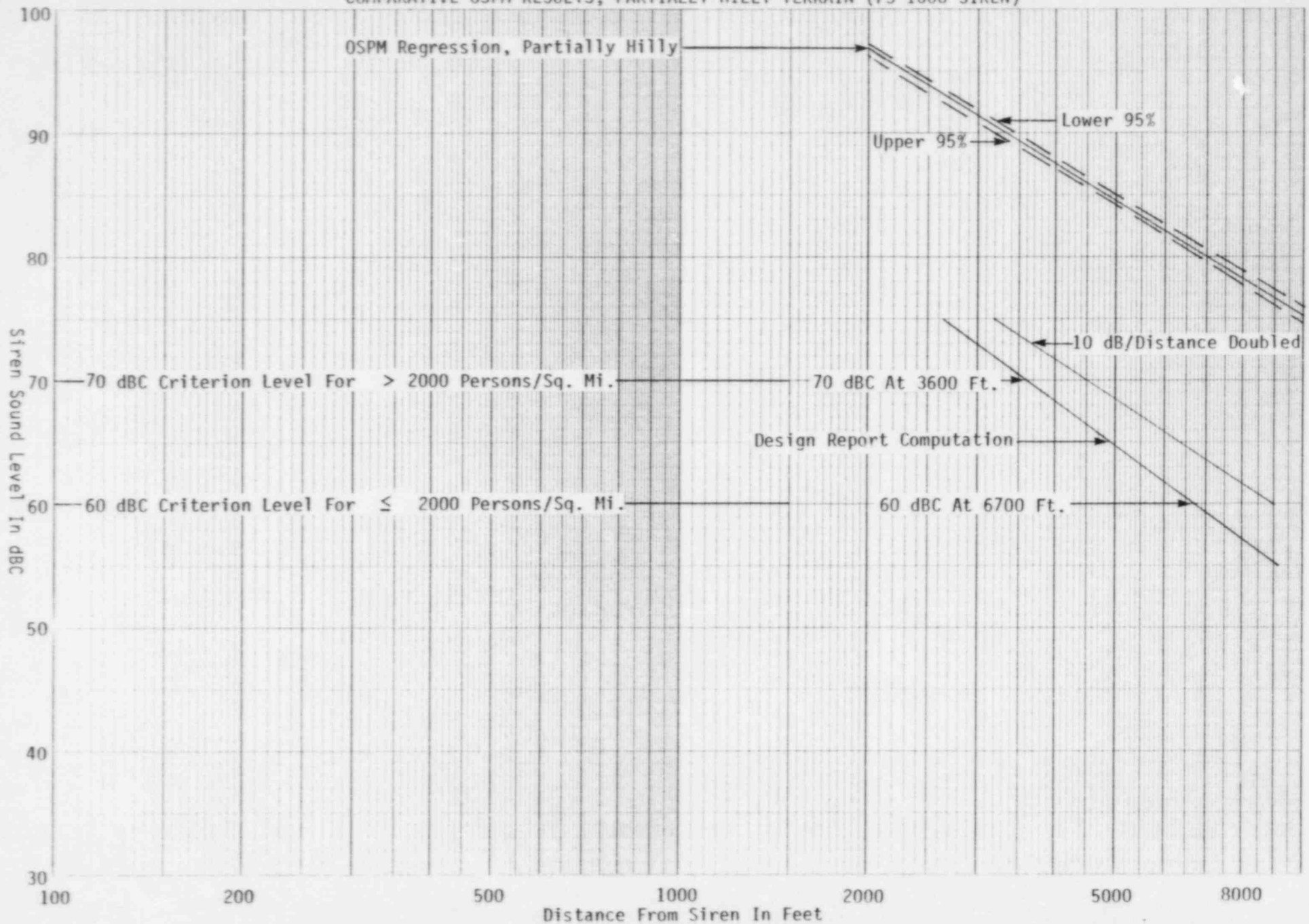


FIGURE 6

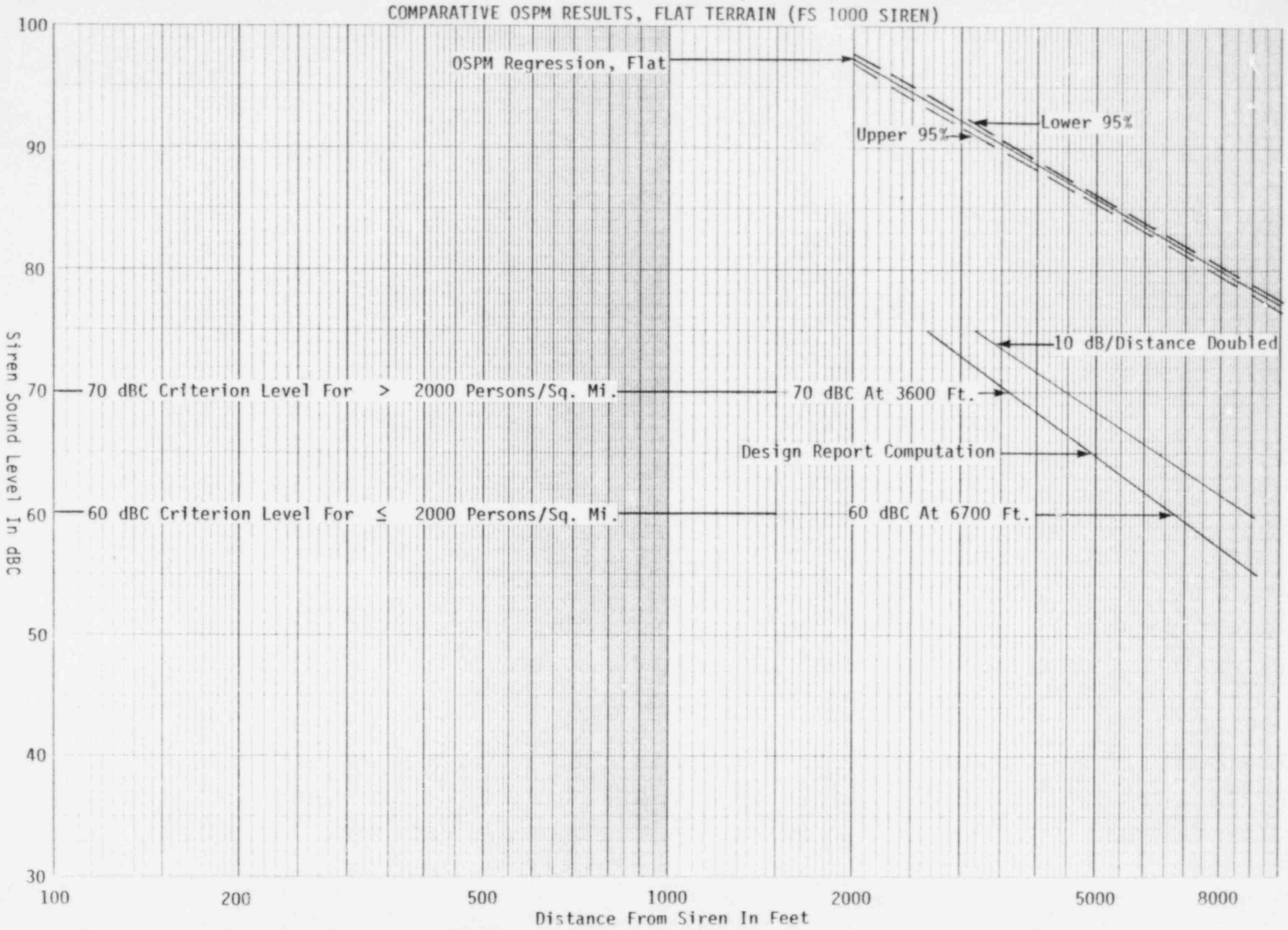

COMPARATIVE OSPM RESULTS, FLAT TERRAIN (FS 1000 SIREN)
OSPM Regression, Flat
Lower 95%
Upper 95%
10 dB/Distance Doubled
70 dBC Criterion Level For > 2000 Persons/Sq. Mi.
70 dBC At 3600 Ft.
Design Report Computation
60 dBC Criterion Level For ≤ 2000 Persons/Sq. Mi.
60 dBC At 6700 Ft.
Siren Sound Level In dBC
100
90
80
70
60
50
40
30
100
200
500
1000
2000
5000
8000
Distance From Siren In Feet

FIGURE 7

COMPARATIVE OSPM RESULTS, PARTIALLY HILLY TERRAIN (FS MODEL 2 SIREN)

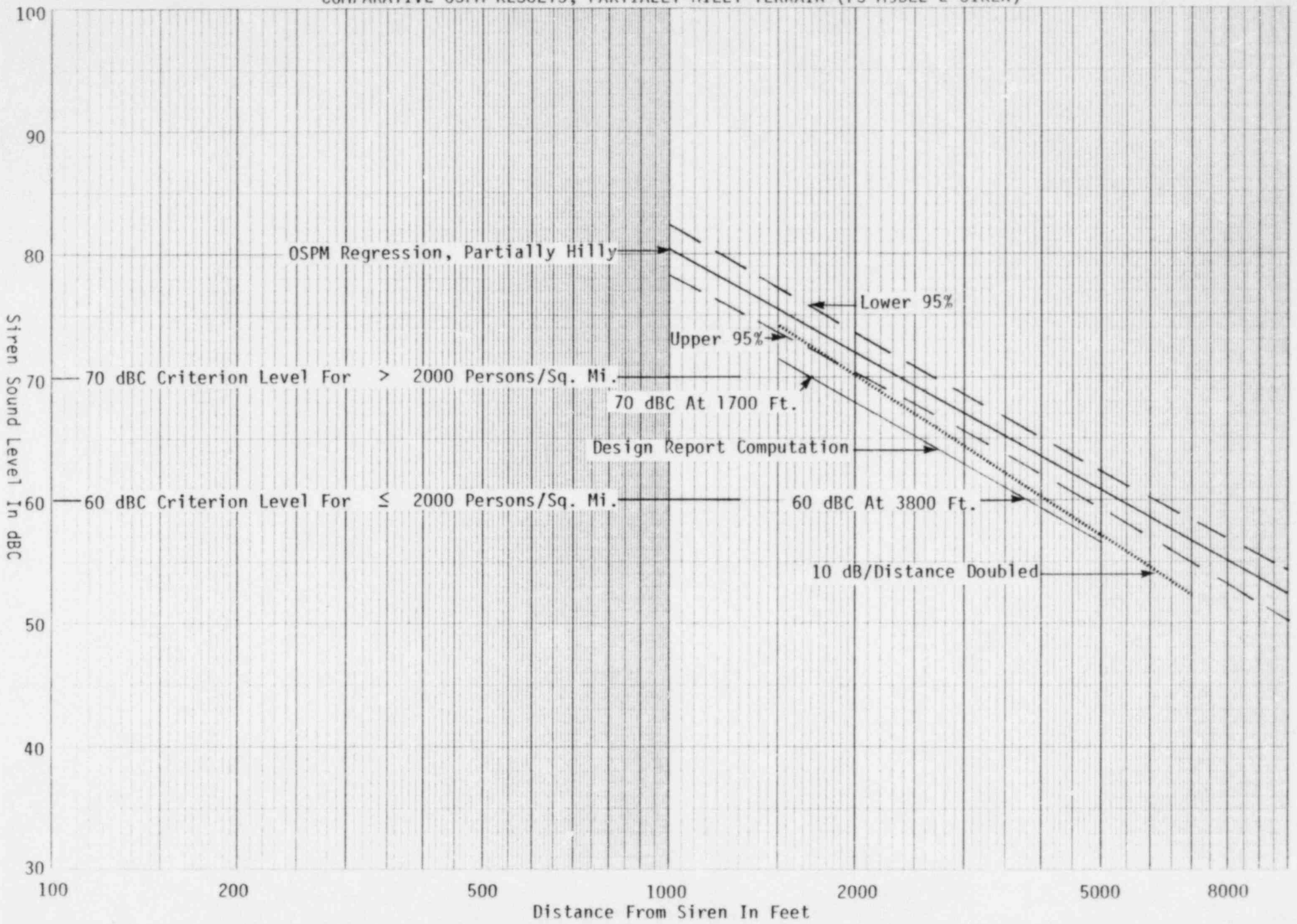
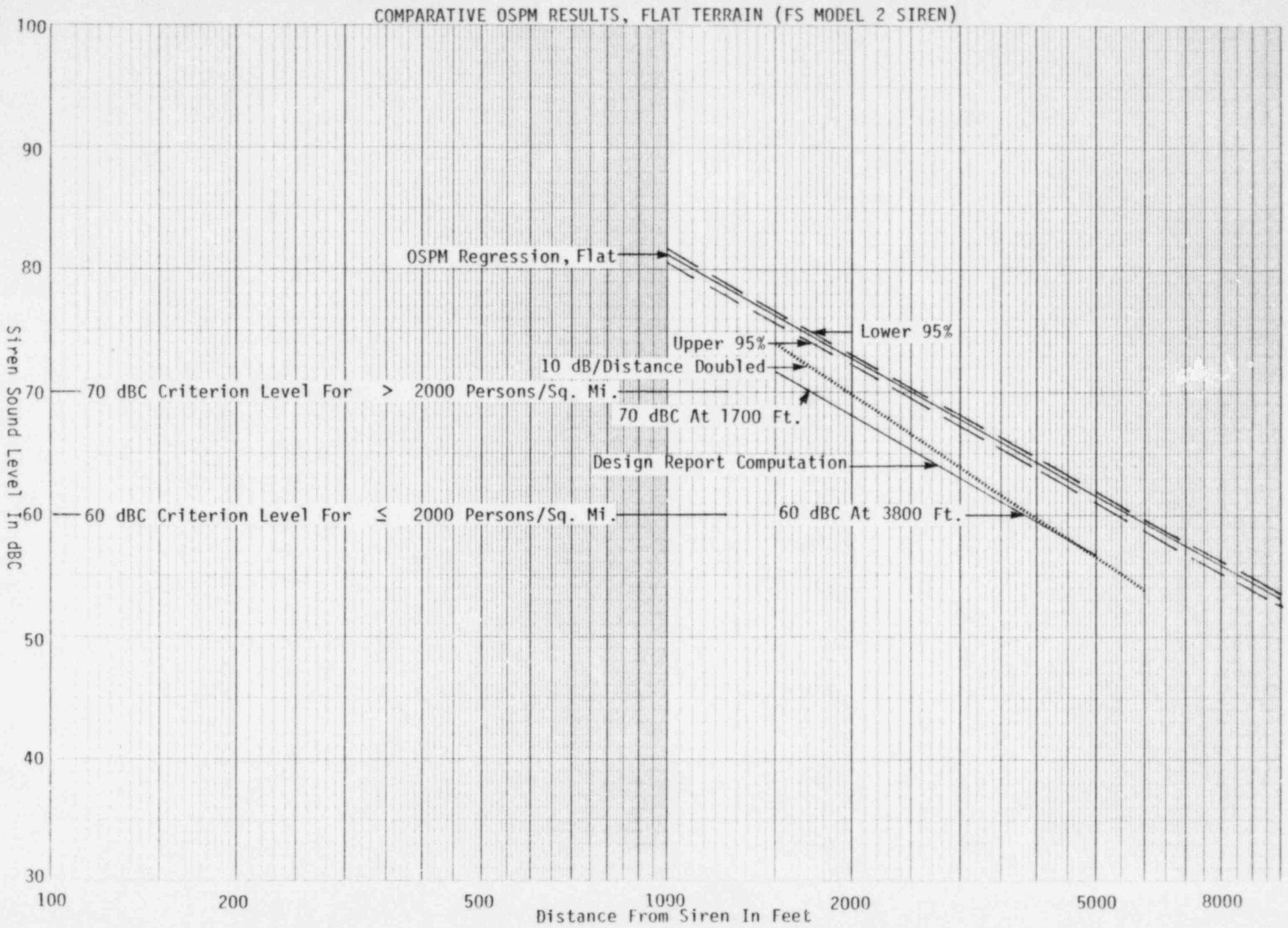


FIGURE 8


COMPARATIVE OSPM RESULTS, FLAT TERRAIN (FS MODEL 2 SIREN)
100
90
80
70
60
50
40
30
Siren Sound Level In dBC
OSPM Regression, Flat
Lower 95%
Upper 95%
10 dB/Distance Doubled
70 dBC Criterion Level For > 2000 Persons/Sq. Mi.
70 dBC At 1700 Ft.
Design Report Computation
60 dBC Criterion Level For ≤ 2000 Persons/Sq. Mi.
60 dBC At 3800 Ft.
100
200
500
1000
2000
5000
8000
Distance From Siren In Feet

contours with the contours in the Wyle Report (Map 1) indicate that the siren coverage as calculated in the Wyle Report is very conservative in the Buffalo and Monticello areas and similar to OSPM results in hilly terrains.*

The design procedure results in a reasonably conservative overall estimate of Monticello Nuclear Generating Plant's siren warning system coverage and is found to be adequate in satisfying FEMA-43 specific design requirements.

2. Special Alerting (F.6.2.4, FEMA-43)

A supplemental system of public alerting and notification has been developed for the Monticello Nuclear Generating Plant EPZ. This system consists of route alerting utilizing county law enforcement agency vehicles along pre-assigned routes within the EPZ. Route alert teams use sirens and/or public address systems while traversing their routes, alerting the general public to follow specific instructions. The route alerting system is designed to alert the downwind or primary sectors and the two adjoining or secondary sectors of the EPZ as a priority in an accident situation. The remaining sectors of the EPZ are covered as necessary, depending on the situation. Initiation of route alerting, as shown in Figure 1, is the responsibility of the Sheriff's Offices of Wright and Sherburne Counties. Route alerting commences upon activation of the fixed

*The removal of siren NSP-1 from the analyzed system has been assessed and found to have no adverse effect since the residences in the area covered by NSP-1 are covered by route alerting.

sirens and, as stated in the Design Report, can be completed within 45 minutes in accordance with the NUREG-0654/FEMA-REP-1, Rev. 1, criteria.

Furthermore, approximately 50 commercial-grade tone alert receivers provide alert and notification to commercial and institutional facilities containing large groups of persons during all or part of a day. Most of these locations are already covered by state and county emergency warning plans and are within the alerting range of the fixed sirens.

The tone alert receivers, Regency Communications Inc. Model MCA-611A, are designed to transmit an alerting signal, as well as emergency instructions broadcast by the Minneapolis - St. Paul NWSFO. NWSFO activates the tone alert receivers upon request of the Minnesota Division of Emergency Services (DES) and then broadcasts the emergency message supplied by the DES Duty Officer.

III. FINDINGS FOR EVALUATION CRITERION N.1

On October 3, 1984, the physical means (sirens and route alerting) used to alert the population within the Monticello Nuclear Generating Plant EPZ was demonstrated to satisfy the alert and notification aspects of 44 CFR 350.9(a). This demonstration was conducted by using the methods specified in Section N.1.(a,b).2 of FEMA-43.[10] The results indicate that this portion of the alert and notification system evaluation conforms to FEMA-43 and NUREG-0654/FEMA-REP-1, Rev. 1.[9]

The October 3, 1984 demonstration of the Monticello Nuclear Generating Plant siren system consisted of a triple activation of all sirens, a route alerting demonstration, and a subsequent telephone survey to estimate the proportion of EPZ households actually alerted. Siren activations were initiated at 12:59 p.m., 1:04 p.m., and 1:07 p.m. (Central Daylight Time). All sirens were reported operating during the activations. Route alerting began at approximately 1:00 p.m.

The telephone survey of EPZ residences began at approximately 1:08 p.m. (Central Daylight Time) and was completed within one hour and 30 minutes. This survey was conducted by approximately 40 telephone interviewers, each with a separate WATS line and computer terminal.

The universe of households to be surveyed was determined by establishing a 10-mile-radius circle around the latitude and longitude of the plant. The sample incorporated a sorted master list of approximately 2500 households (addresses and telephone numbers) within the established boundary.

Replicated subsamples were developed from this master list. In order to properly account for route alerting, one replicated subsample of 750 households was analyzed in greater detail than is usually required. The size of this subsample was calculated so that:

- It was sufficiently large to support interviewing efforts for as long as possible and to minimize the down time associated with the waiting period between interviewing households in siren coverage areas and the 45 minutes after initiation of route alerting, so that interviews in route alerting areas could begin; and

- It was small enough in size to ensure that the total sample was representative of the EPZ (i.e., to ensure that a disportionate number of interviews were not completed in the siren coverage areas simply because interviewing could be started in these areas about 40 minutes earlier).

All households in this systematically drawn subsample were screened by checking their addresses against street maps showing siren coverage areas and route alerting areas. The subsample was sorted into two groups: (1) households that were positively identified as being in siren areas (and therefore could be contacted immediately after activation) and (2) households that either were in route alerting areas or had uncertain geographic locations (such as post office boxes or rural route addresses). In addition, all households in the entire sample that could be positively identified as being outside the EPZ were also removed from the sample.

Immediately following the third siren activation, interviews were begun with the households in the subsample

that had been definitely identified as being in the siren coverage area. Interviews were attempted with all of these households until this group of the subsample was exhausted. Forty-five minutes after route alerting began, interviews started with the group of households in the subsample that were in route alerting areas or that could not be precisely located. Interviews were attempted with all of these households until this group of the subsample was exhausted. As soon as this replicate subsample was exhausted, interviews were begun using the remaining replicate subsamples.

A sufficient number of replicated subsamples were developed from the overall sample to ensure that the required number of telephone calls would be made, i.e., to establish the proportion of households alerted to within a 5% precision at a 95% confidence level. Appendix B of this report describes the method for sizing the sample to achieve this result.

The questionnaire used for the telephone survey is included as Figure 9.

As part of the telephone survey, a total of 311 households within the Monticello Nuclear Generating Plant EPZ were contacted and their responses were collected in an automated data base. Of this group, 50 respondents stated that they were not alerted. However, before running the final tabulations, addresses of all households interviewed were checked on a street map to validate their locations. Of the 311 addresses, three were outside the EPZ. Therefore, data were tabulated on the 308 respondent households that were located within the EPZ. Respondents at 30 of these households had been away from home at the time of the siren system demonstration and, therefore, were

FIGURE 9

?2316Q
Chilton Research Services
Radnor, Pennsylvania

Study #8589
October 3, 1984

OMB #3067-0103 (FEMA 9/84)
FEMA NUCLEAR POWER PLANT ALERTING AND NOTIFICATION SYSTEM: PUBLIC TELEPHONE SURVEY

MONTICELLO NUCLEAR GENERATING STATION

Time Dialed _____AM _____PM

Time Began _____AM _____PM

Time Ended _____AM _____PM

Interview # _____ (1-3)

Zip Code _____ (6-10)

INTERVIEWER: Enter Sample Type _____ (11)

RECORD BEFORE DIALING - Telephone # _____ (Area Code) (Exchange) (Number) (12-21)

INTRODUCTION:

Hello, my name is _____. We're calling households long distance from Chilton Research Services as part of a survey. This survey is sponsored by The Federal Emergency Management Agency (FEMA) of the United States Government. Your answers are voluntary and will be kept strictly confidential.

1. First of all, is this (REPEAT # DIALED)?

	Yes	1
TERMINATE AND DIAL AGAIN	No	2

2. As you may or may not know, there was a test of the public warning/alert notification system for THE MONTICELLO NUCLEAR GENERATING STATION. Did you, or any other member of your household, hear any type of emergency warning/alert signal from this test today?

22-

CONTINUE	Yes	1
SKIP TO Q. 4A	No	2
CONTINUE	Heard from another source	3
ASK IF ANY OTHER HOUSEHOLD MEMBER IS MORE KNOWLEDGEABLE	Don't Know	8

. What type of emergency warning signal did you or your household hear? (DO NOT READ. CIRCLE ALL THAT APPLY)

(23-29

SKIP TO Q. 4	Siren (PROBE FOR TYPE)	
	Large pole-mounted	1
	Police or Fire Vehicle	2
	Don't Know	3
	Neighbor told me	4
	Other family member told me	5
	Other: (SPECIFY) _____	0
CONTINUE	Don't Know	Y

A. Did you hear . . . (READ LIST. CIRCLE ALL THAT APPLY)

(30-36

	Large Pole-mounted siren	1
	Police or Fire Vehicle siren	2
	From a neighbor	4
	From another family member	5
	Or by means of something else (SPECIFY) _____	6
DO NOT READ	Siren - Don't know type	3
	Don't Know	Y

. (IF "HEARD EMERGENCY SIGNAL" ASK Q. 4 BELOW; OTHERWISE SKIP TO Q. 4A)

Were you at home or away from home when you were made aware of this emergency test signal?

37-

SKIP TO Q. 5	Home	1
	Away from home	2

A. (IF "DID NOT HEAR EMERGENCY SIGNAL")

Were you at home between 1:00 and 2:00 this afternoon?

38-

Yes	1
No	2
Don't Know	Y

Has your household ever received instructions which tell you what to do in the event of a "real" emergency at Monticello Nuclear Generating Station? This large white booklet with blue print titled "Emergency Planning Guide -- for neighbors of Monticello Generating Station" was delivered to you in September, 1984 from the Northern States Power Company. Do you recall receiving this information?

39-

Yes	1
No	2
Don't Know	Y

Because we need to determine whether or not you live within the 10 mile Emergency Planning Zone of Monticello Nuclear Generating Station, would you please give me your address? (PAUSE FOR ANSWER)

ADDRESS:

_____

_____

and the nearest intersection to your home.

_____

Also, in what community do you live?

_____

On behalf of Chilton Research Services and the Federal Emergency Management Agency, I would like to thank you for your time and for giving us this valuable information.

not included in the alerting analysis. Of the remaining 278 households, 86.7% (241) indicated that they had been alerted during the demonstration. Using the estimated number of households within the EPZ (10,060 from reference 2) in the confidence interval expression in Appendix B, an estimated 95% confidence interval (that ranged from 83.3% to 90.1%) is yielded for the proportion of the total EPZ population alerted. In other words, at the 95% confidence level, between 83.3% and 90.1% of the households within the Monticello Nuclear Generating Plant EPZ were alerted by the siren and route alerting systems.

The sample of 308 households was also used to estimate the proportion of households within the EPZ that would have stated they received information about what to do in a real emergency at the Monticello Nuclear Generating Plant. Of these 308 households, 77.6% (239) responded that they had received the information, 19.1% (59) responded that they had not received the information, and 3.2% (10) did not know or refused to state whether they had received the information. Using the approach discussed previously, the following estimates for the entire EPZ population resulted (at the 95% confidence interval):

- Between 72.7% and 81.8% of the households would have reported receiving the information;

- Between 15.2% and 23.8% of the households would have responded that they had not received the information; and

- Between 1.8% and 5.8% of the households would not have known or refused to state whether they had received the information.

In conclusion, no areas of the Monticello Nuclear Generating Plant siren or route alerting systems were identified as needing enhancements.

IV. FINDINGS FOR EVALUATION CRITERIA E.5, F.1, N.2, N.3, AND N.5

Those aspects of the Monticello Nuclear Generating Plant alert and notification system addressing evaluation criteria E.5, F.1, N.2, N.3, and N.5 of NUREG-0654/FEMA-REP-1, Rev. 1, have been reviewed by FEMA, and the results are documented in the Executive Summary of the "Final Report on the Monticello Nuclear Power Plant Full-Scale Joint Emergency Exercise Conducted February 23, 1983."[8]

REFERENCE LIST

1. Nuclear News. 1984. "World list of nuclear power plants." Vol. 27, No. 10. August 1984.

2. Northern States Power Company. 1981. "Final safety analysis report, Monticello Nuclear Generating Plant." October 1981.

3. Northern States Power Company. 1984. Letter from Gary Hudson, Administrator, Emergency Preparedness, Nuclear Generation Department, to Thomas Motherway, Director, Minnesota Division of Emergency Services, dated June 1, 1984. Subject: FEMA Evaluation of the Monticello Area Public Alert and Notification System.

4. State of Minnesota. 1983. "Minnesota emergency response plan for nuclear power plants." Revision 0. Division of Emergency Services. February 1, 1983.

5. State of Minnesota. 1983. "Minnesota local governments emergency response plans for nuclear power plants." Revision 0. Division of Emergency Services. February 1, 1983.

6. Federal Emergency Management Agency. "Post-exercise evaluation, State of Minnesota and Sherburne and Wright Counties exercise of the Minnesota radiological emergency response plan for Monticello Nuclear Power Plant, January 7, 1981." (No date).

7. Federal Emergency Management Agency. 1982. "Final Report on the Monticello Nuclear Power Plant full-scale joint emergency exercise, March 2, 1982." April 12, 1982.

8. Federal Emergency Management Agency. "Final report on the Monticello Nuclear Power Plant full-scale joint emergency exercise conducted February 23, 1983." (No date).

9. Nuclear Regulatory Commission and Federal Emergency Management Agency. 1980. "Criteria for preparation and evaluation of radiological emergency response plans and preparedness in support of nuclear power plants." NUREG-0654/FEMA-REP-1. Revision 1. November 1980.

10. Federal Emergency Management Agency. 1983. "Standard guide for the evaluation of alert and notification systems for nuclear power plants." FEMA-43. September 1983.

11. International Energy Associates Limited. 1983. "Analysis of siren system pilot test." IEAL-333. November 2, 1983.

APPENDIX A

Topographical Profile Charts

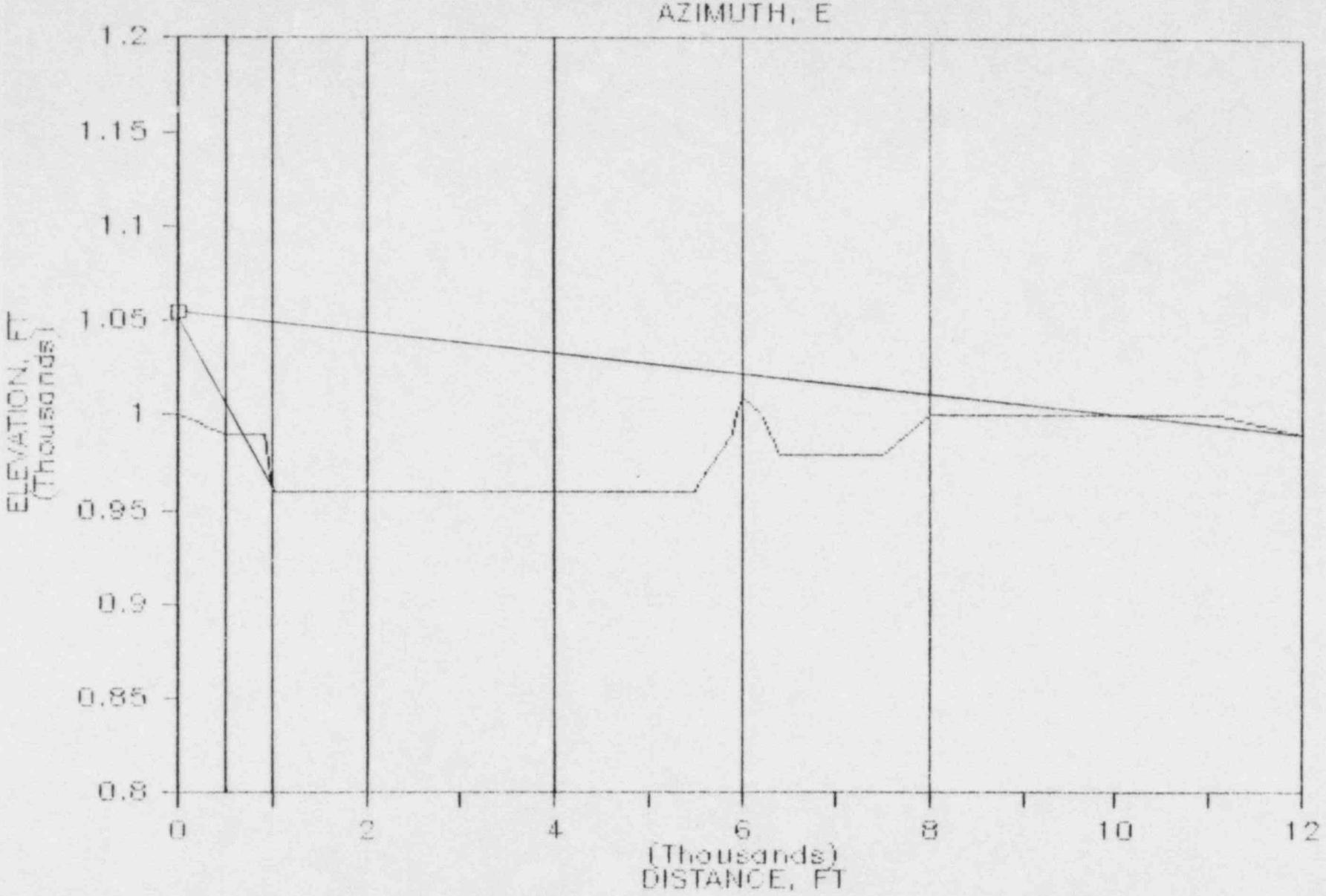
OSPM Topographical Input Data

OSPM Siren Sound Pressure Level Input Data

OSPM Meteorological Input Data

OSPM Siren Sound Pressure Level Output Data

MONTICELLO B1



MONTICELLO B1

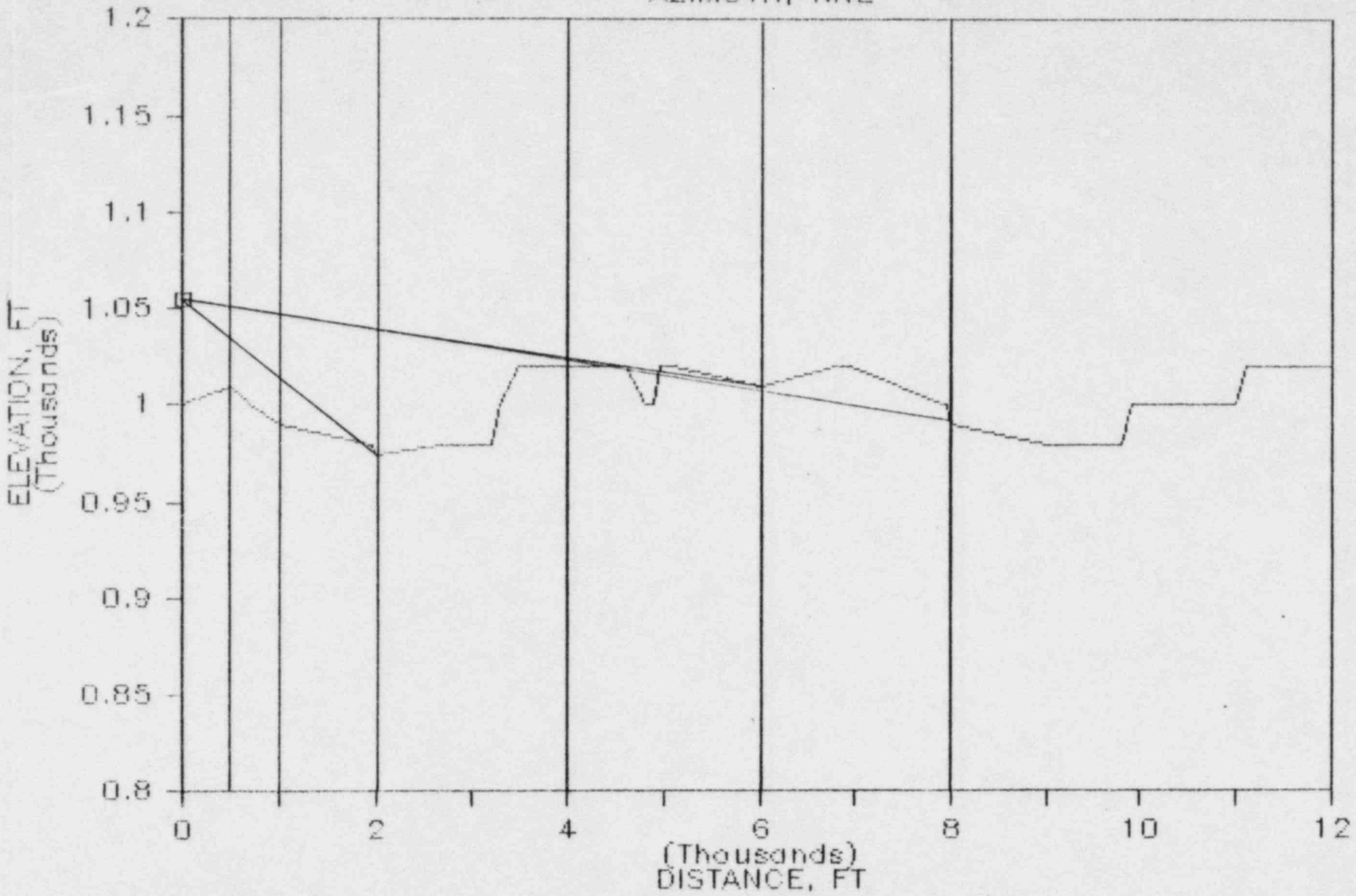
AZIMUTH, ENE

MONTICELLO B1

AZIMUTH, NE

MONTICELLO B1

AZIMUTH, NNE



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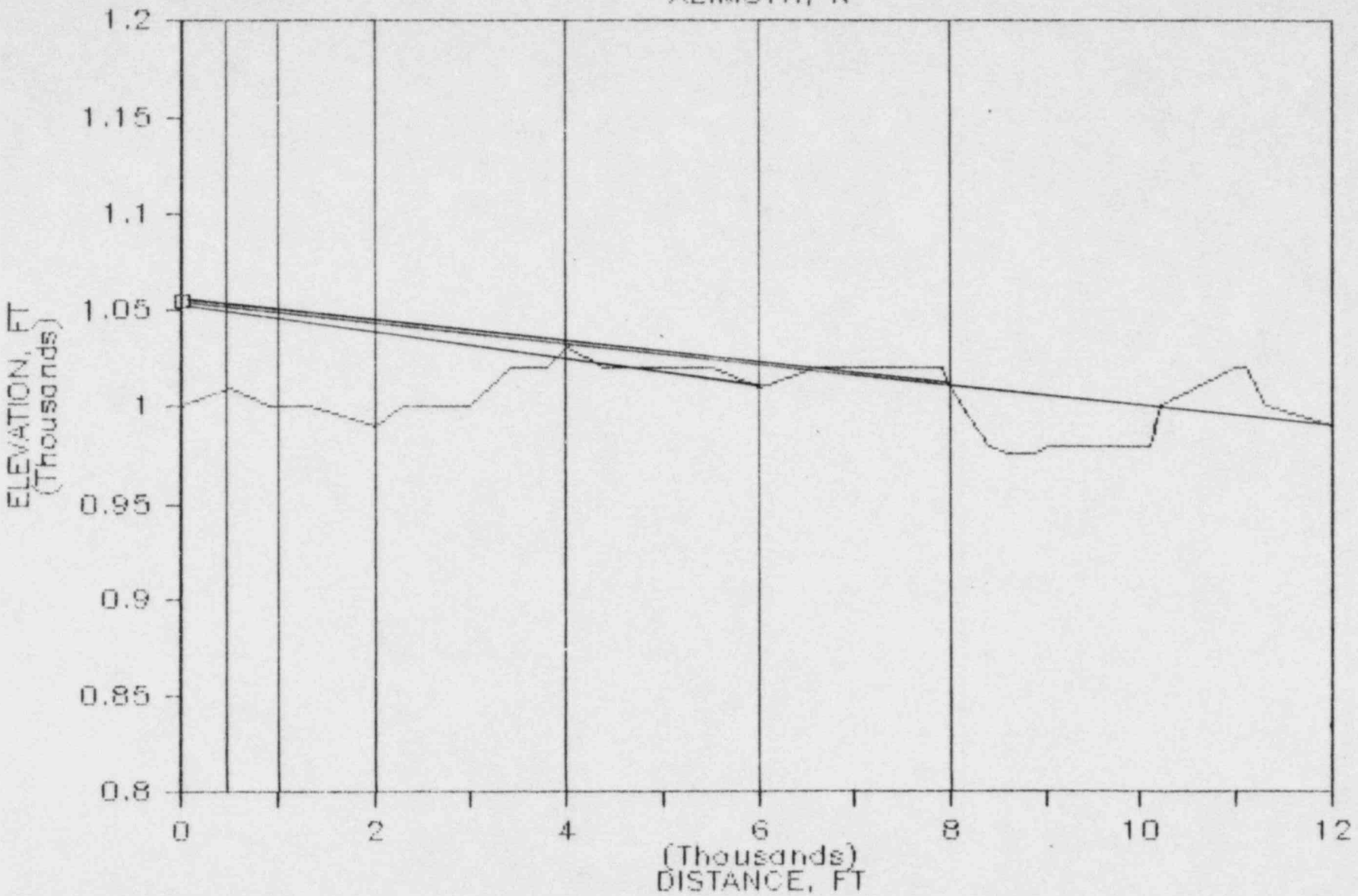

MONTICELLO B1

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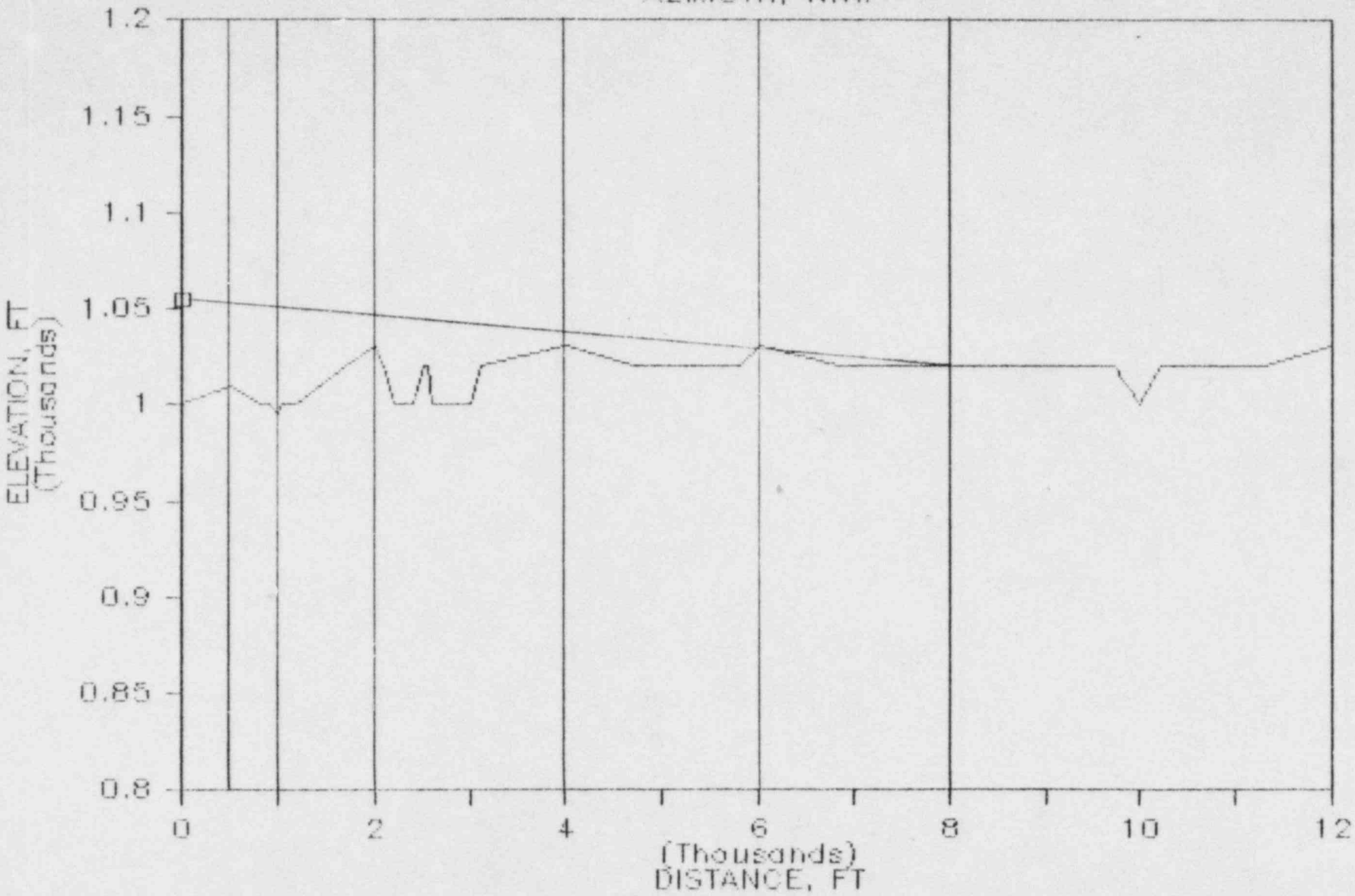
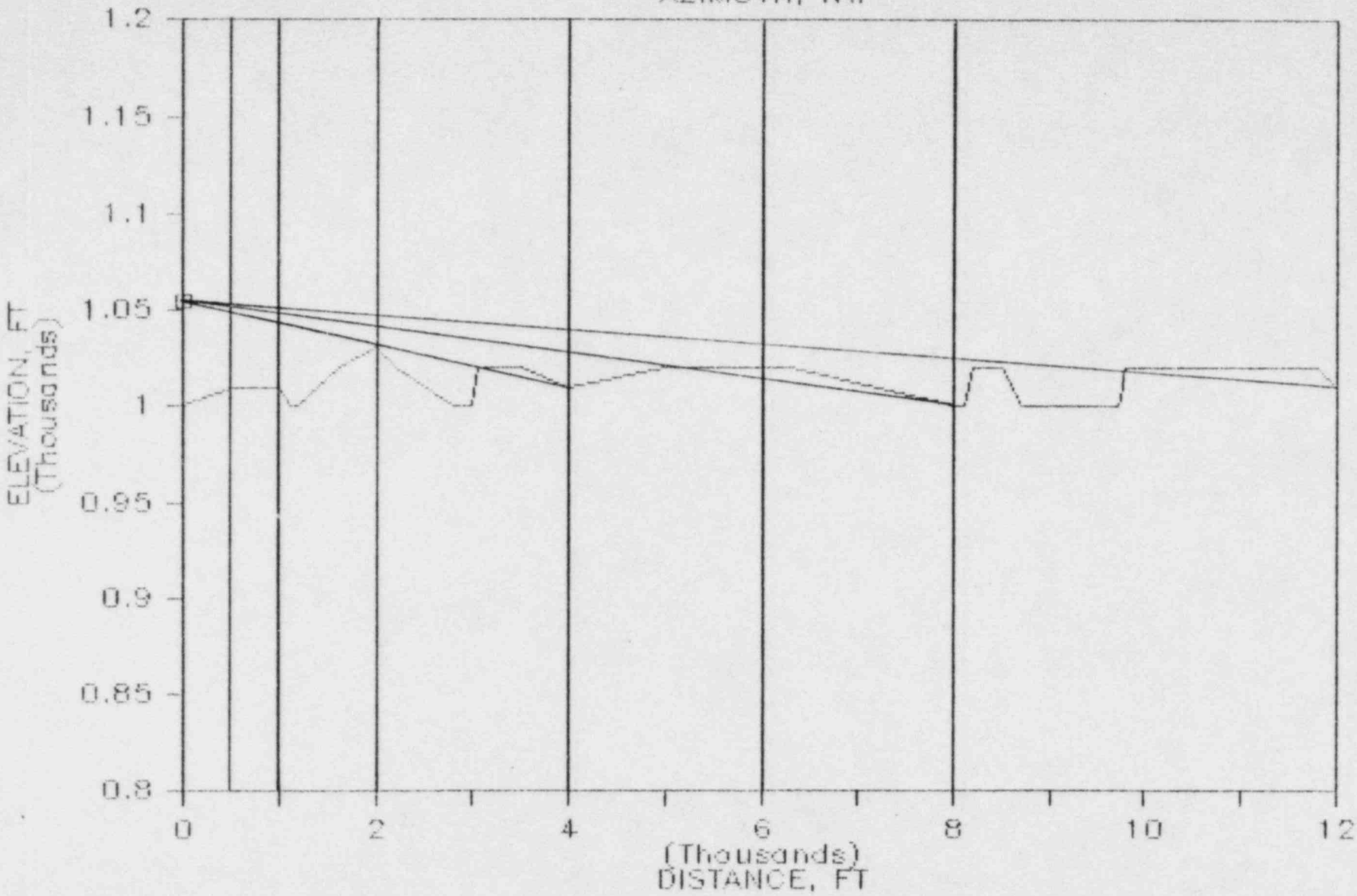


MONTICELLO B1

AZIMUTH, NW



MONTICELLO B1

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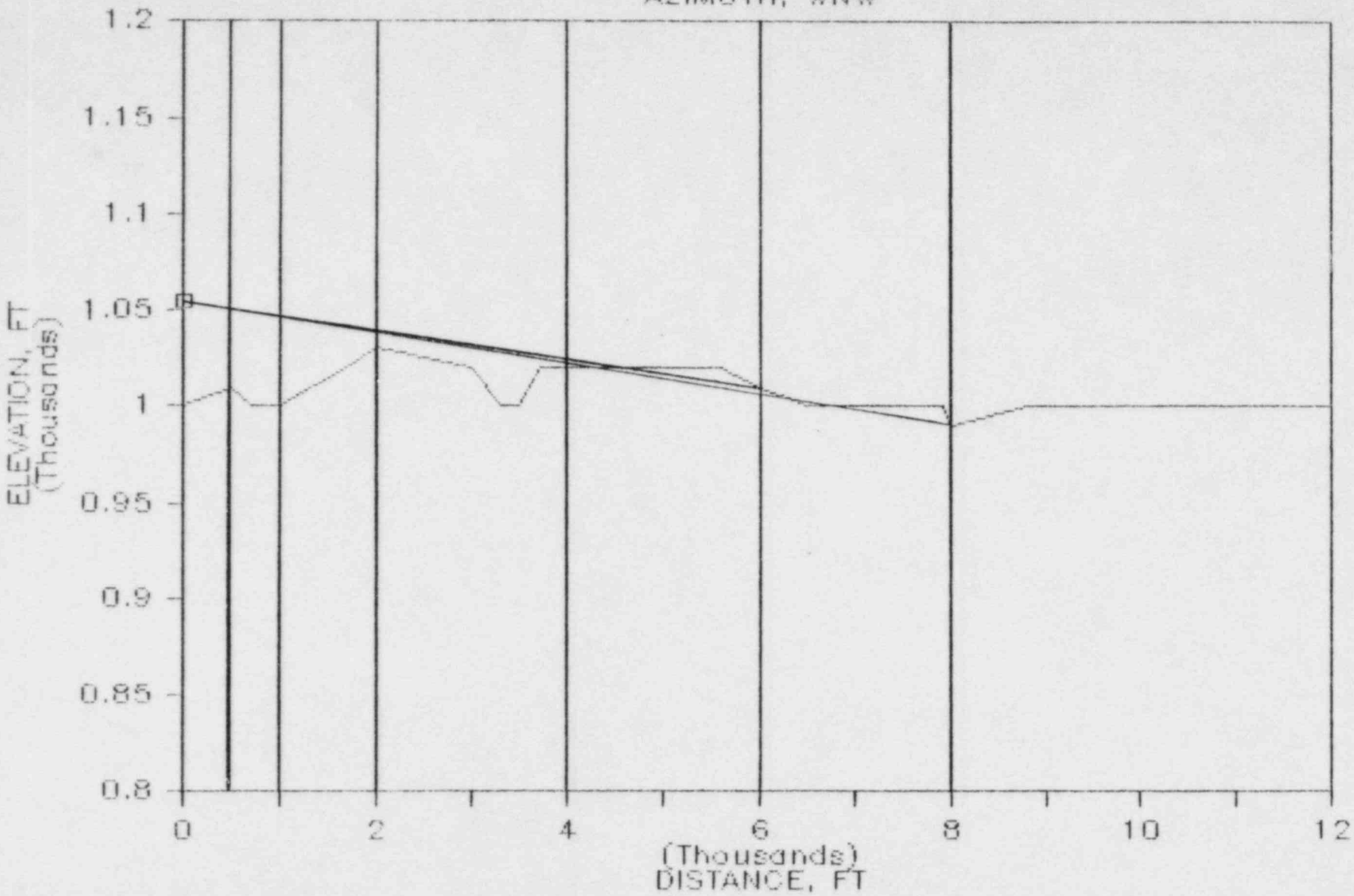

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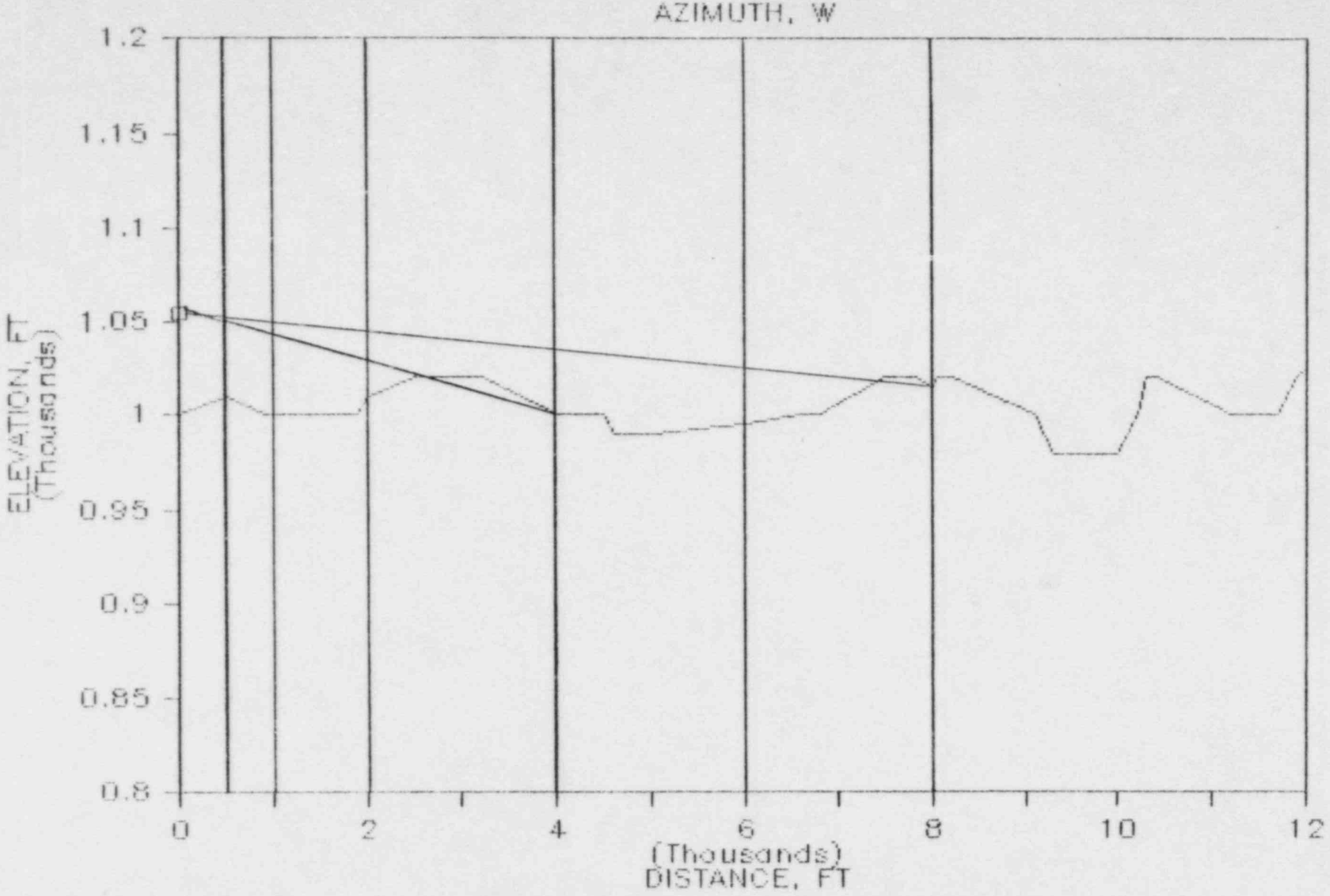
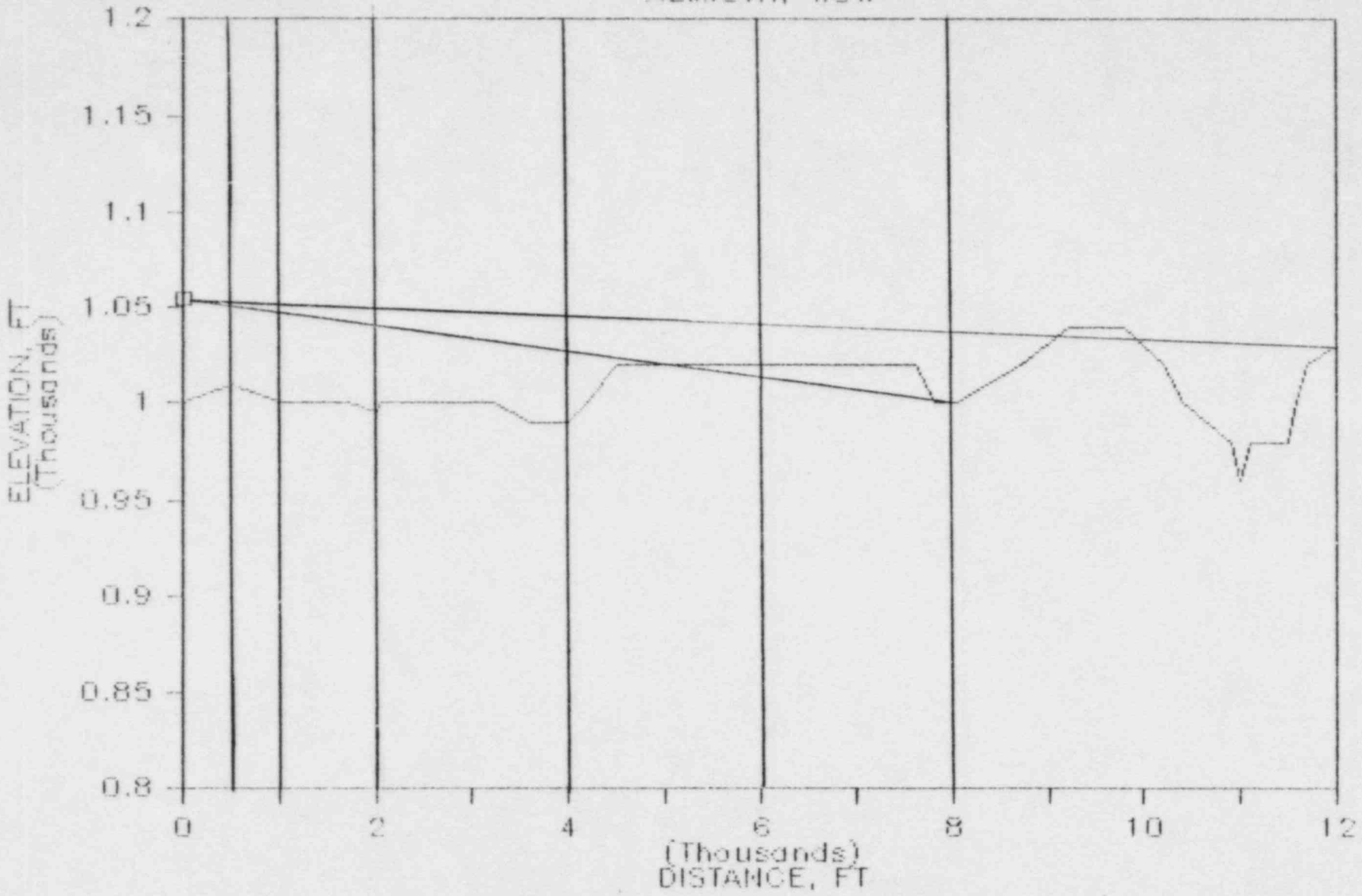


MONTICELLO B1

AZIMUTH, WSW



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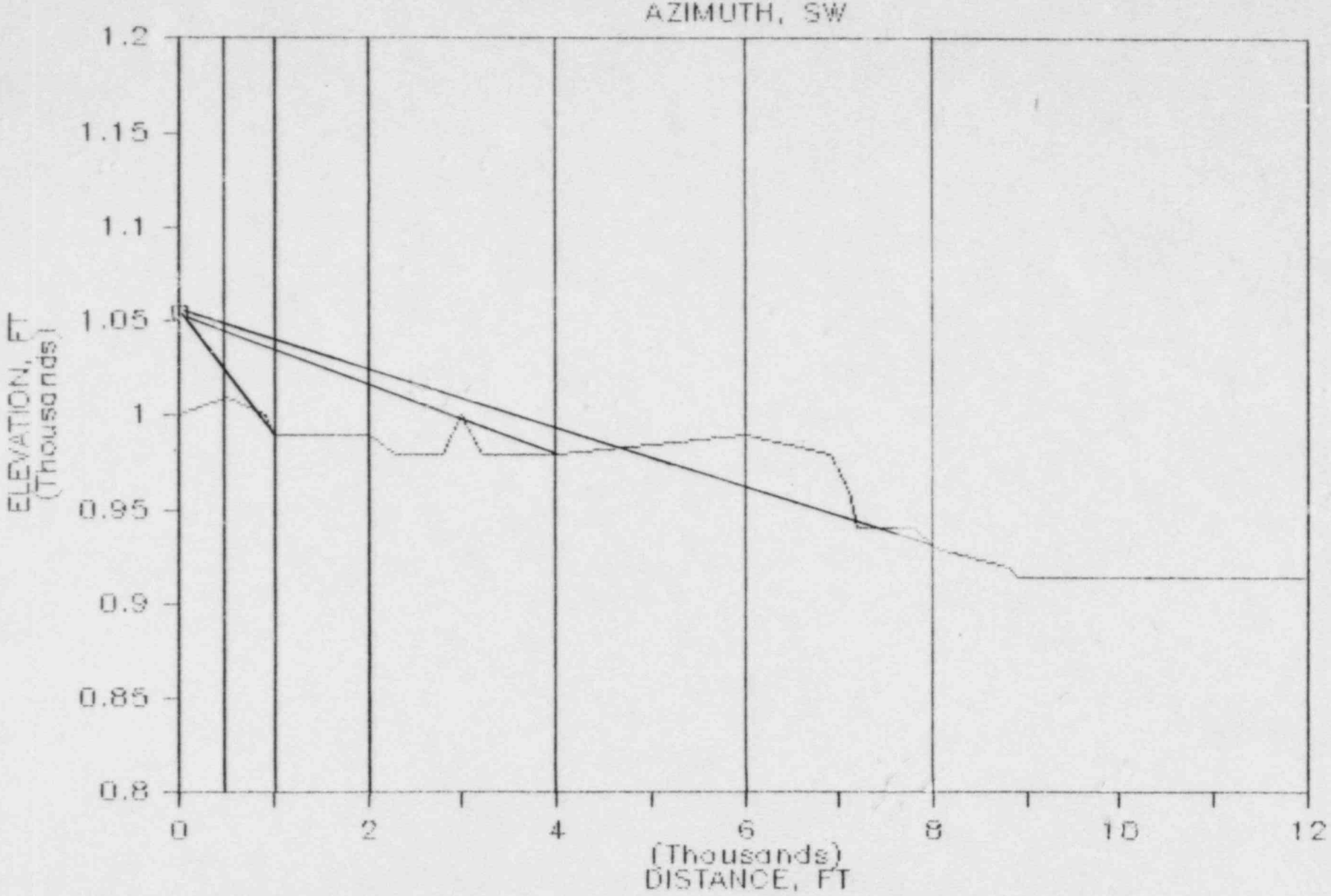

MONTICELLO B1

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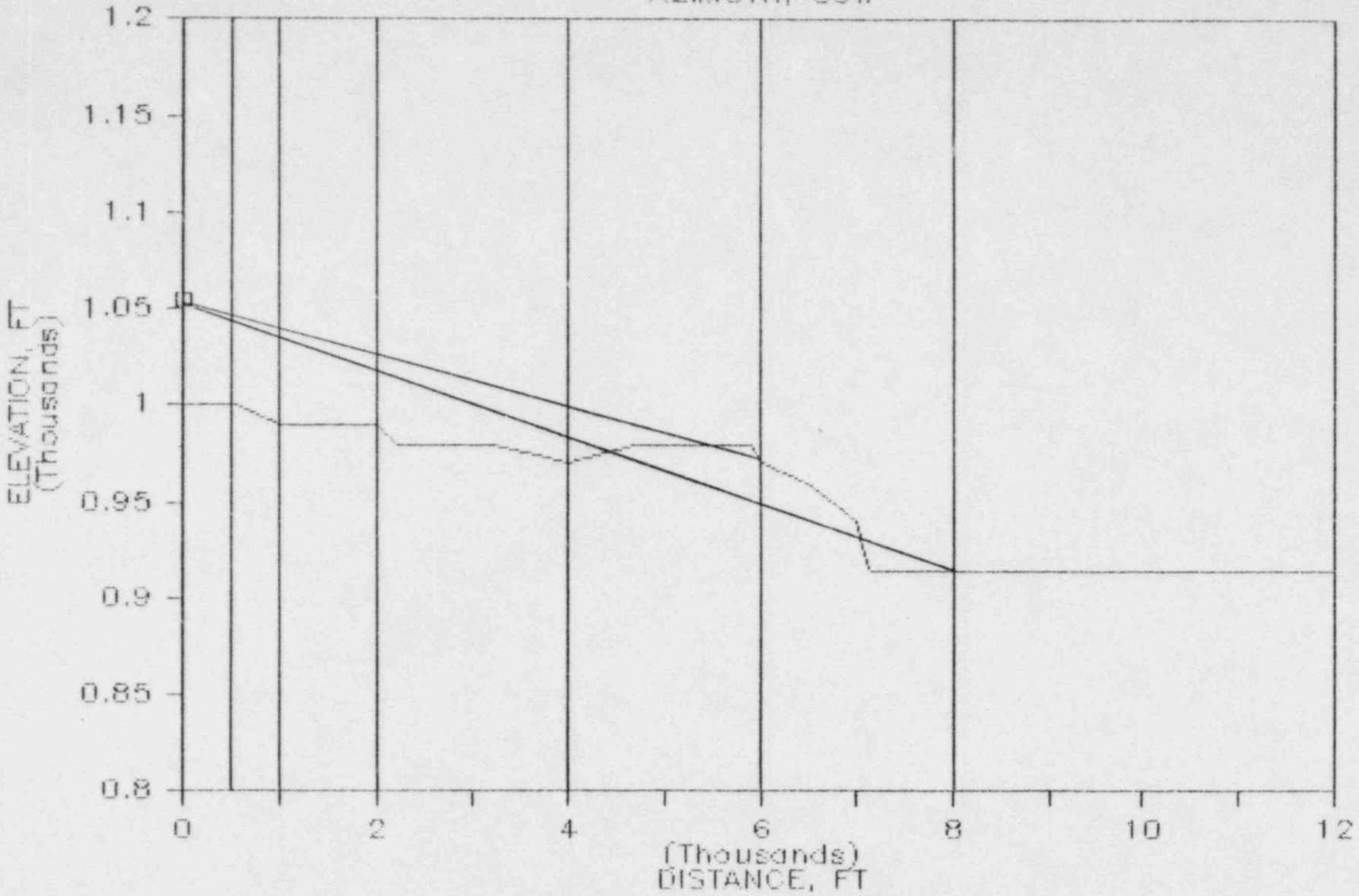

MONTICELLO B1

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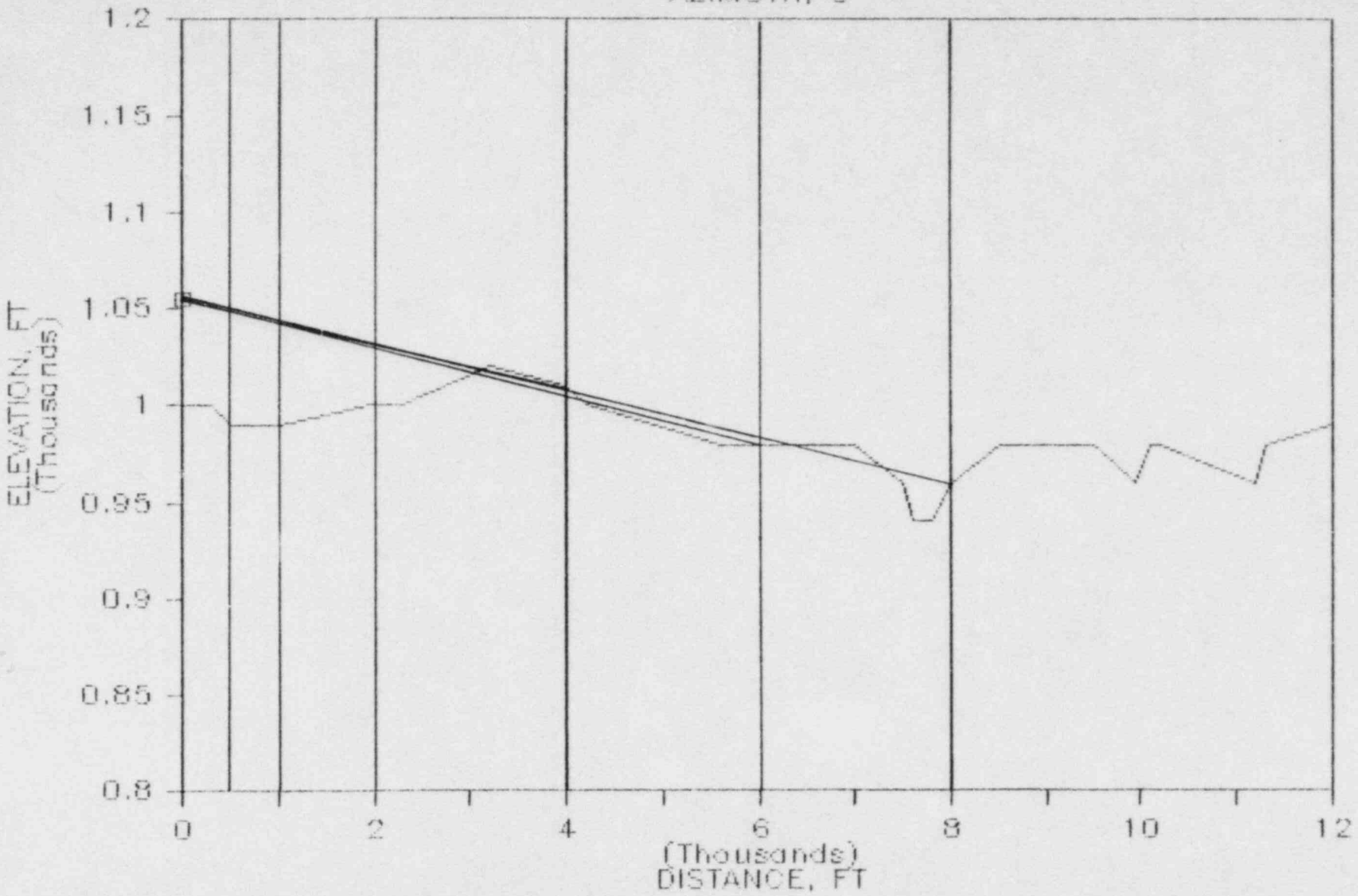

MONTICELLO B1

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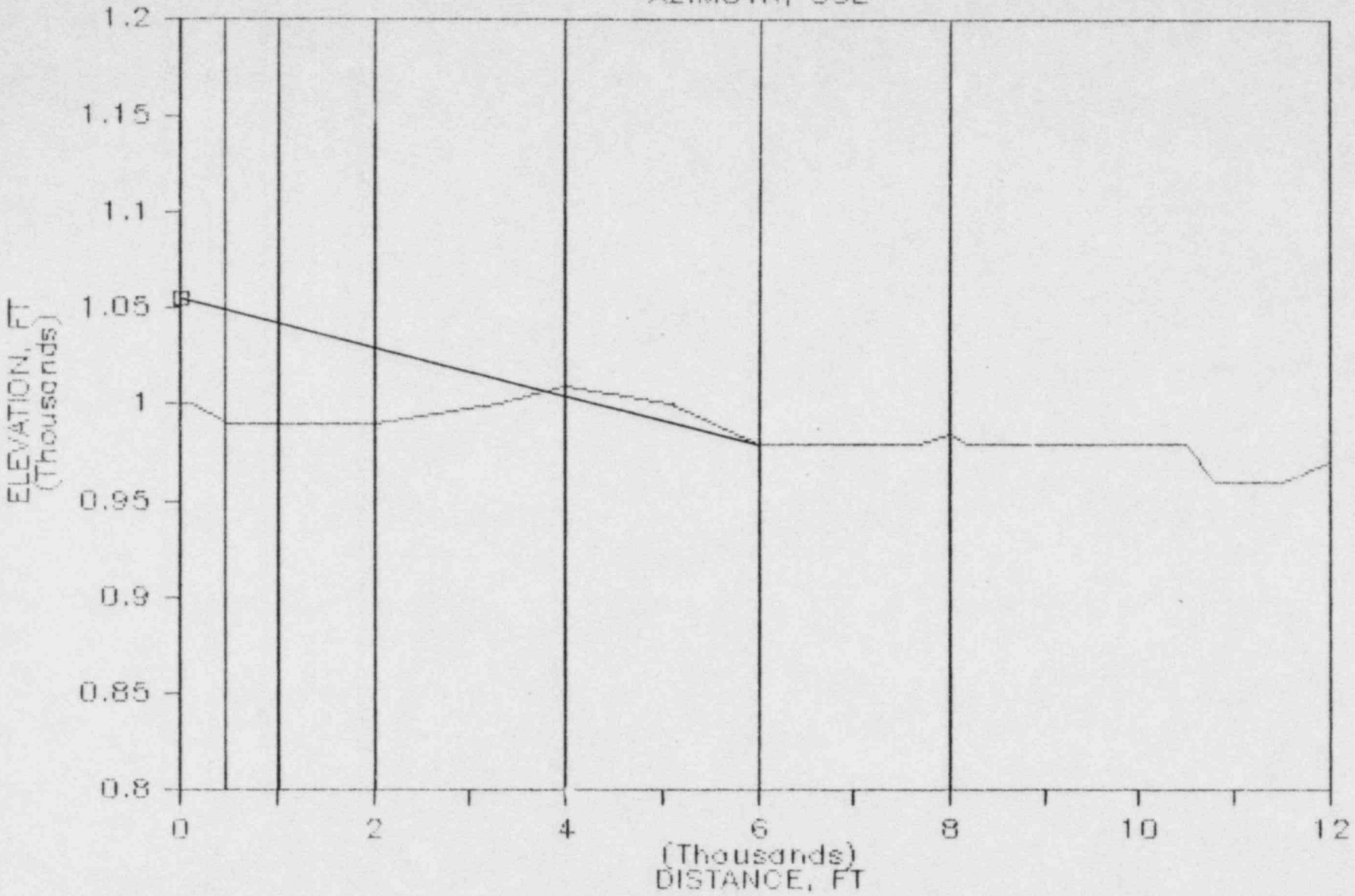

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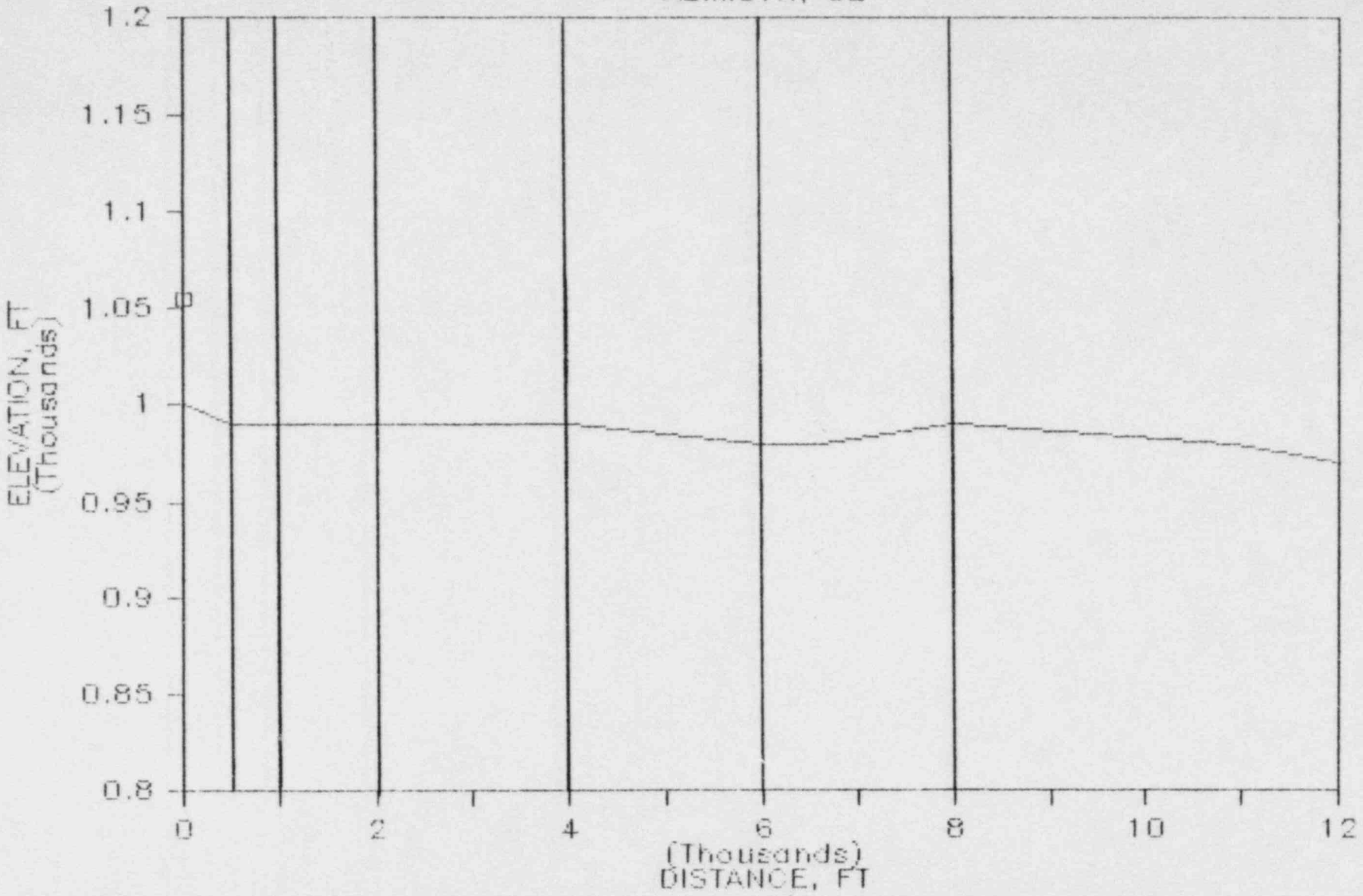
AZIMUTH, SE



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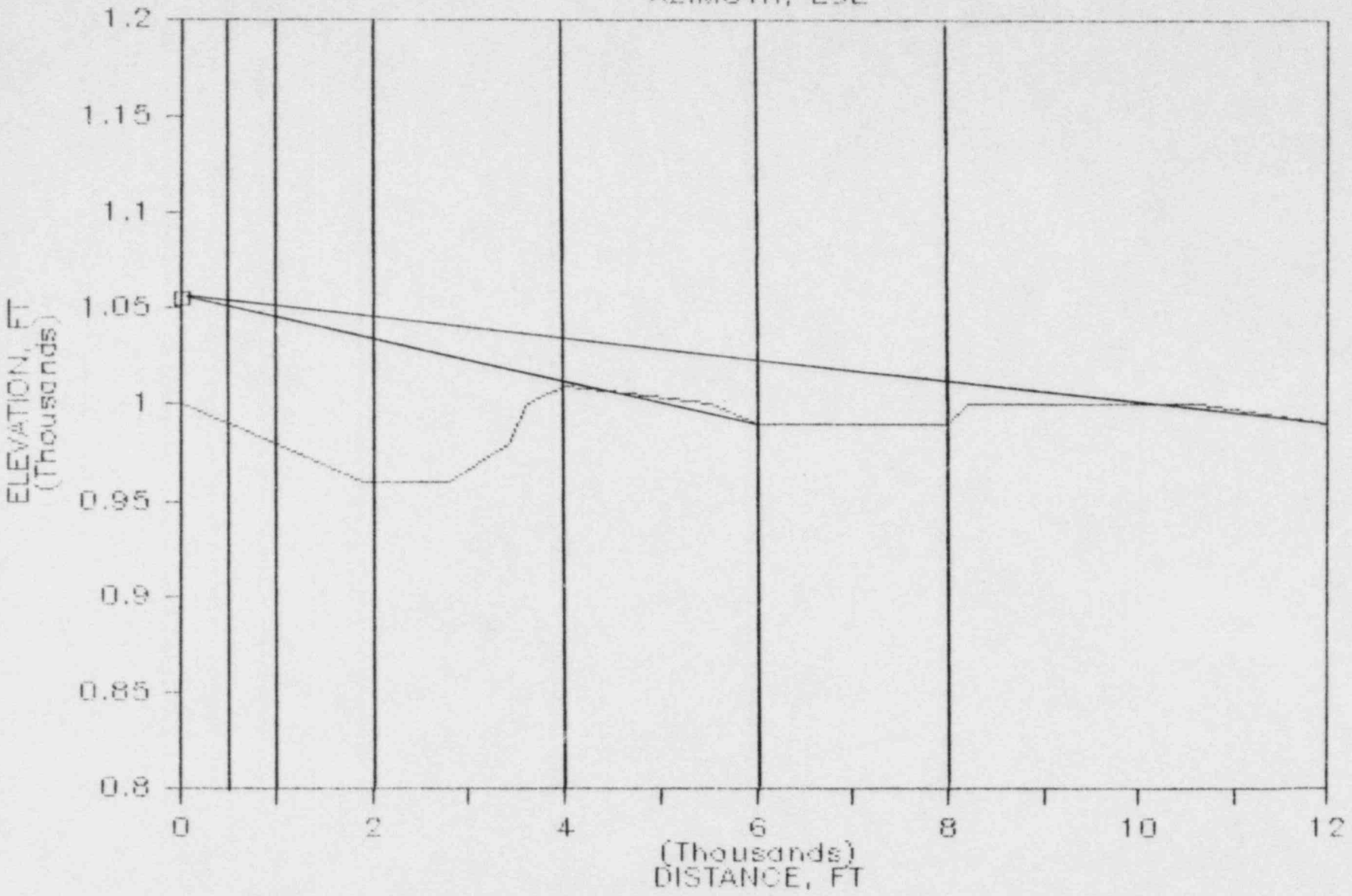
AZIMUTH, ESE



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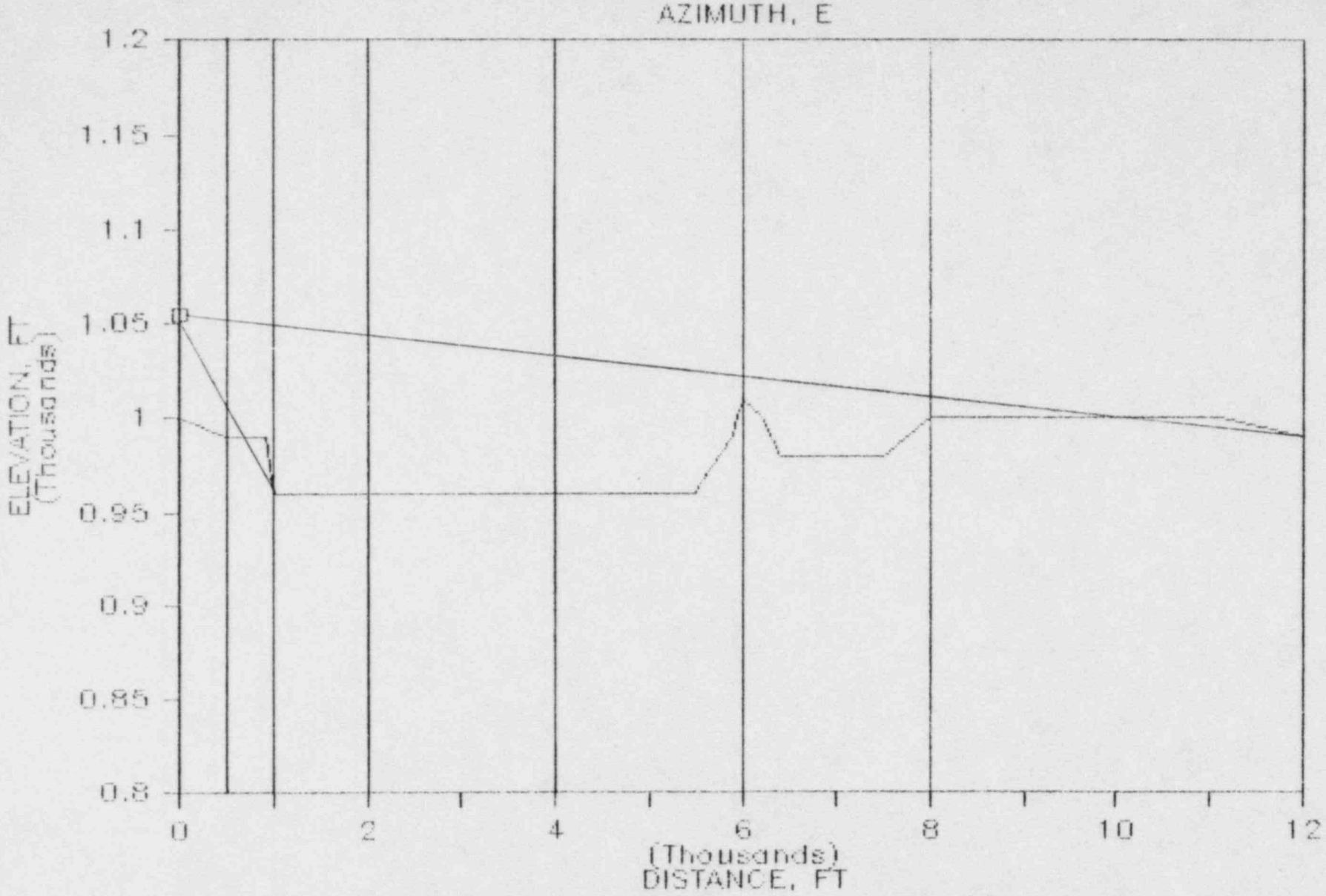
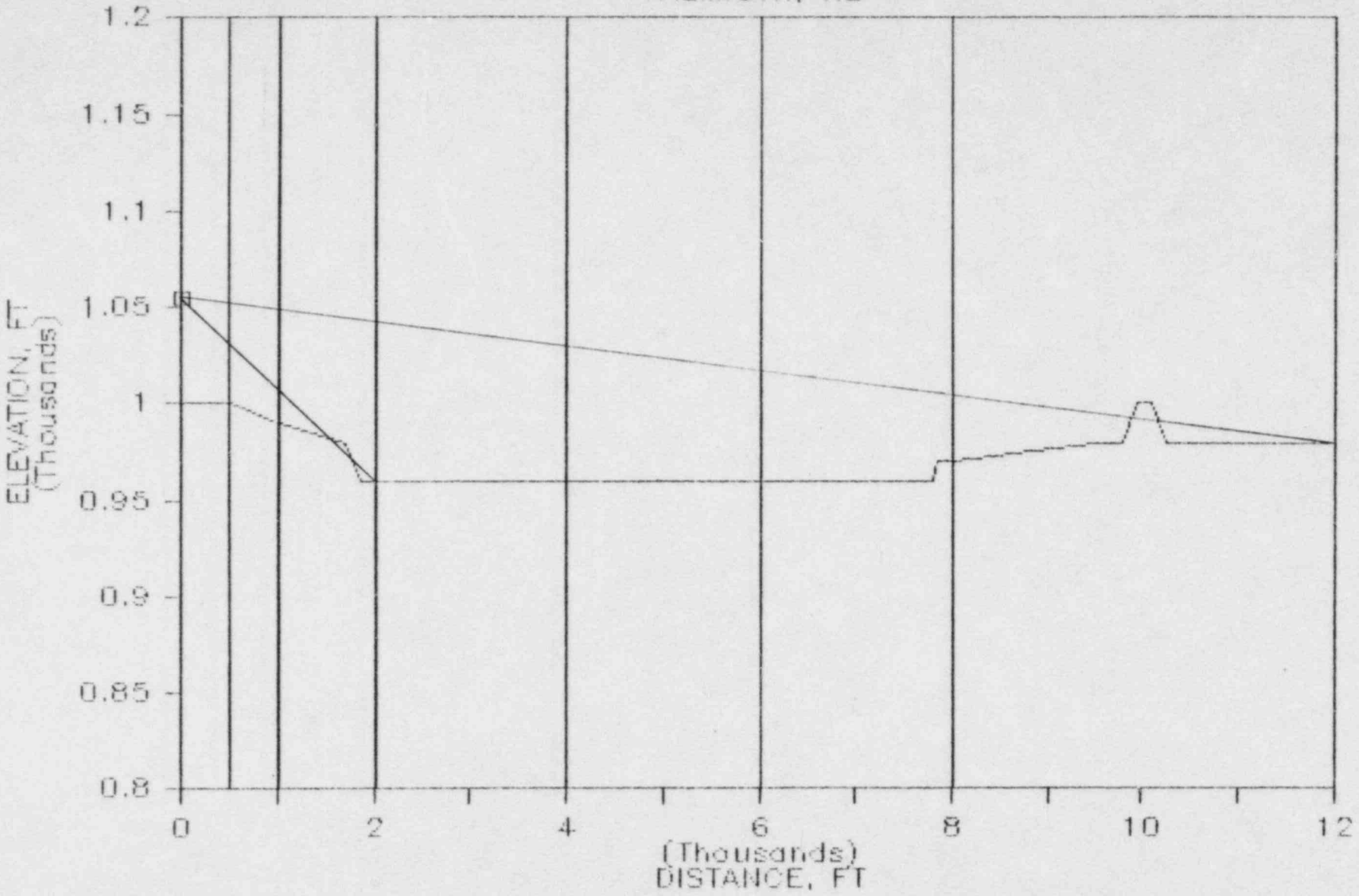


MONTICELLO B1

AZIMUTH, ENE

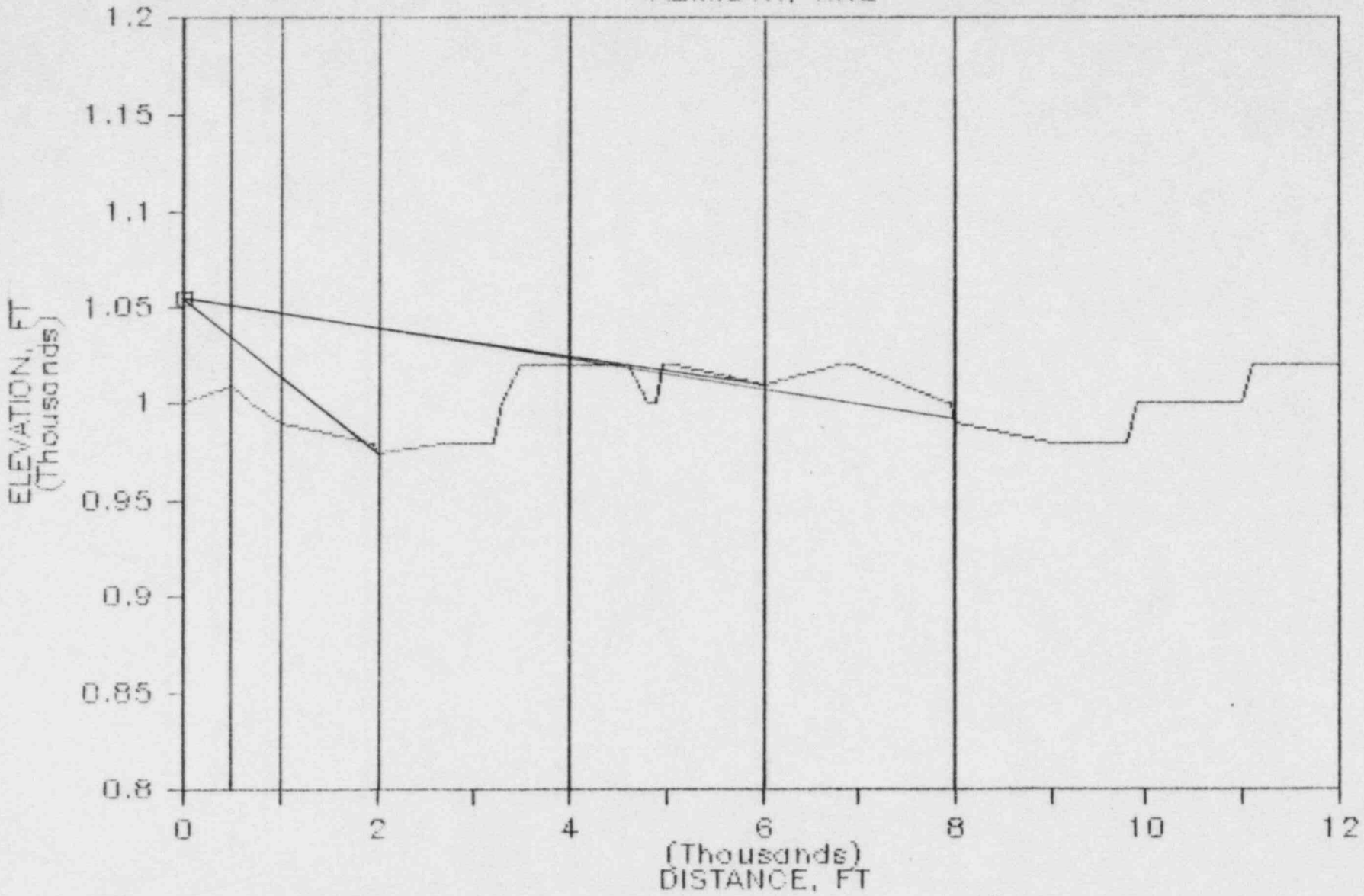
MONTICELLO B1

AZIMUTH, NE



MONTICELLO B1

AZIMUTH, NNE



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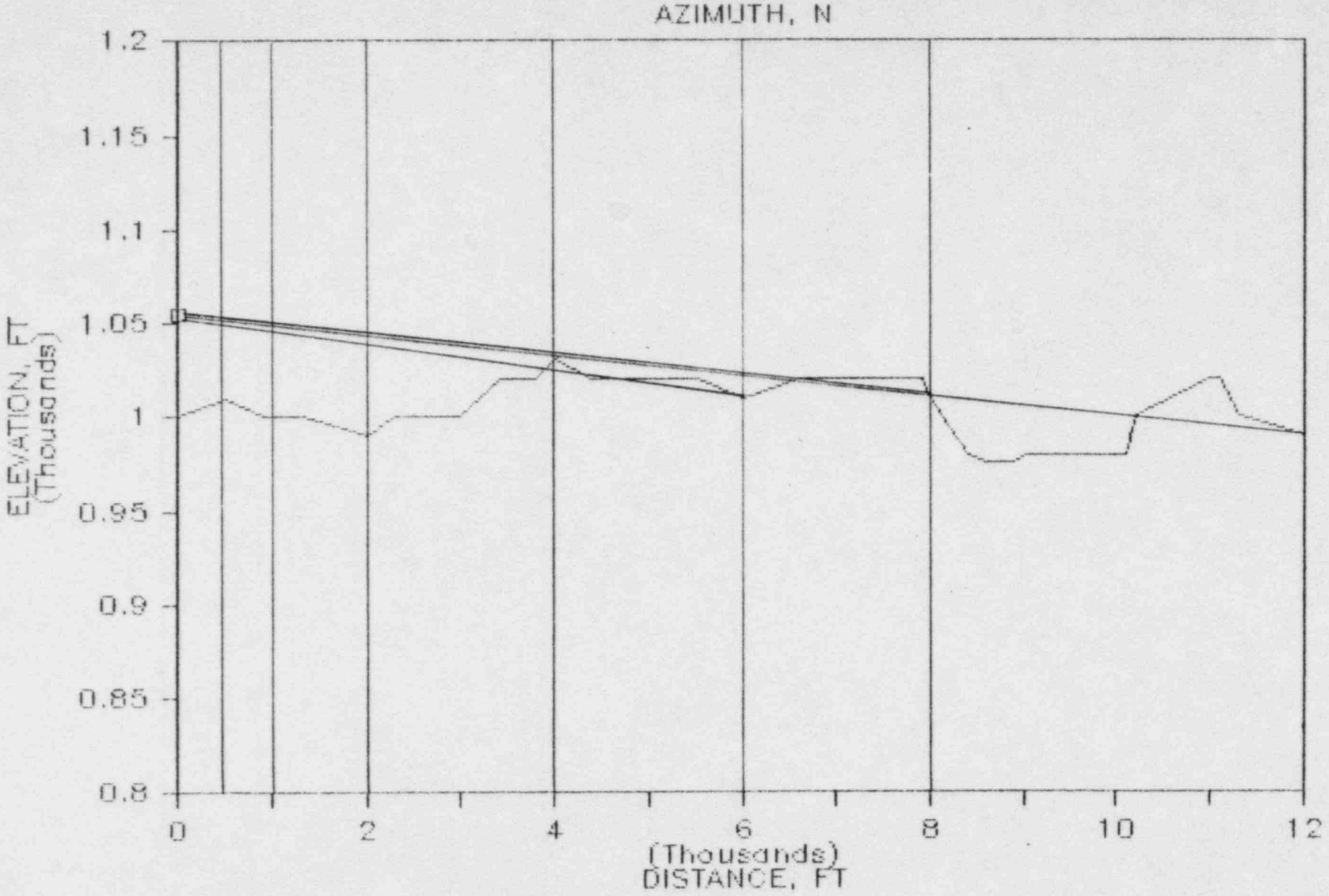

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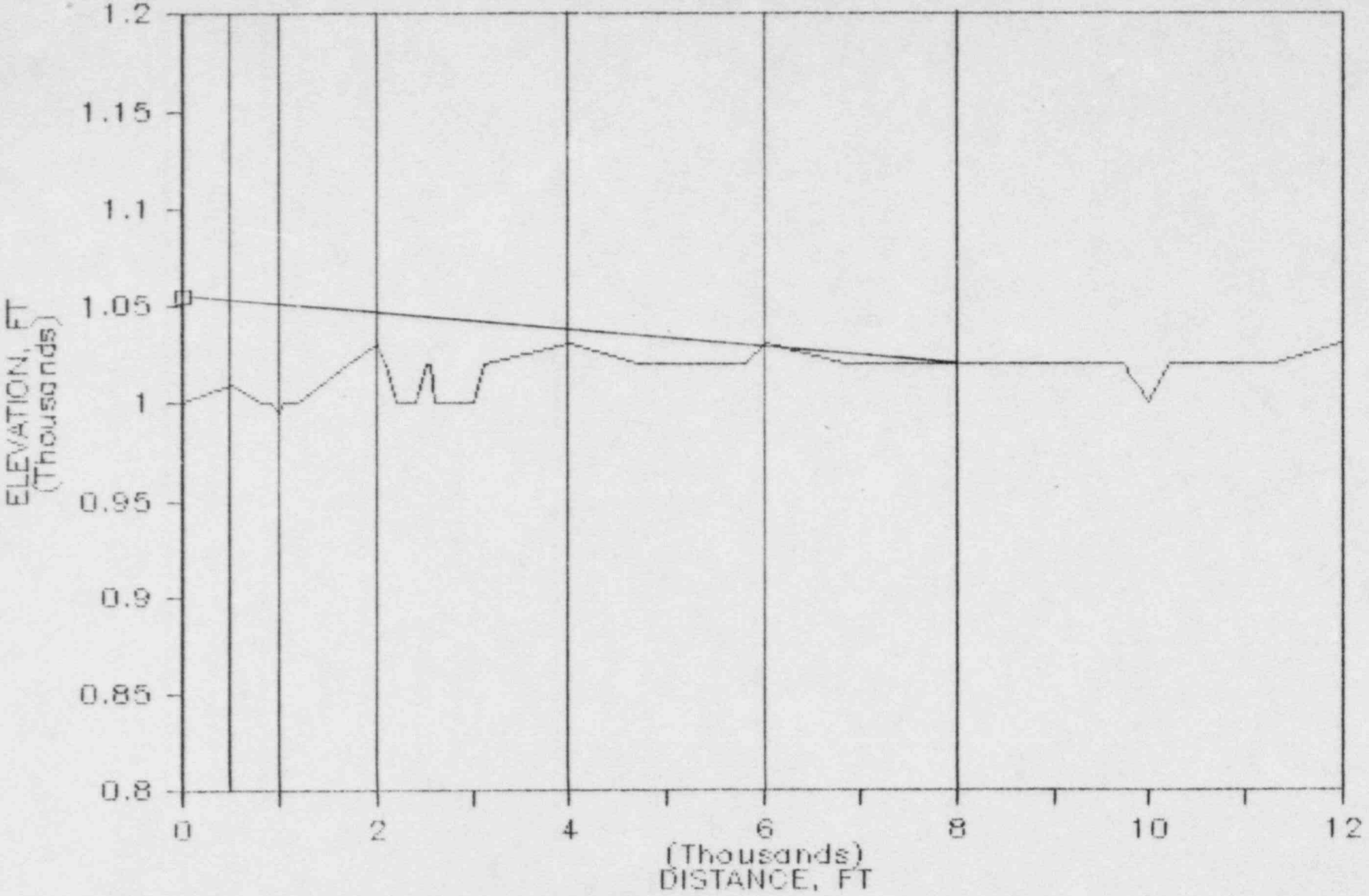
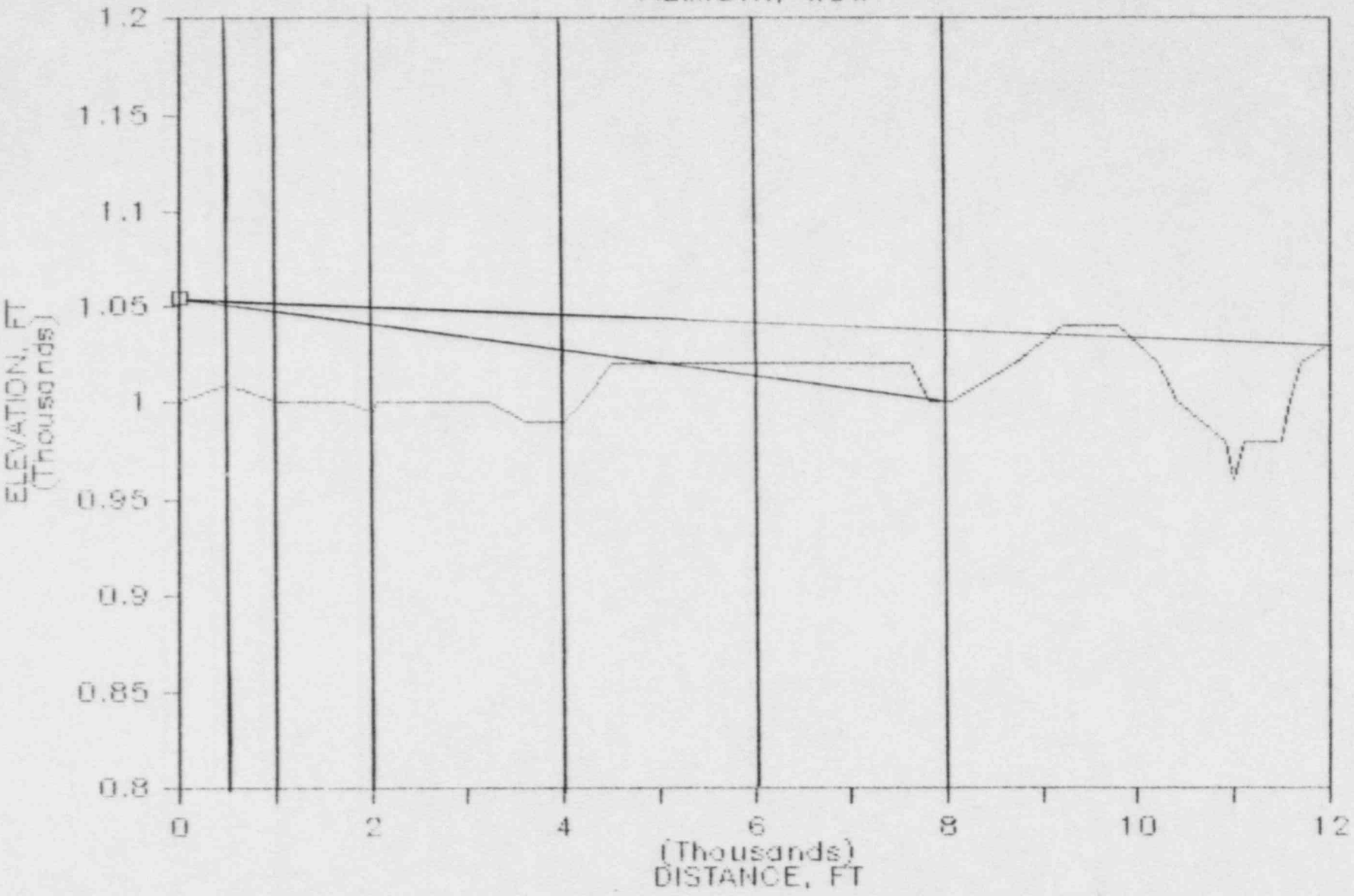
AZIMUTH, NNW



MONTICELLO B1

AZIMUTH, WSW



GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
37	1000.	337.50	995.00	SOFT	0.	NO	0.	0.
38	2000.	337.50	1030.00	SOFT	0.	NO	0.	0.
39	4000.	337.50	1030.00	SOFT	0.	NO	0.	0.
40	6000.	337.50	1030.00	SOFT	0.	NO	0.	0.
41	8000.	337.50	1020.00	SOFT	0.	YES	6000.	1030.
42	12000.	337.50	1030.00	SOFT	0.	NO	0.	0.
43	500.	315.00	1010.00	SOFT	0.	NO	0.	0.
44	1000.	315.00	1010.00	SOFT	0.	NO	0.	0.
45	2000.	315.00	1030.00	SOFT	0.	NO	0.	0.
46	4000.	315.00	1010.00	SOFT	0.	YES	5500.	1020.
47	6000.	315.00	1020.00	SOFT	0.	NO	0.	0.
48	8000.	315.00	1000.00	SOFT	0.	YES	6300.	1020.
49	12000.	315.00	1010.00	SOFT	0.	YES	11800.	1020.
50	500.	292.50	1010.00	SOFT	0.	NO	0.	0.
51	1000.	292.50	1000.00	SOFT	0.	NO	0.	0.
52	2000.	292.50	1030.00	SOFT	0.	NO	0.	0.
53	4000.	292.50	1020.00	SOFT	0.	NO	0.	0.
54	6000.	292.50	1010.00	SOFT	0.	YES	5600.	1020.
55	8000.	292.50	990.00	SOFT	0.	YES	5600.	1020.
56	12000.	292.50	1000.00	SOFT	0.	NO	0.	0.
57	500.	270.00	1010.00	SOFT	0.	NO	0.	0.
58	1000.	270.00	1000.00	SOFT	0.	NO	0.	0.
59	2000.	270.00	1010.00	SOFT	0.	NO	0.	0.
60	4000.	270.00	1000.00	SOFT	0.	YES	3300.	1020.
61	6000.	270.00	995.00	SOFT	0.	NO	0.	0.
62	8000.	270.00	1015.00	SOFT	0.	YES	7850.	1020.
63	12000.	270.00	1025.00	SOFT	0.	NO	0.	0.
64	500.	247.50	1010.00	SOFT	0.	NO	0.	0.
65	1000.	247.50	1000.00	SOFT	0.	NO	0.	0.
66	2000.	247.50	995.00	SOFT	0.	NO	0.	0.
67	4000.	247.50	990.00	SOFT	0.	NO	0.	0.
68	6000.	247.50	1020.00	SOFT	0.	NO	0.	0.
69	8000.	247.50	1000.00	SOFT	0.	YES	7650.	1020.
70	12000.	247.50	1030.00	SOFT	0.	YES	9850.	1040.
71	500.	225.00	1010.00	SOFT	0.	NO	0.	0.
72	1000.	225.00	990.00	SOFT	0.	YES	900.	1000.

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
37	1000.	337.50	995.00	SOFT	0.	NO	0.	0.
38	2000.	337.50	1030.00	SOFT	0.	NO	0.	0.
39	4000.	337.50	1030.00	SOFT	0.	NO	0.	0.
40	6000.	337.50	1030.00	SOFT	0.	NO	0.	0.
41	8000.	337.50	1020.00	SOFT	0.	YES	6000.	1030.
42	12000.	337.50	1030.00	SOFT	0.	NO	0.	0.
43	500.	315.00	1010.00	SOFT	0.	NO	0.	0.
44	1000.	315.00	1010.00	SOFT	0.	NO	0.	0.
45	2000.	315.00	1030.00	SOFT	0.	NO	0.	0.
46	4000.	315.00	1010.00	SOFT	0.	YES	5500.	1020.
47	6000.	315.00	1020.00	SOFT	0.	NO	0.	0.
48	8000.	315.00	1000.00	SOFT	0.	YES	6300.	1020.
49	12000.	315.00	1010.00	SOFT	0.	YES	11800.	1020.
50	500.	292.50	1010.00	SOFT	0.	NO	0.	0.
51	1000.	292.50	1000.00	SOFT	0.	NO	0.	0.
52	2000.	292.50	1030.00	SOFT	0.	NO	0.	0.
53	4000.	292.50	1020.00	SOFT	0.	NO	0.	0.
54	6000.	292.50	1010.00	SOFT	0.	YES	5600.	1020.
55	8000.	292.50	990.00	SOFT	0.	YES	5600.	1020.
56	12000.	292.50	1000.00	SOFT	0.	NO	0.	0.
57	500.	270.00	1010.00	SOFT	0.	NO	0.	0.
58	1000.	270.00	1000.00	SOFT	0.	NO	0.	0.
59	2000.	270.00	1010.00	SOFT	0.	NO	0.	0.
60	3000.	270.00	1000.00	SOFT	0.	YES	3300.	1020.
61	6000.	270.00	995.00	SOFT	0.	NO	0.	0.
62	8000.	270.00	1015.00	SOFT	0.	YES	7850.	1020.
63	12000.	270.00	1025.00	SOFT	0.	NO	0.	0.
64	500.	247.50	1010.00	SOFT	0.	NO	0.	0.
65	1000.	247.50	1000.00	SOFT	0.	NO	0.	0.
66	2000.	247.50	995.00	SOFT	0.	NO	0.	0.
67	4000.	247.50	990.00	SOFT	0.	NO	0.	0.
68	6000.	247.50	1020.00	SOFT	0.	NO	0.	0.
69	8000.	247.50	1000.00	SOFT	0.	YES	7650.	1020.
70	12000.	247.50	1030.00	SOFT	0.	YES	9850.	1040.
71	500.	225.00	1010.00	SOFT	0.	NO	0.	0.
72	1000.	225.00	990.00	SOFT	0.	YES	900.	1000.

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #B1-T1003
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	SIREN B-1	165.9	167.9	0.0	0.0	0.0	0.0	167.0	158.0	157.0	150.0	148.0

XO= 0.0 YO= 0.0 ZO= 1000.00 HEIGHT ABOVE GROUND= 55.00

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN B1-T1003
METEOROLOGICAL INPUT CONDITIONS

H1= 10.06 METERS H2= 43.28 METERS

YEAR	SEASON	MONTH	DATE	HOUR	WIND DIRECTION	WIND SPEED(MPS) H1	WIND SPEED(MPS) H2	TEMPERATURE(C) H1	TEMPERATURE(C) H2	RELATIVE HUMIDITY	BAROMETRIC PRESSURE(MM OF HG)
1984	S	7	22	12	188.0	3.1	3.8	28.1	27.2	68.0	760.0

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #B1-T1003

SIREN SOUND LEVELS IN DBC

UNDER MET CONDITION 1

DISTANCE IN FEET

AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	115.	87.	102.	94.	88.	82.	70.
ENE	115.	94.	102.	94.	88.	82.	75.
NE	115.	106.	89.	94.	88.	84.	69.
NNE	115.	106.	91.	90.	80.	73.	75.
N	115.	106.	97.	90.	79.	73.	66.
NNW	115.	106.	97.	90.	86.	76.	75.
NW	115.	106.	97.	65.	86.	76.	68.
WNW	115.	106.	97.	90.	79.	75.	75.
W	115.	106.	97.	83.	85.	76.	68.
WSW	115.	106.	97.	90.	86.	73.	70.
SW	115.	97.	97.	65.	86.	71.	75.
SSW	115.	106.	97.	90.	77.	73.	74.
S	115.	106.	97.	84.	78.	76.	73.
SSE	115.	106.	97.	90.	79.	82.	75.
SE	115.	106.	97.	90.	86.	82.	75.
ESE	115.	106.	97.	90.	80.	80.	69.

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #B1-T1003
SOURCE-RECEIVER TOPOGRAPHICAL INPUTS

ALL BEARINGS ARE WITH RESPECT TO THE NORTH MEASURING CLOCKWISE

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
1	500.	90.00	990.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	960.00	SOFT	0.	YES	950.	990.
3	2000.	90.00	960.00	HARD	0.	NO	0.	0.
4	4000.	90.00	960.00	HARD	0.	NO	0.	0.
5	6000.	90.00	1010.00	HARD	0.	NO	0.	0.
6	8000.	90.00	1000.00	SOFT	0.	NO	0.	0.
7	12000.	90.00	990.00	SOFT	0.	YES	11200.	1000.
8	500.	67.50	990.00	SOFT	0.	NO	0.	0.
9	1000.	67.50	968.00	SOFT	0.	YES	950.	980.
10	2000.	67.50	960.00	HARD	0.	NO	0.	0.
11	4000.	67.50	960.00	HARD	0.	NO	0.	0.
12	6000.	67.50	960.00	HARD	0.	NO	0.	0.
13	8000.	67.50	1010.00	SOFT	0.	NO	0.	0.
14	12000.	67.50	1040.00	SOFT	0.	NO	0.	0.
15	500.	45.00	1000.00	SOFT	0.	NO	0.	0.
16	1000.	45.00	990.00	SOFT	0.	NO	0.	0.
17	2000.	45.00	960.00	SOFT	0.	YES	1700.	980.
18	4000.	45.00	960.00	HARD	0.	NO	0.	0.
19	6000.	45.00	960.00	HARD	0.	NO	0.	0.
20	8000.	45.00	970.00	HARD	0.	NO	0.	0.
21	12000.	45.00	980.00	SOFT	0.	YES	10100.	1005.
22	500.	22.50	1010.00	SOFT	0.	NO	0.	0.
23	1000.	22.50	990.00	SOFT	0.	NO	0.	0.
24	2000.	22.50	975.00	SOFT	0.	YES	1900.	982.
25	4000.	22.50	1020.00	SOFT	0.	NO	0.	0.
26	6000.	22.50	1010.00	SOFT	0.	YES	5100.	1020.
27	8000.	22.50	990.00	SOFT	0.	YES	7000.	1020.
28	12000.	22.50	1020.00	SOFT	0.	NO	0.	0.
29	500.	0.0	1010.00	SOFT	0.	NO	0.	0.
30	1000.	0.0	1000.00	SOFT	0.	NO	0.	0.
31	2000.	0.0	990.00	SOFT	0.	NO	0.	0.
32	4000.	0.0	1030.00	SOFT	0.	NO	0.	0.
33	6000.	0.0	1010.00	SOFT	0.	YES	4000.	1030.
34	8000.	0.0	1010.00	SOFT	0.	YES	7900.	1020.
35	12000.	0.0	990.00	SOFT	0.	YES	11200.	1020.
36	500.	337.50	1010.00	SOFT	0.	NO	0.	0.

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
37	1000.	337.50	995.00	SOFT	0.	NO	0.	0.
38	2000.	337.50	1030.00	SOFT	0.	NO	0.	0.
39	4000.	337.50	1030.00	SOFT	0.	NO	0.	0.
40	6000.	337.50	1030.00	SOFT	0.	NO	0.	0.
41	8000.	337.50	1020.00	SOFT	0.	YES	6000.	1030.
42	12000.	337.50	1030.00	SOFT	0.	NO	0.	0.
43	500.	315.00	1010.00	SOFT	0.	NO	0.	0.
44	1000.	315.00	1010.00	SOFT	0.	NO	0.	0.
45	2000.	315.00	1030.00	SOFT	0.	NO	0.	0.
46	4000.	315.00	1010.00	SOFT	0.	YES	5500.	1020.
47	6000.	315.00	1020.00	SOFT	0.	NO	0.	0.
48	8000.	315.00	1000.00	SOFT	0.	YES	6300.	1020.
49	12000.	315.00	1010.00	SOFT	0.	YES	11800.	1020.
50	500.	292.50	1010.00	SOFT	0.	NO	0.	0.
51	1000.	292.50	1000.00	SOFT	0.	NO	0.	0.
52	2000.	292.50	1030.00	SOFT	0.	NO	0.	0.
53	4000.	292.50	1020.00	SOFT	0.	NO	0.	0.
54	6000.	292.50	1010.00	SOFT	0.	YES	5600.	1020.
55	8000.	292.50	990.00	SOFT	0.	YES	5600.	1020.
56	12000.	292.50	1000.00	SOFT	0.	NO	0.	0.
57	500.	270.00	1010.00	SOFT	0.	NO	0.	0.
58	1000.	270.00	1000.00	SOFT	0.	NO	0.	0.
59	2000.	270.00	1010.00	SOFT	0.	NO	0.	0.
60	4000.	270.00	1000.00	SOFT	0.	YES	3300.	1020.
61	6000.	270.00	995.00	SOFT	0.	NO	0.	0.
62	8000.	270.00	1015.00	SOFT	0.	YES	7850.	1020.
63	12000.	270.00	1025.00	SOFT	0.	NO	0.	0.
64	500.	247.50	1010.00	SOFT	0.	NO	0.	0.
65	1000.	247.50	1000.00	SOFT	0.	NO	0.	0.
66	2000.	247.50	995.00	SOFT	0.	NO	0.	0.
67	4000.	247.50	990.00	SOFT	0.	NO	0.	0.
68	6000.	247.50	1020.00	SOFT	0.	NO	0.	0.
69	8000.	247.50	1000.00	SOFT	0.	YES	7650.	1020.
70	12000.	247.50	1030.00	SOFT	0.	YES	9850.	1040.
71	500.	225.00	1010.00	SOFT	0.	NO	0.	0.
72	1000.	225.00	990.00	SOFT	0.	YES	900.	1000.

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
73	2000.	225.00	990.00	SOFT	0.	NO	0.	0.
74	4000.	225.00	980.00	SOFT	0.	YES	5000.	1000.
75	6000.	225.00	990.00	SOFT	0.	NO	0.	0.
76	8000.	225.00	930.00	SOFT	0.	YES	7000.	980.
77	12000.	225.00	914.00	SOFT	0.	NO	0.	0.
78	500.	202.50	1000.00	SOFT	0.	NO	0.	0.
79	1000.	202.50	990.00	SOFT	0.	NO	0.	0.
80	2000.	202.50	990.00	SOFT	0.	NO	0.	0.
81	4000.	202.50	970.00	SOFT	0.	NO	0.	0.
82	6000.	202.50	970.00	SOFT	0.	YES	5900.	980.
83	8000.	202.50	914.00	SOFT	0.	YES	5900.	980.
84	12000.	202.50	914.00	SOFT	0.	NO	0.	0.
85	500.	180.00	990.00	SOFT	0.	NO	0.	0.
86	1000.	180.00	990.00	SOFT	0.	NO	0.	0.
87	2000.	180.00	1000.00	SOFT	0.	NO	0.	0.
88	4000.	180.00	1010.00	SOFT	0.	YES	3200.	1020.
89	6000.	180.00	980.00	SOFT	0.	YES	3200.	1020.
90	8000.	180.00	960.00	SOFT	0.	YES	7000.	980.
91	12000.	180.00	990.00	SOFT	0.	NO	0.	0.
92	500.	157.50	990.00	SOFT	0.	NO	0.	0.
93	1000.	157.50	990.00	SOFT	0.	NO	0.	0.
94	2000.	157.50	990.00	SOFT	0.	NO	0.	0.
95	4000.	157.50	1010.00	SOFT	0.	NO	0.	0.
96	6000.	157.50	980.00	SOFT	0.	YES	5100.	1000.
97	8000.	157.50	985.00	SOFT	0.	NO	0.	0.
98	12000.	157.50	970.00	SOFT	0.	NO	0.	0.
99	500.	135.00	990.00	SOFT	0.	NO	0.	0.
100	1000.	135.00	990.00	SOFT	0.	NO	0.	0.
101	2000.	135.00	990.00	SOFT	0.	NO	0.	0.
102	4000.	135.00	990.00	SOFT	0.	NO	0.	0.
103	6000.	135.00	980.00	SOFT	0.	NO	0.	0.
104	8000.	135.00	990.00	SOFT	0.	NO	0.	0.
105	12000.	135.00	970.00	SOFT	0.	NO	0.	0.
106	500.	112.50	990.00	SOFT	0.	NO	0.	0.
107	1000.	112.50	980.00	SOFT	0.	NO	0.	0.
108	2000.	112.50	960.00	SOFT	0.	NO	0.	0.
109	4000.	112.50	1010.00	SOFT	0.	NO	0.	0.
110	6000.	112.50	990.00	SOFT	0.	YES	5400.	1000.
111	8000.	112.50	990.00	SOFT	0.	NO	0.	0.
112	12000.	112.50	990.00	SOFT	0.	YES	10550.	1000.
113	32645.	301.87	1000.00	SOFT	0.	YES	11800.	1020.
114	30854.	56.04	200.00	SOFT	0.	YES	10100.	1005.
115	45498.	217.54	10.00	SOFT	0.	YES	7000.	980.
116	44230.	144.65	900.00	SOFT	0.	YES	5100.	1000.

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #B1-T1003
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	SIREN B-1	165.9	167.9	0.0	0.0	0.0	0.0	167.0	158.0	157.0	150.0	148.0

XO= 0.0 YO= 0.0 ZO= 1000.00 HEIGHT ABOVE GROUND= 55.00

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN B1-T1003
METEOROLOGICAL INPUT CONDITIONS

H1= 10.06 METERS H2= 43.28 METERS

YEAR	SEASON	MONTH	DATE	HOUR	WIND DIRECTION	WIND SPEED(MPS) H1	WIND SPEED(MPS) H2	TEMPERATURE(C) H1	TEMPERATURE(C) H2	RELATIVE HUMIDITY	BAROMETRIC PRESSURE(MM OF HG)
1984	S	7	22	12	188.0	3.1	3.8	28.1	27.2	68.0	760.0

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #B1-T1003

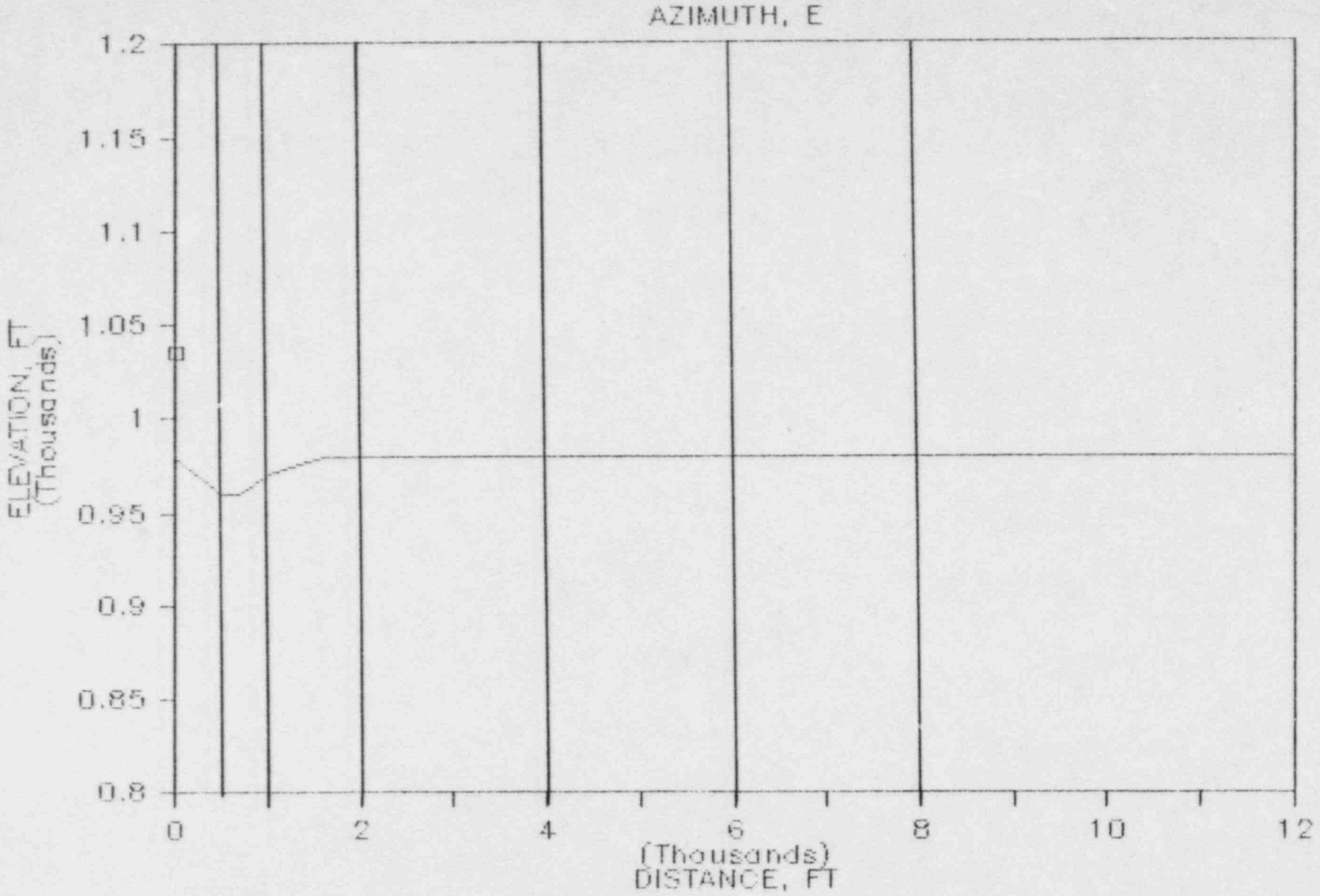
SIREN SOUND LEVELS IN DBC

UNDER MET CONDITION 1

DISTANCE IN FEET

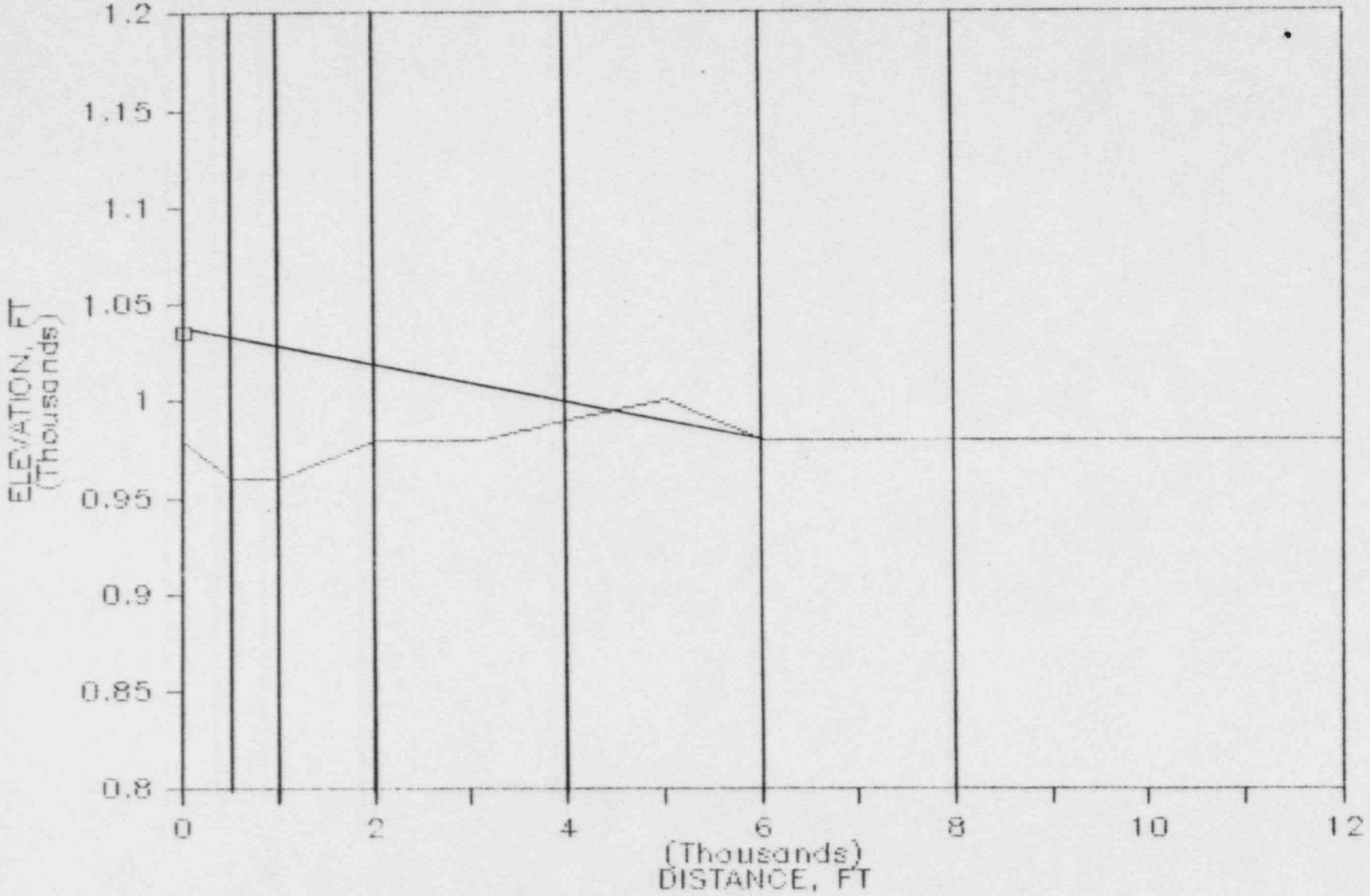
AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	115.	87.	102.	94.	88.	82.	70.
ENE	115.	94.	102.	94.	88.	82.	75.
NE	115.	106.	89.	94.	88.	84.	69.
NNE	115.	106.	91.	90.	80.	73.	75.
N	115.	106.	97.	90.	79.	73.	66.
NNW	115.	106.	97.	90.	86.	76.	75.
NW	115.	106.	97.	65.	86.	76.	68.
WNW	115.	106.	97.	90.	79.	75.	75.
W	115.	106.	97.	83.	85.	76.	68.
WSW	115.	106.	97.	90.	86.	73.	70.
SW	115.	97.	97.	65.	86.	71.	75.
SSW	115.	106.	97.	90.	77.	73.	74.
S	115.	106.	97.	84.	78.	76.	73.
SSE	115.	106.	97.	90.	79.	82.	75.
SE	115.	106.	97.	90.	86.	82.	75.
ESE	115.	106.	97.	90.	80.	80.	69.

MONTICELLO B2



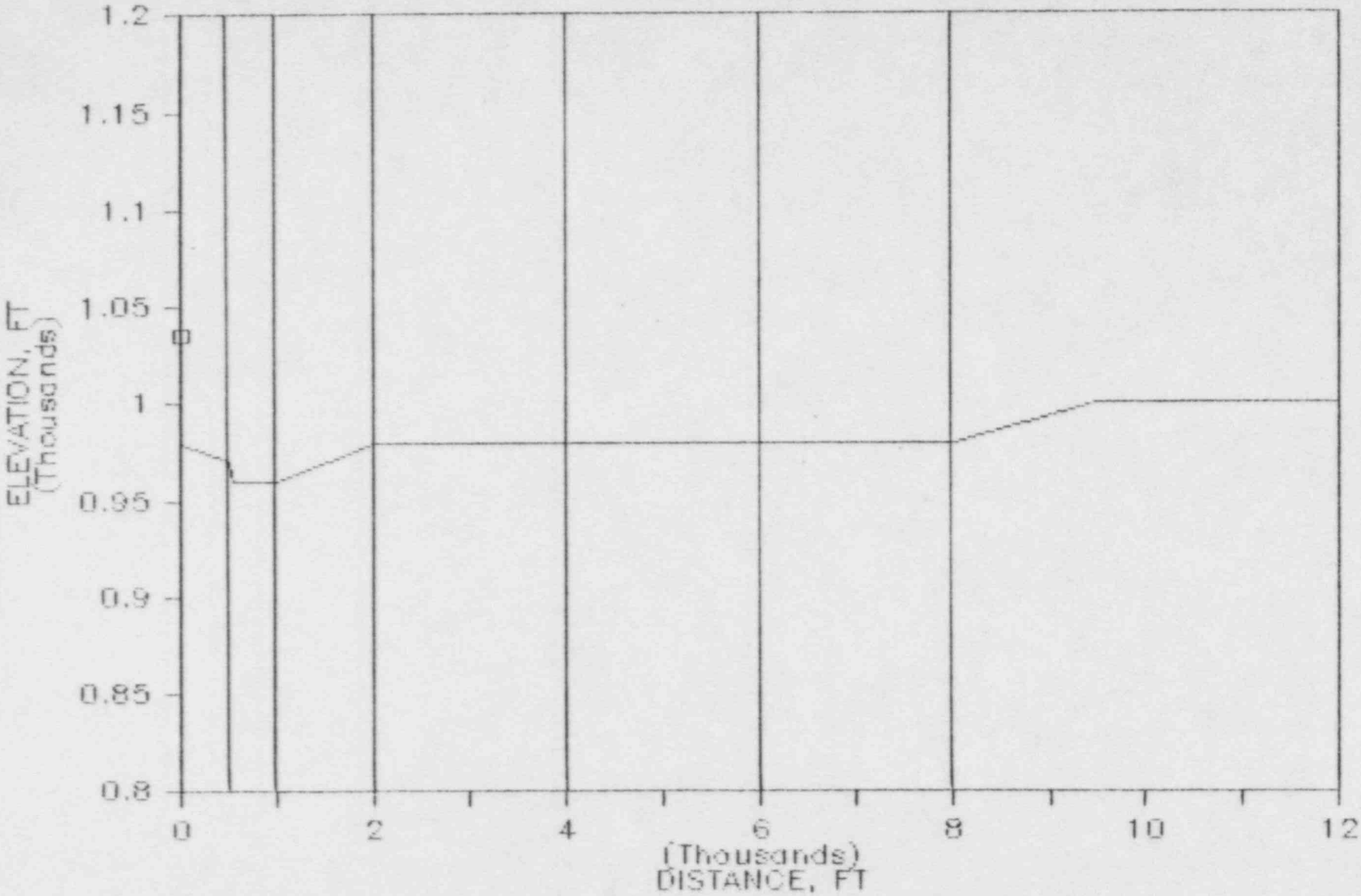
MONTICELLO B2

AZIMUTH, ENE



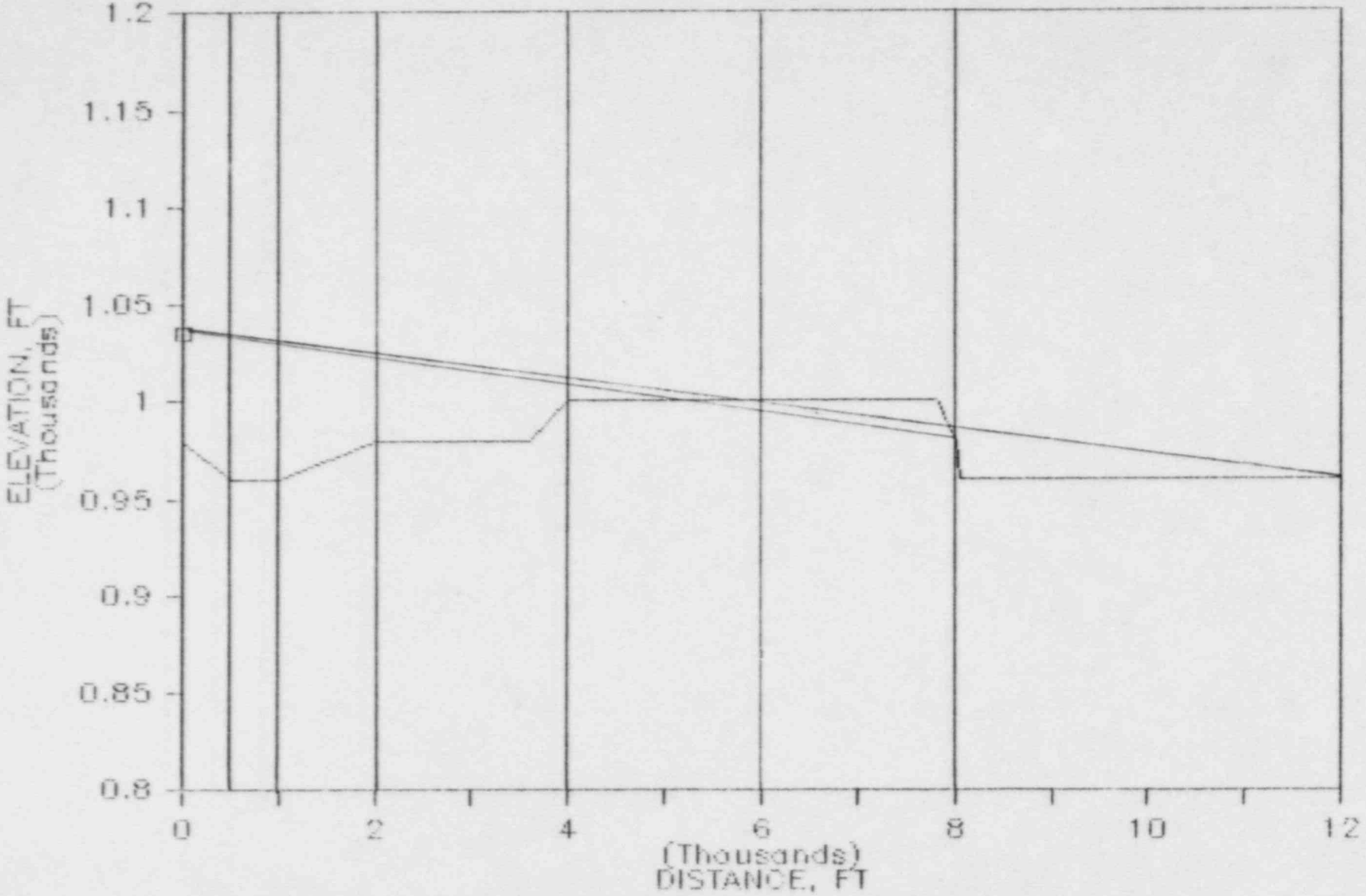
MONTICELLO B2

AZIMUTH, NE



MONTICELLO B2

AZIMUTH, NNE



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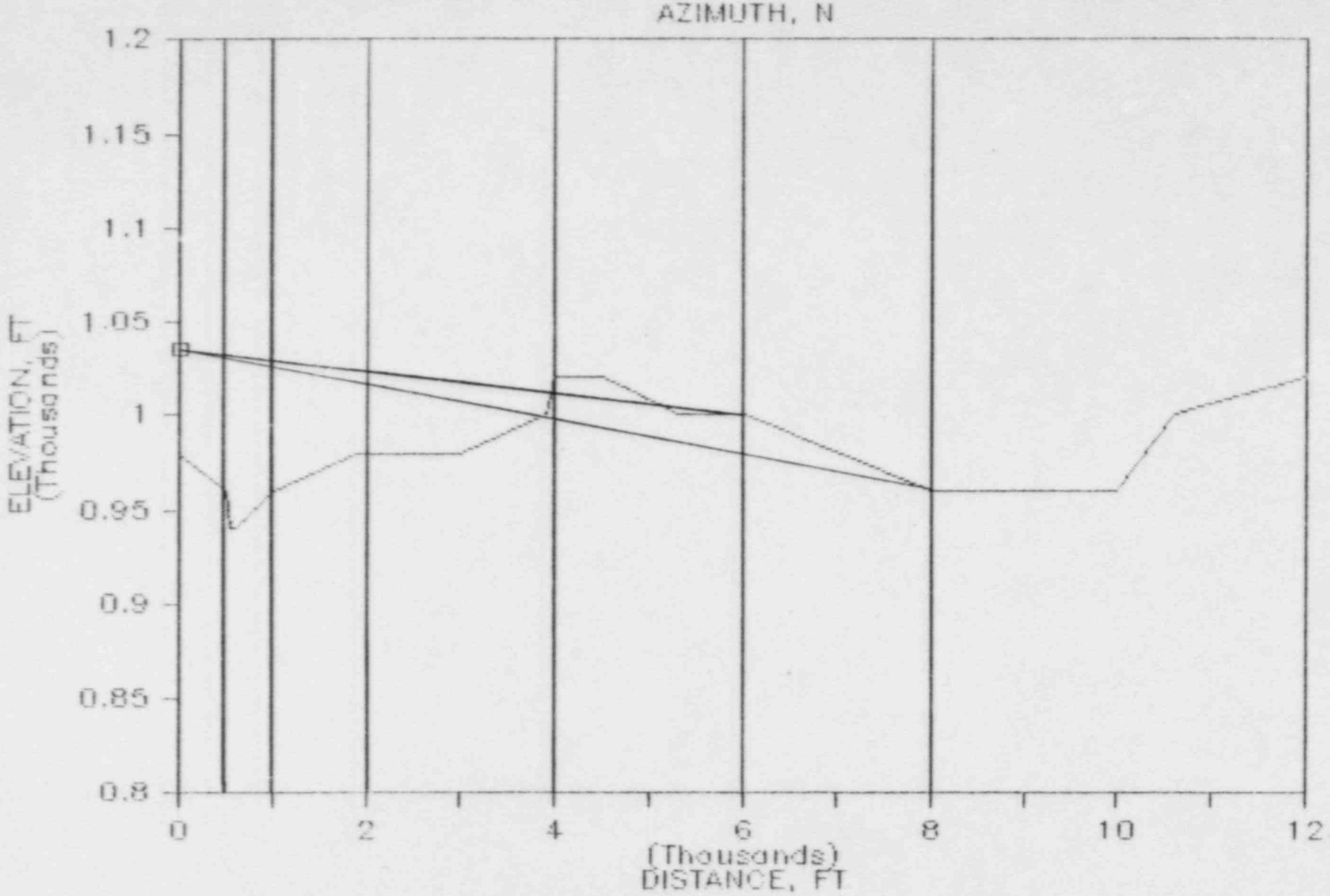
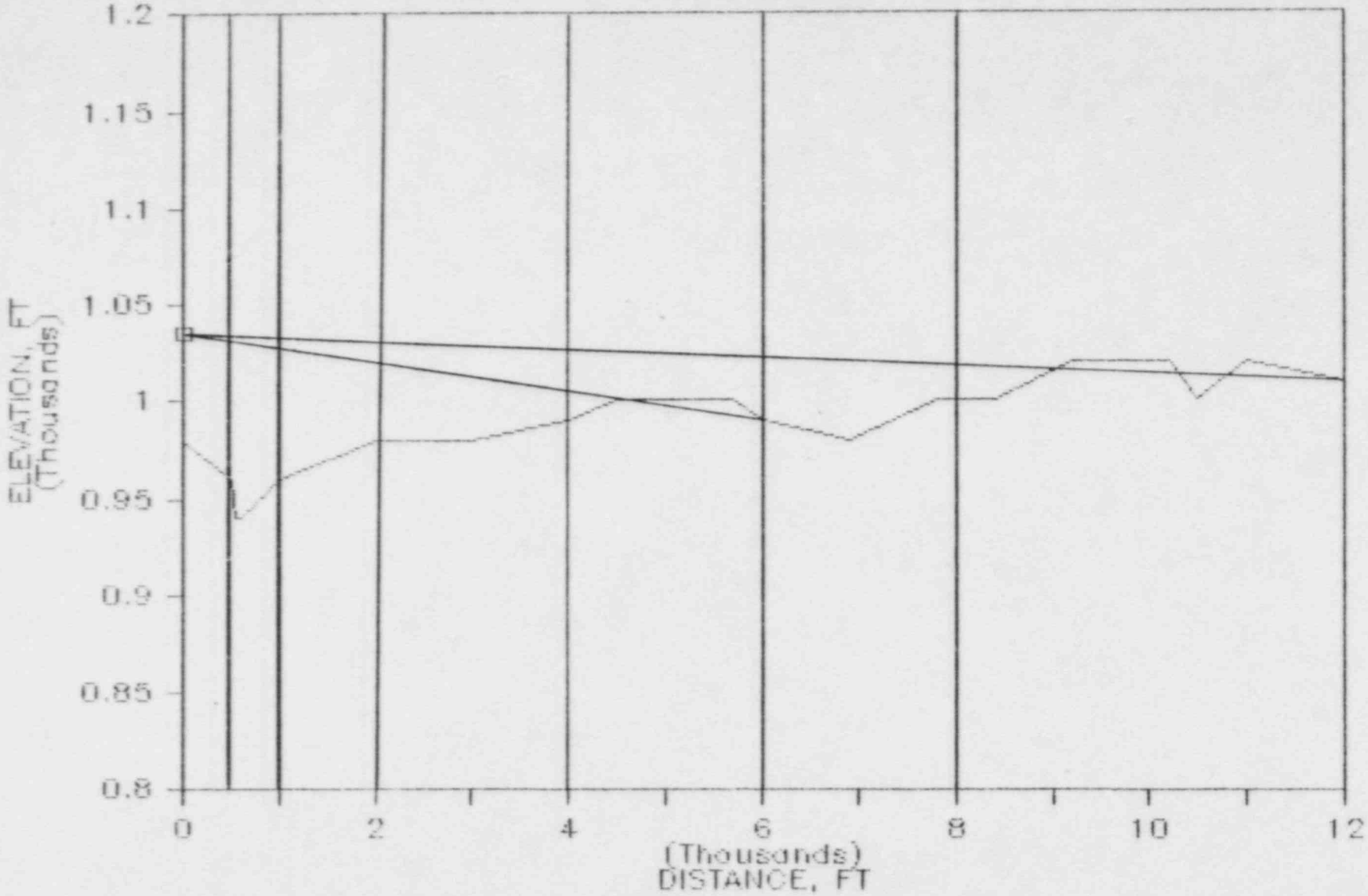


MONTICELLO B2

AZIMUTH, NNW



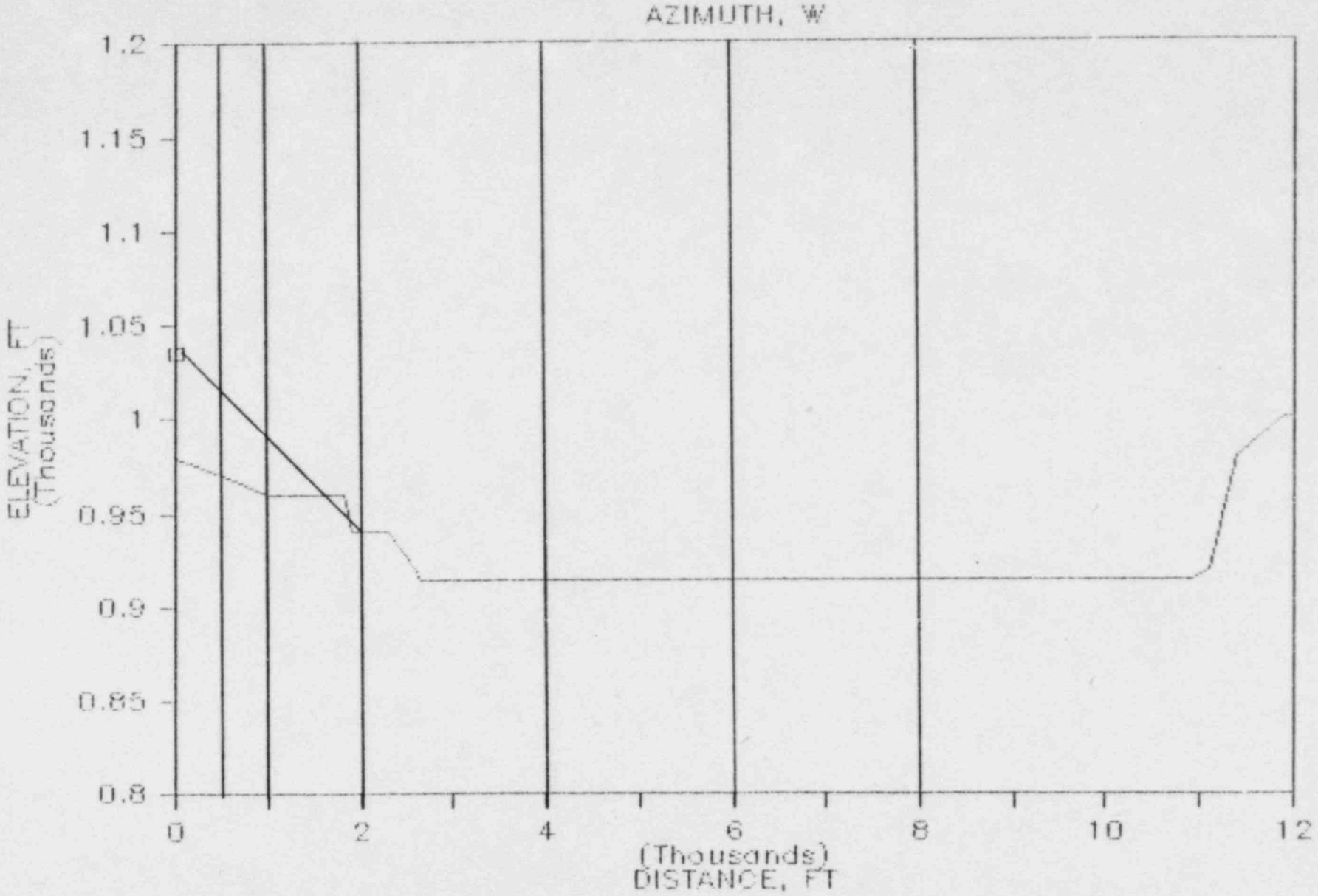
MONTICELLO B2

AZIMUTH, NW

MONTICELLO B2

AZIMUTH, WNW

MONTICELLO B2

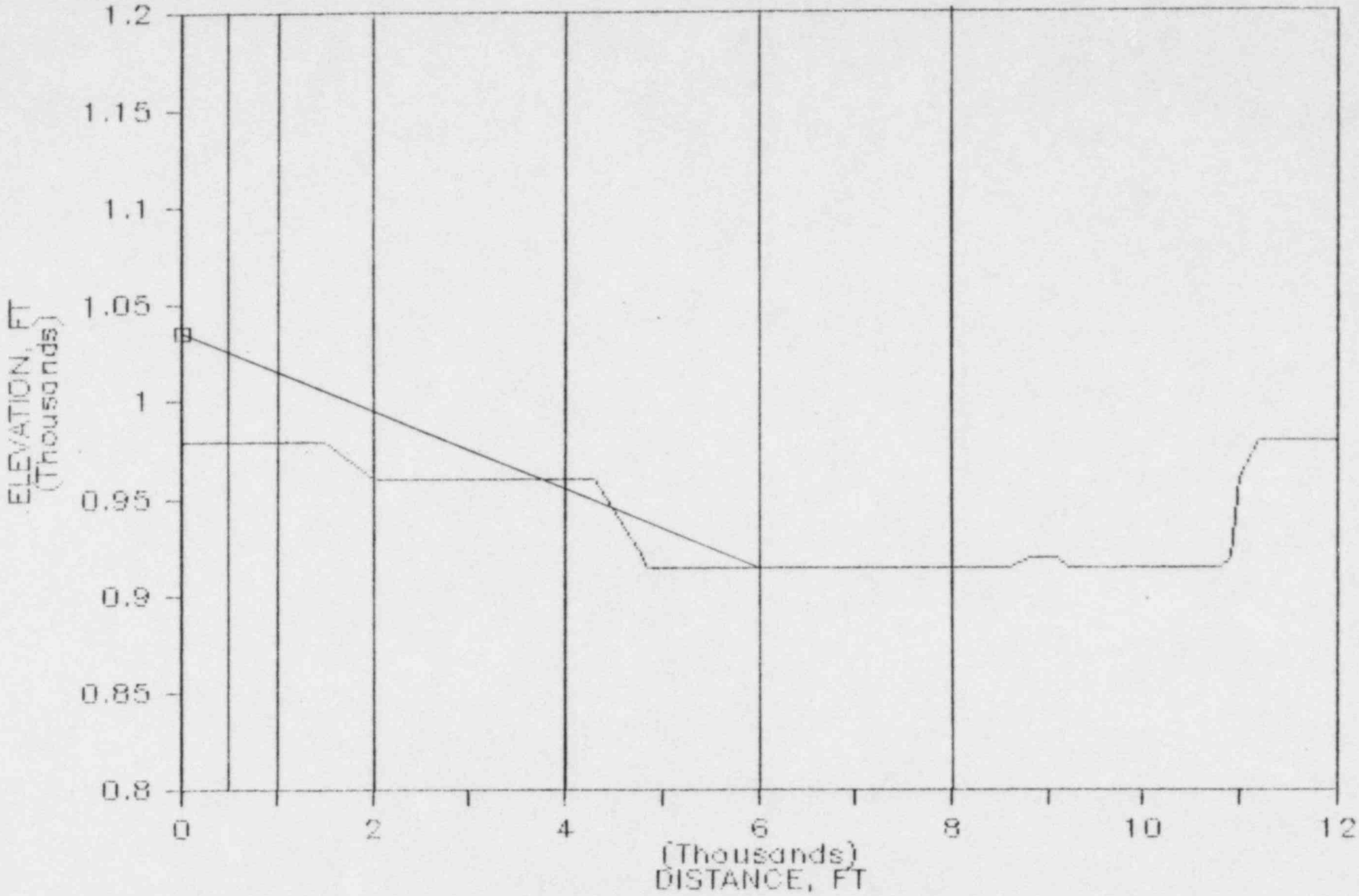


MONTICELLO B2

AZIMUTH, WSW

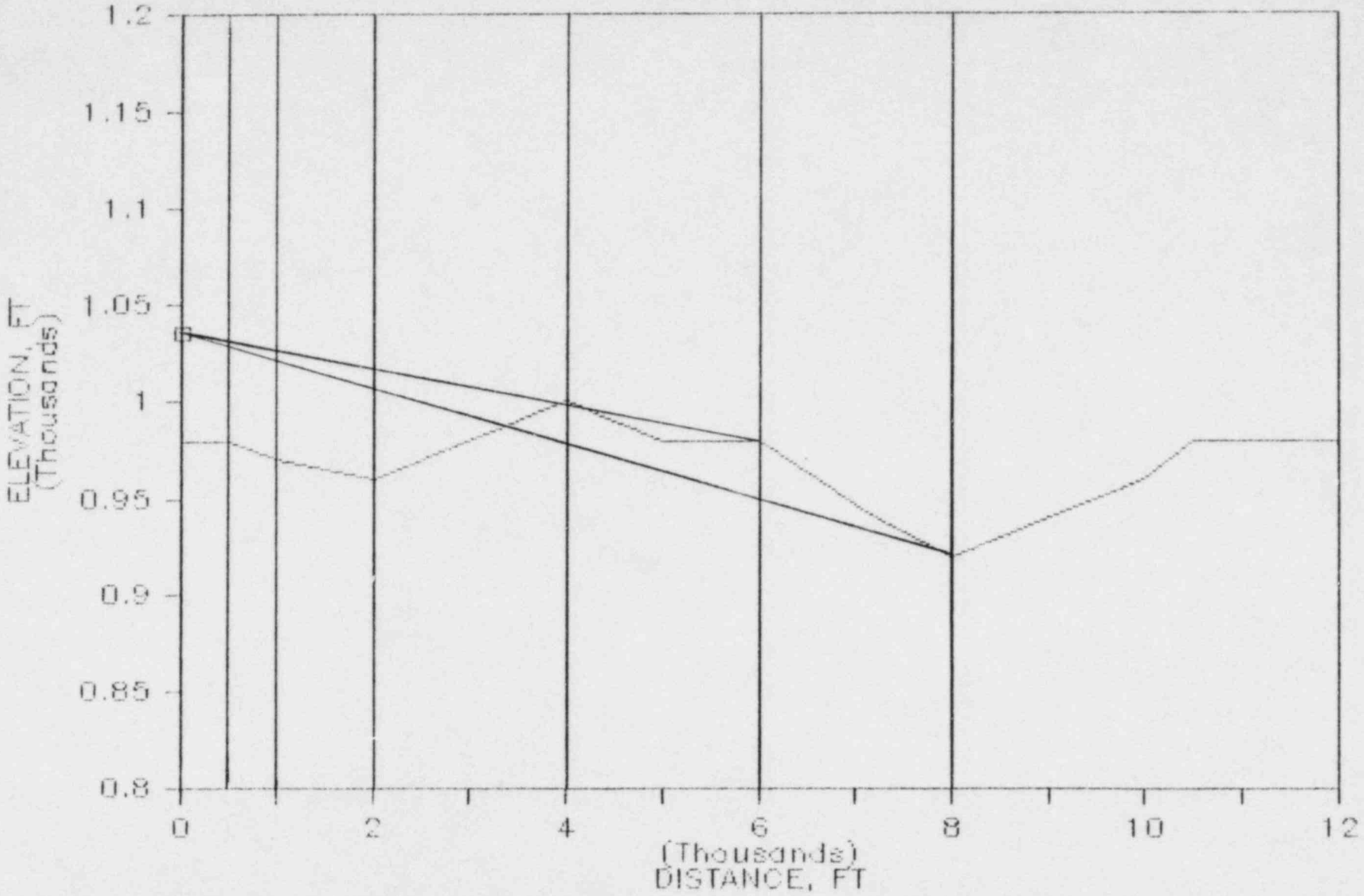
MONTICELLO B2

AZIMUTH, SW



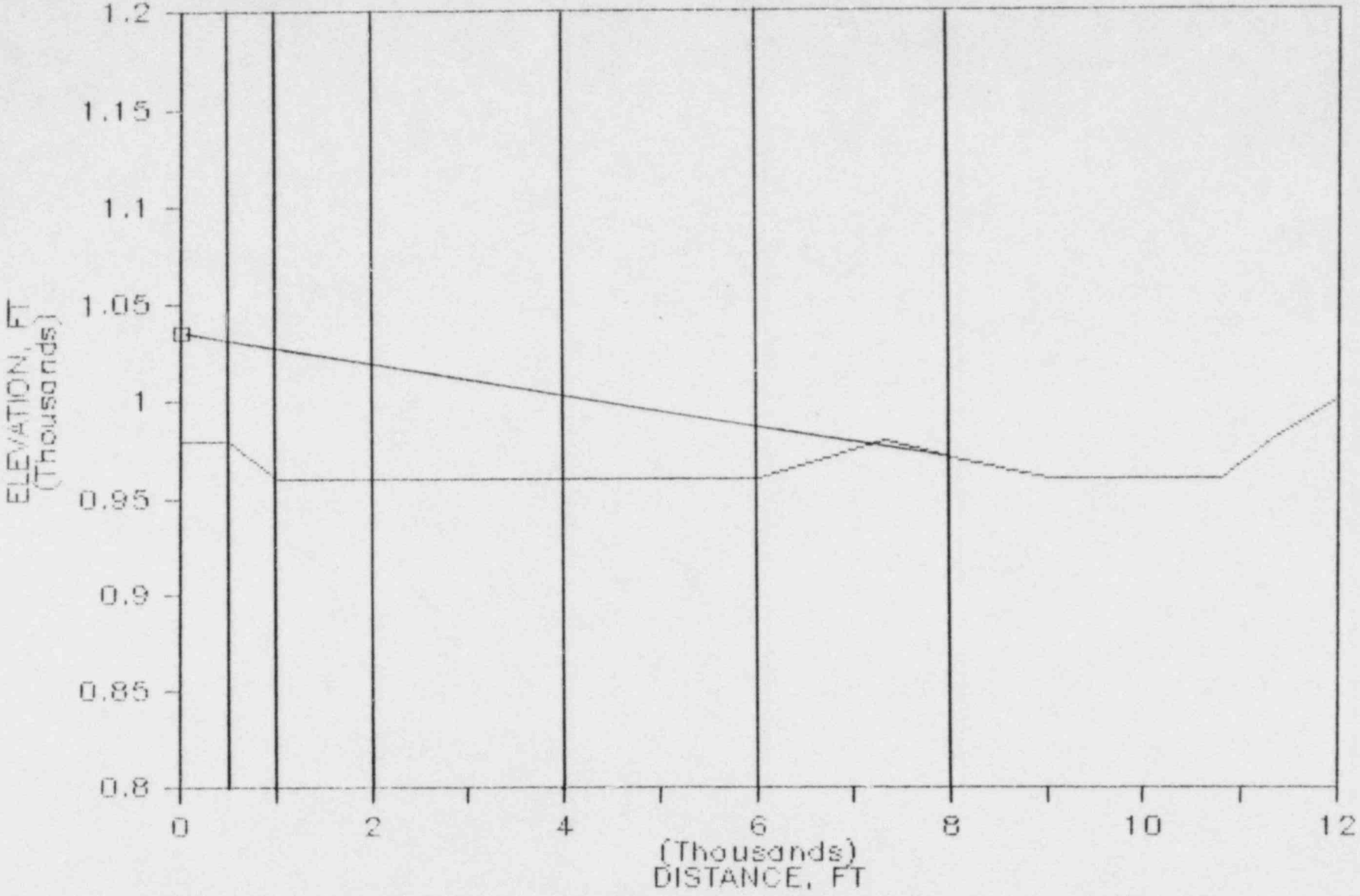
MONTICELLO B2

AZIMUTH, SSW



MONTICELLO B2

AZIMUTH, S

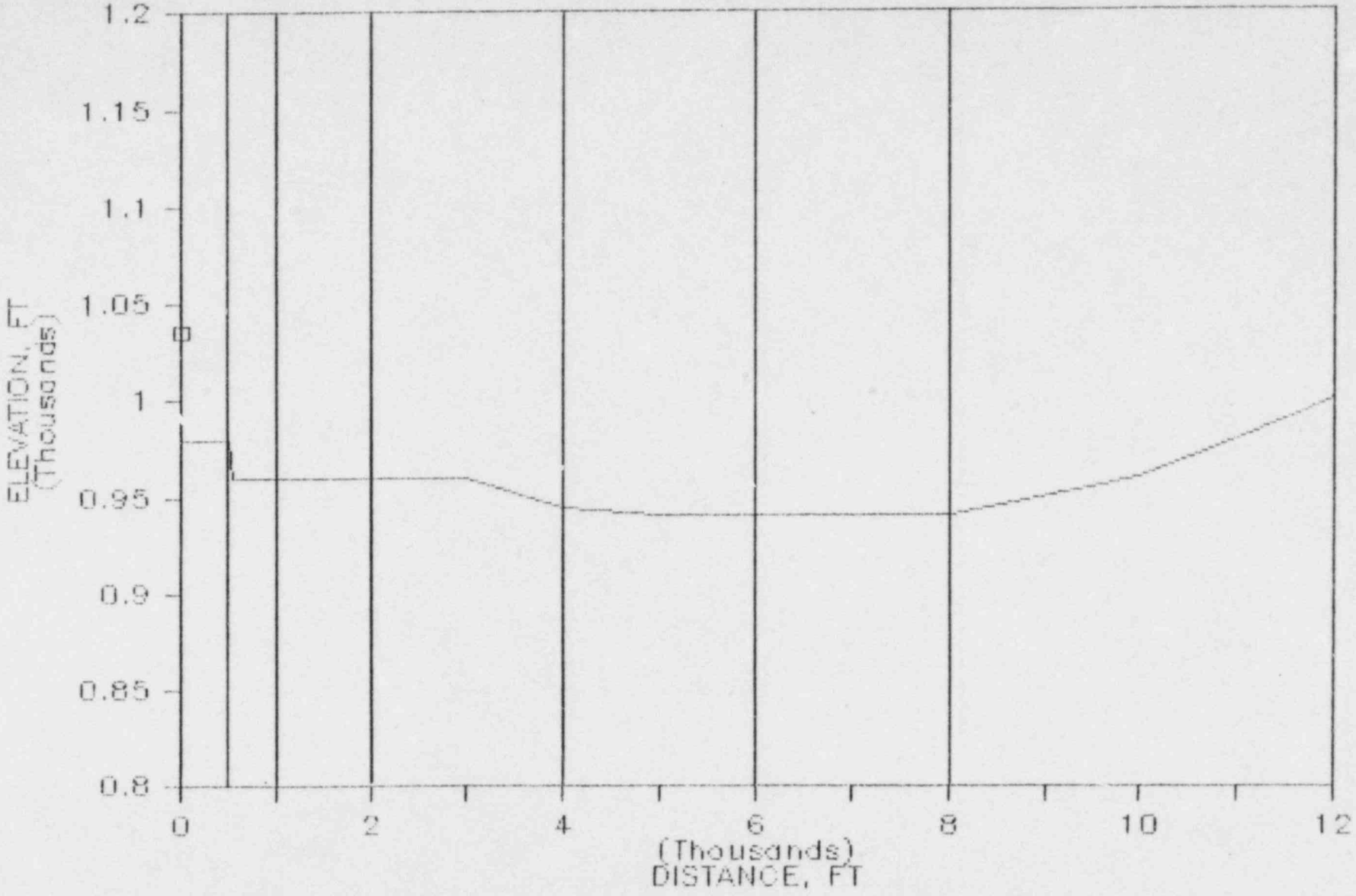


MONTICELLO B2

AZIMUTH, SSE

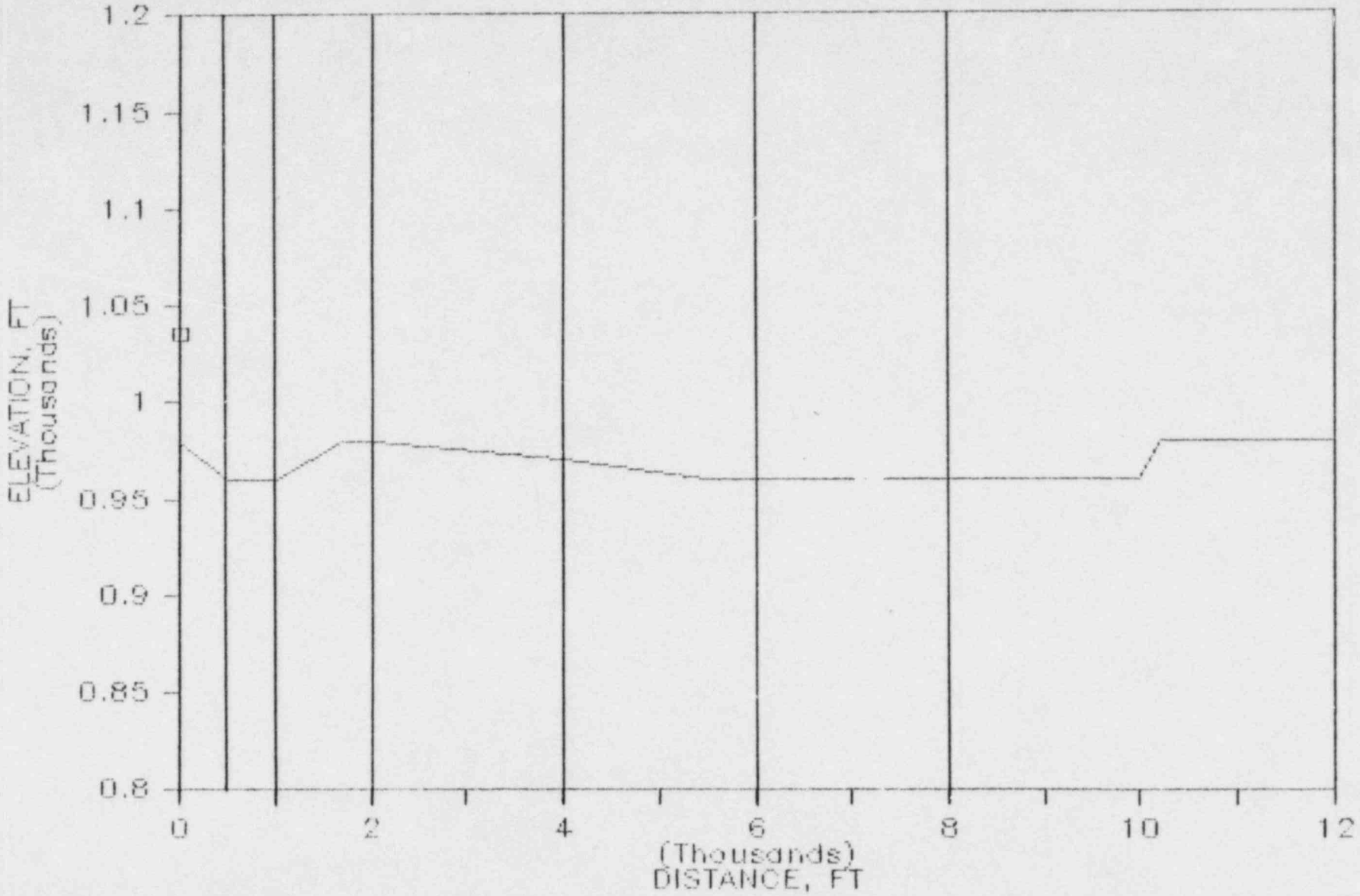
MONTICELLO B2

AZIMUTH, SE



MONTICELLO B2

AZIMUTH, ESE



NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #B2-T1003
SOURCE-RECEIVER TOPOGRAPHICAL INPUTS

ALL BEARINGS ARE WITH RESPECT TO THE NORTH MEASURING CLOCKWISE

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
1	500.	90.00	960.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	970.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	980.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	980.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	980.00	SOFT	0.	NO	0.	0.
6	8000.	90.00	980.00	SOFT	0.	NO	0.	0.
7	12000.	90.00	980.00	SOFT	0.	NO	0.	0.
8	500.	67.50	960.00	SOFT	0.	NO	0.	0.
9	1000.	67.50	960.00	SOFT	0.	NO	0.	0.
10	2000.	67.50	980.00	SOFT	0.	NO	0.	0.
11	4000.	67.50	990.00	SOFT	0.	NO	0.	0.
12	6000.	67.50	980.00	SOFT	0.	YES	5100.	1000.
13	8000.	67.50	980.00	SOFT	0.	NO	0.	0.
14	12000.	67.50	980.00	SOFT	0.	NO	0.	0.
15	500.	45.00	970.00	SOFT	0.	NO	0.	0.
16	1000.	45.00	960.00	SOFT	0.	NO	0.	0.
17	2000.	45.00	980.00	SOFT	0.	NO	0.	0.
18	4000.	45.00	980.00	SOFT	0.	NO	0.	0.
19	6000.	45.00	980.00	SOFT	0.	NO	0.	0.
20	8000.	45.00	980.00	SOFT	0.	NO	0.	0.
21	12000.	45.00	1000.00	SOFT	0.	NO	0.	0.
22	500.	22.50	960.00	SOFT	0.	NO	0.	0.
23	1000.	22.50	960.00	SOFT	0.	NO	0.	0.
24	2000.	22.50	980.00	SOFT	0.	NO	0.	0.
25	4000.	22.50	1000.00	SOFT	0.	NO	0.	0.
26	6000.	22.50	1000.00	SOFT	0.	NO	0.	0.
27	8000.	22.50	980.00	SOFT	0.	YES	7800.	1000.
28	12000.	22.50	960.00	HARD	0.	YES	7800.	1000.
29	500.	0.0	960.00	SOFT	0.	NO	0.	0.
30	1000.	0.0	960.00	SOFT	0.	NO	0.	0.
31	2000.	0.0	980.00	SOFT	0.	NO	0.	0.
32	4000.	0.0	1020.00	SOFT	0.	NO	0.	0.
33	6000.	0.0	1000.00	SOFT	0.	YES	4500.	1020.
34	8000.	0.0	960.00	HARD	0.	YES	4500.	1020.
35	12000.	0.0	1020.00	SOFT	0.	NO	0.	0.
36	500.	337.50	960.00	SOFT	0.	NO	0.	0.

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
37	1000.	337.50	960.00	SOFT	0.	NO	0.	0.
38	2000.	337.50	980.00	SOFT	0.	NO	0.	0.
39	4000.	337.50	990.00	SOFT	0.	NO	0.	0.
40	6000.	337.50	990.00	SOFT	0.	YES	5700.	1000.
41	8000.	337.50	1000.00	SOFT	0.	NO	0.	0.
42	12000.	337.50	1010.00	SOFT	0.	YES	11000.	1025.
43	500.	315.00	960.00	SOFT	0.	NO	0.	0.
44	1000.	315.00	940.00	SOFT	0.	NO	0.	0.
45	2000.	315.00	980.00	SOFT	0.	NO	0.	0.
46	4000.	315.00	980.00	SOFT	0.	NO	0.	0.
47	6000.	315.00	980.00	SOFT	0.	NO	0.	0.
48	8000.	315.00	1000.00	SOFT	0.	NO	0.	0.
49	12000.	315.00	1010.00	SOFT	0.	YES	10350.	1040.
50	500.	292.50	960.00	SOFT	0.	NO	0.	0.
51	1000.	292.50	960.00	SOFT	0.	NO	0.	0.
52	2000.	292.50	940.00	SOFT	0.	NO	0.	0.
53	4000.	292.50	940.00	SOFT	0.	NO	0.	0.
54	6000.	292.50	914.00	HARD	0.	NO	0.	0.
55	8000.	292.50	960.00	SOFT	0.	NO	0.	0.
56	12000.	292.50	1020.00	SOFT	0.	NO	0.	0.
57	500.	270.00	970.00	SOFT	0.	NO	0.	0.
58	1000.	270.00	960.00	SOFT	0.	NO	0.	0.
59	2000.	270.00	940.00	SOFT	0.	YES	1850.	960.
60	4000.	270.00	914.00	HARD	0.	NO	0.	0.
61	6000.	270.00	914.00	HARD	0.	NO	0.	0.
62	8000.	270.00	914.00	HARD	0.	NO	0.	0.
63	12000.	270.00	1000.00	SOFT	0.	NO	0.	0.
64	500.	247.50	950.00	SOFT	0.	NO	0.	0.
65	1000.	247.50	980.00	SOFT	0.	NO	0.	0.
66	2000.	247.50	950.00	SOFT	0.	NO	0.	0.
67	4000.	247.50	914.00	HARD	0.	NO	0.	0.
68	6000.	247.50	914.00	HARD	0.	NO	0.	0.
69	8000.	247.50	914.00	HARD	0.	NO	0.	0.
70	12000.	247.50	914.00	HARD	0.	NO	0.	0.
71	500.	225.00	980.00	SOFT	0.	NO	0.	0.
72	1000.	225.00	980.00	SOFT	0.	NO	0.	0.

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
73	2000.	225.00	960.00	SOFT	0.	NO	0.	0.
74	4000.	225.00	960.00	SOFT	0.	NO	0.	0.
75	6000.	225.00	914.00	HARD	0.	YES	4300.	960.
76	8000.	225.00	914.00	HARD	0.	NO	0.	0.
77	12000.	225.00	980.00	SOFT	0.	NO	0.	0.
78	500.	202.50	980.00	SOFT	0.	NO	0.	0.
79	1000.	202.50	970.00	SOFT	0.	NO	0.	0.
80	2000.	202.50	960.00	SOFT	0.	NO	0.	0.
81	4000.	202.50	1000.00	SOFT	0.	NO	0.	0.
82	6000.	202.50	980.00	SOFT	0.	YES	4000.	1000.
83	8000.	202.50	920.00	SOFT	0.	YES	4000.	1000.
84	12000.	202.50	980.00	SOFT	0.	NO	0.	0.
85	500.	180.00	980.00	SOFT	0.	NO	0.	0.
86	1000.	180.00	960.00	SOFT	0.	NO	0.	0.
87	2000.	180.00	960.00	SOFT	0.	NO	0.	0.
88	4000.	180.00	960.00	SOFT	0.	NO	0.	0.
89	6000.	180.00	960.00	SOFT	0.	NO	0.	0.
90	8000.	180.00	970.00	SOFT	0.	YES	7400.	980.
91	12000.	180.00	1000.00	SOFT	0.	NO	0.	0.
92	500.	157.50	980.00	SOFT	0.	NO	0.	0.
93	1000.	157.50	960.00	SOFT	0.	NO	0.	0.
94	2000.	157.50	960.00	SOFT	0.	NO	0.	0.
95	4000.	157.50	960.00	SOFT	0.	NO	0.	0.
96	6000.	157.50	944.00	SOFT	0.	NO	0.	0.
97	8000.	157.50	944.00	HARD	0.	NO	0.	0.
98	12000.	157.50	1000.00	SOFT	0.	NO	0.	0.
99	500.	135.00	980.00	SOFT	0.	NO	0.	0.
100	1000.	135.00	960.00	SOFT	0.	NO	0.	0.
101	2000.	135.00	960.00	SOFT	0.	NO	0.	0.
102	4000.	135.00	945.00	SOFT	0.	NO	0.	0.
103	6000.	135.00	940.00	SOFT	0.	NO	0.	0.
104	8000.	135.00	940.00	SOFT	0.	NO	0.	0.
105	12000.	135.00	1000.00	SOFT	0.	NO	0.	0.
106	500.	112.50	960.00	SOFT	0.	NO	0.	0.
107	1000.	112.50	960.00	SOFT	0.	NO	0.	0.
108	2000.	112.50	980.00	SOFT	0.	NO	0.	0.
109	4000.	112.50	970.00	SOFT	0.	NO	0.	0.
110	6000.	112.50	960.00	SOFT	0.	NO	0.	0.
111	8000.	112.50	960.00	SOFT	0.	NO	0.	0.
112	12000.	112.50	980.00	SOFT	0.	NO	0.	0.
113	37744.	309.91	1000.00	SOFT	0.	YES	10350.	1040.
114	34347.	45.17	200.00	SOFT	0.	YES	7800.	1000.
115	41049.	224.86	10.00	SOFT	0.	YES	4300.	960.
116	37949.	140.07	900.00	SOFT	0.	YES	7400.	980.

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #B2-T1003
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	SIREN B-2	165.9	167.9	0.0	0.0	0.0	0.0	167.0	158.0	157.0	150.0	148.0

XO= 0.0 YO= 0.0 ZO= 980.00 HEIGHT ABOVE GROUND= 55.00

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #B2-T1003
METEOROLOGICAL INPUT CONDITIONS

H1= 10.06 METERS H2= 43.28 METERS

YEAR	SEASON	MONTH	DATE	HOUR	WIND DIRECTION	WIND SPEED(MPS) H1	WIND SPEED(MPS) H2	TEMPERATURE(C) H1	TEMPERATURE(C) H2	RELATIVE HUMIDITY	BAROMETRIC PRESSURE(MM OF HG)
1984	S	7	22	12	188.0	3.1	3.8	28.1	27.2	68.0	760.0

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #B2-T1003

SIREN SOUND LEVELS IN DBC

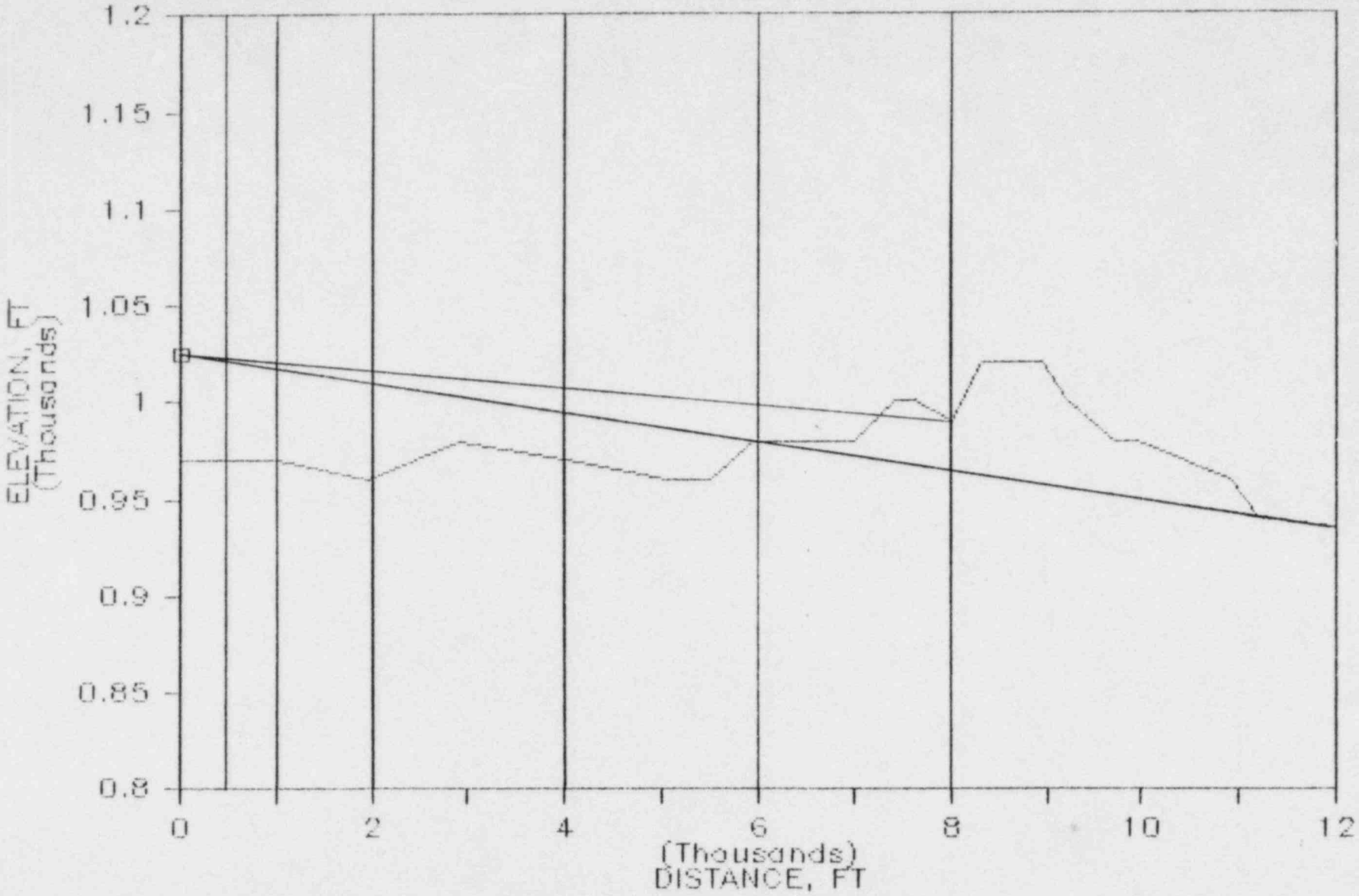
UNDER MET CONDITION 1

DISTANCE IN FEET

AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	115.	106.	97.	90.	86.	82.	75.
ENE	115.	106.	97.	90.	79.	82.	75.
NE	115.	106.	97.	90.	86.	82.	75.
NNE	115.	106.	97.	90.	86.	71.	70.
N	115.	106.	97.	90.	79.	74.	75.
NNW	115.	106.	97.	90.	79.	82.	69.
NW	115.	106.	97.	90.	86.	82.	67.
WNW	115.	106.	97.	90.	88.	82.	75.
W	115.	106.	86.	94.	88.	81.	68.
WSW	116.	106.	97.	94.	88.	84.	74.
SW	115.	106.	97.	90.	81.	84.	75.
SSW	115.	106.	97.	90.	80.	73.	74.
S	115.	106.	97.	90.	86.	76.	73.
SSE	115.	106.	97.	90.	86.	84.	75.
SE	115.	106.	97.	90.	86.	82.	75.
ESE	115.	106.	97.	90.	86.	80.	69.

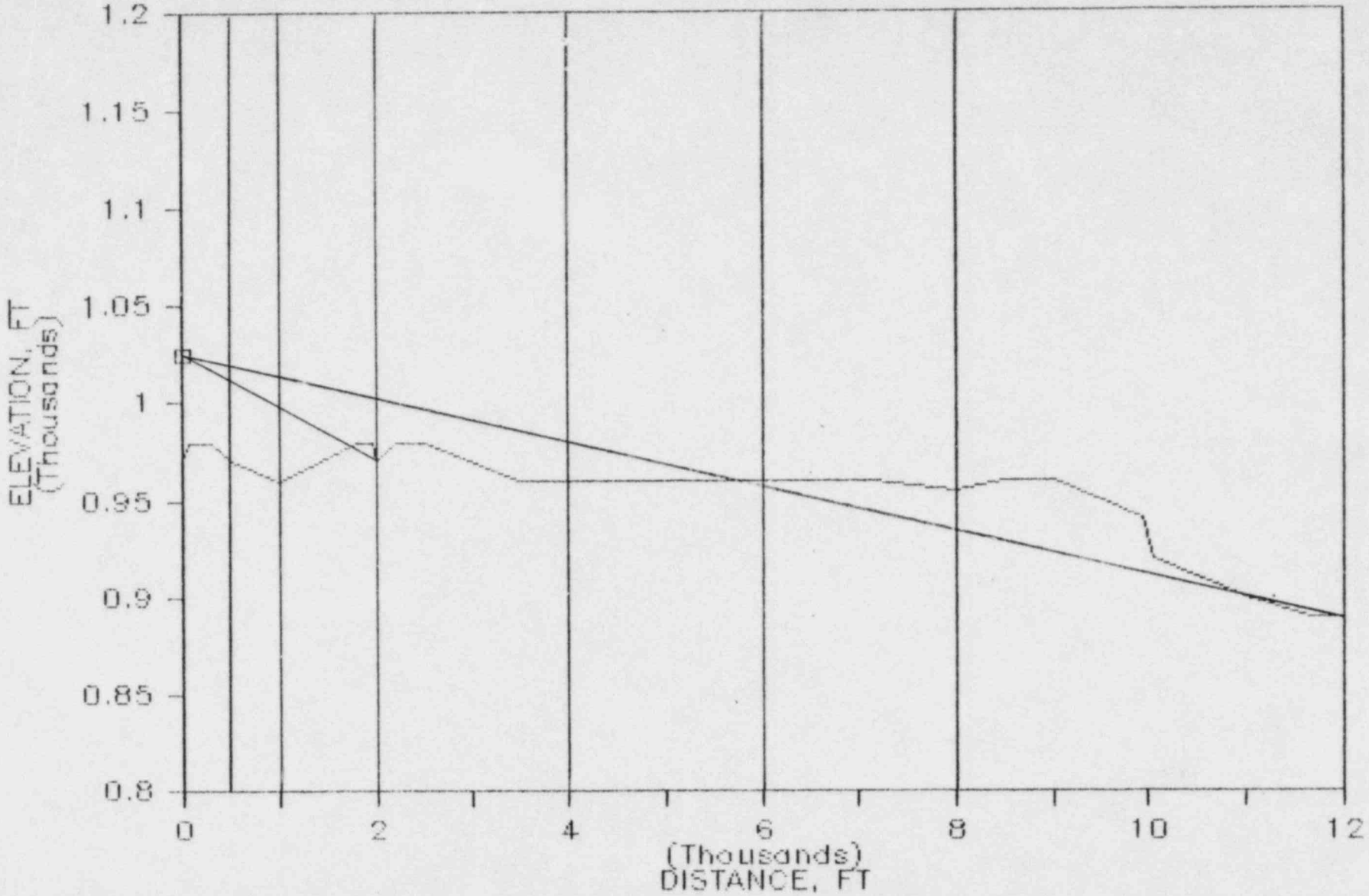
MONTICELLO NSP1

AZIMUTH, E

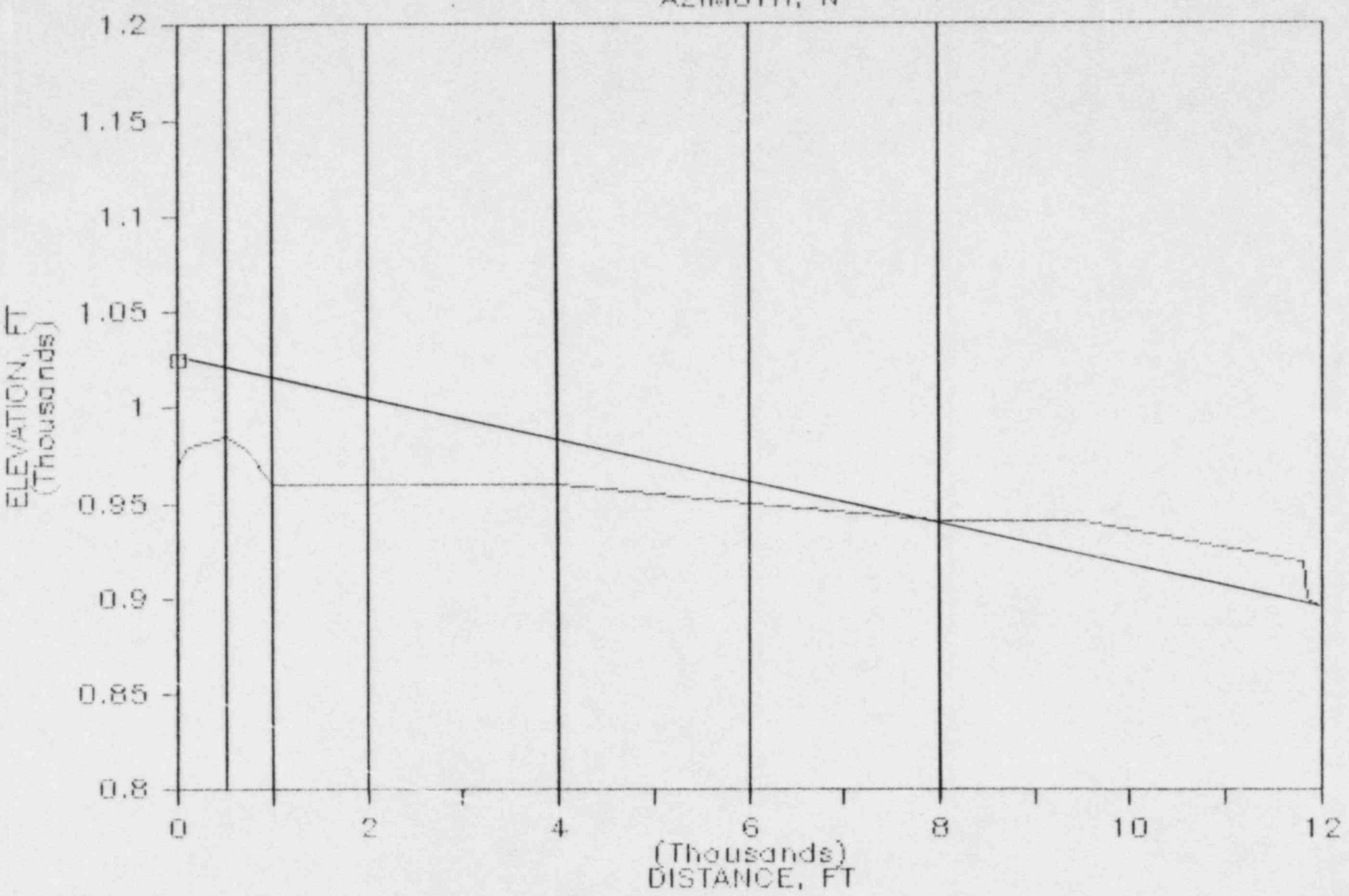


MONTICELLO NSP1

AZIMUTH, NE

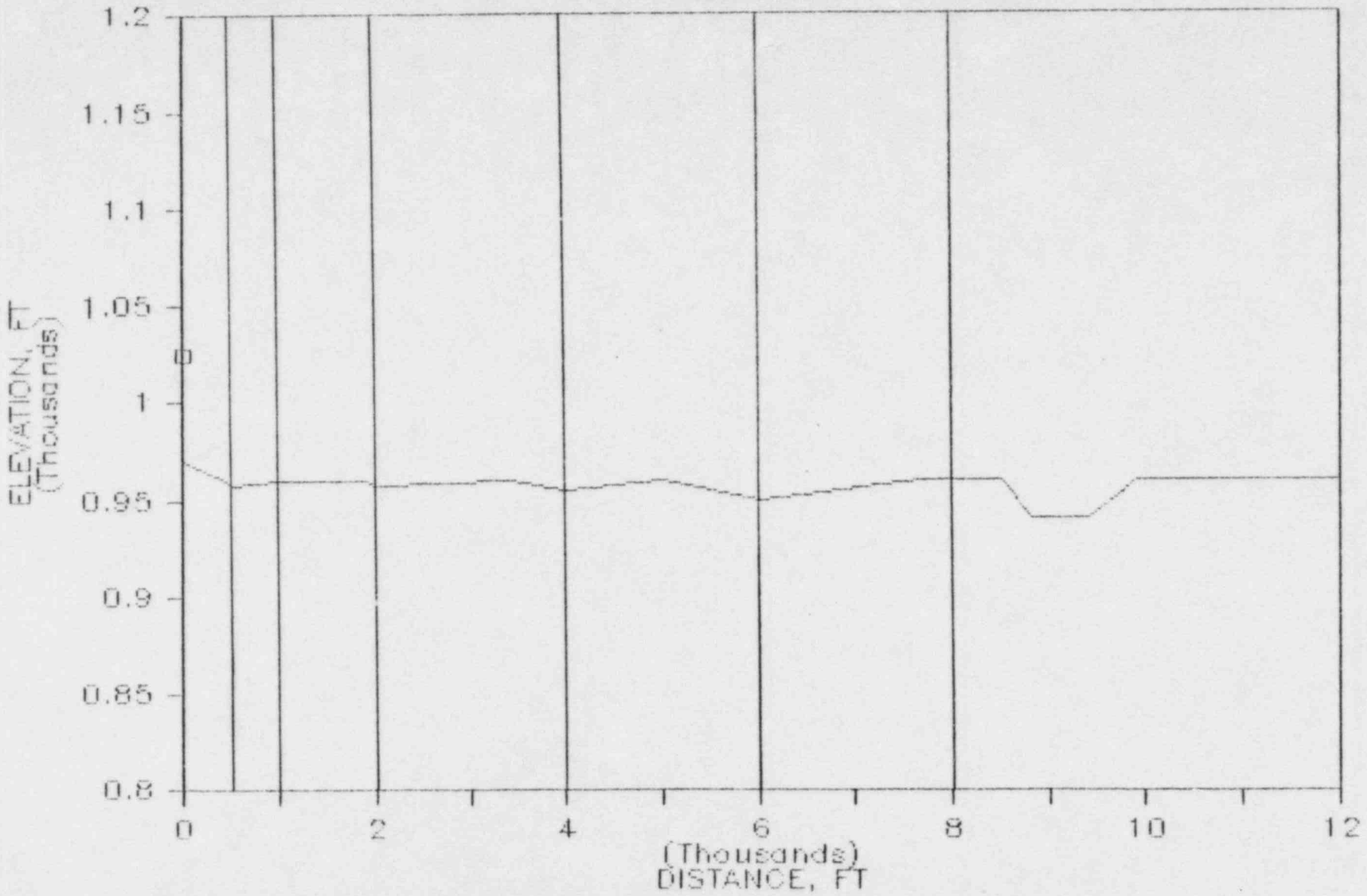


MONTICELLO NSP1

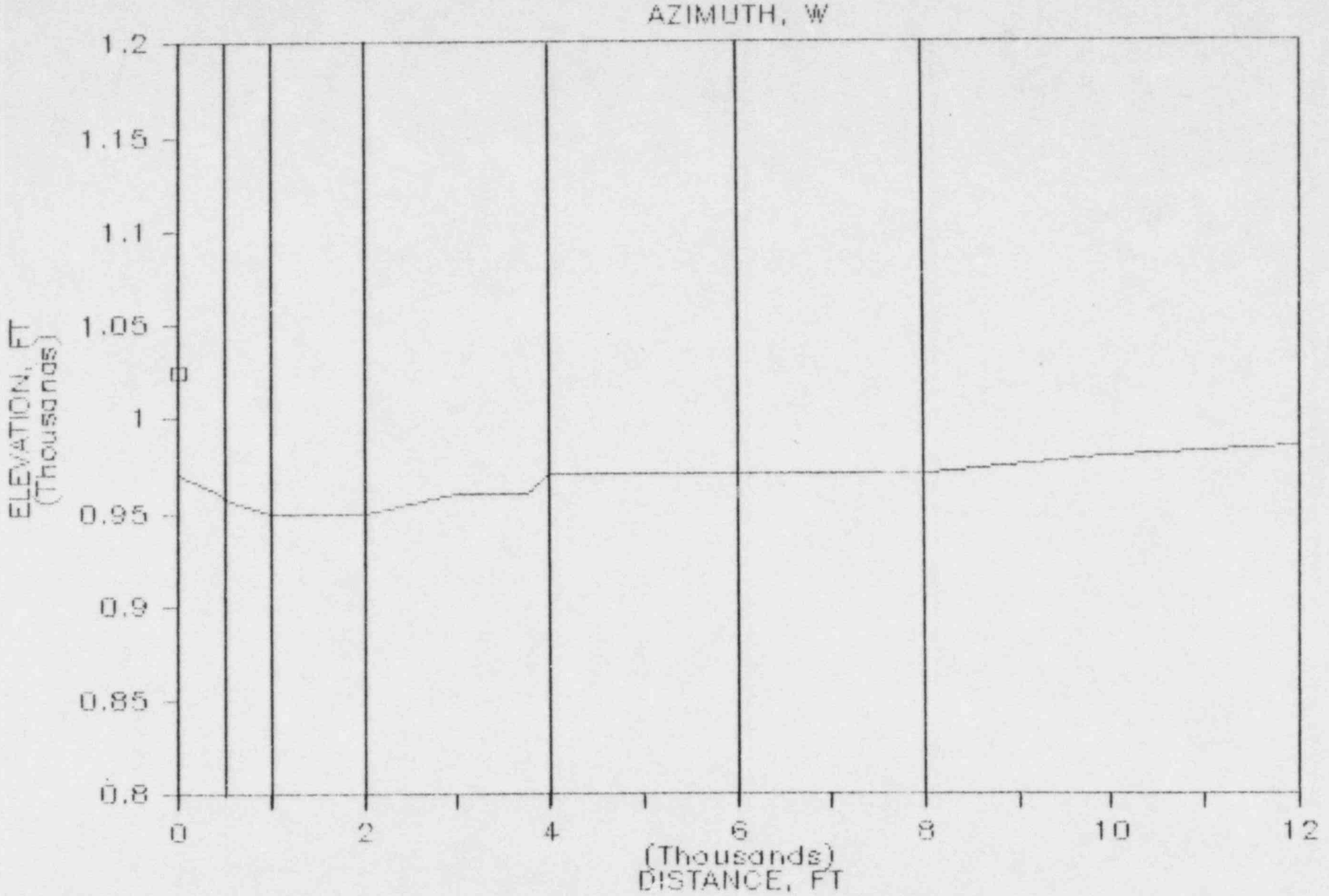


MONTICELLO NSP1

AZIMUTH, NW

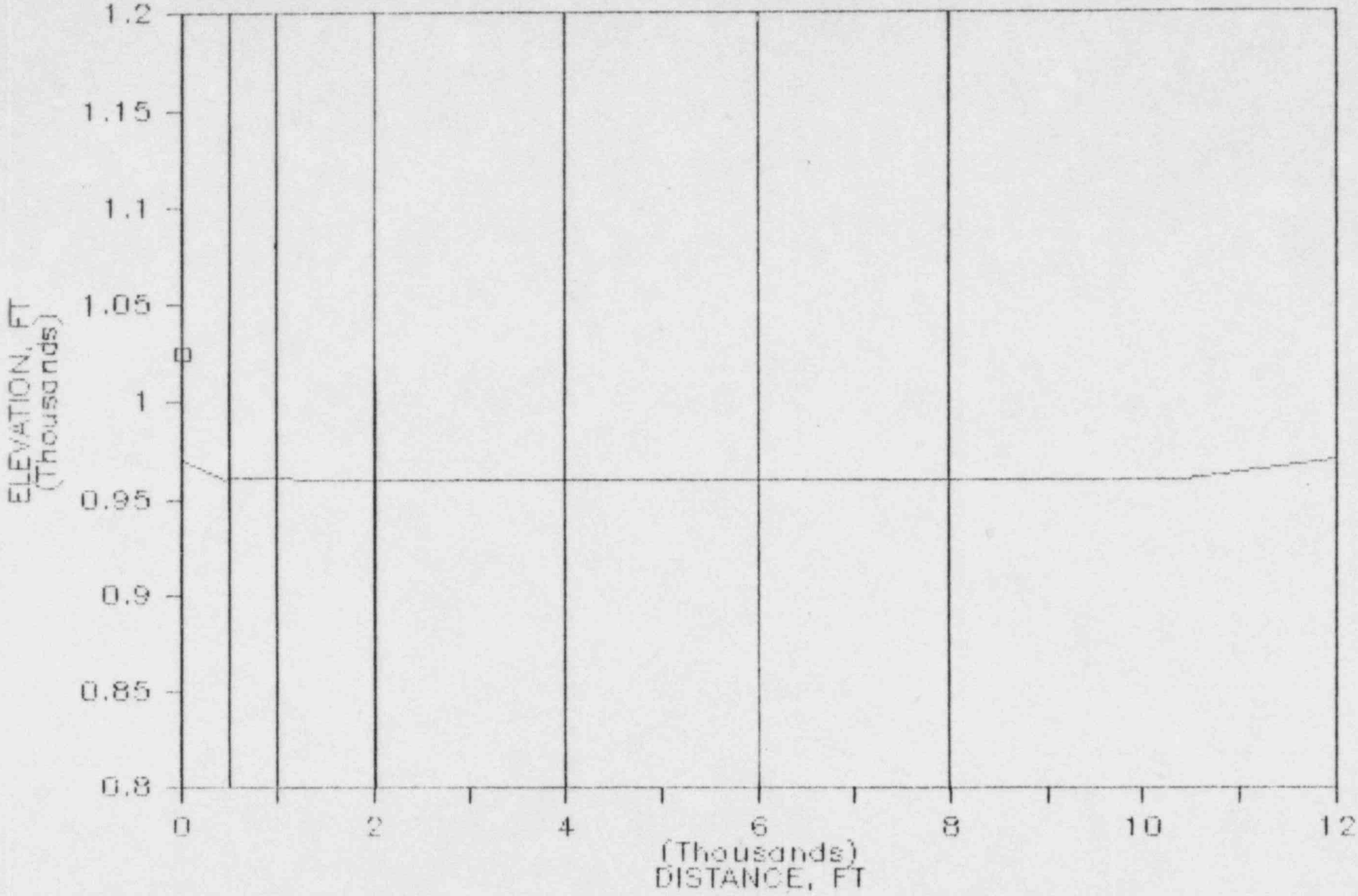


MONTICELLO NSP1



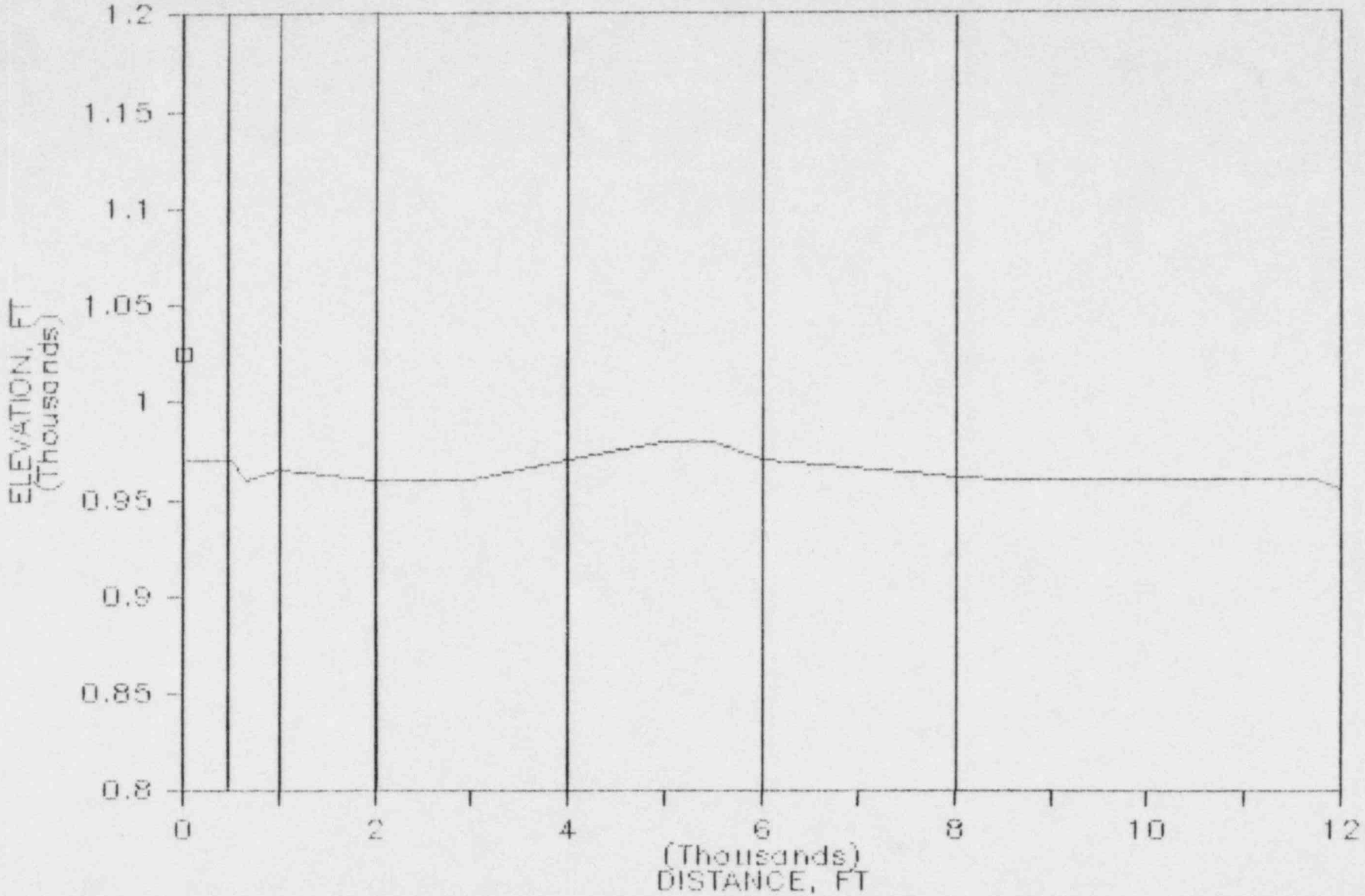
MONTICELLO NSP1

AZIMUTH, SW



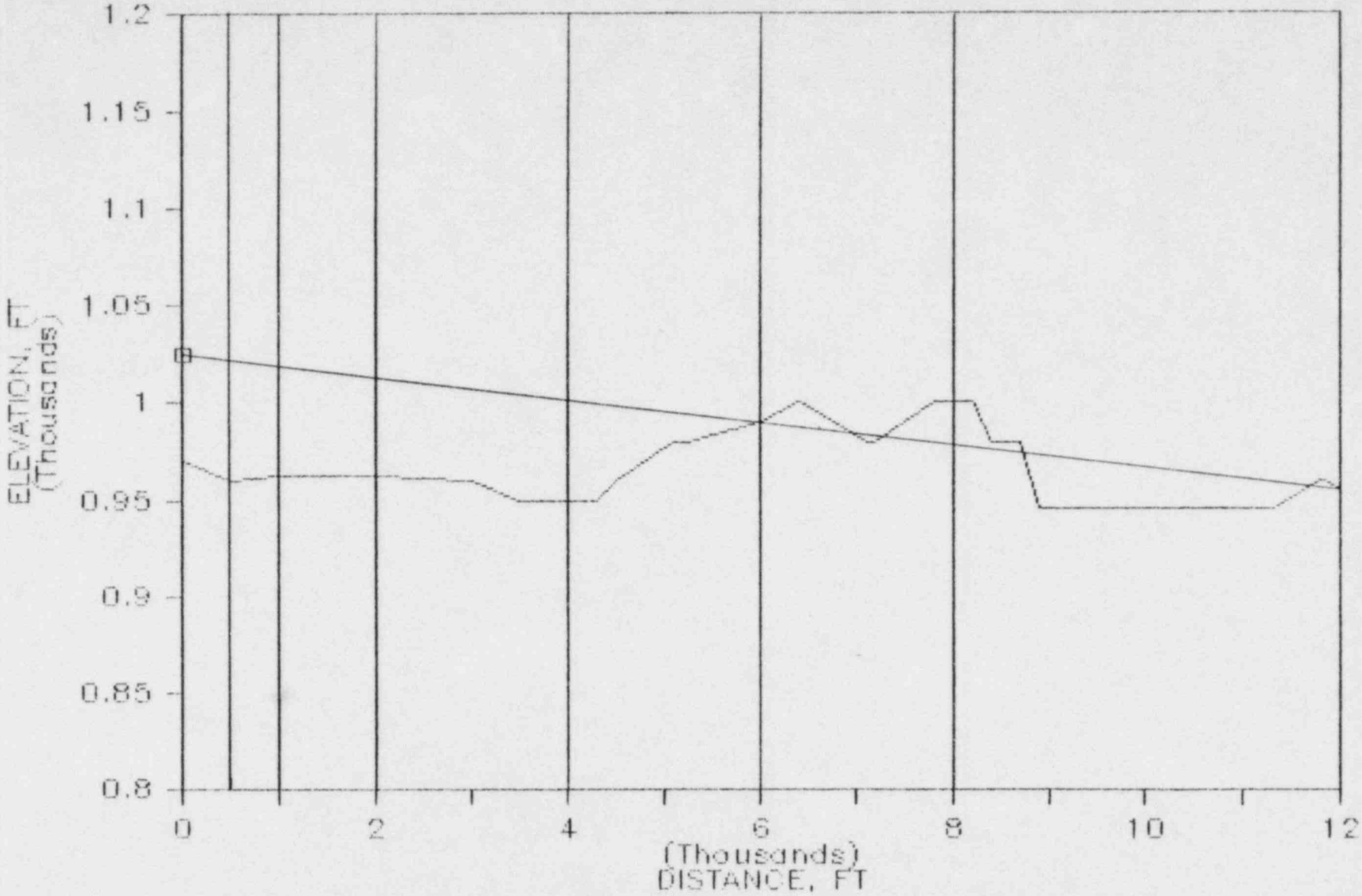
MONTICELLO NSP1

AZIMUTH, S



MONTICELLO NSP1

AZIMUTH, SE



NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP01-T1000
SOURCE-RECEIVER TOPOGRAPHICAL INPUTS

ALL BEARINGS ARE WITH RESPECT TO THE NORTH MEASURING CLOCKWISE

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
1	500.	90.00	970.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	970.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	962.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	970.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	980.00	SOFT	0.	NO	0.	0.
6	8000.	90.00	990.00	SOFT	0.	YES	7500.	1000.
7	12000.	90.00	935.00	SOFT	0.	YES	8900.	1020.
8	500.	45.00	970.00	SOFT	0.	NO	0.	0.
9	1000.	45.00	960.00	SOFT	0.	NO	0.	0.
10	2000.	45.00	970.00	SOFT	0.	YES	1950.	980.
11	4000.	45.00	960.00	SOFT	0.	NO	0.	0.
12	6000.	45.00	960.00	SOFT	0.	NO	0.	0.
13	8000.	45.00	955.00	SOFT	0.	NO	0.	0.
14	12000.	45.00	890.00	SOFT	0.	YES	9000.	960.
15	500.	0.0	985.00	SOFT	0.	NO	0.	0.
16	1000.	0.0	960.00	SOFT	0.	NO	0.	0.
17	2000.	0.0	960.00	SOFT	0.	NO	0.	0.
18	4000.	0.0	960.00	SOFT	0.	NO	0.	0.
19	6000.	0.0	950.00	SOFT	0.	NO	0.	0.
20	8000.	0.0	940.00	SOFT	0.	NO	0.	0.
21	12000.	0.0	895.00	SOFT	0.	YES	11800.	920.
22	500.	315.00	957.00	SOFT	0.	NO	0.	0.
23	1000.	315.00	960.00	SOFT	0.	NO	0.	0.
24	2000.	315.00	957.00	SOFT	0.	NO	0.	0.
25	4000.	315.00	955.00	SOFT	0.	NO	0.	0.
26	6000.	315.00	950.00	SOFT	0.	NO	0.	0.
27	8000.	315.00	960.00	SOFT	0.	NO	0.	0.
28	12000.	315.00	960.00	SOFT	0.	NO	0.	0.
29	500.	270.00	957.00	SOFT	0.	NO	0.	0.
30	1000.	270.00	950.00	SOFT	0.	NO	0.	0.
31	2000.	270.00	950.00	SOFT	0.	NO	0.	0.
32	4000.	270.00	970.00	SOFT	0.	NO	0.	0.
33	6000.	270.00	970.00	SOFT	0.	NO	0.	0.
34	8000.	270.00	970.00	SOFT	0.	NO	0.	0.
35	12000.	270.00	985.00	SOFT	0.	NO	0.	0.
36	500.	225.00	962.00	SOFT	0.	NO	0.	0.

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
37	1000.	225.00	962.00	SOFT	0.	NO	0.	0.
38	2000.	225.00	960.00	SOFT	0.	NO	0.	0.
39	4000.	225.00	960.00	SOFT	0.	NO	0.	0.
40	6000.	225.00	960.00	SOFT	0.	NO	0.	0.
41	8000.	225.00	960.00	SOFT	0.	NO	0.	0.
42	12000.	225.00	970.00	SOFT	0.	NO	0.	0.
43	500.	180.00	970.00	SOFT	0.	NO	0.	0.
44	1000.	180.00	965.00	SOFT	0.	NO	0.	0.
45	2000.	180.00	960.00	SOFT	0.	NO	0.	0.
46	4000.	180.00	970.00	SOFT	0.	NO	0.	0.
47	6000.	180.00	970.00	SOFT	0.	NO	0.	0.
48	8000.	180.00	962.00	SOFT	0.	NO	0.	0.
49	12000.	180.00	955.00	SOFT	0.	NO	0.	0.
50	500.	135.00	960.00	SOFT	0.	NO	0.	0.
51	1000.	135.00	963.00	SOFT	0.	NO	0.	0.
52	2000.	135.00	963.00	SOFT	0.	NO	0.	0.
53	4000.	135.00	950.00	SOFT	0.	NO	0.	0.
54	6000.	135.00	990.00	SOFT	0.	NO	0.	0.
55	8000.	135.00	1000.00	SOFT	0.	NO	0.	0.
56	12000.	135.00	955.00	HARD	0.	YES	8100.	1000.
57	43921.	328.77	950.00	SOFT	0.	YES	11800.	920.
58	44306.	32.04	930.00	SOFT	0.	YES	9000.	960.
59	24381.	249.05	1040.00	SOFT	0.	YES	21800.	1000.
60	25068.	110.35	950.00	SOFT	0.	YES	8100.	1000.

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP01-T1000
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	SIREN NSP01	165.9	167.9	0.0	0.0	0.0	0.0	167.0	158.0	157.0	150.0	148.0

XO= 0.0 YO= 0.0 ZO= 970.00 HEIGHT ABOVE GROUND= 55.00

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP01-T1000
METEOROLOGICAL INPUT CONDITIONS

H1= 10.06 METERS H2= 43.28 METERS

YEAR	SEASON	MONTH	DATE	HOUR	WIND DIRECTION	WIND SPEED(MPS) H1	WIND SPEED(MPS) H2	TEMPERATURE(C) H1	TEMPERATURE(C) H2	RELATIVE HUMIDITY	BAROMETRIC PRESSURE(MM OF HG)
1984	S	7	22	12	188.0	3.1	3.8	28.1	27.2	68.0	760.0

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP01-T1000

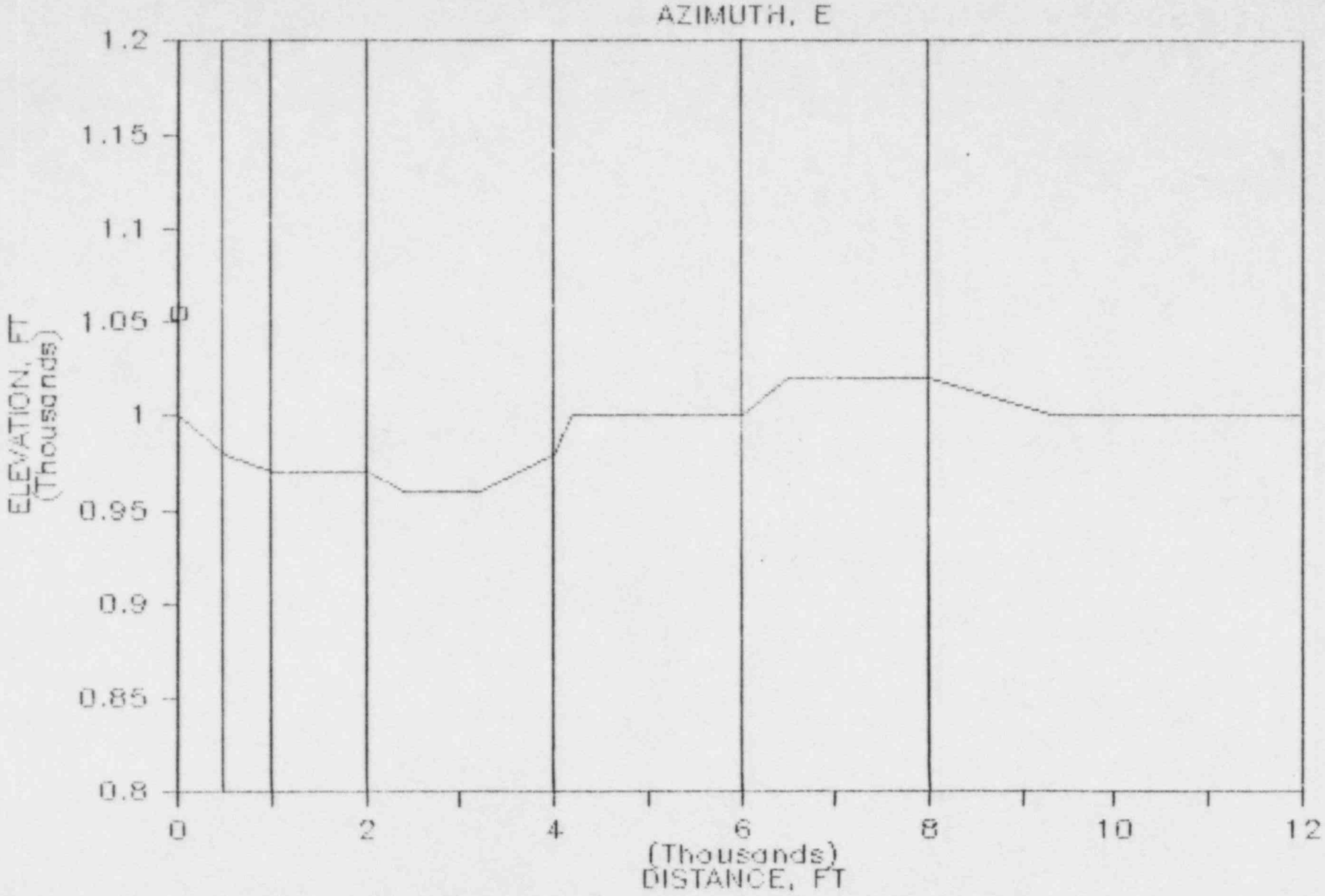
SIREN SOUND LEVELS IN DBC

UNDER MET CONDITION 1

DISTANCE IN FEET

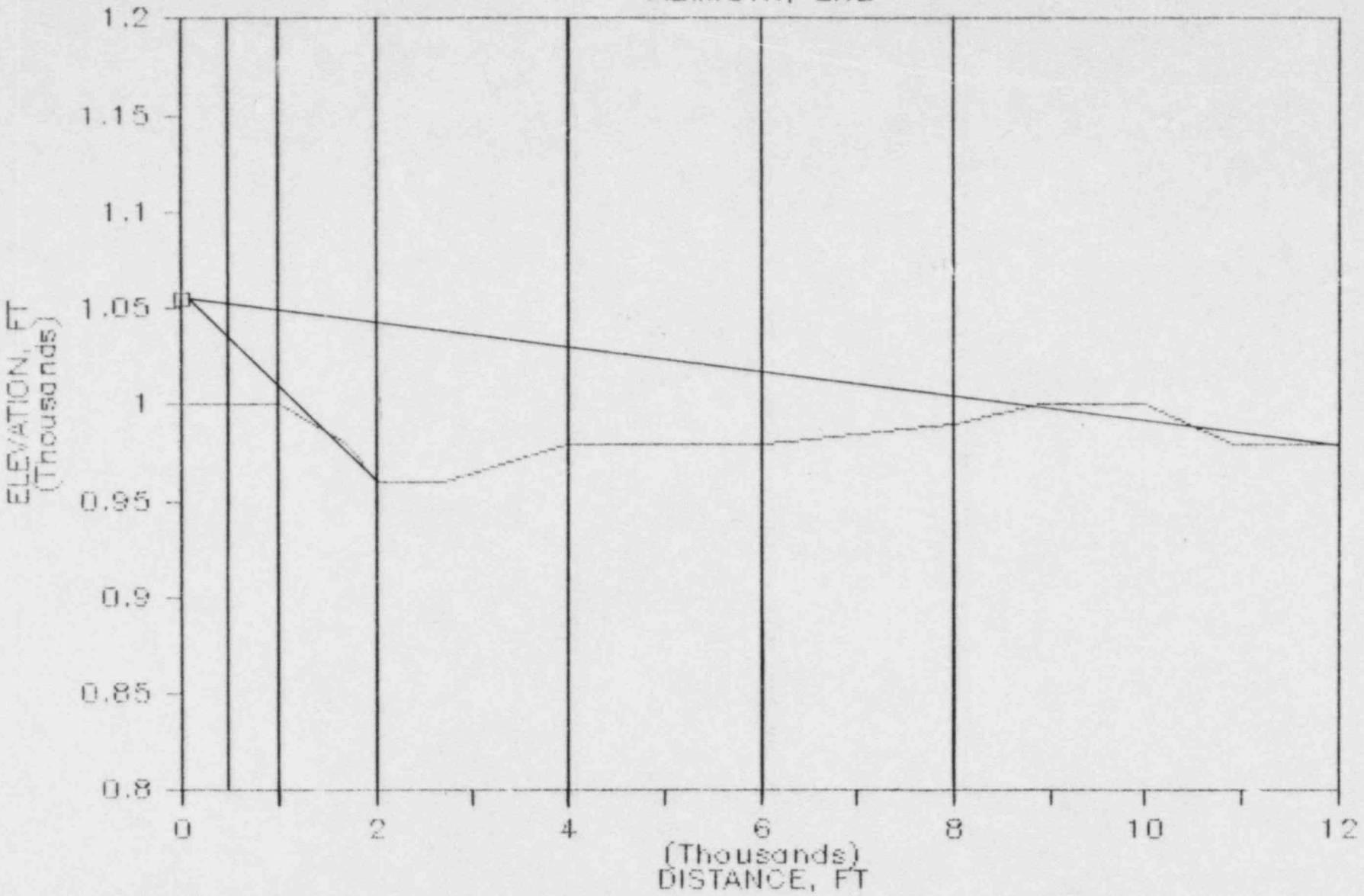
AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	115.	106.	97.	90.	86.	76.	64.
NE	115.	106.	86.	90.	86.	82.	66.
N	115.	106.	97.	90.	86.	82.	63.
NW	115.	106.	97.	90.	86.	82.	75.
W	115.	106.	97.	90.	85.	79.	68.
SW	115.	106.	97.	90.	86.	82.	75.
S	115.	106.	97.	90.	86.	82.	73.
SE	115.	106.	97.	90.	86.	82.	69.

MONTICELLO NSP3



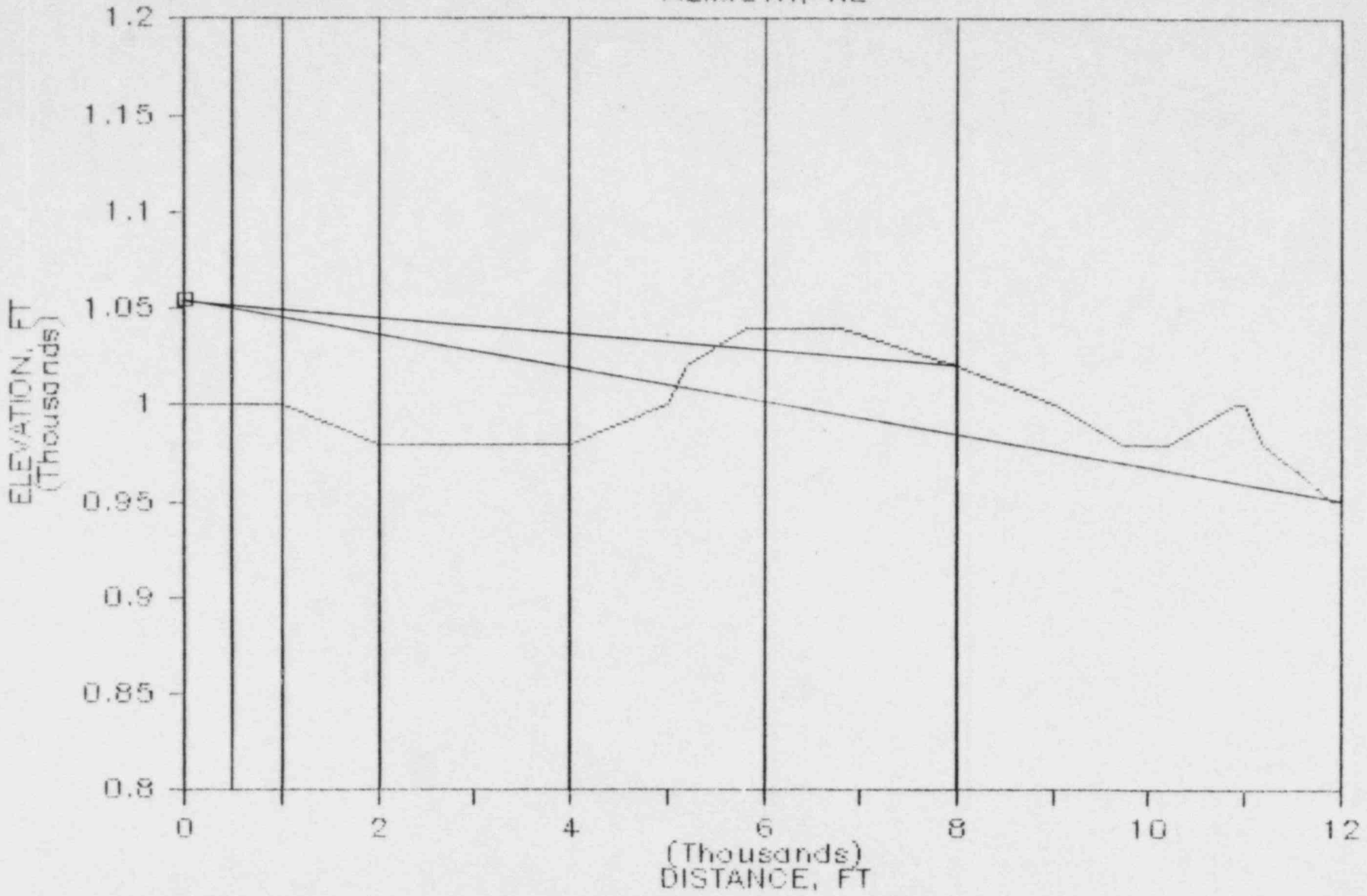
MONTICELLO NSP3

AZIMUTH, ENE



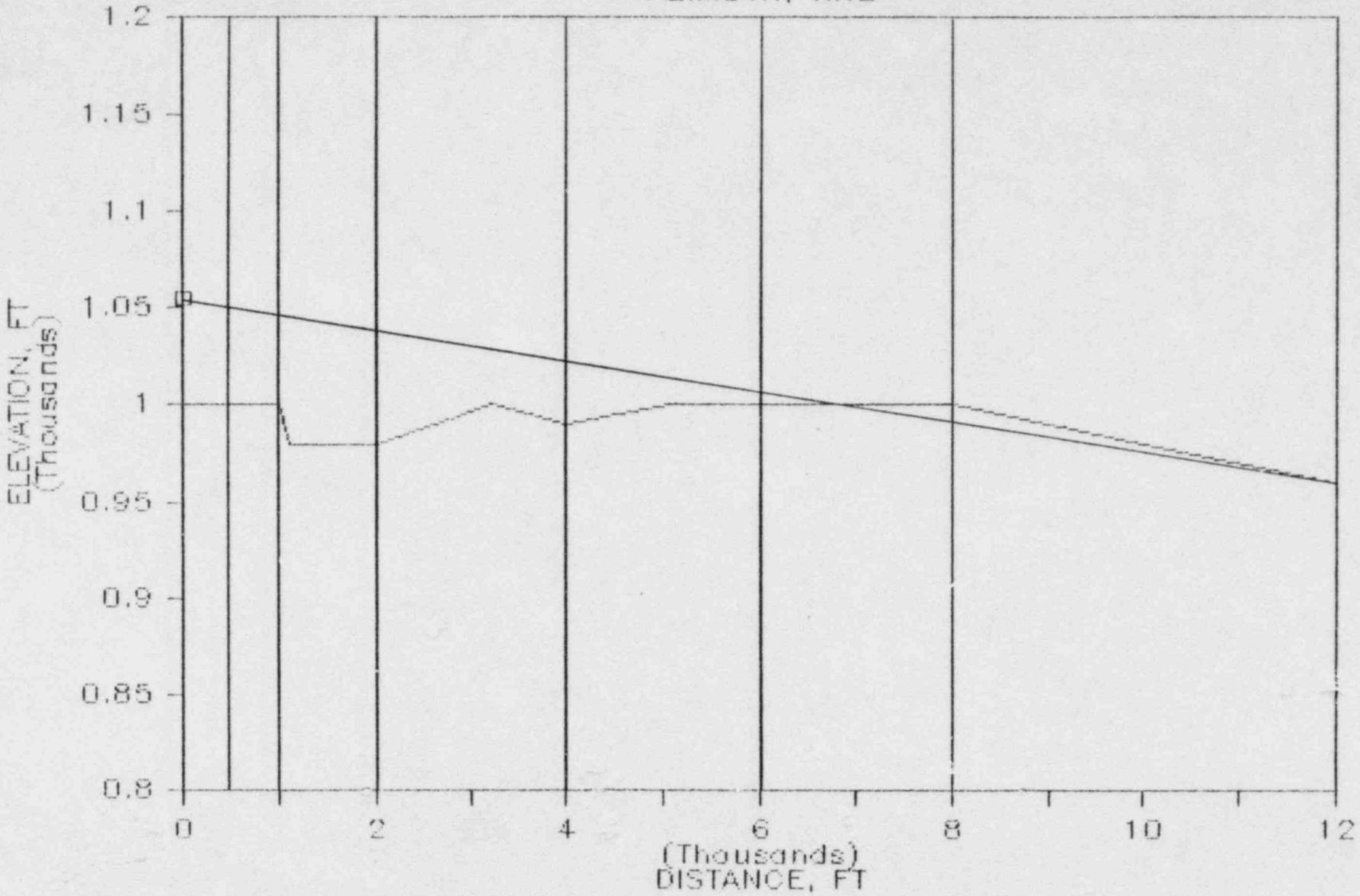
MONTICELLO NSP3

AZIMUTH, NE

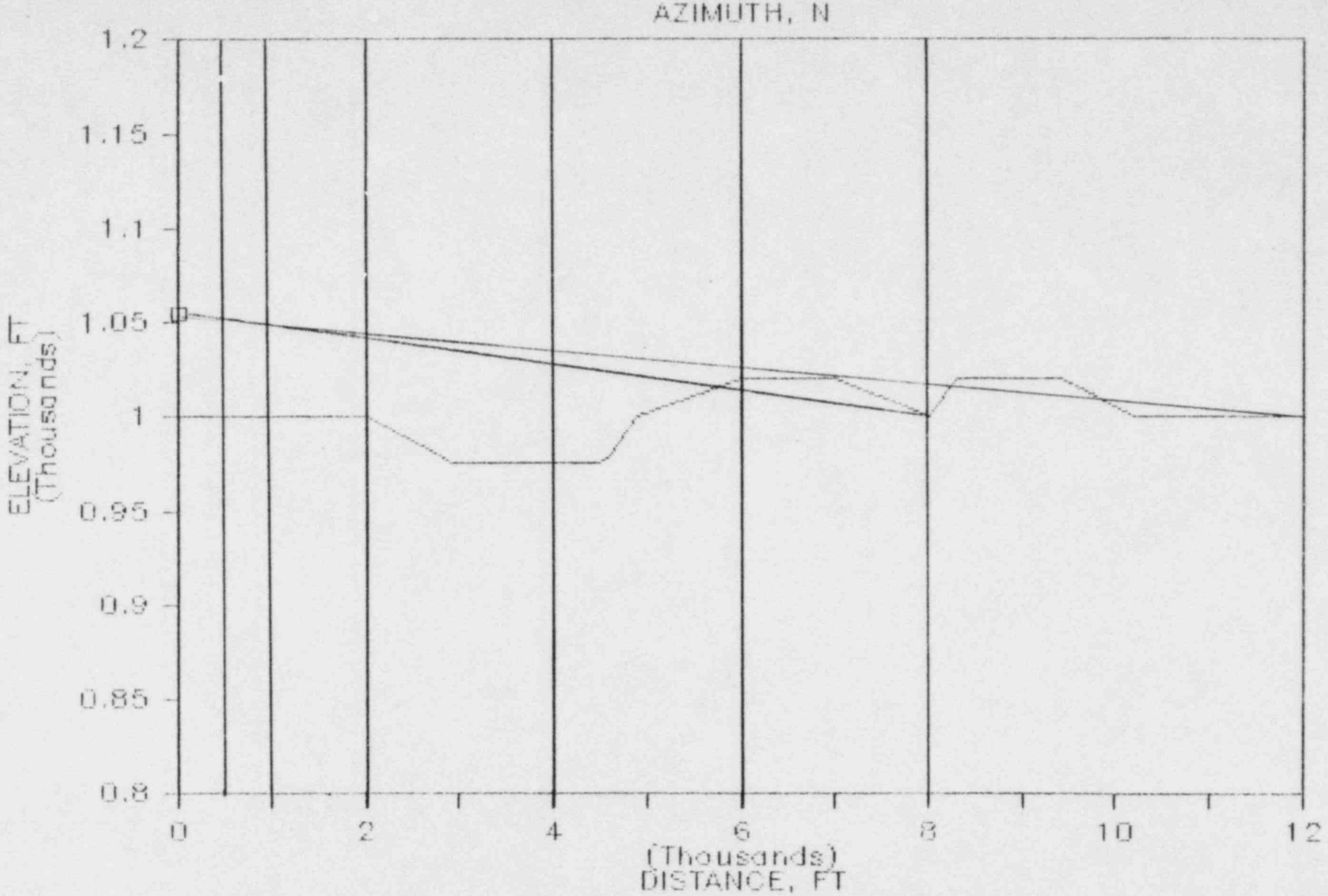


MONTICELLO NSP3

AZIMUTH, NNE

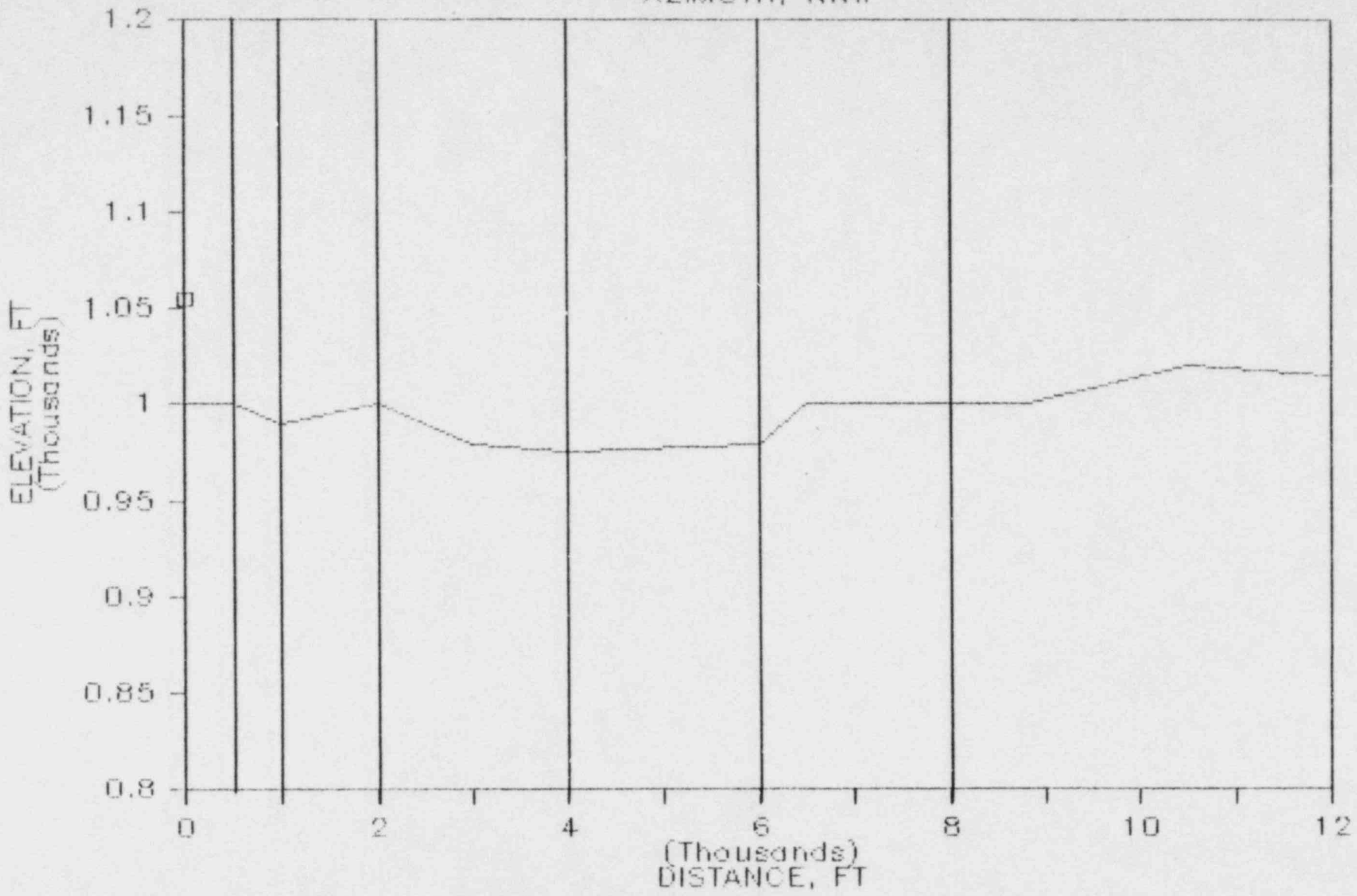


MONTICELLO NSP3



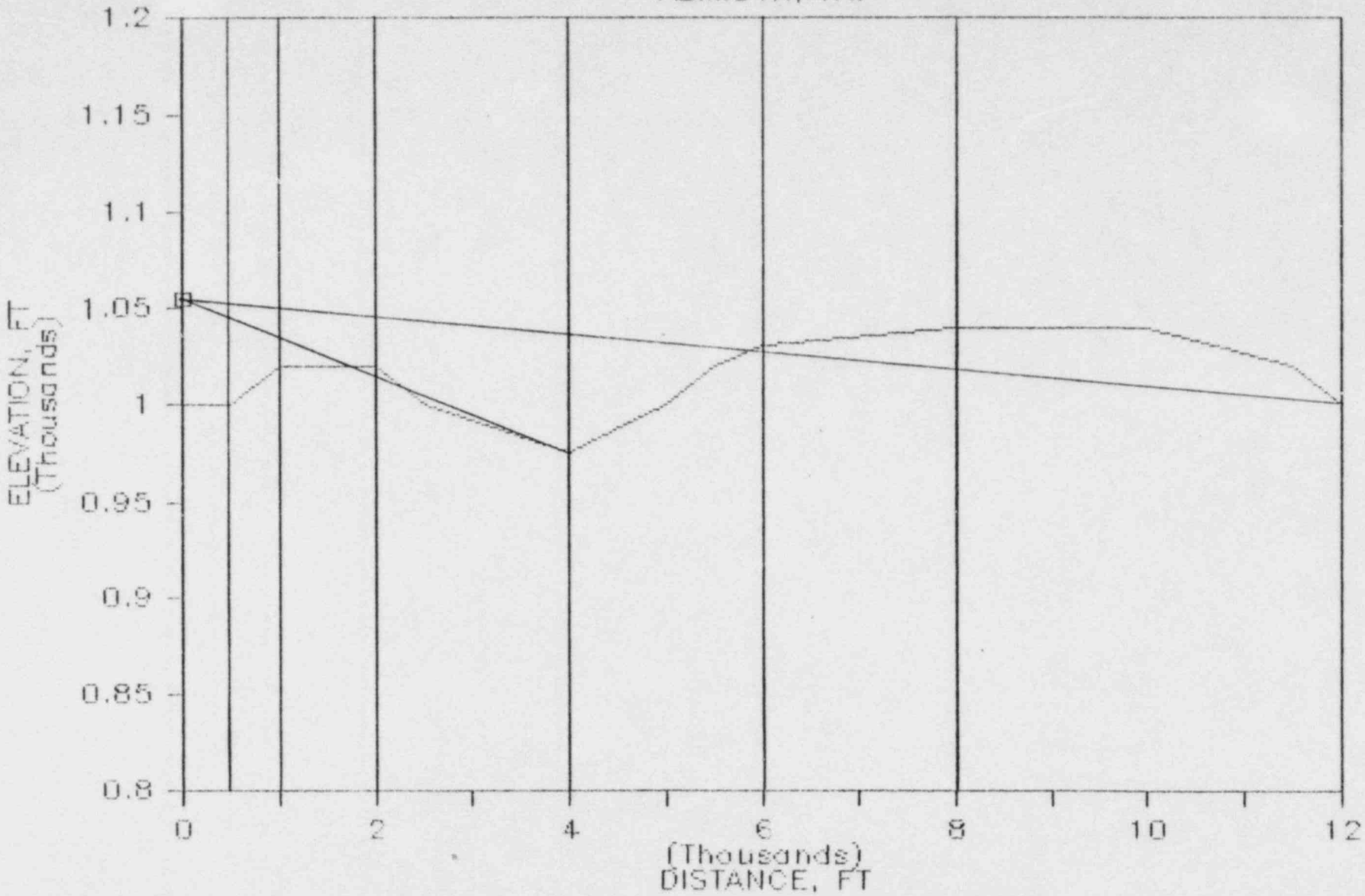
MONTICELLO NSP3

AZIMUTH, NNW



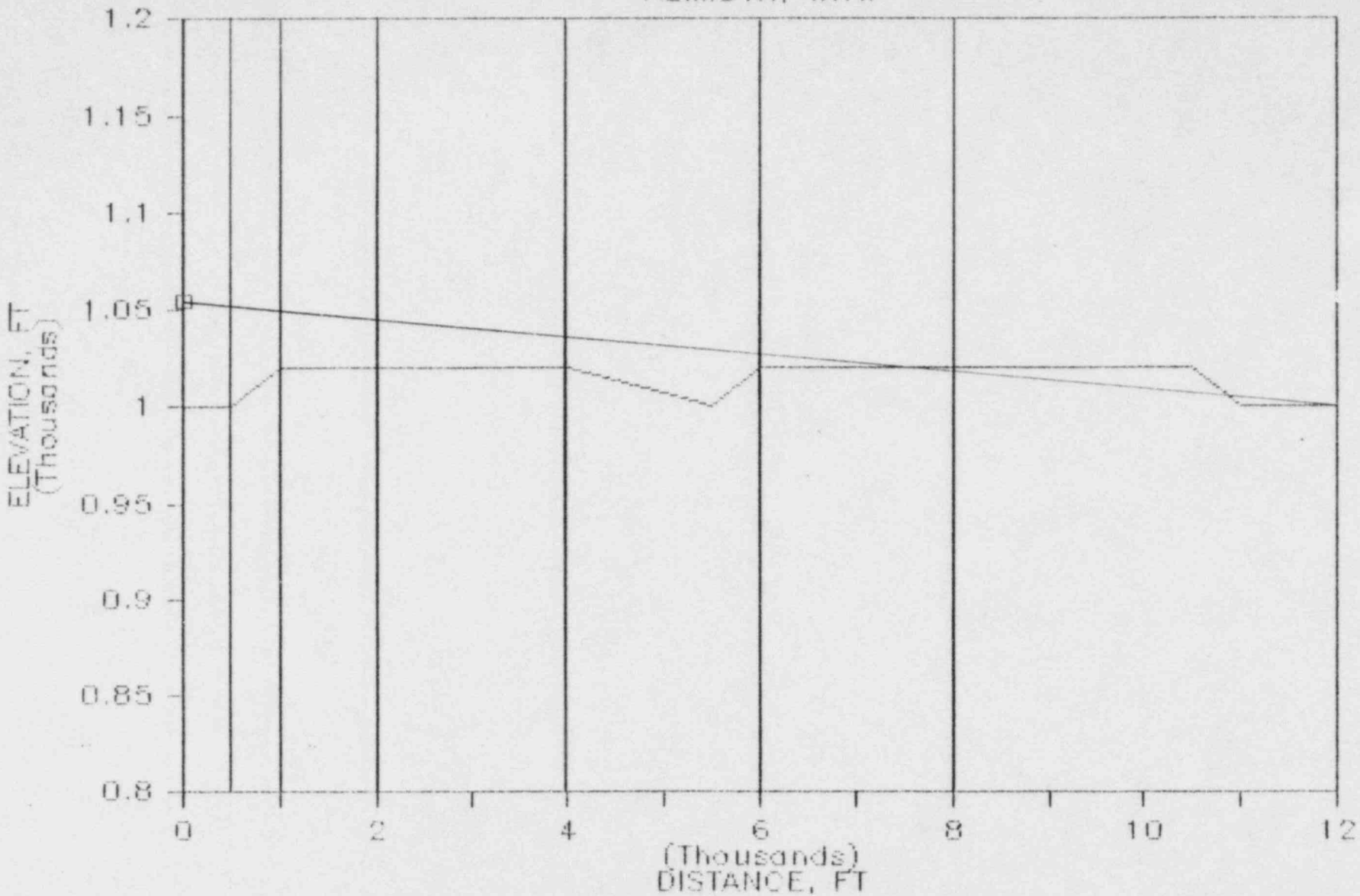
MONTICELLO NSP3

AZIMUTH, NW



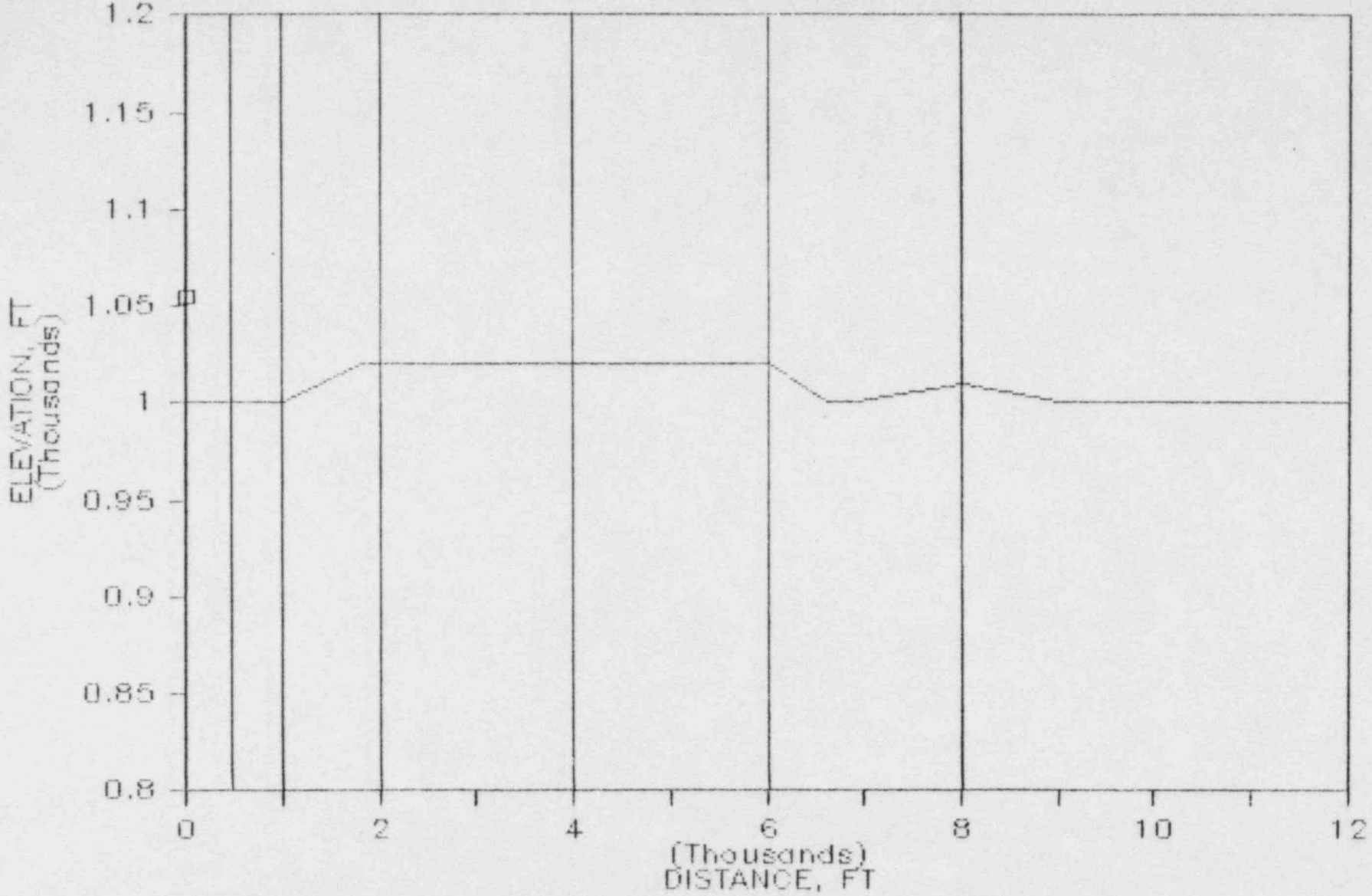
MONTICELLO NSP3

AZIMUTH, WNW



MONTICELLO NSP3

AZIMUTH, W

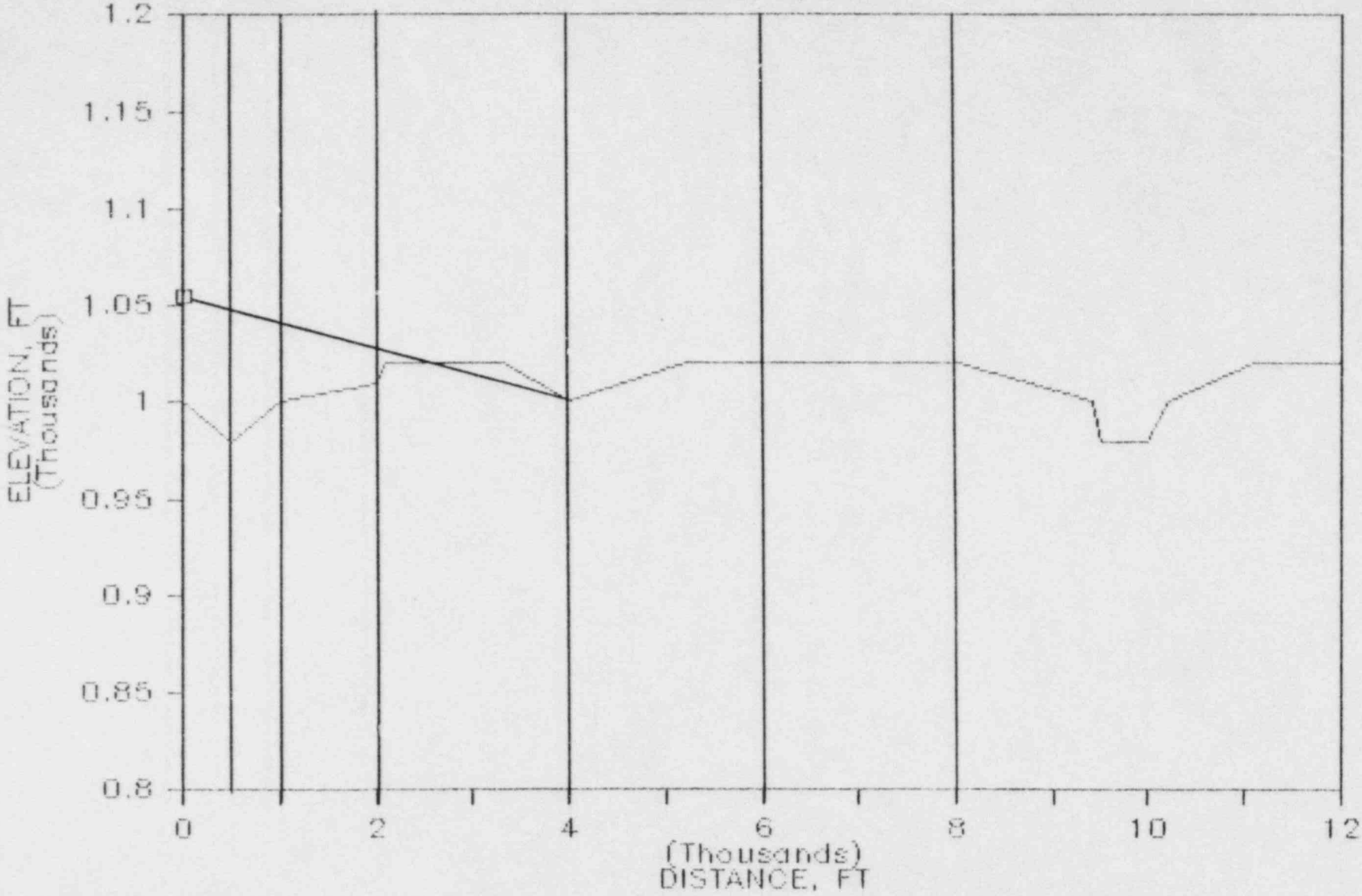


MONTICELLO NSP3

AZIMUTH, WSW

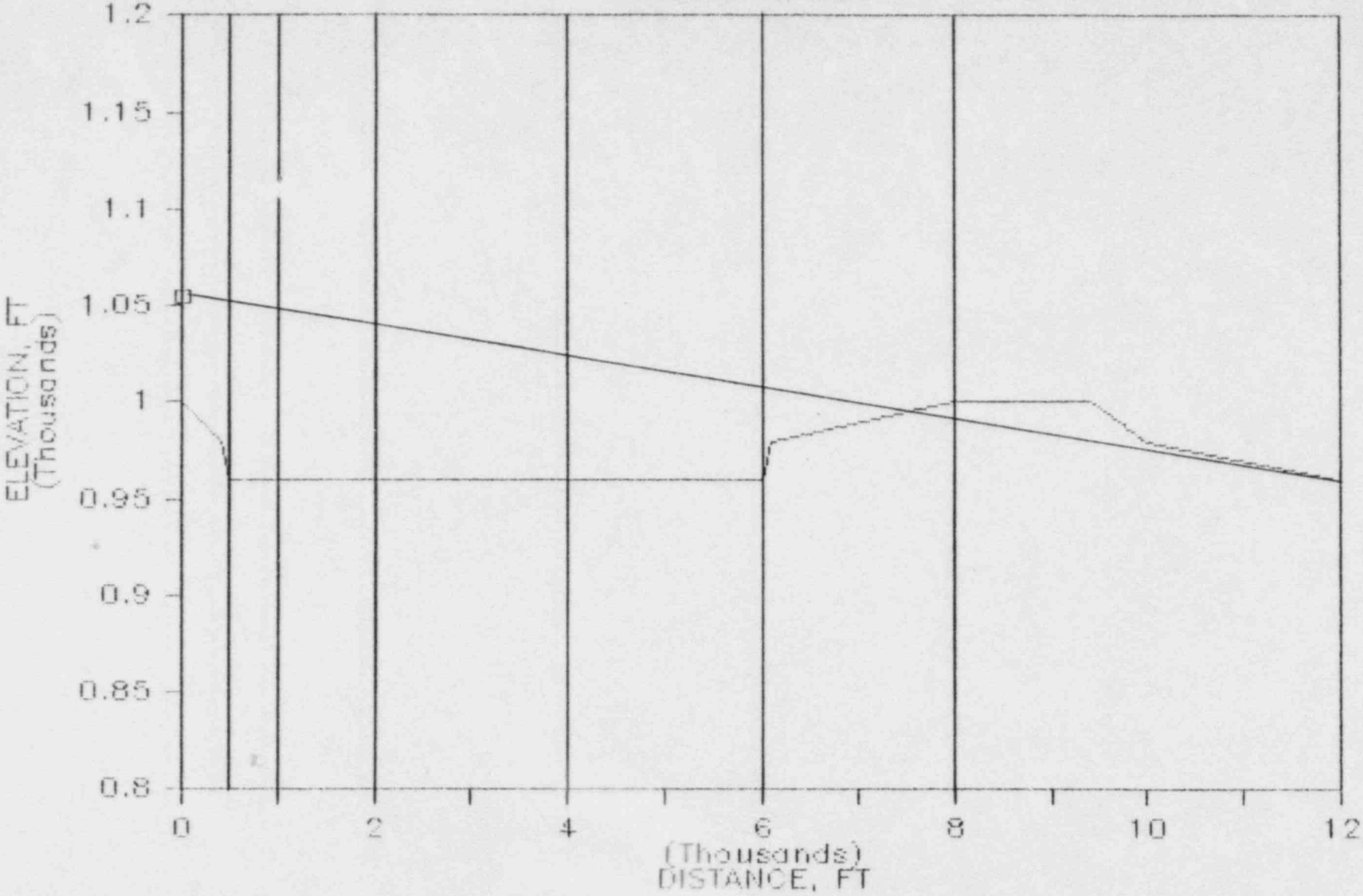
MONTICELLO NSP3

AZIMUTH, SW



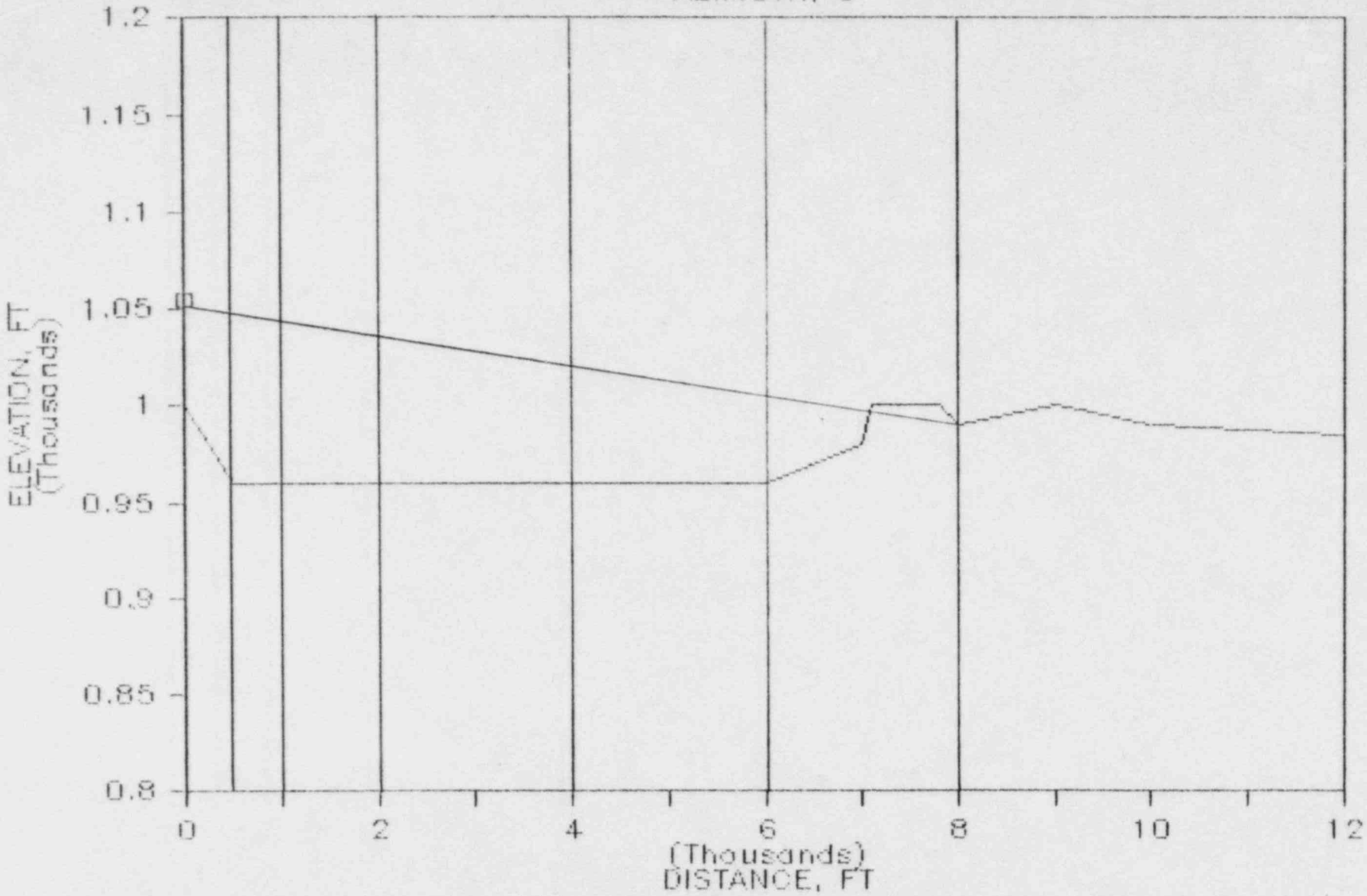
MONTICELLO NSP3

AZIMUTH, SSW



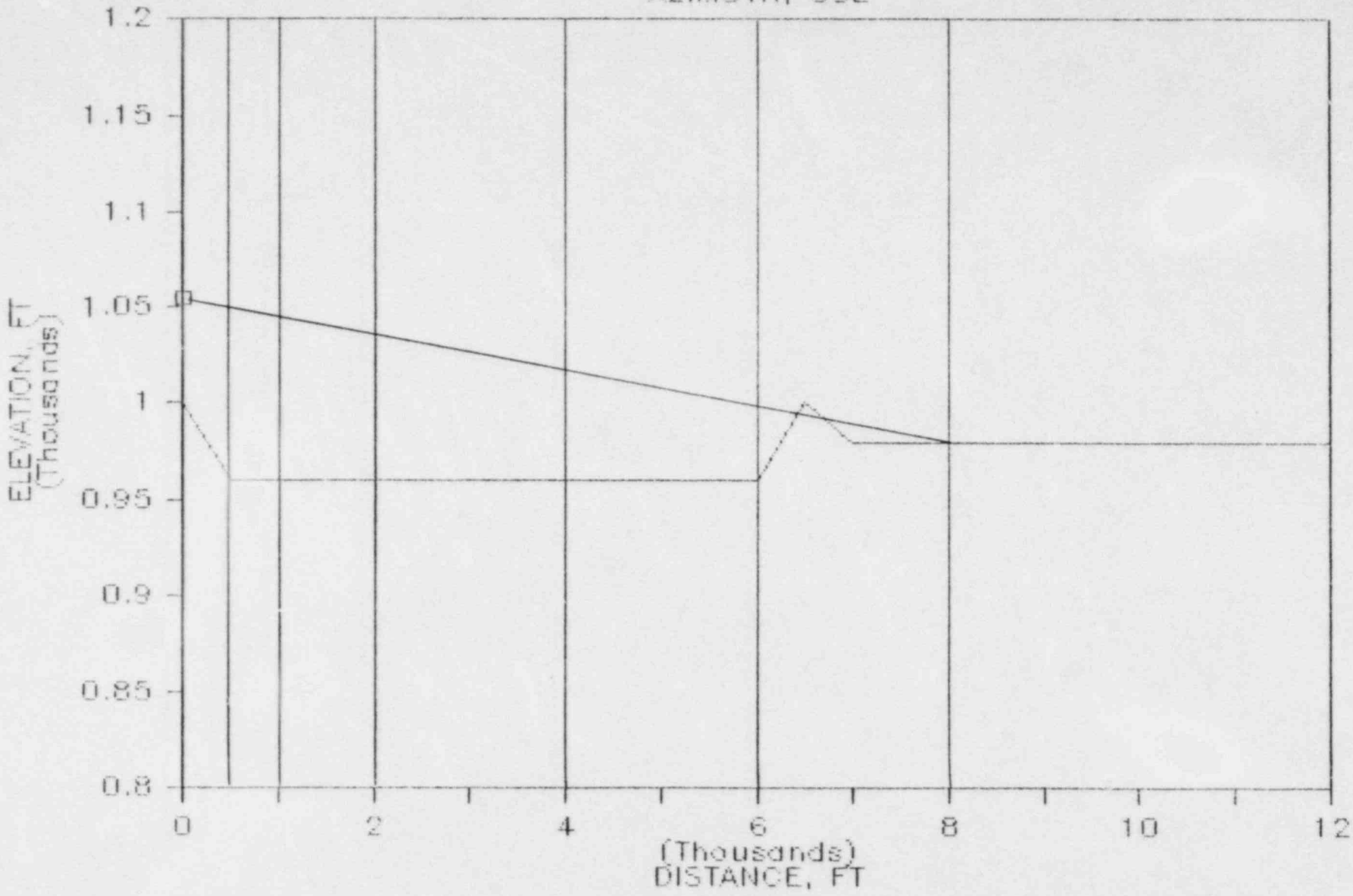
MONTICELLO NSP3

AZIMUTH, S



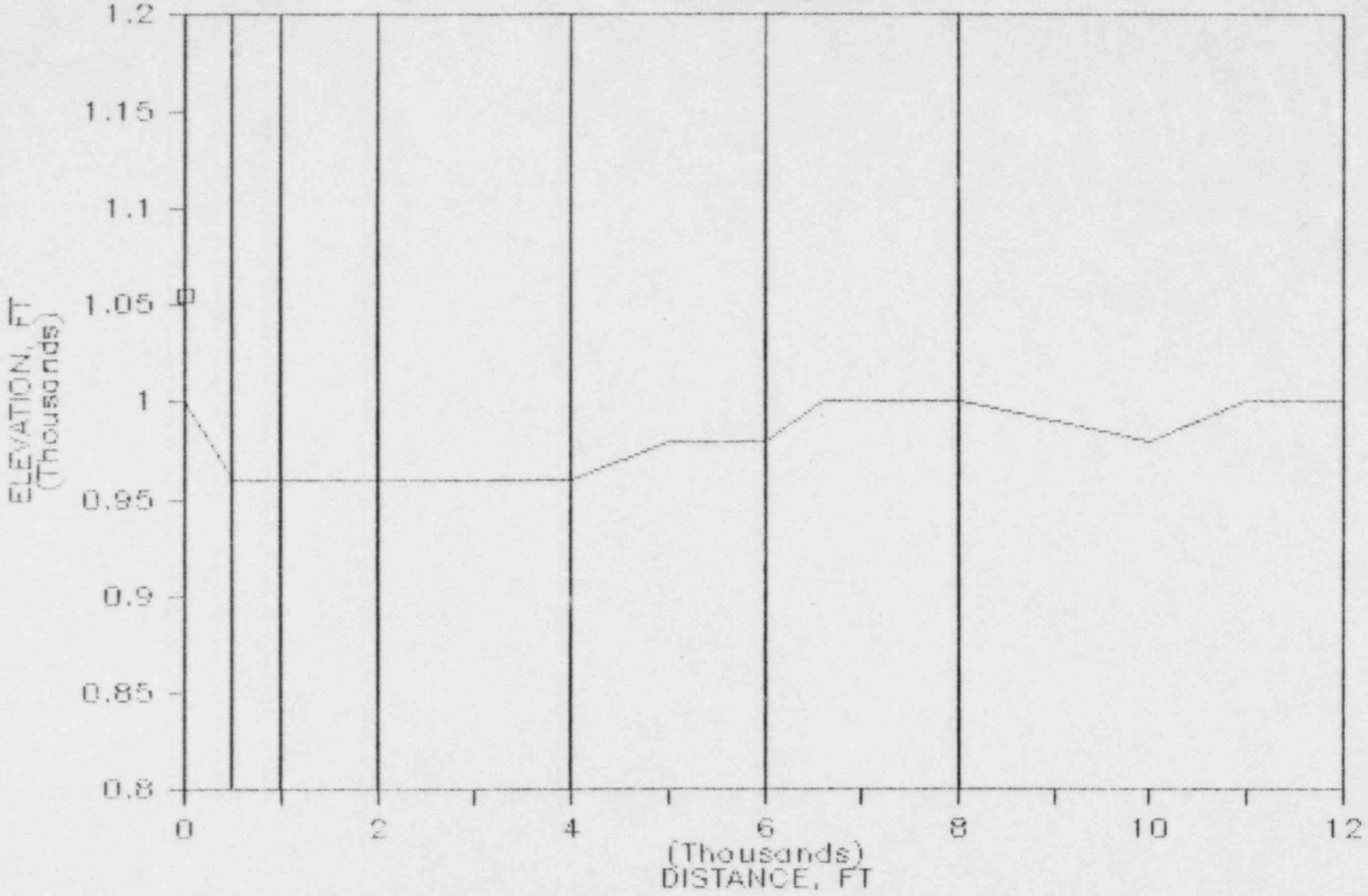
MONTICELLO NSP3

AZIMUTH, SSE



MONTICELLO NSP3

AZIMUTH, SE



MONTICELLO NSP3

AZIMUTH, ESE

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP03-T1000
SOURCE-RECEIVER TOPOGRAPHICAL INPUTS

ALL BEARINGS ARE WITH RESPECT TO THE NORTH MEASURING CLOCKWISE

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
1	500.	90.00	980.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	970.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	970.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	980.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	1000.00	SOFT	0.	NO	0.	0.
6	8000.	90.00	1020.00	SOFT	0.	NO	0.	0.
7	12000.	90.00	1000.00	SOFT	0.	NO	0.	0.
8	500.	67.50	1000.00	SOFT	0.	NO	0.	0.
9	1000.	67.50	1000.00	SOFT	0.	NO	0.	0.
10	2000.	67.50	960.00	SOFT	0.	YES	1700.	980.
11	4000.	67.50	980.00	SOFT	0.	NO	0.	0.
12	6000.	67.50	980.00	HARD	0.	NO	0.	0.
13	8000.	67.50	1000.00	HARD	0.	NO	0.	0.
14	12000.	67.50	980.00	SOFT	0.	YES	1050.	1000.
15	500.	45.00	1000.00	SOFT	0.	NO	0.	0.
16	1000.	45.00	1000.00	SOFT	0.	NO	0.	0.
17	2000.	45.00	980.00	SOFT	0.	NO	0.	0.
18	4000.	45.00	980.00	SOFT	0.	NO	0.	0.
19	6000.	45.00	1040.00	SOFT	0.	NO	0.	0.
20	8000.	45.00	1020.00	SOFT	0.	YES	6800.	1040.
21	12000.	45.00	951.00	SOFT	0.	YES	6800.	1040.
22	500.	22.50	1000.00	SOFT	0.	NO	0.	0.
23	1000.	22.50	1000.00	SOFT	0.	NO	0.	0.
24	2000.	22.50	980.00	SOFT	0.	NO	0.	0.
25	4000.	22.50	990.00	SOFT	0.	NO	0.	0.
26	6000.	22.50	1000.00	SOFT	0.	NO	0.	0.
27	8000.	22.50	1000.00	SOFT	0.	NO	0.	0.
28	12000.	22.50	960.00	SOFT	0.	YES	8000.	1000.
29	500.	0.0	1000.00	SOFT	0.	NO	0.	0.
30	1000.	0.0	1000.00	SOFT	0.	NO	0.	0.
31	2000.	0.0	1000.00	SOFT	0.	NO	0.	0.
32	4000.	0.0	960.00	SOFT	0.	NO	0.	0.
33	6000.	0.0	1020.00	SOFT	0.	NO	0.	0.
34	8000.	0.0	1000.00	SOFT	0.	YES	7050.	1020.
35	12000.	0.0	1000.00	SOFT	0.	YES	9450.	1020.
36	500.	337.50	1000.00	SOFT	0.	NO	0.	0.

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
37	1000.	337.50	990.00	SOFT	0.	NO	0.	0.
38	2000.	337.50	1000.00	SOFT	0.	NO	0.	0.
39	4000.	337.50	976.00	HARD	0.	NO	0.	0.
40	6000.	337.50	980.00	HARD	0.	NO	0.	0.
41	8000.	337.50	1000.00	SOFT	0.	NO	0.	0.
42	12000.	337.50	1015.00	SOFT	0.	NO	0.	0.
43	500.	315.00	1000.00	SOFT	0.	NO	0.	0.
44	1000.	315.00	1020.00	SOFT	0.	NO	0.	0.
45	2000.	315.00	1020.00	SOFT	0.	NO	0.	0.
46	4000.	315.00	976.00	SOFT	0.	YES	2000.	1020.
47	6000.	315.00	1030.00	SOFT	0.	NO	0.	0.
48	8000.	315.00	1040.00	SOFT	0.	NO	0.	0.
49	12000.	315.00	1000.00	SOFT	0.	YES	10000.	1040.
50	500.	292.50	1000.00	SOFT	0.	NO	0.	0.
51	1000.	292.50	1020.00	SOFT	0.	NO	0.	0.
52	2000.	292.50	1020.00	SOFT	0.	NO	0.	0.
53	4000.	292.50	1020.00	SOFT	0.	NO	0.	0.
54	6000.	292.50	1020.00	HARD	0.	NO	0.	0.
55	8000.	292.50	1020.00	HARD	0.	NO	0.	0.
56	12000.	292.50	1000.00	HARD	0.	YES	10500.	1020.
57	500.	270.00	1000.00	SOFT	0.	NO	0.	0.
58	1000.	270.00	1000.00	SOFT	0.	NO	0.	0.
59	2000.	270.00	1020.00	SOFT	0.	NO	0.	0.
60	4000.	270.00	1020.00	SOFT	0.	NO	0.	0.
61	6000.	270.00	1020.00	SOFT	0.	NO	0.	0.
62	8000.	270.00	1010.00	HARD	0.	NO	0.	0.
63	12000.	270.00	1000.00	HARD	0.	NO	0.	0.
64	500.	247.50	1000.00	SOFT	0.	NO	0.	0.
65	1000.	247.50	1000.00	SOFT	0.	NO	0.	0.
66	2000.	247.50	1020.00	SOFT	0.	NO	0.	0.
67	4000.	247.50	1020.00	SOFT	0.	NO	0.	0.
68	6000.	247.50	1020.00	SOFT	0.	NO	0.	0.
69	8000.	247.50	1020.00	SOFT	0.	NO	0.	0.
70	12000.	247.50	1000.00	SOFT	0.	NO	0.	0.
71	500.	225.00	980.00	SOFT	0.	NO	0.	0.
72	1000.	225.00	1000.00	SOFT	0.	NO	0.	0.

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
73	2000.	225.00	1010.00	SOFT	0.	NO	0.	0.
74	4000.	225.00	1000.00	SOFT	0.	YES	3350.	1020.
75	6000.	225.00	1020.00	SOFT	0.	NO	0.	0.
76	8000.	225.00	1020.00	SOFT	0.	NO	0.	0.
77	12000.	225.00	1020.00	SOFT	0.	NO	0.	0.
78	500.	202.50	960.00	SOFT	0.	NO	0.	0.
79	1000.	202.50	960.00	SOFT	0.	NO	0.	0.
80	2000.	202.50	960.00	HARD	0.	NO	0.	0.
81	4000.	202.50	960.00	HARD	0.	NO	0.	0.
82	6000.	202.50	960.00	HARD	0.	NO	0.	0.
83	8000.	202.50	1000.00	SOFT	0.	NO	0.	0.
84	12000.	202.50	960.00	SOFT	0.	YES	9400.	1000.
85	500.	180.00	960.00	HARD	0.	NO	0.	0.
86	1000.	180.00	960.00	HARD	0.	NO	0.	0.
87	2000.	180.00	960.00	HARD	0.	NO	0.	0.
88	4000.	180.00	960.00	HARD	0.	NO	0.	0.
89	6000.	180.00	960.00	HARD	0.	NO	0.	0.
90	8000.	180.00	990.00	SOFT	0.	YES	780.	1000.
91	12000.	180.00	985.00	SOFT	0.	NO	0.	0.
92	500.	157.50	960.00	HARD	0.	NO	0.	0.
93	1000.	157.50	960.00	HARD	0.	NO	0.	0.
94	2000.	157.50	960.00	HARD	0.	NO	0.	0.
95	4000.	157.50	960.00	HARD	0.	NO	0.	0.
96	6000.	157.50	960.00	HARD	0.	NO	0.	0.
97	8000.	157.50	980.00	HARD	0.	YES	6500.	1000.
98	12000.	157.50	980.00	HARD	0.	NO	0.	0.
99	500.	135.00	960.00	HARD	0.	NO	0.	0.
100	1000.	135.00	960.00	HARD	0.	NO	0.	0.
101	2000.	135.00	960.00	HARD	0.	NO	0.	0.
102	4000.	135.00	960.00	HARD	0.	NO	0.	0.
103	6000.	135.00	980.00	SOFT	0.	NO	0.	0.
104	8000.	135.00	1000.00	HARD	0.	NO	0.	0.
105	12000.	135.00	1000.00	HARD	0.	NO	0.	0.
106	500.	112.50	1000.00	SOFT	0.	NO	0.	0.
107	1000.	112.50	960.00	HARD	0.	NO	0.	0.
108	2000.	112.50	960.00	HARD	0.	NO	0.	0.
109	4000.	112.50	960.00	HARD	0.	NO	0.	0.
110	6000.	112.50	1010.00	SOFT	0.	NO	0.	0.
111	8000.	112.50	1020.00	SOFT	0.	NO	0.	0.
112	12000.	112.50	1020.00	SOFT	0.	NO	0.	0.
113	32830.	292.80	1000.00	SOFT	0.	YES	10000.	1040.
114	26326.	61.10	200.00	SOFT	0.	YES	6800.	1040.
115	50632.	216.71	10.00	SOFT	0.	YES	3350.	1020.
116	46678.	150.41	900.00	SOFT	0.	YES	6500.	1000.

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP03-T1000
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	SIREN NSP03	165.9	167.9	0.0	0.0	0.0	0.0	167.0	158.0	157.0	150.0	148.0

XO= 0.0 YO= 0.0 ZO= 1000.00 HEIGHT ABOVE GROUND= 55.00

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP03-T1000
METEOROLOGICAL INPUT CONDITIONS

H1= 10.06 METERS H2= 43.28 METERS

YEAR	SEASON	MONTH	DATE	HOUR	WIND DIRECTION	WIND SPEED(MPS) H1	WIND SPEED(MPS) H2	TEMPERATURE(C) H1	TEMPERATURE(C) H2	RELATIVE HUMIDITY	BAROMETRIC PRESSURE(MM OF HG)
1984	5	7	22	12	188.0	3.1	3.8	28.1	27.2	68.0	760.0

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP03-T1000

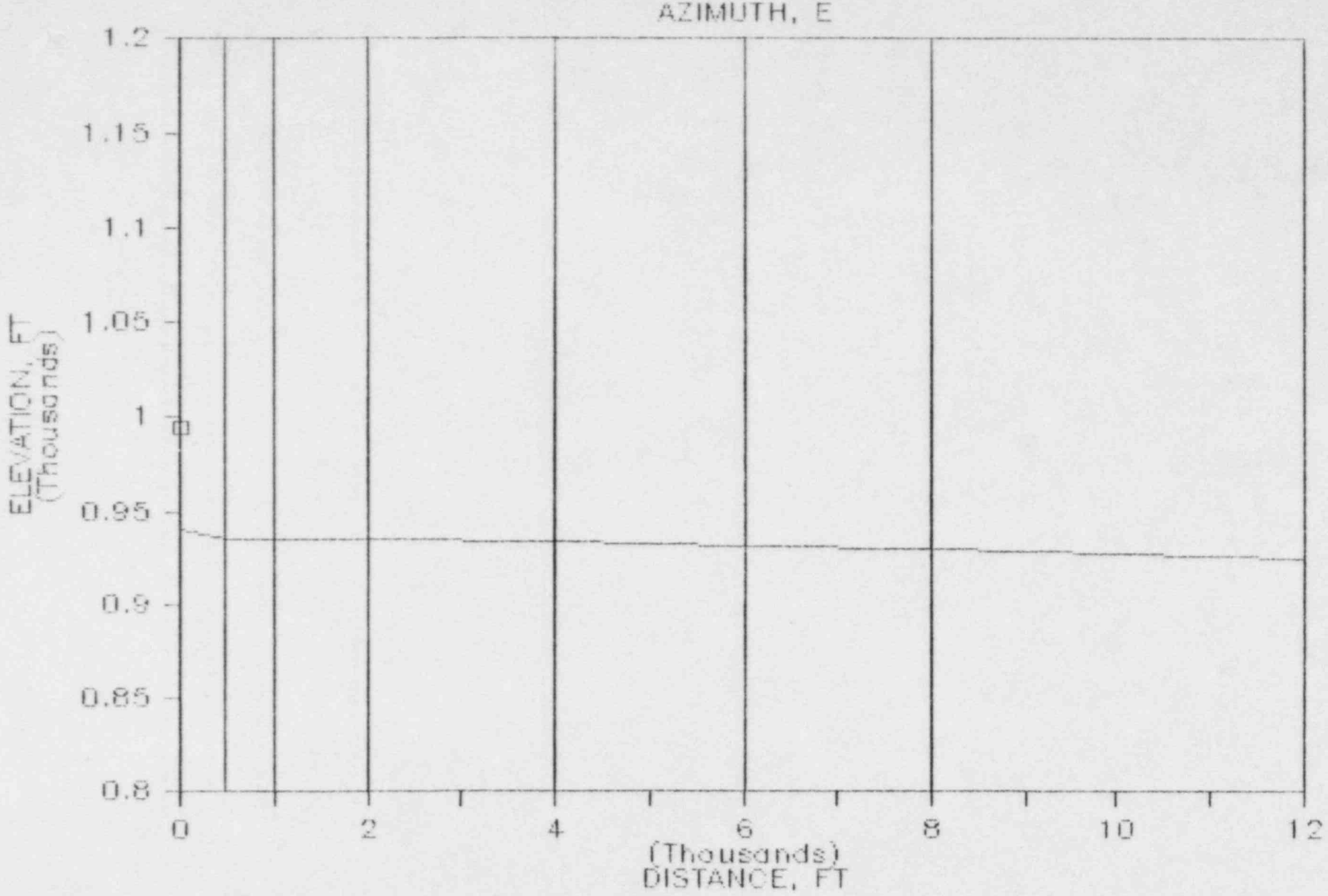
SIREN SOUND LEVELS IN DBC

UNDER MET CONDITION 1

DISTANCE IN FEET

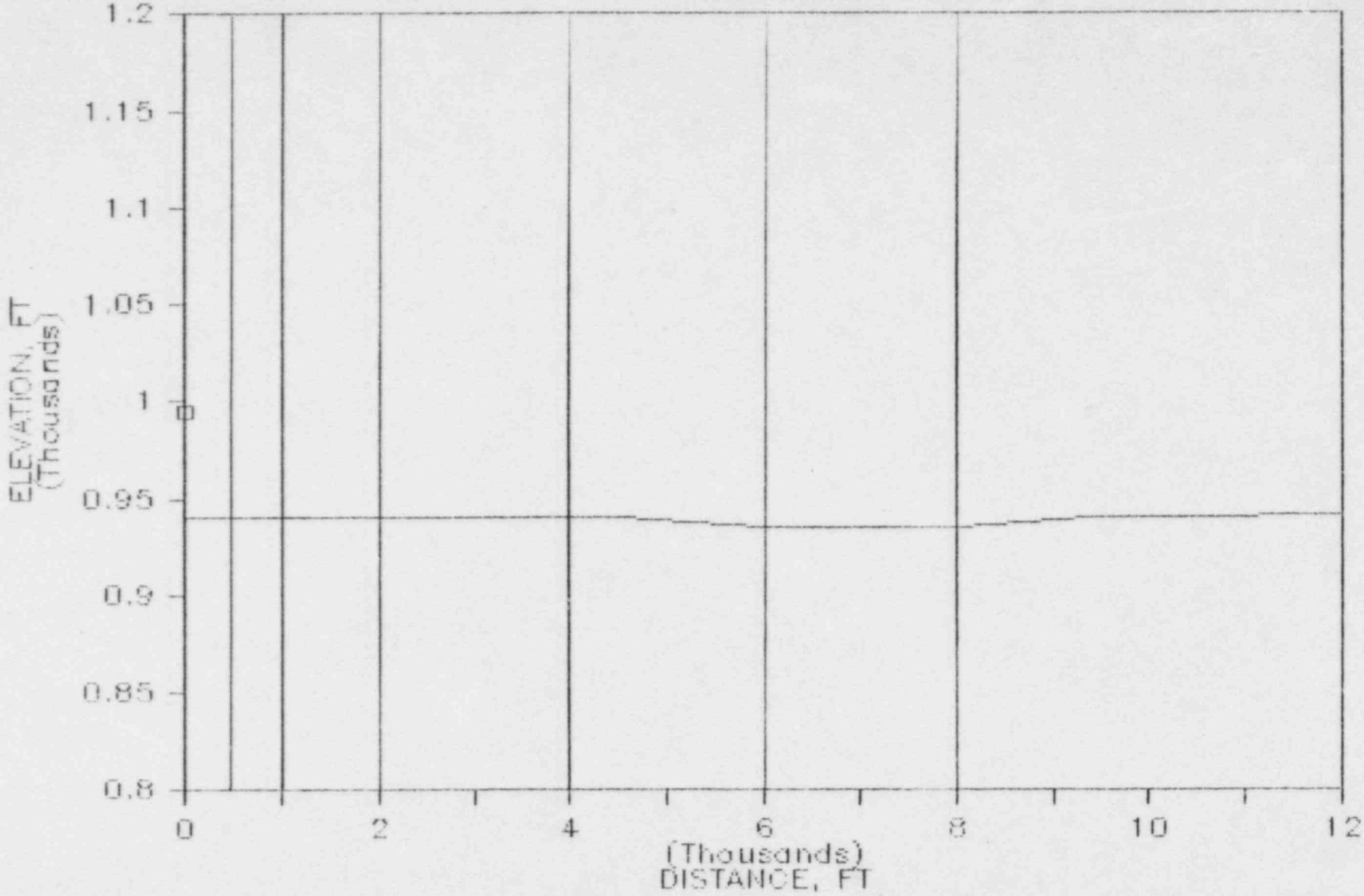
AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	115.	106.	97.	90.	86.	82.	75.
ENE	115.	106.	89.	90.	88.	84.	70.
NE	115.	106.	97.	90.	86.	75.	65.
NNE	115.	106.	97.	90.	86.	82.	69.
N	115.	106.	97.	90.	86.	75.	69.
NNW	115.	106.	97.	94.	88.	82.	75.
NW	115.	106.	97.	82.	86.	82.	67.
WNW	115.	106.	97.	90.	88.	84.	70.
W	115.	106.	97.	90.	85.	81.	69.
WSW	115.	106.	97.	90.	86.	82.	73.
SW	115.	106.	97.	82.	86.	82.	75.
SSW	116.	106.	102.	94.	88.	82.	68.
S	116.	109.	102.	94.	88.	82.	73.
SSE	116.	109.	102.	94.	88.	78.	76.
SE	116.	109.	102.	94.	86.	84.	76.
ESE	115.	109.	102.	94.	86.	80.	69.

MONTICELLO 4



MONTICELLO 4

AZIMUTH, NE



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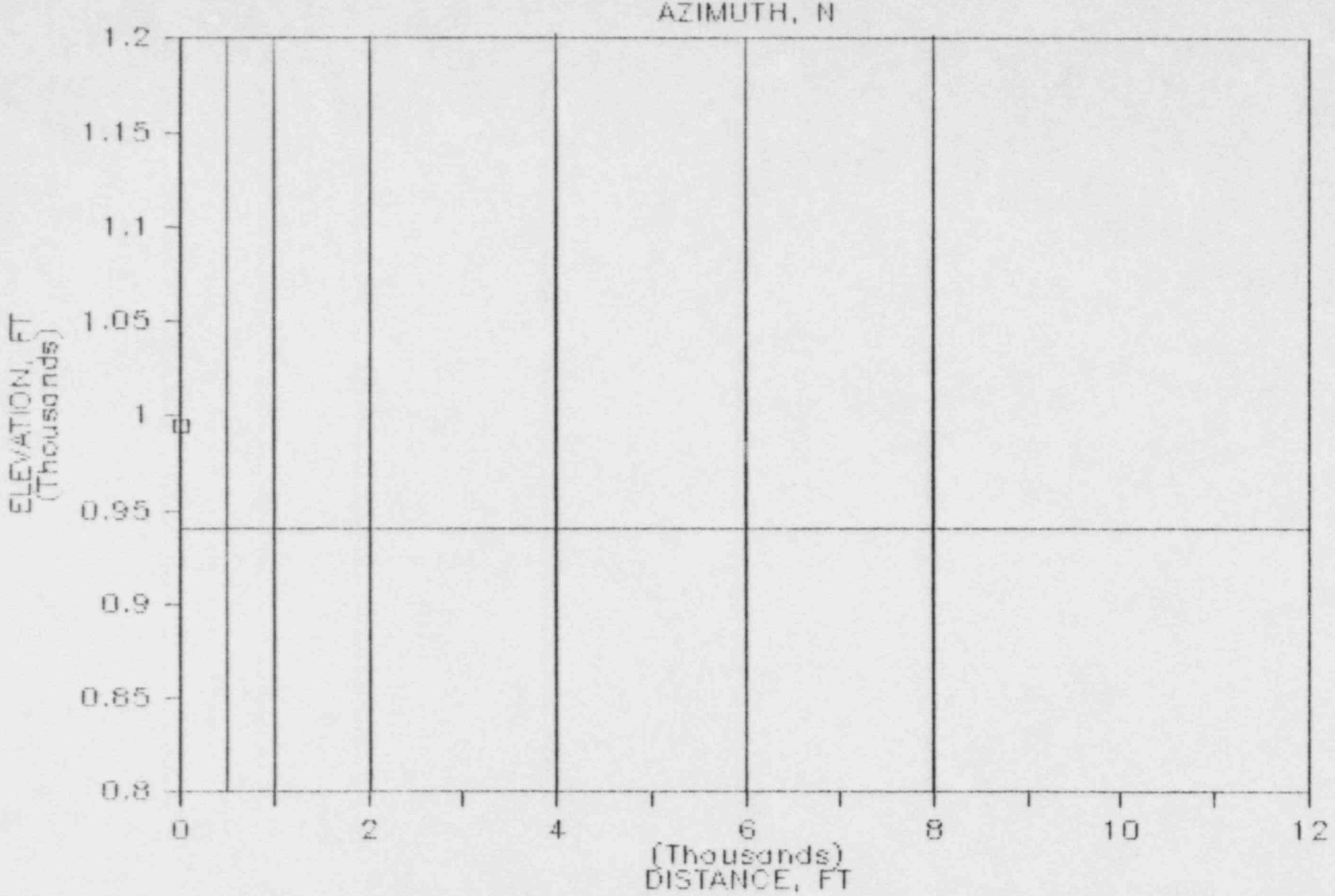
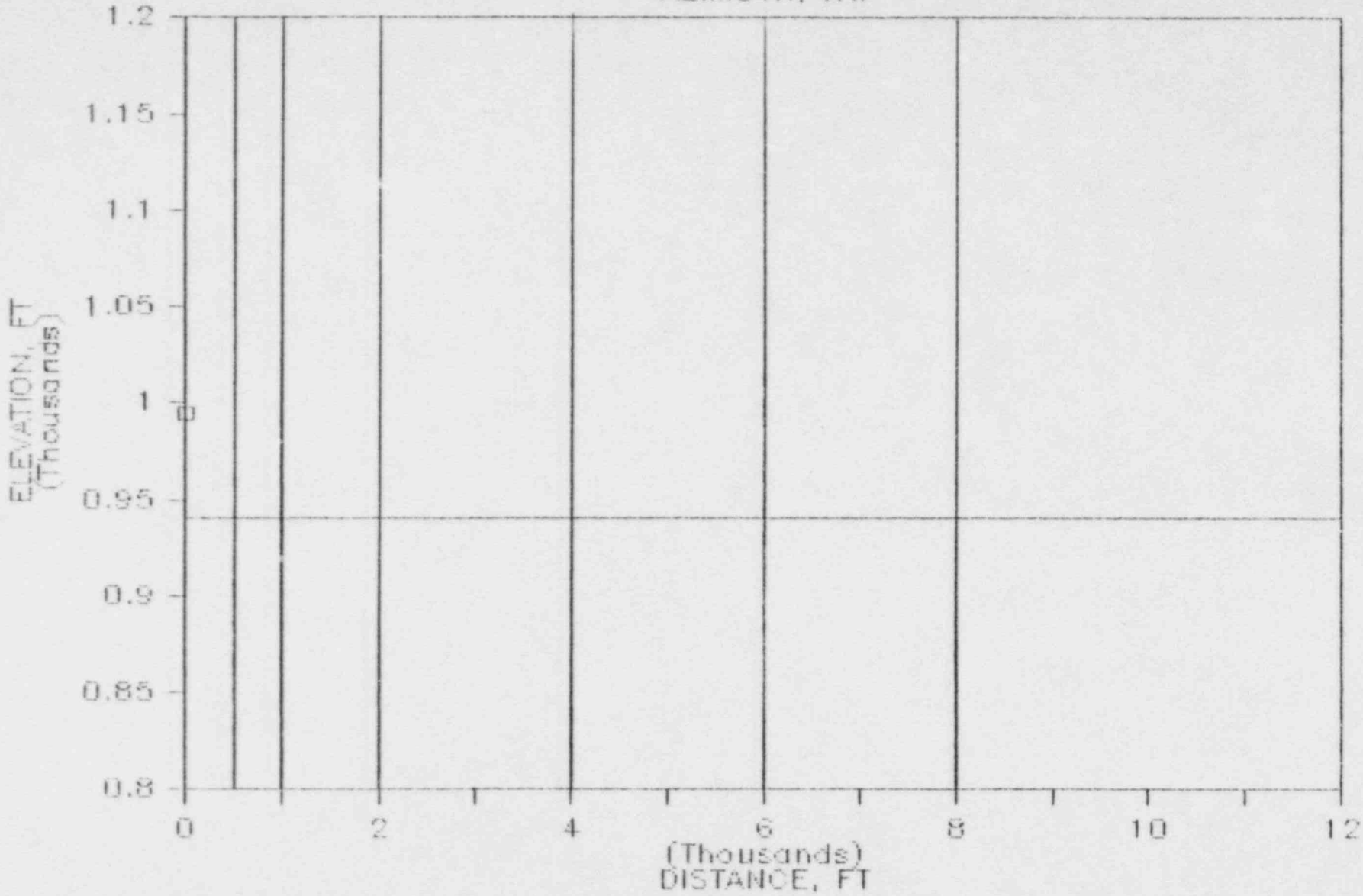


MONTICELLO 4

AZIMUTH, NW



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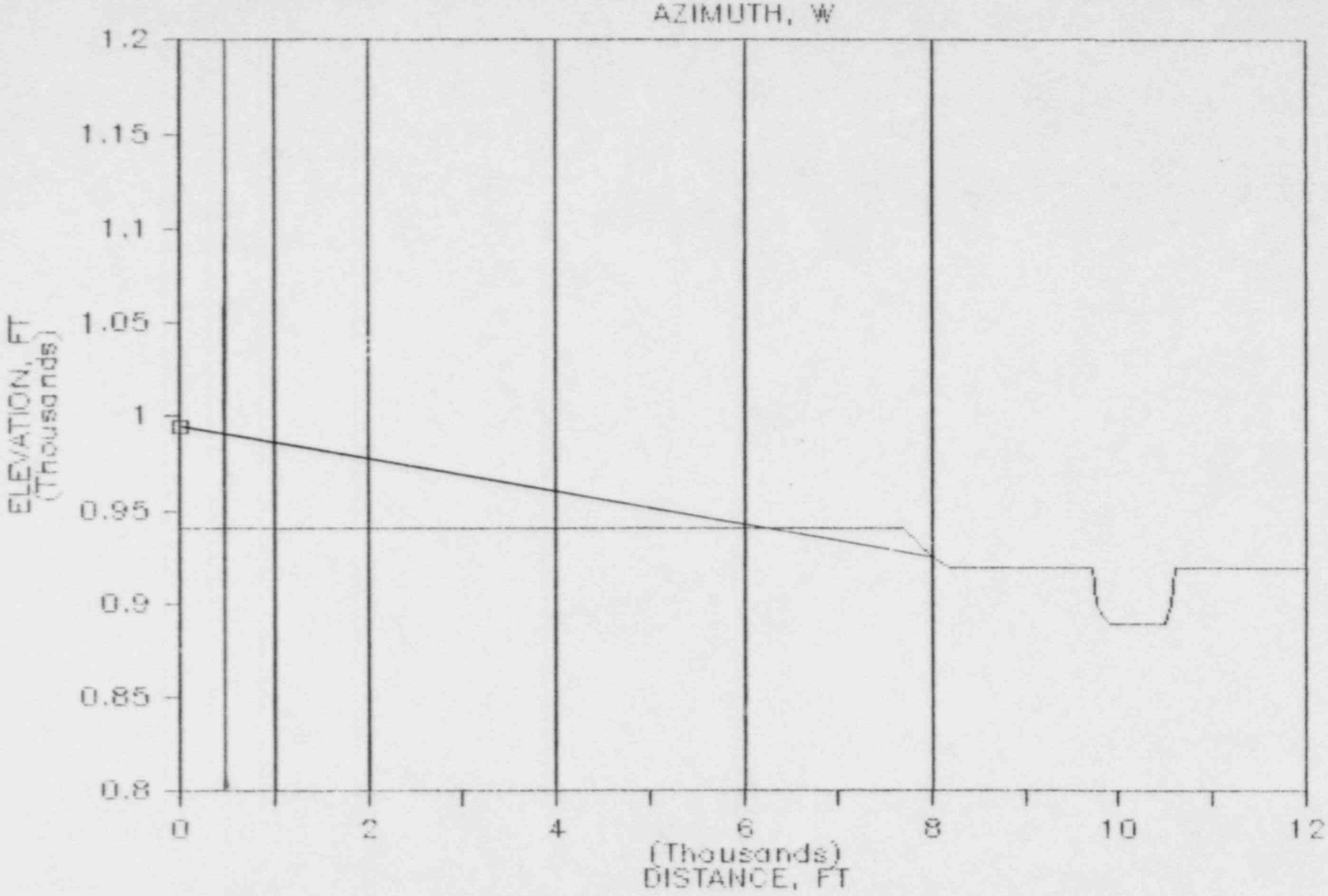
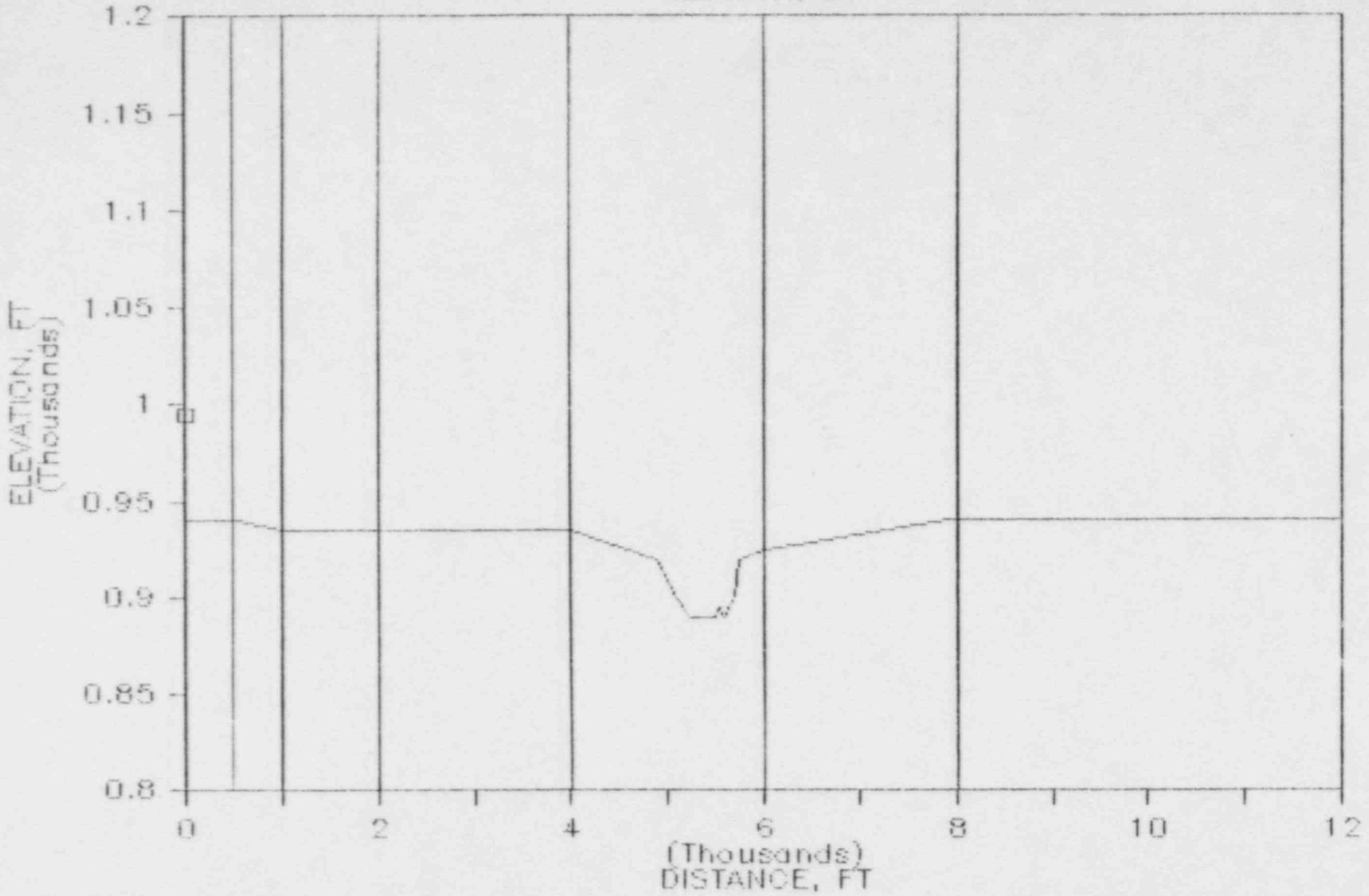


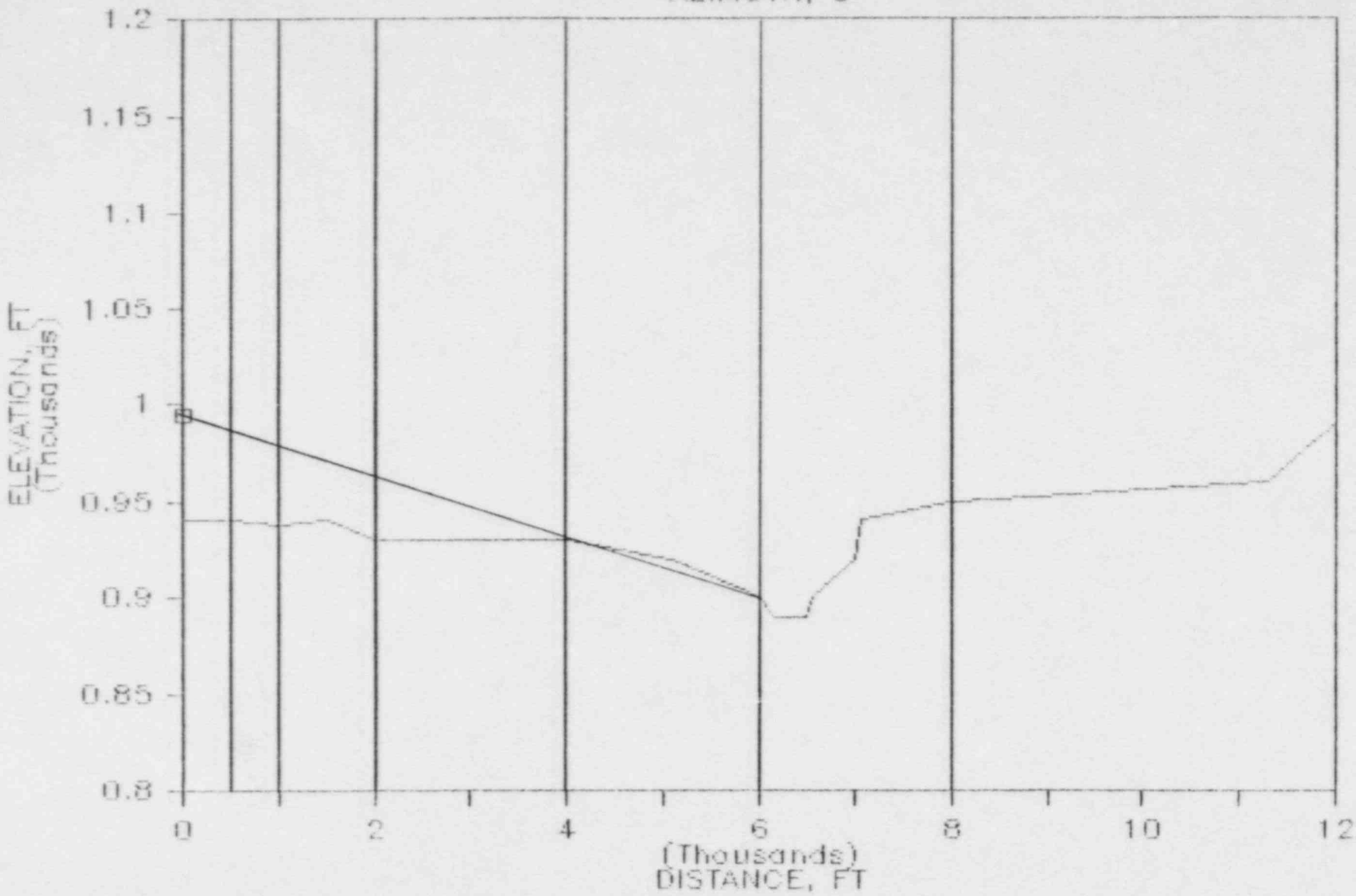
MONTICELLO 4

AZIMUTH, SW



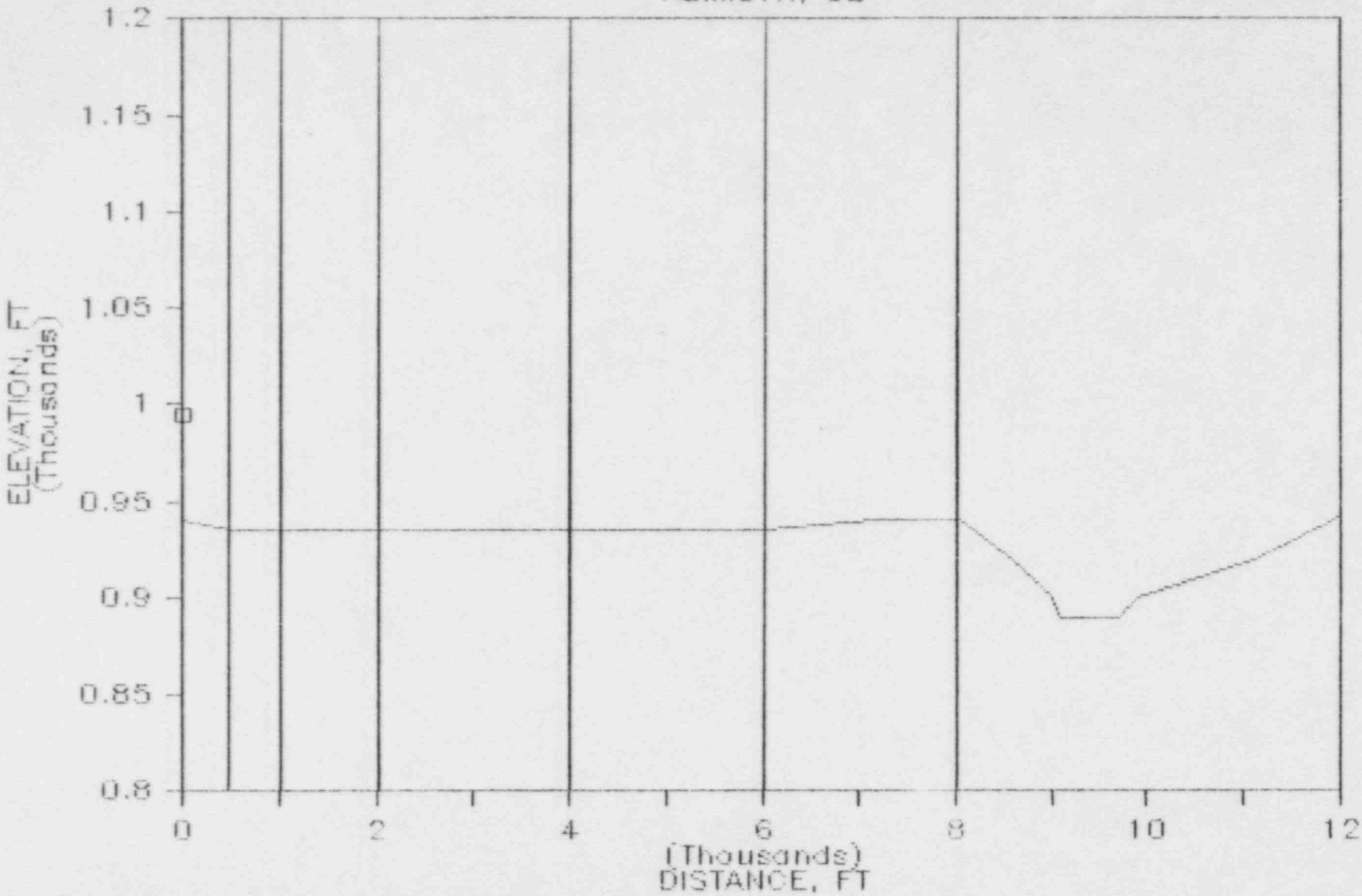
MONTICELLO 4

AZIMUTH, S



MONTICELLO 4

AZIMUTH, SE



NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP04-T1000
SOURCE-RECEIVER TOPOGRAPHICAL INPUTS

ALL BEARINGS ARE WITH RESPECT TO THE NORTH MEASURING CLOCKWISE

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
1	500.	90.00	935.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	935.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	935.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	934.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	932.00	SOFT	0.	NO	0.	0.
6	8000.	90.00	930.00	SOFT	0.	NO	0.	0.
7	12000.	90.00	925.00	SOFT	0.	NO	0.	0.
8	500.	45.00	940.00	SOFT	0.	NO	0.	0.
9	1000.	45.00	940.00	SOFT	0.	NO	0.	0.
10	2000.	45.00	940.00	SOFT	0.	NO	0.	0.
11	4000.	45.00	940.00	SOFT	0.	NO	0.	0.
12	6000.	45.00	935.00	SOFT	0.	NO	0.	0.
13	8000.	45.00	935.00	HARD	0.	NO	0.	0.
14	12000.	45.00	942.00	SOFT	0.	NO	0.	0.
15	500.	0.0	940.00	SOFT	0.	NO	0.	0.
16	1000.	0.0	940.00	SOFT	0.	NO	0.	0.
17	2000.	0.0	940.00	SOFT	0.	NO	0.	0.
18	4000.	0.0	940.00	SOFT	0.	NO	0.	0.
19	6000.	0.0	940.00	SOFT	0.	NO	0.	0.
20	8000.	0.0	940.00	HARD	0.	NO	0.	0.
21	12000.	0.0	940.00	SOFT	0.	NO	0.	0.
22	500.	315.00	940.00	SOFT	0.	NO	0.	0.
23	1000.	315.00	940.00	SOFT	0.	NO	0.	0.
24	2000.	315.00	940.00	SOFT	0.	NO	0.	0.
25	4000.	315.00	940.00	SOFT	0.	NO	0.	0.
26	6000.	315.00	940.00	SOFT	0.	NO	0.	0.
27	8000.	315.00	940.00	SOFT	0.	NO	0.	0.
28	12000.	315.00	940.00	SOFT	0.	NO	0.	0.
29	500.	270.00	940.00	SOFT	0.	NO	0.	0.
30	1000.	270.00	940.00	SOFT	0.	NO	0.	0.
31	2000.	270.00	940.00	SOFT	0.	NO	0.	0.
32	4000.	270.00	940.00	SOFT	0.	NO	0.	0.
33	6000.	270.00	940.00	SOFT	0.	NO	0.	0.
34	8000.	270.00	925.00	SOFT	0.	YES	7700.	942.
35	12000.	270.00	920.00	SOFT	0.	NO	0.	0.
36	500.	225.00	940.00	SOFT	0.	NO	0.	0.

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
37	1000.	225.00	935.00	SOFT	0.	NO	0.	0.
38	2000.	225.00	935.00	SOFT	0.	NO	0.	0.
39	4000.	225.00	935.00	SOFT	0.	NO	0.	0.
40	6000.	225.00	925.00	SOFT	0.	NO	0.	0.
41	8000.	225.00	940.00	SOFT	0.	NO	0.	0.
42	12000.	225.00	940.00	SOFT	0.	NO	0.	0.
43	500.	180.00	940.00	SOFT	0.	NO	0.	0.
44	1000.	180.00	938.00	SOFT	0.	NO	0.	0.
45	2000.	180.00	930.00	SOFT	0.	NO	0.	0.
46	4000.	180.00	930.00	SOFT	0.	NO	0.	0.
47	6000.	180.00	900.00	SOFT	0.	YES	5200.	920.
48	8000.	180.00	950.00	SOFT	0.	NO	0.	0.
49	12000.	180.00	990.00	SOFT	0.	NO	0.	0.
50	500.	135.00	935.00	SOFT	0.	NO	0.	0.
51	1000.	135.00	935.00	SOFT	0.	NO	0.	0.
52	2000.	135.00	935.00	SOFT	0.	NO	0.	0.
53	4000.	135.00	935.00	SOFT	0.	NO	0.	0.
54	6000.	135.00	935.00	SOFT	0.	NO	0.	0.
55	8000.	135.00	940.00	SOFT	0.	NO	0.	0.
56	12000.	135.00	943.00	SOFT	0.	NO	0.	0.
57	34724.	309.65	950.00	SOFT	0.	YES	17000.	1050.
58	29542.	41.40	930.00	SOFT	0.	YES	17000.	1050.
59	36005.	227.95	1040.00	SOFT	0.	YES	17000.	1050.
60	31037.	140.99	950.00	SOFT	0.	YES	17000.	1050.

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP04-T1000
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	SIREN NSP04	165.9	167.9	0.0	0.0	0.0	0.0	167.0	158.0	157.0	150.0	148.0

XO= 0.0 YO= 0.0 ZO= 940.00 HEIGHT ABOVE GROUND= 55.00

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP04-T1000
METEOROLOGICAL INPUT CONDITIONS

H1= 10.06 METERS H2= 43.28 METERS

YEAR	SEASON	MONTH	DATE	HOUR	WIND DIRECTION	WIND SPEED(MPS) H1	WIND SPEED(MPS) H2	TEMPERATURE(C) H1	TEMPERATURE(C) H2	RELATIVE HUMIDITY	BAROMETRIC PRESSURE(MM OF HG)
1984	S	7	22	12	188.0	3.1	3.8	28.1	27.2	68.0	760.0

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP04-T1000

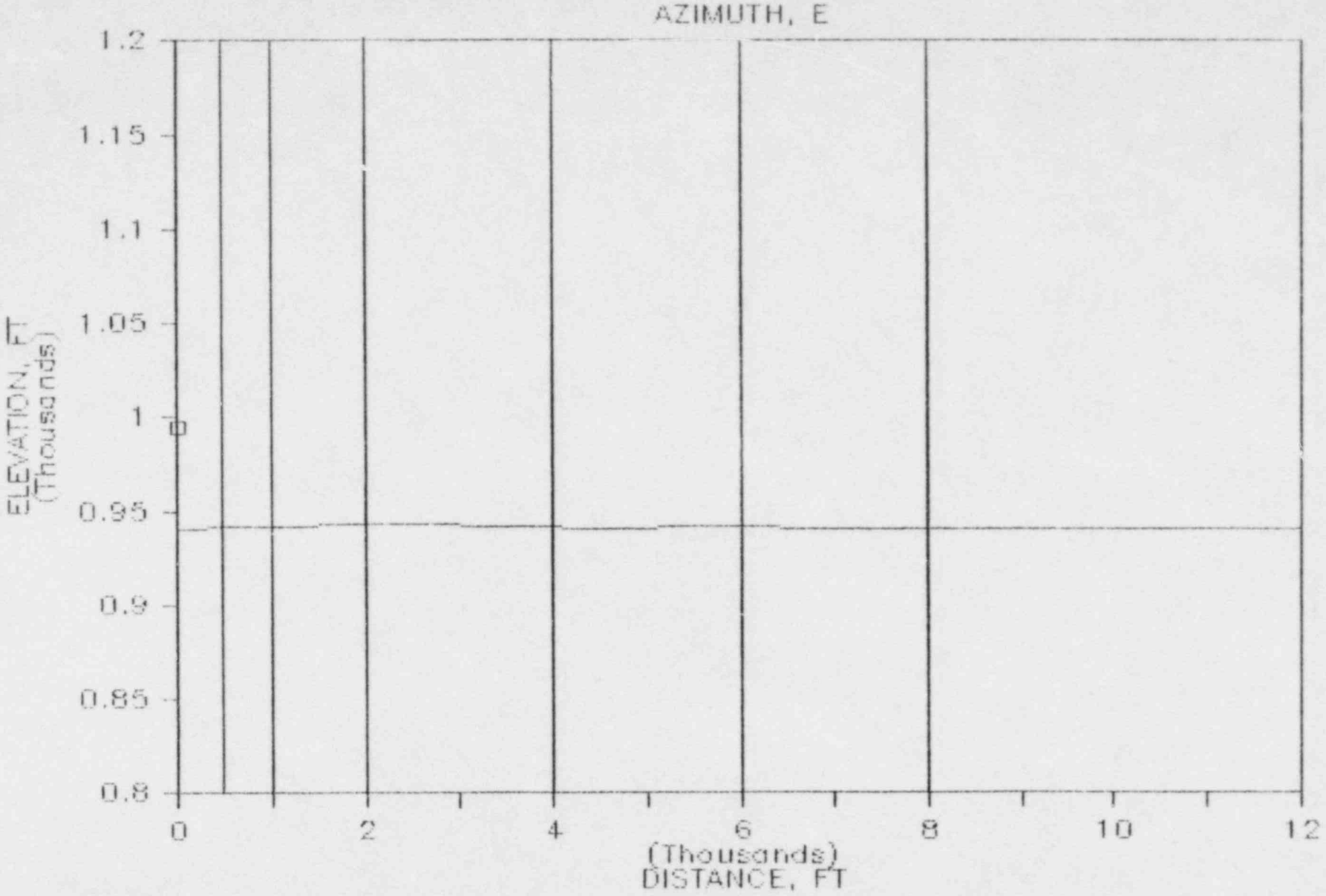
SIREN SOUND LEVELS IN DBC

UNDER MET CONDITION 1

DISTANCE IN FEET

AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	115.	106.	97.	90.	86.	82.	75.
NE	115.	106.	97.	90.	86.	84.	75.
N	115.	106.	97.	90.	86.	84.	75.
NW	115.	106.	97.	90.	86.	82.	75.
W	115.	106.	97.	90.	85.	73.	68.
SW	115.	106.	97.	90.	86.	82.	75.
S	115.	106.	97.	90.	79.	82.	73.
SE	115.	106.	97.	90.	86.	82.	75.

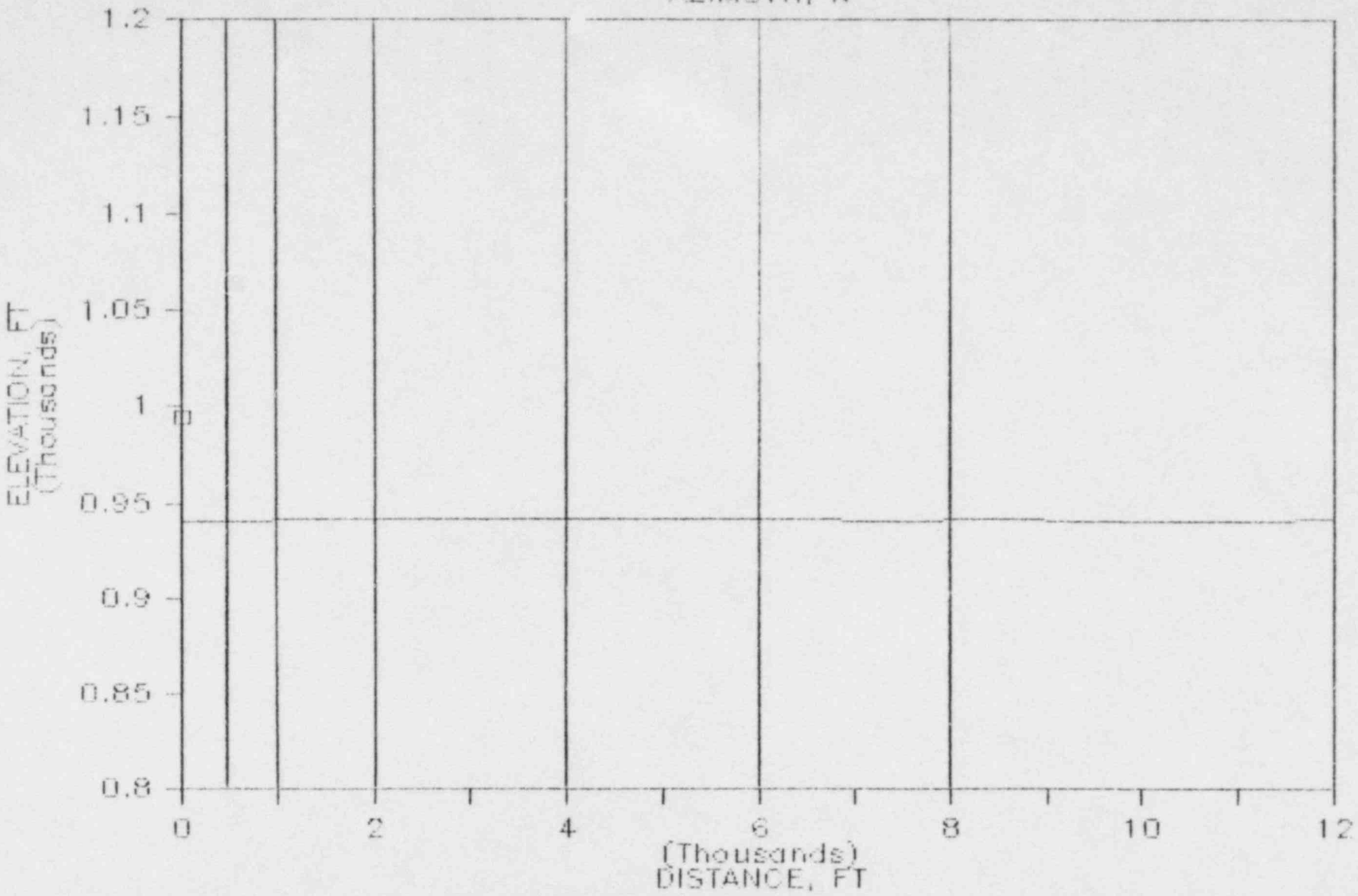
MONTICELLO 5



MONTICELLO 5

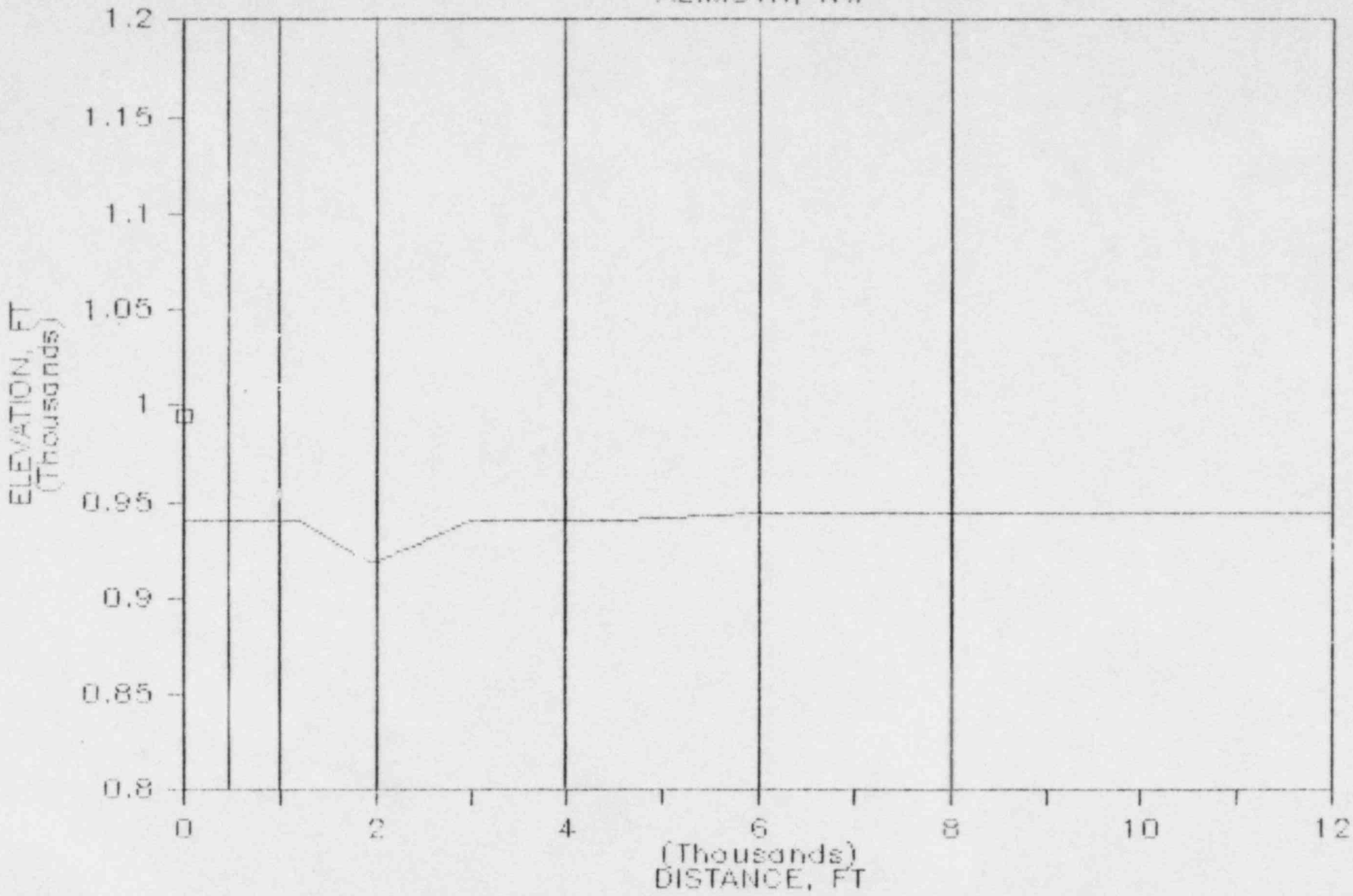
MONTICELLO 5

AZIMUTH, N

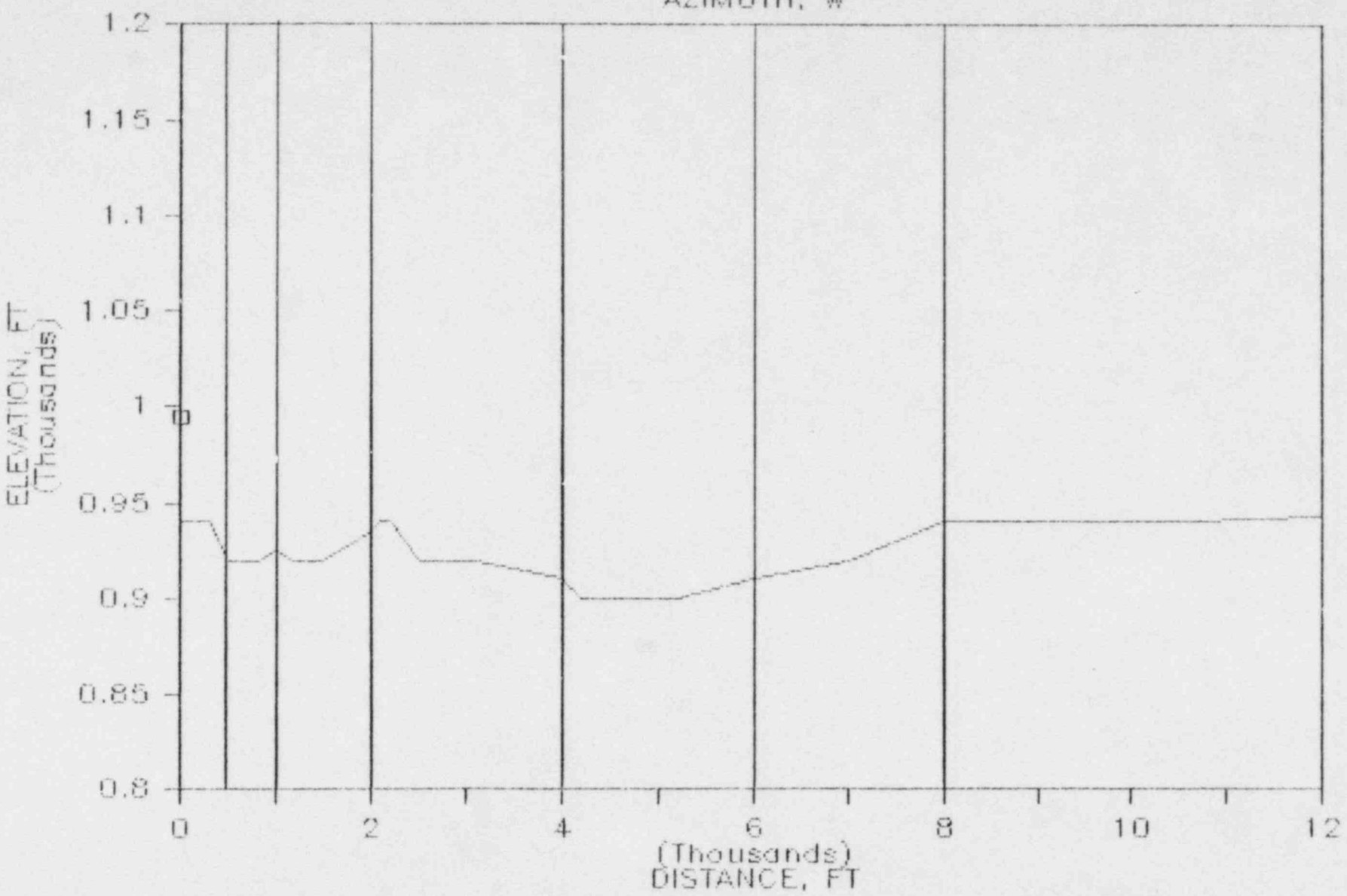


MONTICELLO 5

AZIMUTH, NW

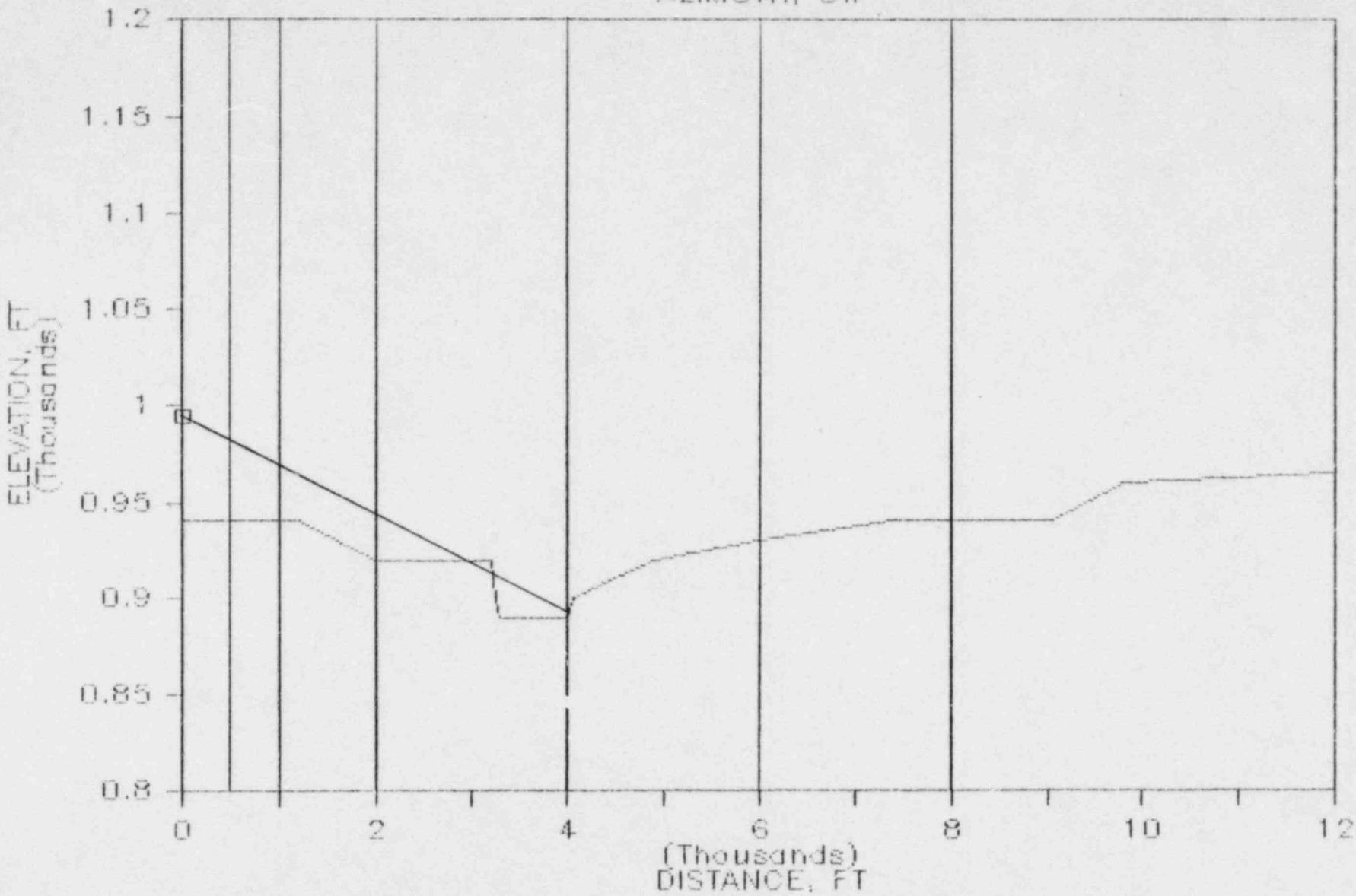


MONTICELLO 5

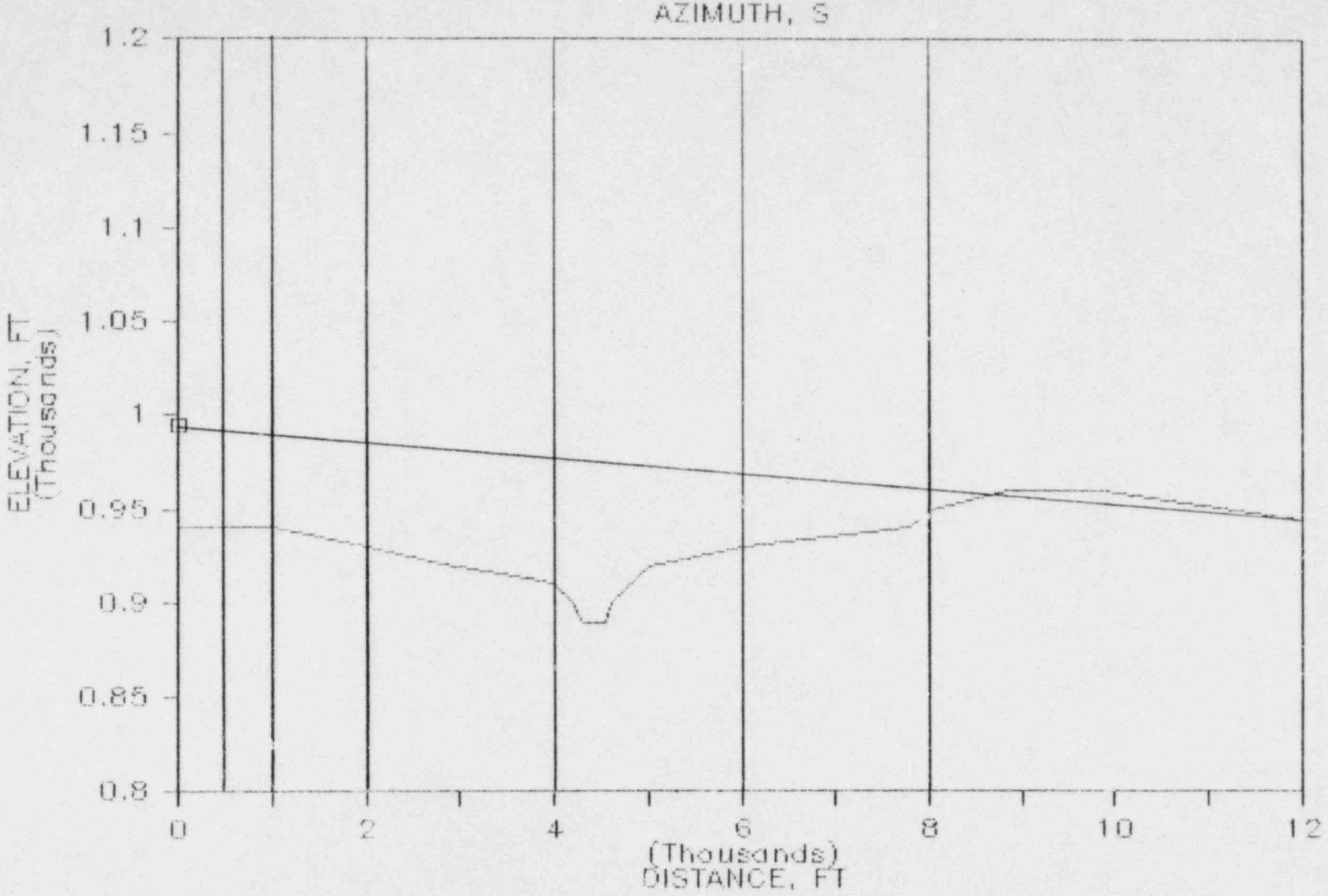


MONTICELLO 5

AZIMUTH, SW

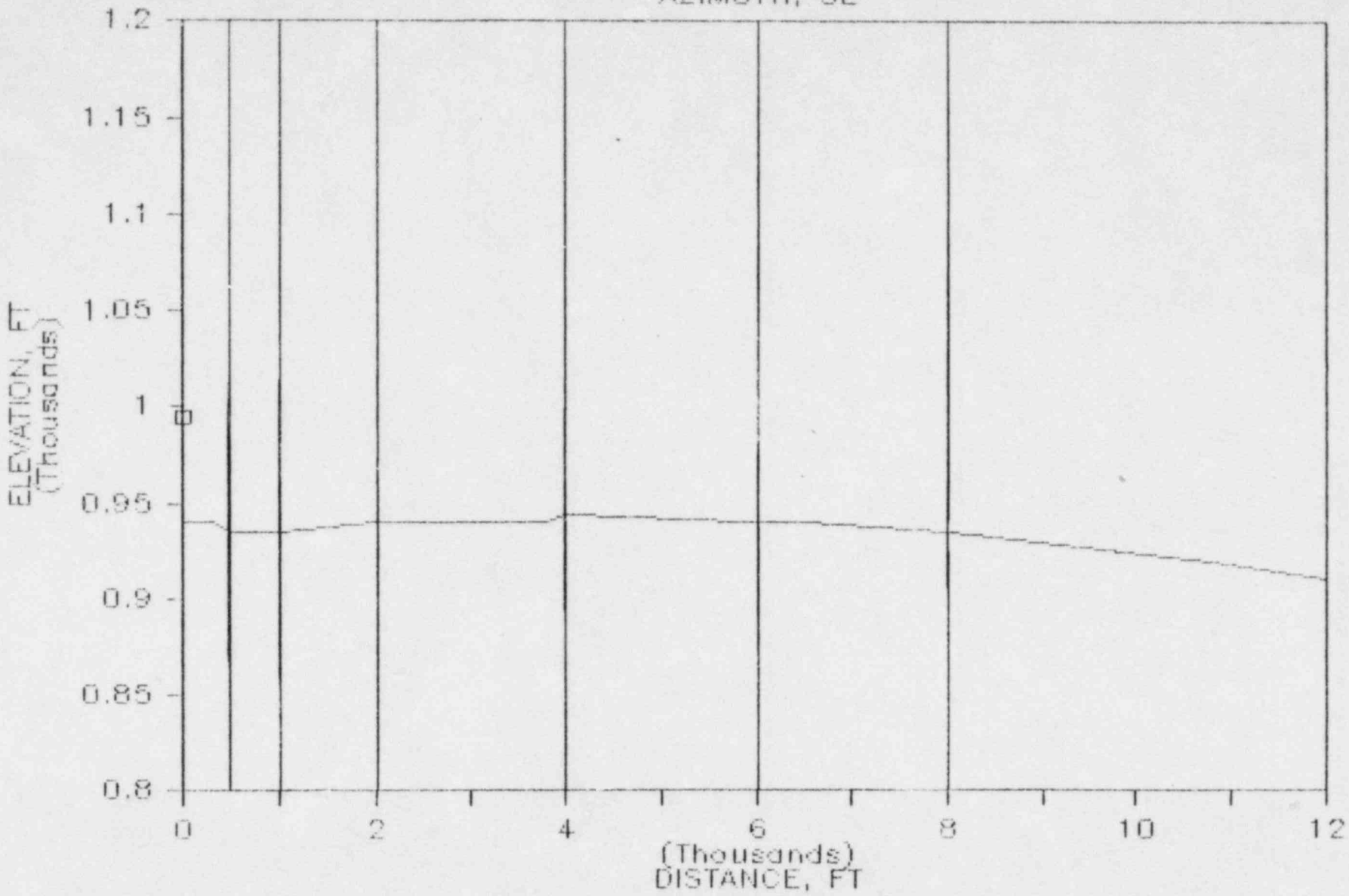


MONTICELLO 5



MONTICELLO 5

AZIMUTH, SE



NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP05-MODEL 2
SOURCE-RECEIVER TOPOGRAPHICAL INPUTS

ALL BEARINGS ARE WITH RESPECT TO THE NORTH MEASURING CLOCKWISE

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
1	500.	90.00	942.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	942.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	943.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	942.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	942.00	SOFT	0.	NO	0.	0.
6	8000.	90.00	940.00	SOFT	0.	NO	0.	0.
7	12000.	90.00	940.00	SOFT	0.	NO	0.	0.
8	500.	45.00	945.00	SOFT	0.	NO	0.	0.
9	1000.	45.00	945.00	SOFT	0.	NO	0.	0.
10	2000.	45.00	945.00	SOFT	0.	NO	0.	0.
11	4000.	45.00	945.00	SOFT	0.	NO	0.	0.
12	6000.	45.00	945.00	SOFT	0.	NO	0.	0.
13	8000.	45.00	942.00	SOFT	0.	NO	0.	0.
14	12000.	45.00	923.00	SOFT	0.	NO	0.	0.
15	500.	0.0	940.00	SOFT	0.	NO	0.	0.
16	1000.	0.0	942.00	SOFT	0.	NO	0.	0.
17	2000.	0.0	942.00	SOFT	0.	NO	0.	0.
18	4000.	0.0	942.00	SOFT	0.	NO	0.	0.
19	6000.	0.0	942.00	SOFT	0.	NO	0.	0.
20	8000.	0.0	942.00	SOFT	0.	NO	0.	0.
21	12000.	0.0	942.00	SOFT	0.	NO	0.	0.
22	500.	315.00	940.00	SOFT	0.	NO	0.	0.
23	1000.	315.00	940.00	SOFT	0.	NO	0.	0.
24	2000.	315.00	920.00	SOFT	0.	NO	0.	0.
25	4000.	315.00	940.00	SOFT	0.	NO	0.	0.
26	6000.	315.00	945.00	SOFT	0.	NO	0.	0.
27	8000.	315.00	945.00	SOFT	0.	NO	0.	0.
28	12000.	315.00	945.00	SOFT	0.	NO	0.	0.
29	500.	270.00	920.00	SOFT	0.	NO	0.	0.
30	1000.	270.00	925.00	SOFT	0.	NO	0.	0.
31	2000.	270.00	935.00	SOFT	0.	NO	0.	0.
32	4000.	270.00	910.00	SOFT	0.	NO	0.	0.
33	6000.	270.00	910.00	SOFT	0.	NO	0.	0.
34	8000.	270.00	940.00	SOFT	0.	NO	0.	0.
35	12000.	270.00	943.00	SOFT	0.	NO	0.	0.
36	500.	225.00	940.00	SOFT	0.	NO	0.	0.

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
37	1000.	225.00	940.00	SOFT	0.	NO	0.	0.
38	2000.	225.00	920.00	SOFT	0.	NO	0.	0.
39	4000.	225.00	890.00	SOFT	0.	YES	3200.	920.
40	6000.	225.00	930.00	SOFT	0.	NO	0.	0.
41	8000.	225.00	940.00	SOFT	0.	NO	0.	0.
42	12000.	225.00	965.00	SOFT	0.	NO	0.	0.
43	500.	180.00	940.00	SOFT	0.	NO	0.	0.
44	1000.	180.00	930.00	SOFT	0.	NO	0.	0.
45	2000.	180.00	930.00	SOFT	0.	NO	0.	0.
46	4000.	180.00	910.00	SOFT	0.	NO	0.	0.
47	6000.	180.00	930.00	SOFT	0.	NO	0.	0.
48	8000.	180.00	950.00	SOFT	0.	NO	0.	0.
49	12000.	180.00	945.00	SOFT	0.	YES	10000.	960.
50	500.	135.00	935.00	SOFT	0.	NO	0.	0.
51	1000.	135.00	935.00	SOFT	0.	NO	0.	0.
52	2000.	135.00	940.00	SOFT	0.	NO	0.	0.
53	4000.	135.00	945.00	SOFT	0.	NO	0.	0.
54	6000.	135.00	940.00	SOFT	0.	NO	0.	0.
55	8000.	135.00	935.00	SOFT	0.	NO	0.	0.
56	12000.	135.00	910.00	SOFT	0.	NO	0.	0.
57	27666.	315.36	950.00	SOFT	0.	YES	17000.	1040.
58	33280.	53.74	930.00	SOFT	0.	YES	17000.	1040.
59	32938.	216.17	1040.00	SOFT	0.	YES	3200.	920.
60	37776.	134.74	950.00	SOFT	0.	YES	10000.	960.

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP05-MODEL 2
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	SIREN NSP05	140.3	142.6	0.0	0.0	0.0	0.0	142.0	127.0	129.0	131.0	0.0

XO= 0.0 YO= 0.0 ZO= 940.00 HEIGHT ABOVE GROUND= 55.00

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP05-MODEL 2
METEOROLOGICAL INPUT CONDITIONS

H1= 10.06 METERS H2= 43.28 METERS

YEAR	SEASON	MONTH	DATE	HOUR	WIND DIRECTION	WIND SPEED(MPS) H1	WIND SPEED(MPS) H2	TEMPERATURE(C) H1	TEMPERATURE(C) H2	RELATIVE HUMIDITY	BAROMETRIC PRESSURE(MM OF HG)
1984	S	7	22	12	188.0	3.1	3.8	28.1	27.2	68.0	760.0

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP05-MODEL 2

SIREN SOUND LEVELS IN DBC

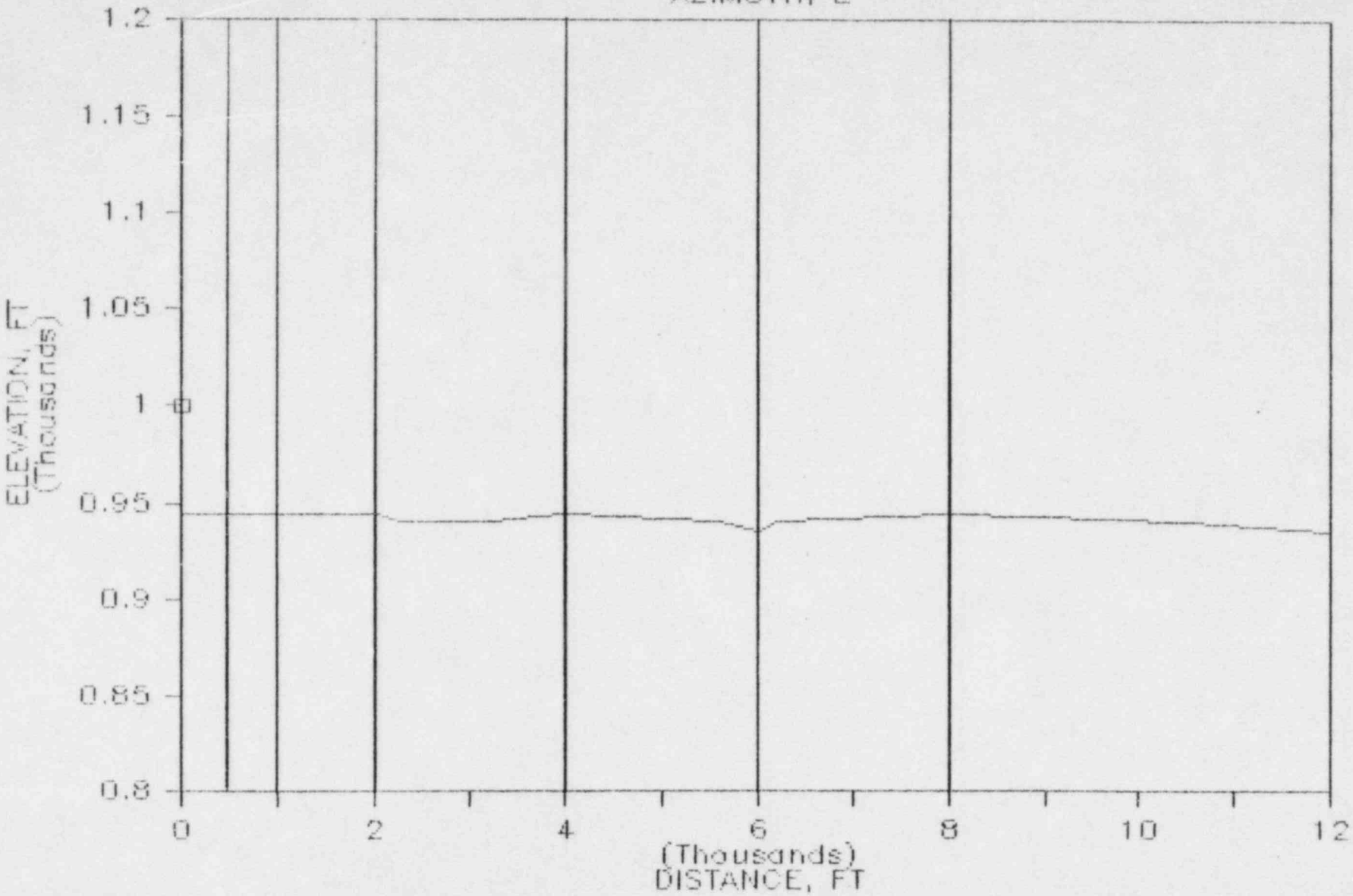
UNDER MET CONDITION 1

DISTANCE IN FEET

AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	90.	80.	72.	65.	61.	57.	50.
NE	90.	80.	72.	65.	61.	57.	50.
N	90.	80.	72.	65.	61.	57.	50.
NW	90.	80.	72.	65.	61.	57.	50.
W	90.	80.	72.	65.	60.	54.	43.
SW	90.	80.	72.	58.	61.	57.	50.
S	90.	80.	72.	65.	61.	57.	44.
SE	90.	80.	72.	65.	61.	57.	50.

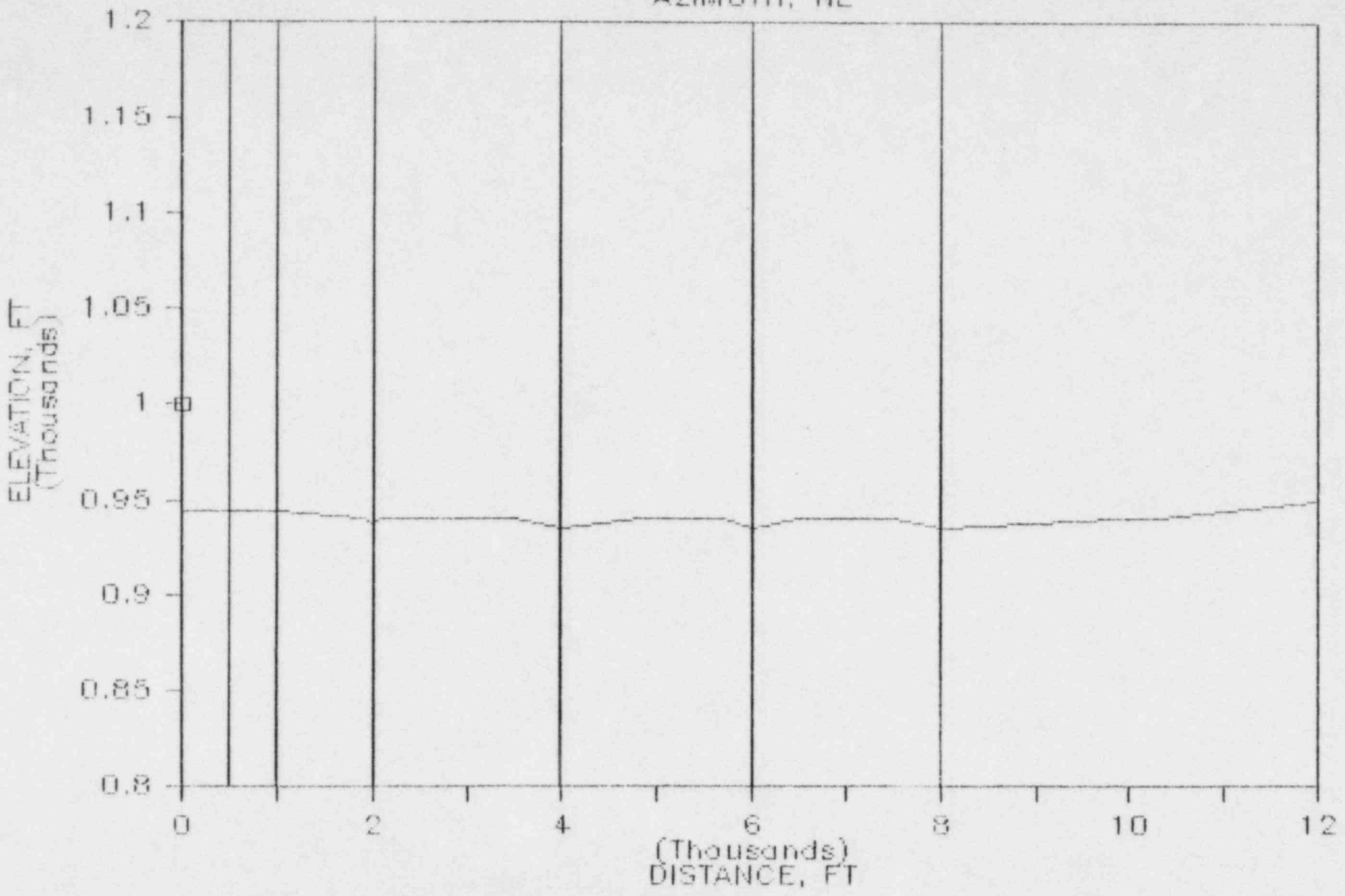
MONTICELLO 6

AZIMUTH, E

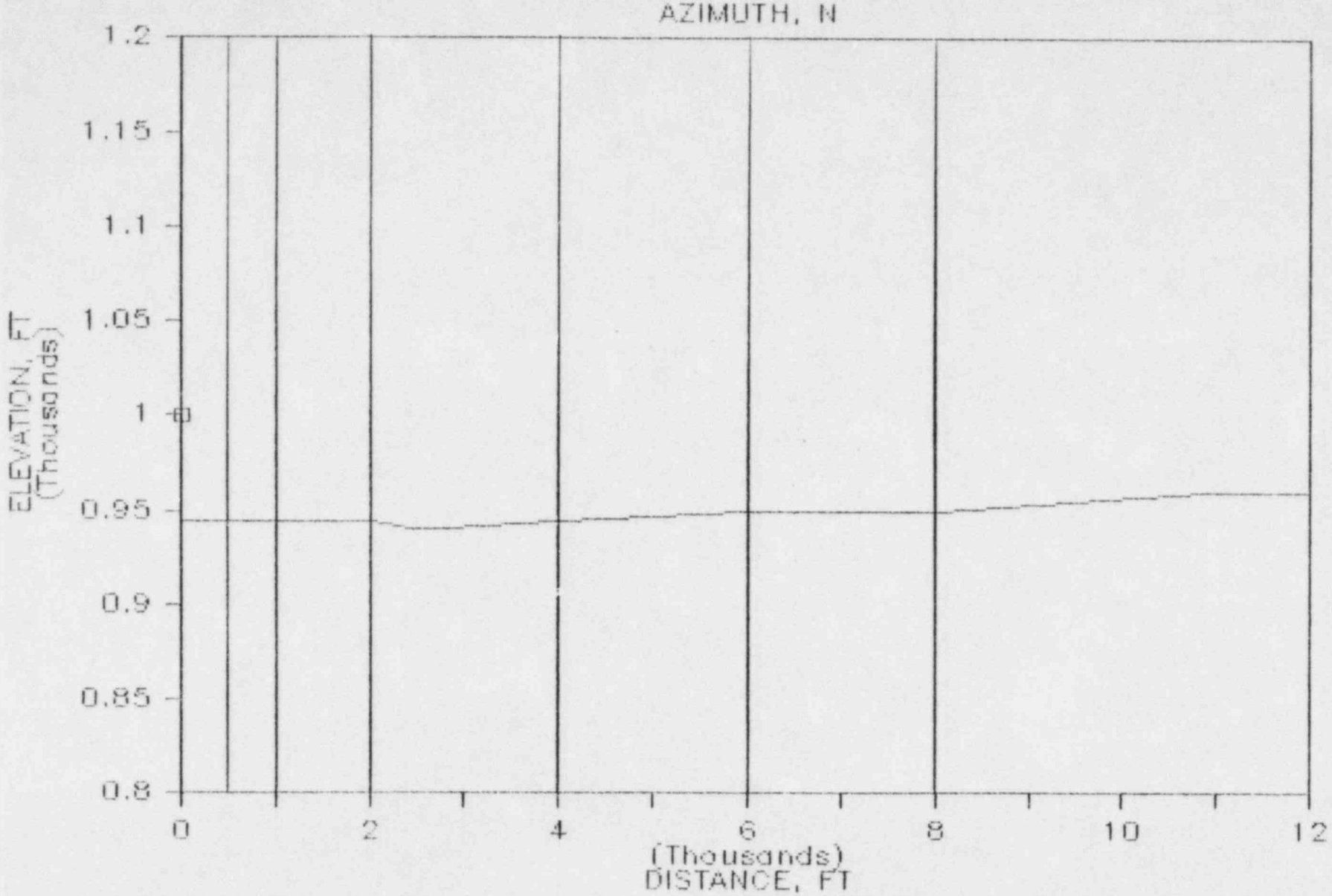


MONTICELLO 6

AZIMUTH, NE

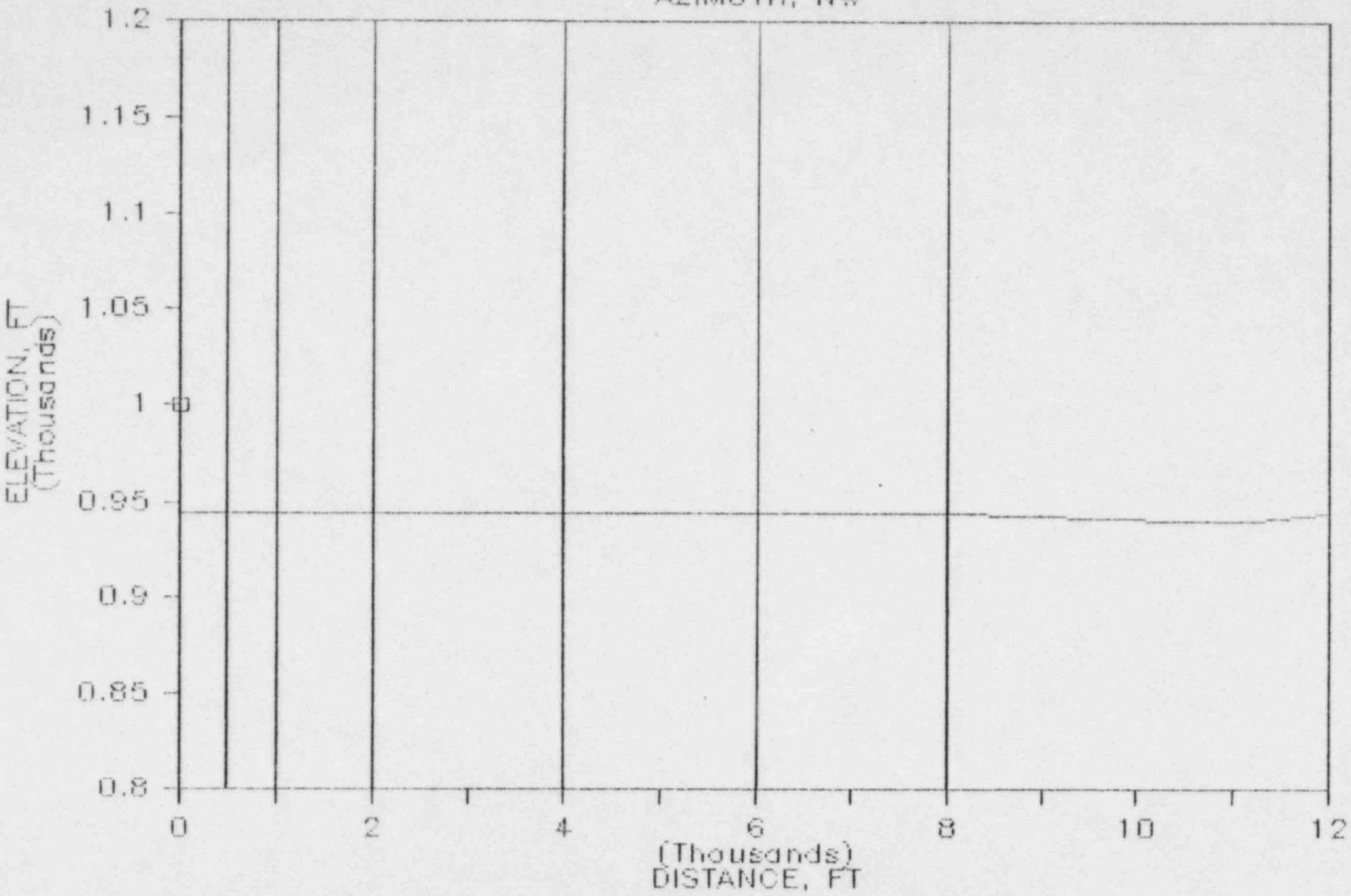


MONTICELLO 6

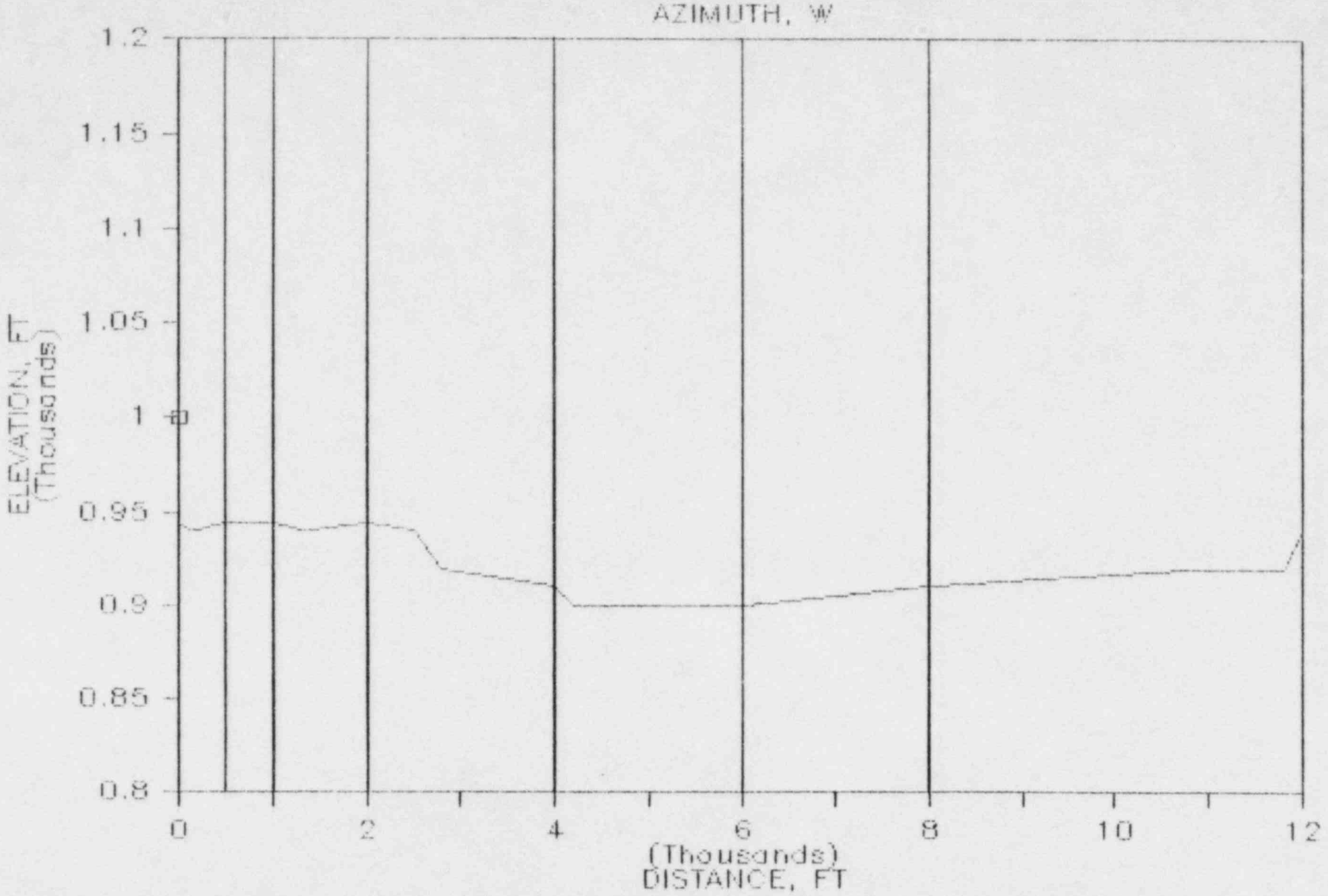


MONTICELLO 6

AZIMUTH, NW

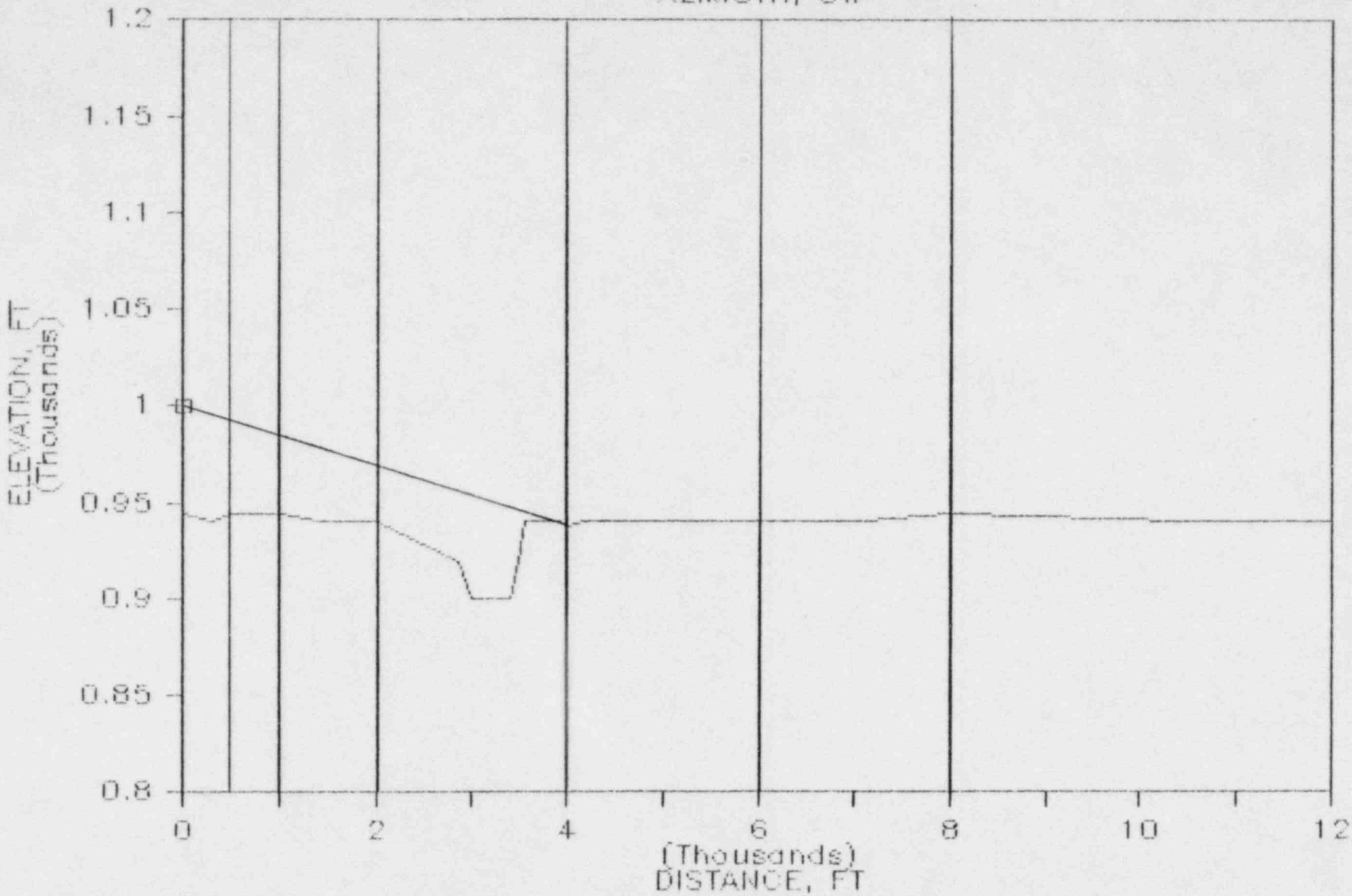


MONTICELLO 6



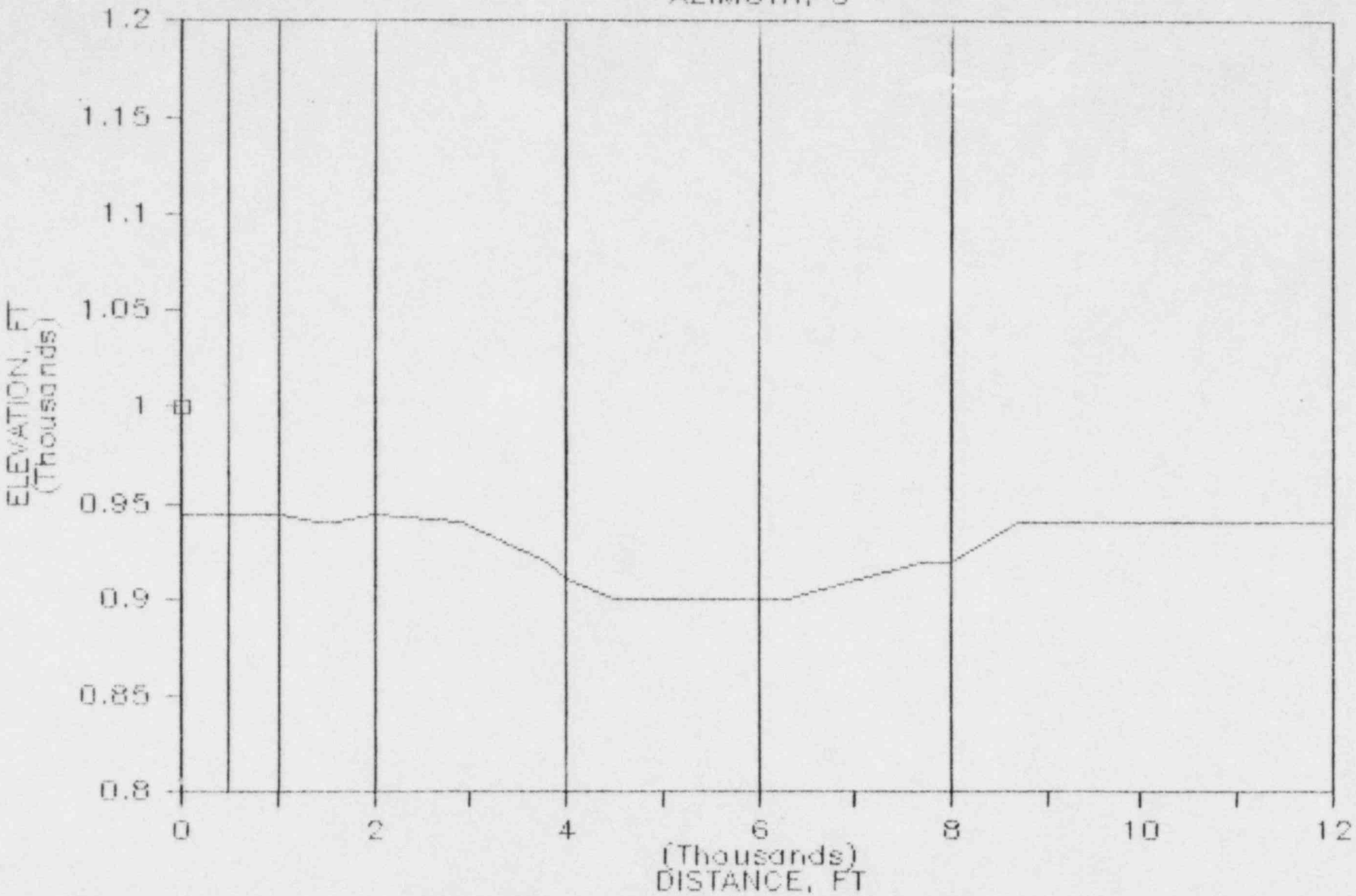
MONTICELLO 6

AZIMUTH, SW



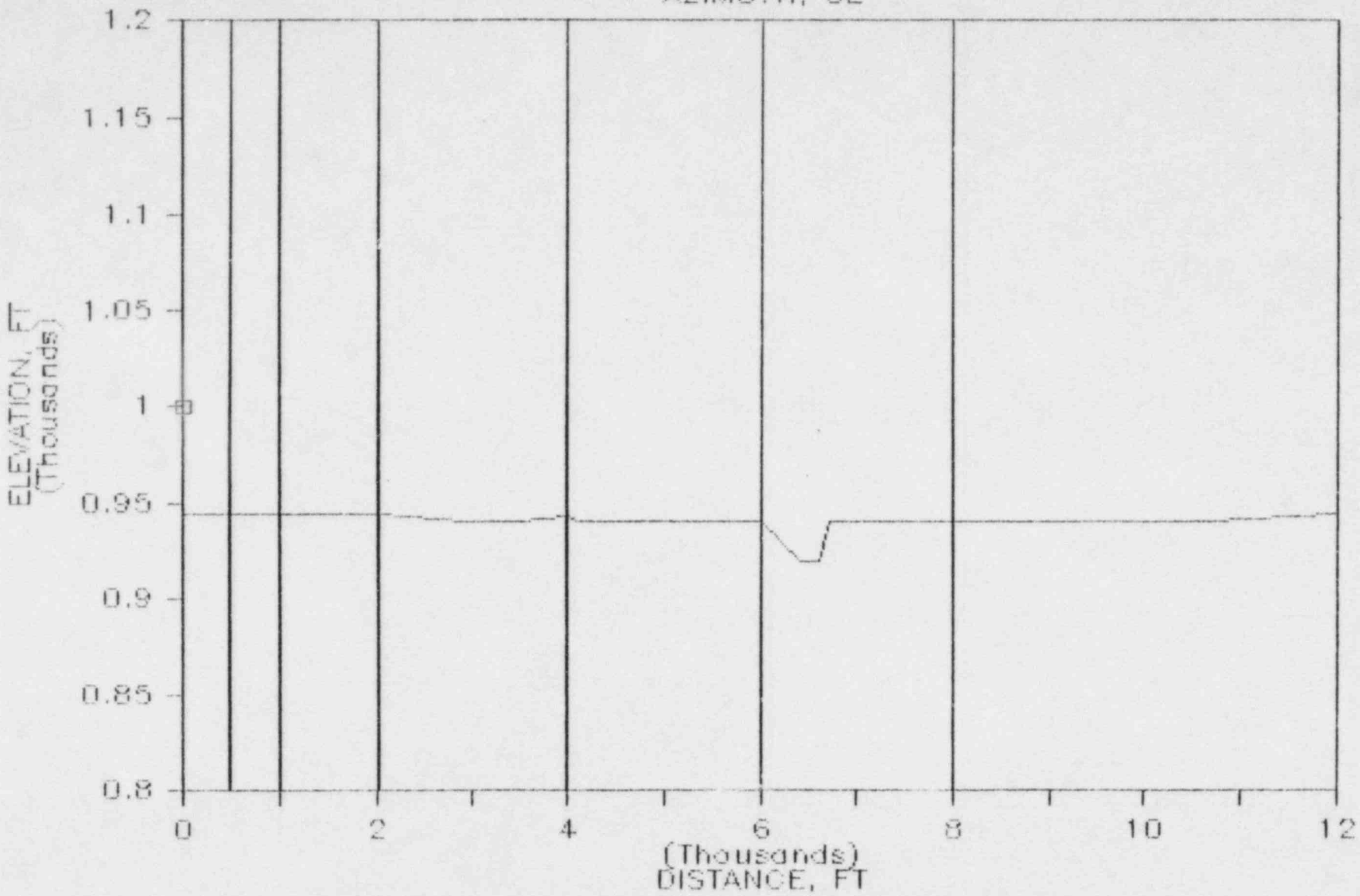
MONTICELLO 6

AZIMUTH, S



MONTICELLO 6

AZIMUTH, SE



NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP06-MODEL 2
SOURCE-RECEIVER TOPOGRAPHICAL INPUTS

ALL BEARINGS ARE WITH RESPECT TO THE NORTH MEASURING CLOCKWISE

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
1	500.	90.00	945.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	945.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	945.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	945.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	935.00	SOFT	0.	NO	0.	0.
6	8000.	90.00	945.00	SOFT	0.	NO	0.	0.
7	12000.	90.00	935.00	SOFT	0.	NO	0.	0.
8	500.	45.00	945.00	SOFT	0.	NO	0.	0.
9	1000.	45.00	945.00	SOFT	0.	NO	0.	0.
10	2000.	45.00	938.00	SOFT	0.	NO	0.	0.
11	4000.	45.00	935.00	SOFT	0.	NO	0.	0.
12	6000.	45.00	935.00	SOFT	0.	NO	0.	0.
13	8000.	45.00	935.00	HARD	0.	NO	0.	0.
14	12000.	45.00	950.00	SOFT	0.	NO	0.	0.
15	500.	0.0	945.00	SOFT	0.	NO	0.	0.
16	1000.	0.0	945.00	SOFT	0.	NO	0.	0.
17	2000.	0.0	945.00	SOFT	0.	NO	0.	0.
18	4000.	0.0	945.00	SOFT	0.	NO	0.	0.
19	6000.	0.0	950.00	SOFT	0.	NO	0.	0.
20	8000.	0.0	950.00	SOFT	0.	NO	0.	0.
21	12000.	0.0	960.00	SOFT	0.	NO	0.	0.
22	500.	315.00	945.00	SOFT	0.	NO	0.	0.
23	1000.	315.00	945.00	SOFT	0.	NO	0.	0.
24	2000.	315.00	945.00	SOFT	0.	NO	0.	0.
25	4000.	315.00	945.00	SOFT	0.	NO	0.	0.
26	6000.	315.00	945.00	SOFT	0.	NO	0.	0.
27	8000.	315.00	945.00	SOFT	0.	NO	0.	0.
28	12000.	315.00	945.00	SOFT	0.	NO	0.	0.
29	500.	270.00	945.00	SOFT	0.	NO	0.	0.
30	1000.	270.00	945.00	SOFT	0.	NO	0.	0.
31	2000.	270.00	945.00	SOFT	0.	NO	0.	0.
32	4000.	270.00	910.00	SOFT	0.	NO	0.	0.
33	6000.	270.00	900.00	HARD	0.	NO	0.	0.
34	8000.	270.00	910.00	HARD	0.	NO	0.	0.
35	12000.	270.00	940.00	SOFT	0.	NO	0.	0.
36	500.	225.00	945.00	SOFT	0.	NO	0.	0.

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
37	1000.	225.00	945.00	SOFT	0.	NO	0.	0.
38	2000.	225.00	940.00	SOFT	0.	NO	0.	0.
39	4000.	225.00	938.00	SOFT	0.	YES	3900.	943.
40	6000.	225.00	938.00	SOFT	0.	NO	0.	0.
41	8000.	225.00	945.00	SOFT	0.	NO	0.	0.
42	12000.	225.00	940.00	SOFT	0.	NO	0.	0.
43	500.	180.00	945.00	SOFT	0.	NO	0.	0.
44	1000.	180.00	945.00	SOFT	0.	NO	0.	0.
45	2000.	180.00	945.00	SOFT	0.	NO	0.	0.
46	4000.	180.00	910.00	SOFT	0.	NO	0.	0.
47	6000.	180.00	900.00	SOFT	0.	NO	0.	0.
48	8000.	180.00	920.00	SOFT	0.	NO	0.	0.
49	12000.	180.00	940.00	SOFT	0.	NO	0.	0.
50	500.	135.00	945.00	SOFT	0.	NO	0.	0.
51	1000.	135.00	945.00	SOFT	0.	NO	0.	0.
52	2000.	135.00	945.00	SOFT	0.	NO	0.	0.
53	4000.	135.00	943.00	SOFT	0.	NO	0.	0.
54	6000.	135.00	940.00	SOFT	0.	NO	0.	0.
55	8000.	135.00	940.00	SOFT	0.	NO	0.	0.
56	12000.	135.00	940.00	SOFT	0.	NO	0.	0.
57	20256.	314.51	950.00	SOFT	0.	YES	17000.	1040.
58	34853.	65.96	930.00	SOFT	0.	YES	3900.	943.
59	35177.	204.25	1040.00	SOFT	0.	YES	17000.	1040.
60	45187.	135.22	950.00	SOFT	0.	YES	17000.	1040.

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP06-MODEL 2
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	SIREN NSP06	140.3	142.6	0.0	0.0	0.0	0.0	142.0	127.0	129.0	131.0	0.0

XO= 0.0 YO= 0.0 ZO= 945.00 HEIGHT ABOVE GROUND= 55.00

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP06-MODEL 2
METEOROLOGICAL INPUT CONDITIONS

H1= 10.06 METERS H2= 43.28 METERS

YEAR	SEASON	MONTH	DATE	HOUR	WIND DIRECTION	WIND SPEED(MPS) H1	WIND SPEED(MPS) H2	TEMPERATURE(C) H1	TEMPERATURE(C) H2	RELATIVE HUMIDITY	BAROMETRIC PRESSURE(MM OF HG)
1984	5	7	22	12	188.0	3.1	3.8	28.1	27.2	68.0	760.0

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP06-MODEL 2

SIREN SOUND LEVELS IN DBC

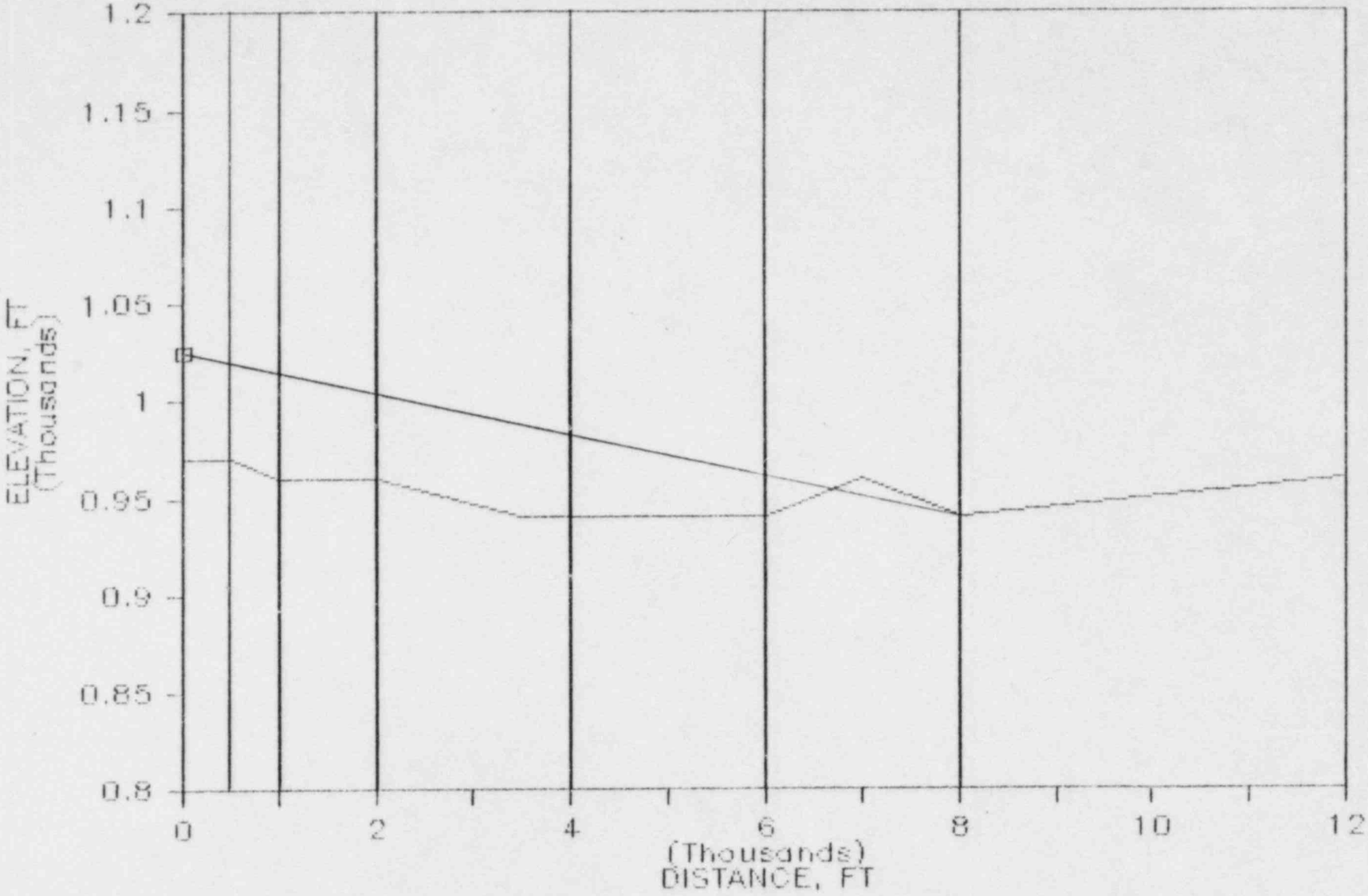
UNDER MET CONDITION 1

DISTANCE IN FEET

AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	90.	80.	72.	65.	61.	57.	50.
NE	90.	80.	72.	65.	61.	59.	50.
N	90.	80.	72.	65.	61.	57.	50.
NW	90.	80.	72.	65.	61.	57.	50.
W	90.	80.	72.	65.	63.	56.	43.
SW	90.	80.	72.	59.	61.	57.	50.
S	90.	80.	72.	65.	61.	57.	48.
SE	90.	80.	72.	65.	61.	57.	50.

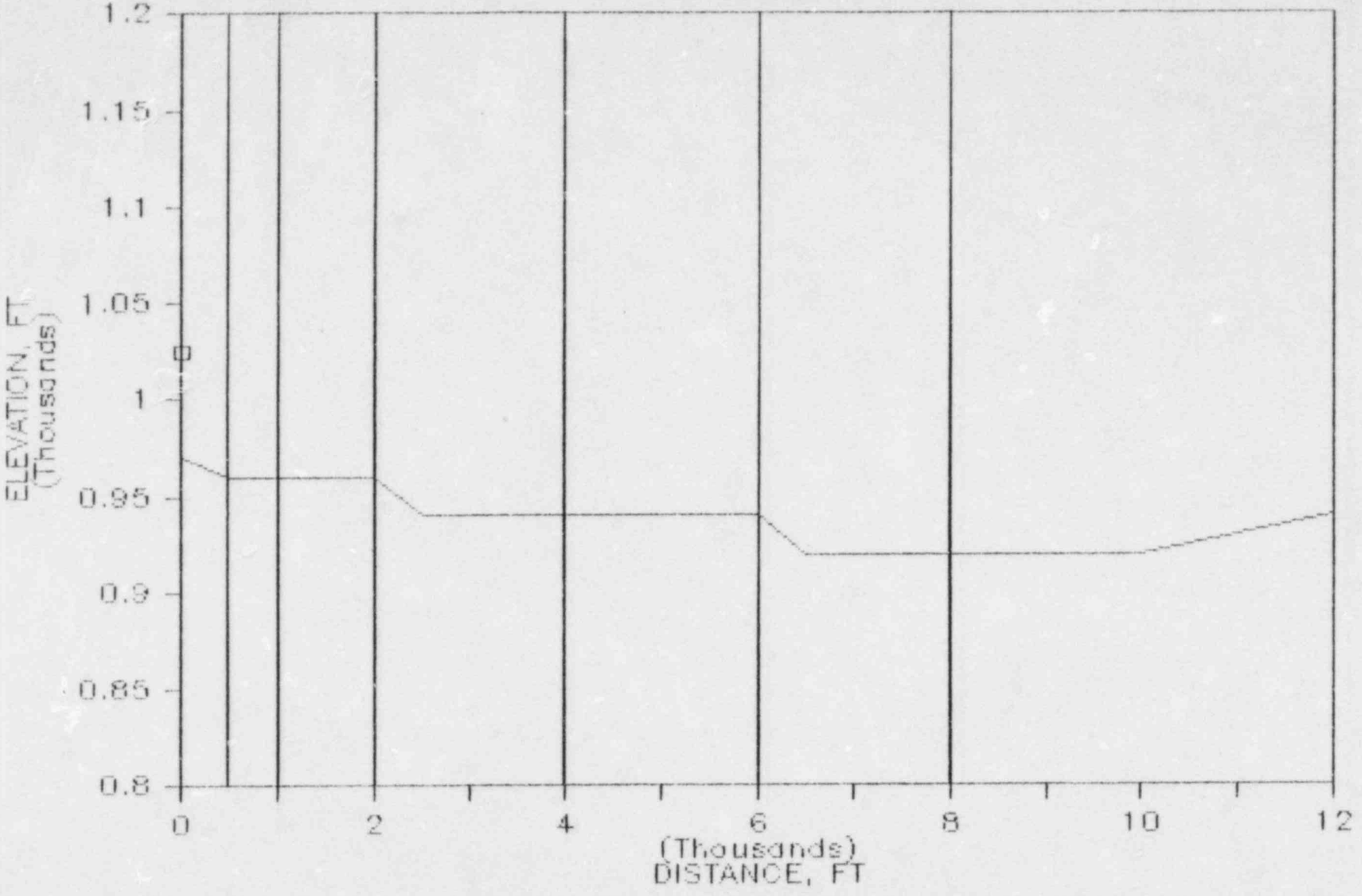
MONTICELLO 7

AZIMUTH, E

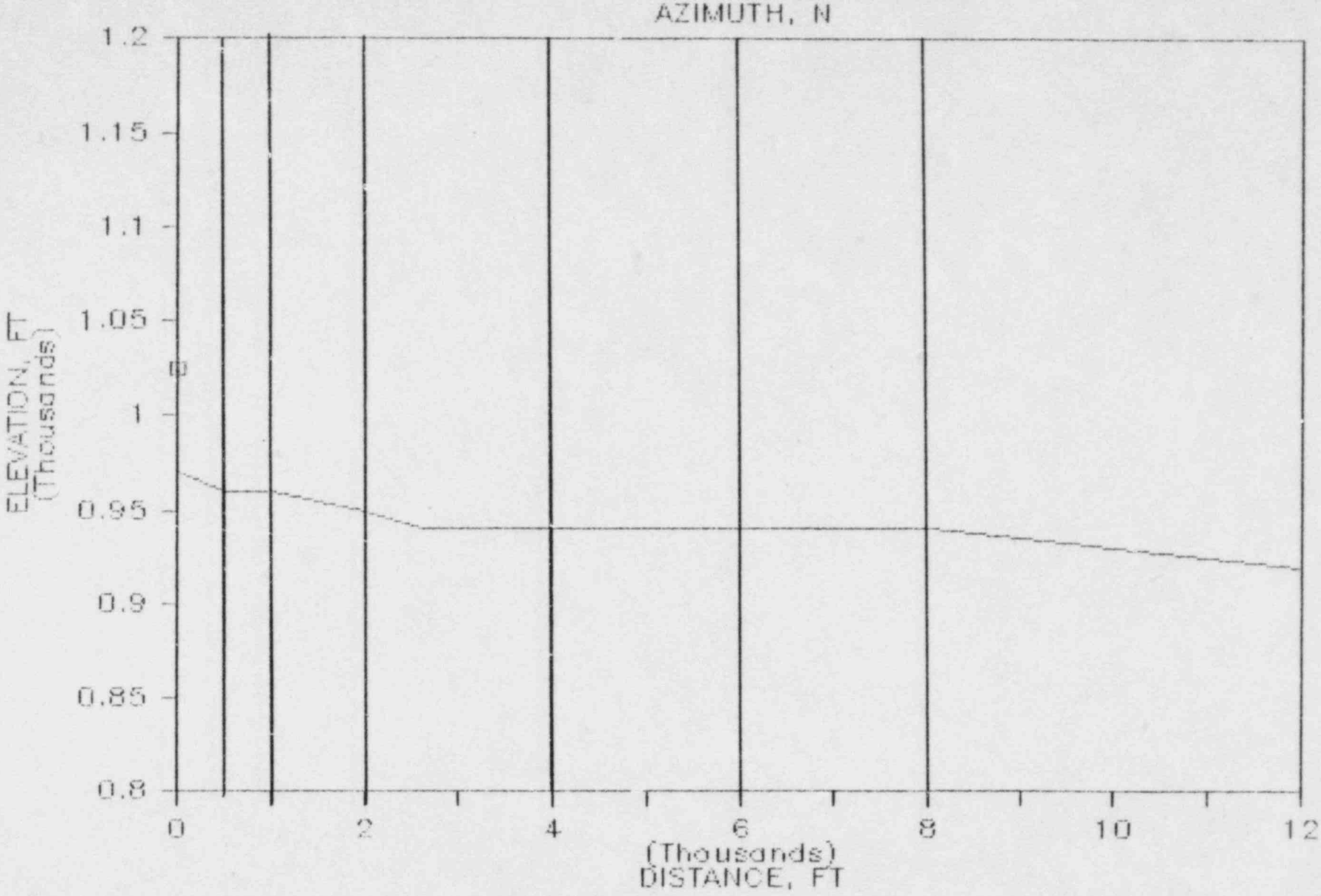


MONTICELLO 7

AZIMUTH, NE

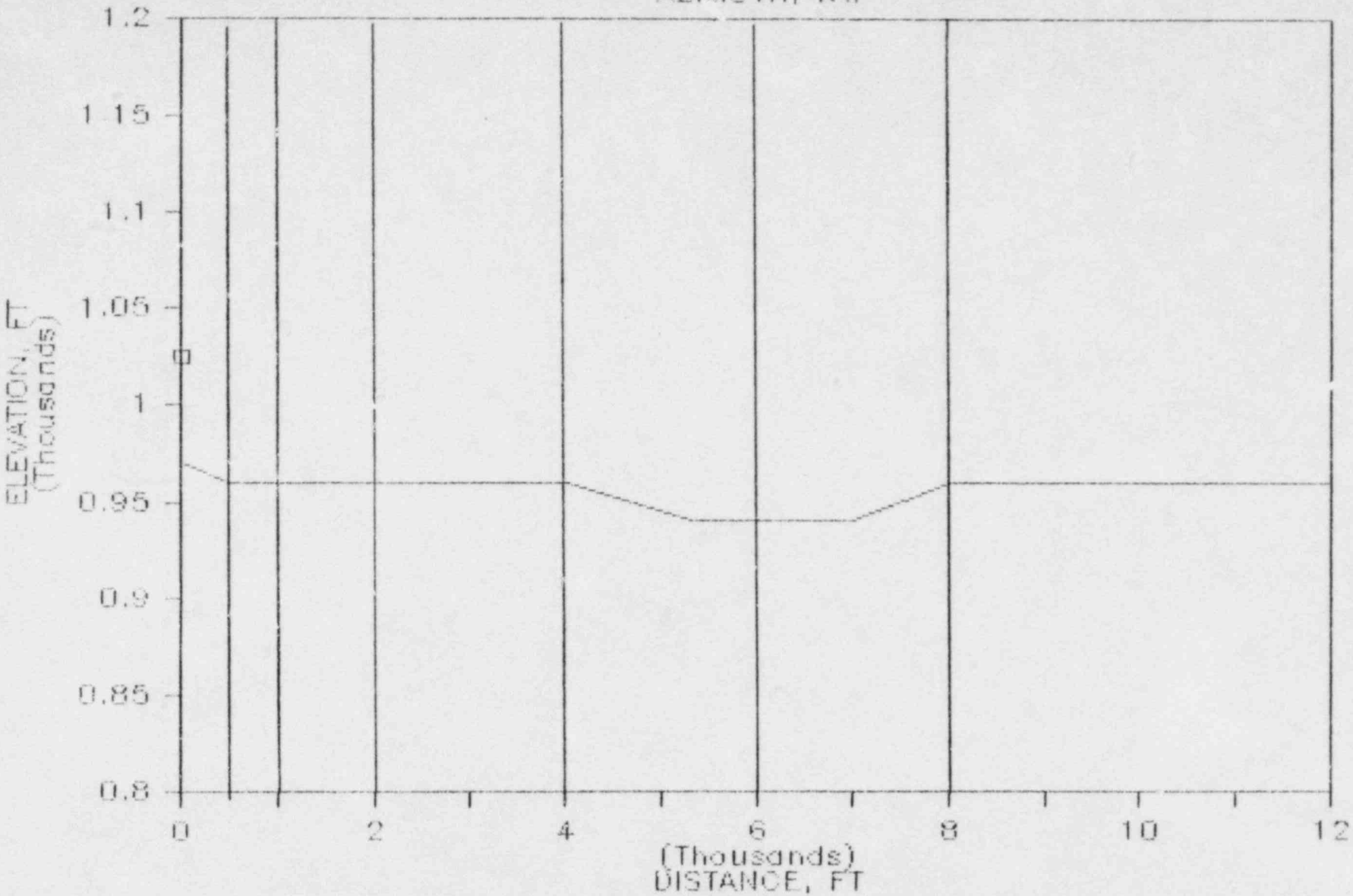


MONTICELLO 7

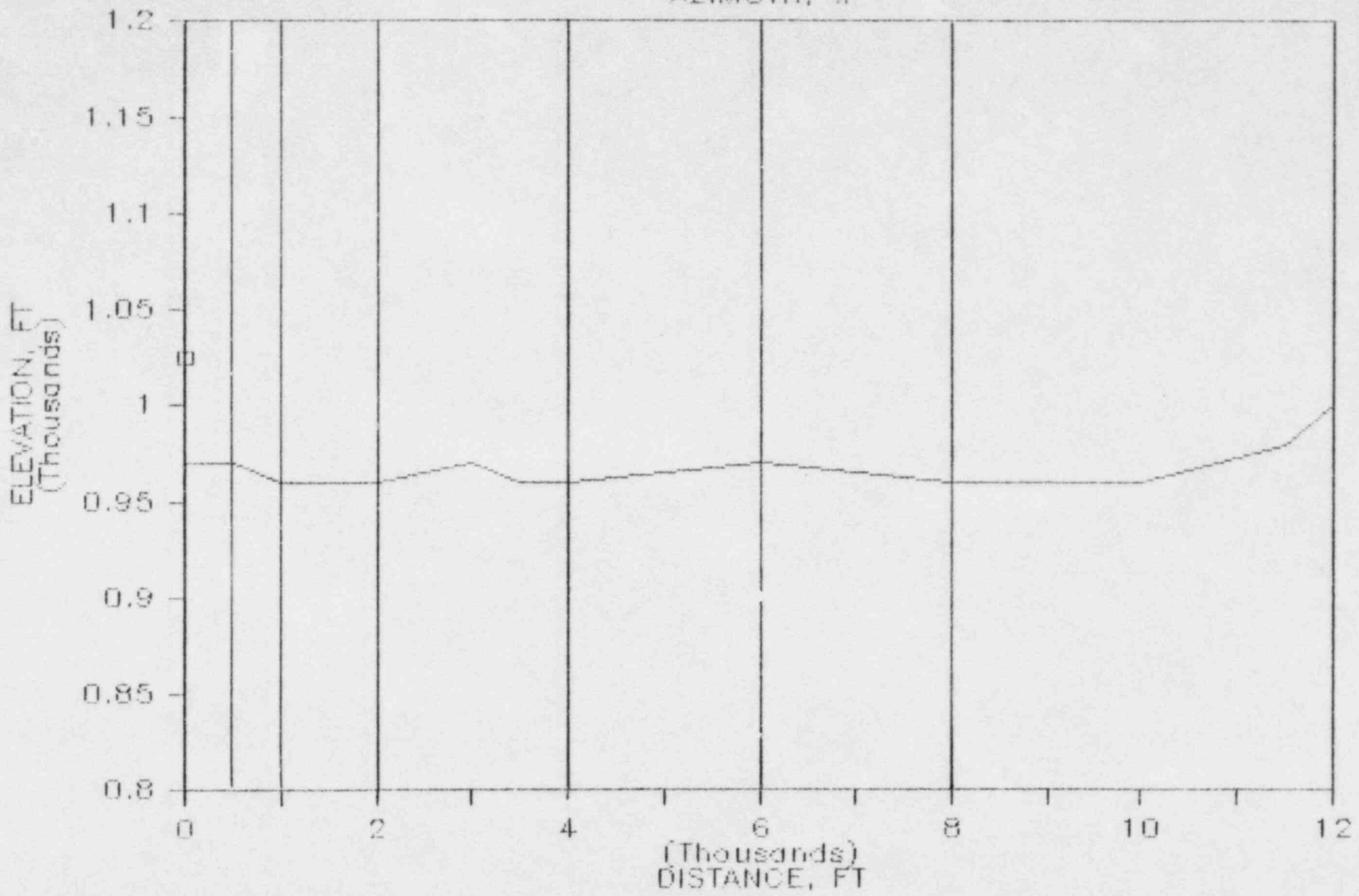


MONTICELLO 7

AZIMUTH, NW

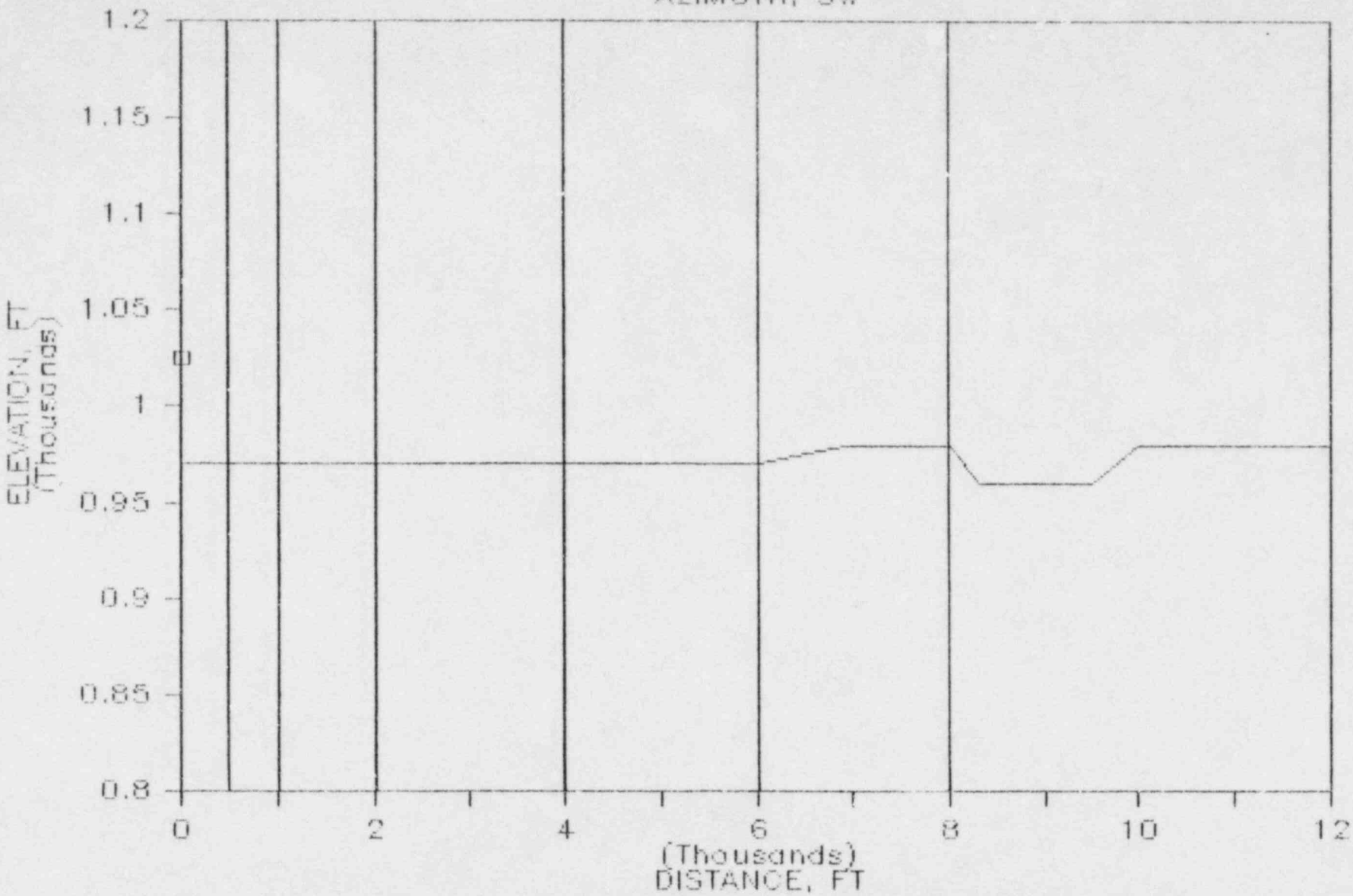


MONTICELLO 7



MONTICELLO 7

AZIMUTH, SW

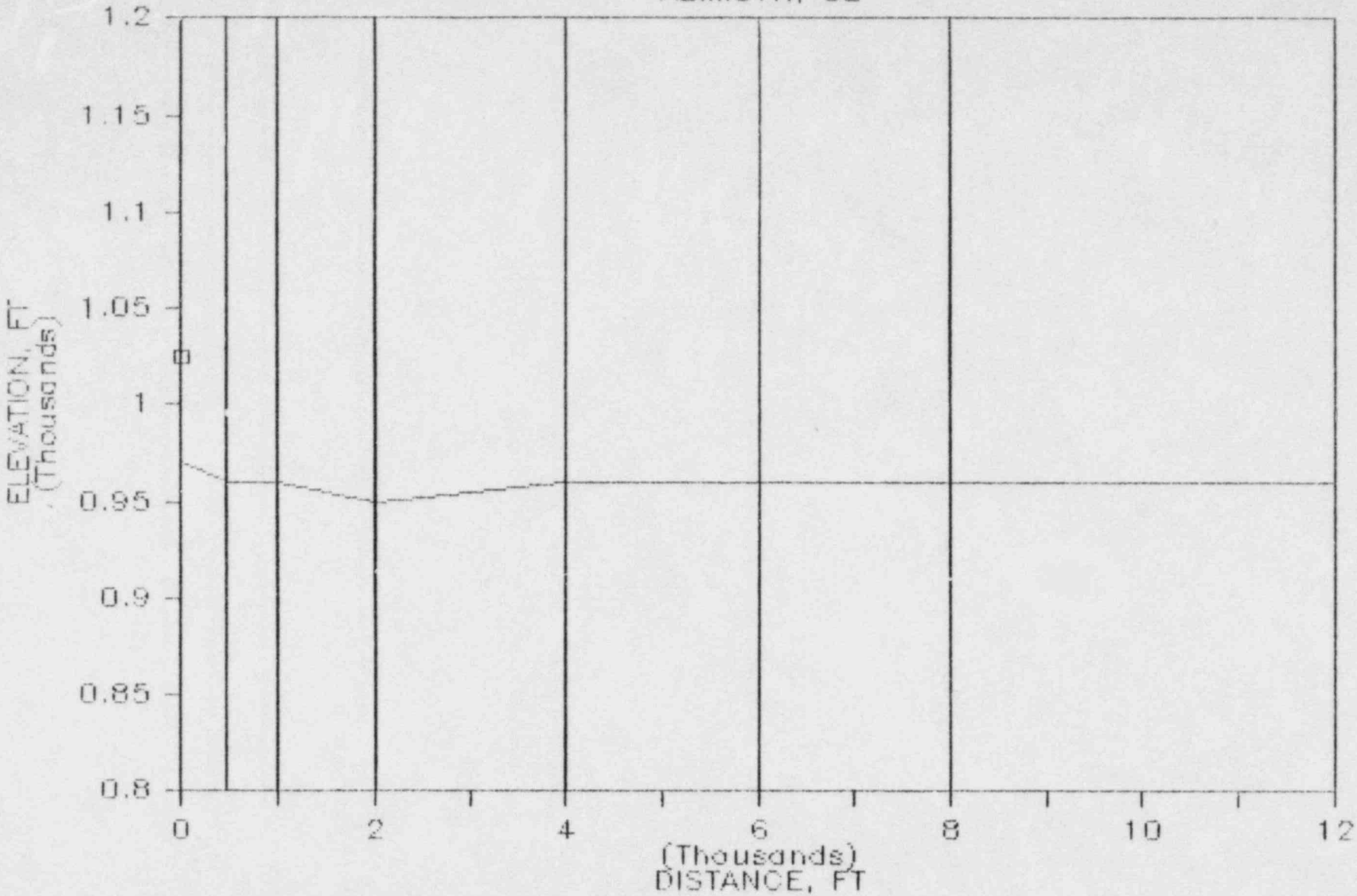


MONTICELLO 7

AZIMUTH, S

MONTICELLO 7

AZIMUTH, SE



NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #WH07-T1000
SOURCE-RECEIVER TOPOGRAPHICAL INPUTS

ALL BEARINGS ARE WITH RESPECT TO THE NORTH MEASURING CLOCKWISE

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
1	500.	90.00	970.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	960.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	960.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	940.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	940.00	SOFT	0.	NO	0.	0.
6	8000.	90.00	940.00	SOFT	0.	YES	7000.	960.
7	12000.	90.00	960.00	SOFT	0.	NO	0.	0.
8	500.	45.00	960.00	SOFT	0.	NO	0.	0.
9	1000.	45.00	960.00	SOFT	0.	NO	0.	0.
10	2000.	45.00	960.00	SOFT	0.	NO	0.	0.
11	4000.	45.00	940.00	SOFT	0.	NO	0.	0.
12	6000.	45.00	940.00	SOFT	0.	NO	0.	0.
13	8000.	45.00	920.00	SOFT	0.	NO	0.	0.
14	12000.	45.00	940.00	SOFT	0.	NO	0.	0.
15	500.	0.0	960.00	SOFT	0.	NO	0.	0.
16	1000.	0.0	960.00	SOFT	0.	NO	0.	0.
17	2000.	0.0	950.00	SOFT	0.	NO	0.	0.
18	4000.	0.0	940.00	SOFT	0.	NO	0.	0.
19	6000.	0.0	940.00	SOFT	0.	NO	0.	0.
20	8000.	0.0	940.00	SOFT	0.	NO	0.	0.
21	12000.	0.0	920.00	SOFT	0.	NO	0.	0.
22	500.	315.00	960.00	SOFT	0.	NO	0.	0.
23	1000.	315.00	960.00	SOFT	0.	NO	0.	0.
24	2000.	315.00	960.00	SOFT	0.	NO	0.	0.
25	4000.	315.00	960.00	SOFT	0.	NO	0.	0.
26	6000.	315.00	940.00	SOFT	0.	NO	0.	0.
27	8000.	315.00	960.00	SOFT	0.	NO	0.	0.
28	12000.	315.00	960.00	SOFT	0.	NO	0.	0.
29	500.	270.00	970.00	SOFT	0.	NO	0.	0.
30	1000.	270.00	960.00	SOFT	0.	NO	0.	0.
31	2000.	270.00	960.00	SOFT	0.	NO	0.	0.
32	4000.	270.00	960.00	SOFT	0.	NO	0.	0
33	6000.	270.00	970.00	SOFT	0.	NO	0.	0.
34	8000.	270.00	960.00	SOFT	0.	NO	0.	0.
35	12000.	270.00	1000.00	SOFT	0.	NO	0.	0.
36	500.	225.00	970.00	SOFT	0.	NO	0.	0.

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
37	1000.	225.00	970.00	SOFT	0.	NO	0.	0.
38	2000.	225.00	970.00	SOFT	0.	NO	0.	0.
39	4000.	225.00	970.00	SOFT	0.	NO	0.	0.
40	6000.	225.00	970.00	SOFT	0.	NO	0.	0.
41	8000.	225.00	980.00	SOFT	0.	NO	0.	0.
42	12000.	225.00	980.00	SOFT	0.	NO	0.	0.
43	500.	180.00	960.00	SOFT	0.	NO	0.	0.
44	1000.	180.00	960.00	SOFT	0.	NO	0.	0.
45	2000.	180.00	960.00	SOFT	0.	NO	0.	0.
46	4000.	180.00	960.00	SOFT	0.	NO	0.	0.
47	6000.	180.00	930.00	HARD	0.	NO	0.	0.
48	8000.	180.00	930.00	HARD	0.	NO	0.	0.
49	12000.	180.00	980.00	SOFT	0.	NO	0.	0.
50	500.	135.00	960.00	SOFT	0.	NO	0.	0.
51	1000.	135.00	960.00	SOFT	0.	NO	0.	0.
52	2000.	135.00	950.00	SOFT	0.	NO	0.	0.
53	4000.	135.00	960.00	SOFT	0.	NO	0.	0.
54	6000.	135.00	960.00	SOFT	0.	NO	0.	0.
55	8000.	135.00	960.00	SOFT	0.	NO	0.	0.
56	12000.	135.00	960.00	SOFT	0.	NO	0.	0.
57	25562.	343.30	950.00	SOFT	0.	YES	17000.	1050.
58	45988.	57.83	930.00	SOFT	0.	YES	17000.	1050.
59	22995.	198.63	1040.00	SOFT	0.	YES	17000.	1050.
60	44612.	119.24	950.00	SOFT	0.	YES	17000.	1050.

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #WH07-T1000
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	SIREN WH-07	165.9	167.9	0.0	0.0	0.0	0.0	167.0	156.0	157.0	150.0	148.0

XO= 0.0 YO= 0.0 ZO= 965.00 HEIGHT ABOVE GROUND= 55.00

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #WH07-T1000
METEOROLOGICAL INPUT CONDITIONS

H1= 10.06 METERS H2= 43.28 METERS

YEAR	SEASON	MONTH	DATE	HOUR	WIND DIRECTION	WIND SPEED(MPS) H1	WIND SPEED(MPS) H2	TEMPERATURE(C) H1	TEMPERATURE(C) H2	RELATIVE HUMIDITY	BAROMETRIC PRESSURE(MM OF HG)
1984	S	7	22	12	188.0	3.1	3.8	28.1	27.2	68.0	760.0

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #WH07-T1000

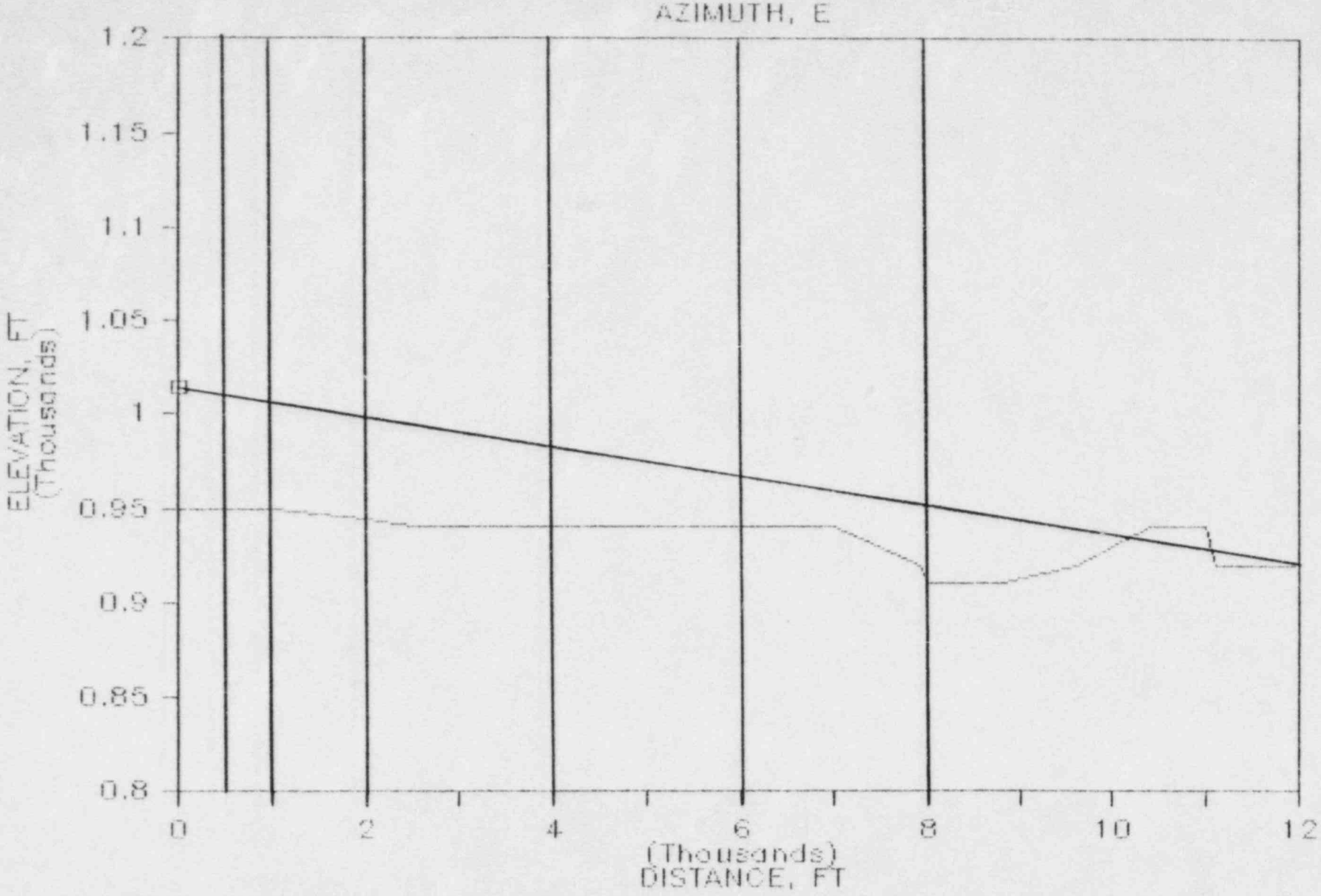
SIREN SOUND LEVELS IN DBC

UNDER MET CONDITION 1

DISTANCE IN FEET

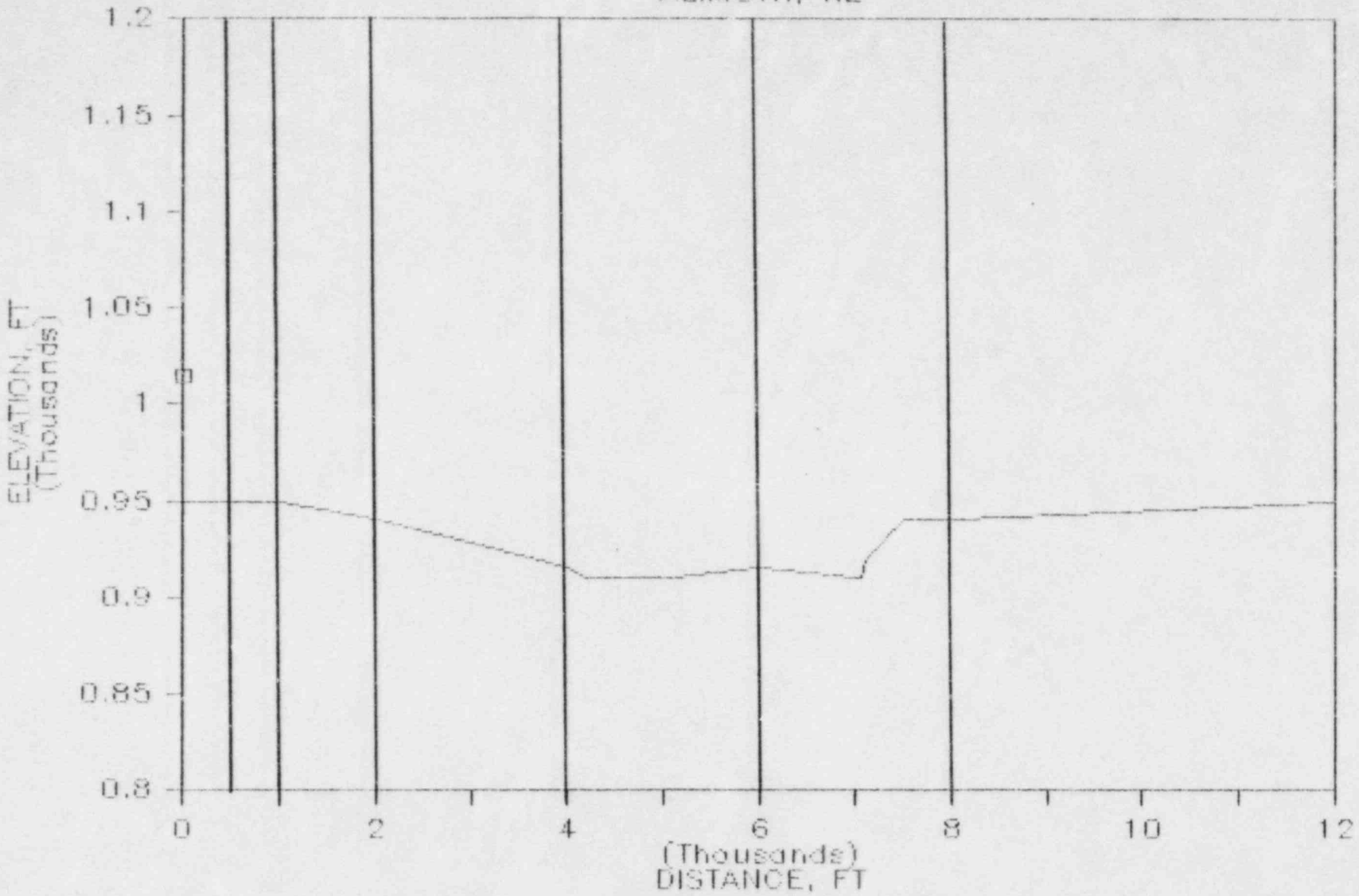
AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	115.	106.	97.	90.	86.	76.	75.
NE	115.	106.	97.	90.	86.	82.	75.
N	115.	106.	97.	90.	86.	82.	75.
NW	115.	106.	97.	90.	86.	82.	75.
W	115.	106.	97.	90.	85.	79.	68.
SW	115.	106.	97.	90.	86.	82.	75.
S	115.	106.	97.	90.	88.	84.	73.
SE	115.	106.	97.	90.	86.	82.	75.

MONTICELLO 8



MONTICELLO 8

AZIMUTH, NE



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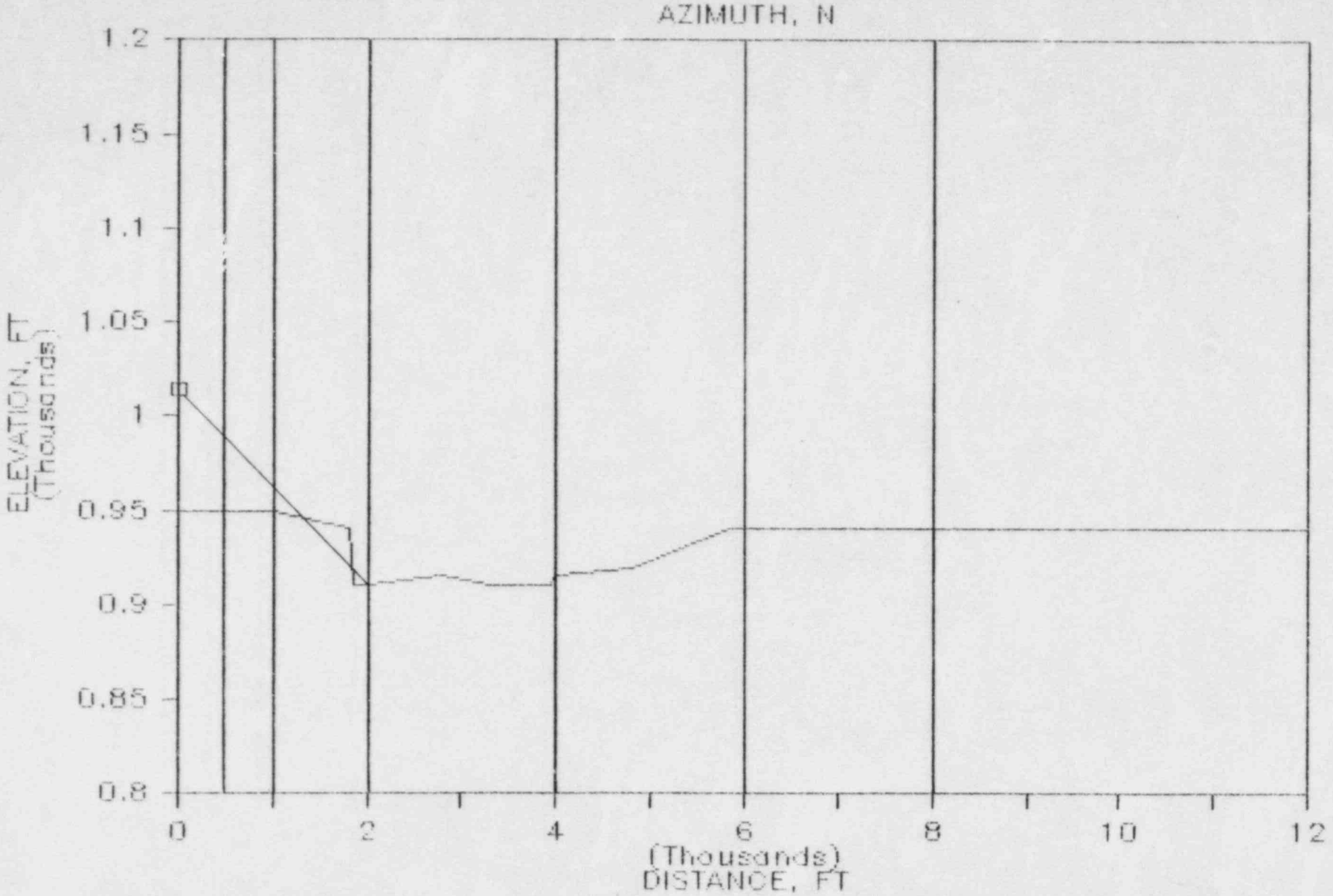
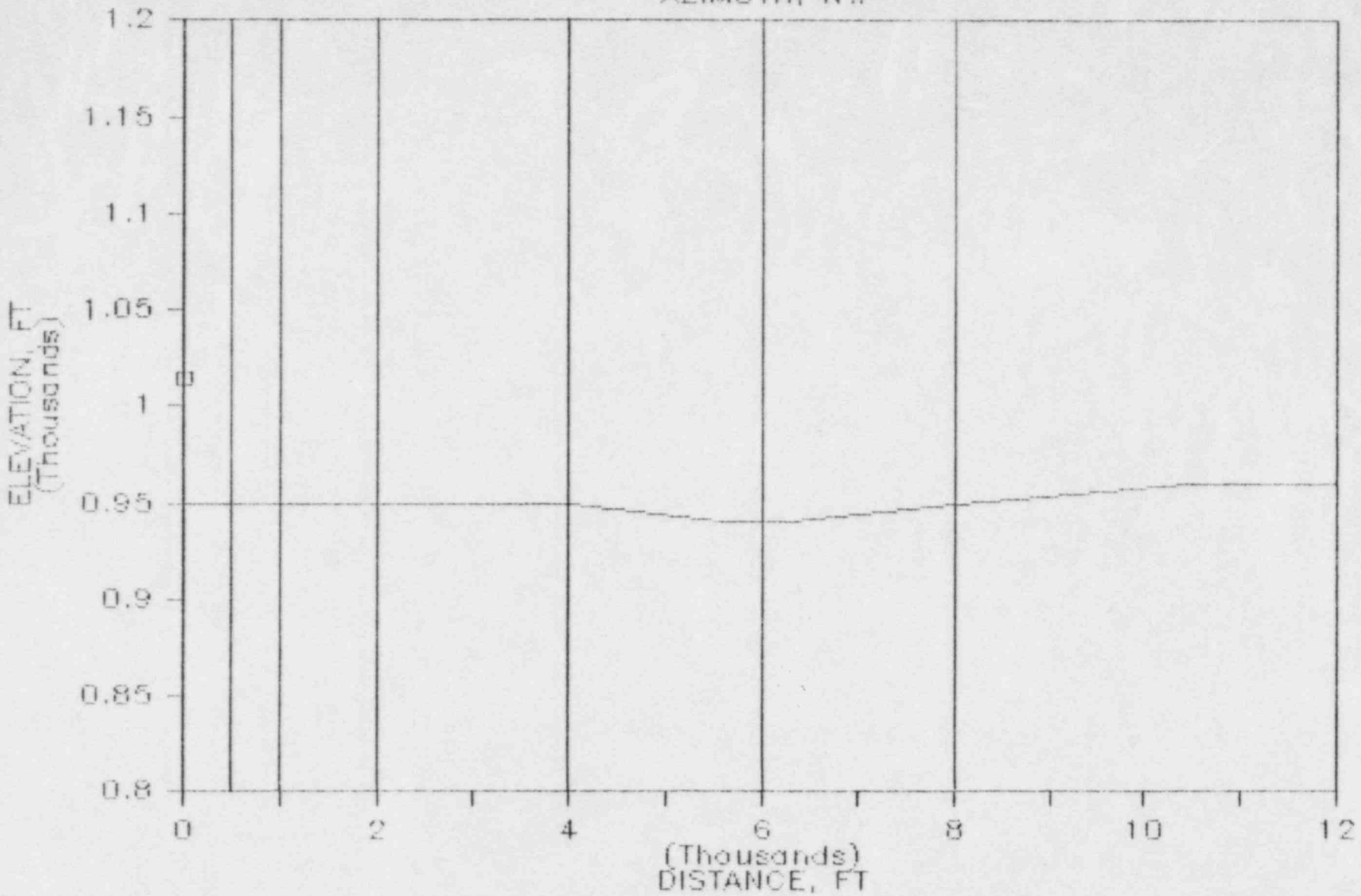
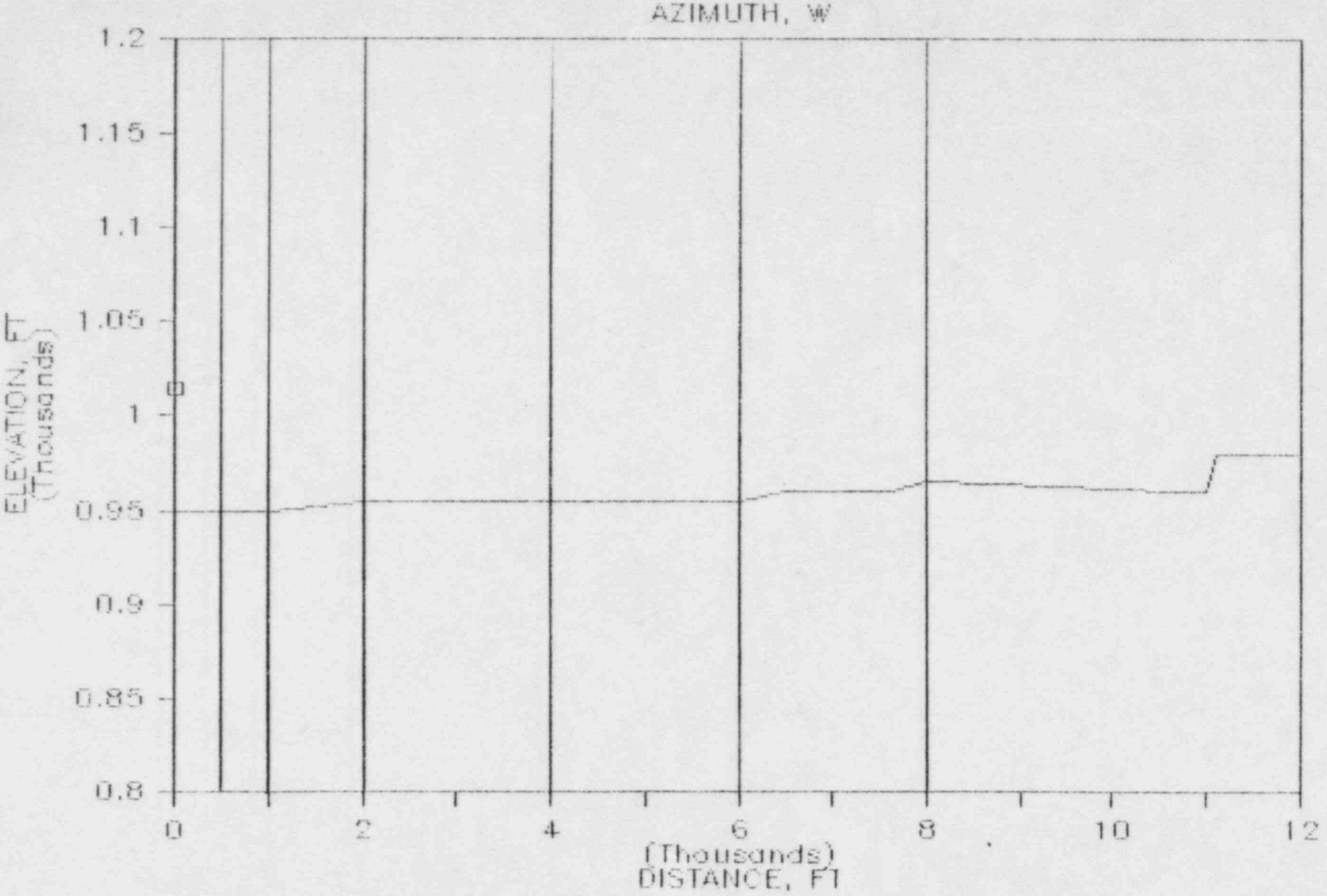


MONTICELLO 8

AZIMUTH, NW

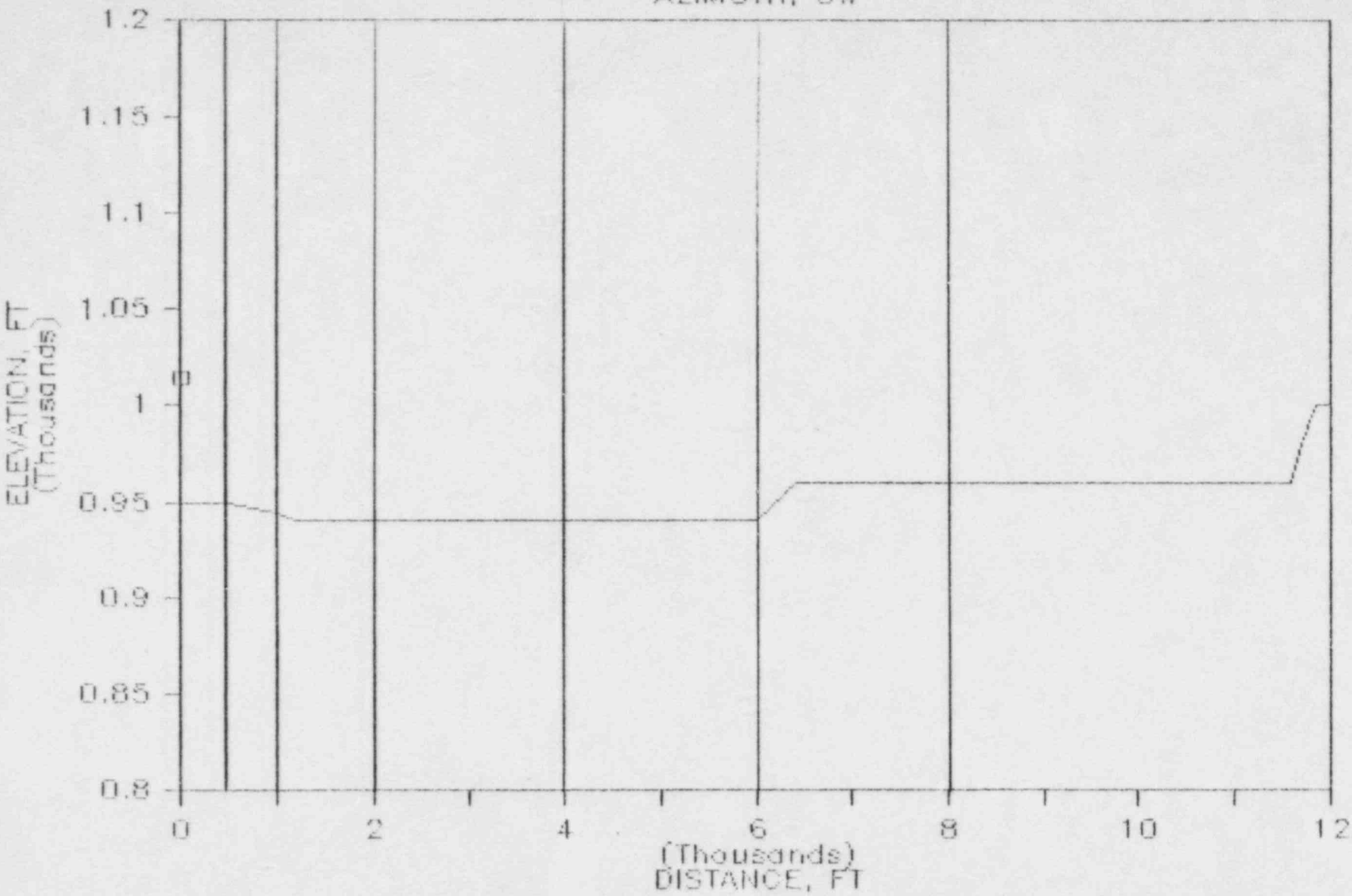


MONTICELLO 8



MONTICELLO 8

AZIMUTH, SW



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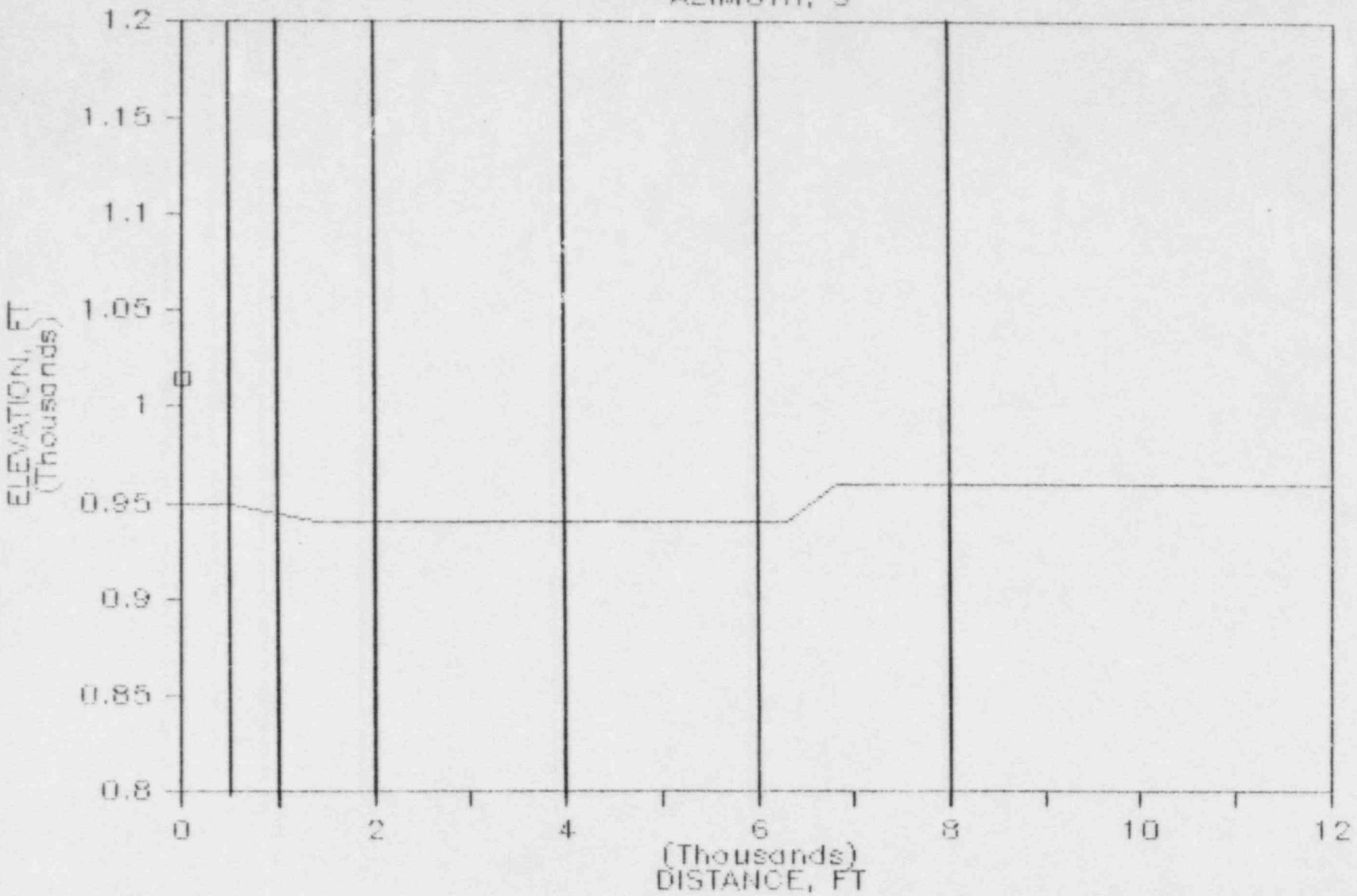


MONTICELLO 8

AZIMUTH, SE

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #WH08-T1000
SOURCE-RECEIVER TOPOGRAPHICAL INPUTS

ALL BEARINGS ARE WITH RESPECT TO THE NORTH GOING CLOCKWISE

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
1	500.	90.00	950.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	950.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	945.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	940.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	940.00	SOFT	0.	NO	0.	0.
6	8000.	90.00	910.00	SOFT	0.	NO	0.	0.
7	12000.	90.0	920.00	SOFT	0.	YES	11000.	940.
8	500.	45	950.00	SOFT	0.	NO	0.	0.
9	1000.	4	950.00	SOFT	0.	NO	0.	0.
10	2000.	45.00	940.00	SOFT	0.	NO	0.	0.
11	4000.	45.00	915.00	SOFT	0.	NO	0.	0.
12	6000.	45.00	915.00	SOFT	0.	NO	0.	0.
13	8000.	45.00	940.00	SOFT	0.	NO	0.	0.
14	12000.	45.00	950.00	SOFT	0.	NO	0.	0.
15	500.	0.0	950.00	SOFT	0.	NO	0.	0.
16	1000.	0.0	950.00	SOFT	0.	NO	0.	0.
17	2000.	0.0	910.00	SOFT	0.	YES	1800.	940.
18	4000.	0.0	915.00	SOFT	0.	NO	0.	0.
19	6000.	0.0	940.00	SOFT	0.	NO	0.	0.
20	8000.	0.0	940.00	SOFT	0.	NO	0.	0.
21	12000.	0.0	940.00	SOFT	0.	NO	0.	0.
22	500.	315.00	950.00	SOFT	0.	NO	0.	0.
23	1000.	315.00	950.00	SOFT	0.	NO	0.	0.
24	2000.	315.00	950.00	SOFT	0.	NO	0.	0.
25	4000.	315.00	950.00	SOFT	0.	NO	0.	0.
26	6000.	315.00	940.00	SOFT	0.	NO	0.	0.
27	8000.	315.00	950.00	SOFT	0.	NO	0.	0.
28	12000.	315.00	960.00	SOFT	0.	NO	0.	0.
29	500.	270.00	950.00	SOFT	0.	NO	0.	0.
30	1000.	270.00	950.00	SOFT	0.	NO	0.	0.
31	2000.	270.00	955.00	SOFT	0.	NO	0.	0.
32	4000.	270.00	955.00	SOFT	0.	NO	0.	0.
33	6000.	270.00	955.00	SOFT	0.	NO	0.	0.
34	8000.	270.00	965.00	SOFT	0.	NO	0.	0.
35	12000.	270.00	980.00	SOFT	0.	NO	0.	0.
36	500.	225.00	950.00	SOFT	0.	NO	0.	0.

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
37	1000.	225.00	945.00	SOFT	0.	NO	0.	0.
38	2000.	225.00	940.00	SOFT	0.	NO	0.	0.
39	4000.	225.00	940.00	SOFT	0.	NO	0.	0.
40	6000.	225.00	940.00	SOFT	0.	NO	0.	0.
41	8000.	225.00	960.00	SOFT	0.	NO	0.	0.
42	12000.	225.00	1000.00	SOFT	0.	NO	0.	0.
43	500.	180.00	950.00	SOFT	0.	NO	0.	0.
44	1000.	180.00	945.00	SOFT	0.	NO	0.	0.
45	2000.	180.00	940.00	SOFT	0.	NO	0.	0.
46	4000.	180.00	940.00	SOFT	0.	NO	0.	0.
47	6000.	180.00	940.00	SOFT	0.	NO	0.	0.
48	8000.	180.00	960.00	SOFT	0.	NO	0.	0.
49	12000.	180.00	960.00	SOFT	0.	NO	0.	0.
50	500.	135.00	950.00	SOFT	0.	NO	0.	0.
51	1000.	135.00	945.00	SOFT	0.	NO	0.	0.
52	2000.	135.00	945.00	SOFT	0.	NO	0.	0.
53	4000.	135.00	945.00	SOFT	0.	NO	0.	0.
54	6000.	135.00	945.00	SOFT	0.	NO	0.	0.
55	8000.	135.00	940.00	SOFT	0.	NO	0.	0.
56	12000.	135.00	940.00	SOFT	0.	NO	0.	0.
57	19408.	346.15	950.00	SOFT	0.	YES	17000.	1050.
58	45522.	66.88	930.00	SOFT	0.	YES	17000.	1050.
59	28741.	188.82	1040.00	SOFT	0.	YES	17000.	1050.
60	50591.	124.15	950.00	SOFT	0.	YES	17000.	1050.

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #WH08-T1000
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	SIREN WH-08	165.9	167.9	0.0	0.0	0.0	0.0	167.0	158.0	157.0	150.0	148.0

XO= 0.0 YO= 0.0 ZO= 950.00 HEIGHT ABOVE GROUND= 55.00

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #WH08-T1000
METEOROLOGICAL INPUT CONDITIONS

H1= 10.06 METERS H2= 43.28 METERS

YEAR	SEASON	MONTH	DATE	HOUR	WIND DIRECTION	WIND SPEED(MPS) H1	WIND SPEED(MPS) H2	TEMPERATURE(C) H1	TEMPERATURE(C) H2	RELATIVE HUMIDITY	BAROMETRIC PRESSURE(MM OF HG)
1984	5	7	22	12	188.0	3.1	3.8	28.1	27.2	68.0	760.0

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #WH08-T1000

SIREN SOUND LEVELS IN DBC

UNDER MET CONDITION 1

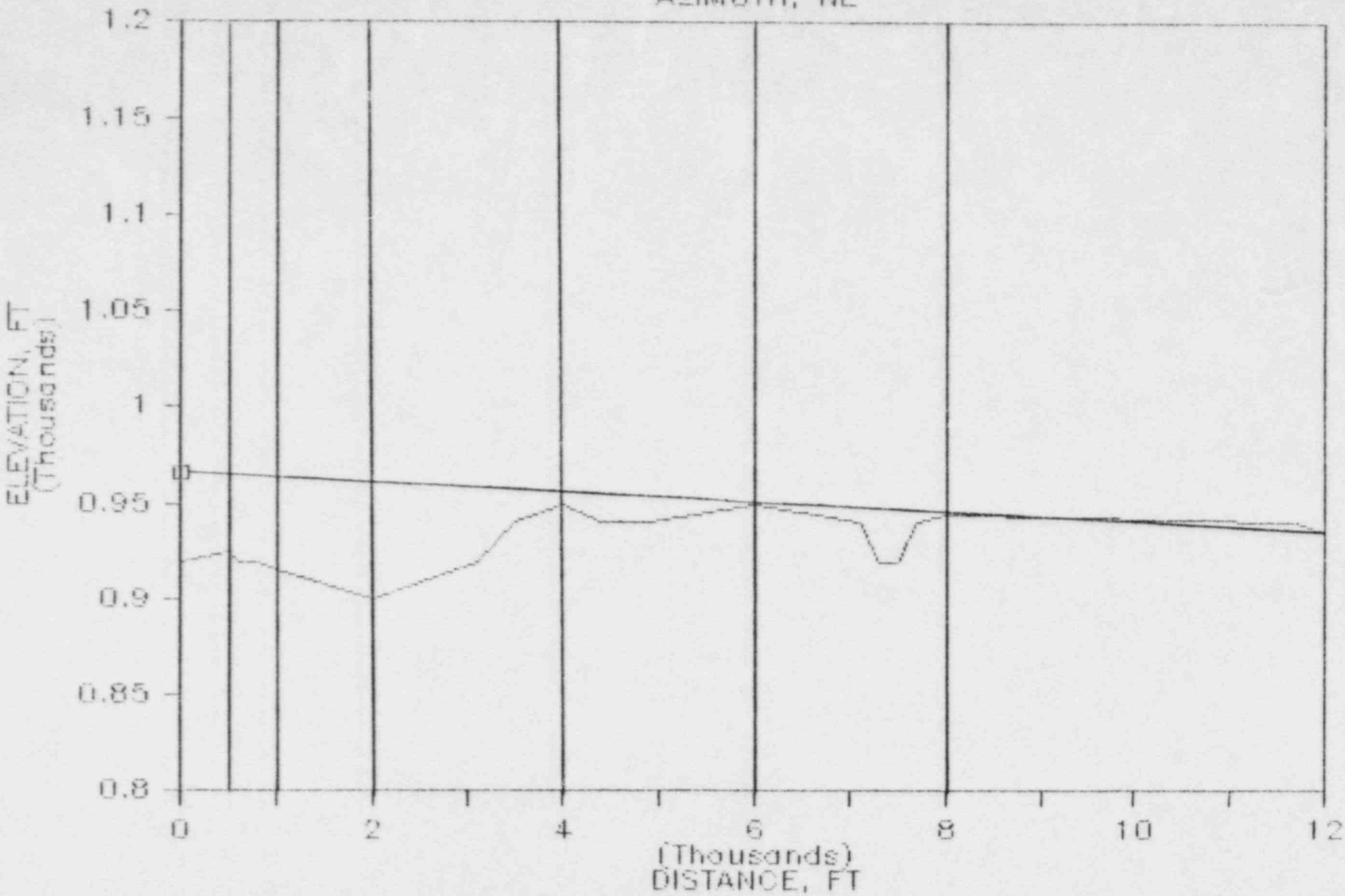
DISTANCE IN FEET

AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	115.	106.	97.	90.	86.	82.	69.
NE	115.	106.	97.	90.	86.	82.	75.
N	115.	106.	84.	90.	86.	82.	75.
NW	115.	106.	97.	90.	86.	82.	75.
W	115.	106.	97.	90.	85.	79.	60.
SW	115.	106.	97.	90.	86.	82.	75.
S	115.	106.	97.	90.	86.	82.	73.
SE	115.	106.	97.	90.	86.	82.	75.

MONTICELLO 14

MONTICELLO 14

AZIMUTH, NE



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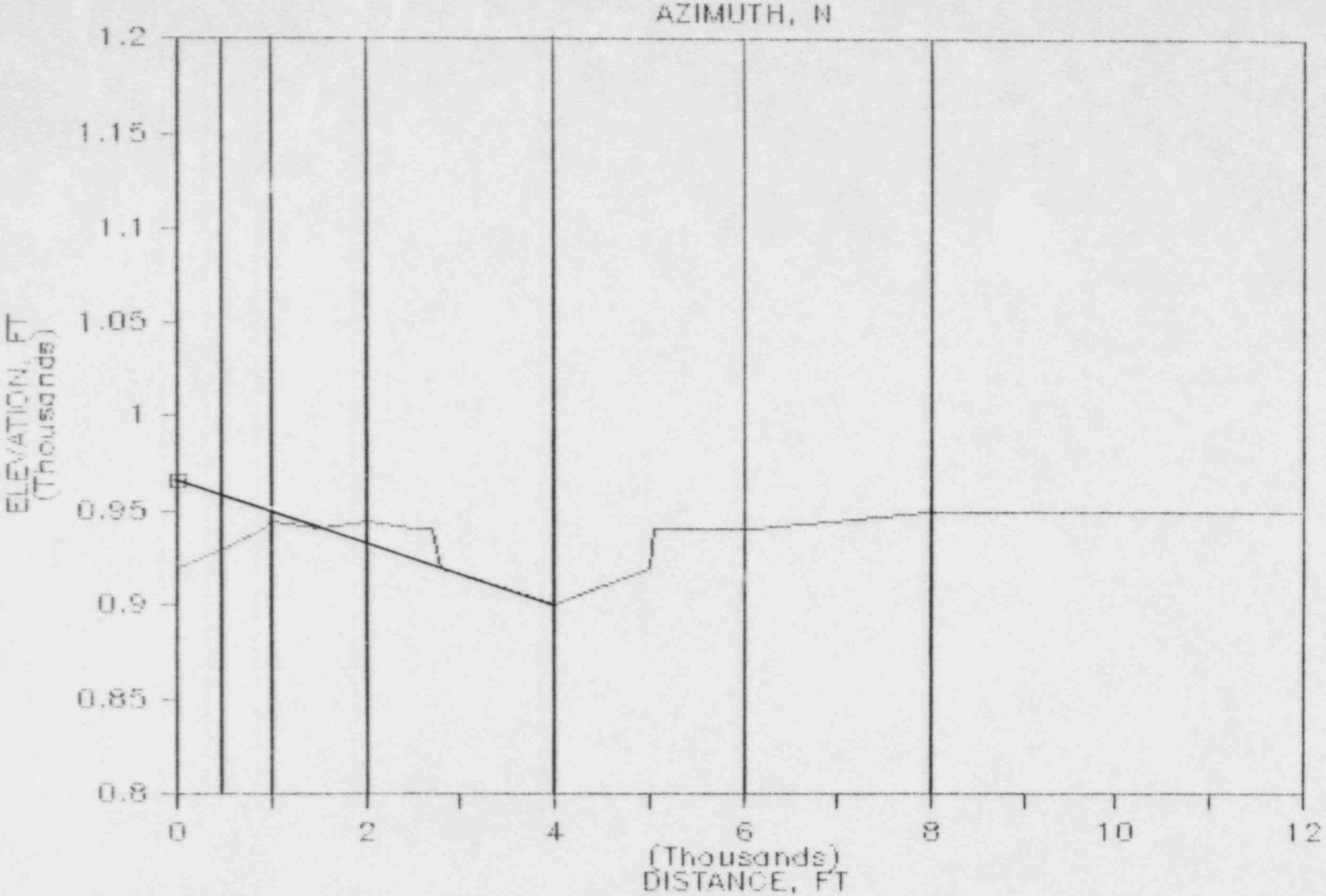

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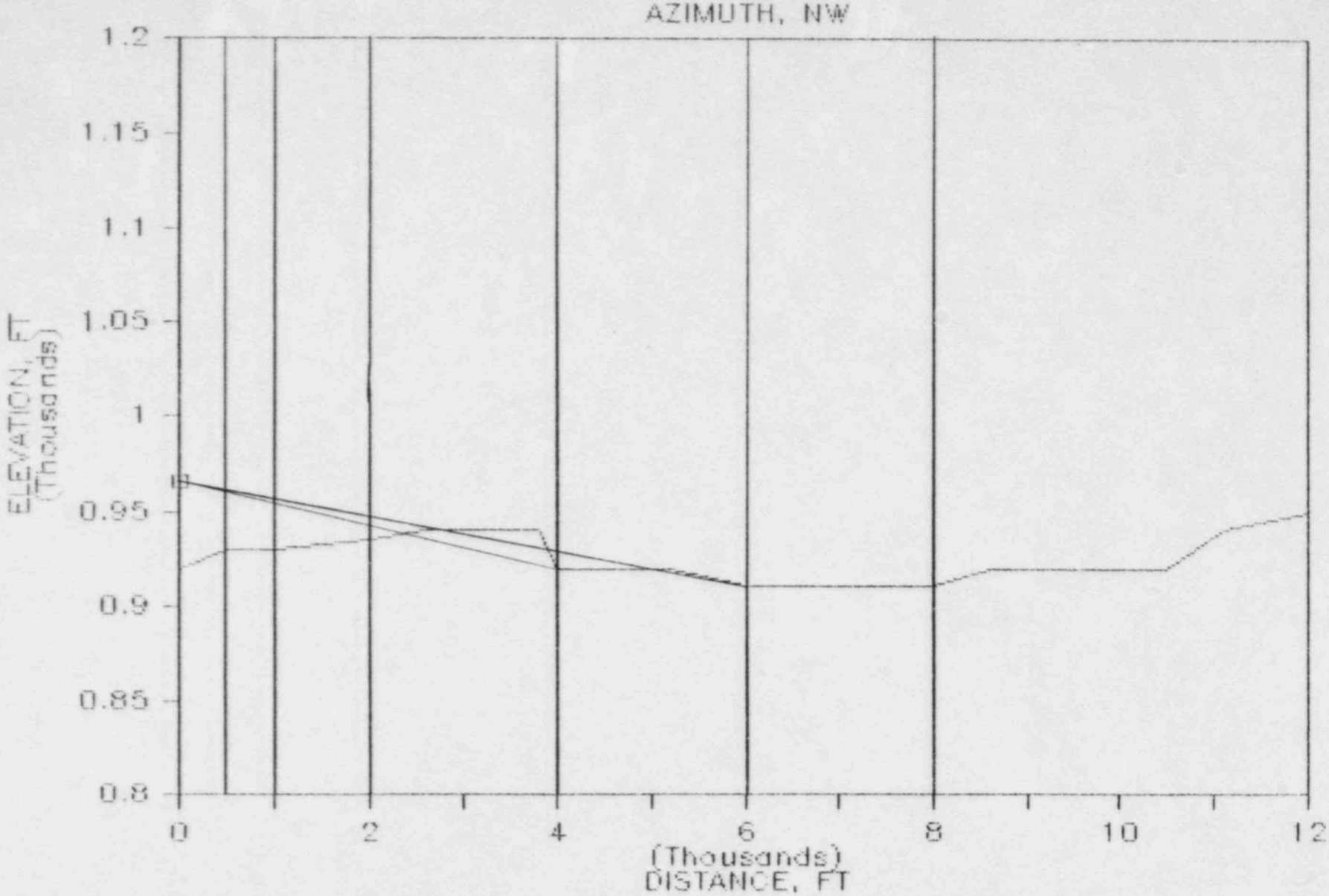
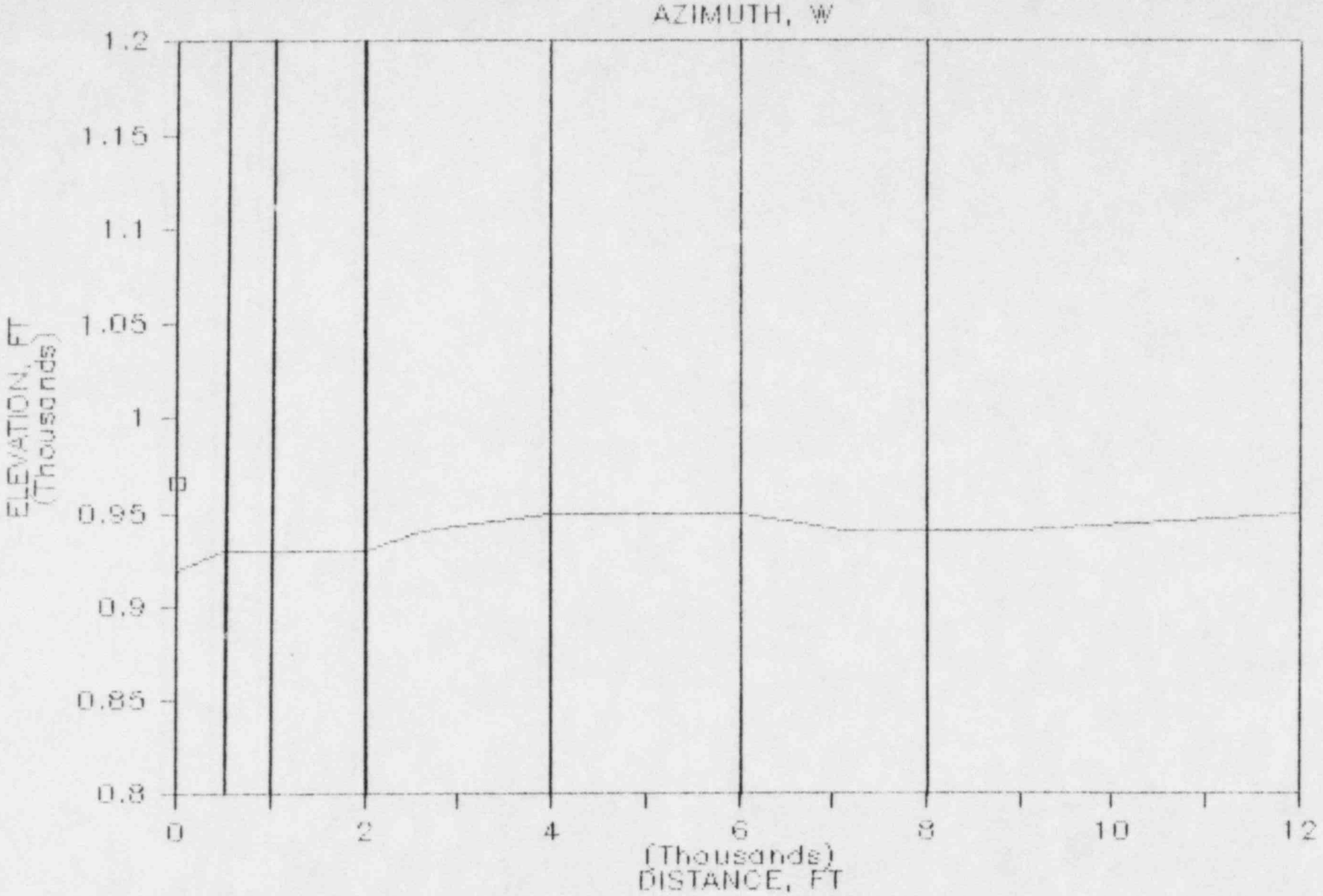
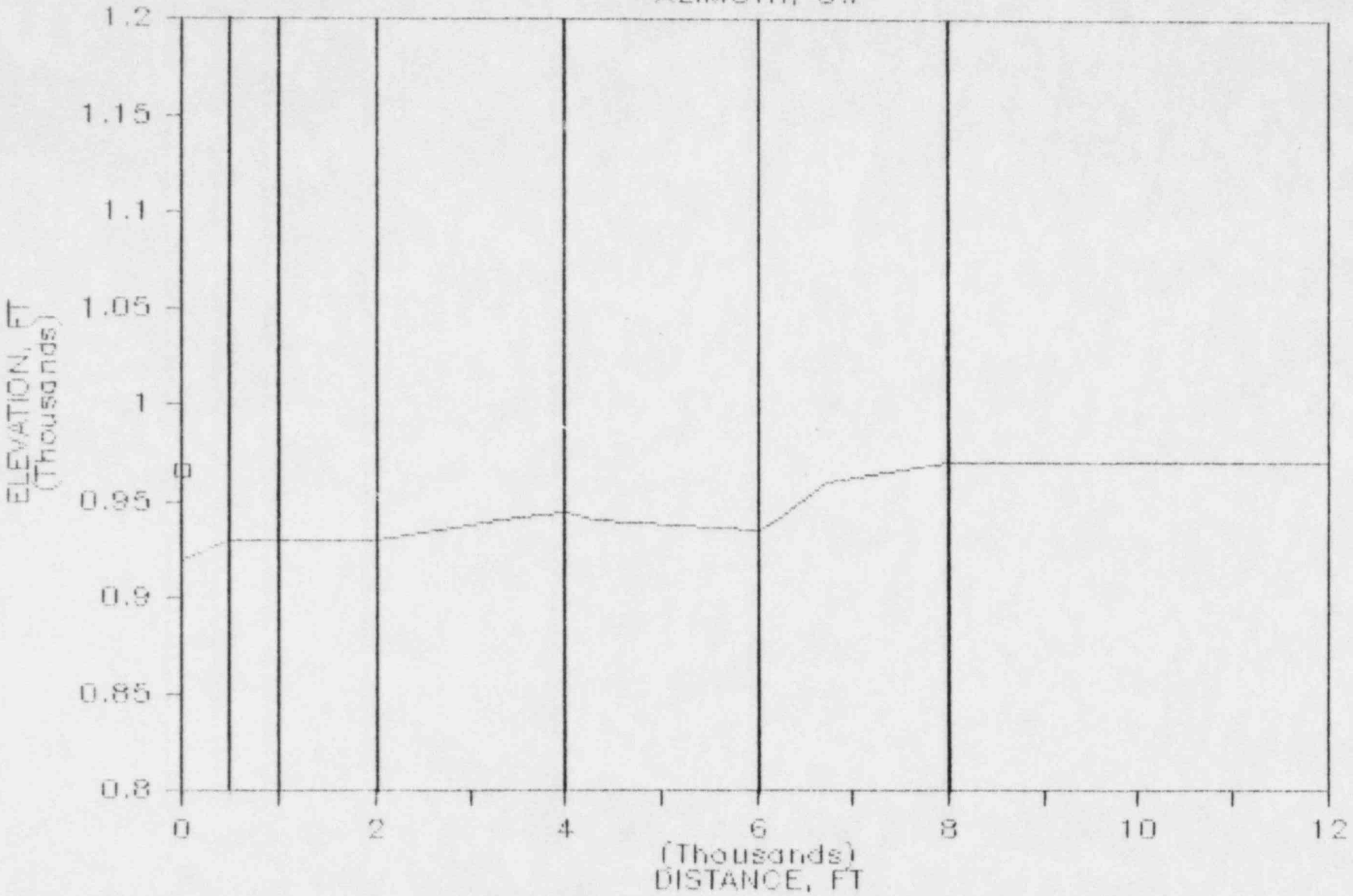


MONTICELLO 14



MONTICELLO 14

AZIMUTH, SW



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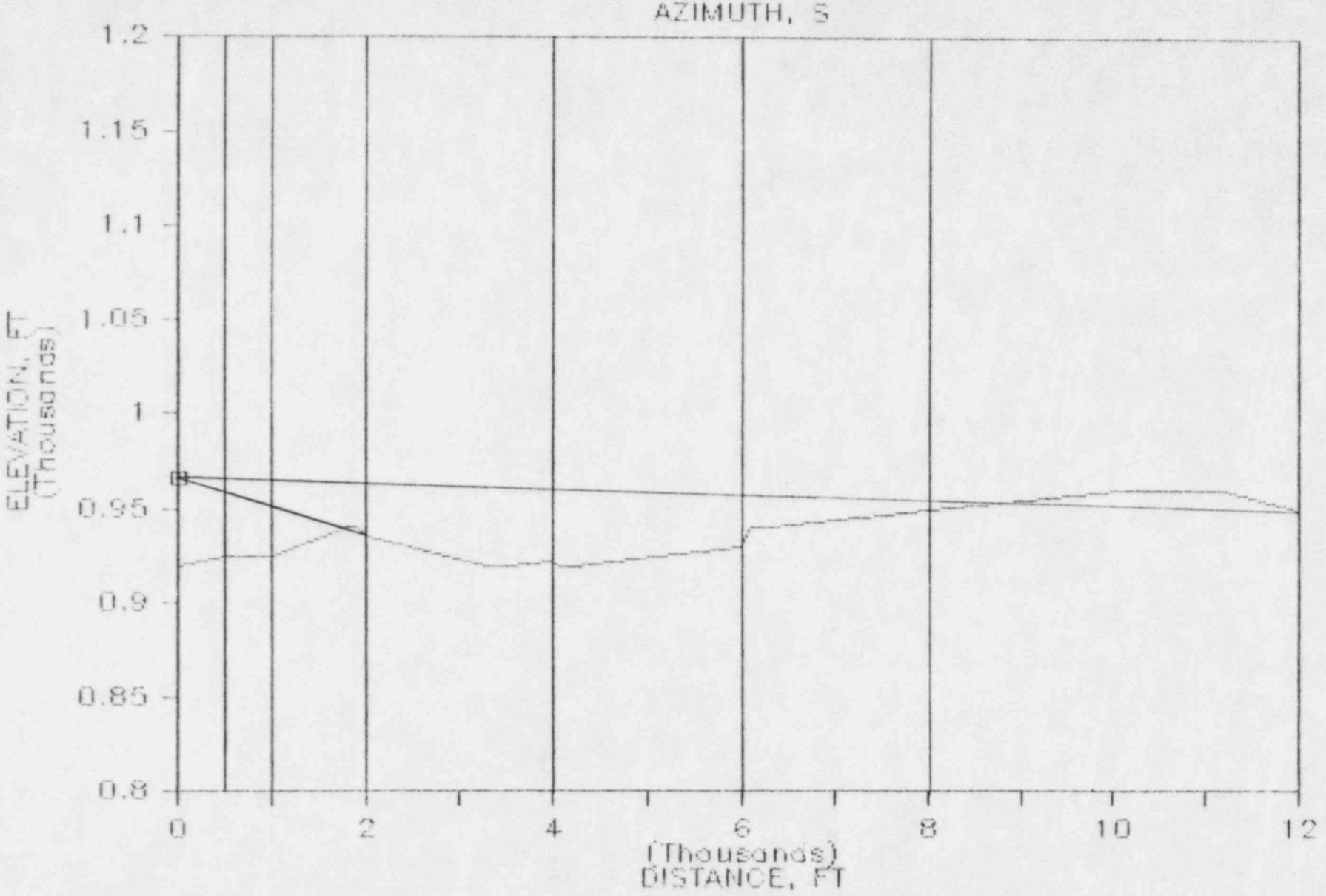
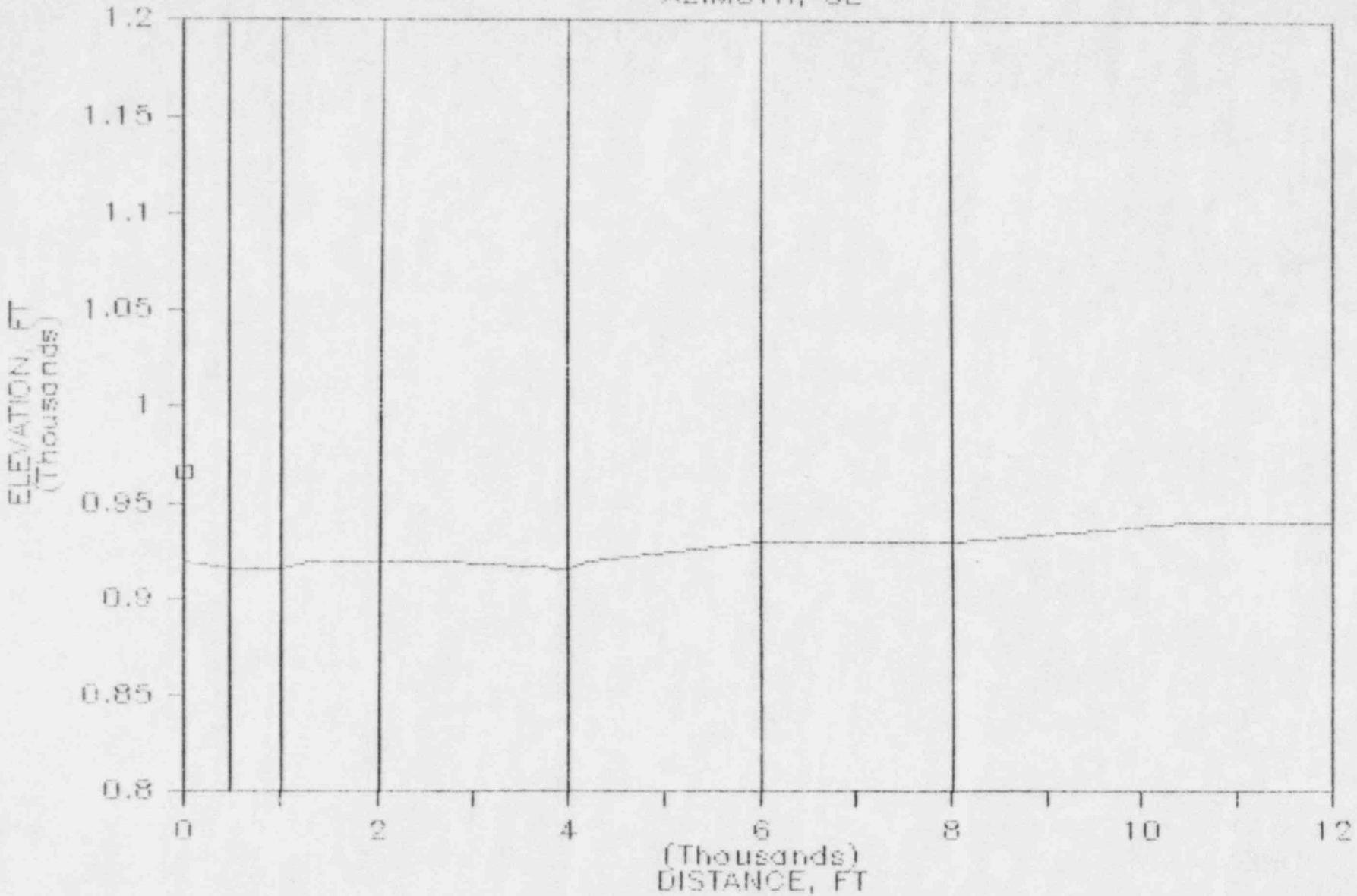


MONTICELLO 14

AZIMUTH, SE



NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP14-T1000
SOURCE-RECEIVER TOPOGRAPHICAL INPUTS

ALL BEARINGS ARE WITH RESPECT TO THE NORTH MEASURING CLOCKWISE

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
1	500.	90.00	910.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	910.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	910.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	910.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	940.00	SOFT	0.	NO	0.	0.
6	8000.	90.00	935.00	SOFT	0.	NO	0.	0.
7	12000.	90.00	930.00	SOFT	0.	YES	8000.	935.
8	500.	45.00	925.00	SOFT	0.	NO	0.	0.
9	1000.	45.00	915.00	SOFT	0.	NO	0.	0.
10	2000.	45.00	900.00	SOFT	0.	NO	0.	0.
11	4000.	45.00	950.00	SOFT	0.	NO	0.	0.
12	6000.	45.00	950.00	SOFT	0.	NO	0.	0.
13	8000.	45.00	945.00	SOFT	0.	NO	0.	0.
14	12000.	45.00	935.00	SOFT	0.	YES	11750.	940.
15	500.	0.0	930.00	SOFT	0.	NO	0.	0.
16	1000.	0.0	945.00	SOFT	0.	NO	0.	0.
17	2000.	0.0	945.00	SOFT	0.	NO	0.	0.
18	4000.	0.0	900.00	SOFT	0.	YES	2700.	945.
19	6000.	0.0	940.00	SOFT	0.	NO	0.	0.
20	8000.	0.0	950.00	SOFT	0.	NO	0.	0.
21	12000.	0.0	950.00	SOFT	0.	NO	0.	0.
22	500.	315.00	930.00	SOFT	0.	NO	0.	0.
23	1000.	315.00	990.00	SOFT	0.	NO	0.	0.
24	2000.	315.00	935.00	SOFT	0.	NO	0.	0.
25	4000.	315.00	920.00	SOFT	0.	YES	3800.	940.
26	6000.	315.00	910.00	SOFT	0.	YES	3800.	940.
27	8000.	315.00	910.00	SOFT	0.	NO	0.	0.
28	12000.	315.00	950.00	SOFT	0.	NO	0.	0.
29	500.	270.00	930.00	SOFT	0.	NO	0.	0.
30	1000.	270.00	930.00	SOFT	0.	NO	0.	0.
31	2000.	270.00	930.00	SOFT	0.	NO	0.	0.
32	4000.	270.00	950.00	SOFT	0.	NO	0.	0.
33	6000.	270.00	950.00	SOFT	0.	NO	0.	0.
34	8000.	270.00	940.00	SOFT	0.	NO	0.	0.
35	12000.	270.00	950.00	SOFT	0.	NO	0.	0.
36	500.	225.00	930.00	SOFT	0.	NO	0.	0.

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
37	1000.	225.00	930.00	SOFT	0.	NO	0.	0.
38	2000.	225.00	930.00	SOFT	0.	NO	0.	0.
39	4000.	225.00	945.00	SOFT	0.	NO	0.	0.
40	6000.	225.00	935.00	SOFT	0.	NO	0.	0.
41	8000.	225.00	970.00	SOFT	0.	NO	0.	0.
42	12000.	225.00	970.00	SOFT	0.	NO	0.	0.
43	500.	180.00	925.00	SOFT	0.	NO	0.	0.
44	1000.	180.00	925.00	SOFT	0.	NO	0.	0.
45	2000.	180.00	935.00	SOFT	0.	YES	1900.	940.
46	4000.	180.00	922.00	SOFT	0.	NO	0.	0.
47	6000.	180.00	930.00	SOFT	0.	NO	0.	0.
48	8000.	180.00	950.00	SOFT	0.	NO	0.	0.
49	12000.	180.00	950.00	SOFT	0.	YES	11300.	960.
50	500.	135.00	915.00	SOFT	0.	NO	0.	0.
51	1000.	135.00	915.00	SOFT	0.	NO	0.	0.
52	2000.	135.00	920.00	SOFT	0.	NO	0.	0.
53	4000.	135.00	915.00	SOFT	0.	NO	0.	0.
54	6000.	135.00	930.00	SOFT	0.	NO	0.	0.
55	8000.	135.00	930.00	SOFT	0.	NO	0.	0.
56	12000.	135.00	940.00	SOFT	0.	NO	0.	0.
57	23204.	328.73	950.00	SOFT	0.	YES	3800.	940.
58	39558.	59.91	930.00	SOFT	0.	YES	11750.	940.
59	29057.	204.49	1040.00	SOFT	0.	YES	11300.	960.
60	43252.	127.69	950.00	SOFT	0.	YES	11300.	960.

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP14-T1000
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	SIREN NSP14	165.9	167.9	0.0	0.0	0.0	0.0	167.0	158.0	157.0	150.0	148.0

XO= 0.0 YO= 0.0 ZO= 920.00 HEIGHT ABOVE GROUND= 46.00

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP14-T1000
METEOROLOGICAL INPUT CONDITIONS

H1= 10.06 METERS H2= 43.28 METERS

YEAR	SEASON	MONTH	DATE	HOUR	WIND DIRECTION	WIND SPEED(MPS) H1	WIND SPEED(MPS) H2	TEMPERATURE(C) H1	TEMPERATURE(C) H2	RELATIVE HUMIDITY	BAROMETRIC PRESSURE(MM OF HG)
1984	5	7	22	12	186.0	3.1	3.8	28.1	27.2	68.0	760.0

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP14-T1000

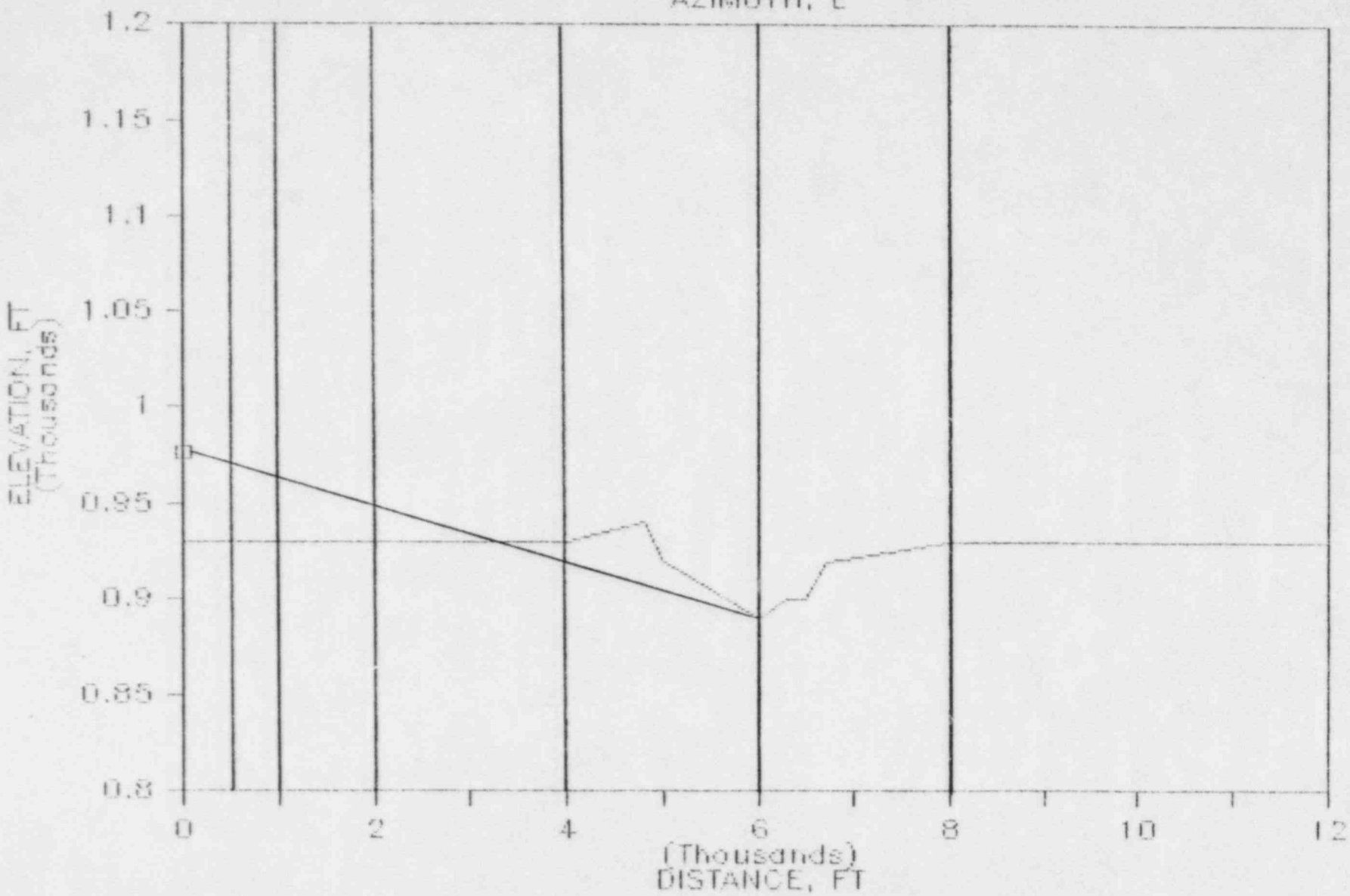
SIREN SOUND LEVELS IN DBC

UNDER MET CONDITION 1

DISTANCE IN FEET

AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	114.	105.	95.	88.	84.	80.	69.
NE	114.	105.	95.	88.	84.	80.	68.
N	114.	104.	95.	78.	84.	80.	74.
NW	114.	106.	95.	77.	77.	80.	74.
W	114.	105.	95.	88.	82.	76.	64.
SW	114.	105.	95.	88.	84.	80.	74.
S	114.	105.	89.	88.	84.	80.	68.
SE	114.	105.	95.	88.	84.	80.	72.

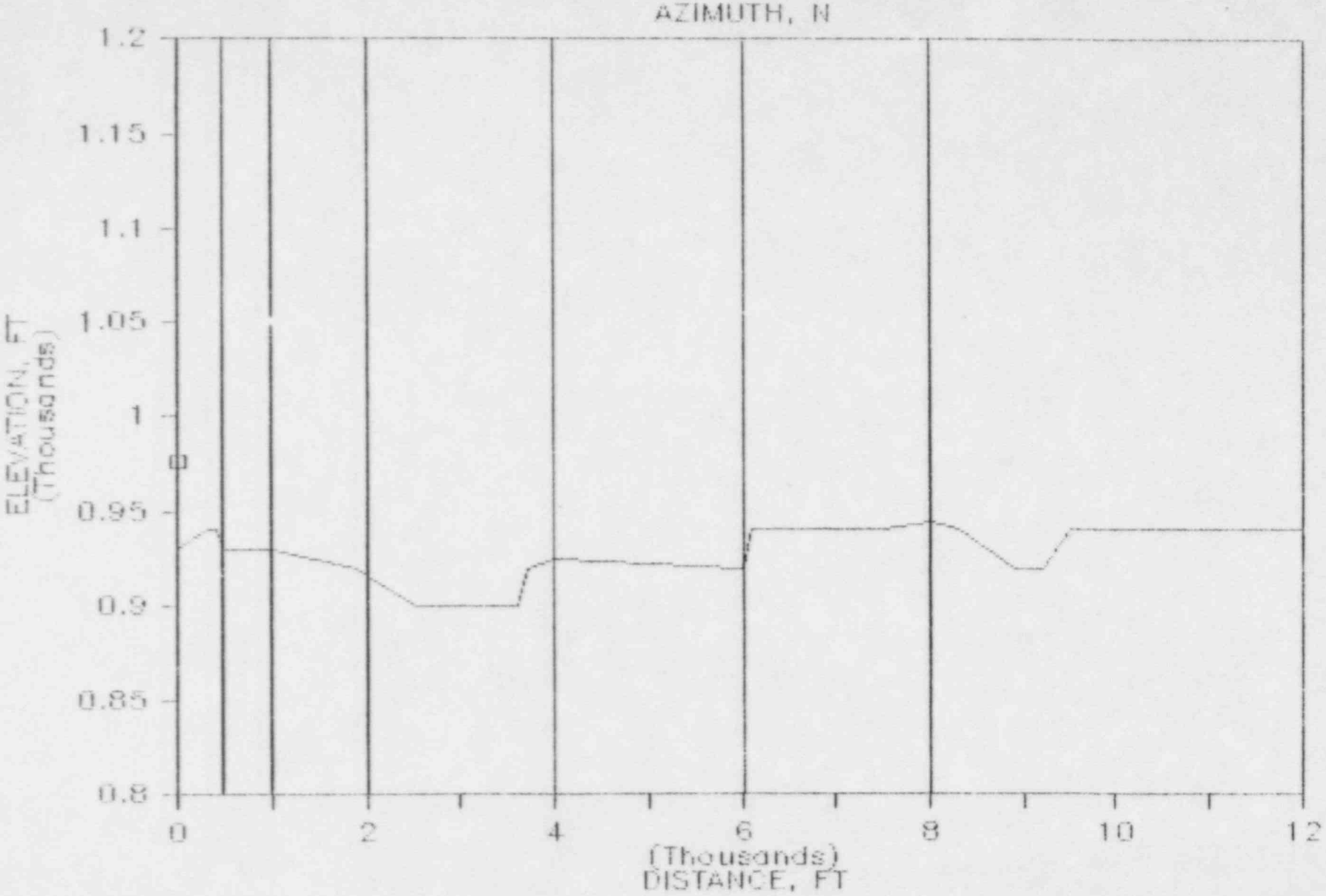
MONTICELLO 15



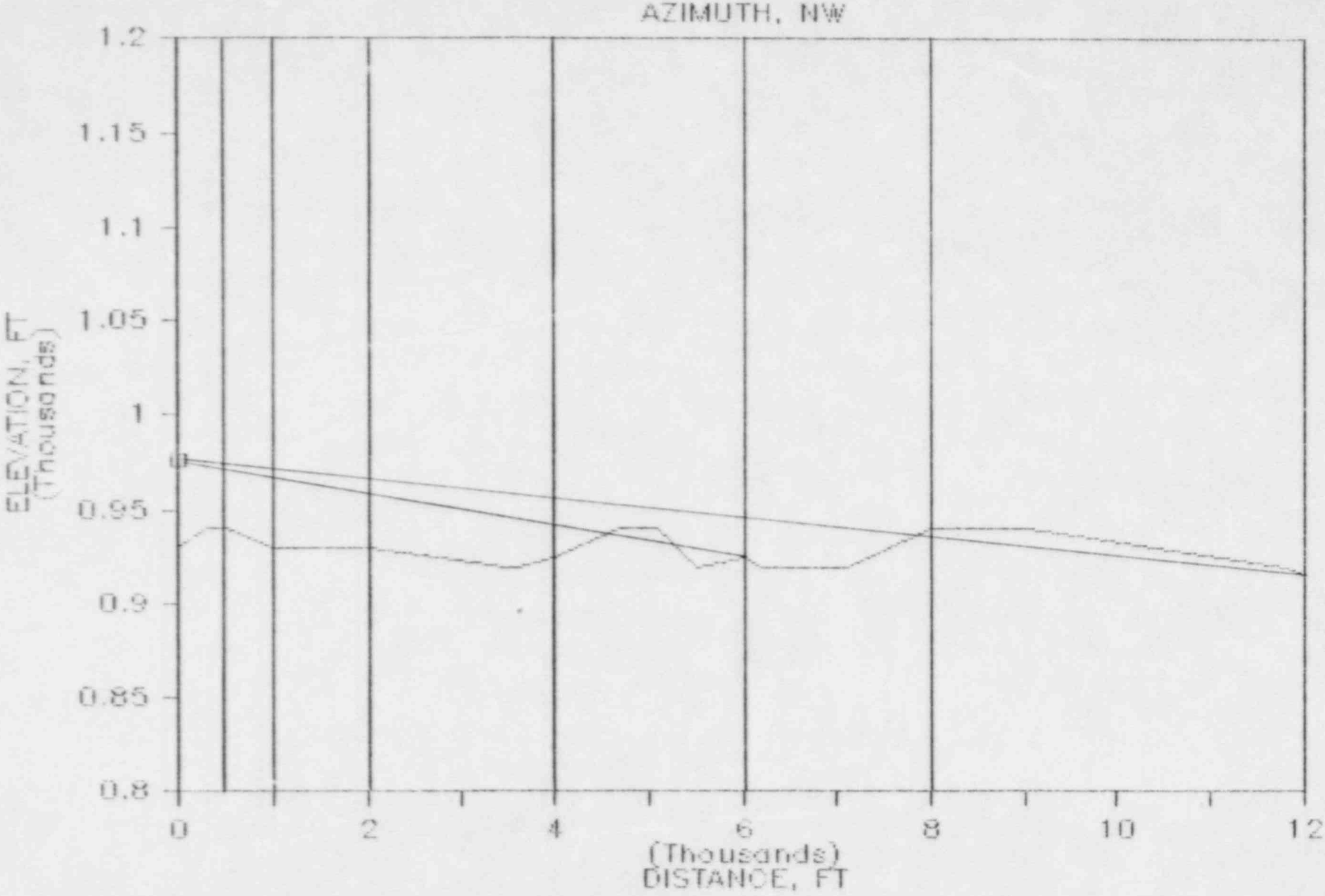
MONTICELLO 15

AZIMUTH, NE

MONTICELLO 15



MONTICELLO 15



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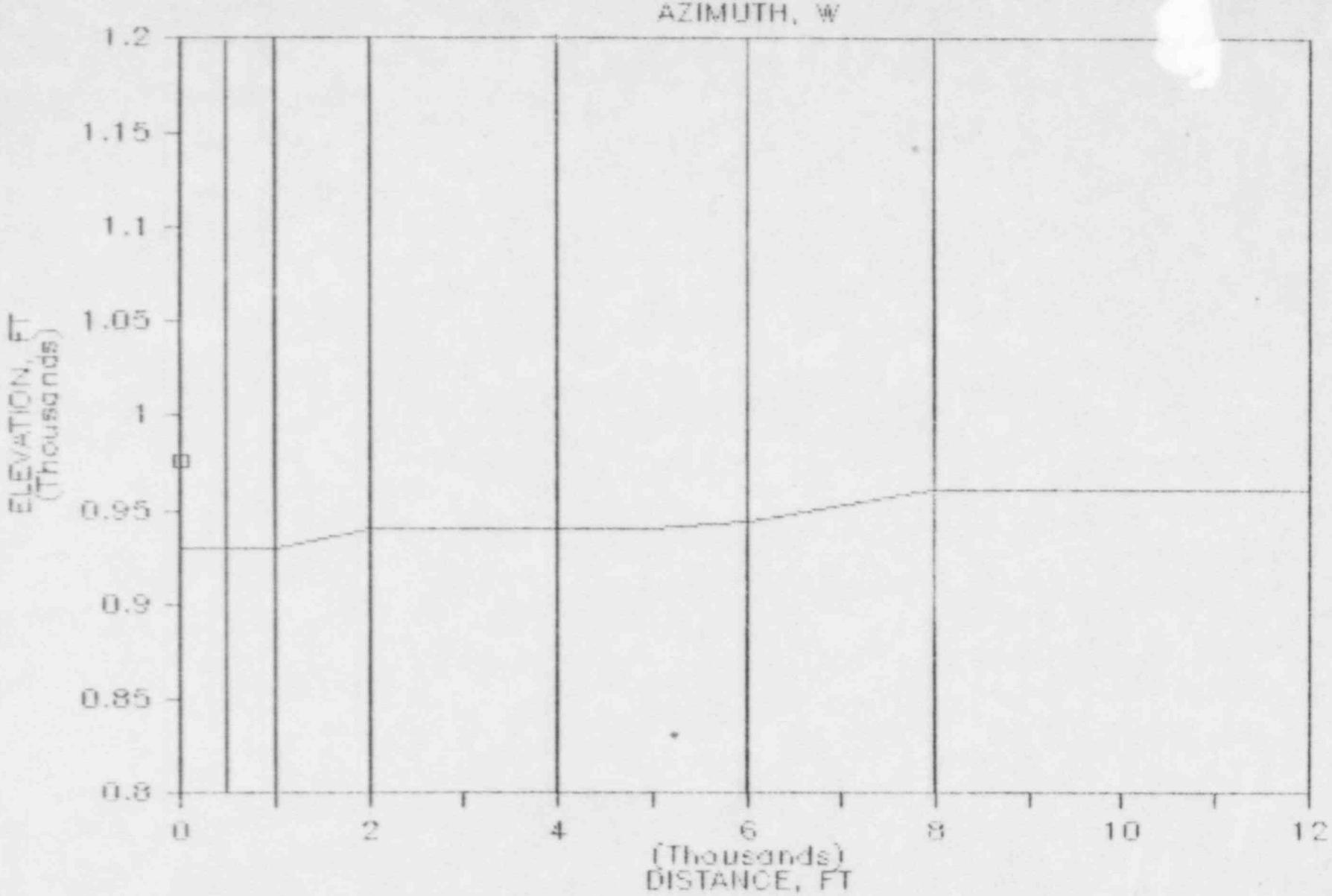
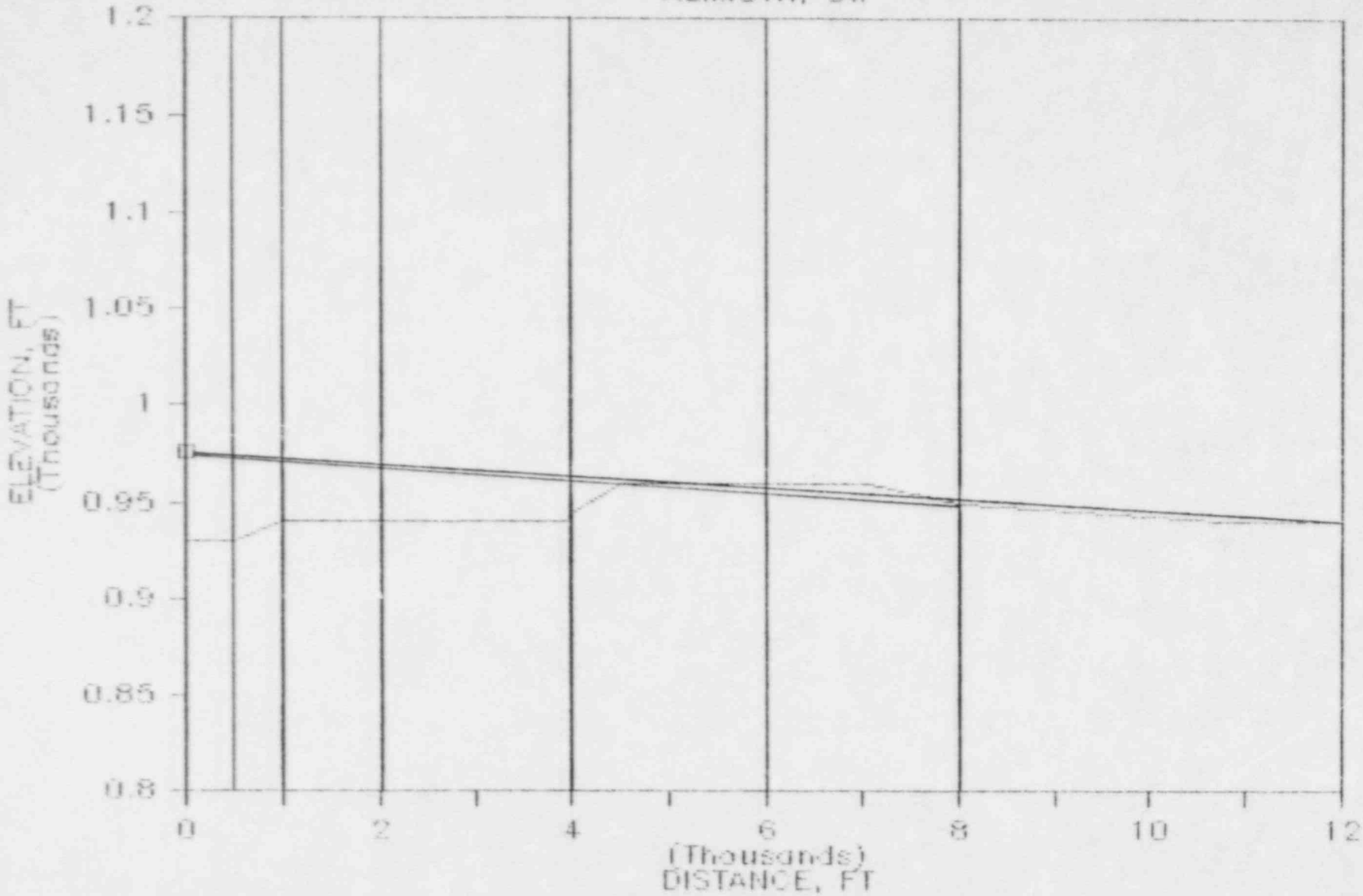


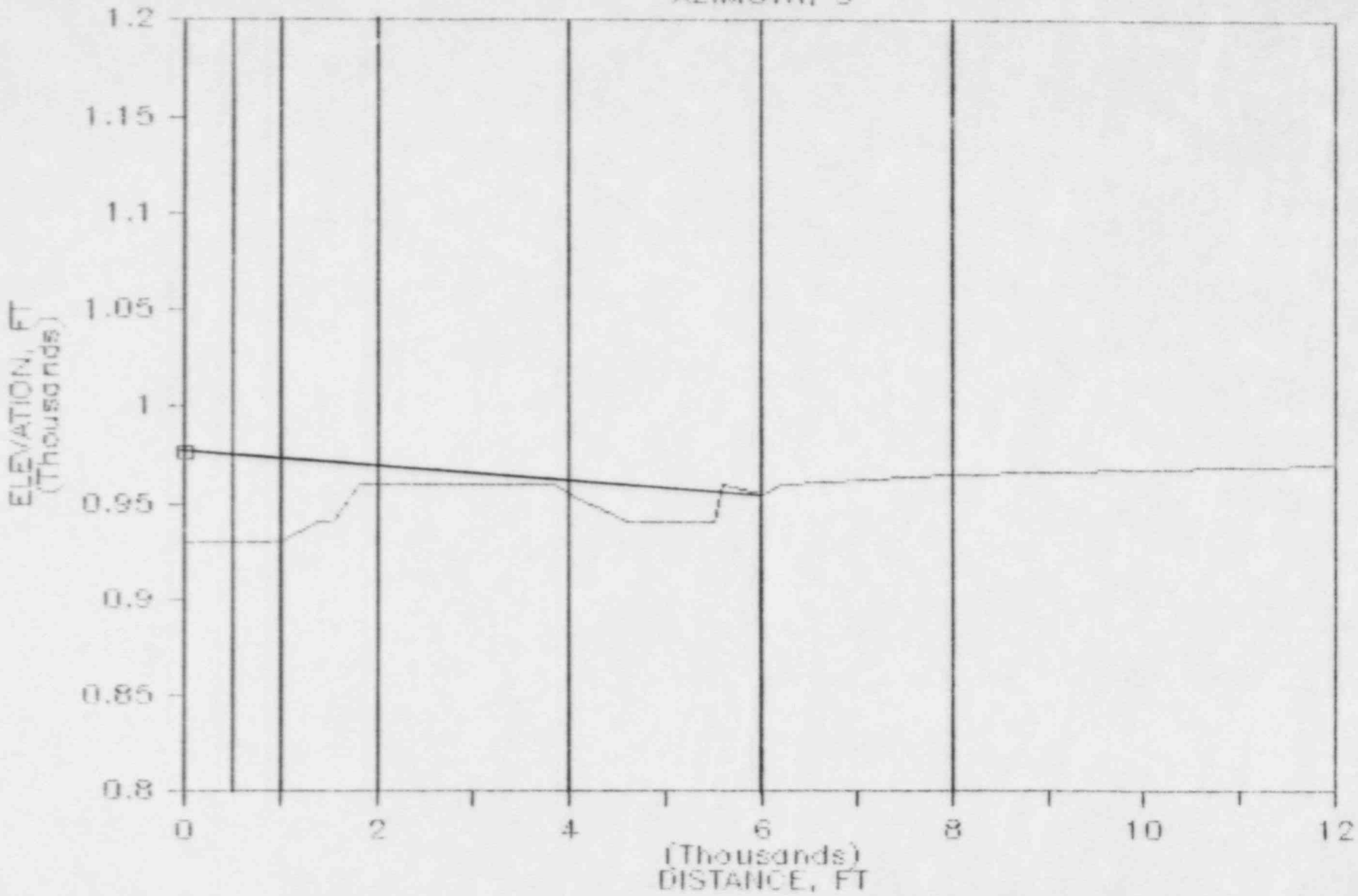
MONTICELLO 15

AZIMUTH, SW



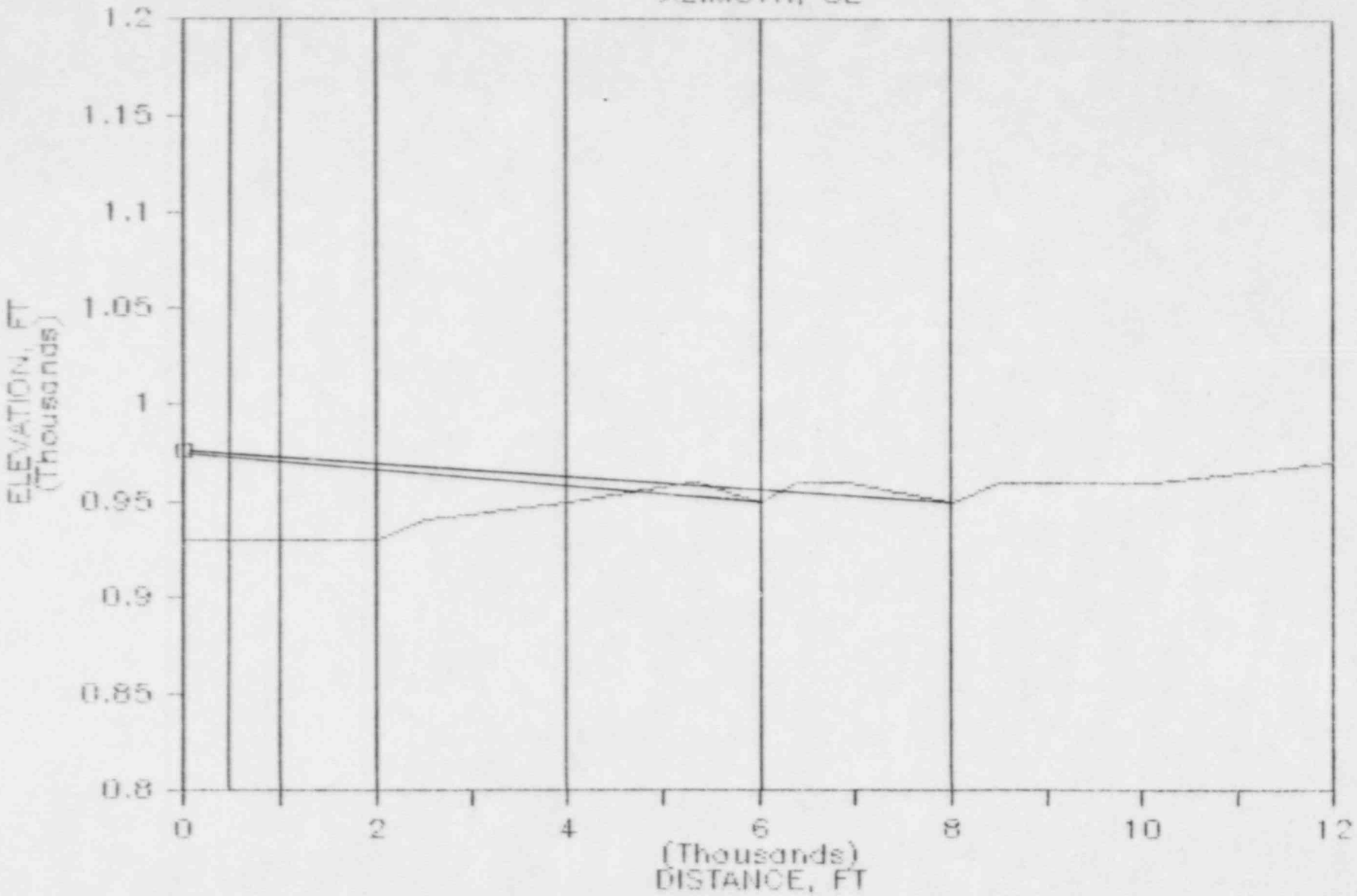
MONTICELLO 15

AZIMUTH, S



MONTICELLO 15

AZIMUTH, SE



NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP15-T1000
SOURCE-RECEIVER TOPOGRAPHICAL INPUTS

ALL BEARINGS ARE WITH RESPECT TO THE NORTH MEASURING CLOCKWISE

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
1	500.	90.00	930.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	930.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	930.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	930.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	890.00	SOFT	0.	YES	4850.	940.
6	8000.	90.00	930.00	SOFT	0.	NO	0.	0.
7	12000.	90.00	930.00	SOFT	0.	NO	0.	0.
8	500.	45.00	930.00	SOFT	0.	NO	0.	0.
9	1000.	45.00	930.00	SOFT	0.	NO	0.	0.
10	2000.	45.00	920.00	SOFT	0.	NO	0.	0.
11	4000.	45.00	930.00	SOFT	0.	NO	0.	0.
12	6000.	45.00	940.00	SOFT	0.	NO	0.	0.
13	8000.	45.00	950.00	SOFT	0.	NO	0.	0.
14	12000.	45.00	950.00	SOFT	0.	NO	0.	0.
15	500.	0.0	930.00	SOFT	0.	NO	0.	0.
16	1000.	0.0	930.00	SOFT	0.	NO	0.	0.
17	2000.	0.0	915.00	SOFT	0.	NO	0.	0.
18	4000.	0.0	925.00	SOFT	0.	NO	0.	0.
19	6000.	0.0	920.00	SOFT	0.	NO	0.	0.
20	8000.	0.0	945.00	SOFT	0.	NO	0.	0.
21	12000.	0.0	940.00	SOFT	0.	NO	0.	0.
22	500.	315.00	940.00	SOFT	0.	NO	0.	0.
23	1000.	315.00	930.00	SOFT	0.	NO	0.	0.
24	2000.	315.00	930.00	SOFT	0.	NO	0.	0.
25	4000.	315.00	925.00	SOFT	0.	NO	0.	0.
26	6000.	315.00	925.00	SOFT	0.	YES	5100.	940.
27	8000.	315.00	940.00	SOFT	0.	NO	0.	0.
28	12000.	315.00	962.00	SOFT	0.	YES	9150.	940.
29	500.	270.00	930.00	SOFT	0.	NO	0.	0.
30	1000.	270.00	930.00	SOFT	0.	NO	0.	0.
31	2000.	270.00	940.00	SOFT	0.	NO	0.	0.
32	4000.	270.00	940.00	SOFT	0.	NO	0.	0.
33	6000.	270.00	945.00	SOFT	0.	NO	0.	0.
34	8000.	270.00	962.00	SOFT	0.	NO	0.	0.
35	12000.	270.00	962.00	SOFT	0.	NO	0.	0.
36	500.	225.00	930.00	SOFT	0.	NO	0.	0.

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
37	1000.	225.00	940.00	SOFT	0.	NO	0.	0.
38	2000.	225.00	940.00	SOFT	0.	NO	0.	0.
39	4000.	225.00	945.00	SOFT	0.	NO	0.	0.
40	6000.	225.00	960.00	SOFT	0.	NO	0.	0.
41	8000.	225.00	950.00	SOFT	0.	YES	7100.	960.
42	12000.	225.00	90.00	SOFT	0.	YES	7100.	960.
43	500.	180.00	930.00	SOFT	0.	NO	0.	0.
44	1000.	180.00	930.00	SOFT	0.	NO	0.	0.
45	2000.	180.00	960.00	SOFT	0.	NO	0.	0.
46	4000.	180.00	955.00	SOFT	0.	NO	0.	0.
47	6000.	180.00	955.00	SOFT	0.	YES	5650.	965.
48	8000.	180.00	965.00	SOFT	0.	NO	0.	0.
49	12000.	180.00	970.00	SOFT	0.	NO	0.	0.
50	500.	135.00	930.00	SOFT	0.	NO	0.	0.
51	1000.	135.00	930.00	SOFT	0.	NO	0.	0.
52	2000.	135.00	930.00	SOFT	0.	NO	0.	0.
53	4000.	135.00	950.00	SOFT	0.	NO	0.	0.
54	6000.	135.00	950.00	SOFT	0.	YES	5350.	960.
55	8000.	135.00	950.00	SOFT	0.	YES	7000.	960.
56	12000.	135.00	970.00	SOFT	0.	NO	0.	0.
57	30831.	325.68	950.00	SOFT	0.	YES	9150.	940.
58	38510.	46.61	930.00	SOFT	0.	YES	4850.	940.
59	27116.	219.87	1040.00	SOFT	0.	YES	7100.	960.
60	35606.	125.77	950.00	SOFT	0.	YES	7000.	960.

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP15-T1000
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	SIREN NSP15	165.9	167.9	0.0	0.0	0.0	0.0	167.0	158.0	157.0	150.0	148.0

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP15-T1000
METEOROLOGICAL INPUT CONDITIONS

H1= 10.06 METERS H2= 43.28 METERS

YEAR	SEASON	MONTH	DATE	HOUR	WIND DIRECTION	WIND SPEED(MPS) H1	WIND SPEED(MPS) H2	TEMPERATURE(C) H1	TEMPERATURE(C) H2	RELATIVE HUMIDITY	BAROMETRIC PRESSURE(MM OF HG)
1984	S	7	22	12	188.0	3.1	3.8	20.1	27.2	68.0	760.0

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP15-T1000

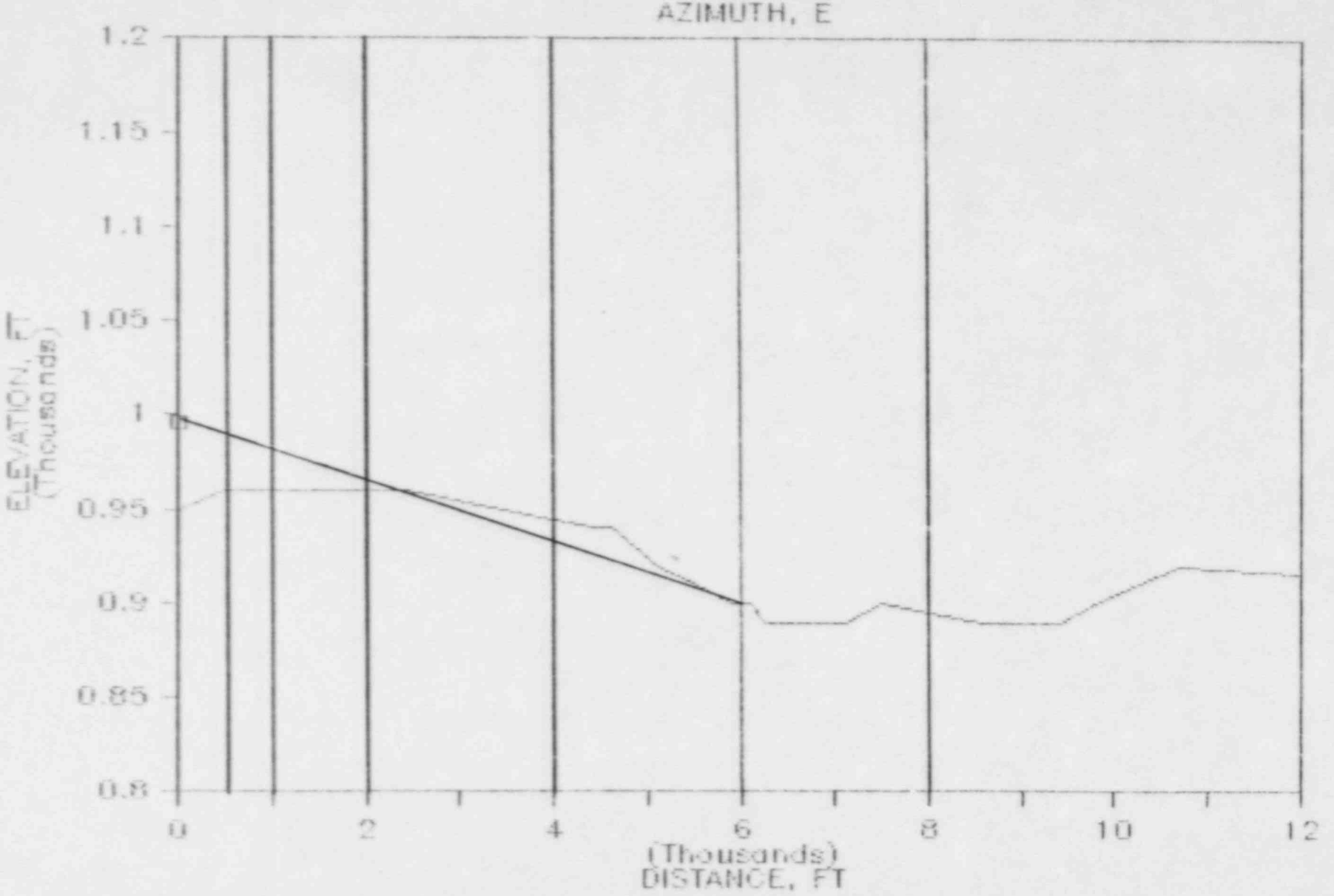
SIREN SOUND LEVELS IN DBC

UNDER MET CONDITION 1

DISTANCE IN FEET

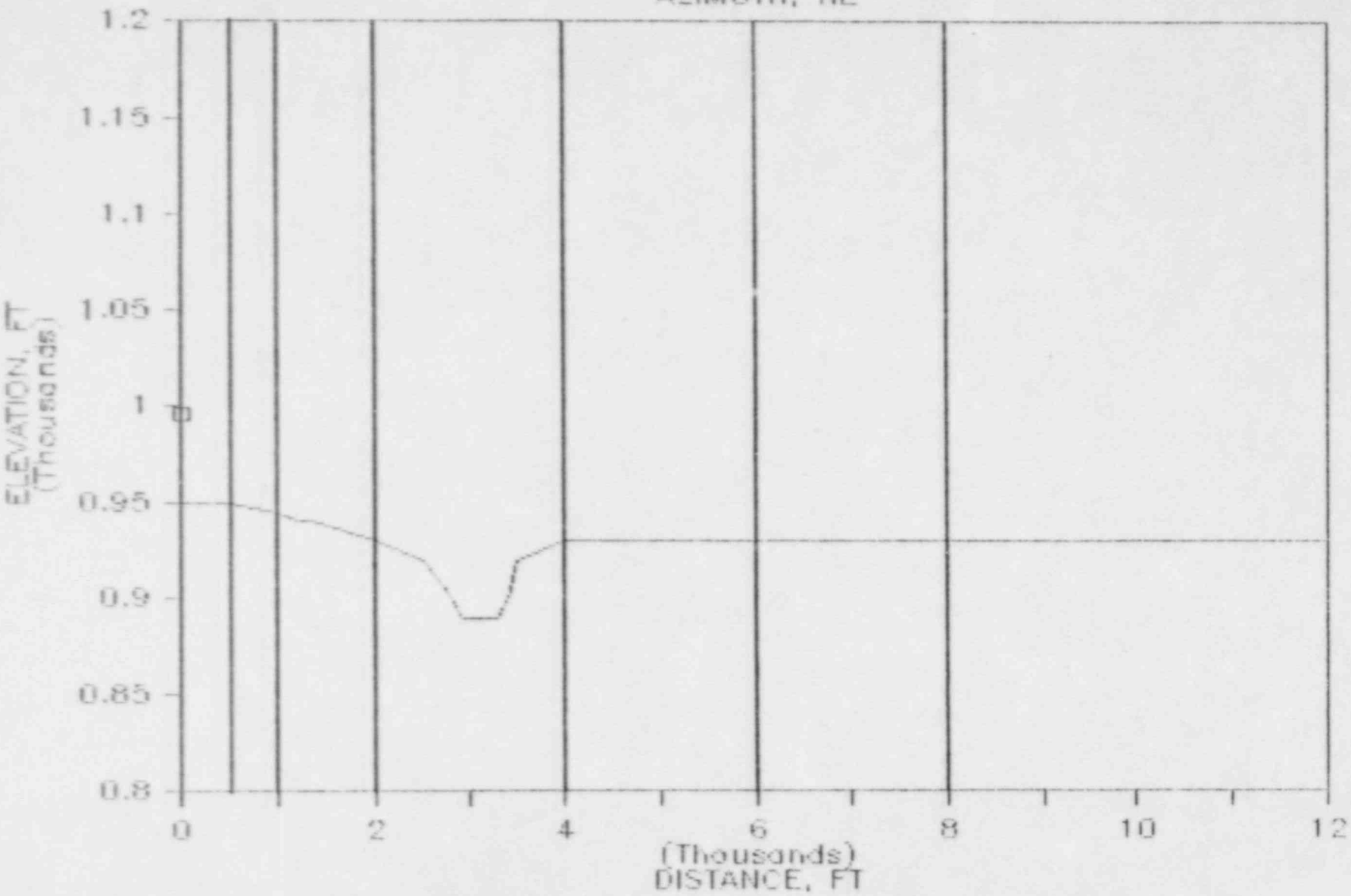
AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	114.	105.	95.	88.	73.	80.	74.
NE	114.	105.	95.	88.	84.	80.	74.
N	114.	105.	95.	88.	84.	80.	74.
NW	114.	105.	95.	88.	78.	80.	68.
W	114.	105.	95.	88.	82.	76.	64.
SW	114.	105.	95.	88.	84.	75.	68.
S	114.	105.	95.	86.	77.	80.	71.
SE	114.	105.	95.	88.	78.	75.	72.

MONTICELLO 16

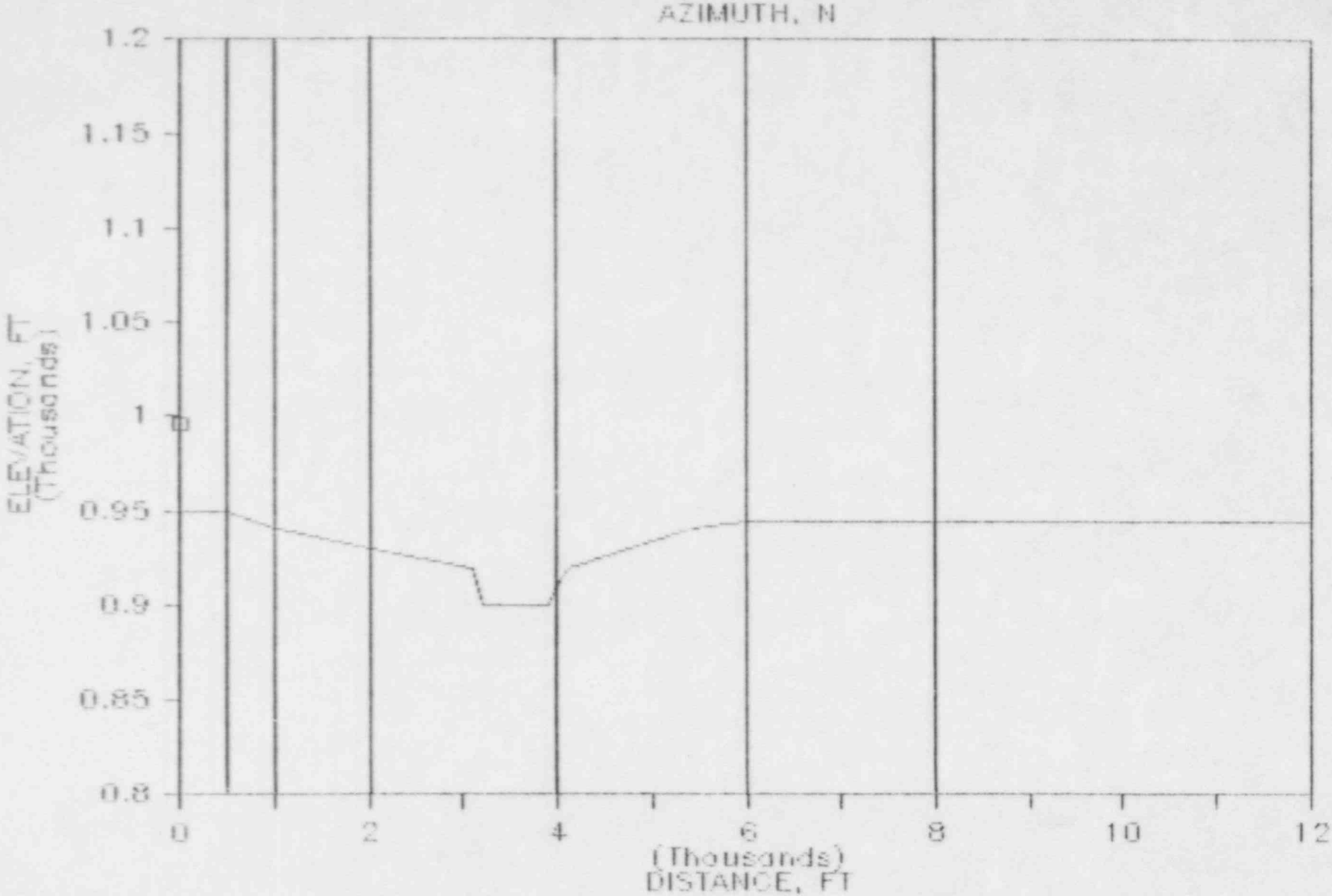


MONTICELLO 16

AZIMUTH, NE



MONTICELLO 16



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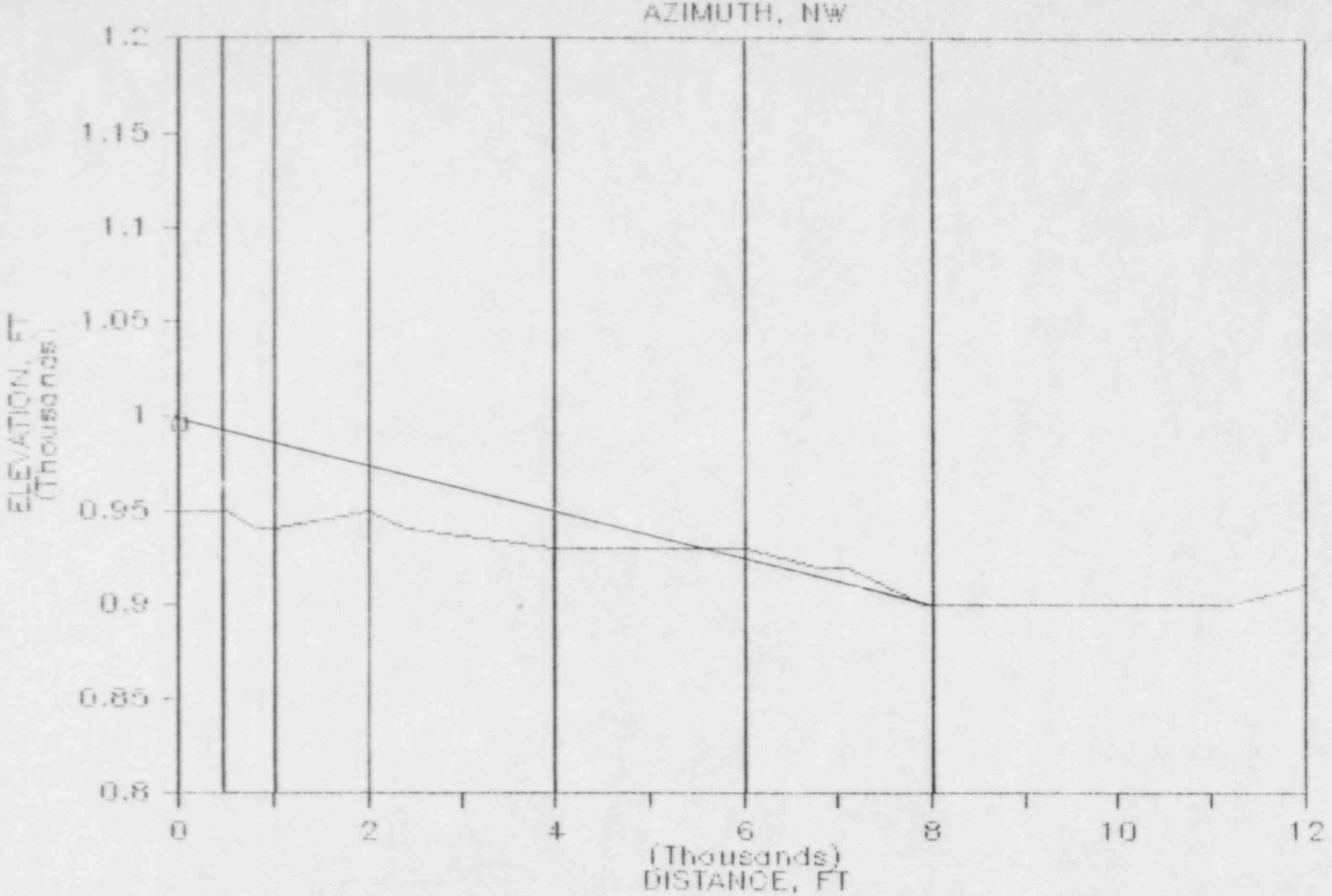
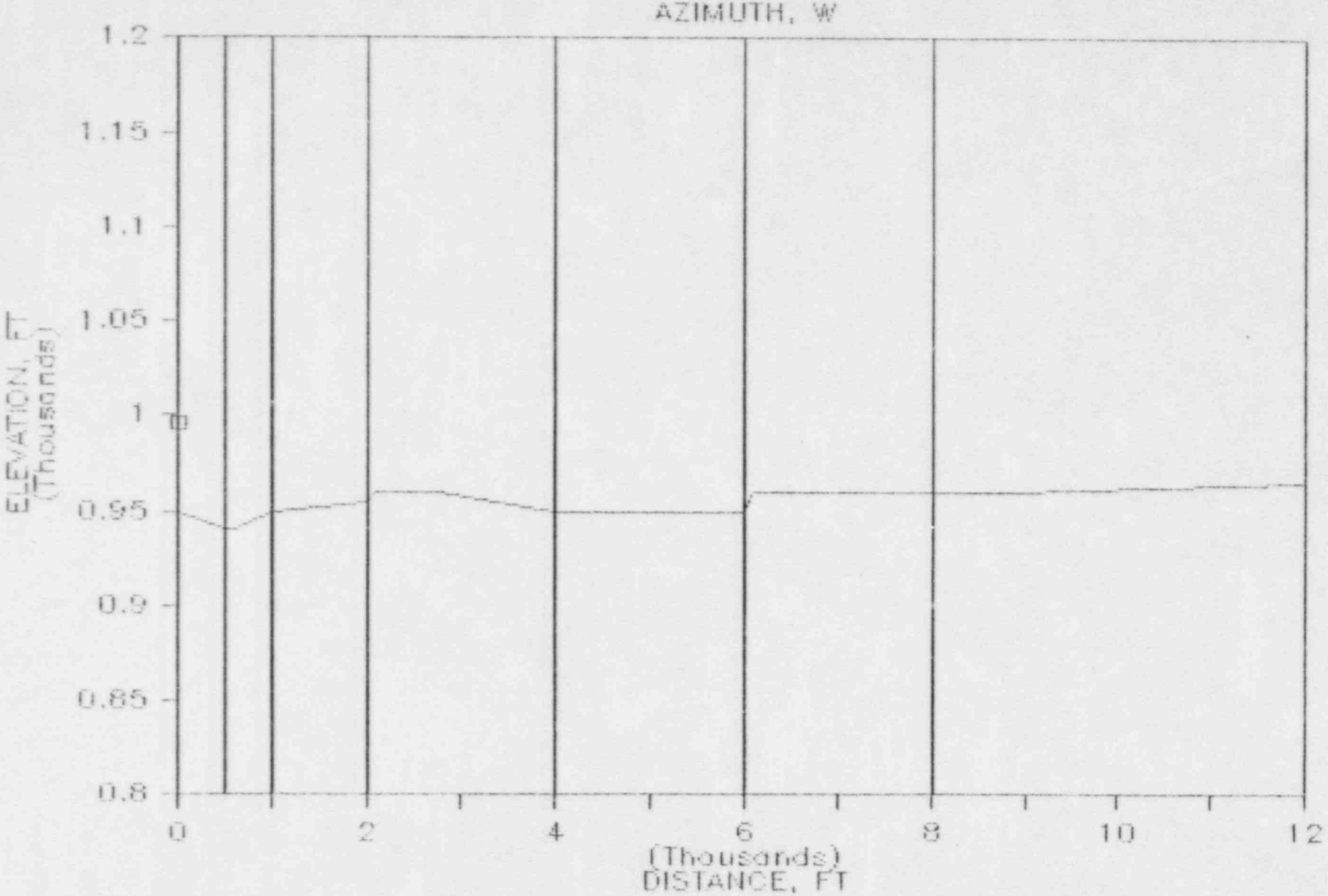
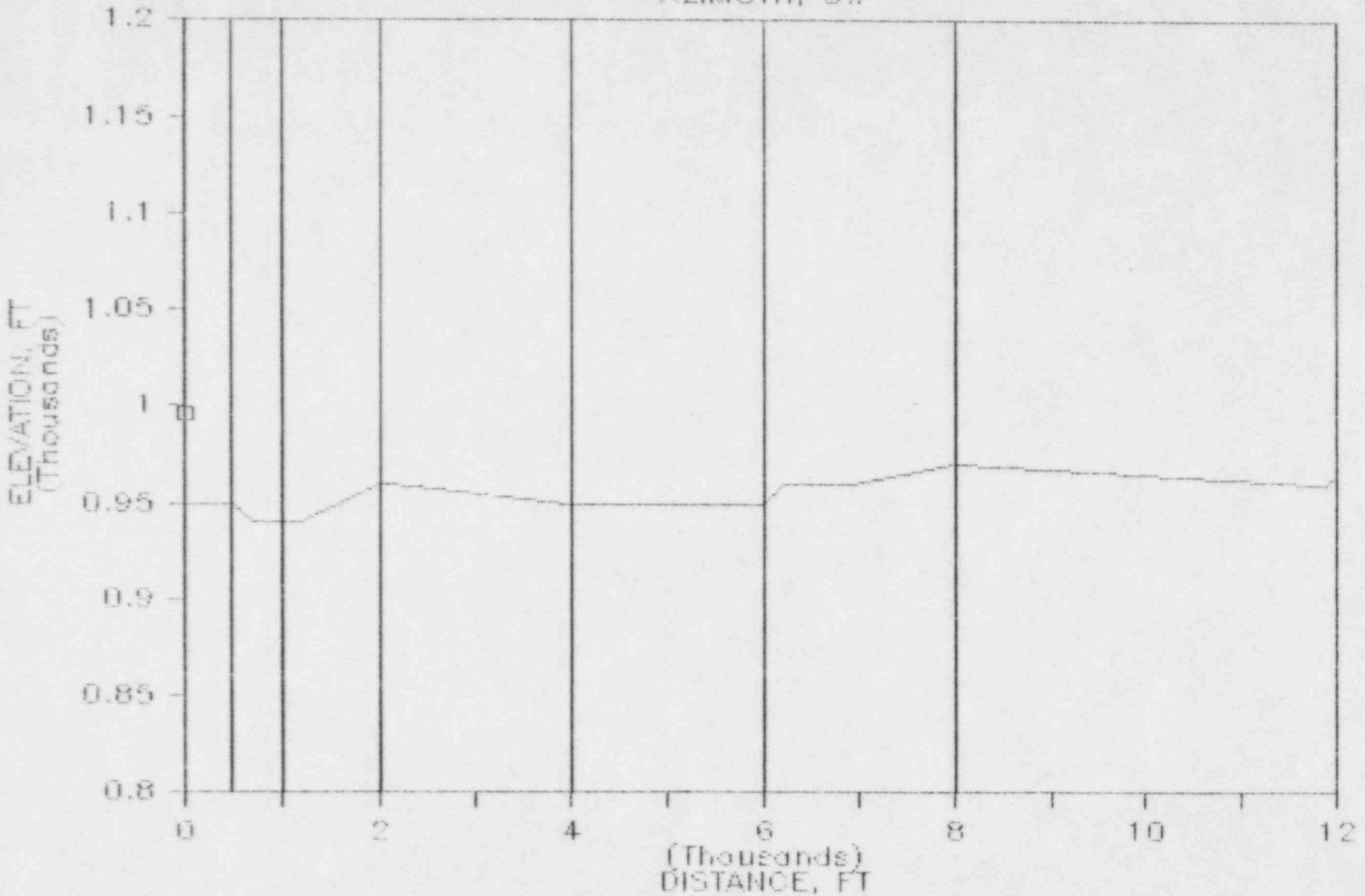


MONTICELLO 16

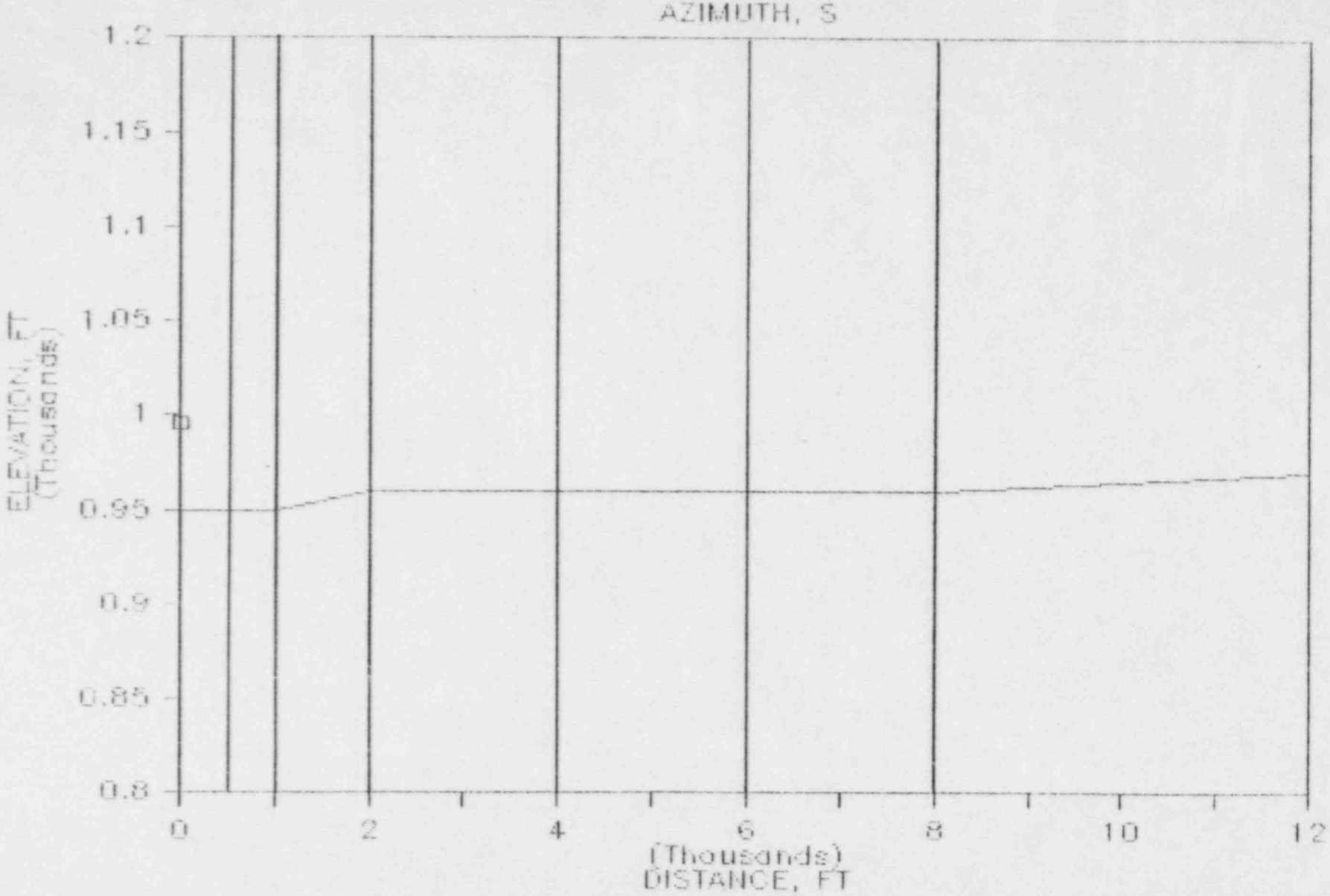


MONTICELLO 16

AZIMUTH, SW

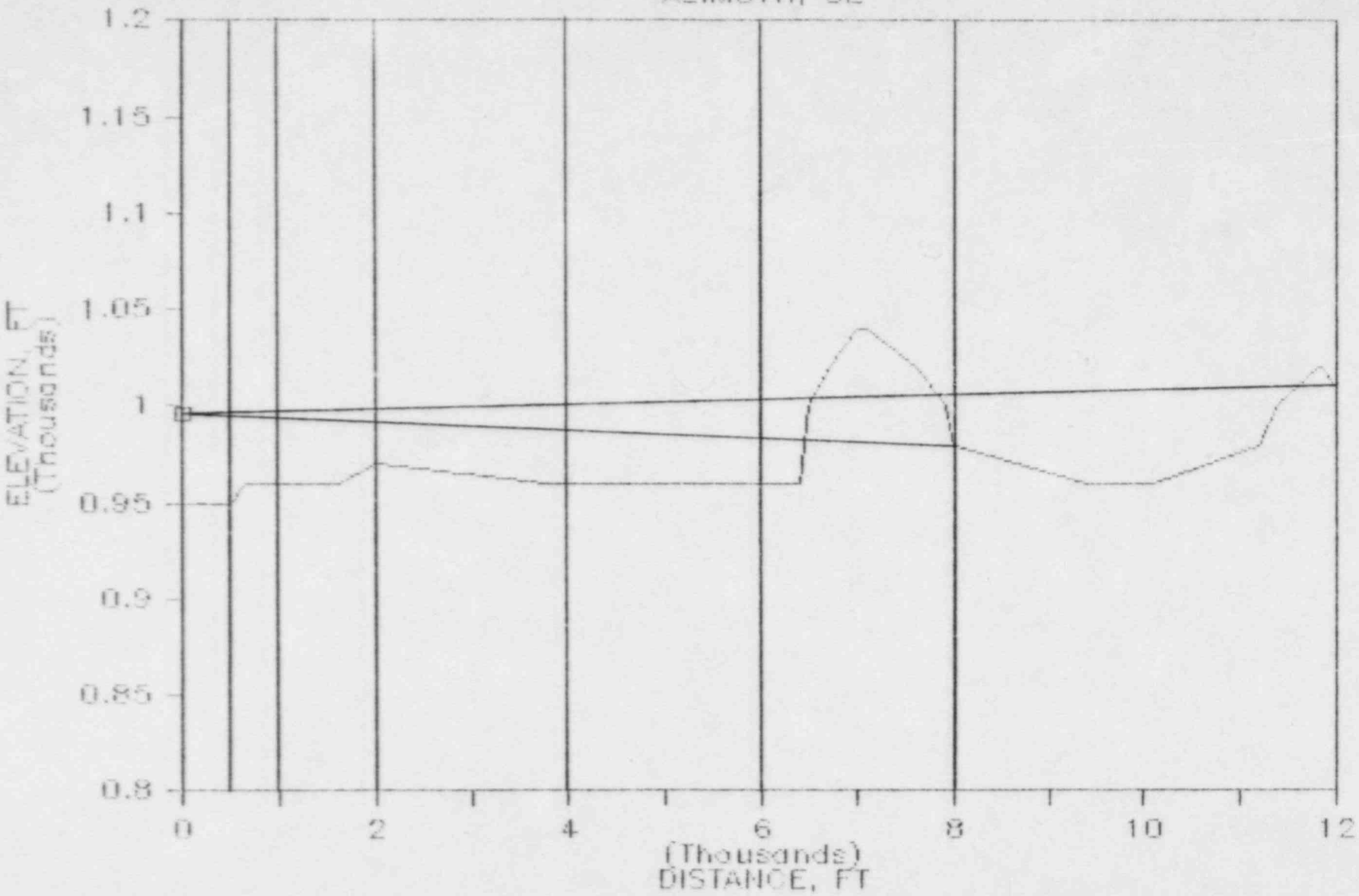


MONTICELLO 16



MONTICELLO 16

AZIMUTH, SE



NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP16-T1000
SOURCE-RECEIVER TOPOGRAPHICAL INPUTS

ALL BEARINGS ARE WITH RESPECT TO THE NORTH MEASURING CLOCKWISE

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
1	500.	90.00	960.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	960.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	960.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	945.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	900.00	SOFT	0.	YES	4650.	940.
6	8000.	90.00	895.00	SOFT	0.	NO	0.	0.
7	12000.	90.00	915.00	SOFT	0.	NO	0.	0.
8	500.	45.00	950.00	SOFT	0.	NO	0.	0.
9	1000.	45.00	945.00	SOFT	0.	NO	0.	0.
10	2000.	45.00	930.00	SOFT	0.	NO	0.	0.
11	4000.	45.00	930.00	SOFT	0.	NO	0.	0.
12	6000.	45.00	930.00	SOFT	0.	NO	0.	0.
13	8000.	45.00	930.00	SOFT	0.	NO	0.	0.
14	12000.	45.00	930.00	SOFT	0.	NO	0.	0.
15	500.	0.0	950.00	SOFT	0.	NO	0.	0.
16	1000.	0.0	940.00	SOFT	0.	NO	0.	0.
17	2000.	0.0	930.00	SOFT	0.	NO	0.	0.
18	4000.	0.0	910.00	SOFT	0.	NO	0.	0.
19	6000.	0.0	945.00	SOFT	0.	NO	0.	0.
20	8000.	0.0	945.00	SOFT	0.	NO	0.	0.
21	12000.	0.0	945.00	SOFT	0.	NO	0.	0.
22	500.	315.00	950.00	SOFT	0.	NO	0.	0.
23	1000.	315.00	940.00	SOFT	0.	NO	0.	0.
24	2000.	315.00	950.00	SOFT	0.	NO	0.	0.
25	4000.	315.00	930.00	SOFT	0.	NO	0.	0.
26	6000.	315.00	930.00	SOFT	0.	NO	0.	0.
27	8000.	315.00	900.00	SOFT	0.	YES	7150.	920.
28	12000.	315.00	910.00	SOFT	0.	NO	0.	0.
29	500.	270.00	940.00	SOFT	0.	NO	0.	0.
30	1000.	270.00	950.00	SOFT	0.	NO	0.	0.
31	2000.	270.00	955.00	SOFT	0.	NO	0.	0.
32	4000.	270.00	950.00	SOFT	0.	NO	0.	0.
33	6000.	270.00	950.00	SOFT	0.	NO	0.	0.
34	8000.	270.00	960.00	SOFT	0.	NO	0.	0.
35	12000.	270.00	965.00	SOFT	0.	NO	0.	0.
36	500.	225.00	950.00	SOFT	0.	NO	0.	0.

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
37	1000.	225.00	940.00	SOFT	0.	NO	0.	0.
38	2000.	225.00	960.00	SOFT	0.	NO	0.	0.
39	4000.	225.00	950.00	SOFT	0.	NO	0.	0.
40	6000.	225.00	950.00	SOFT	0.	NO	0.	0.
41	8000.	225.00	970.00	SOFT	0.	NO	0.	0.
42	12000.	225.00	965.00	SOFT	0.	NO	0.	0.
43	500.	180.00	950.00	SOFT	0.	NO	0.	0.
44	1000.	180.00	950.00	SOFT	0.	NO	0.	0.
45	2000.	180.00	960.00	SOFT	0.	NO	0.	0.
46	4000.	180.00	960.00	SOFT	0.	NO	0.	0.
47	6000.	180.00	960.00	SOFT	0.	NO	0.	0.
48	8000.	180.00	960.00	SOFT	0.	NO	0.	0.
49	12000.	180.00	970.00	SOFT	0.	NO	0.	0.
50	500.	135.00	950.00	SOFT	0.	NO	0.	0.
51	1000.	135.00	960.00	SOFT	0.	NO	0.	0.
52	2000.	135.00	970.00	SOFT	0.	NO	0.	0.
53	4000.	135.00	960.00	SOFT	0.	NO	0.	0.
54	6000.	135.00	960.00	SOFT	0.	NO	0.	0.
55	8000.	135.00	980.00	SOFT	0.	YES	7100.	1040.
56	12000.	135.00	1010.00	SOFT	0.	YES	7100.	1040.
57	37244.	321.83	950.00	SOFT	0.	YES	7150.	920.
58	37395.	38.46	930.00	SOFT	0.	YES	4650.	940.
59	28608.	233.56	1040.00	SOFT	0.	YES	7100.	1040.
60	28805.	126.15	950.00	SOFT	0.	YES	7100.	1040.

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP16-T1000
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	SIREN NSP16	165.9	167.9	0.0	0.0	0.0	0.0	167.0	158.0	157.0	150.0	148.0

XO= 0.0 YO= 0.0 ZO= 950.00 HEIGHT ABOVE GROUND= 46.00

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP16-T1000
METEOROLOGICAL INPUT CONDITIONS

H1= 10.06 METERS H2= 43.28 METERS

YEAR	SEASON	MONTH	DATE	HOUR	WIND DIRECTION	WIND SPEED(MPS) H1	WIND SPEED(MPS) H2	TEMPERATURE(C) H1	TEMPERATURE(C) H2	RELATIVE HUMIDITY	BAROMETRIC PRESSURE(MM OF HG)
1984	S	7	22	12	188.0	3.1	3.8	28.1	27.2	68.0	760.0

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP16-T1000

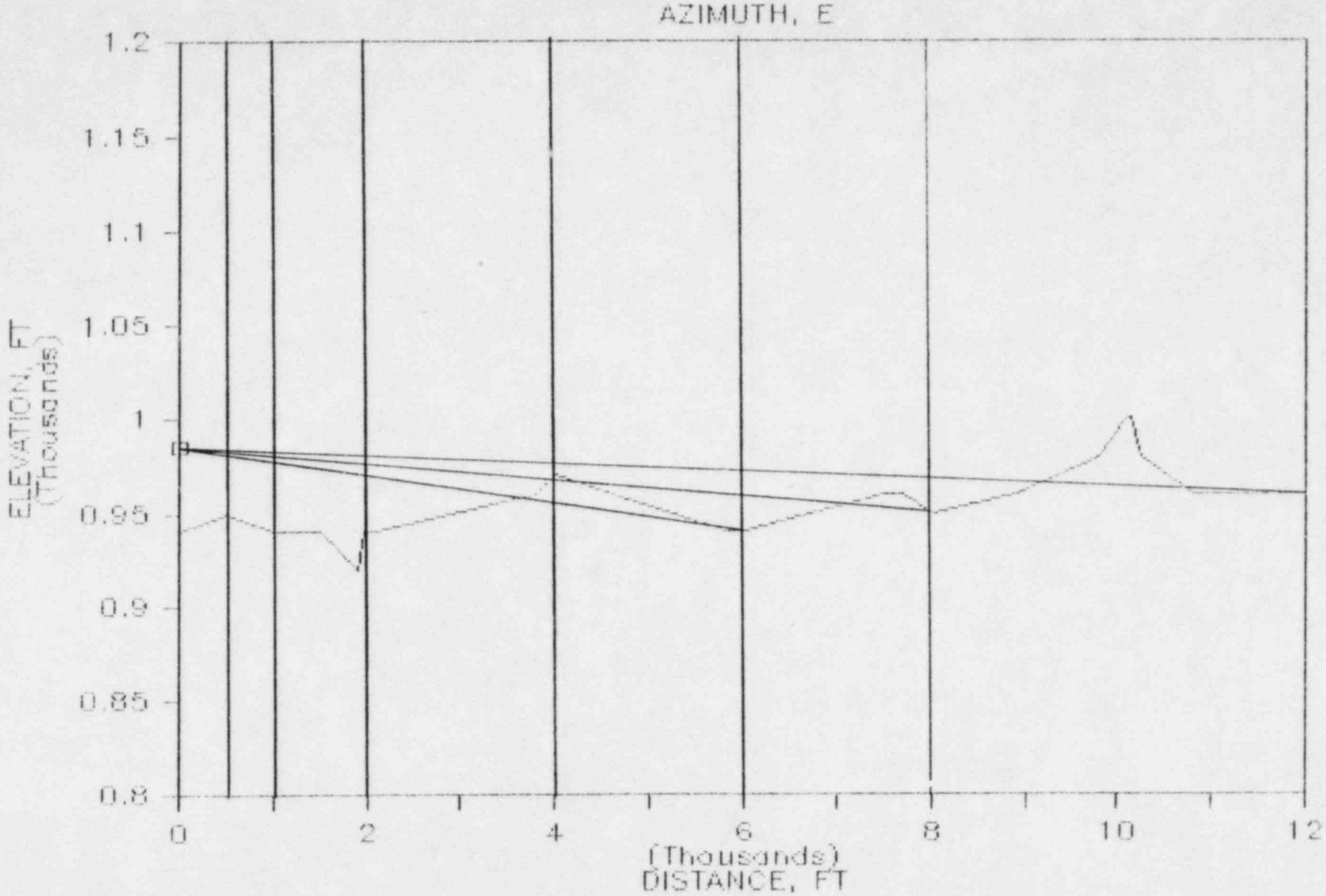
SIREN SOUND LEVELS IN DBC

UNDER MET CONDITION 1

DISTANCE IN FEET

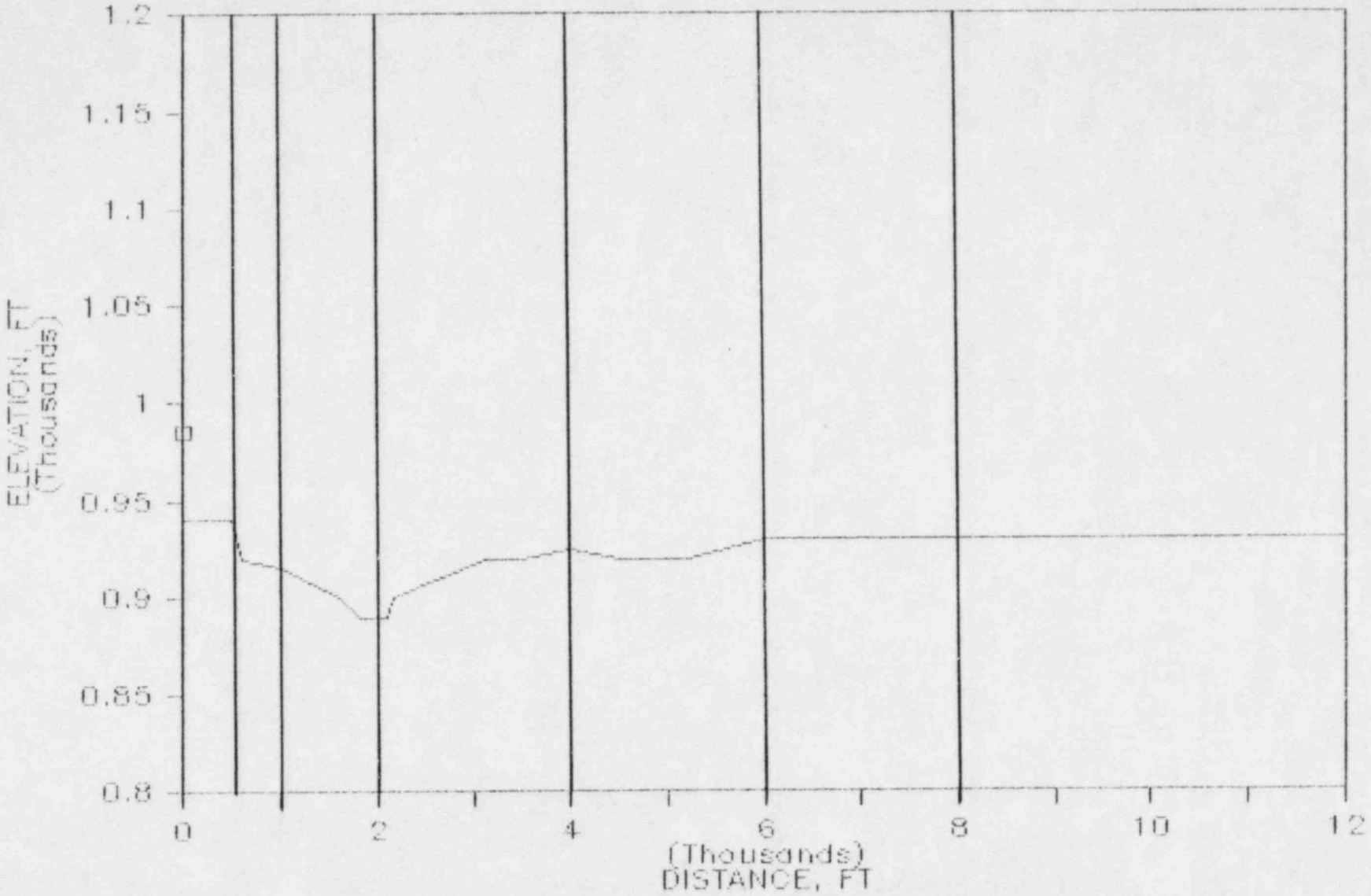
AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	114.	105.	95.	88.	76.	80.	74.
NE	114.	105.	95.	88.	84.	80.	74.
N	114.	105.	95.	88.	84.	80.	74.
NW	114.	105.	95.	88.	84.	74.	74.
W	114.	105.	95.	88.	82.	76.	64.
SW	114.	105.	95.	88.	84.	80.	74.
S	114.	105.	95.	88.	84.	80.	71.
SE	114.	105.	95.	88.	84.	66.	65.

MONTICELLO 17



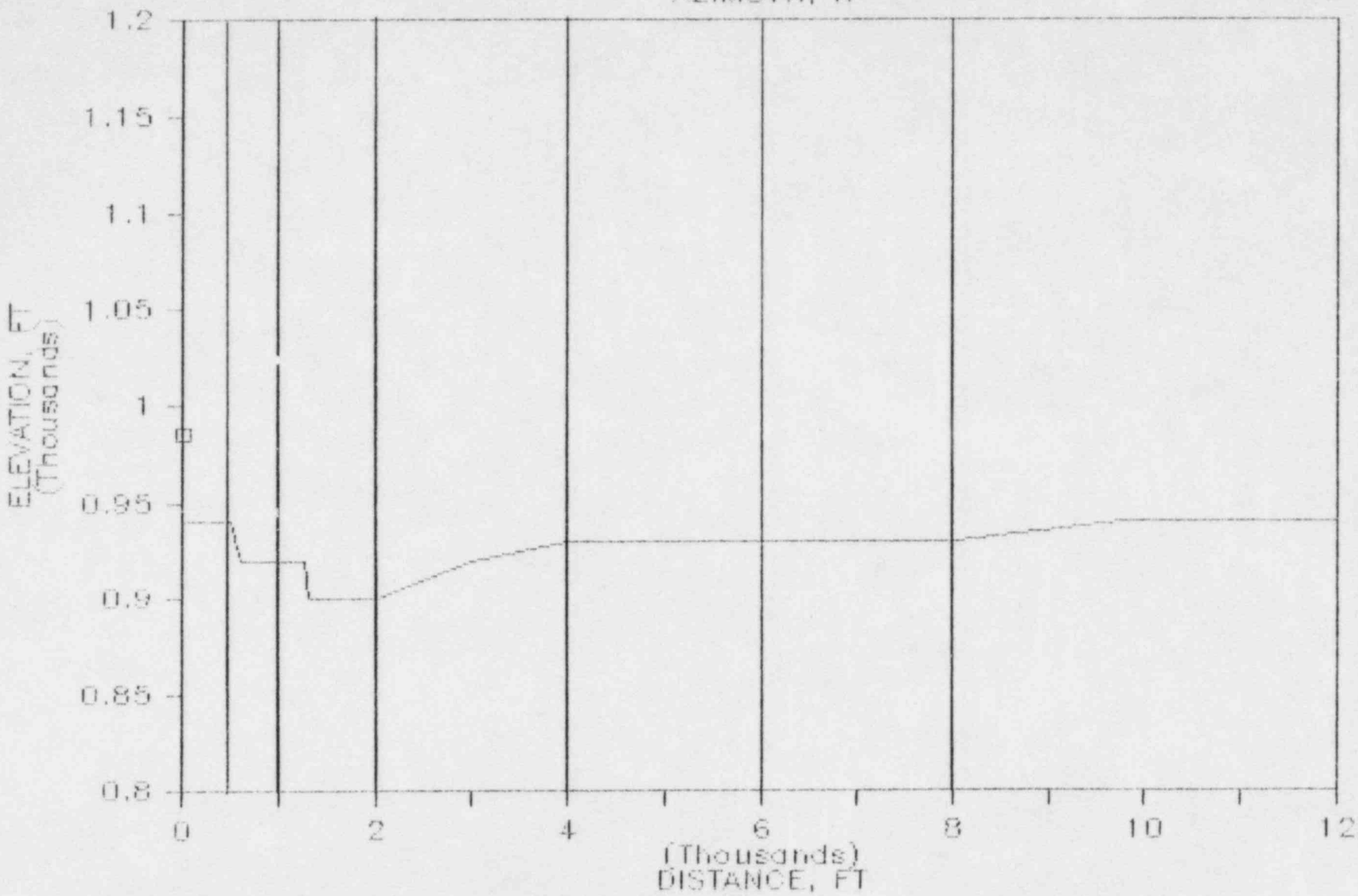
MONTICELLO 17

AZIMUTH, NE



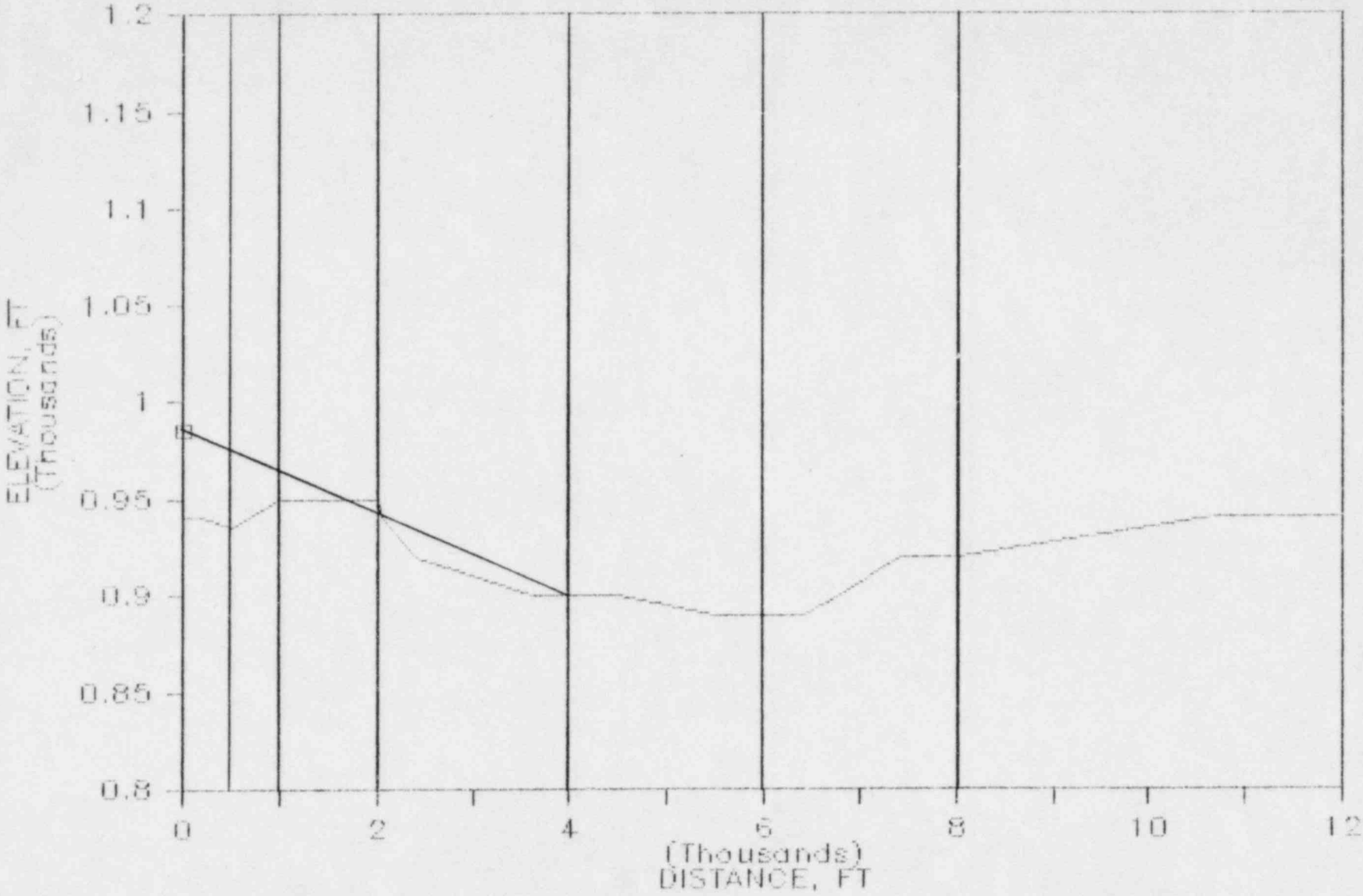
MONTICELLO 17

AZIMUTH, N



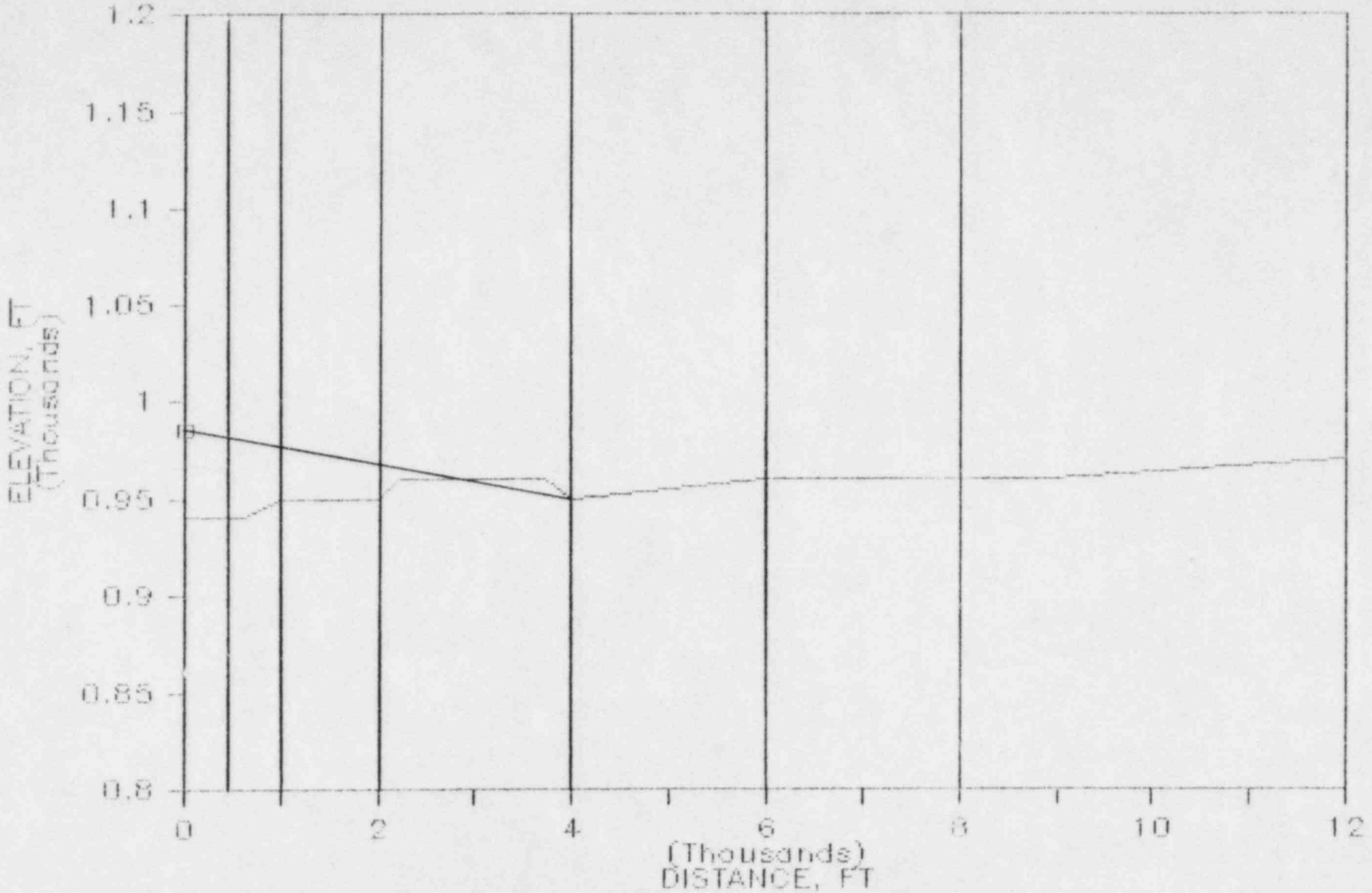
MONTICELLO 17

AZIMUTH, NW



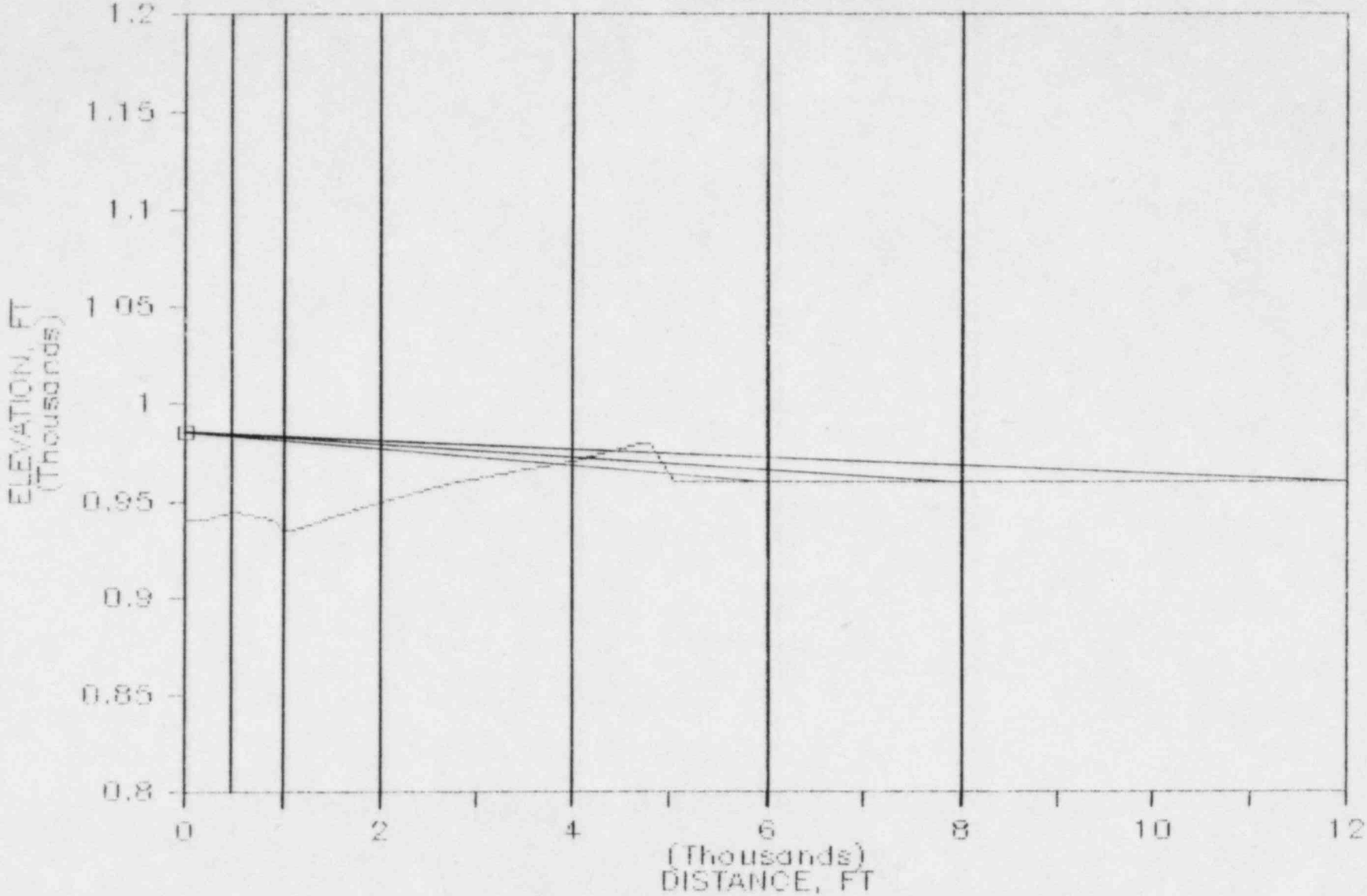
MONTICELLO 17

AZIMUTH, W



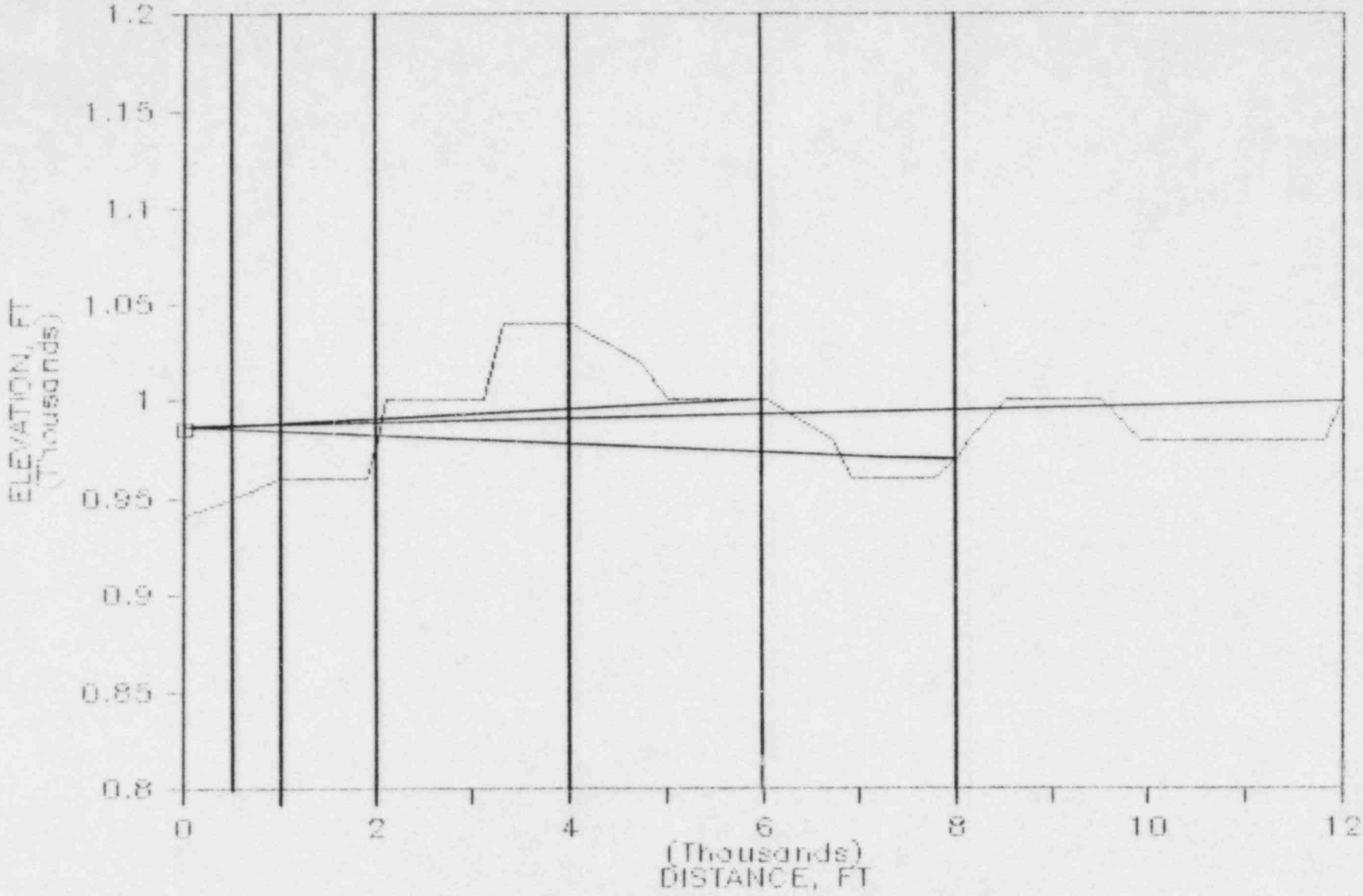
MONTICELLO 17

AZIMUTH, SW



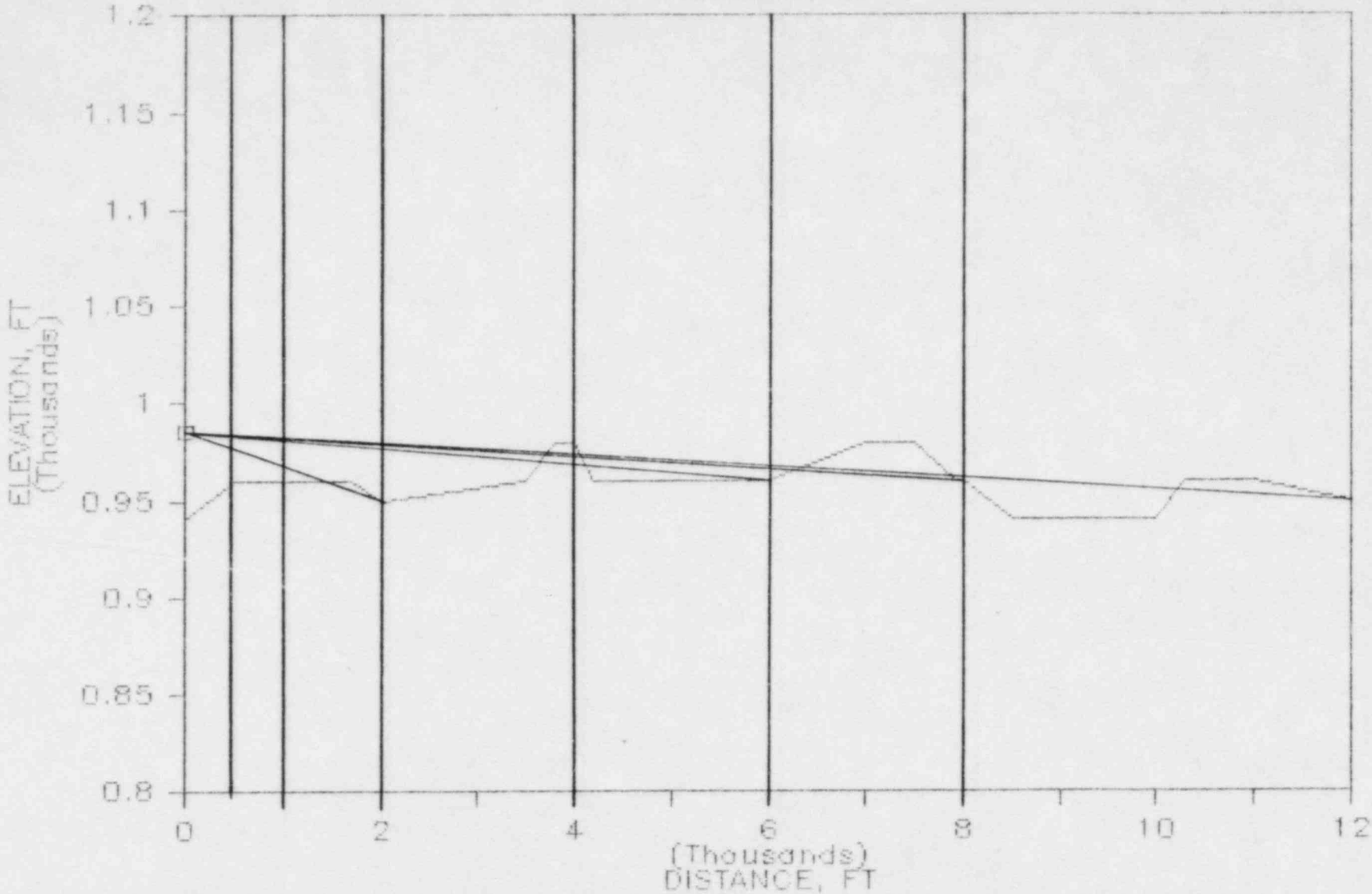
MONTICELLO 17

AZIMUTH, S



MONTICELLO 17

AZIMUTH, SE



NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP17-T1000
SOURCE-RECEIVER TOPOGRAPHICAL INPUTS

ALL BEARINGS ARE WITH RESPECT TO THE NORTH MEASURING CLOCKWISE

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
1	500.	90.00	950.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	940.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	940.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	970.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	940.00	SOFT	0.	YES	4000.	970.
6	8000.	90.00	950.00	SOFT	0.	YES	7750.	960.
7	12000.	90.00	960.00	SOFT	0.	YES	10200.	1000.
8	500.	45.00	940.00	SOFT	0.	NO	0.	0.
9	1000.	45.00	915.00	SOFT	0.	NO	0.	0.
10	2000.	45.00	890.00	SOFT	0.	NO	0.	0.
11	4000.	45.00	925.00	SOFT	0.	NO	0.	0.
12	6000.	45.00	930.00	SOFT	0.	NO	0.	0.
13	8000.	45.00	930.00	SOFT	0.	NO	0.	0.
14	12000.	45.00	930.00	SOFT	0.	NO	0.	0.
15	500.	0.0	940.00	SOFT	0.	NO	0.	0.
16	1000.	0.0	920.00	SOFT	0.	NO	0.	0.
17	2000.	0.0	900.00	SOFT	0.	NO	0.	0.
18	4000.	0.0	930.00	SOFT	0.	NO	0.	0.
19	6000.	0.0	930.00	SOFT	0.	NO	0.	0.
20	8000.	0.0	930.00	SOFT	0.	NO	0.	0.
21	12000.	0.0	940.00	SOFT	0.	NO	0.	0.
22	500.	315.00	935.00	SOFT	0.	NO	0.	0.
23	1000.	315.00	950.00	SOFT	0.	NO	0.	0.
24	2000.	315.00	950.00	SOFT	0.	NO	0.	0.
25	4000.	315.00	900.00	SOFT	0.	YES	2000.	950.
26	6000.	315.00	890.00	SOFT	0.	NO	0.	0.
27	8000.	315.00	920.00	SOFT	0.	NO	0.	0.
28	12000.	315.00	940.00	SOFT	0.	NO	0.	0.
29	500.	270.00	940.00	SOFT	0.	NO	0.	0.
30	1000.	270.00	950.00	SOFT	0.	NO	0.	0.
31	2000.	270.00	950.00	SOFT	0.	NO	0.	0.
32	4000.	270.00	950.00	SOFT	0.	YES	3700.	960.
33	6000.	270.00	960.00	SOFT	0.	NO	0.	0.
34	8000.	270.00	960.00	SOFT	0.	NO	0.	0.
35	12000.	270.00	970.00	SOFT	0.	NO	0.	0.
36	500.	225.00	945.00	SOFT	0.	NO	0.	0.

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
37	1000.	225.00	935.00	SOFT	0.	NO	0.	0.
38	2000.	225.00	950.00	SOFT	0.	NO	0.	0.
39	4000.	225.00	970.00	SOFT	0.	NO	0.	0.
40	6000.	225.00	960.00	SOFT	0.	YES	4900.	985.
41	8000.	225.00	960.00	SOFT	0.	YES	4900.	985.
42	12000.	225.00	960.00	SOFT	0.	YES	4900.	985.
43	500.	180.00	950.00	SOFT	0.	NO	0.	0.
44	1000.	180.00	960.00	SOFT	0.	NO	0.	0.
45	2000.	180.00	980.00	SOFT	0.	NO	0.	0.
46	4000.	180.00	1040.00	SOFT	0.	NO	0.	0.
47	6000.	180.00	1000.00	SOFT	0.	YES	4000.	1040.
48	8000.	180.00	970.00	SOFT	0.	YES	4000.	1040.
49	12000.	180.00	1000.00	SOFT	0.	YES	4000.	1040.
50	500.	135.00	960.00	SOFT	0.	NO	0.	0.
51	1000.	135.00	960.00	SOFT	0.	NO	0.	0.
52	2000.	135.00	950.00	SOFT	0.	YES	1750.	960.
53	4000.	135.00	980.00	SOFT	0.	NO	0.	0.
54	6000.	135.00	960.00	SOFT	0.	YES	4000.	980.
55	8000.	135.00	960.00	SOFT	0.	YES	7550.	980.
56	12000.	135.00	950.00	SOFT	0.	YES	7550.	980.
57	42294.	317.82	950.00	SOFT	0.	YES	2000.	950.
58	36077.	29.70	930.00	SOFT	0.	YES	10200.	1000.
59	32088.	242.26	1040.00	SOFT	0.	YES	4900.	985.
60	23292.	129.88	950.00	SOFT	0.	YES	7550.	980.

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP17-T1000
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	SIREN NSP17	165.9	167.9	0.0	0.0	0.0	0.0	167.0	158.0	157.0	150.0	148.0

XO= 0.0 YO= 0.0 ZO= 940.00 HEIGHT ABOVE GROUND= 46.00

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP17-T1000
METEOROLOGICAL INPUT CONDITIONS

H1= 10.06 METERS H2= 43.28 METERS

YEAR	SEASON	MONTH	DATE	HOUR	WIND DIRECTION	WIND SPEED(MPS) H1	WIND SPEED(MPS) H2	TEMPERATURE(C) H1	TEMPERATURE(C) H2	RELATIVE HUMIDITY	BAROMETRIC PRESSURE(MM OF HG)
1984	S	7	22	12	188.0	3.1	3.8	28.1	27.2	68.0	760.0

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP17-T1000

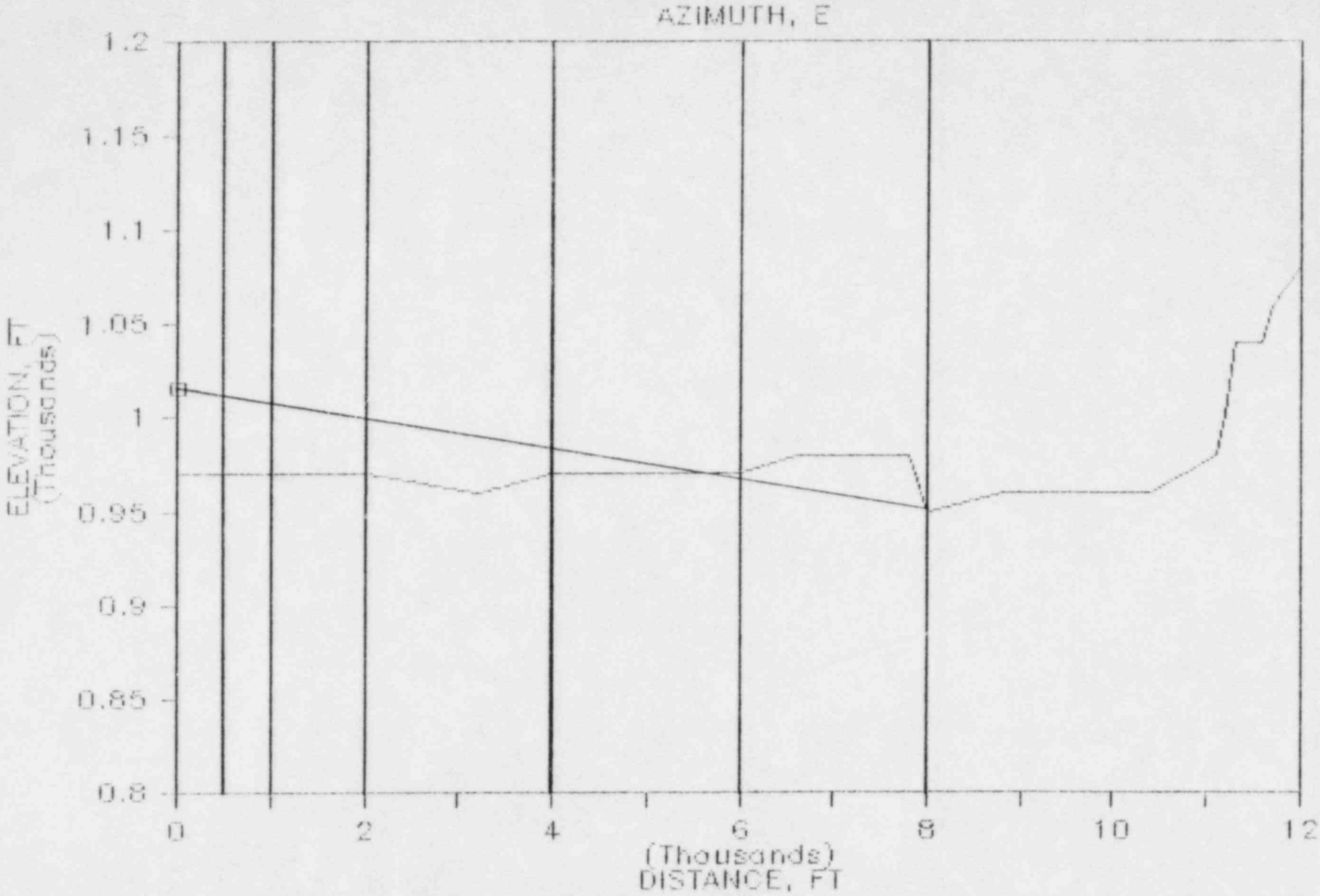
SIREN SOUND LEVELS IN DBC

UNDER MET CONDITION 1

DISTANCE IN FEET

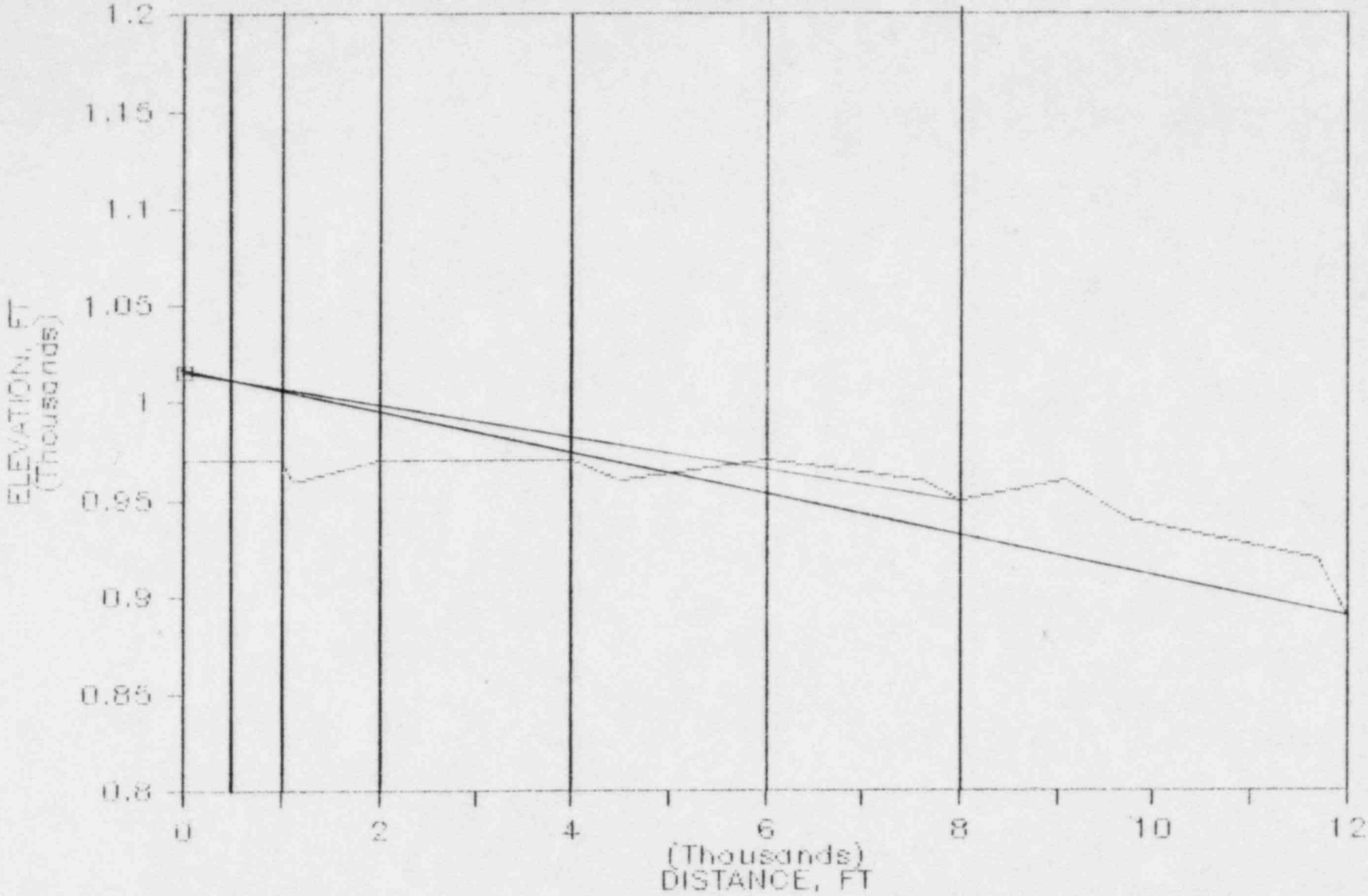
AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	114.	105.	95.	88.	76.	73.	65.
NE	114.	104.	95.	88.	84.	80.	74.
N	114.	104.	95.	88.	84.	80.	74.
NW	114.	105.	95.	80.	84.	80.	74.
W	114.	105.	95.	81.	82.	76.	64.
SW	114.	105.	95.	88.	75.	73.	67.
S	114.	104.	95.	88.	72.	68.	62.
SE	114.	104.	88.	88.	77.	72.	67.

MONTICELLO 18



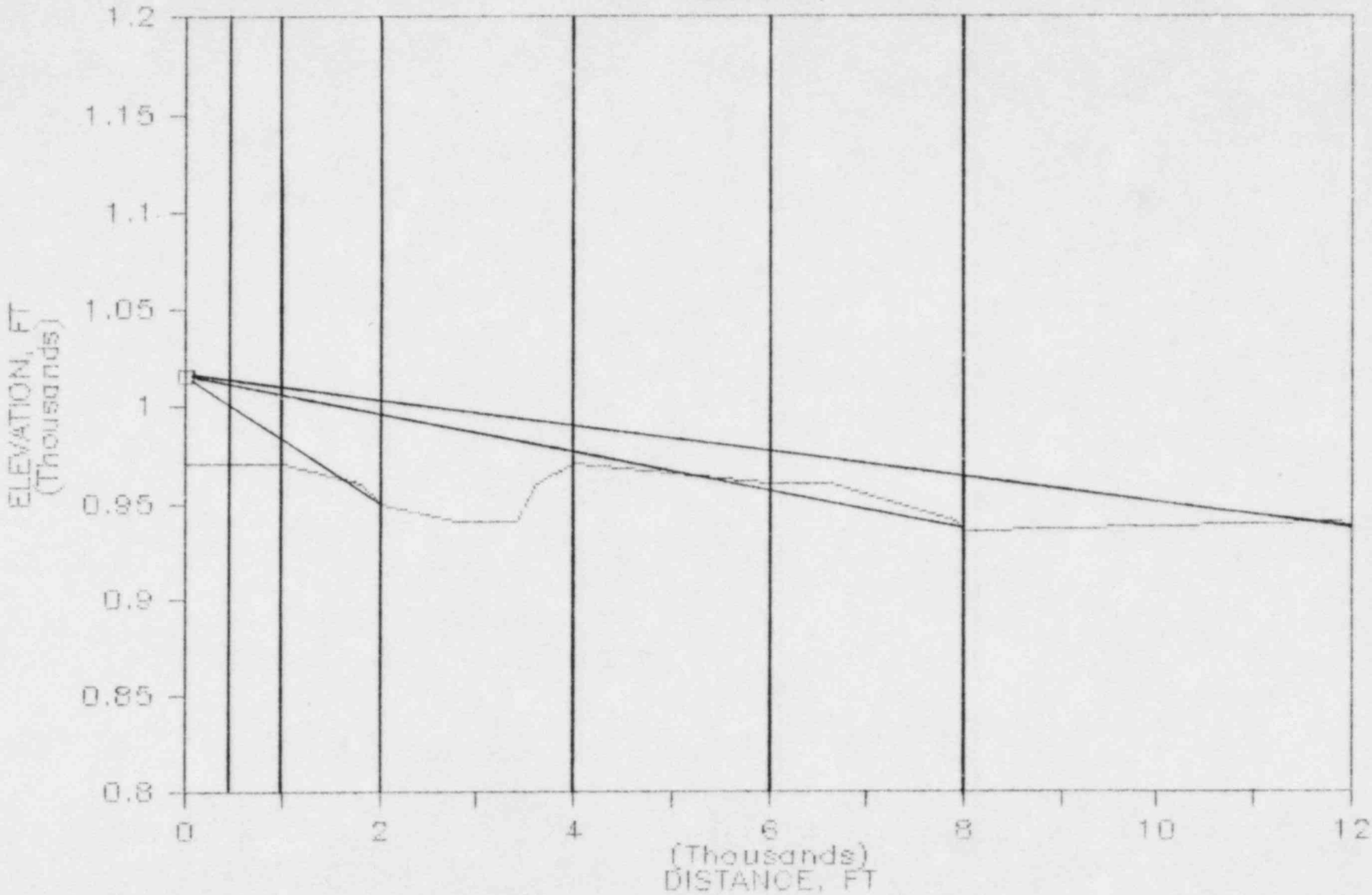
MONTICELLO 18

AZIMUTH, NE



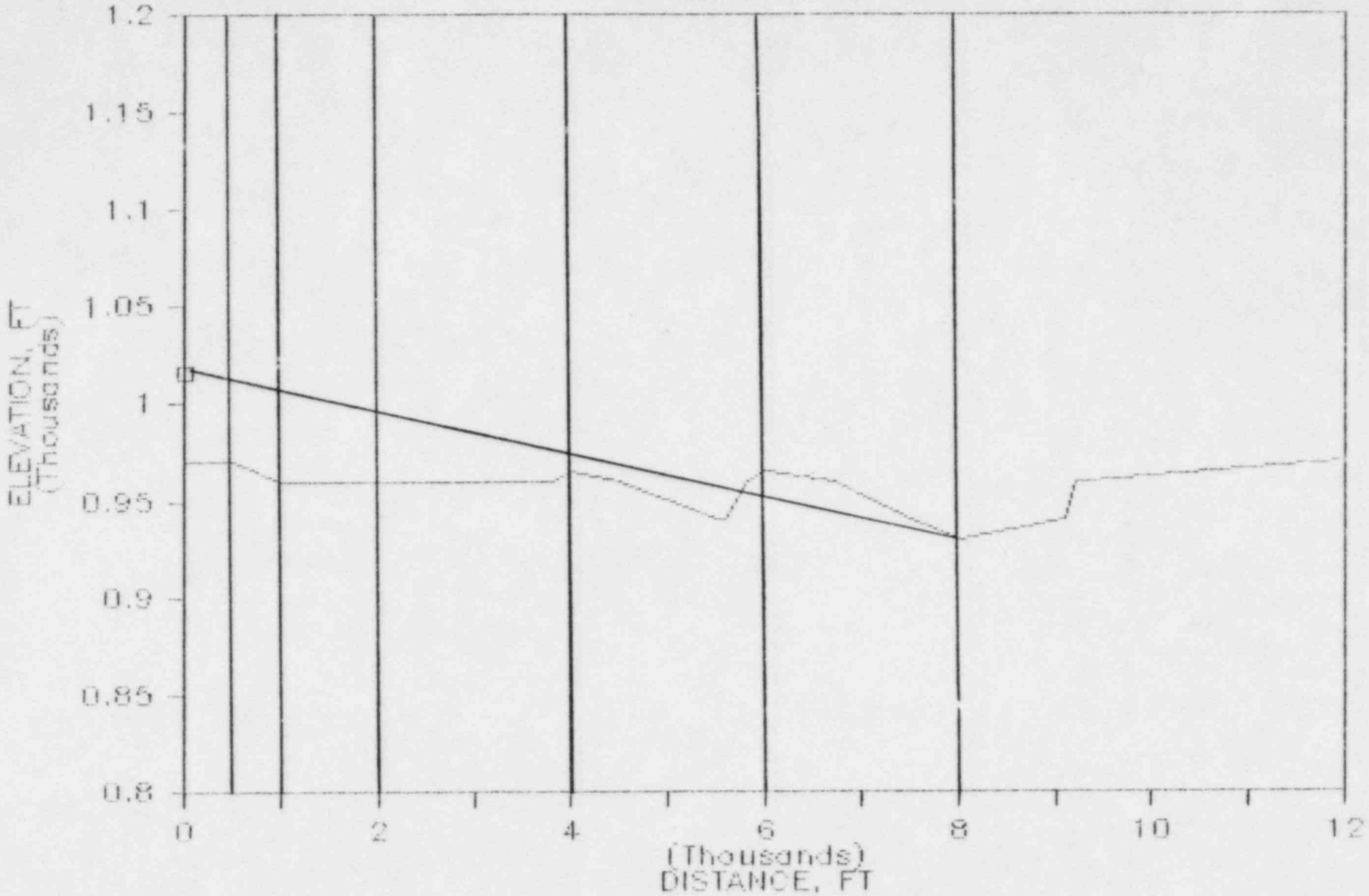
MONTICELLO 18

AZIMUTH, N



MONTICELLO 18

AZIMUTH, NW



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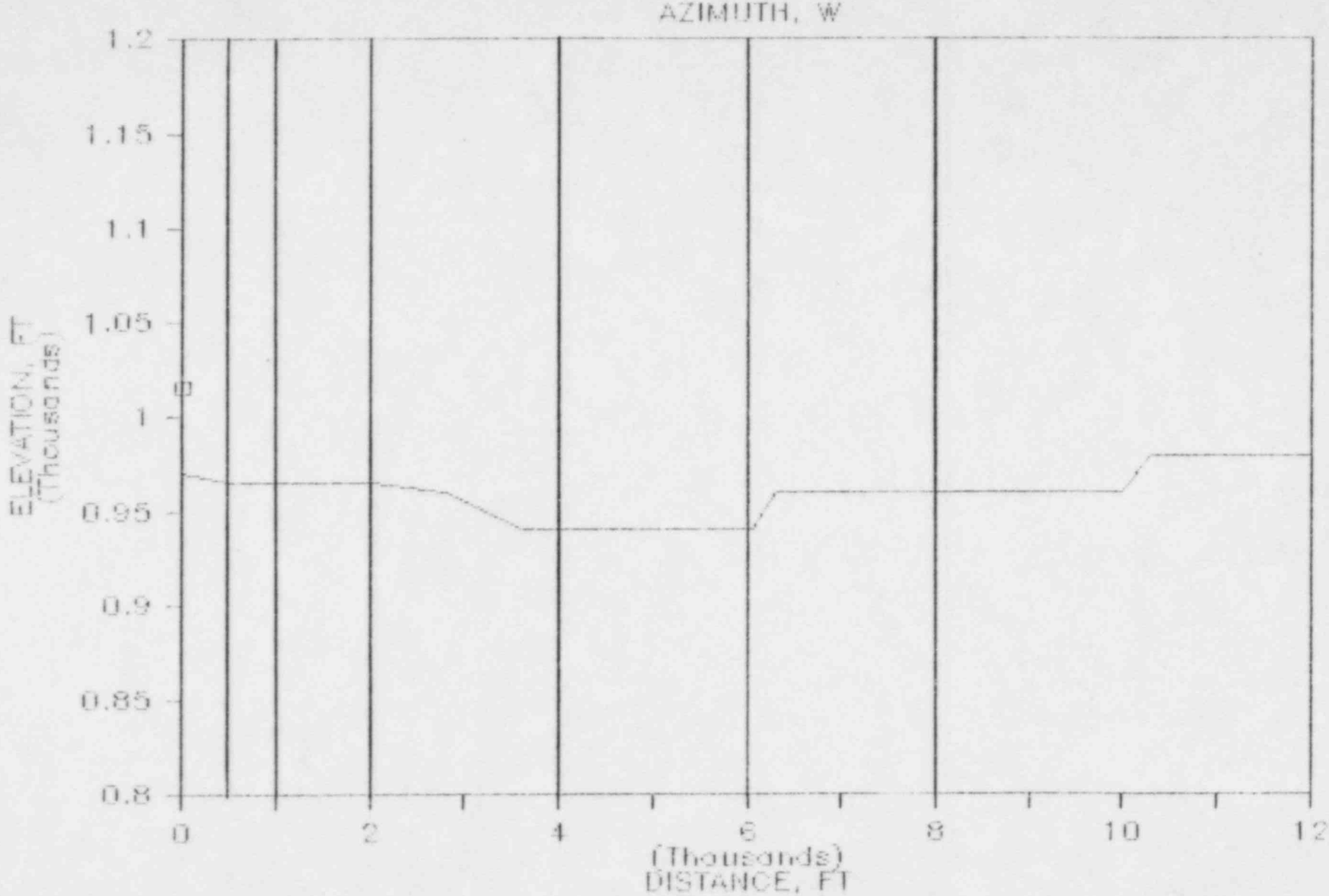
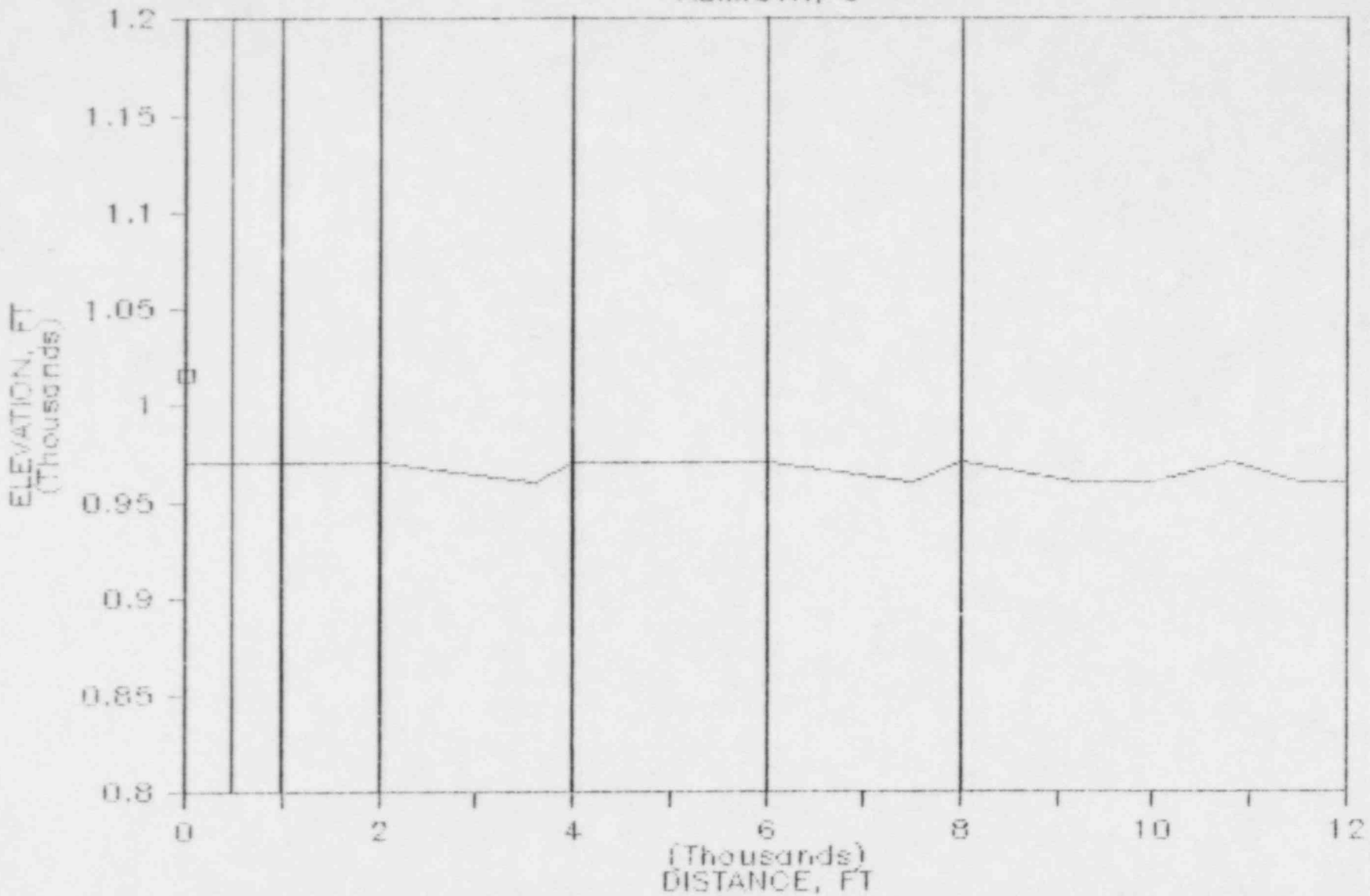


MONTICELLO 18

AZIMUTH, SW

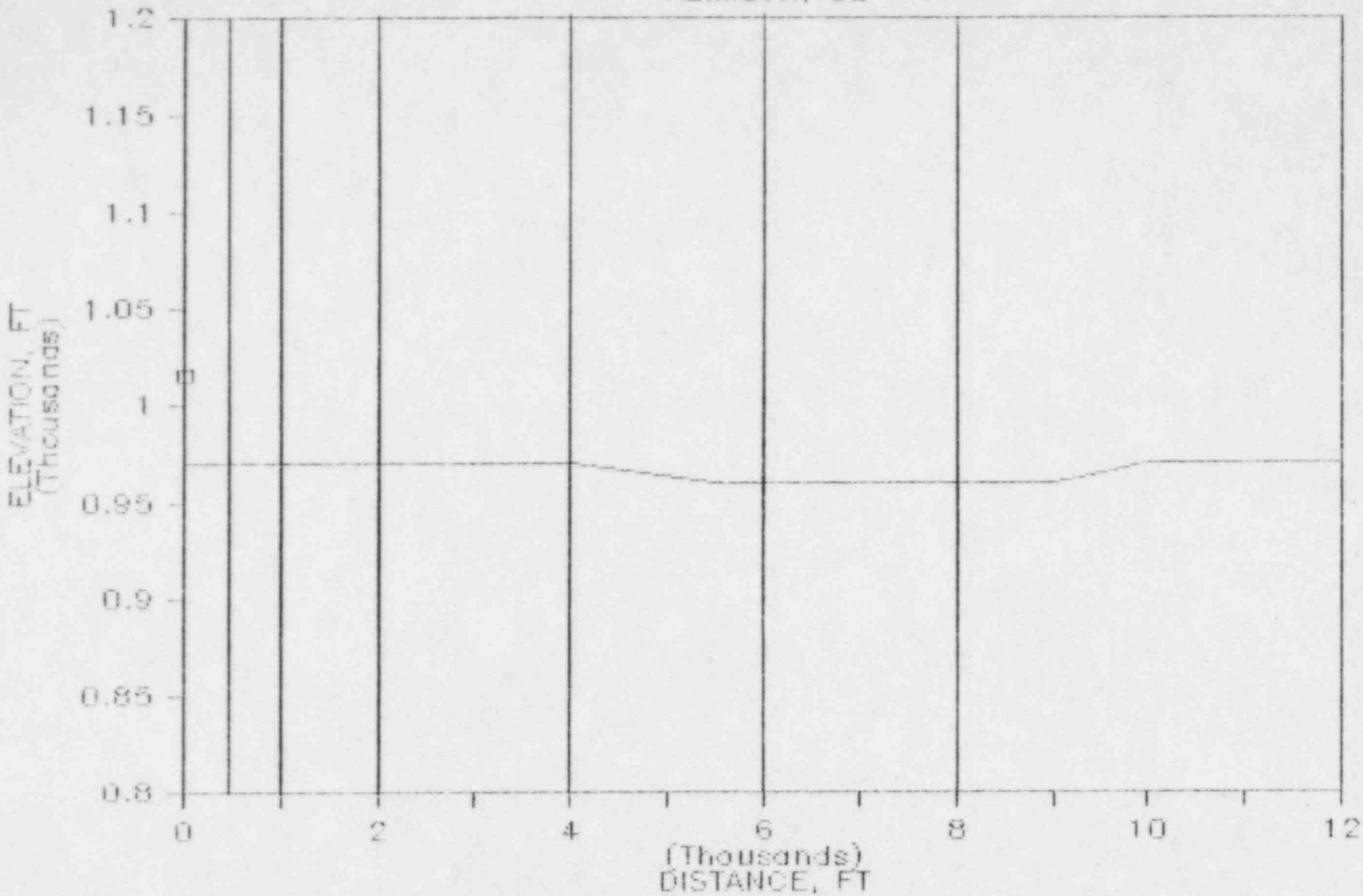
MONTICELLO 18

AZIMUTH, S



MONTICELLO 18

AZIMUTH, SE



NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP18-T1000
SOURCE-RECEIVER TOPOGRAPHICAL INPUTS

ALL BEARINGS ARE WITH RESPECT TO THE NORTH MEASURING CLOCKWISE

GRID POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENING OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
1	500.	90.00	970.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	970.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	970.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	970.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	970.00	SOFT	0.	NO	0.	0.
6	8000.	90.00	950.00	SOFT	0.	YES	7800.	981.
7	12000.	90.00	1080.00	SOFT	0.	NO	0.	0.
8	500.	45.00	970.00	SOFT	0.	NO	0.	0.
9	1000.	45.00	970.00	SOFT	0.	NO	0.	0.
10	2000.	45.00	970.00	SOFT	0.	NO	0.	0.
11	4000.	45.00	970.00	SOFT	0.	NO	0.	0.
12	6000.	45.00	970.00	SOFT	0.	NO	0.	0.
13	8000.	45.00	950.00	SOFT	0.	YES	7600.	960.
14	12000.	45.00	890.00	SOFT	0.	YES	9100.	960.
15	500.	0.0	970.00	SOFT	0.	NO	0.	0.
16	1000.	0.0	970.00	SOFT	0.	NO	0.	0.
17	2000.	0.0	950.00	SOFT	0.	YES	1850.	963.
18	4000.	0.0	970.00	SOFT	0.	NO	0.	0.
19	6000.	0.0	960.00	SOFT	0.	NO	0.	0.
20	8000.	0.0	935.00	SOFT	0.	YES	6700.	960.
21	12000.	0.0	935.00	SOFT	0.	YES	11950.	940.
22	500.	315.00	970.00	SOFT	0.	NO	0.	0.
23	1000.	315.00	960.00	SOFT	0.	NO	0.	0.
24	2000.	315.00	960.00	SOFT	0.	NO	0.	0.
25	4000.	315.00	965.00	SOFT	0.	NO	0.	0.
26	6000.	315.00	965.00	SOFT	0.	NO	0.	0.
27	8000.	315.00	930.00	SOFT	0.	YES	6650.	960.
28	12000.	315.00	970.00	SOFT	0.	NO	0.	0.
29	500.	270.00	965.00	SOFT	0.	NO	0.	0.
30	1000.	270.00	965.00	SOFT	0.	NO	0.	0.
31	2000.	270.00	965.00	SOFT	0.	NO	0.	0.
32	4000.	270.00	940.00	SOFT	0.	NO	0.	0.
33	6000.	270.00	940.00	SOFT	0.	NO	0.	0.
34	8000.	270.00	960.00	SOFT	0.	NO	0.	0.
35	12000.	270.00	980.00	SOFT	0.	NO	0.	0.
36	500.	225.00	970.00	SOFT	0.	NO	0.	0.

37	1000.	225.00	970.00	SOFT	0.	NO	0.	0.
38	2000.	225.00	970.00	SOFT	0.	NO	0.	0.
39	4000.	225.00	980.00	SOFT	0.	NO	0.	0.
40	6000.	225.00	980.00	SOFT	0.	NO	0.	0.
41	8000.	225.00	980.00	SOFT	0.	NO	0.	0.
42	12000.	225.00	980.00	SOFT	0.	NO	0.	0.
43	500.	180.00	970.00	SOFT	0.	NO	0.	0.
44	1000.	180.00	970.00	SOFT	0.	NO	0.	0.
45	2000.	180.00	970.00	SOFT	0.	NO	0.	0.
46	4000.	180.00	970.00	SOFT	0.	NO	0.	0.
47	6000.	180.00	970.00	SOFT	0.	NO	0.	0.
48	8000.	180.00	970.00	SOFT	0.	NO	0.	0.
49	12000.	180.00	960.00	HARD	0.	NO	0.	0.
50	500.	135.00	970.00	SOFT	0.	NO	0.	0.
51	1000.	135.00	970.00	SOFT	0.	NO	0.	0.
52	2000.	135.00	970.00	SOFT	0.	NO	0.	0.
53	4000.	135.00	970.00	SOFT	0.	NO	0.	0.
54	6000.	135.00	960.00	SOFT	0.	NO	0.	0.
55	8000.	135.00	960.00	SOFT	0.	NO	0.	0.
56	12000.	135.00	970.00	SOFT	0.	NO	0.	0.
57	39352.	336.15	950.00	SOFT	0.	YES	6650.	960.
58	47086.	40.15	930.00	SOFT	0.	YES	9100.	960.
59	18947.	237.13	1040.00	SOFT	0.	YES	17000.	1040.
60	32054.	108.71	950.00	SOFT	0.	YES	17000.	1040.

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP1B-T1000
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	SIREN NSP1B	165.9	167.9	0.0	0.0	0.0	0.0	167.0	158.0	157.0	150.0	148.0

XO= 0.0 YO= 0.0 ZO= 970.00 HEIGHT ABOVE GROUND= 46.00

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP1B-T1000
METEOROLOGICAL INPUT CONDITIONS

H1= 10.06 METERS H2= 43.28 METERS

YEAR	SEASON	MONTH	DATE	HOUR	WIND DIRECTION	WIND SPEED(MPS) H1	WIND SPEED(MPS) H2	TEMPERATURE(C) H1	TEMPERATURE(C) H2	RELATIVE HUMIDITY	BAROMETRIC PRESSURE(MM OF HG)
1984	S	7	22	12	188.0	3.1	3.8	28.1	27.2	68.0	760.0

NORTHERN STATES POWER COMPANY
MONTICELLO ANS SIREN #NSP18-T1000

SIREN SOUND LEVELS IN DBC

UNDER MET CONDITION 1

DISTANCE IN FEET

AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	114.	105.	95.	88.	84.	67.	74.
NE	114.	105.	95.	88.	84.	74.	65.
N	114.	105.	87.	88.	84.	74.	67.
NW	114.	105.	95.	88.	84.	73.	74.
W	114.	105.	95.	88.	82.	76.	64.
SW	114.	105.	95.	88.	84.	80.	74.
S	114.	105.	95.	86.	84.	80.	73.
SE	114.	105.	95.	88.	84.	80.	72.

APPENDIX B

Sample Size Determination

APPENDIX B

SAMPLE SIZE DETERMINATION

The number of households that need to be surveyed is determined based upon the need to obtain a sample size sufficient to obtain a 95% confidence interval with precision (half-width) of 0.05 for the estimate of the porportion alerted. The exact number of households to be surveyed can be derived from the following statistical considerations. For relatively large sample sizes ($n \geq 30$), taken without replacement from a population (N), the sampling distribution for proportions (e.g., the proportion of the population alerted) is nearly a normal distribution, the mean of which is the proportion (p) of the population alerted and the variance of which is

$$p(1 - p)/n \left(\frac{N - n}{N - 1}\right)$$

If P is the observed sample proportion, then for a particular confidence level with confidence coefficient Z_c,

$$(P - p)^2 \leq Z_c^2 \, p(1 - p)/n \left(\frac{N - n}{N - 1}\right)$$

Thus, for this confidence level, the actual proportion of the population alerted satisfies the following inequalities:

$$\frac{p + \frac{Z_c^2}{2n}\left(\frac{N - n}{N - 1}\right) - Z_c\sqrt{\frac{P(1 - P)}{n}\left(\frac{N - n}{N - 1}\right) + \frac{Z_c^2}{4n^2}\left(\frac{N - n}{N - 1}\right)^2}}{1 + \frac{Z_c^2}{n}\left(\frac{N - n}{N - 1}\right)} \leq p \text{ and}$$

$$P \leq \frac{P + \frac{Z_c^2}{2n}\left(\frac{N-n}{N-1}\right) + Z_c\sqrt{\frac{P(1-P)}{n}\left(\frac{N-n}{N-1}\right) + \frac{Z_c^2}{4n^2}\left(\frac{N-n}{N-1}\right)^2}}{1 + \frac{Z_c^2}{n}\left(\frac{N-n}{N-1}\right)}$$

Thus, the precision (W) is simply given by

$$W = \frac{Z_c\sqrt{\frac{P(1-P)}{n}\left(\frac{N-n}{N-1}\right) + \frac{Z_c^2}{4n^2}\left(\frac{N-n}{N-1}\right)^2}}{1 + \frac{Z_c^2}{n}\left(\frac{N-n}{N-1}\right)}$$

This equation can be solved to determine the sample size (n) required to yield a given precision (W) with a given observed sample proportion (P) as follows:

$$n = \frac{\frac{Z_c^2}{2W^2}\left[P(1-P) - 2W^2 + \sqrt{W^2\left[1 - 4P(1-P)\right] + P^2(1-P)^2}\right]}{1 + \frac{Z_c^2}{2W^2N}\left[P(1-P) - 2W^2\left(1 + \frac{1}{Z_c^2}\right) + \sqrt{W^2\left[1 - 4P(1-P)\right] + P^2(1-P)^2}\right]}$$

Although this expression for n can be used directly, it is customary to make several approximations. First, since the term in N in the denominator (the finite population term) is positive definite for all reasonable values of W ($0 < W < 0.5$), omitting this term will result in an approximation to n that is slightly larger than its true value. This is an acceptable practice in sizing the sample since a larger sample gives greater precision.

A second approximation that can be made is to neglect the terms in W^2 within the bracket in the numerator. Analysis demonstrates that this underestimates n when $P < 1/2 - 1/4 \sqrt{2 + 8W^2}$ or $P > 1/2 + 1/4 \sqrt{2 + 8W^2}$ and overestimates n for P between those two values. For the case of interest (a 95% confidence interval with precision of 0.05), this approximation provides an overestimation of n when a sample size greater than 191 is required. Since the sampling plan calls for a minimum sample size of 250, regardless of the value of P, this approximation is acceptable because it also yields an estimate of n larger than the true value. Therefore, for the purposes of the pilot test and subsequent surveys, the following approximate equation can be used to determine whether a sample size larger than 250 is required:

$$n = \frac{Z_c^2}{W^2} P(1 - P)$$

or using 1.96 for Z_c and 0.05 for W,

$$n = 1536.64\ P(1 - P)$$

Data from the pilot test can be used to illustrate the effects of these approximations. In the pilot test, the population of tone alert households from which the sample was to be drawn (N) was approximately 4500 and the observed proportion alerted (P) was 0.675. This yields 311 as the exact result for n. Neglecting the finite population term yields an estimate of 334 for n, and the simplified final approximation estimates n as 338. Thus, the final simplified approximation overestimates the required sample size by 27 in this case.

SOURCE: International Energy Associates Limited. "Analysis of Tone Alert Pilot Test." IEAL-321. September 27, 1983.