50-331 DUANE ARNOLD

SITE-SPECIFIC OFFSITE RADIOLOGICAL PREPAREDNESS ALERT NOTIFICATION SYS QUALITY ASSURANCE VERIFICATION

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DUANE ARNOLD ENERGY CENTER
SITE-SPECIFIC OFFSITE RADIOLOGICAL EMERGENCY PREPAREDNESS ALERT AND NOTIFICATION SYSTEM QUALITY ASSURANCE VERIFICATION

Prepared for

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Duane Arnold Energy Center
Site-Specific Offsite Radiological Emergency
Preparedness Alert And Notification System
Quality Assurance Verification

State Of Iowa

Benton County
Linn County

I. INTRODUCTION

A. Identification

1. Site Information

The Duane Arnold Energy Center is located in east-central Iowa in the western portion of Linn County, approximately 10 miles northwest of the city of Cedar Rapids, Iowa (1980 census population 110,243 persons) and 35 miles northwest of Iowa City, Iowa. The plant is situated on the western side of a north-south reach of the Cedar River, approximately 2.5 miles north-northeast of the town of Palo, Iowa (1980 population 529 persons).[1,2]

The area surrounding the Duane Arnold Energy Center site is used primarily for agricultural purposes. The major harvested crops are corn, oats, and soybeans, while the major livestock animals are cattle and hogs. Poultry is also a significant farm product. The industrial activities within 10 miles of the Duane Arnold Energy Center are confined principally to the Cedar Rapids-Marion metropolitan area.

The topography of the site varies. A relatively flat plain (approximately 750 ft. above mean sea level) extends from the site towards the town of Palo to the southwest, and most of this land is farmland. Across the river from the site, the land rises to an elevation of approximately 900 ft., these slopes are heavily wooded with only an occasional field or pasture dotting the landscape. Beyond this rise, the terrain is gently rolling farmland. Immediately adjacent to the east of the site is another heavily wooded low area that constitutes the current flood plain. This area is very flat and extends approximately 1,500 ft. to the west bank of the river.[1,3]

Recreational activities in the vicinity of the Duane Arnold Energy Center include fishing, boating, swimming, camping, and hunting. The Pleasant Creek State Park is located 3 miles northwest of the plant site, within 1 mile of the west bank of the Cedar River. Directly east of the site and adjacent to the east bank of the river lies the Wickiup Hill Conservation Area, used primarily for hiking, camping, and hunting. Other recreational areas include Palo Marsh Wildlife Refuge and Chain Lakes County Park, located 2 and 5 miles south of the plant site respectively, in the Cedar River floodplain; Morgan Creek Park, located 9 miles south of the site; and the Lewis Bottoms Park and Game Preserve, located 3 miles north of the site along the Cedar River. (In the vicinity of the Duane Arnold Energy Center site, the Cedar River is not navigable.)[1,3]

2. Governments Within The 10-Mile Emergency Planning Zone

The emergency planning zone (EPZ) for the Duane Arnold Energy Center is an irregular shape that approximates a 10-mile-radius circle. The originally designed EPZ was modified to include areas of Cedar Rapids and Marion outside the 10-mile-radius circle with the station as the center point. This EPZ is situated in two counties: the eastern two-thirds of the EPZ is located in Linn County and the western one-third is located in Benton County. Linn County, although it includes the Cedar Rapids-Marion metropolitan area, is predominantly rural. Benton County remains a typical agricultural area. The Duane Arnold Energy Center EPZ is located entirely within the State of Iowa and Benton and Linn Counties.

The 1980 resident population of the Duane Arnold Energy Center EPZ was 148,271 persons. Populated areas located within the Duane Arnold Energy Center EPZ include Cedar Rapids (located between 8 and 14 miles southeast of the plant, 1980 population 110,243 persons); Marion (located 10 miles east southeast of the plant, 1980 population 19,474 persons); Hiawatha (located 6.5 miles southeast of the plant; population 4,825 persons); and Center Point (located 6 miles north of the plant, population 1,591 persons). Smaller communities in the EPZ include Atkins, Shellsburg, Urbana, Alburnett and Robins. Aside from these areas of population concentration, the EPZ is primarily rural and sparsely populated.[2,3]

The map in Appendix C to reference 3 of this report identifies the area within the Duane Arnold Energy Center EPZ with a population density greater than 2,000 persons per square mile. This area includes portions of the cities of Cedar Rapids, Marion, and Hiawatha, all located in the southeast portion of the EPZ.[3]

B. Scope Of Review

1. Emergency Plans For Offsite Response Organizations

Both the Iowa Electric Light and Power Company's reports, "An Off-Site Emergency Plan Prompt Alert And Notification System Addendum For The Duane Arnold Energy Center"[3] and "An Off-site Emergency Plan Prompt Alert and Notification System Addendum For The Duane Arnold Energy Center" (Revision 3: July 1989)[13] describe the public alert and notification system evaluated in this quality assurance verification review. State and local emergency response plans and implementing instructions applicable to this review are included in the:

- State of Iowa, "Iowa Radiological Emergency Response Plan, Section B, Nuclear Power Plant Accident/Incident (Part IV of Iowa Emergency Plan)," Revision 6, September 1987;[4]
- Benton County, "Benton County Radiological Emergency Response Plan," Revision I, September 15, 1988;[5] and
- Linn County, "Linn County Radiological Emergency Response Plan," Revision, September, 15 1988.[6]

References 3 through 6 and reference 13 document the administrative means established for notifying and providing prompt instructions to the public within the Duane Arnold Energy Center EPZ.

2. Alert And Notification System Design Report

The physical means established for alerting the public within the Duane Arnold Energy Center EPZ are documented in the following:

- Iowa Electric Light and Power Company, letter from David L. Wilson, Manager, Nuclear Licensing and Emergency Planning, to Mr. Robert S. Wilkerson, Chief, Field Operations Branch, Technological Hazards Division, Federal Emergency Management Agency, dated October 21, 1986, enclosing one copy of "An Off-Site Emergency Plan Prompt Alert And Notification System Addendum For The Duane Arnold Energy Center," dated October 1986[3] and "An Off-site Emergency Plan Prompt Alert and Notification System Addendum For the Duane Arnold Energy Center," Revision 3 dated July 1989.[13] (These letters and corresponding enclosures are hereinafter referred to as the Design Report.)

3. FEMA Evaluation Findings

The Federal Emergency Management Agency (FEMA) Region VII and the Regional Assistance Committee have evaluated the following offsite emergency preparedness exercise for the Duane Arnold Energy Center:

- FEMA, "Exercise Evaluation of the Implementation of State and Local Radiological Emergency Response Plans Conducted November 18, 1986 and the Remedial Exercise Conducted January 22, 1987 for the Duane Arnold Energy Center," February 11, 1987.[7]

- FEMA, "Exercise Evaluation of the Implementation of State and Local Radiological Emergency Response Plans Conducted November 9, 1988 and the Remedial Exercise Conducted December 1, 1988 for the Duane Arnold Energy Center," January 9, 1989.[14]

II. FINDINGS FOR EVALUATION CRITERION E.6

The Design Report describing the alert and notification system for the Duane Arnold Energy Center 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.[8]

The bases for review against this evaluation criterion were the corresponding acceptance criteria of FEMA-REP-10, "Guide for the Evaluation of Alert and Notification Systems for Nuclear Power Plants"[9] (hereinafter referred to as FEMA-REP-10). This quality assurance verification review was performed to make a determination of alert and notification system adequacy prior to conducting a demonstration of this system for the Duane Arnold Energy Center.

Based upon this quality assurance verification review, ERC Environmental and Energy Services Company (formerly International Energy Associates Limited) concluded that the design and implementation of the alert and notification system for the Duane Arnold Energy Center and its supporting procedures conformed sufficiently to the acceptance criteria, as stated in FEMA-REP-10, 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 evaluates the Duane Arnold Energy Center's alert and notification system against FEMA-REP-10 acceptance criteria in the following areas: the administrative means of alerting, the physical means of alerting, and the special alerting methods.

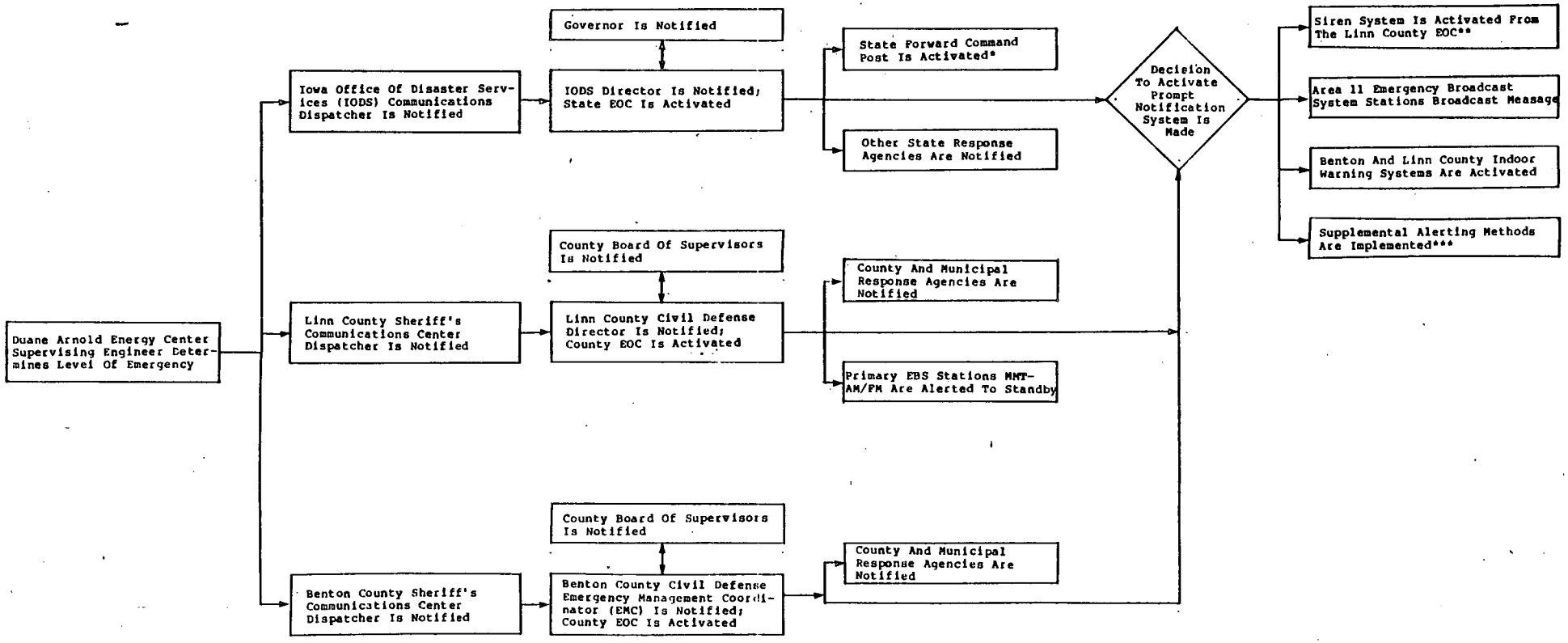
A. Administrative Means Of Alerting (E.6.1, FEMA-REP-10)

The Design Report specifies those organizations or individuals within the state and local governments who are responsible for recommending alert and notification system activation for the Duane Arnold Energy Center. The decision logic shown in Figure 1 of this report was developed after a review of the current emergency procedures and implementing instructions for the Duane Arnold Energy Center, the State of Iowa, and Benton and Linn Counties.

The current emergency procedures document the responsibilities concerning the alert and notification system activation process from the time the emergency message is conveyed from the Duane Arnold Energy Center control room to the state and county warning points and to the state and county officials who are responsible for making the decision to activate the public alert and notification system. As Figure 1 indicates, these procedures satisfy FEMA-REP-10 acceptance criteria.

FIGURE 1

DUANE ARNOLD ENERGY CENTER
ALERT AND NOTIFICATION SYSTEM ACTIVATION DECISION/ACTION SEQUENCE DIAGRAM



*During non-duty hours, state notification is made to the Iowa State Patrol Communications Dispatcher.

**Siren system may also be activated by Benton County.

***Supplemental alerting methods include NOAA weather radio, county civil defense and municipal fire department sirens, and emergency vehicle alerting.

In the event of an incident at the Duane Arnold Energy Center, emergency information is disseminated and requests for assistance made via dedicated commercial telephone lines. A conference hot line using speaker phones is established linking the state Emergency Operations Center (EOC) and the Benton and Linn county EOCs. A dedicated Health Physics phcne line links the Iowa State Department of Health (ISDH) with the University of Iowa State Hygienic Laboratory (UHL) and the Radiological Monitoring Team coordinators at the utility's offsite Emergency Operations Facility (EOF). Backup communications systems include the Iowa Law Enforcement point-to-point radio alarm system linking the Benton and Linn county sheriff departments with the Iowa State Department of Public Safety Communications Center as well as the Microwave Teletype System.

Initial determination of an emergency classification which may require protective actions is made by the Shift Supervising Engineer at the Duane Arnold Energy center. The Supervising Engineer initiates the notification process by contacting the state and county warning points simultaneously via the dedicated conference hot line telephone system, providing the emergency classification, and recommending the appropriate protective actions.

During regular work hours state notification is made to the Iowa Disaster Services Division (IDSD) Communications Dispatcher, who verifies the message by return phone call. The dispatcher then notifies the IDSD Duty Officer and/or Administrator, Benton and Linn Counties, and all state agencies having response roles.

During non-duty hours state notification is made to the Iowa State Patrol Communications Dispatcher, who verifies the message and make the notifications as listed above. Command and coordination of the emergency response at the state level is exercised by the Governor and/or the IDSD Administrator from the state EOC, which is located in Des Moines.

County nctification is made by the Supervising Engineer at the Duane Arnold Energy Center to the Linn and Benton Counties sheriffs' communications centers (the respective county civil defense communications centers will serve as backup notification points). Upon verification of the messages by return phone call to the Duane Arnold Energy Center control room, the county communications dispatchers begin fan-out notification of key county and municipal personnel by telephone call list, radio, or pager. (Notification of the counties by the state will serve as redundant notification/verification.) The Linn County Communications Dispatcher notifies the county Civil Defense Director (CDD), who activates the Linn County EOC, while the Benton County Communications Dispatcher notifies the county Civil Defense and Disaster Services Emergency Management Coordinator (EMC), who activates the Benton County EOC. Any necessary protective actions are initiated by these county direction and control officials based on recommendations made by the Duane Arnold Energy Center Supervising Engineer and concurred with by the Governor, ISDH, and UHL.

The activation of the prompt notification siren system can be accomplished from either the Benton County EOC or

the Linn County EOC in coordination with recommendations from IDSD. The primary responsibility for the activation is with Linn County, with Benton County acting as the secondary activation point. Similarly, activation of the Area 11 Emergency Broadcast System (EBS) via dedicated telephone line is the primary responsibility of Linn County, with Benton County acting as the secondary activation point. These primary responsibilities do not preclude Benton County officials from activating the siren system or the EBS Common Program Control stations (Primary Stations WMT-AM/FM, Cedar Rapids) should these systems not be activated prior to Benton County's needs. Once activation of the siren and EBS systems is complete, the activating county immediately notifies the other county of the action taken.

The Common Program Control stations are monitored for the EBS tone by other stations on the area EBS network. These stations are capable of broadcasting official information 24 hours per day, 7 days per week, and have emergency power available. All EOCs have radio and television capability to monitor the pre-scripted emergency broadcast messages.

The Linn County EOC has a dedicated Civil Defense Direct Line Telephone System link with area radio stations (KQCR, KCRG, KCCK, KHAK, and WMT) and two television stations (KGAN, KCRG), as well as public safety agencies and schools. All phones on the system ring simultaneously when the Linn County Civil Defense Director instructs the Cedar Rapids Fire Department dispatcher to

activate the system. The school warning point is also on the direct line system and once notified transmits a fan-out message to appropriate school officials and individual schools. In addition, a direct audio transmit site is located in the Linn County EOC so that emergency information may be broadcast directly to the public from the EOC via the local radio stations.

Additional alerting systems such as county and municipal civil defense siren systems, alerting by police, fire, or rescue vehicles, and institutional alerting systems are described in Section E.6.2.4, Special Alerting.

B. Physical Means of Alerting (E.6.2, FEMA-REP-10)

As described in the original Design Report and Revision 1, the physical means of alerting for the Duane Arnold Energy Center consist of 87 originally designed fixed siren units and 22 fixed siren units added after this initial acoustical analysis.[3,12,13]

1. Sirens (E.6.2.1, FEMA-REP-10)

The Duane Arnold Energy Center siren alerting system, as submitted in the original Design Report, was evaluated in accordance with the design evaluation methodology detailed in "Analysis of Siren System Pilot Test."[10]

The original siren system as analyzed consists of the following mix of sirens manufactured by Federal Signal Corporation and Whelen Engineering Company:

Quantity	Siren Model	Rating (at 100 ft.)	Type
1	FS-SD10	109 dBC	Omni-directional
1	FS-3T22	113 dBC	Omni-directional
16	FS-1003	122 dBC	Rotating
8	WS-2000	115 dBC	Rotating
61	WS-3000	123 dBC	Rotating

Siren locations, mounting heights, and ratings are shown in Table 4-1 of Appendix B of the Design Report. The siren locations are also indicated on the Siren Contour Map in Appendix C.

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

Routine siren testing procedures and operability for the Duane Arnold Energy Center siren system have been reviewed and determined to satisfy FEMA-REP-10 operability requirements.

The evaluations of the siren system design calculation procedure was conducted by:

- Verifying the design calculation procedure as presented in Section 2.4.2 of the Design 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 comparison of the design procedure with the Outdoor Sound Propagation Model (OSPM)[10]

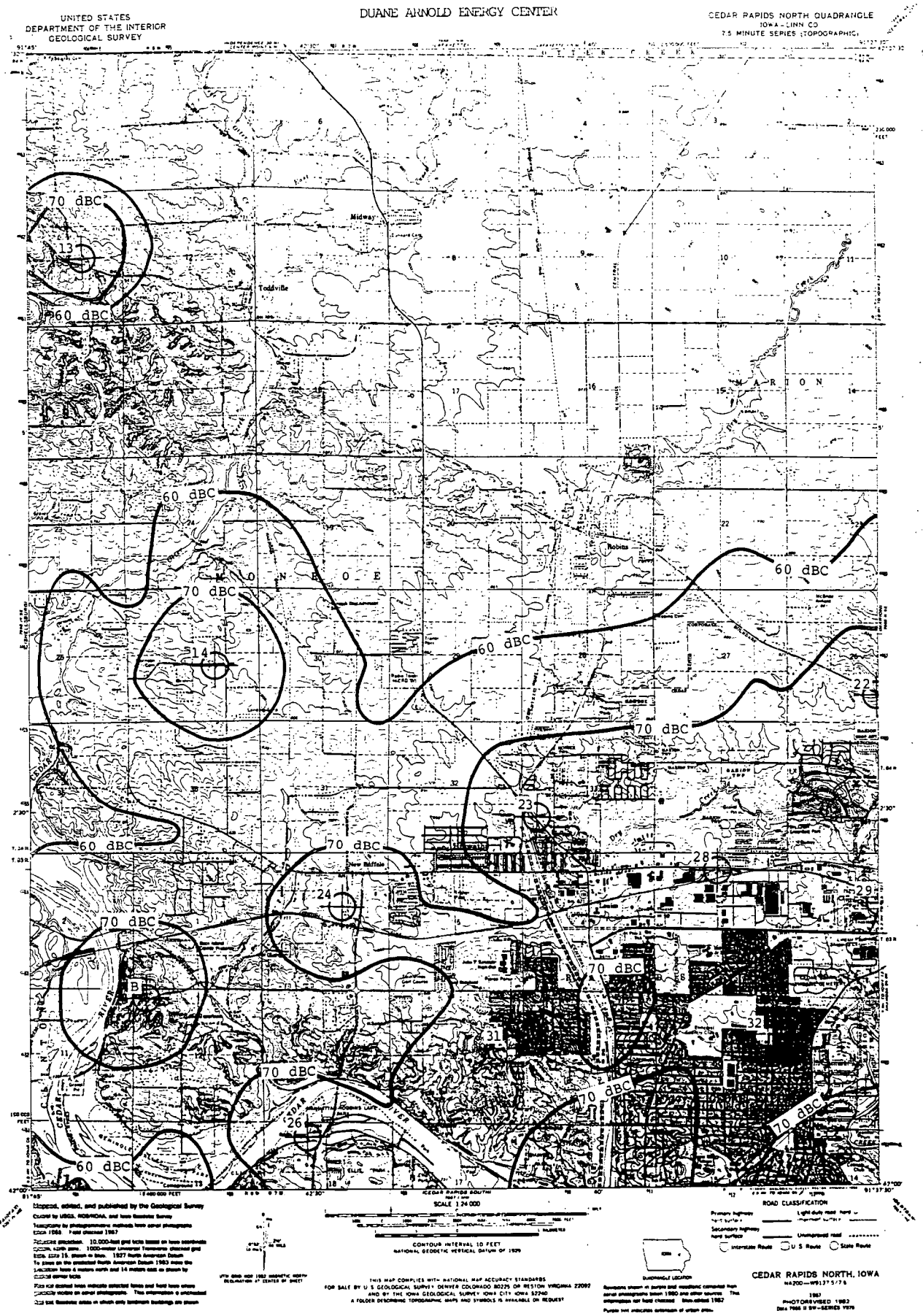
The Duane Arnold Energy Center siren alerting system design used Figure 1 of CPG 1-17[11] in the absence of intervening topographical features to predict the siren ranges to 70 dBC. The ranges from 70 dBC to 60 dBC were then computed based on an attenuation rate of 10 dB loss per distance doubled. Kurze's point scurce barrier attenuation formulation, with a cap of 24 dB maximum reduction, was then applied through visual inspection of USGS topographic maps to topographical features representing acoustical barriers. A logarithmic super position procedure was formulated for computing the locations of the 70 dBC contour lines which were influenced by two sirens (irrespective of rotating or omni-directional siren types). However, no credit was taken for this additive effect when computing the 60 dBC contours. These procedures were applied to the entire system of 87 fixed sirens resulting in the Siren Contour Map in Appendix C of the Design Report. The map also depicts one geographical area in the southeast corner of the EPZ with a population density greater than 2,000 persons per square mile.

This quality assurance verification review seeks to ascertain whether this design procedure, namely the 10 dB loss per distance doubled attenuation rate, adequately accounts for the site-specific terrain and weather conditions and whether the siren alerting system (as designed) does indeed meet the FEMA-REP-10 acceptance criteria.

Eleven sirens, depicted on the U.S. Geological Survey's Cedar Rapids North quadrangle map (see Figure 2 of this report), were selected for this quality assurance verification review. This

FIGURE 2

DUANE ARNOLD ENERGY CENTER



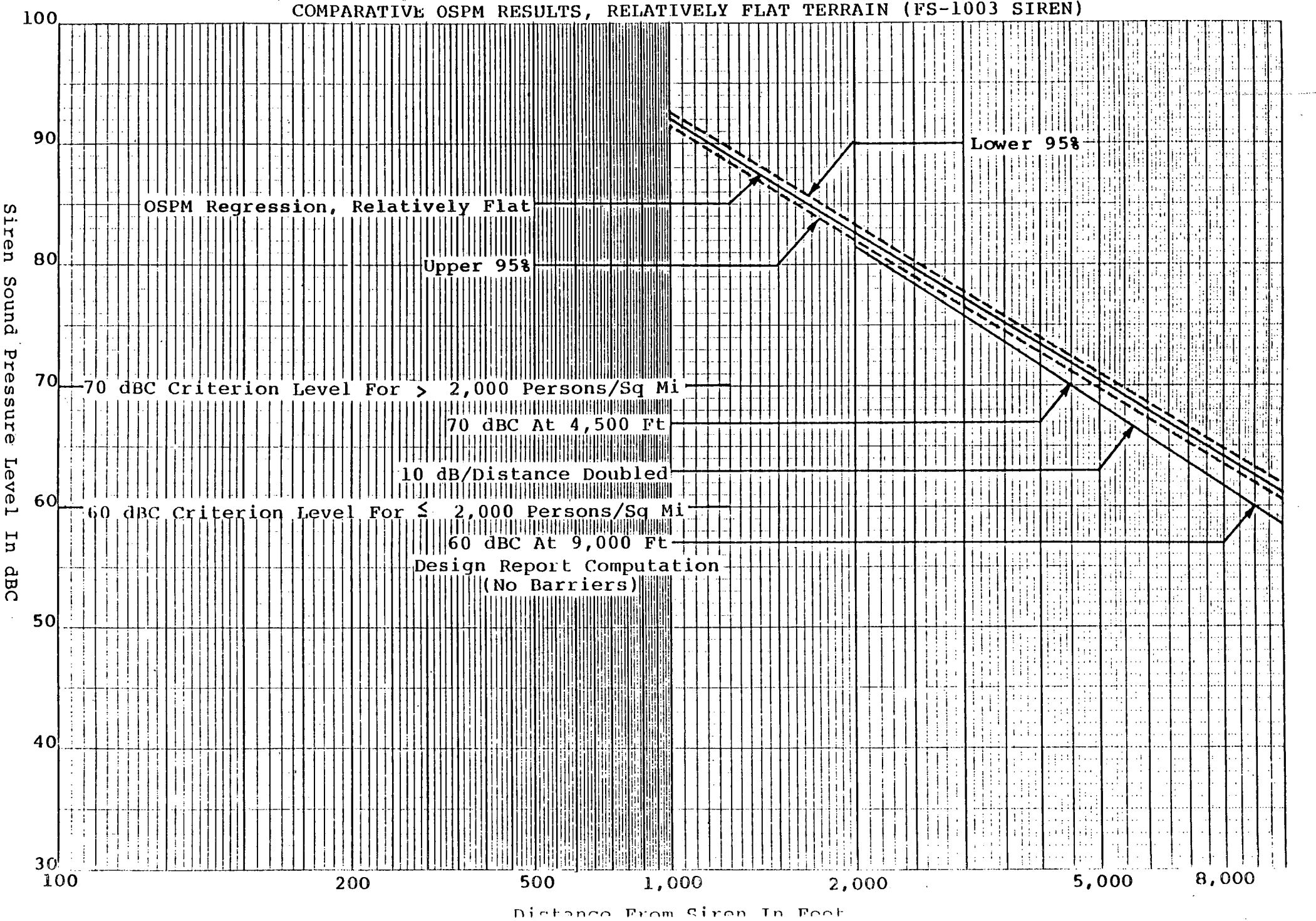
selection is representative of the site-specific topographical conditions around the more populated areas within the Duane Arnold Energy Center EPZ.

Surface weather parameters, representative of site prevailing summer daytime conditions, were used in the OSPM calculations. Appendix A of this report contains OSPM topographical profile charts, OSPM topographical input, OSPM siren sound pressure level input, OSPM meteorological input, and OSPM siren sound pressure level output for each of the 11 individual siren runs.

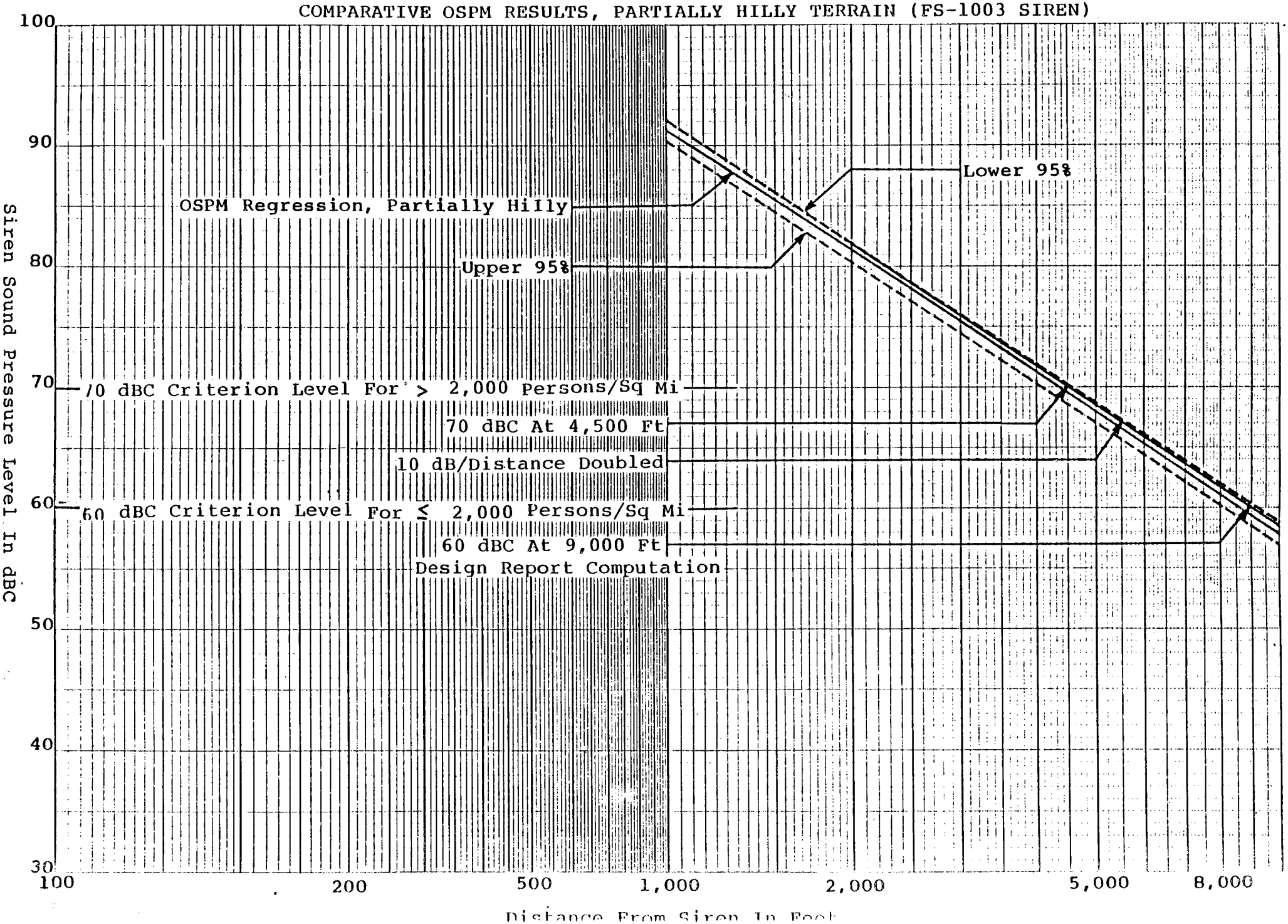
To compare the ranging estimates of OSPM with the design procedure for each type of siren analyzed, the output dBC levels along each azimuth of the 11 sirens were classified into three terrain categories: flat terrain (generally unobstructed line-of-sight); partially hilly terrain (very slightly obstructed line-of-sight); and hilly terrain (obstructed line-of-site). Regressions of dBC versus the logarithm of distance were performed for the sirens over these categories.

The OSPM regression results of the siren sound pressure levels are presented in Figures 3 through 8 of this report. Also depicted are the ranges of 60 dBC and 70 dBC as calculated by the licensee using the 10 dB loss per distance doubled attenuation rate with no barriers. The following table summarizes the estimated effective ranges of 70 dBC and 60 dBC over the various terrain classifications:

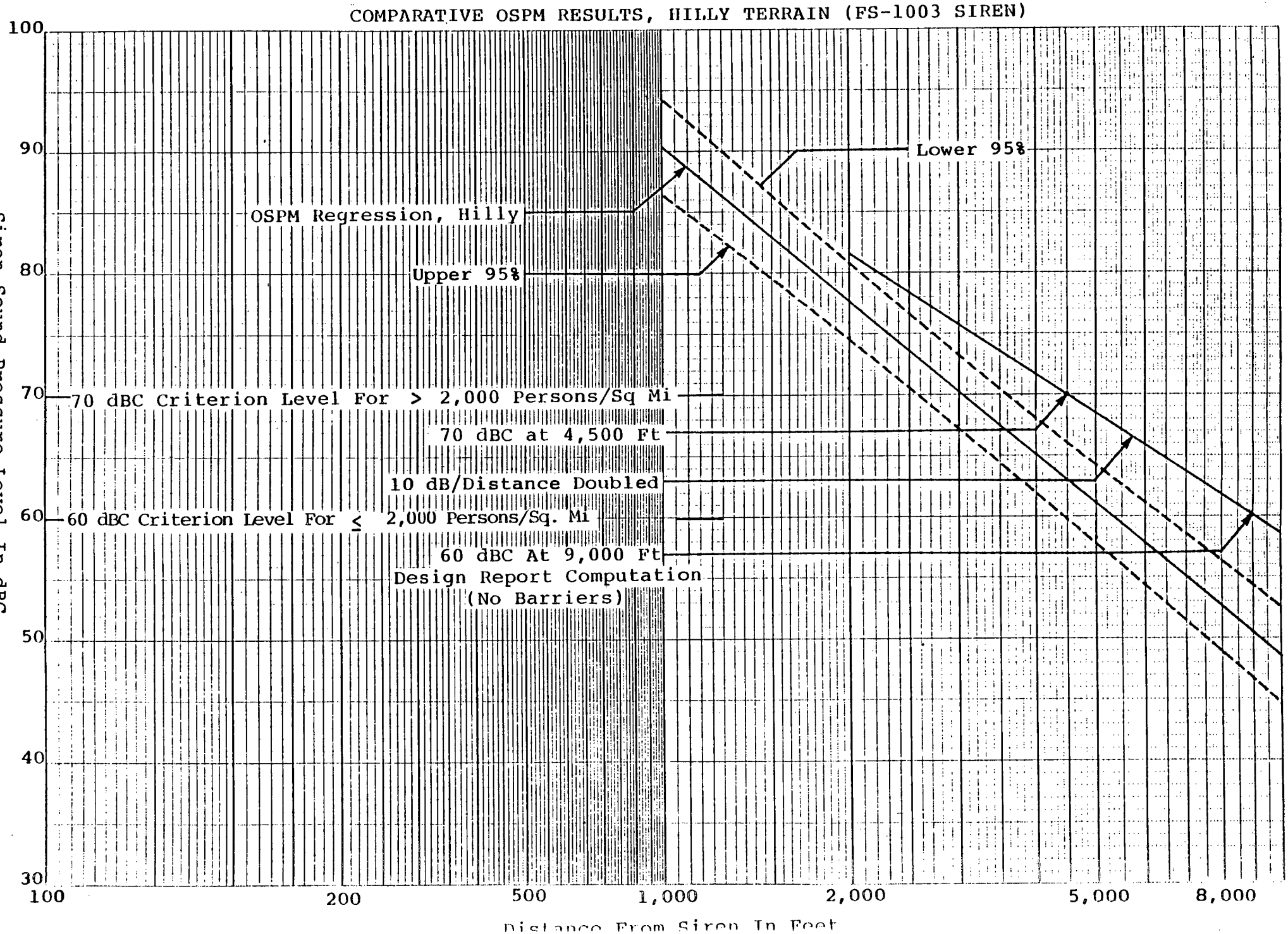
FIGURE


COMPARATIVE OSPM RESULTS, RELATIVELY FLAT TERRAIN (FS-1003 SIREN)
Siren Sound Pressure Level In dBC
100
90
80
70
60
50
40
30
OSPM Regression, Relatively Flat
Upper 95%
Lower 95%
70 dBC Criterion Level For > 2,000 Persons/Sq Mi
70 dBC At 4,500 Ft
10 dB/Distance Doubled
60 dBC Criterion Level For ≤ 2,000 Persons/Sq Mi
60 dBC At 9,000 Ft
Design Report Computation
(No Barriers)
100
200
500
1,000
2,000
5,000
8,000
Distance From Siren In Feet

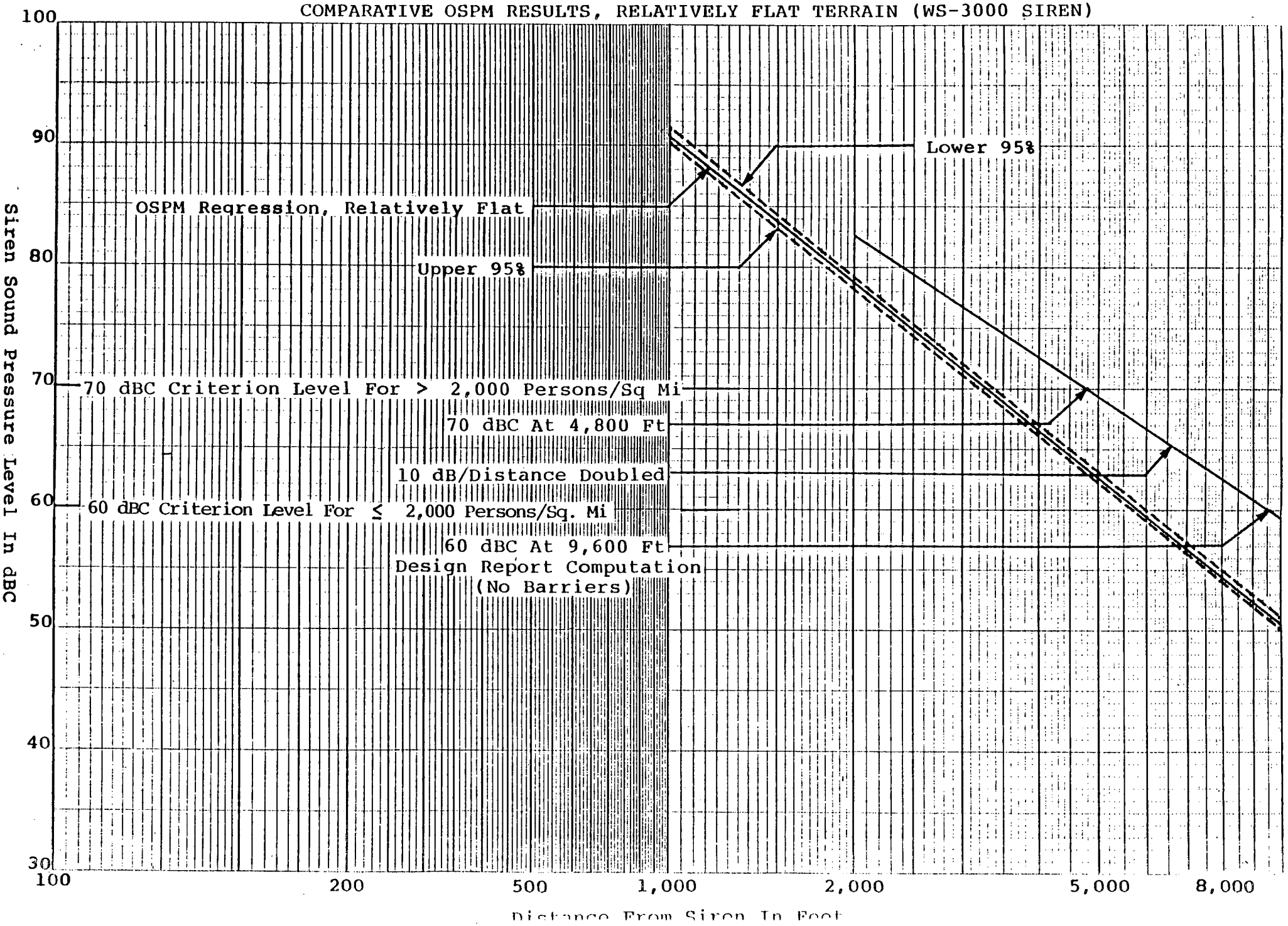
FIGURE


COMPARATIVE OSPM RESULTS, PARTIALLY HILLY TERRAIN (FS-1003 SIREN)
Siren Sound Pressure Level In dBC
100
90
80
70
60
50
40
30
OSPM Regression, Partially Hilly
Upper 95%
Lower 95%
70 dBC Criterion Level For > 2,000 Persons/Sq Mi
70 dBC At 4,500 Ft
10 dB/Distance Doubled
60 dBC Criterion Level For ≤ 2,000 Persons/Sq Mi
60 dBC At 9,000 Ft
Design Report Computation
100
200
500
1,000
2,000
5,000
8,000
Distance From Siren In Feet

FIGURE


COMPARATIVE OSPM RESULTS, HILLY TERRAIN (FS-1003 SIREN)
Siren Sound Pressure Level In dBC
100
90
80
70
60
50
40
30
OSPM Regression, Hilly
Upper 95%
Lower 95%
70 dBC Criterion Level For > 2,000 Persons/Sq Mi
70 dBC at 4,500 Ft
10 dB/Distance Doubled
60 dBC Criterion Level For ≤ 2,000 Persons/Sq. Mi
60 dBC At 9,000 Ft
Design Report Computation
(No Barriers)
100
200
500
1,000
2,000
5,000
8,000
Distance From Siren In Feet

FIGURE


COMPARATIVE OSPM RESULTS, RELATIVELY FLAT TERRAIN (WS-3000 SIREN)
Siren Sound Pressure Level In dBC
100
90
80
70
60
50
40
30
OSPM Regression, Relatively Flat
Upper 95%
Lower 95%
70 dBC Criterion Level For > 2,000 Persons/Sq Mi
70 dBC At 4,800 Ft
10 dB/Distance Doubled
60 dBC Criterion Level For ≤ 2,000 Persons/Sq. Mi
60 dBC At 9,600 Ft
Design Report Computation
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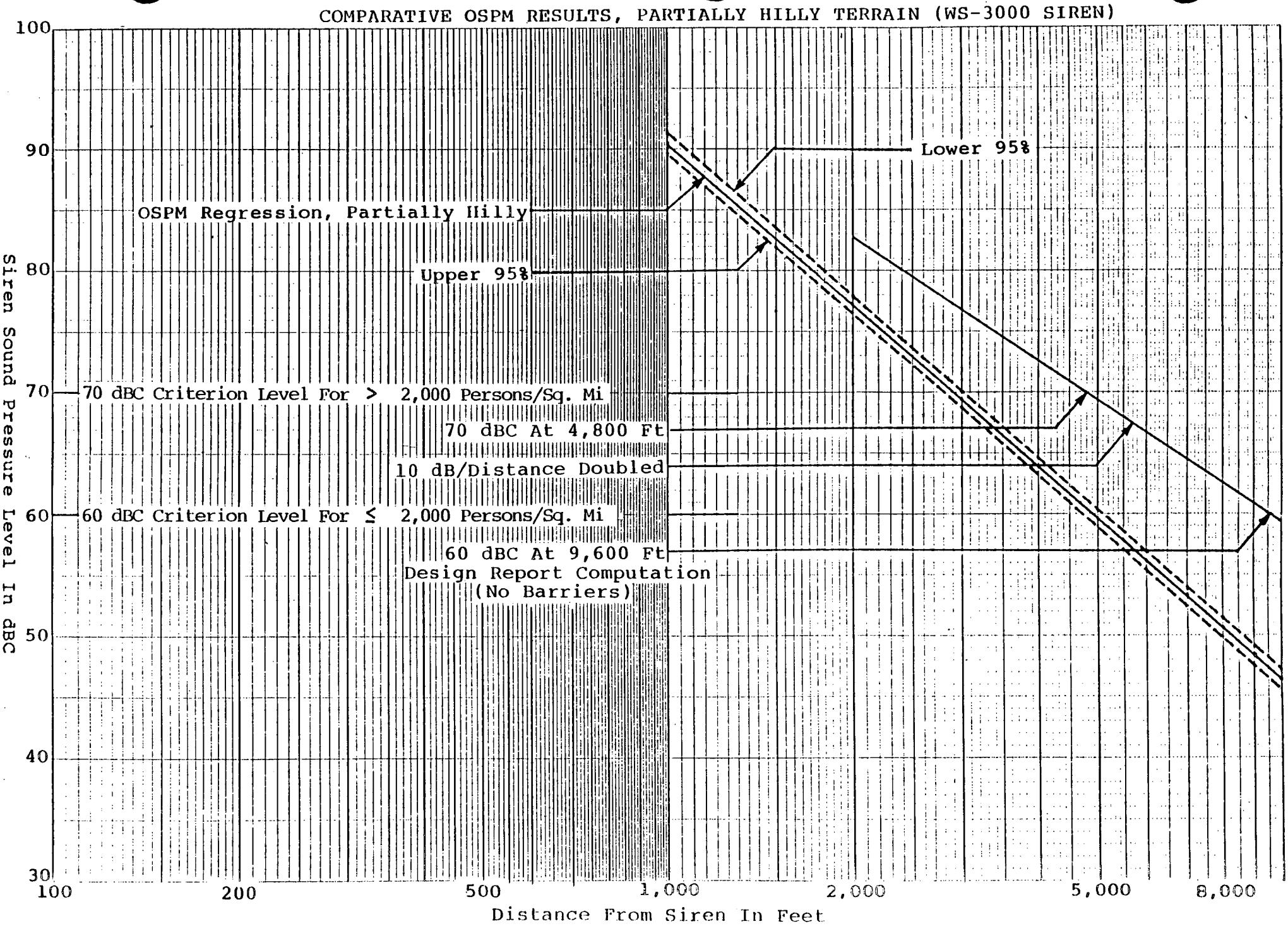
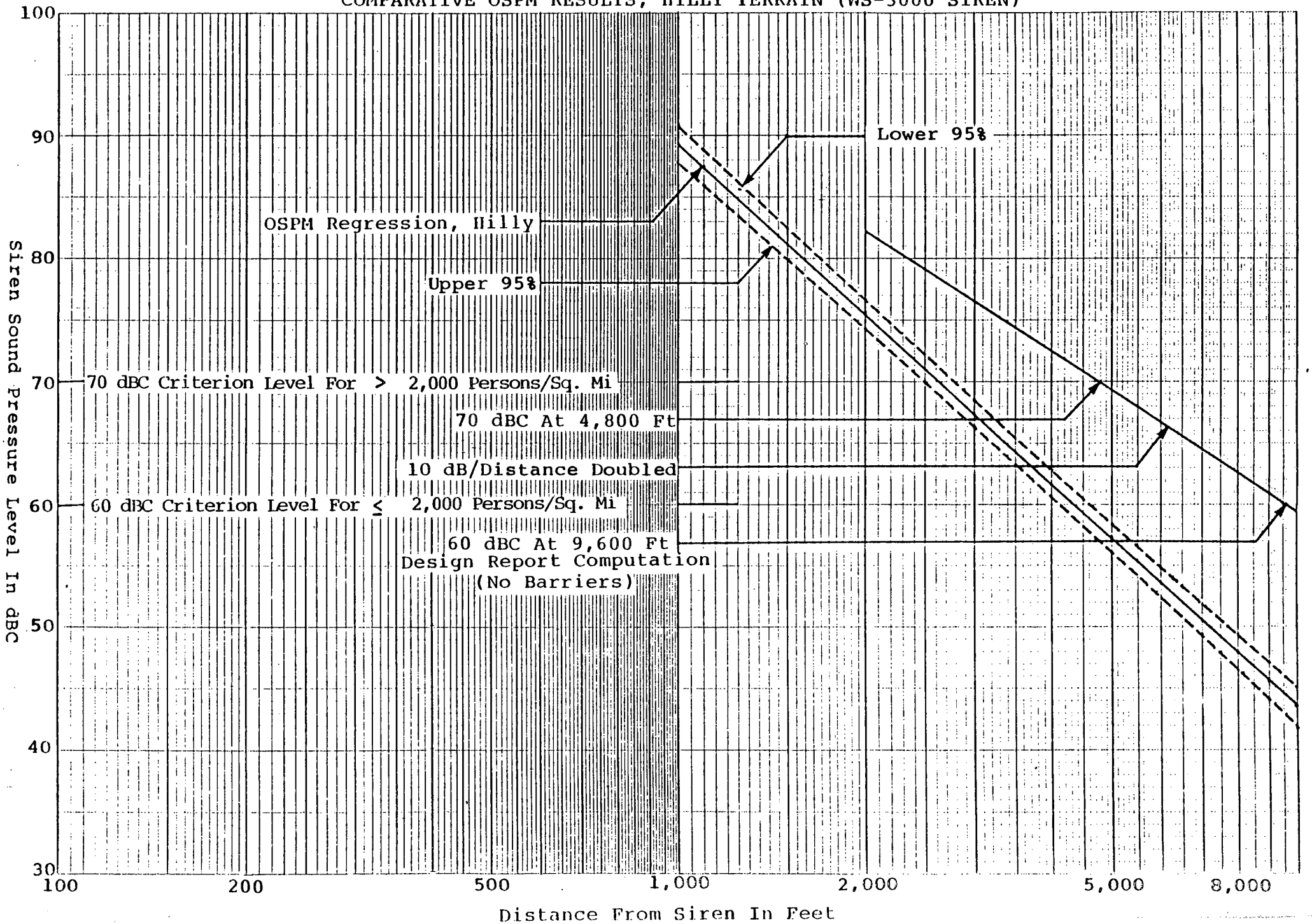
100
200
500
1,000
2,000
5,000
8,000
Distance From Siren In Feet

FIGURE


COMPARATIVE OSPM RESULTS, PARTIALLY HILLY TERRAIN (WS-3000 SIREN)
Siren Sound Pressure Level In dBC
100
90
80
70
60
50
40
30
OSPM Regression, Partially Hilly
Upper 95%
Lower 95%
70 dBC Criterion Level For > 2,000 Persons/Sq. Mi
70 dBC At 4,800 Ft
10 dB/Distance Doubled
60 dBC Criterion Level For ≤ 2,000 Persons/Sq. Mi
60 dBC At 9,600 Ft
Design Report Computation
(No Barriers)
100
200
500
1,000
2,000
5,000
8,000
Distance From Siren In Feet

FIGURE

COMPARATIVE OSPM RESULTS, HILLY TERRAIN (WS-3000 SIREN)



Siren Type	Procedure	Terrain	Range in Ft to 70 dBC	60 dBC
FS-1003	Licensee	No Barriers	4,500	9,000
	OSPM	Flat	5,150	>10,000
		Partially Hilly	4,375	8,600
		Hilly	3,050	5,300
WS-3000	Licensee	No Barriers	4,800	9,600
	OSPM	Flat	3,900	5,800
		Partially Hilly	2,900	4,900
		Hilly	2,625	4,350

Some general observations can be made concerning the siren range comparisons. The 60 dBC and 70 dBC ranges estimated by the licensee for the FS-1003 sirens over partially hilly and flat terrains are similar to OSPM results. With proper terrain adjustments, the effective 70 and 60 dBC ranges would be greatly reduced as demonstrated above.

The licensee's estimated 60 dBC and 70 dBC ranges for the WS-3000 sirens, however, are very liberal compared to OSPM results. This is due to the higher operating frequency of the WS-3000 siren which suffers much higher attenuation rates through atmospheric absorption and other excess attenuations. The effective range of the WS-3000 siren is therefore substantially reduced from the 10 dBC rule which is based on operating frequencies of 500 to 800 Hz. This is particularly so for the 60 dBC range, since the attenuation rate in the 1,000 Hz octave band is typically much greater than 10 dB per distance doubling at large distances (5,000 ft. and beyond).

To assess the overall adequacy of the design on an area basis, for each siren located on the U.S. Geological Survey's Cedar Rapids North quadrangle map (Figure 2 of this report), the area coverages of 60 dBC and 70 dBC were numerically integrated and averaged. The results are as follows:

AVERAGE AREA
(In Square Miles)

Siren Type	70 dBC	60 dBC
FS-1003	3.13	13.84
WS-3000	.86	3.83

Using these results, the following average effective radii are derived:

EFFECTIVE RADIUS
(In Ft)

Siren Type	70 dBC	60 dBC
FS-1003	5,273	11,085
WS-3000	2,771	5,832

These derived radii confirm that on the average, the Design Report siren ranges are liberal when site terrain and weather conditions are taken into account.

The results of the individual OSPM runs were combined to generate a comprehensive overview of the siren sound pressure levels in the Cedar Rapids North area as depicted in Figure 2 of this report. A surface interpolation and contouring program utilizing the output results of the 11 sirens was used to generate

the sound pressure level contours shown in Figure 2. These contours account for site-specific topographical and meteorological effects of the sirens.

Comparisons of the OSPM-predicted 60 dBC and 70 dBC contours with the contours in Appendix C of the Design Report indicate that the coverage of the sirens as calculated in the Design Report is liberal.

The original Design Report states in Section 2.4.1 that there are some isolated areas of the EPZ which have siren coverage slightly less than 60 dBC that are indicated on the licensee's map. Those areas have been determined to be unpopulated (see Appendix I of the Design Report). The OSPM contour map confirms that not all of the originally designed EPZ is covered by at least 60 dBC. For example, a small area was identified between siren 14 and siren 24 that contains a group of houses which does not receive siren sound pressure levels of 60 dBC or greater.

The original Design Report map showed the Cedar Rapids area containing more than 2,000 persons per square mile; however, the licensee's 70 dBC contours did not fully cover this area. The OSPM results confirmed that Cedar Rapids was not covered by a minimum siren sound pressure level of 70 dBC (see Figure 2 of this report).

In conclusion, the Duane Arnold Energy Center siren alerting system was found to be conditionally acceptable. The licensee had not fully demonstrated that the system met FEMA-REP-10 specific design requirements throughout the 10-mile EPZ. The

licensee was asked to (1) ascertain that all geographical areas below 60 dBC coverage are either unpopulated or are exposed to actual siren sound pressure levels of greater than 60 dBC and (2) ascertain that the Cedar Rapids area containing more than 2,000 persons per square mile is fully covered by a minimum siren sound pressure level of 70 dBC, or (3) provide another primary alerting mechanism in those areas.

In response to the conditional approval, the licensee submitted a revised original Design Report proposing the use of 23 municipal civil defense sirens and 86 utility electronic sirens with public address capability. Also, the original design report was modified to include a revised EPZ (adding all of the Cedar Rapids and the Marion metropolitan areas). The revised installed siren warning system was analyzed and found to provide more complete and more uniform siren coverage throughout the modified EPZ. Appendix C of the revised Design Report identified some isolated areas within the EPZ with siren coverage slightly less than 60 dB(C). These areas were certified, in Appendix I of the revised Design Report, as being unpopulated.

In conclusion, the Duane Arnold Energy Center siren alerting system is found to meet the specific design requirements of FEMA-REP-10.

2. Special Alerting (E.6.2.4., FEMA-REP-10)

Alerting of the public in Linn County by the Duane Arnold Energy Center fixed siren system is supplemented by the Linn County Municipal Civil Defense Warning System as well as municipal fire

department siren systems. The Linn County Civil Defense Director authorizes the activation of these siren systems and instructs the County Communications Dispatcher to coordinate activation with the Cedar Rapids, Marion, and Hiawatha fire dispatchers.

An educational package developed by Iowa Electric Light and Power Company, IDSD, Linn County Civil Defense, and the Benton County Office of Emergency Management has been printed in the area telephone book and in a brochure. The brochure is mailed annually to each EPZ resident and is distributed by park rangers when registering in any of the state and county recreational areas in the EPZ, and is also placed in each area hotel/motel room, filling stations, public libraries, and local government offices.

3. Institutional Alerting (E.6.2.4.2, FEMA-REP-10)

Both Linn and Benton Counties utilize their individual county Indoor Warning System consisting of FM radio receivers located in all public, private, and parochial schools, nursing homes, hospitals, and local emergency management agencies. These radio receivers are activated by encoders at the county EOCs.

III. FINDINGS FOR EVALUATION CRITERION N.1

On Wednesday, April 13, 1988 at 9:15 a.m. Central Daylight Time (CDT), the physical means (sirens) used to alert the population within the Duane Arnold Energy Center EPZ were 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 the FEMA-REP-10. The results indicate that this portion of the alert and notification system evaluation conforms to FEMA-REP-10 and NUREG-0654/FEMA-REP-1, Rev. 1.

The April 13, 1988, demonstration of the Duane Arnold Energy Center alerting system consisted of a double activation of all sirens and a subsequent telephone survey to estimate the proportion of EPZ households actually alerted. The first siren activation was initiated at approximately 9:15 a.m. CDT and continued for three minutes. The sirens were activated a second time beginning at approximately 9:21 a.m. CDT and continued for approximately three minutes. All sirens were reported to have operated properly during all activations.

The telephone survey of EPZ residences began at approximately 9:23 a.m. and was completed within 72 minutes. This survey was conducted by 39 telephone interviewers, each with a separate WATS line and computer terminal.

The universe of households to be surveyed was determined by establishing a 15-mile-radius circle around the latitude and longitude of the plant. All households known to be outside the EPZ boundary (an irregular 10-mile-radius with the plant at the center

point) were eliminated from the sample. The sample incorporated a sorted master list of approximately 2,500 households (addresses and telephone numbers) believed to be within the established boundary.

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 95% confidence level. Appendix B of this report describes the method used for sizing the sample to achieve this result.

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

As part of the telephone survey, a total of 275 households believed to be within the Duane Arnold Energy Center EPZ were contacted, and the responses were collected in an automated data base. Of this group, 56 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 275 addresses, 2 were found to lie outside the EPZ. Therefore, data were tabulated on the 273 respondent households that were located within the EPZ. Respondents at 10 of these households had been away from home at the time of the alerting system demonstration and, therefore, were also not included in the alerting analysis. Of the remaining 263 households, 79.8% (210) indicated that they had been alerted during the demonstration. Using the estimated number of households within the

#39400
Chilton Research Services
Jacnot, Pennsylvania

Draft #2
Study #7460
April 12, 1988

FIGURE 9

OMB #3067-0103 (FEMA 9/86)
FEMA NUCLEAR POWER PLANT ALERTING AND NOTIFICATION SYSTEM: PUBLIC TELEPHONE SURVEY

DUANE ARNOLD

Time Began _____AM _____PM

Time Ended _____AM _____PM

Interview # _____ (1-5)

Zip Code _____ (6-10)

Sample Type _____ (11-)

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

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 Duane Arnold Energy Center. Did you, or any other member of this household, hear the siren/warning signal from this test today? 22-

SKIP TO Q. 4	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

FIGURE 9 (CONT.)

3. What did you or your household hear? (DO NOT READ. CIRCLE ALL THAT APPLY)

(31-32)

SKIP TO Q. 4	A siren	1
	Neighbor told me	2
	Other family member told me	3
	EBS on radio	4
	EBS on television	5
	Other (SPECIFY) _____	9
CONTINUE	Don't Know	Y

3a. Did you hear . . . (READ LIST. CIRCLE ALL THAT APPLY)

(33-34)

	A Siren	1
	From a Neighbor	2
	From Another Family Member	3
	Or by means of something else (SPECIFY) _____	4
DO NOT READ	EBS on radio	5
	EBS on television	6
	Don't Know	Y

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

Were you at home or away from home when you heard the siren signal?

(35-

SKIP TO Q. 5	Home	1
	Away From Home	2

FIGURE 9 (CONT.)

4A. (IF "DID NOT HEAR EMERGENCY SIGNAL")

Were you at home around 9:15 this morning?

30-

Yes	1
No	2
Don't Know	Y

5. Information about what to do in the event of a "real" emergency at the Duane Arnold Energy Center is printed inside your Phone Book. Were you aware of this?

31-

Yes	1
No	2
Don't Know	Y

6. Because we need to determine whether or not you live within the Emergency Planning Zone of the Duane Arnold Energy Center, would you please give me this address? (PAUSE FOR ANSWER)

ADDRESS:

_____

_____

and the nearest intersection (or cross street) to this house.

_____

Also, what community is this?

_____

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.

EPZ (45,763 from reference 2) in the confidence interval that ranges from 75.4% to 84.9% is yielded for the proportion of the total EPZ population alerted. In other words, at the 95% confidence level, between 75.4% and 84.9% of the households within the Duane Arnold Energy Center EPZ would have stated that they were alerted by the siren system.

The sample of 273 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 Duane Arnold Energy Center. Of these 273 households, 57.1% (156) responded that they had received the information and 42.9% (117) responded that they had not received the information. Using the approach discussed previously, the following estimates for the entire EPZ population resulted (at the 95% confidence interval):

- Between 51.2% and 62.9% of the households would have reported receiving the information;

- Between 37.1% and 48.8% of the households would have responded that they had not received the information; and

In conclusion, no areas of the Duane Arnold Energy Center siren system 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 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 FEMA's "Exercise Evaluation of the Implementation of State and Local Radiological Emergency Response Plans Conducted November 18, 1986 and the Remedial Exercise Conducted January 22, 1987 for the Duane Arnold Energy Center," dated February 11, 1987[7] and the "Exercise Evaluation of the Implementation of State and Local Radiological Emergency Response Plans Conducted November 9, 1988 and the Remedial Exercise Conducted December 1, 1988 for the Duane Arnold Energy Center," dated January 9, 1989[14].

REFERENCE LIST

1. Iowa Electric Light and Power Company. 1986. "Duane Arnold Energy Center updated final safety analysis report." Revision 4. June 1986.

2. U.S. Department of Commerce, Bureau of the Census. 1983. 1980 census of population. Volume 1, Chapter A, Part 1, "United States summary." PC80-1-A1. April 1983.

3. Iowa Electric Light and Power Company. 1986. Letter from David L. Wilson, Manager, Nuclear Licensing and Emergency Planning, to Mr. Robert S. Wilkerson, Chief, Field Operations Branch, Technological Hazards Division, Federal Emergency Management Agency, dated October 21, 1986, enclosing one copy of "An offsite emergency plan prompt alert and notification system addendum for the Duane Arnold Energy Center." October 1986.

4. State of Iowa. 1984. "Iowa radiological emergency response plan, Section B, nuclear power plant accident/ incident (part IV of Iowa emergency plan)." Revision 6. September 1987.

5. Benton County. "Benton County radiological emergency response plan." Revision I. September 15, 1988.

6. Linn County. "Linn County radiological emergency response plan." Revision. September 15, 1988.

7. Federal Emergency Management Agency. 1987. "Exercise evaluation of the implementation of state and local radiological emergency response plans conducted November 18, 1986 and the remedial exercise conducted January 22, 1987 for the Duane Arnold Energy Center." February 11, 1987.

8. 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.

9. Federal Emergency Management Agency. 1985. "Guide for the evaluation of alert and notification systems for nuclear power plants." FEMA-REP-10. November 1985.

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

11. Federal Emergency Management Agency. 1980. "Outdoor warning systems guide." CPG 1-17. March 1, 1980.

12. Iowa Electric Light and Power Company. 1987. Letter from Stephen L. Swails, Manager, Nuclear Licensing and Emergency Planning, to Craig Wingo, Chief, Field Operations Branch, Natural and Technological Hazards Program, Federal Emergency Management Agency, dated December 16, 1987, enclosing one copy of "An offsite emergency plan prompt alert and notification system addendum for the Duane Arnold Energy Center, Revision 1." December 1987.

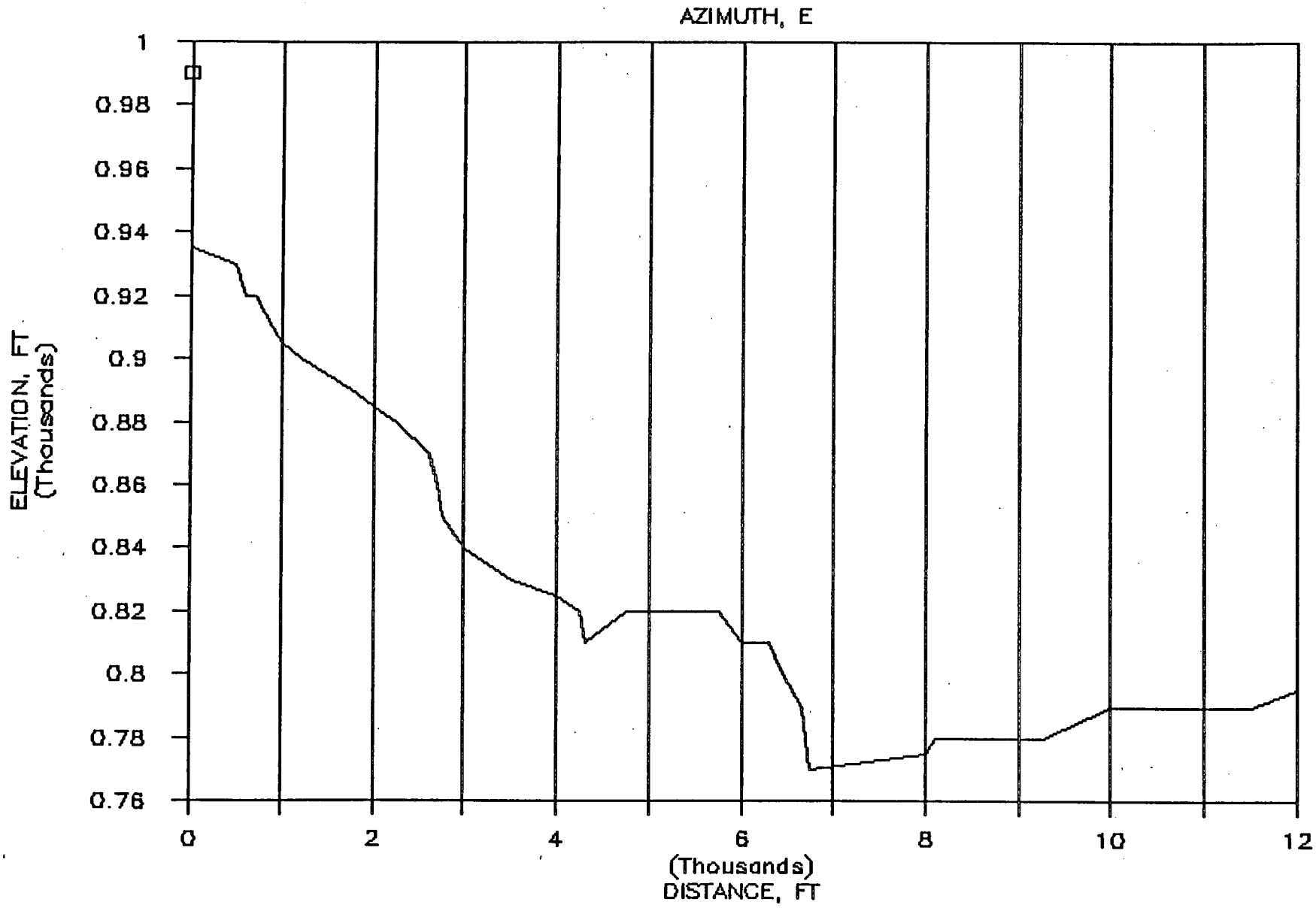
13. Iowa Electric Light and Power Company. 1989. An "off-site emergency plan prompt alert and notification system addendum for the Duane Arnold Energy Center, revision 3." July 1989.

14. Federal Emergency Management Agency. 1989. "Exercise evaluation of the implementation of state and local radiological emergency response plans conducted November 9, 1988 and the remedial exercise conducted December 1, 1988 for the Duane Arnold Energy Center." January 9, 1989.

APPENDIX A

OSPM 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

DUANE ARNOLD 13



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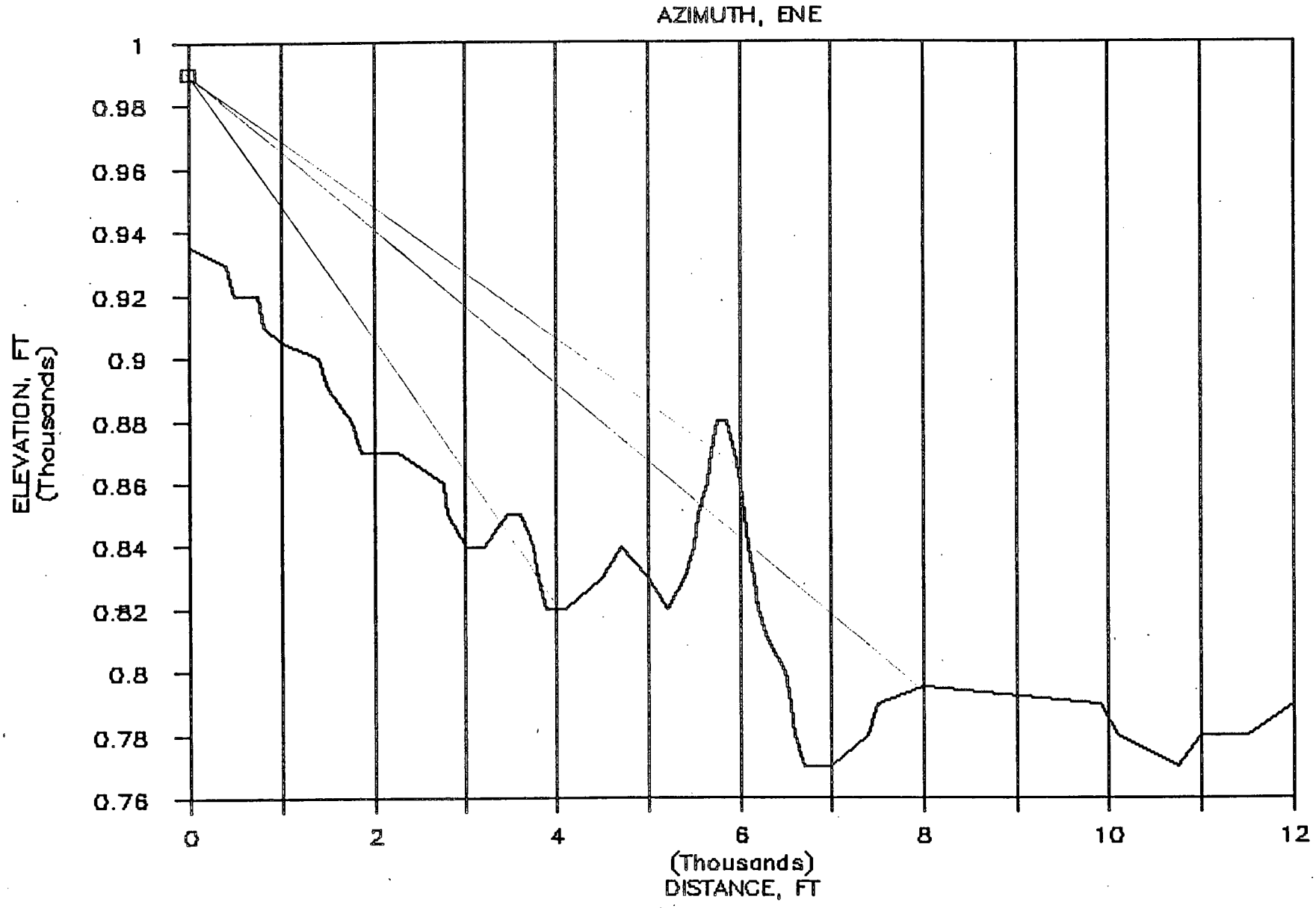

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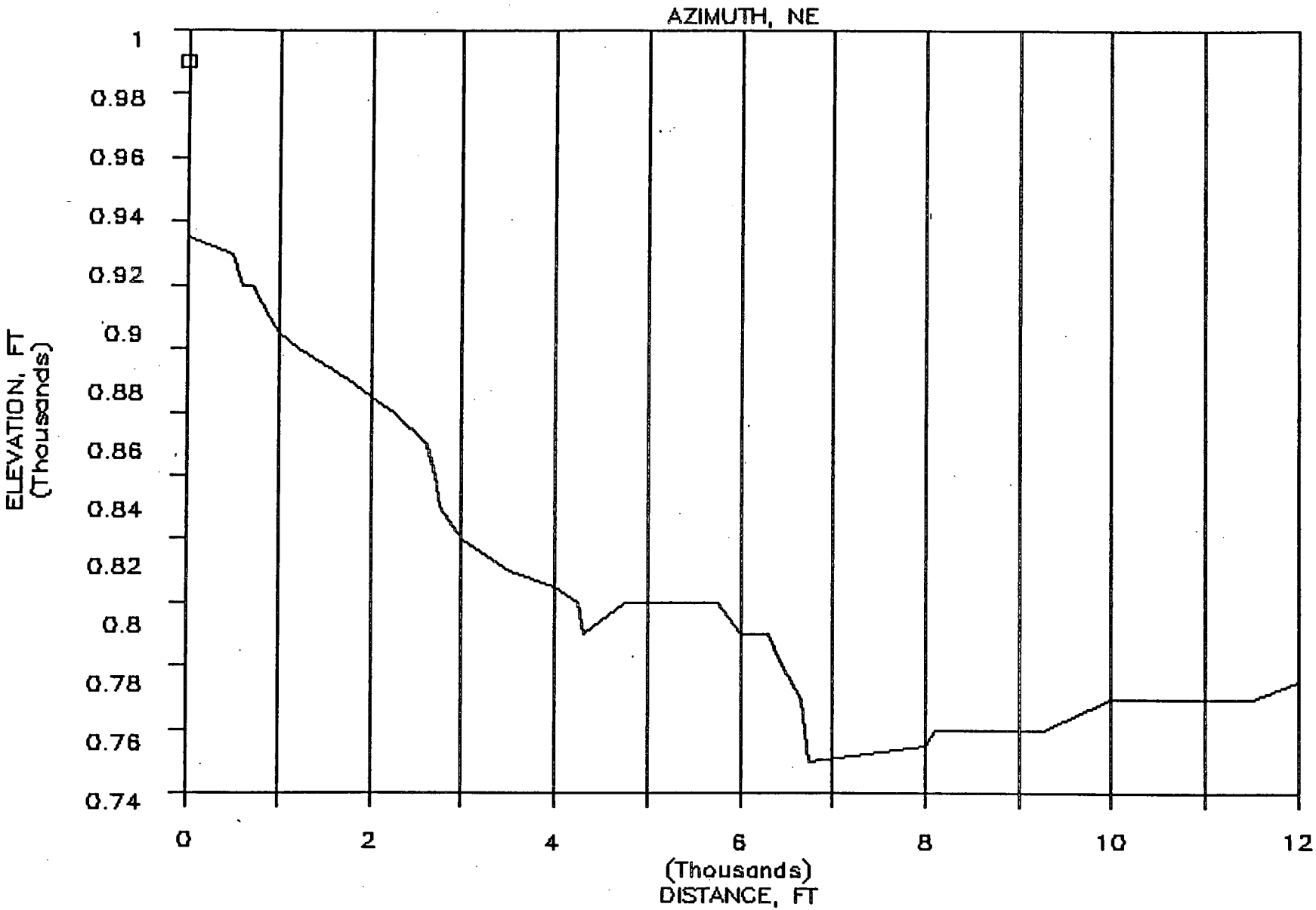

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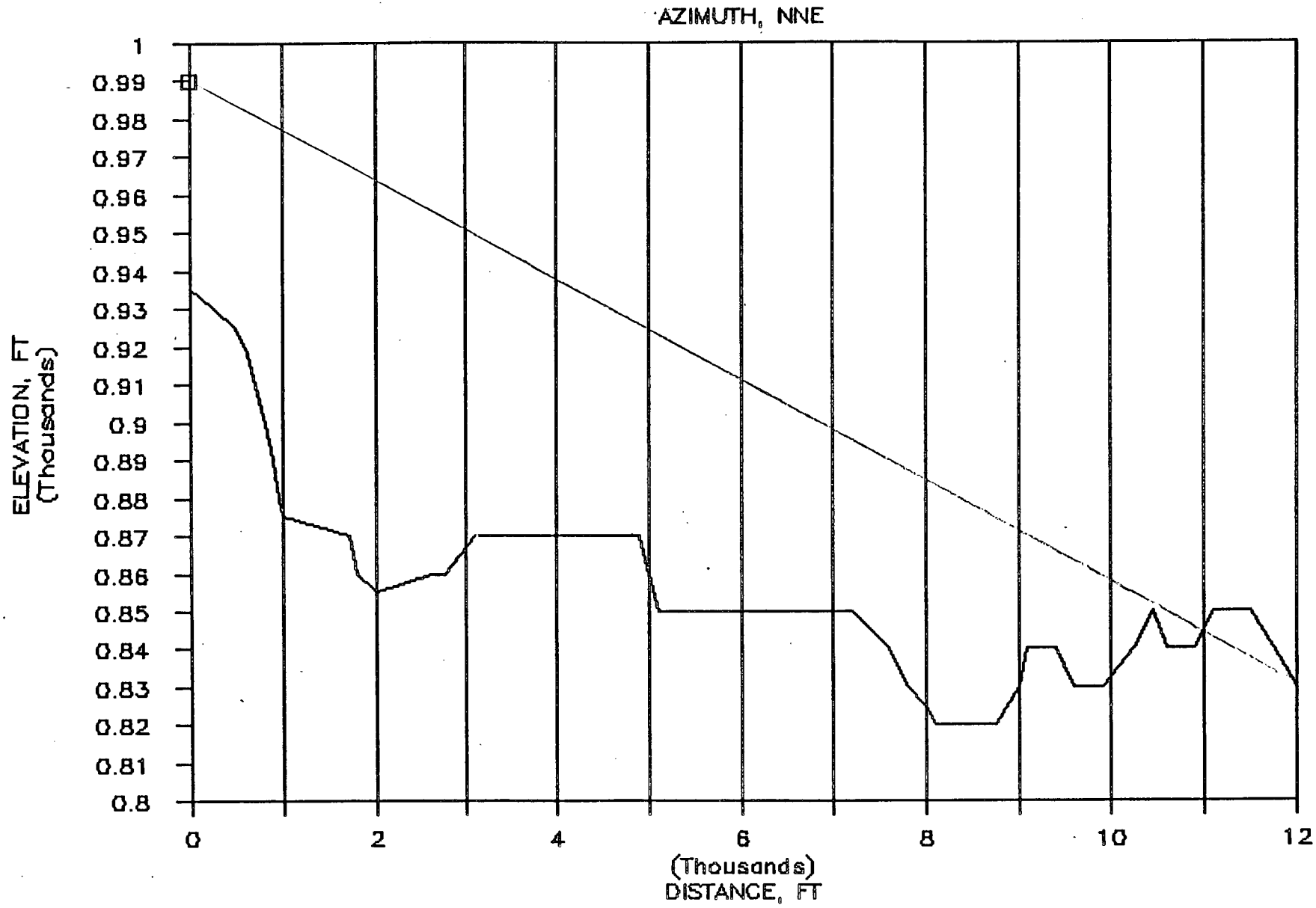

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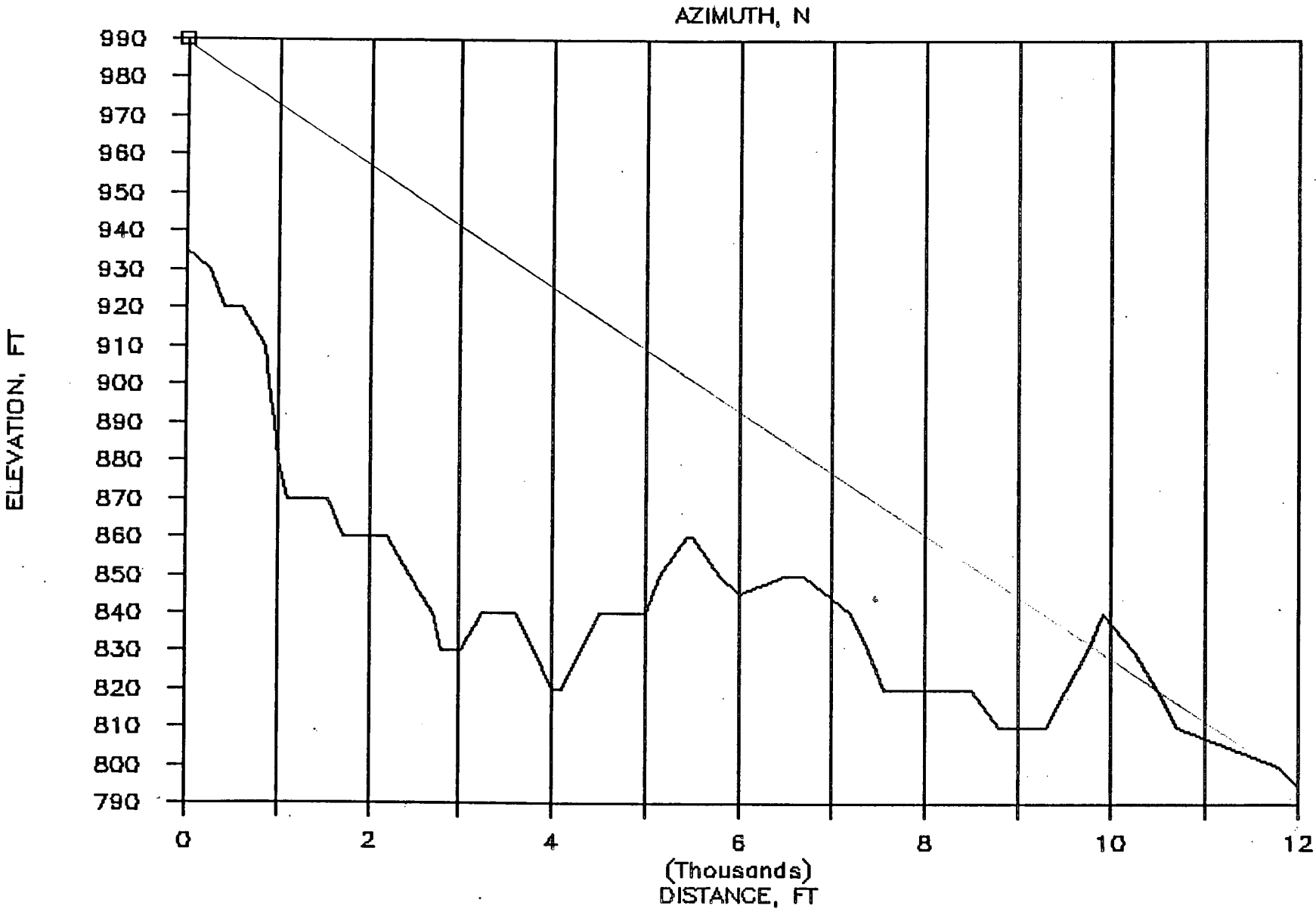

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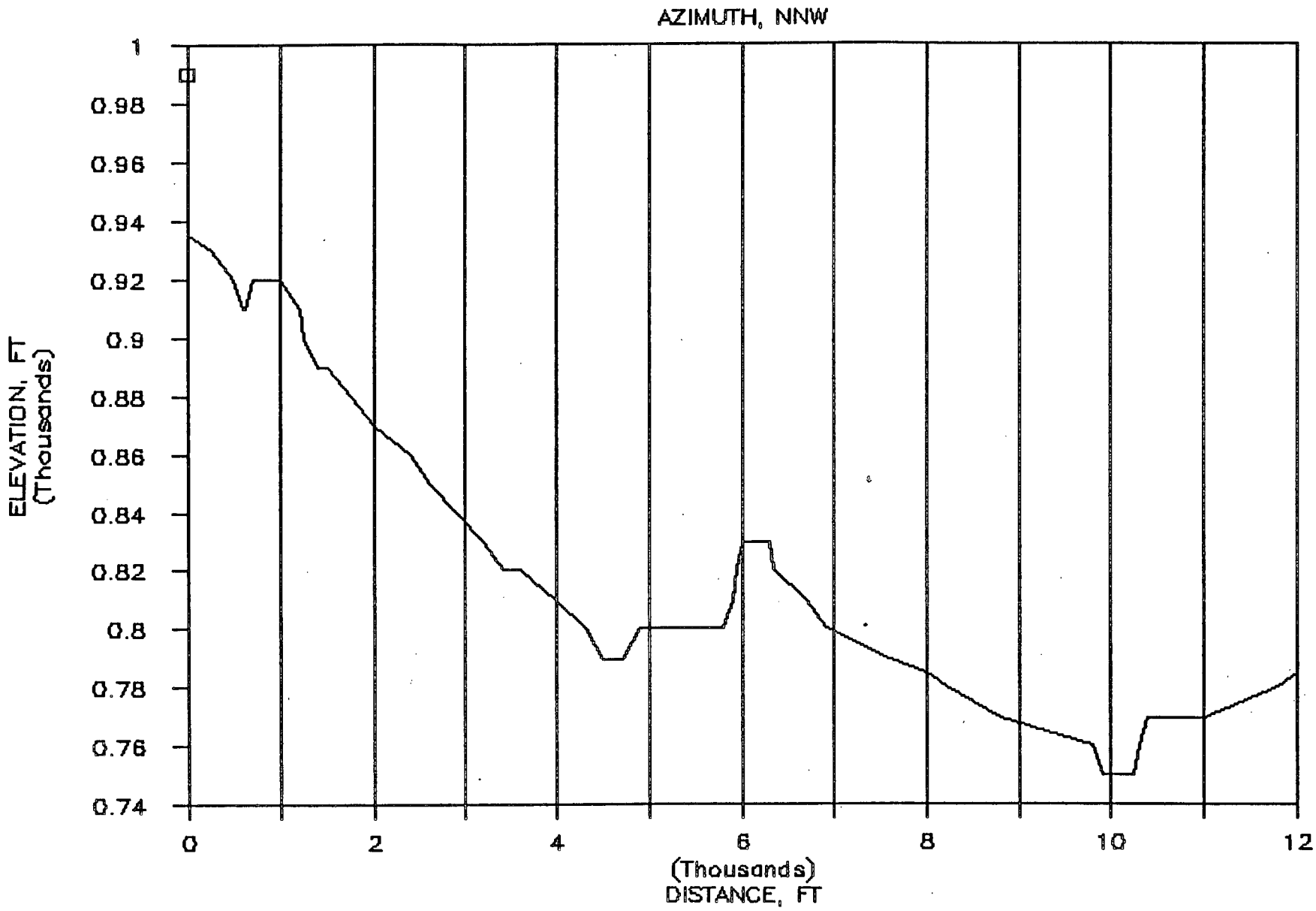

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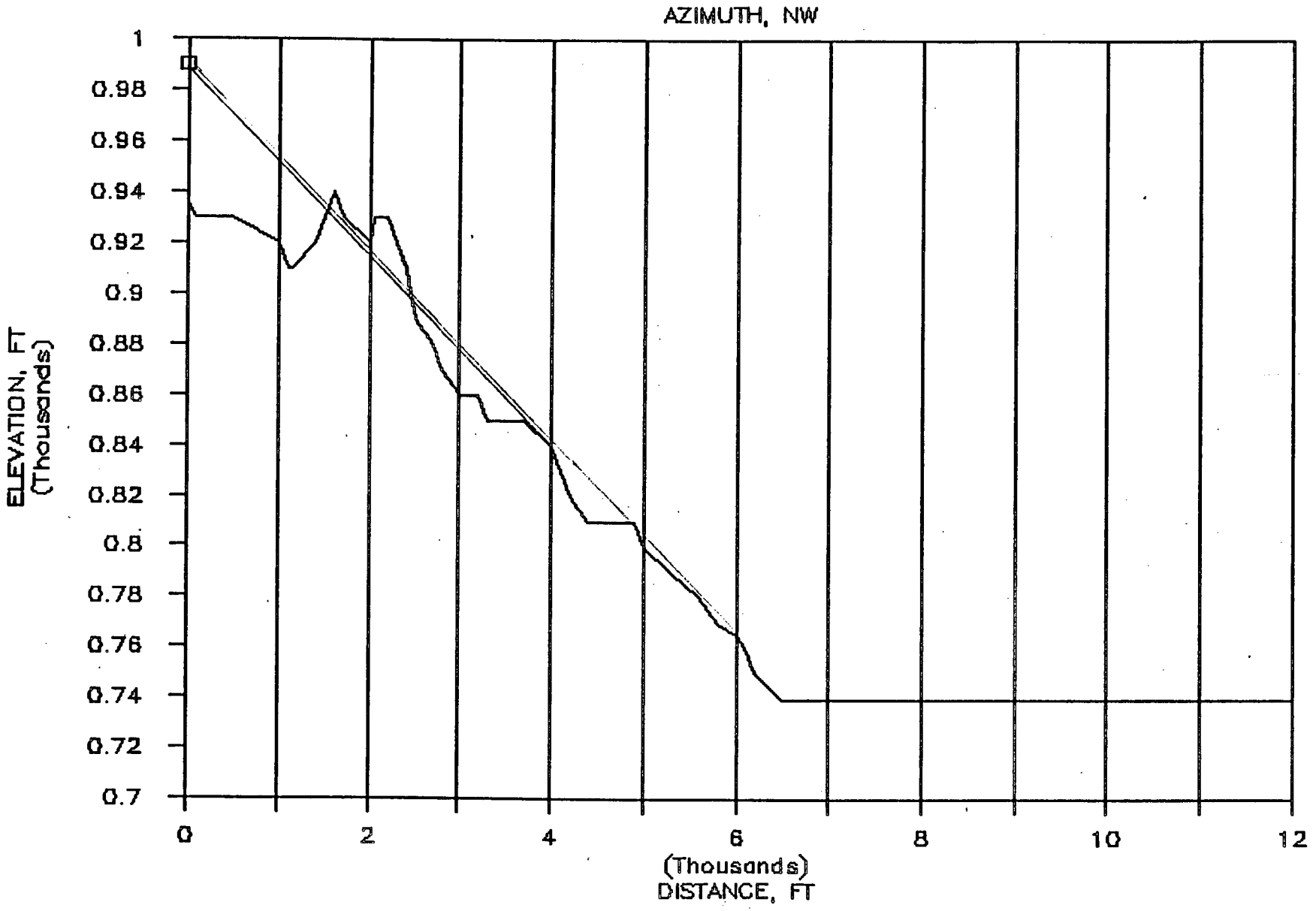
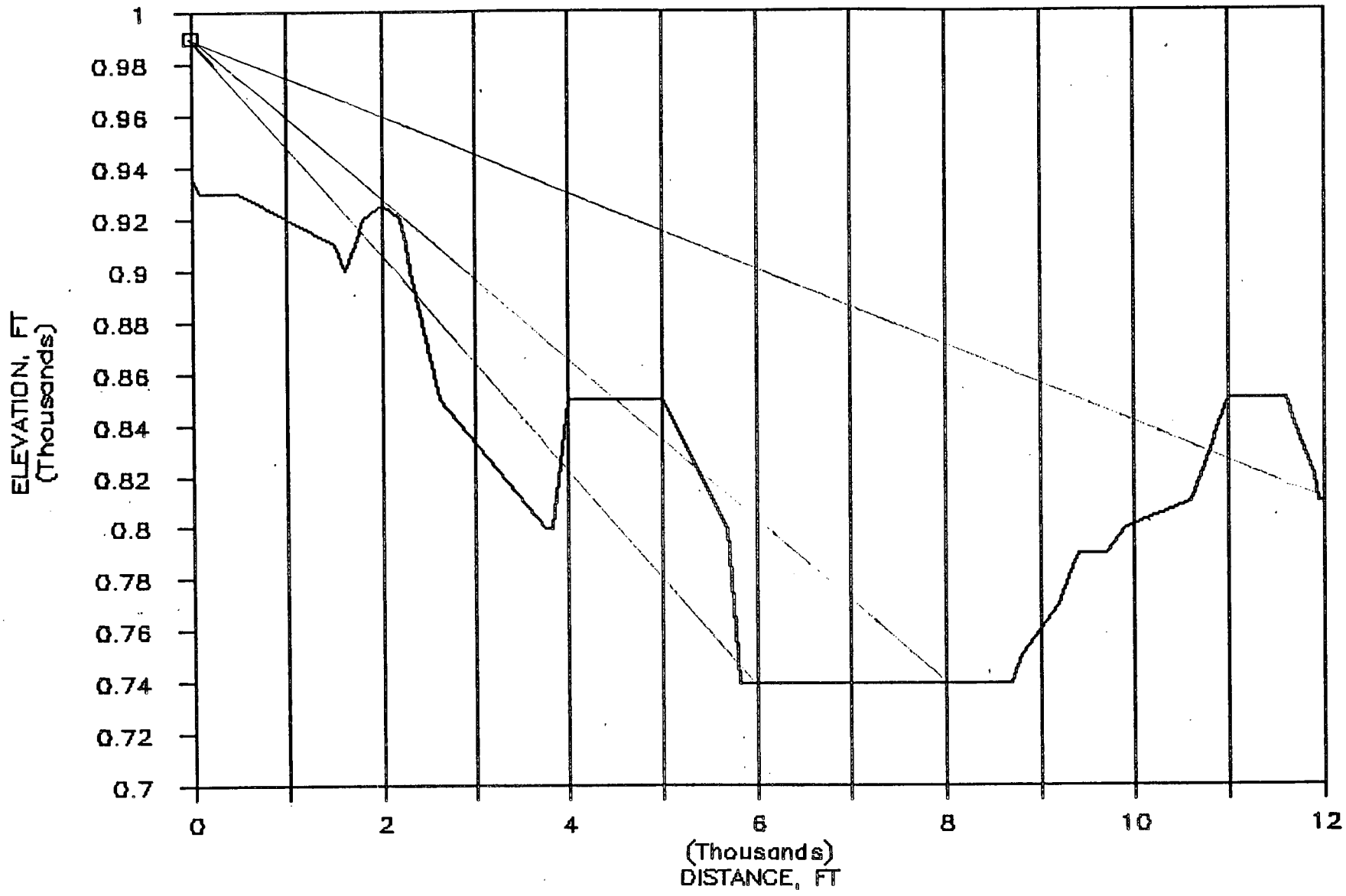


DUANE ARNOLD 13

AZIMUTH, WNW



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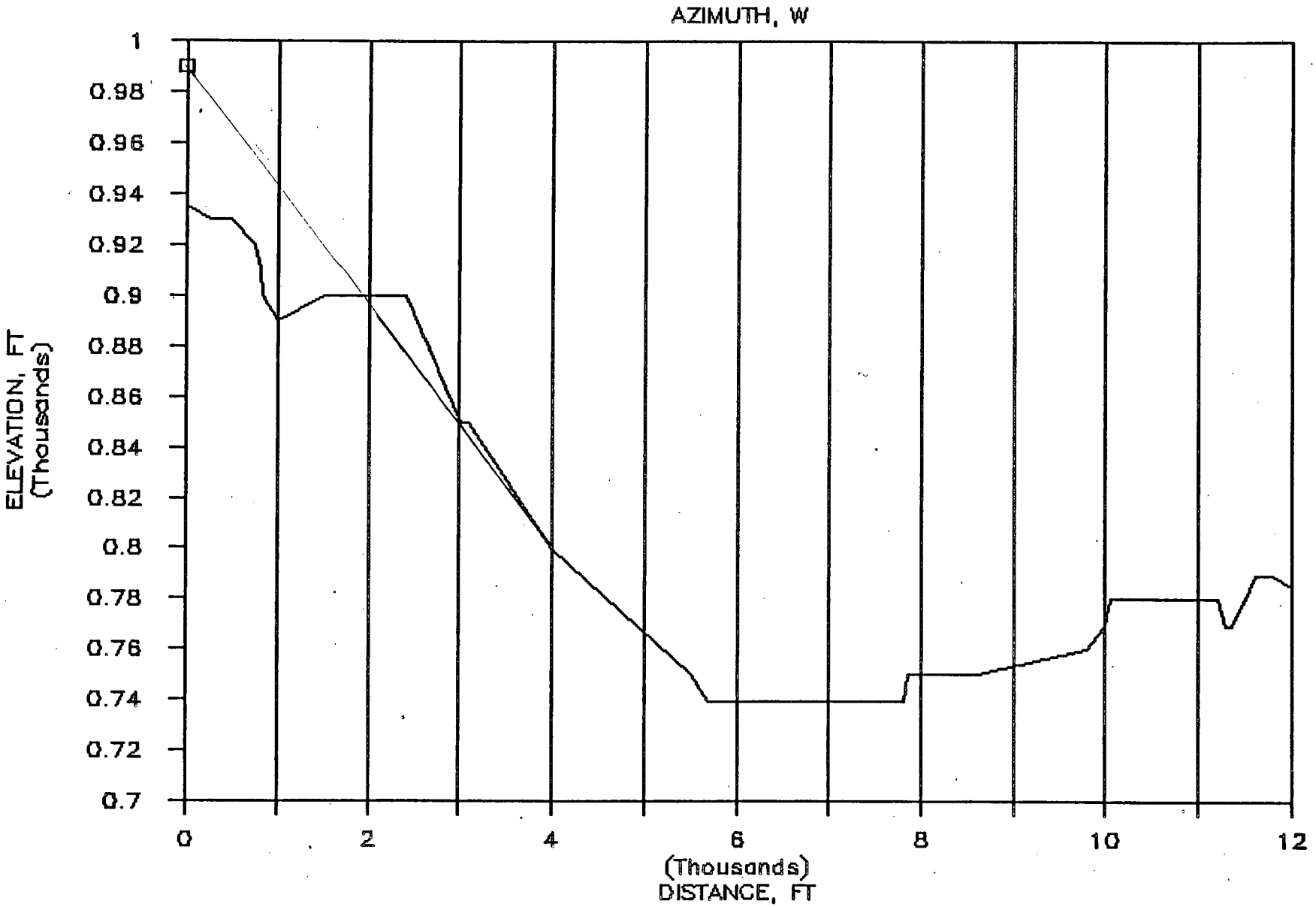

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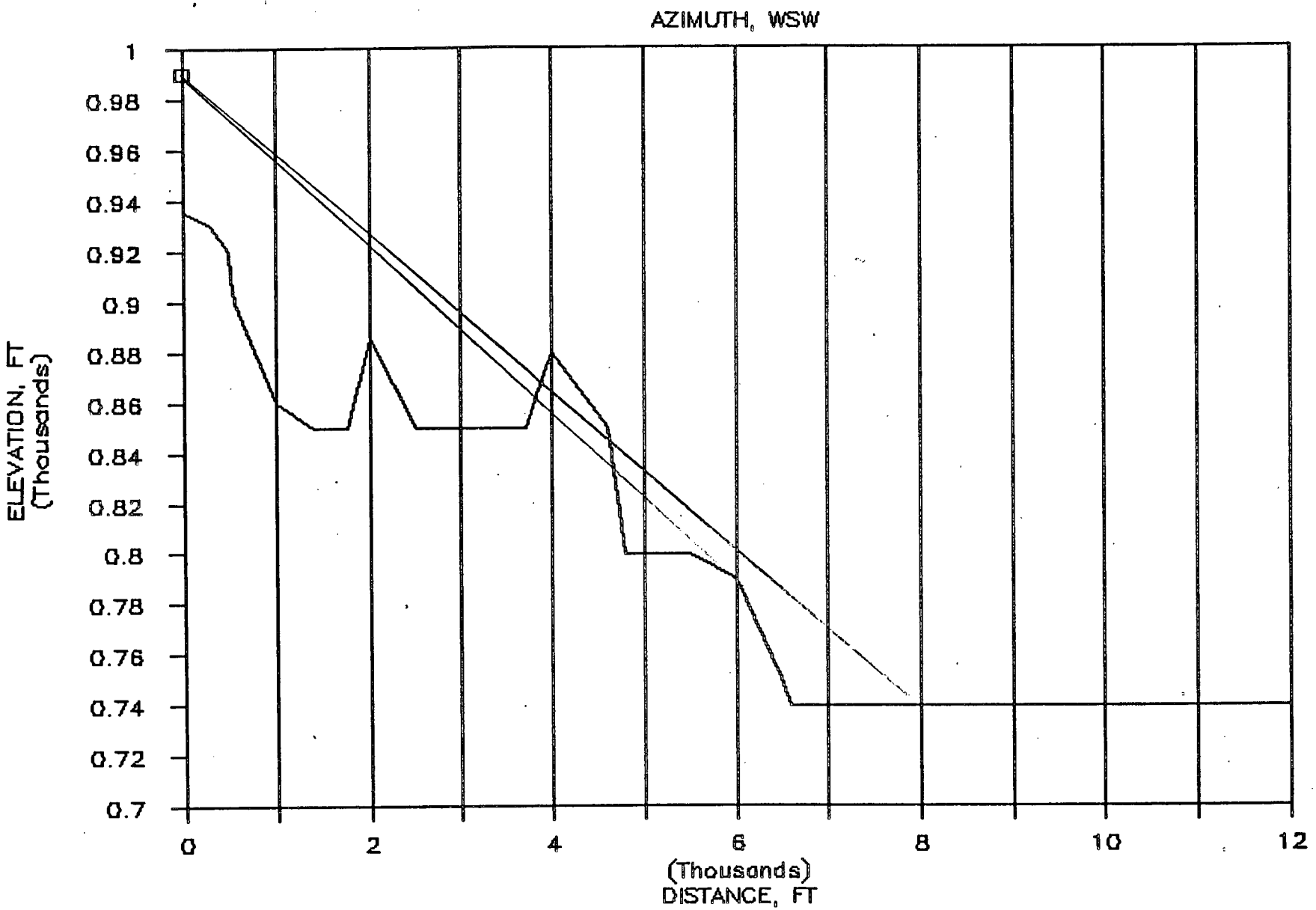

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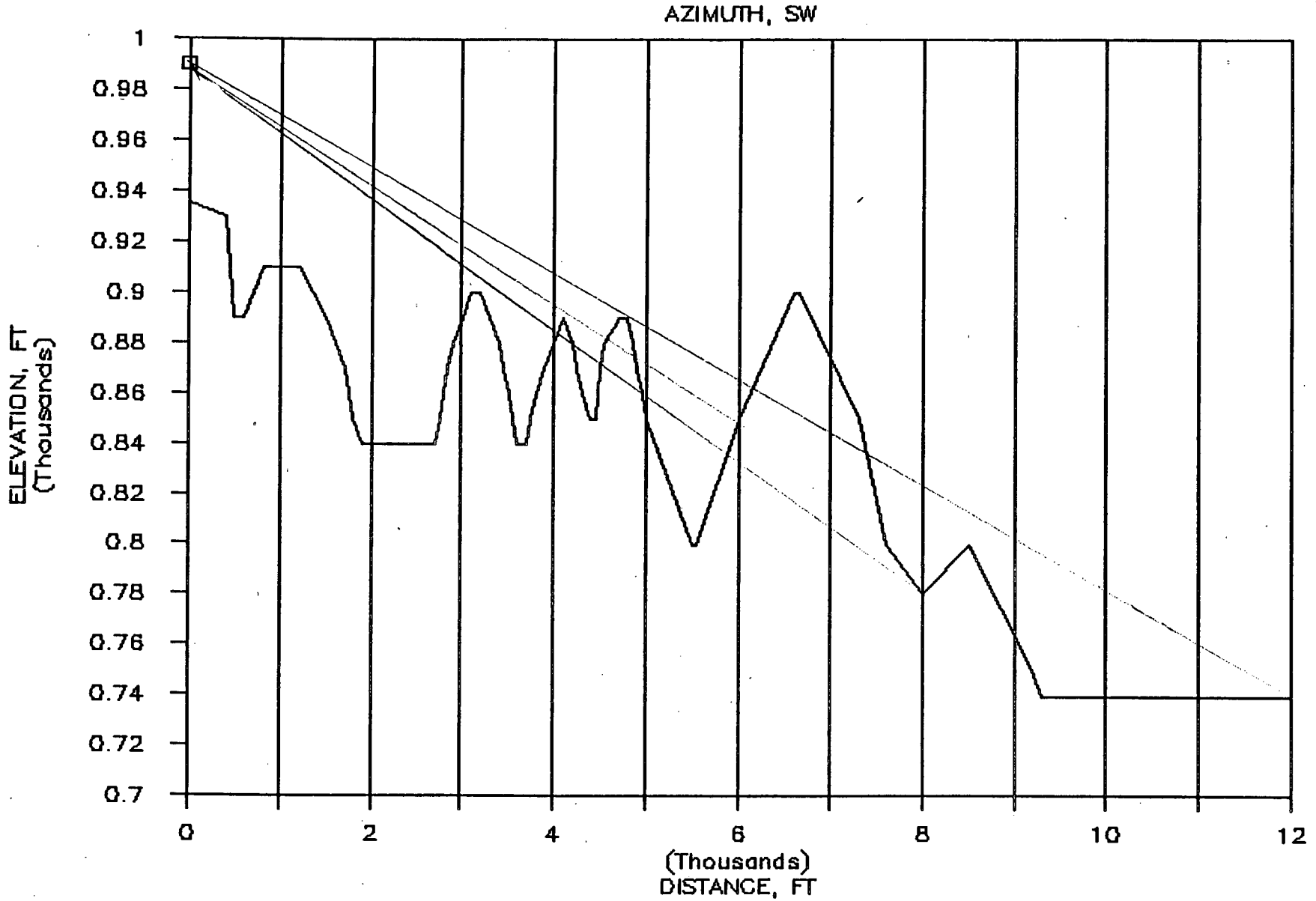

DUANE ARNOLD 13

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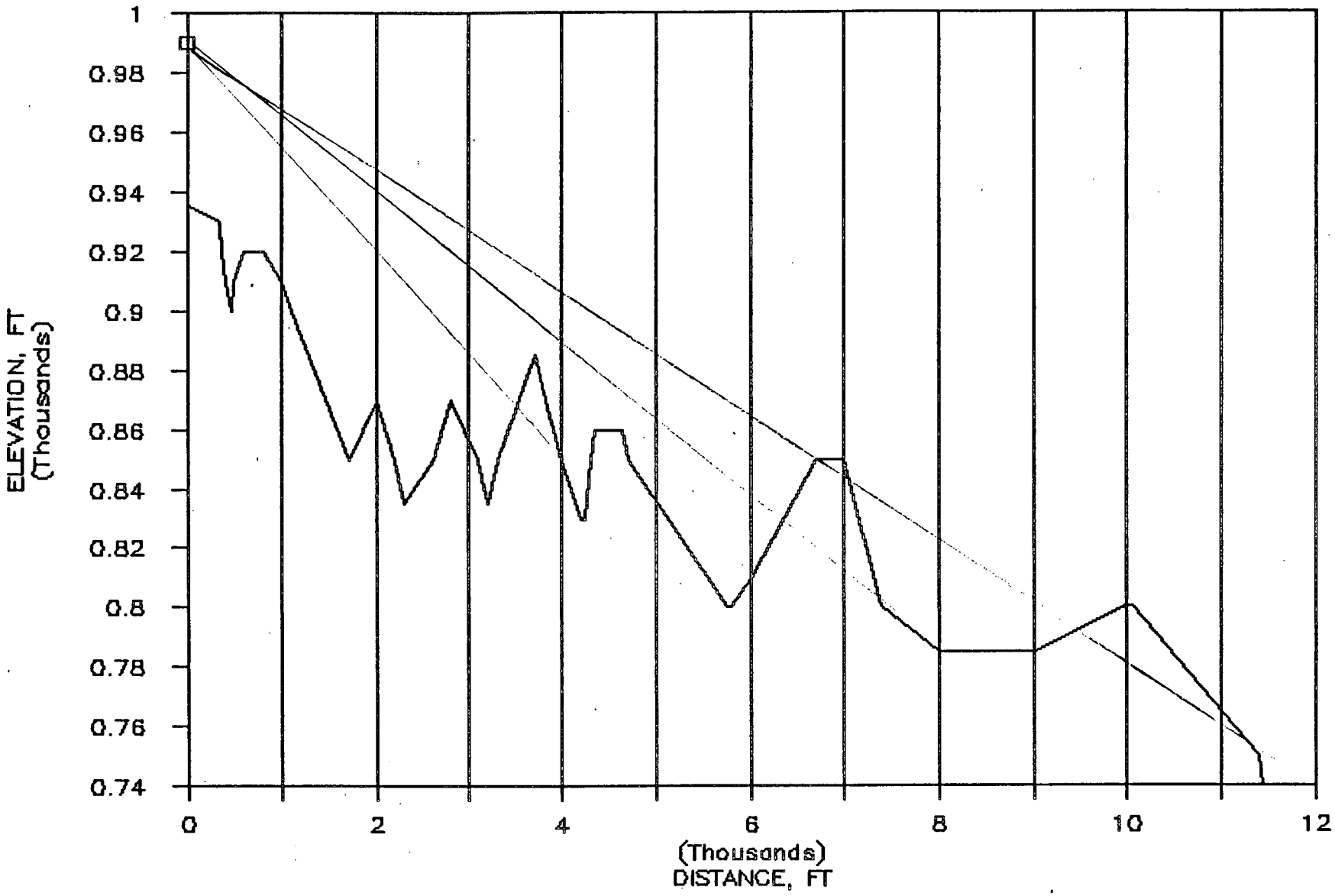

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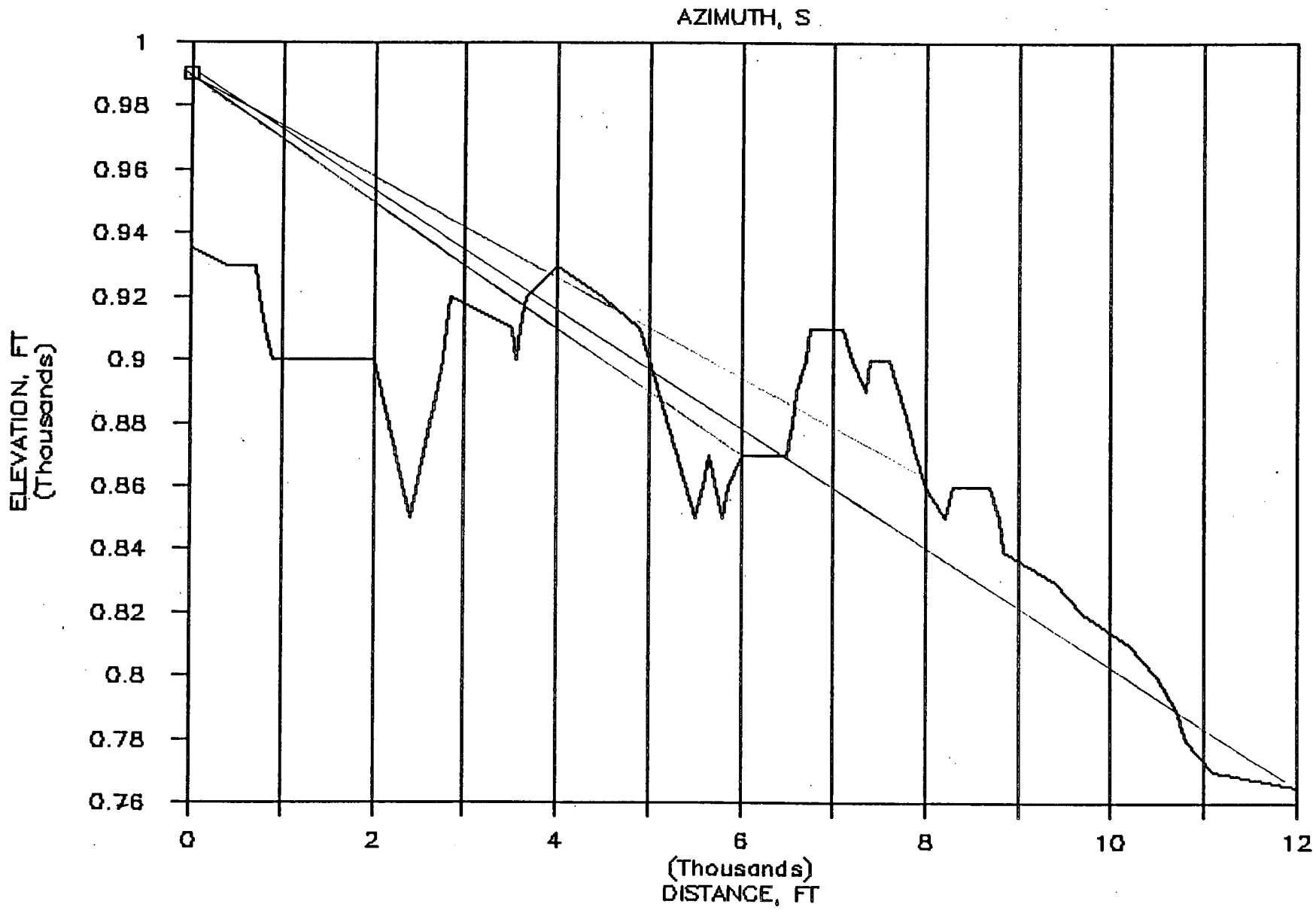

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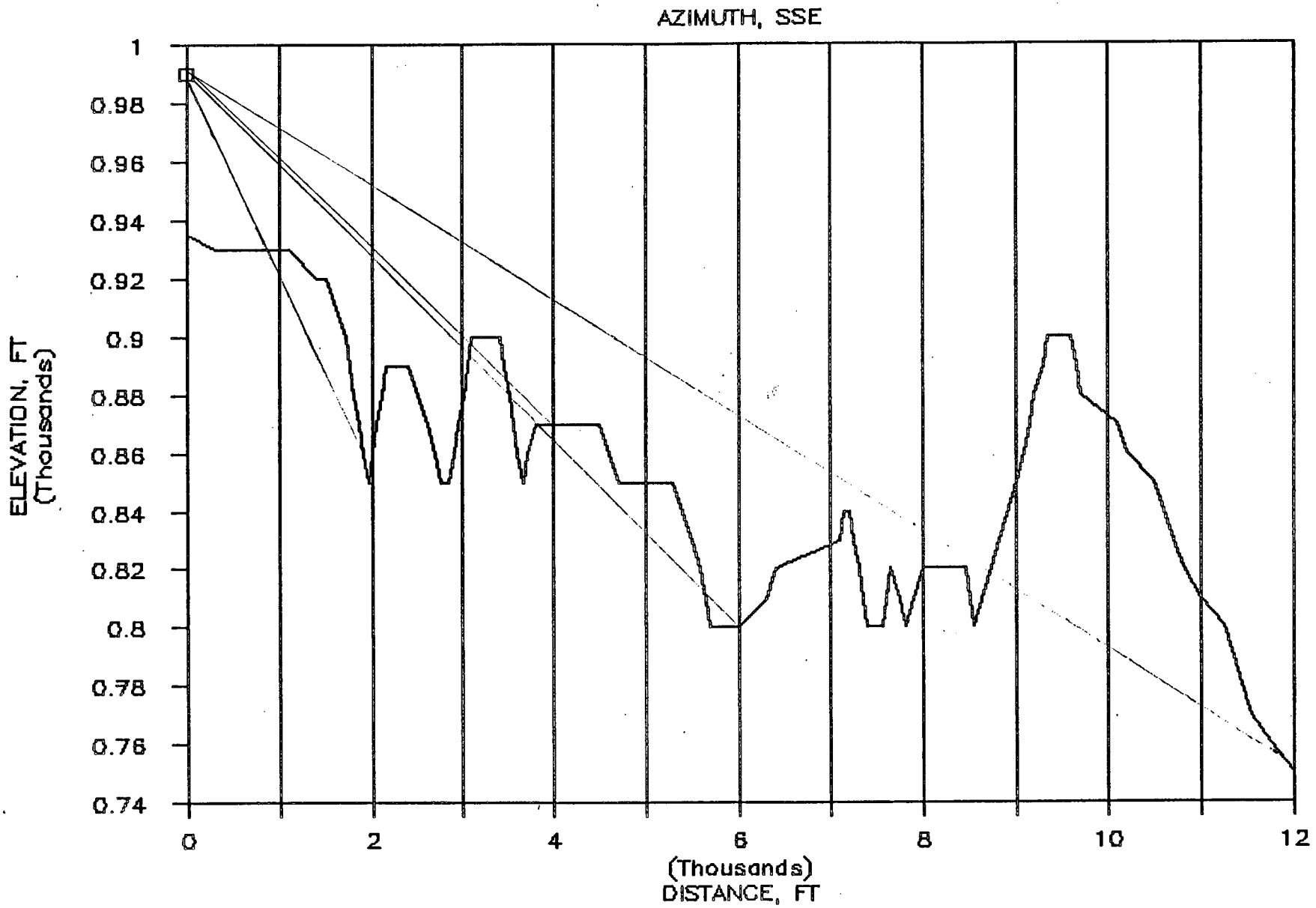

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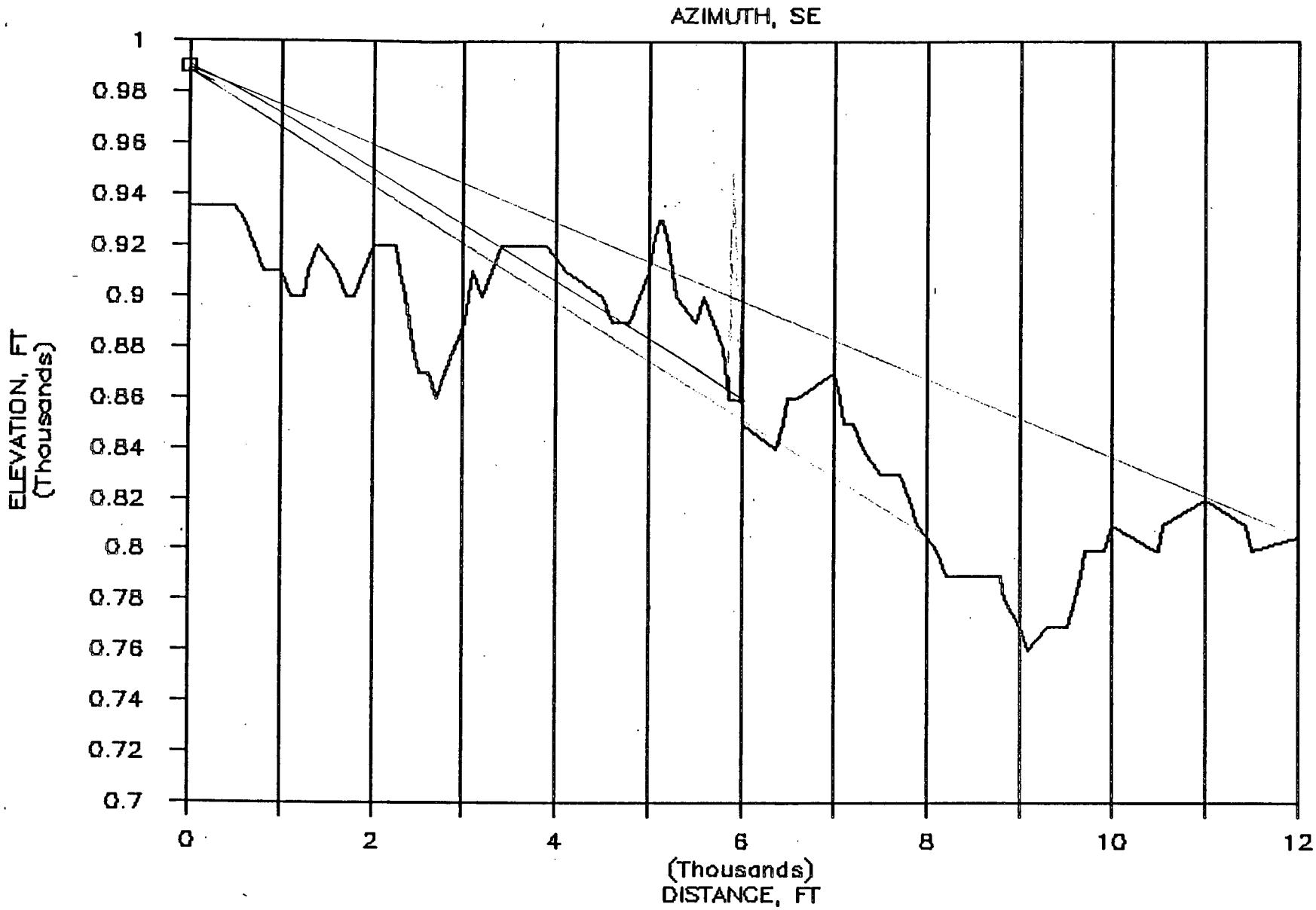

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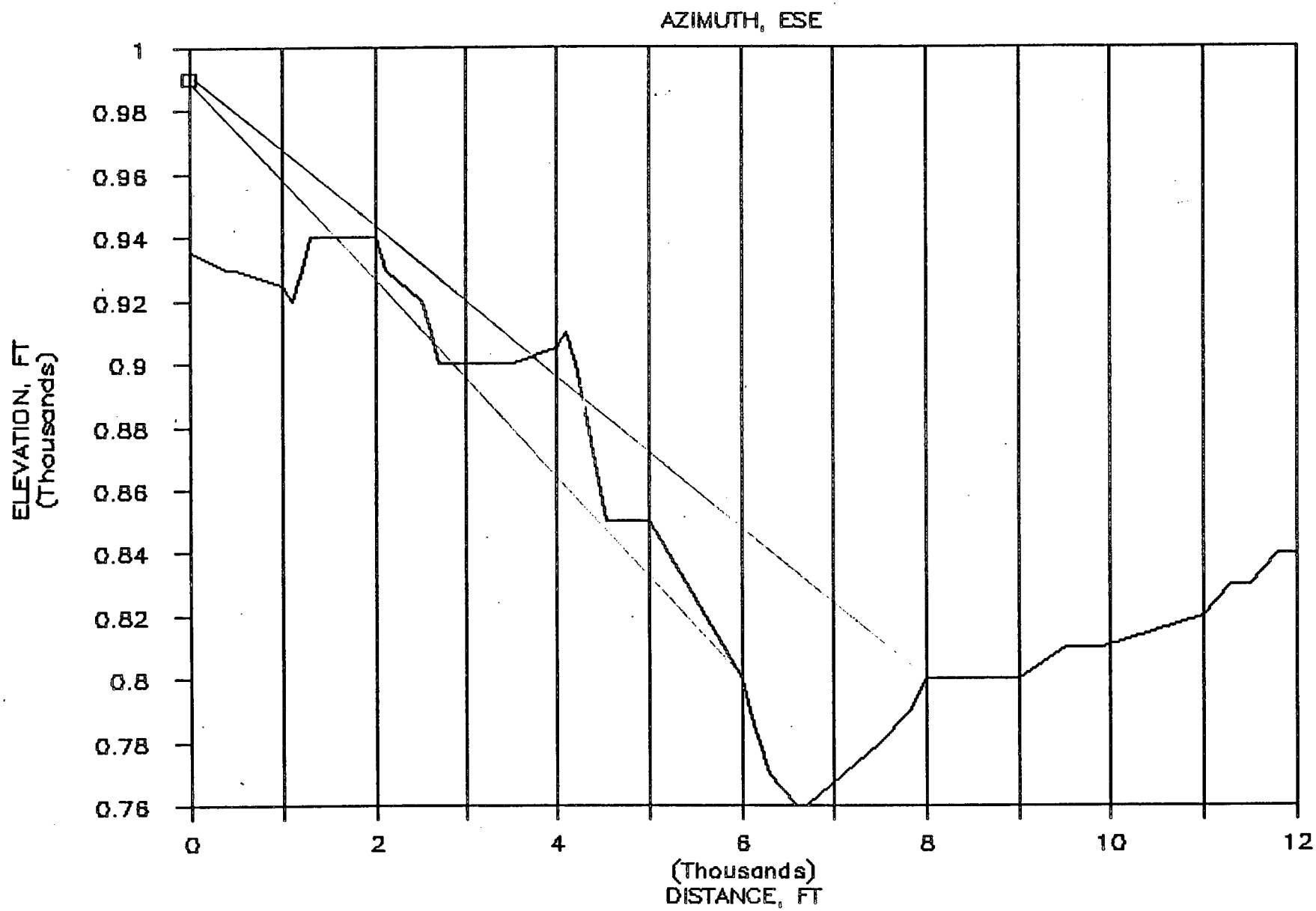


IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #13-WS2000
SOURCE-RECEIVER TOPOGRAPHICAL INPUTS

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	905.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	885.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	825.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	810.00	SOFT	0.	NO	0.	0.
6	8000.	90.00	775.00	SOFT	0.	NO	0.	0.
7	12000.	90.00	795.00	SOFT	0.	NO	0.	0.
8	500.	67.50	920.00	SOFT	0.	NO	0.	0.
9	1000.	67.50	905.00	SOFT	0.	NO	0.	0.
10	2000.	67.50	870.00	SOFT	0.	NO	0.	0.
11	4000.	67.50	820.00	SOFT	0.	YES	3500.	850.
12	6000.	67.50	860.00	SOFT	0.	YES	5800.	880.
13	8000.	67.50	790.00	SOFT	0.	YES	5800.	880.
14	12000.	67.50	790.00	SOFT	0.	NO	0.	0.
15	500.	45.00	920.00	SOFT	0.	NO	0.	0.
16	1000.	45.00	890.00	SOFT	0.	NO	0.	0.
17	2000.	45.00	870.00	SOFT	0.	NO	0.	0.
18	4000.	45.00	880.00	SOFT	0.	NO	0.	0.
19	6000.	45.00	850.00	SOFT	0.	NO	0.	0.
20	8000.	45.00	810.00	SOFT	0.	NO	0.	0.
21	12000.	45.00	840.00	SOFT	0.	NO	0.	0.
22	500.	22.50	925.00	SOFT	0.	NO	0.	0.
23	1000.	22.50	875.00	SOFT	0.	NO	0.	0.
24	2000.	22.50	855.00	SOFT	0.	NO	0.	0.
25	4000.	22.50	870.00	SOFT	0.	NO	0.	0.
26	6000.	22.50	850.00	SOFT	0.	NO	0.	0.
27	8000.	22.50	825.00	SOFT	0.	NO	0.	0.
28	12000.	22.50	830.00	SOFT	0.	YES	11500.	850.
29	500.	.00	920.00	SOFT	0.	NO	0.	0.
30	1000.	.00	880.00	SOFT	0.	NO	0.	0.
31	2000.	.00	860.00	SOFT	0.	NO	0.	0.
32	4000.	.00	820.00	SOFT	0.	NO	0.	0.
33	6000.	.00	845.00	SOFT	0.	NO	0.	0.
34	8000.	.00	820.00	SOFT	0.	NO	0.	0.
35	12000.	.00	795.00	SOFT	0.	YES	9900.	845.
36	500.	337.50	920.00	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	920.00	SOFT	0.	NO	0.	0.
38	2000.	337.50	870.00	SOFT	0.	NO	0.	0.
39	4000.	337.50	810.00	SOFT	0.	NO	0.	0.
40	6000.	337.50	830.00	SOFT	0.	NO	0.	0.
41	8000.	337.50	785.00	SOFT	0.	NO	0.	0.
42	12000.	337.50	785.00	SOFT	0.	NO	0.	0.
43	500.	315.00	930.00	SOFT	0.	NO	0.	0.
44	1000.	315.00	920.00	SOFT	0.	NO	0.	0.
45	2000.	315.00	920.00	SOFT	0.	NO	0.	0.
46	4000.	315.00	840.00	SOFT	0.	YES	1500.	940.
47	6000.	315.00	765.00	SOFT	0.	YES	1500.	940.
48	8000.	315.00	740.00	SOFT	0.	NO	0.	0.
49	12000.	315.00	740.00	SOFT	0.	NO	0.	0.
50	500.	292.50	930.00	SOFT	0.	NO	0.	
51	1000.	292.50	920.00	SOFT	0.	NO	0.	
52	2000.	292.50	920.00	SOFT	0.	NO	0.	0.
53	4000.	292.50	850.00	SOFT	0.	NO	0.	0.
54	6000.	292.50	740.00	SOFT	0.	YES	2000.	920.
55	8000.	292.50	740.00	SOFT	0.	YES	4000.	850.
56	12000.	292.50	810.00	SOFT	0.	YES	11000.	850.
57	500.	270.00	930.00	SOFT	0.	NO	0.	0.
58	1000.	270.00	890.00	SOFT	0.	NO	0.	0.
59	2000.	270.00	900.00	SOFT	0.	NO	0.	0.
60	4000.	270.00	800.00	SOFT	0.	YES	1500.	920.
61	6000.	270.00	740.00	SOFT	0.	NO	0.	0.
62	8000.	270.00	750.00	SOFT	0.	NO	0.	0.
63	12000.	270.00	785.00	SOFT	0.	NO	0.	0.
64	500.	247.50	920.00	SOFT	0.	NO	0.	0.
65	1000.	247.50	860.00	SOFT	0.	NO	0.	0.
66	2000.	247.50	885.00	SOFT	0.	NO	0.	0.
67	4000.	247.50	880.00	SOFT	0.	NO	0.	0.
68	6000.	247.50	790.00	SOFT	0.	YES	4000.	880.
69	8000.	247.50	740.00	SOFT	0.	YES	4000.	880.
70	12000.	247.50	740.00	SOFT	0.	NO	0.	0.
71	500.	225.00	890.00	SOFT	0.	NO	0.	0.
72	1000.	225.00	910.00	SOFT	0.	NO	0.	0.

GR+D POINT	DISTANCE	BEARING	HEIGHT	GROUND TYPE	FOLIAGE PENETRATION	INTERVENIHG OBSTRUCTIONS	DISTANCE TO HIGHEST OBSTRUCTION FROM SOURCE	HEIGHT OF OBSTRUCTION
73	2000.	225.00	840.00	SOFT	0.	NO	0.	0.
74	4000.	225.00	880.00	SOFT	0.	NO	0.	0.
75	6000.	225.00	850.00	SOFT	0.	YES	4700.	890.
76	8000.	225.00	780.00	SOFT	0.	YES	4100.	890.
77	12000.	225.00	740.00	SOFT	0.	YES	4100.	890.
78	500.	202.50	910.00	SOFT	0.	NO	0.	0.
79	1000.	202.50	910.00	SOFT	0.	NO	0.	0.
80	2000.	202.50	870.00	SOFT	0.	NO	0.	0.
81	4000.	202.50	850.00	SOFT	0.	YES	3800.	890.
82	6000.	202.50	810.00	SOFT	0.	NO	0.	0.
83	8000.	202.50	785.00	SOFT	0.	YES	6600.	850.
84	12000.	202.50	740.00	SOFT	0.	YES	6600.	850.
85	500.	180.00	930.00	SOFT	0.	NO	0.	0.
86	1000.	180.00	900.00	SOFT	0.	NO	0.	0.
87	2000.	180.00	900.00	SOFT	0.	NO	0.	0.
88	4000.	180.00	930.00	SOFT	0.	NO	0.	0.
89	6000.	180.00	870.00	SOFT	0.	YES	3500.	910.
90	8000.	180.00	860.00	SOFT	0.	YES	3500.	910.
91	12000.	180.00	765.00	SOFT	0.	YES	3500.	910.
92	500.	157.50	930.00	SOFT	0.	NO	0.	0.
93	1000.	157.50	930.00	SOFT	0.	NO	0.	0.
94	2000.	157.50	860.00	SOFT	0.	YES	500.	930.
95	4000.	157.50	870.00	SOFT	0.	YES	3100.	900.
96	6000.	157.50	800.00	SOFT	0.	YES	3100.	900.
97	8000.	157.50	820.00	SOFT	0.	NO	0.	0.
98	12000.	157.50	750.00	SOFT	0.	YES	12000.	900.
99	500.	135.00	935.00	SOFT	0.	NO	0.	0.
100	1000.	135.00	910.00	SOFT	0.	NO	0.	0.
101	2000.	135.00	920.00	SOFT	0.	NO	0.	0.
102	4000.	135.00	915.00	SOFT	0.	NO	0.	0.
103	6000.	135.00	850.00	SOFT	0.	YES	5900.	960.
104	8000.	135.00	805.00	SOFT	0.	YES	5900.	960.
105	12000.	135.00	805.00	SOFT	0.	YES	5900.	960.
106	500.	112.50	930.00	SOFT	0.	NO	0.	0.
107	1000.	112.50	925.00	SOFT	0.	NO	0.	0.
108	2000.	112.50	940.00	SOFT	0.	NO	0.	0.
109	4000.	112.50	905.00	SOFT	0.	NO	0.	0.
110	6000.	112.50	800.00	SOFT	0.	YES	1200.	940.
111	8000.	112.50	800.00	SOFT	0.	YES	4100.	910.
112	12000.	112.50	840.00	SOFT	0.	NO	0.	0.

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #13-WS2000
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	DUANE - WS2000	152.9	152.6	.0	.0	.0	.0	.0	152.0	143.0	138.0	126.0

XO= .00 YO= .00 ZO= 990.00 HEIGHT ABOVE GROUND= 55.00

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #13-WS2000
METEOROLOGICAL INPUT CONDITIONS

H1= 10.67 METERS H2= 50.29 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)
1981		8	21	12	177.0	2.1	2.6	23.9	23.2	30.0	742.0

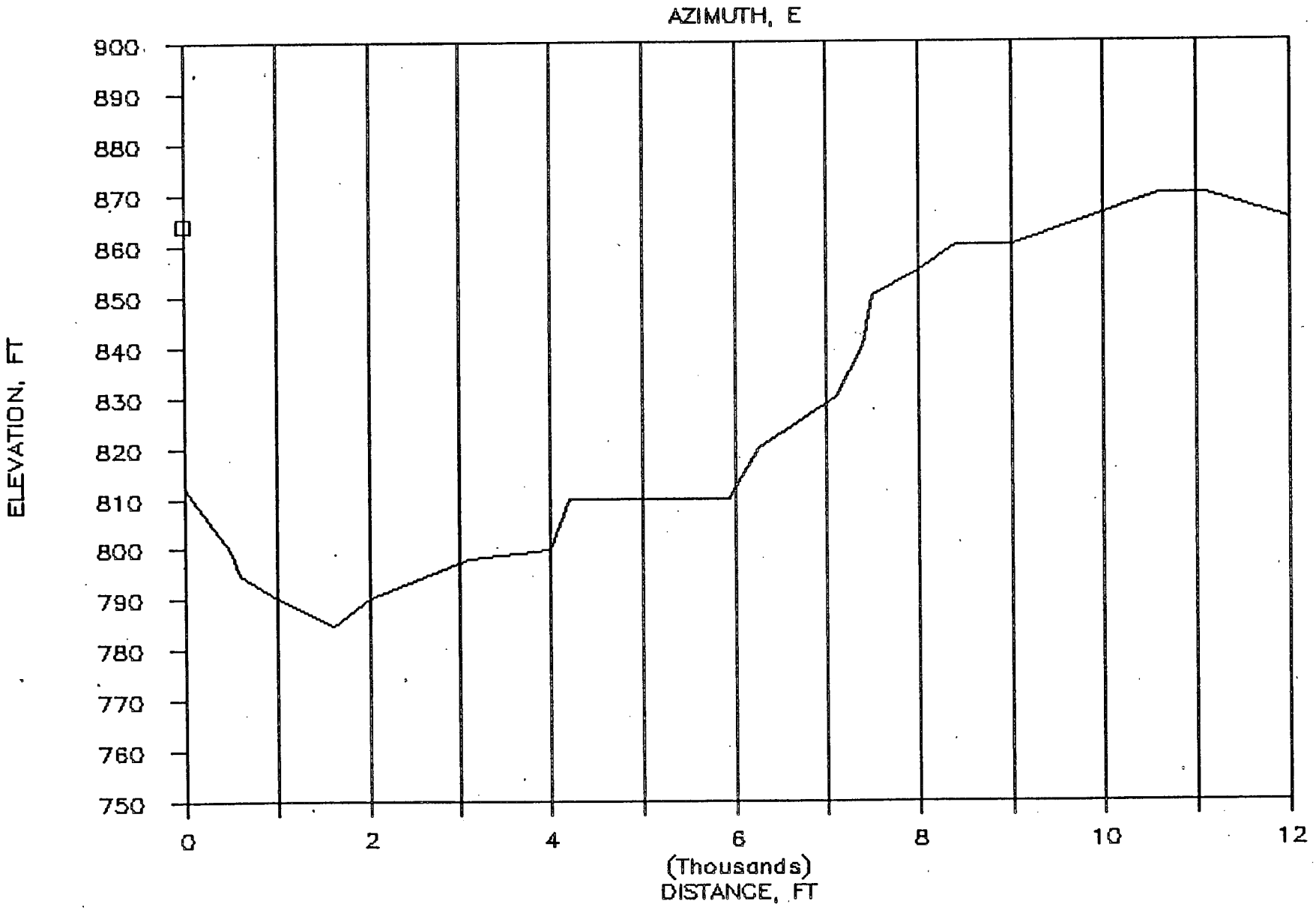
IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #13-WS2000

SOUND PRESSURE LEVELS IN DBC
UNDER MET CONDITION 1

DISTANCE IN FEET

AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	99.3	85.1	67.5	52.5	47.6	44.3	35.8
ENE	99.3	85.1	67.4	45.9	36.0	34.4	35.8
NE	99.3	85.1	67.4	52.5	46.7	41.0	27.5
NNE	99.3	85.0	67.4	52.5	47.6	44.3	27.8
N	99.3	85.0	67.4	52.5	47.6	44.3	29.5
NNW	99.3	85.1	67.4	52.5	47.6	44.3	35.8
NW	99.3	85.1	67.5	47.2	42.3	44.3	35.8
WNW	99.3	85.1	67.5	52.5	41.3	38.3	26.3
W	99.3	85.1	67.5	47.7	47.5	44.3	35.8
WSW	99.3	85.0	67.5	52.5	38.8	35.3	28.0
SW	99.2	85.1	67.4	52.5	41.7	39.2	30.1
SSW	99.2	85.1	67.4	35.3	47.6	34.6	31.0
S	99.3	85.1	67.5	52.5	42.0	37.0	30.1
SSE	99.3	85.1	54.2	47.6	42.3	44.2	7.3
SE	99.3	85.1	67.5	52.5	21.7	22.7	16.1
ESE	99.3	85.1	67.5	52.5	41.2	37.9	35.8

DUANE ARNOLD 14



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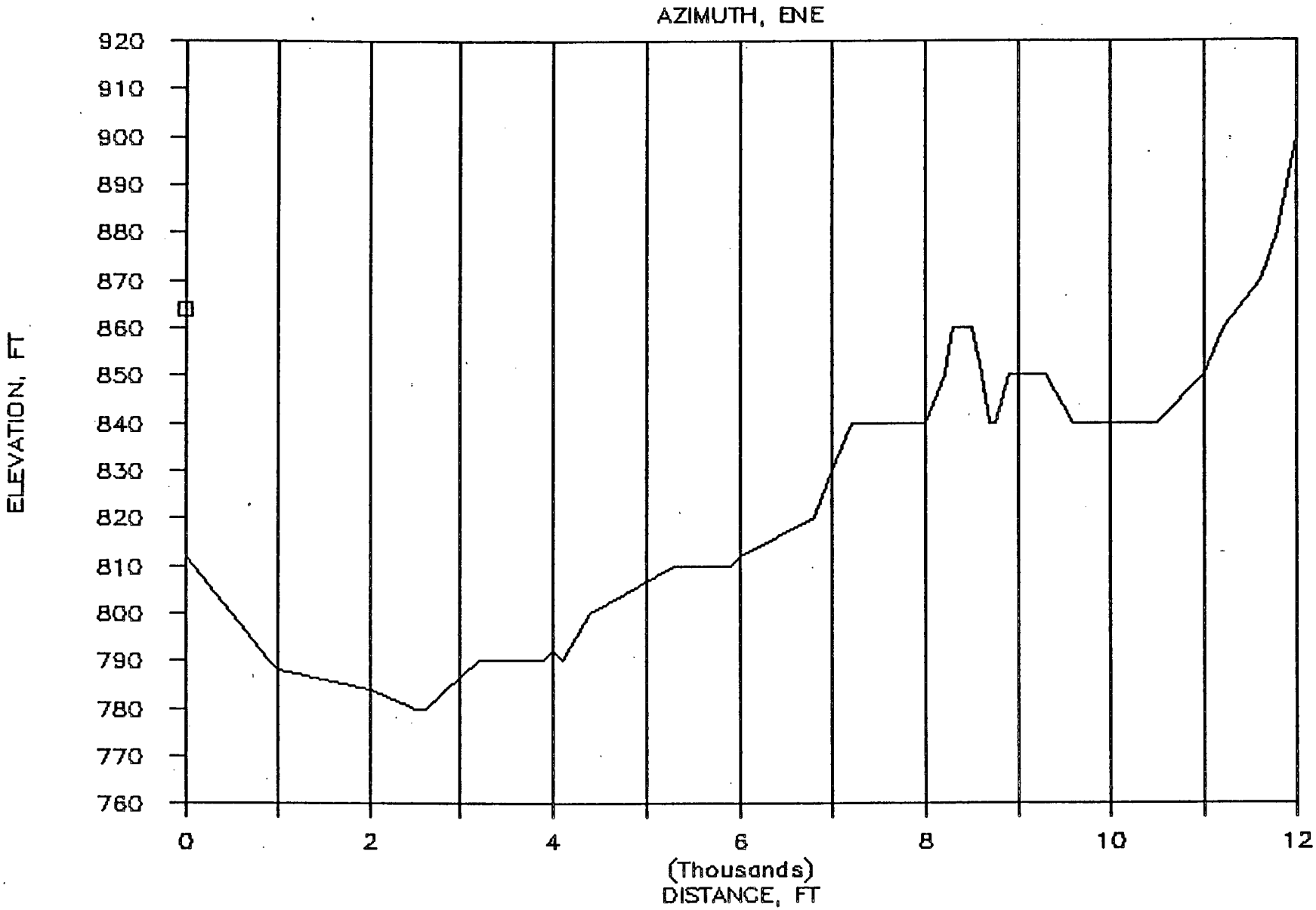

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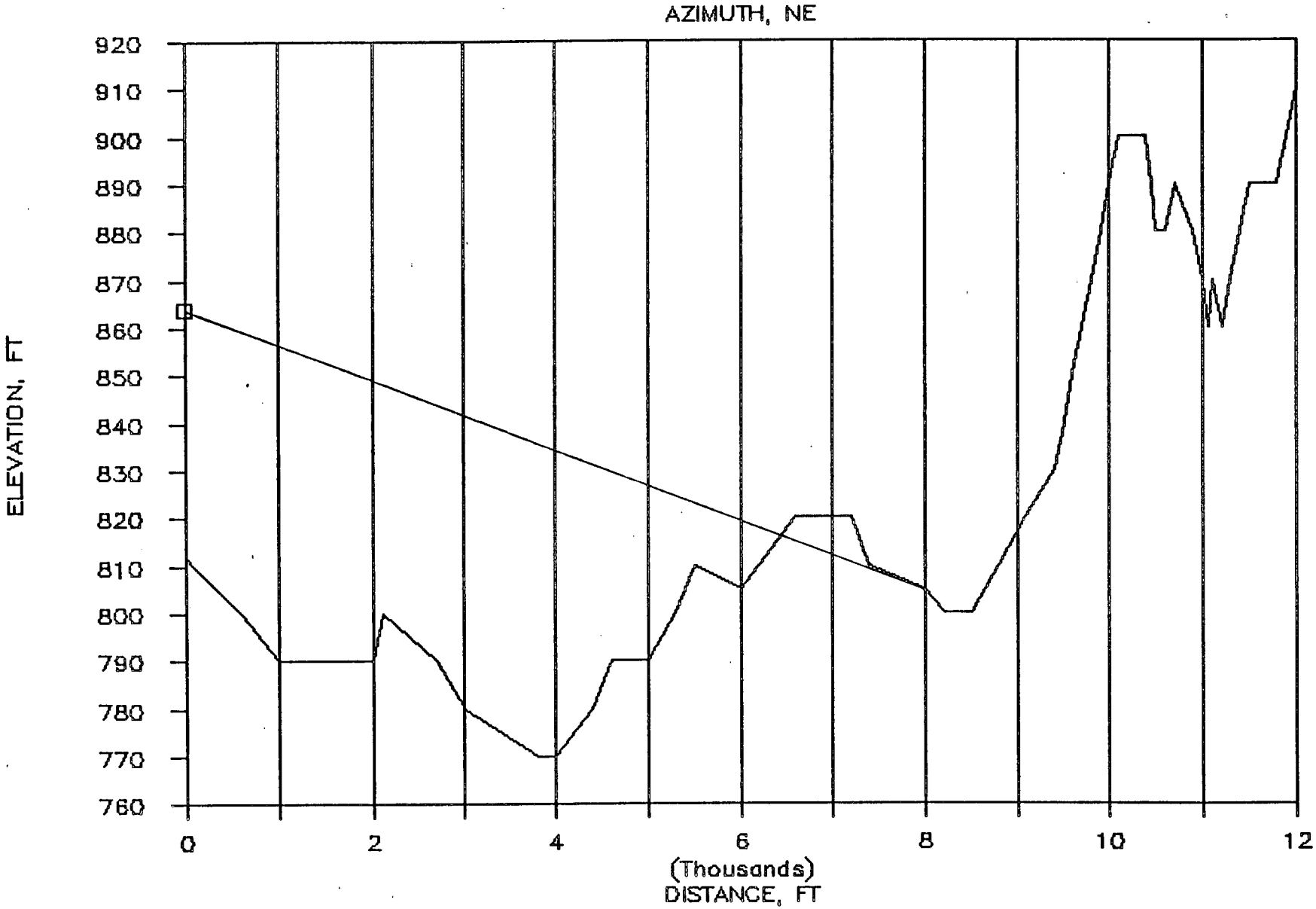

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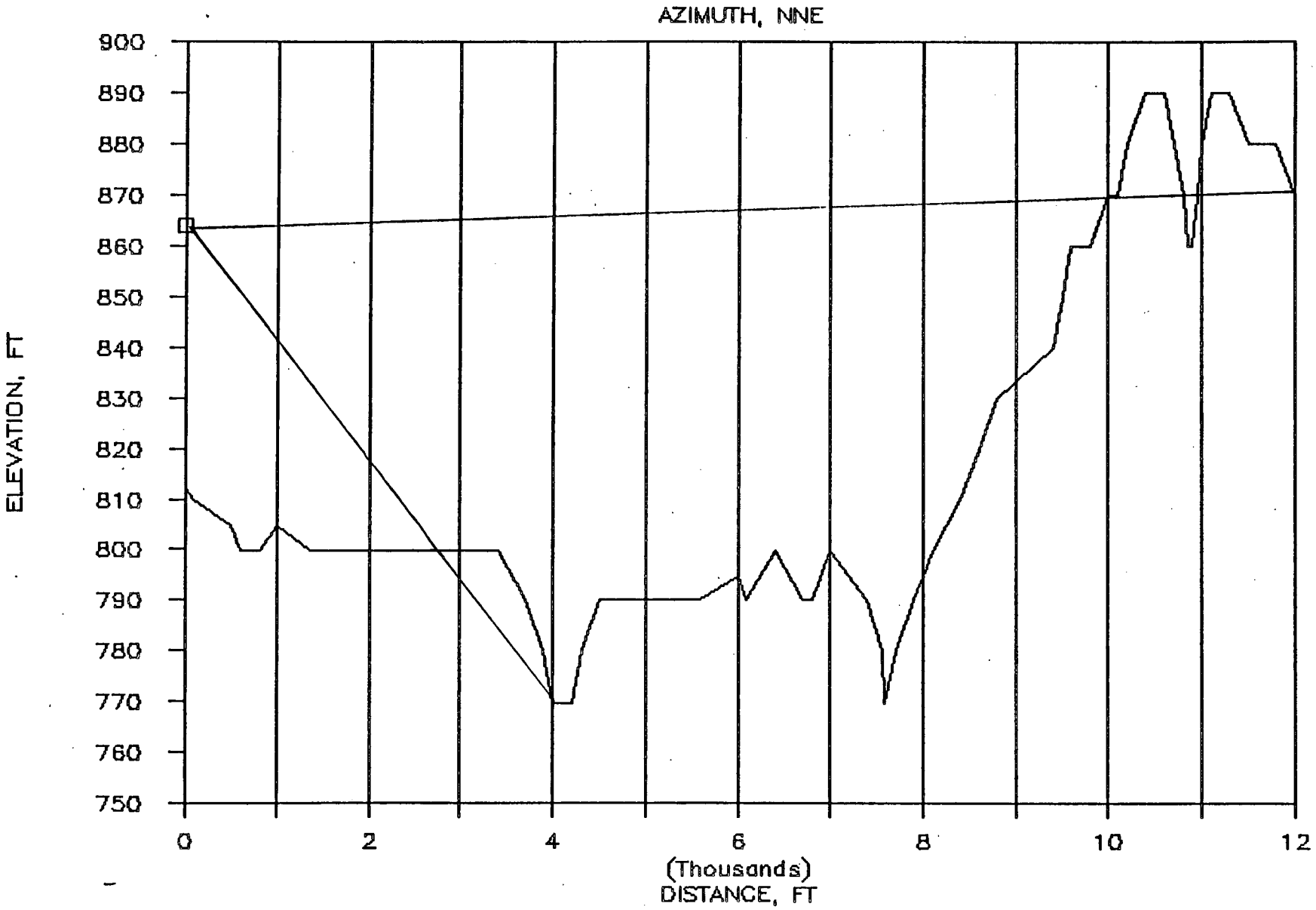

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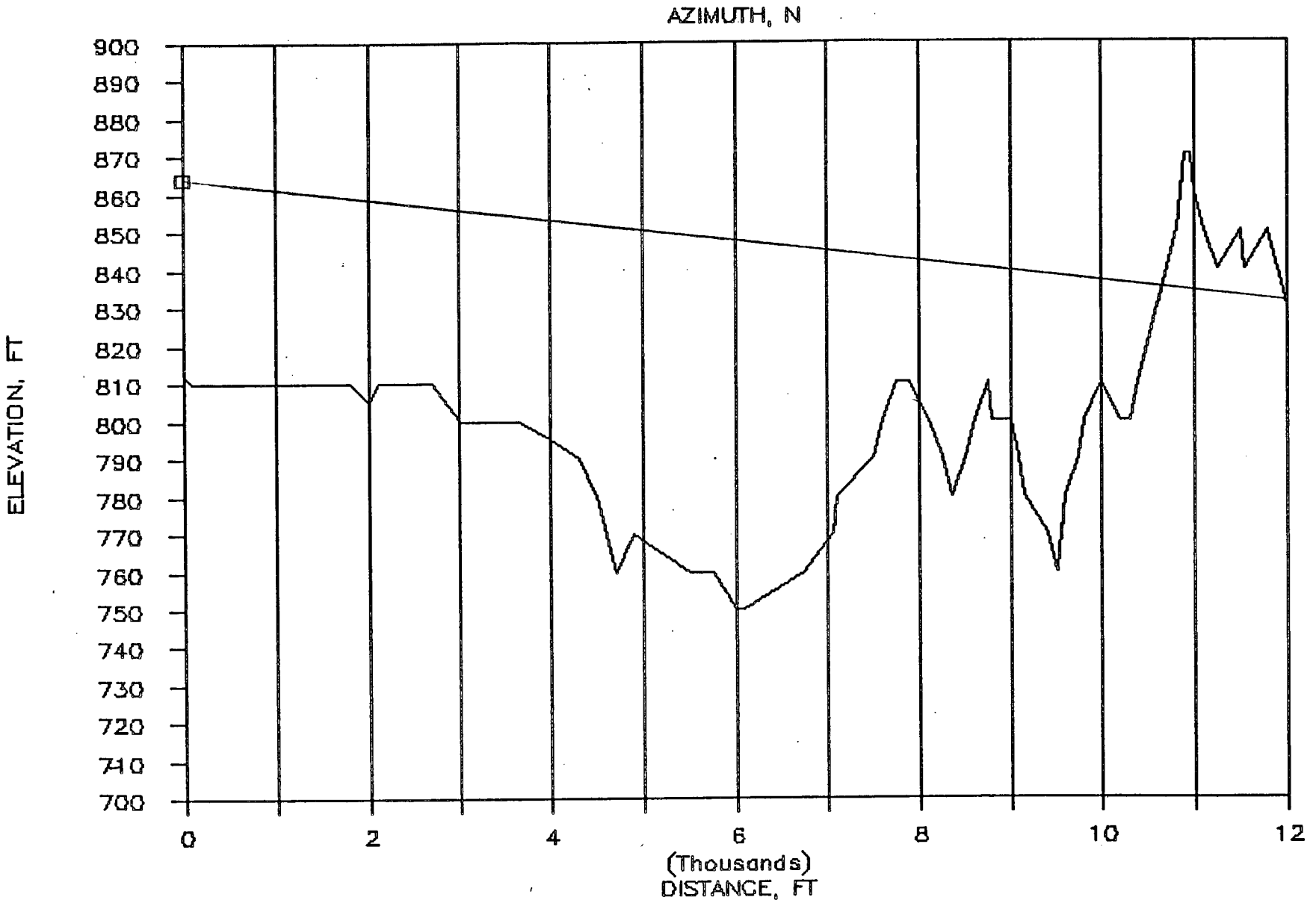

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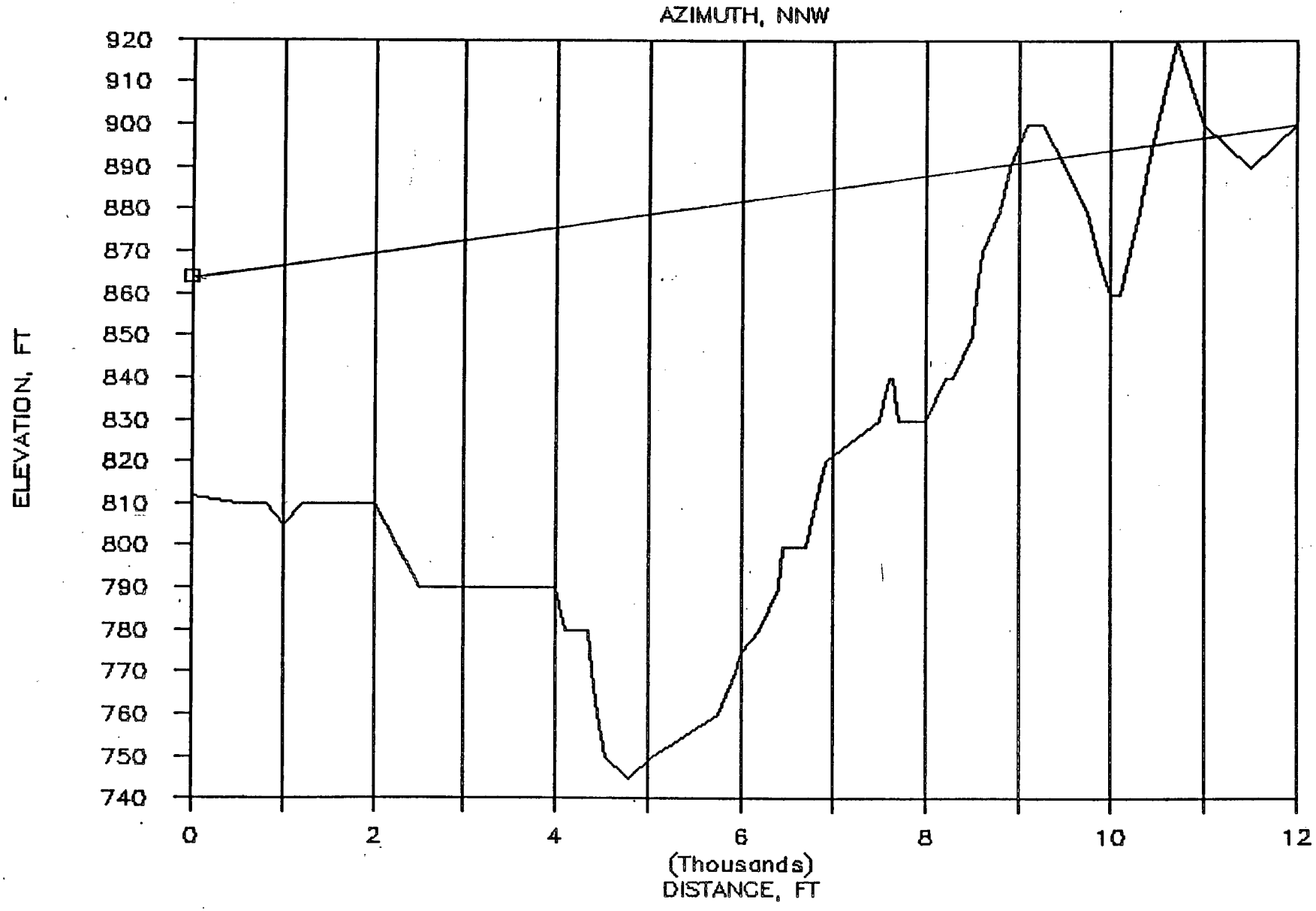

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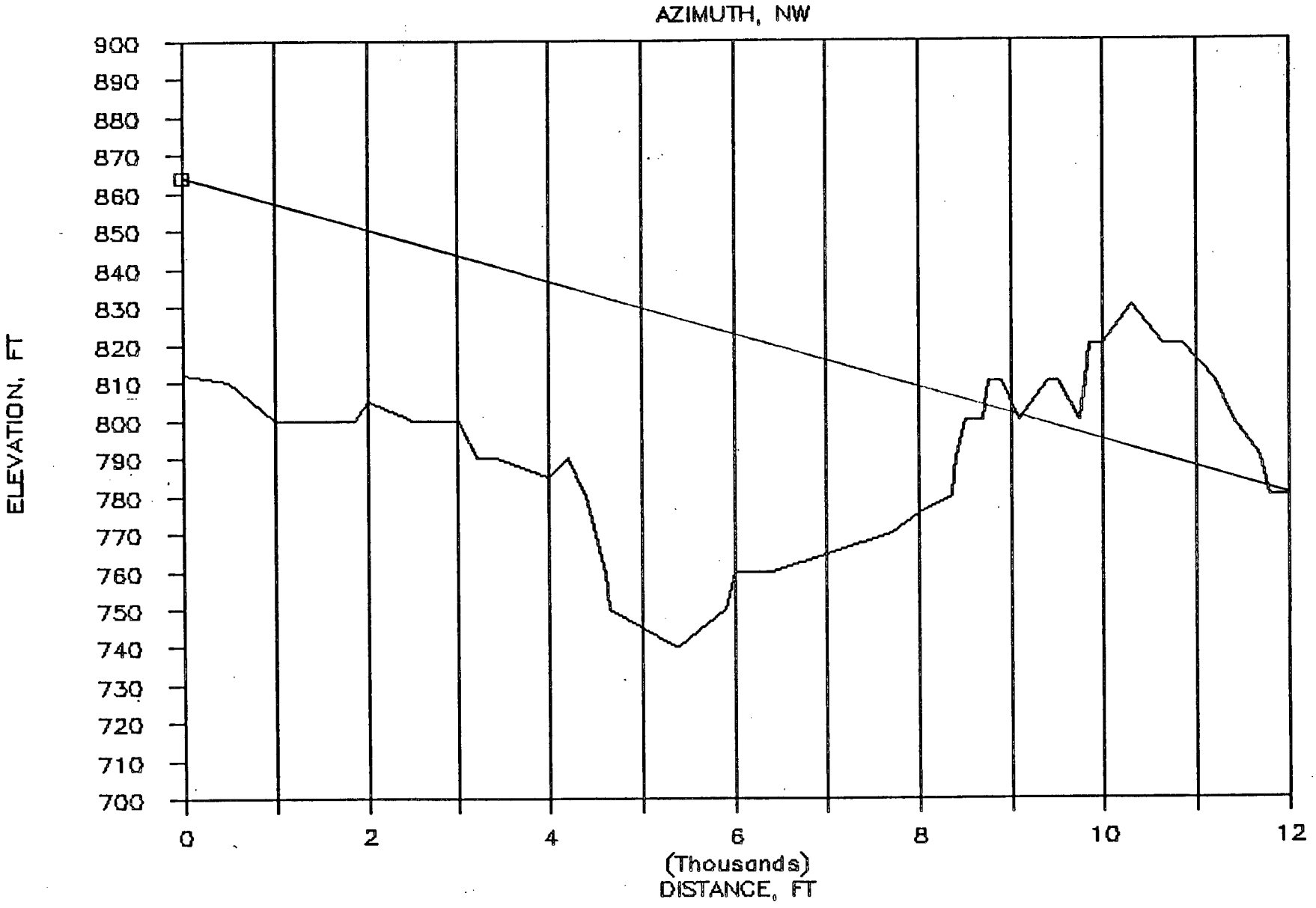

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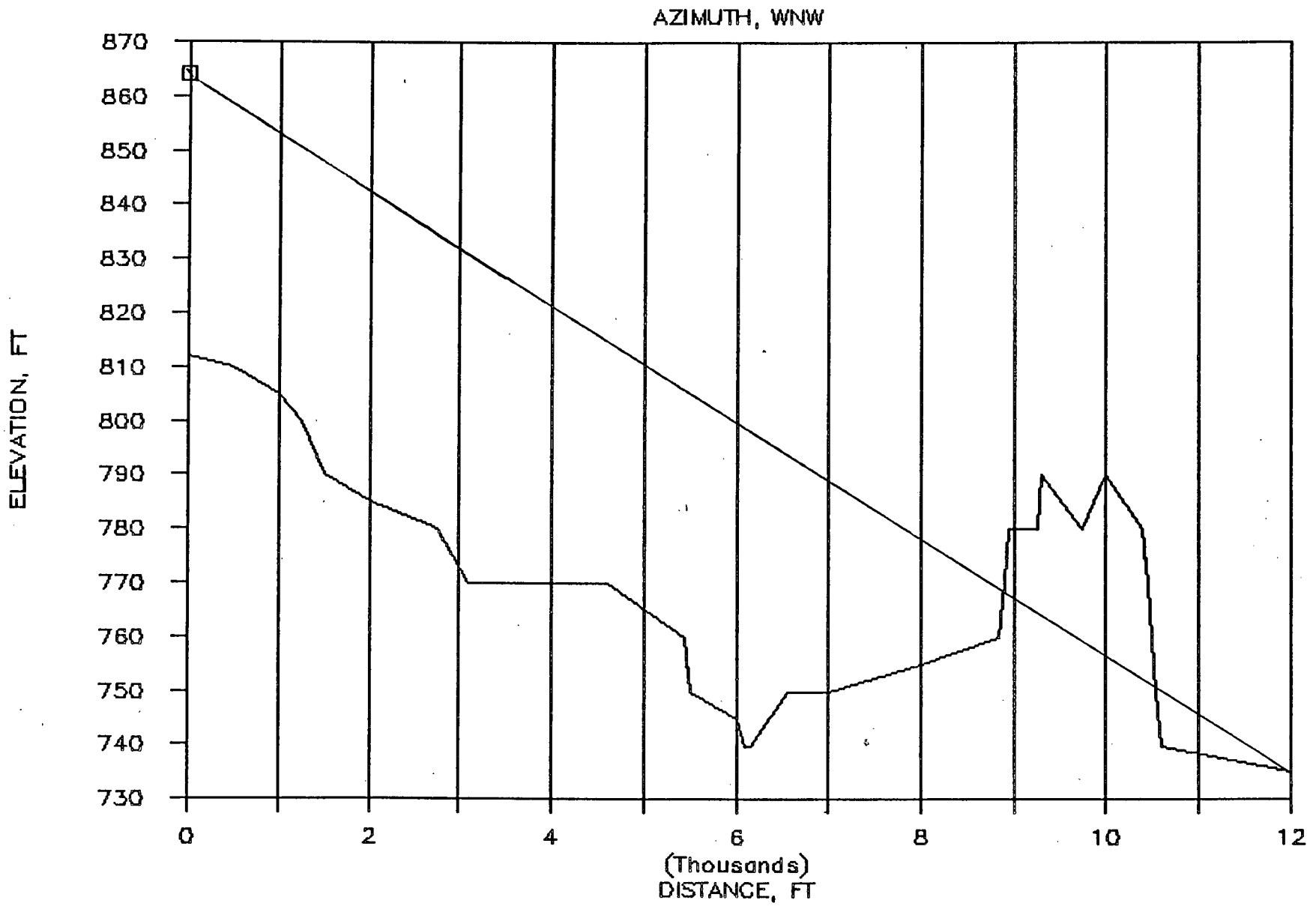

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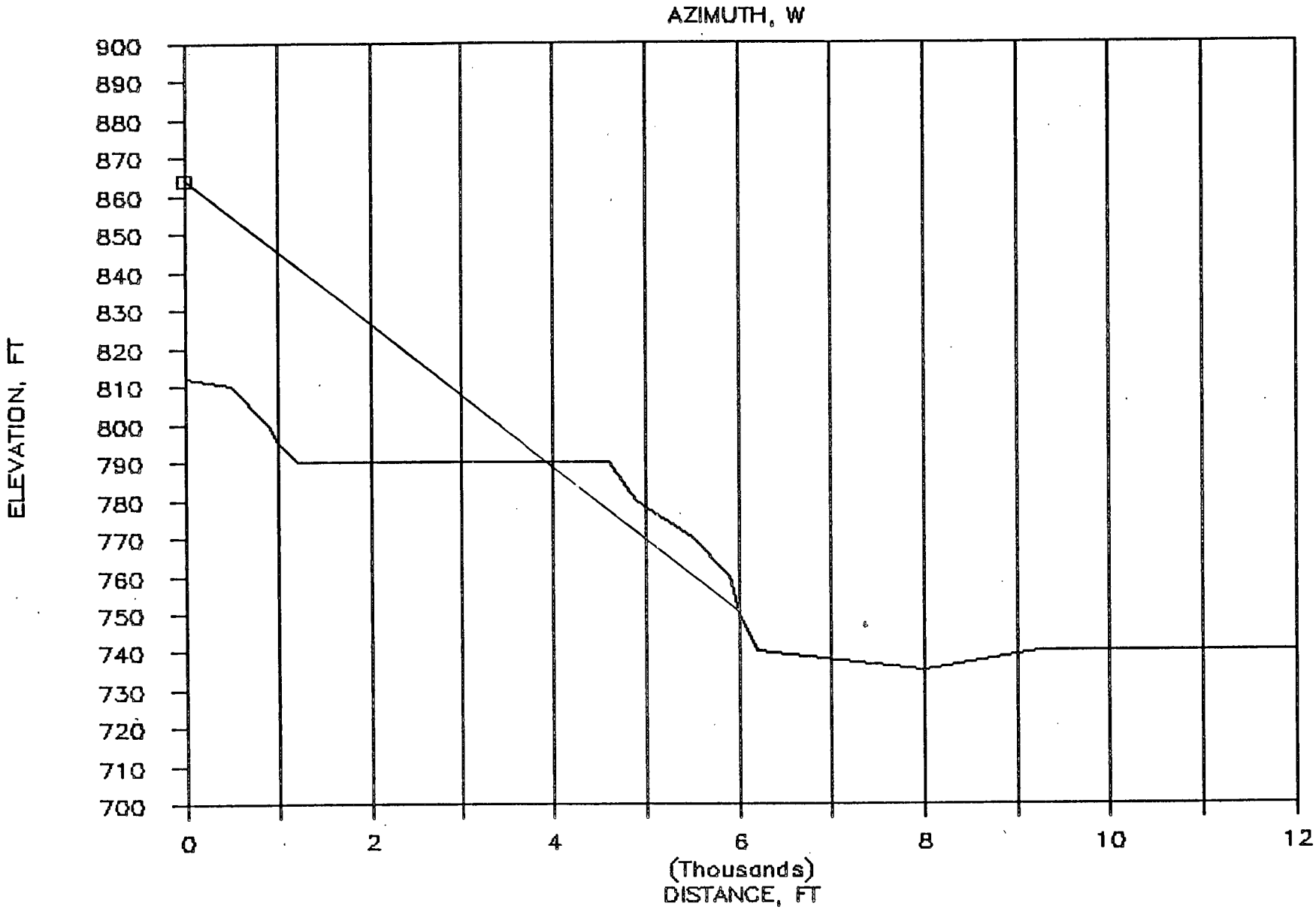

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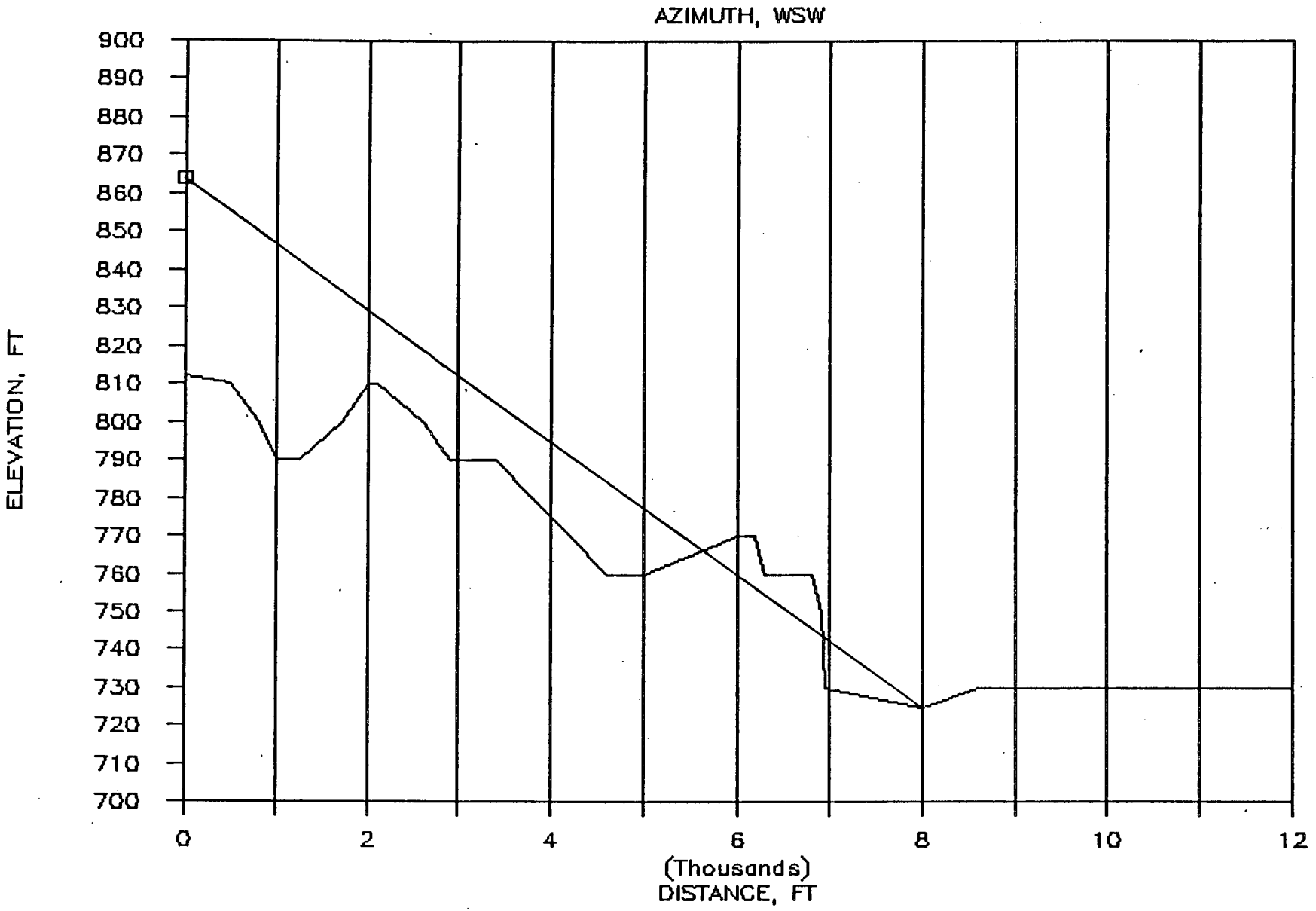

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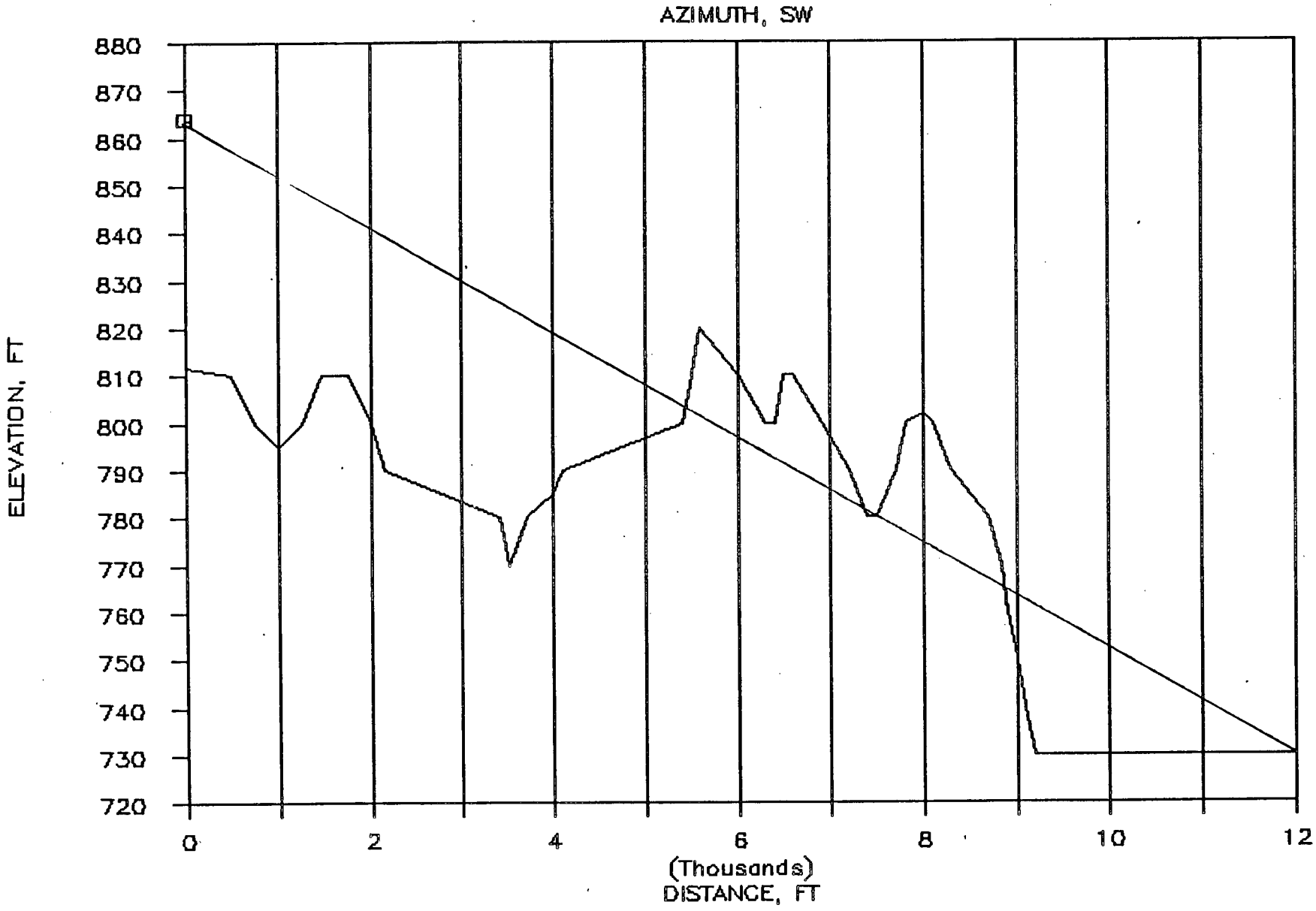

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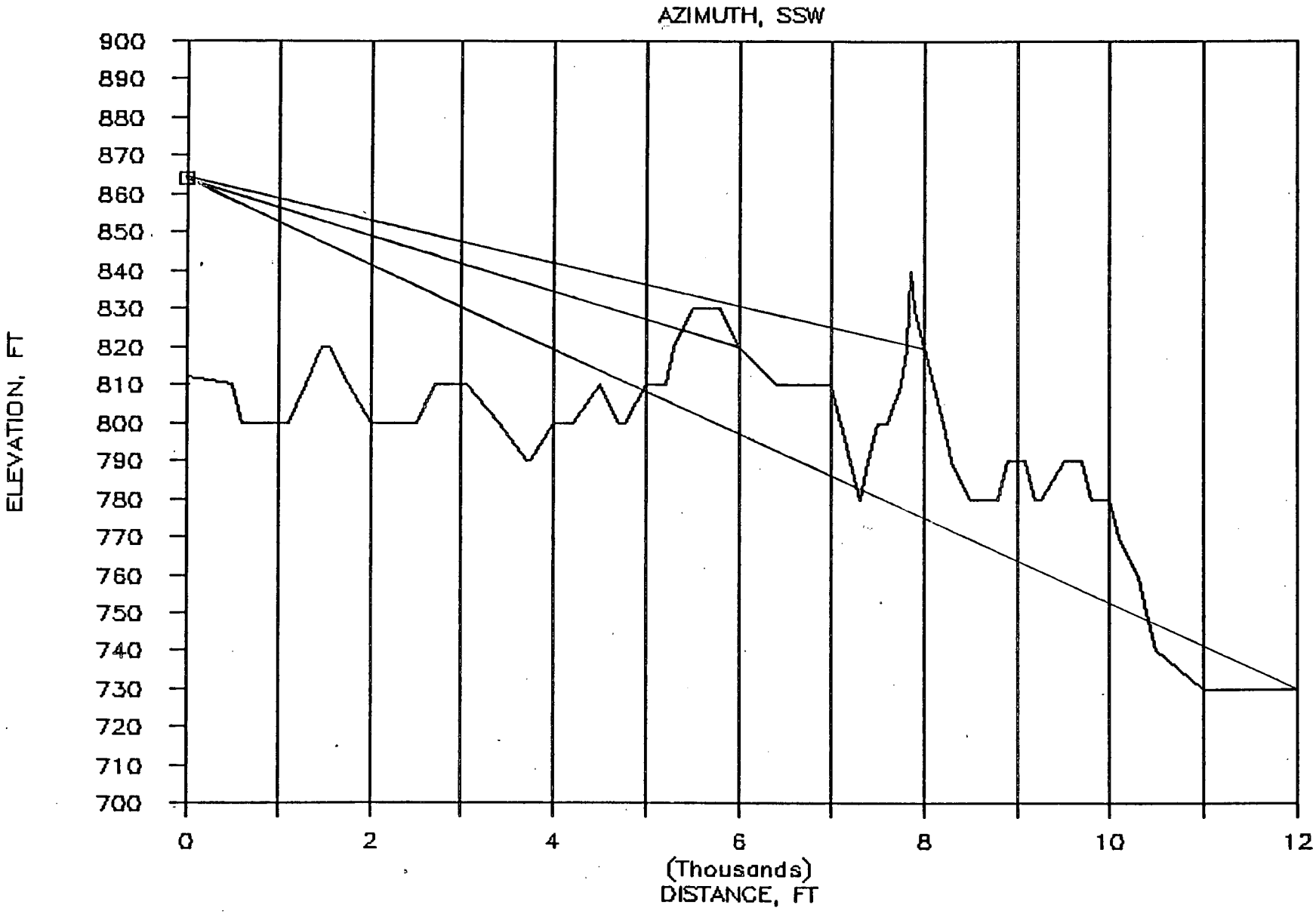

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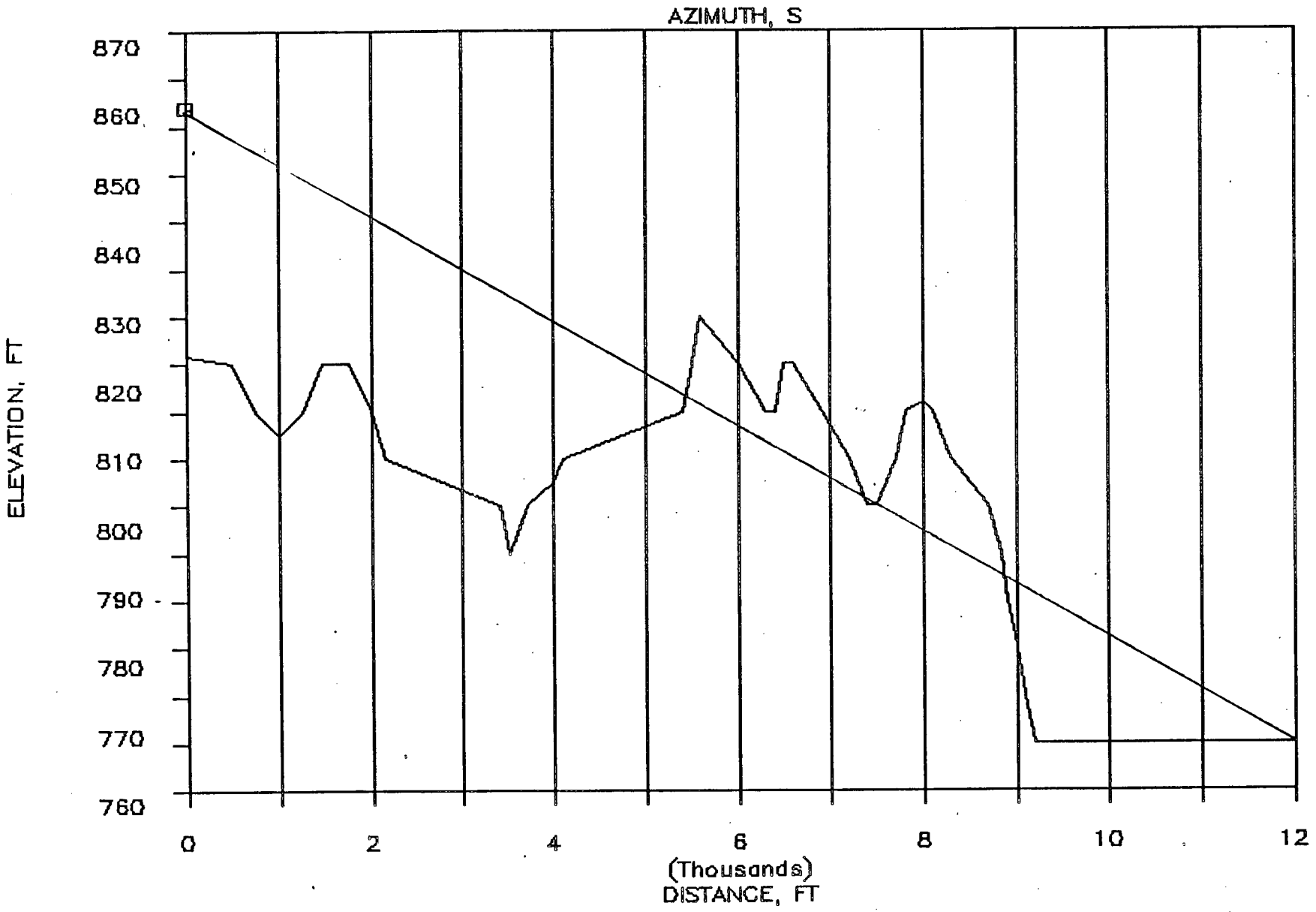

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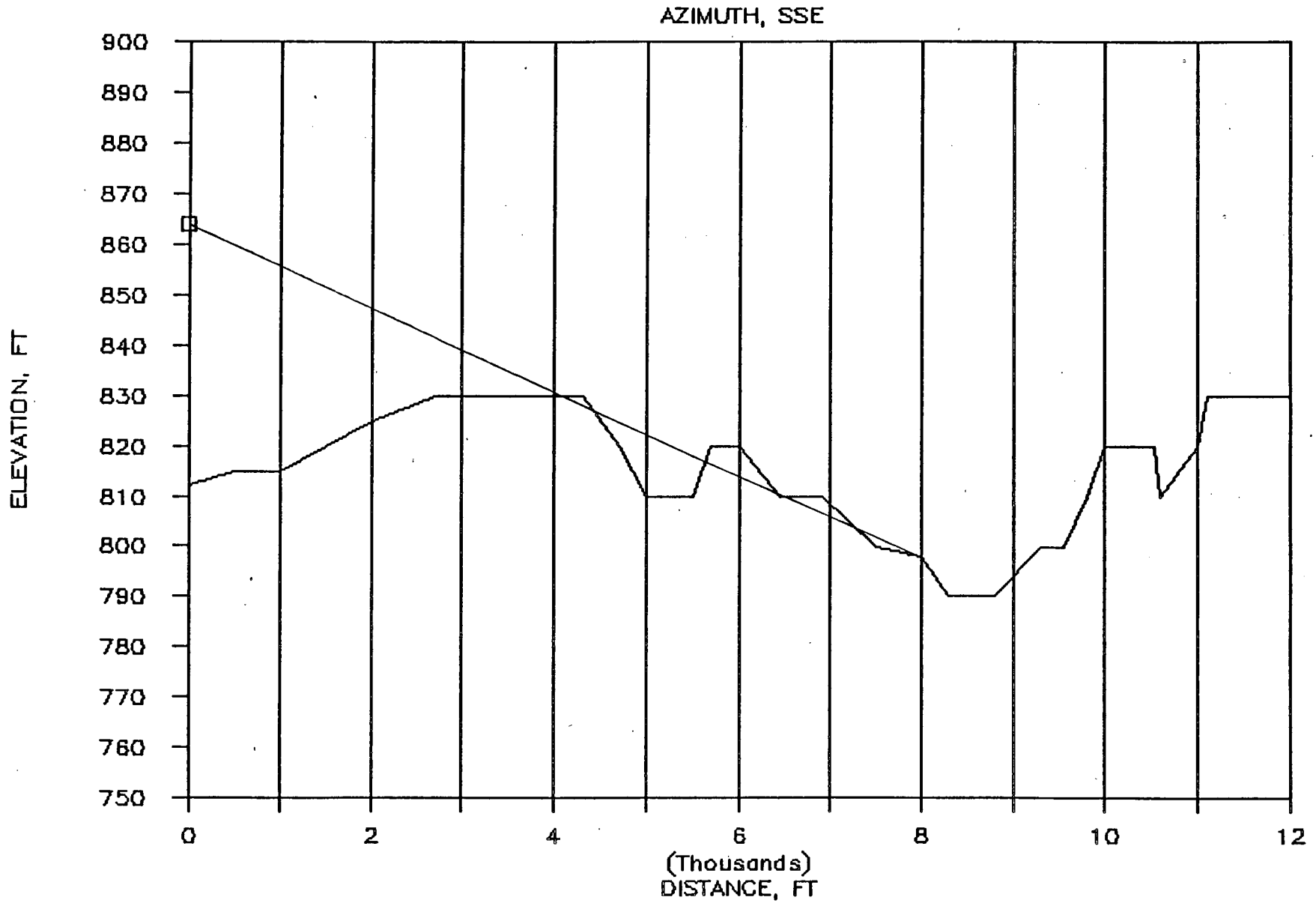

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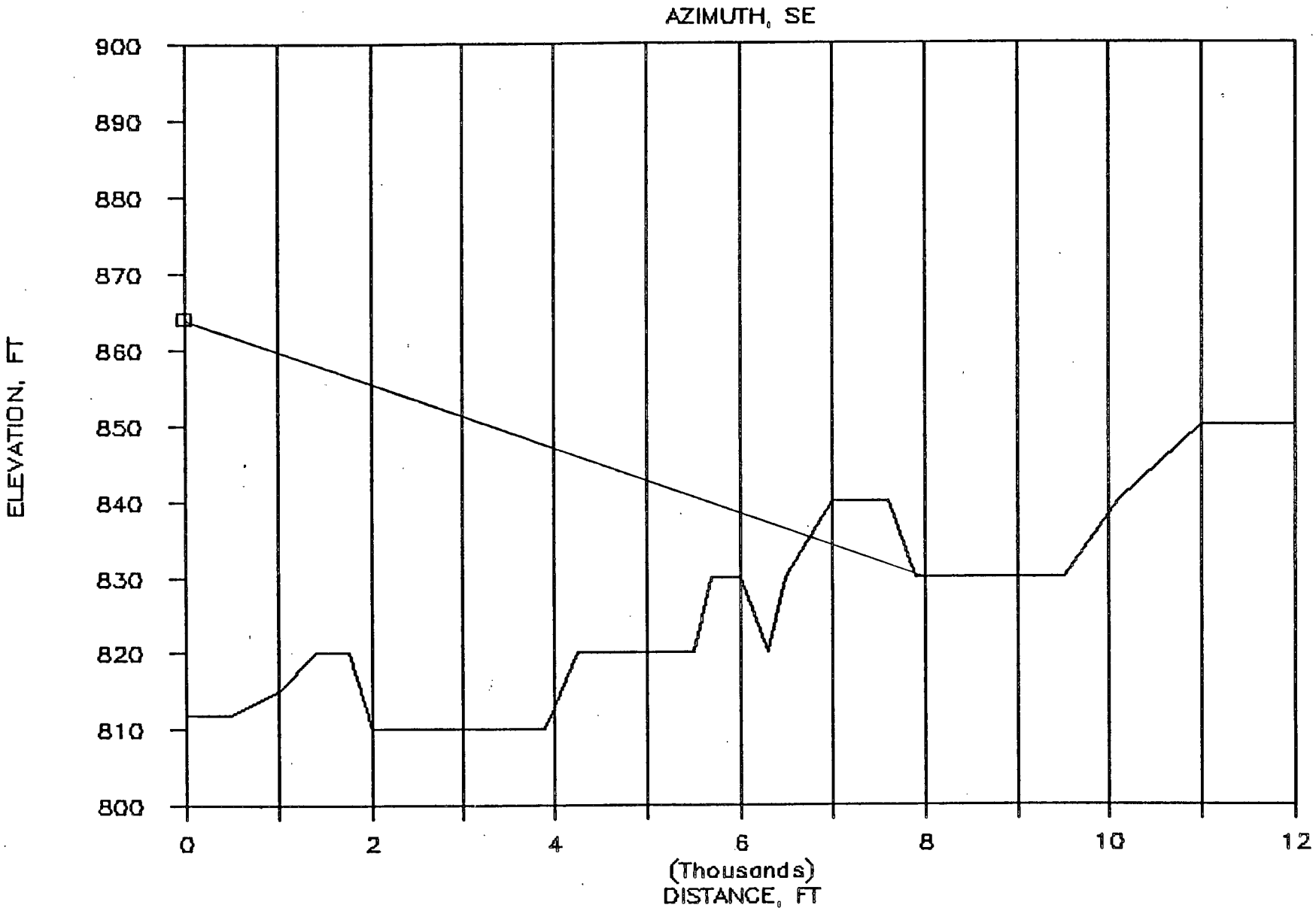
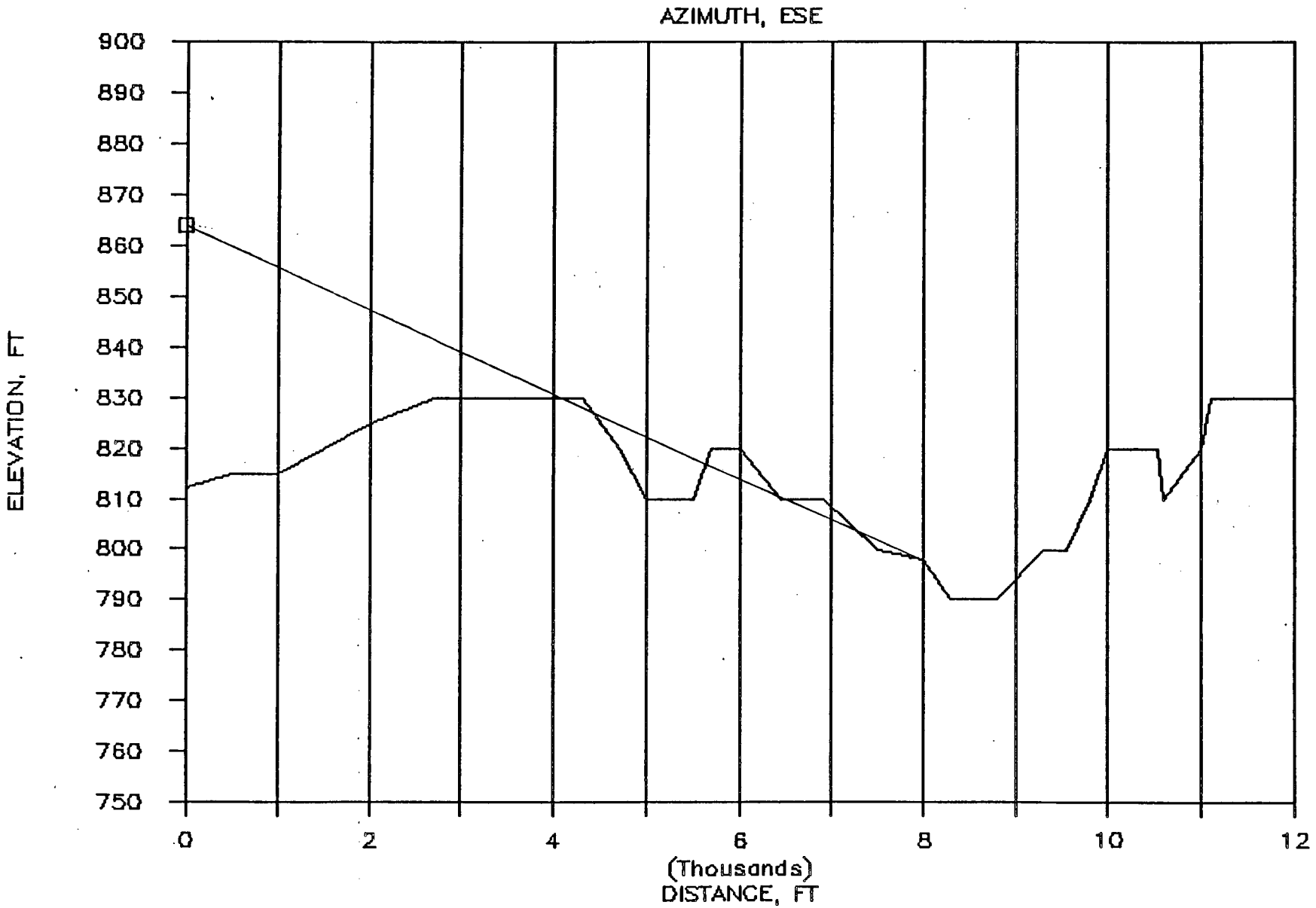


DUANE ARNOLD 14



IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #14-WS3000
SOURCE-RECEIVER TOPOGRAPHICAL INPUTS

ALL BEARINGS ARE WITH RESPECT TO 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	800.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	790.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	790.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	800.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	812.00	SOFT	0.	NO	0.	0.
6	8000.	90.00	855.00	SOFT	0.	NO	0.	0.
7	12000.	90.00	865.00	SOFT	0.	NO	0.	0.
8	500.	67.50	800.00	SOFT	0.	NO	0.	
9	1000.	67.50	788.00	SOFT	0.	NO	0.	
10	2000.	67.50	784.00	SOFT	0.	NO	0.	0.
11	4000.	67.50	792.00	SOFT	0.	NO	0.	0.
12	6000.	67.50	812.00	SOFT	0.	NO	0.	0.
13	8000.	67.50	840.00	SOFT	0.	NO	0.	0.
14	12000.	67.50	900.00	SOFT	0.	NO	0.	0.
15	500.	45.00	802.00	SOFT	0.	NO	0.	0.
16	1000.	45.00	790.00	SOFT	0.	NO	0.	0.
17	2000.	45.00	790.00	SOFT	0.	NO	0.	0.
18	4000.	45.00	770.00	SOFT	0.	NO	0.	0.
19	6000.	45.00	805.00	SOFT	0.	NO	0.	0.
20	8000.	45.00	805.00	SOFT	0.	YES	6600.	820.
21	12000.	45.00	910.00	SOFT	0.	NO	0.	0.
22	500.	22.50	805.00	SOFT	0.	NO	0.	0.
23	1000.	22.50	805.00	SOFT	0.	NO	0.	0.
24	2000.	22.50	800.00	SOFT	0.	NO	0.	0.
25	4000.	22.50	770.00	SOFT	0.	YES	2800.	800.
26	6000.	22.50	795.00	SOFT	0.	NO	0.	0.
27	8000.	22.50	795.00	SOFT	0.	NO	0.	0.
28	12000.	22.50	870.00	SOFT	0.	YES	10400.	890.
29	500.	.00	810.00	SOFT	0.	NO	0.	0.
30	1000.	.00	810.00	SOFT	0.	NO	0.	0.
31	2000.	.00	805.00	SOFT	0.	NO	0.	0.
32	4000.	.00	795.00	SOFT	0.	NO	0.	0.
33	6000.	.00	750.00	SOFT	0.	NO	0.	0.
34	8000.	.00	805.00	SOFT	0.	NO	0.	0.
35	12000.	.00	830.00	SOFT	0.	YES	10900.	870.
36	500.	337.50	810.00	SOFT	0.	NO	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	805.00	SOFT	0.	NO	0.	0.
38	2000.	337.50	810.00	SOFT	0.	NO	0.	0.
39	4000.	337.50	790.00	SOFT	0.	NO	0.	0.
40	6000.	337.50	775.00	SOFT	0.	NO	0.	0.
41	8000.	337.50	830.00	SOFT	0.	NO	0.	0.
42	12000.	337.50	900.00	SOFT	0.	YES	10700.	920.
43	500.	315.00	810.00	SOFT	0.	NO	0.	0.
44	1000.	315.00	800.00	SOFT	0.	NO	0.	0.
45	2000.	315.00	805.00	SOFT	0.	NO	0.	0.
46	4000.	315.00	785.00	SOFT	0.	NO	0.	0.
47	6000.	315.00	760.00	SOFT	0.	NO	0.	0.
48	8000.	315.00	775.00	SOFT	0.	NO	0.	0.
49	12000.	315.00	780.00	SOFT	0.	YES	10300.	830.
50	500.	292.50	810.00	SOFT	0.	NO	0.	0.
51	1000.	292.50	805.00	SOFT	0.	NO	0.	0.
52	2000.	292.50	785.00	SOFT	0.	NO	0.	0.
53	4000.	292.50	770.00	SOFT	0.	NO	0.	0.
54	6000.	292.50	745.00	SOFT	0.	NO	0.	0.
55	8000.	292.50	755.00	SOFT	0.	NO	0.	0.
56	12000.	292.50	735.00	SOFT	0.	YES	9300.	790.
57	500.	270.00	810.00	SOFT	0.	NO	0.	0.
58	1000.	270.00	795.00	SOFT	0.	NO	0.	0.
59	2000.	270.00	790.00	SOFT	0.	NO	0.	0.
60	4000.	270.00	790.00	SOFT	0.	NO	0.	0.
61	6000.	270.00	750.00	SOFT	0.	YES	4000.	790.
62	8000.	270.00	735.00	SOFT	0.	NO	0.	0.
63	12000.	270.00	740.00	SOFT	0.	NO	0.	0.
64	500.	247.50	810.00	SOFT	0.	NO	0.	0.
65	1000.	247.50	790.00	SOFT	0.	NO	0.	0.
66	2000.	247.50	810.00	SOFT	0.	NO	0.	0.
67	4000.	247.50	775.00	SOFT	0.	NO	0.	0.
68	6000.	247.50	770.00	SOFT	0.	NO	0.	0.
69	8000.	247.50	725.00	SOFT	0.	YES	6000.	770.
70	12000.	247.50	730.00	SOFT	0.	NO	0.	0.
71	500.	225.00	810.00	SOFT	0.	NO	0.	0.
72	1000.	225.00	795.00	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	800.00	SOFT	0.	NO	0.	0.
74	4000.	225.00	785.00	SOFT	0.	NO	0.	0.
75	6000.	225.00	810.00	SOFT	0.	NO	0.	0.
76	8000.	225.00	802.00	SOFT	0.	NO	0.	0.
77	12000.	225.00	730.00	SOFT	0.	YES	5600.	820.
78	500.	202.50	810.00	SOFT	0.	NO	0.	0.
79	1000.	202.50	800.00	SOFT	0.	NO	0.	0.
80	2000.	202.50	800.00	SOFT	0.	NO	0.	0.
81	4000.	202.50	800.00	SOFT	0.	NO	0.	0.
82	6000.	202.50	820.00	SOFT	0.	YES	5500.	830.
83	8000.	202.50	820.00	SOFT	0.	YES	7850.	840.
84	12000.	202.50	730.00	SOFT	0.	YES	7850.	840.
85	500.	180.00	812.00	SOFT	0.	NO	0.	0.
86	1000.	180.00	810.00	SOFT	0.	NO	0.	0.
87	2000.	180.00	820.00	SOFT	0.	NO	0.	0.
88	4000.	180.00	818.00	SOFT	0.	NO	0.	0.
89	6000.	180.00	845.00	SOFT	0.	NO	0.	0.
90	8000.	180.00	850.00	SOFT	0.	NO	0.	0.
91	12000.	180.00	765.00	SOFT	0.	YES	8000.	850.
92	500.	157.50	815.00	SOFT	0.	NO	0.	0.
93	1000.	157.50	815.00	SOFT	0.	NO	0.	0.
94	2000.	157.50	825.00	SOFT	0.	NO	0.	0.
95	4000.	157.50	830.00	SOFT	0.	NO	0.	0.
96	6000.	157.50	820.00	SOFT	0.	NO	0.	0.
97	8000.	157.50	798.00	SOFT	0.	YES	4300.	830.
98	12000.	157.50	830.00	SOFT	0.	NO	0.	0.
99	500.	135.00	812.00	SOFT	0.	NO	0.	0.
100	1000.	135.00	815.00	SOFT	0.	NO	0.	0.
101	2000.	135.00	810.00	SOFT	0.	NO	0.	0.
102	4000.	135.00	813.00	SOFT	0.	NO	0.	0.
103	6000.	135.00	830.00	SOFT	0.	NO	0.	0.
104	8000.	135.00	830.00	SOFT	0.	YES	7000.	840.
105	12000.	135.00	850.00	SOFT	0.	NO	0.	0.
106	500.	112.50	810.00	SOFT	0.	NO	0.	0.
107	1000.	112.50	800.00	SOFT	0.	NO	0.	0.
108	2000.	112.50	798.00	SOFT	0.	NO	0.	0.
109	4000.	112.50	798.00	SOFT	0.	NO	0.	0.
110	6000.	112.50	815.00	SOFT	0.	NO	0.	0.
111	8000.	112.50	835.00	SOFT	0.	NO	0.	0.
112	12000.	112.50	850.00	SOFT	0.	NO	0.	0.

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #14-WS3000
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	DUANE - WS3000	158.1	158.0	.0	.0	.0	.0	147.0	157.0	149.0	141.0	124.0

XO= .00 YO= .00 ZO= 864.00 HEIGHT ABOVE GROUND= 52.00

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #14-WS3000
METEOROLOGICAL INPUT CONDITIONS

H1= 10.67 METERS H2= 50.29 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)
1981		8	21	12	177.0	2.1	2.6	23.9	23.2	30.0	742.0

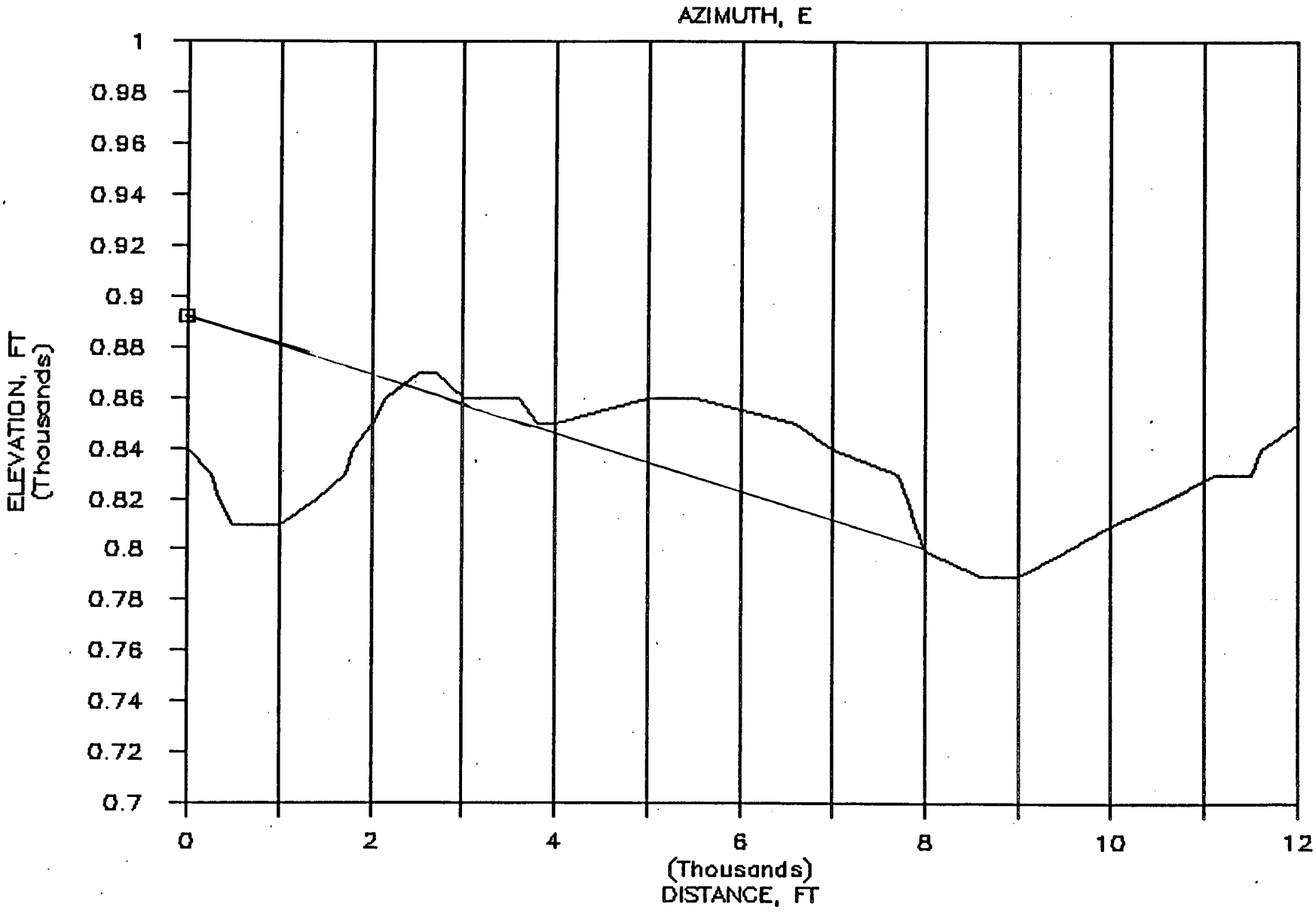
IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #14-WS3000

SOUND PRESSURE LEVELS IN DBC
UNDER MET CONDITION 1

DISTANCE IN FEET

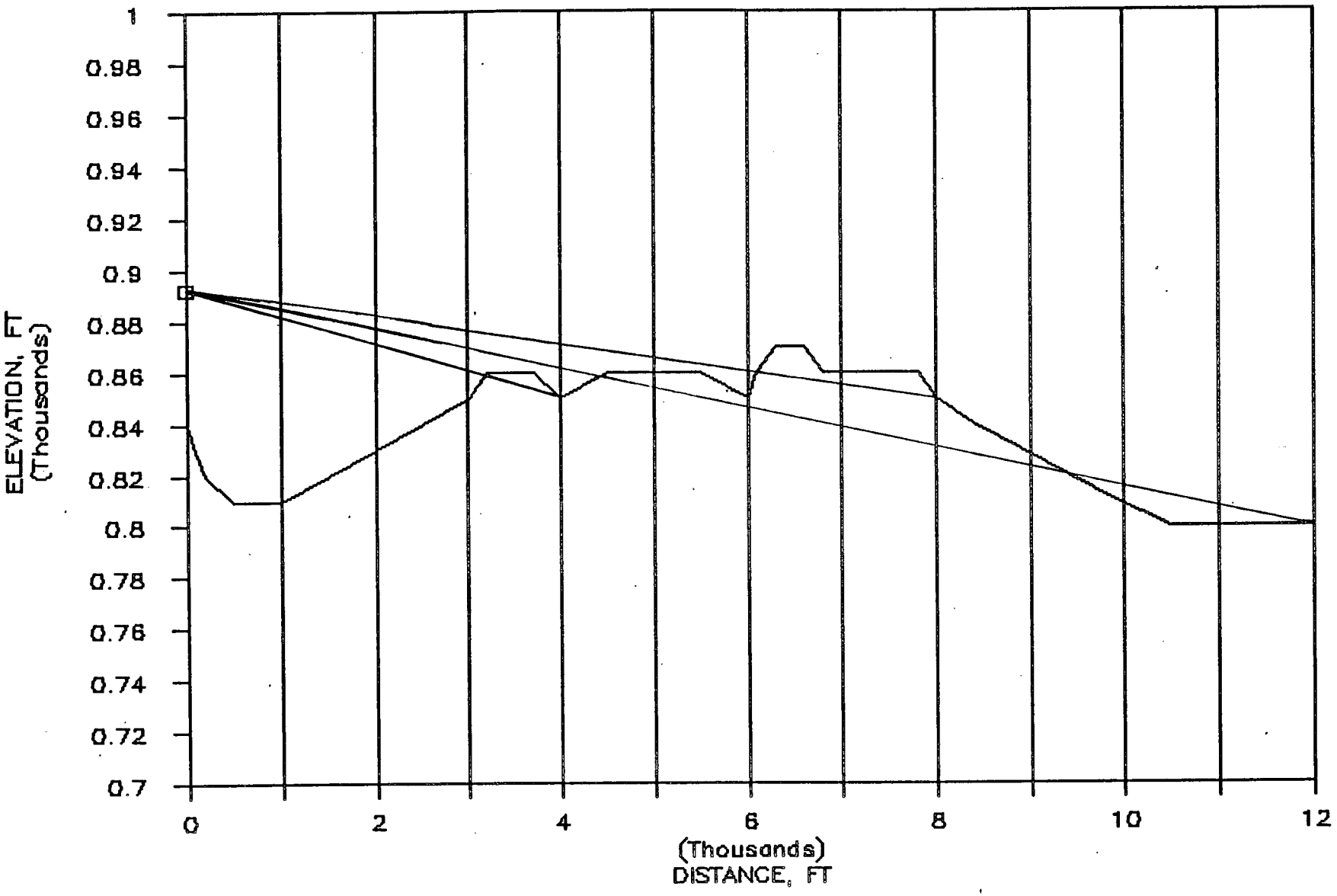
AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	104.7	90.6	75.6	65.7	61.3	57.8	51.3
ENE	104.7	90.6	75.6	65.7	61.3	57.8	51.3
NE	104.7	90.6	75.6	65.7	60.0	49.0	42.1
NNE	104.7	90.6	75.6	60.9	61.3	57.8	44.8
N	104.7	90.6	75.6	65.7	61.3	57.8	41.6
NNW	104.7	90.6	75.6	65.7	61.3	57.8	44.1
NW	104.7	90.6	75.6	65.7	61.3	57.8	42.5
WNW	104.7	90.6	75.6	65.7	61.3	57.8	44.8
W	104.7	90.6	75.6	65.7	56.5	57.8	51.3
WSW	104.7	90.6	75.6	65.7	60.3	49.0	42.6
SW	104.7	90.6	75.6	65.7	61.3	57.8	45.8
SSW	104.7	90.6	75.6	65.7	56.0	46.2	41.4
S	104.7	90.6	75.6	65.7	61.3	57.8	42.5
SSE	104.7	90.6	75.6	65.7	61.3	52.6	47.3
SE	104.7	90.6	75.6	65.7	60.1	48.9	42.1
ESE	104.7	90.6	75.6	65.7	61.3	57.8	51.3

DUANE ARNOLD 22



DUANE ARNOLD 22

AZIMUTH, ENE



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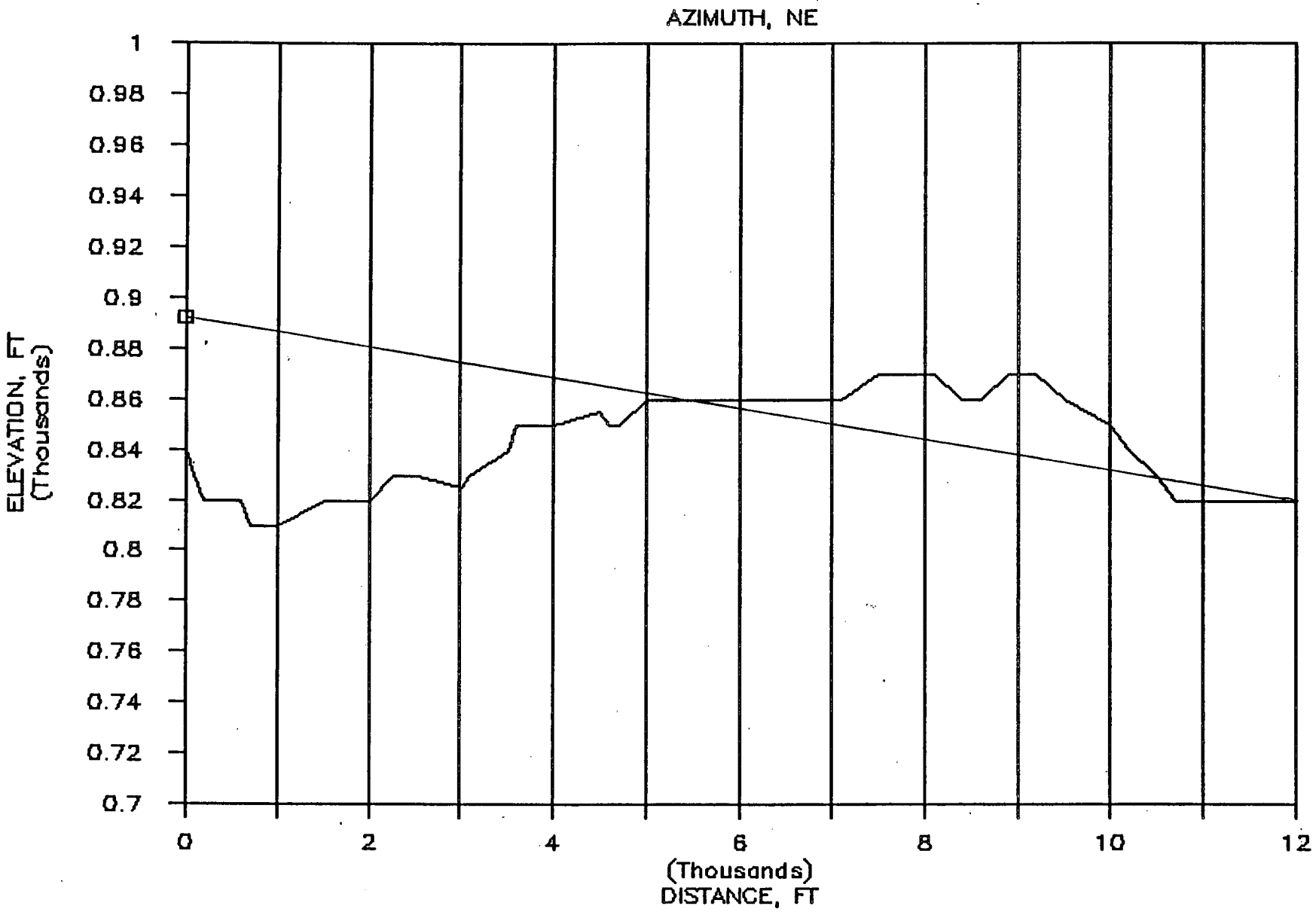

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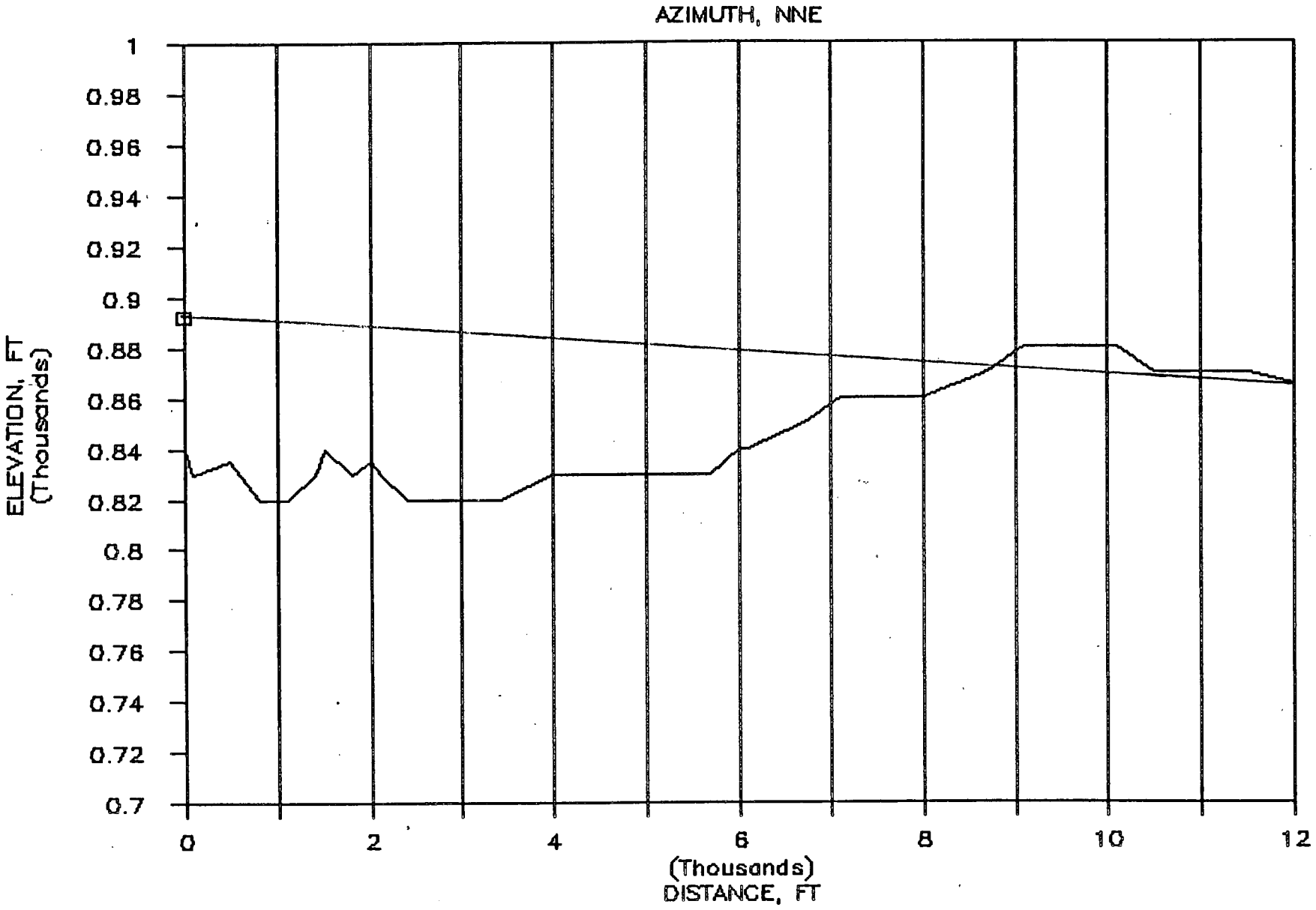

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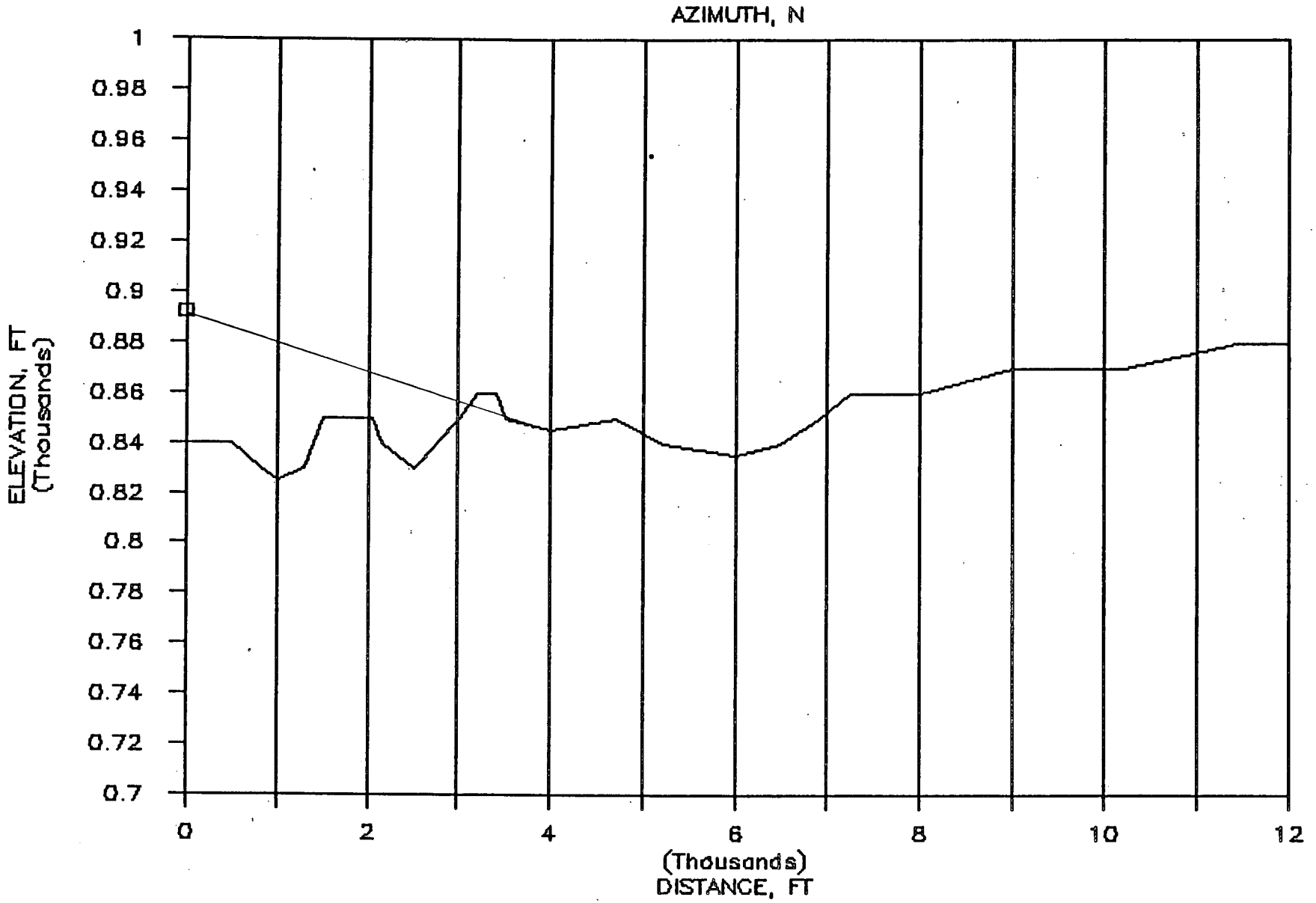

DUANE ARNOLD 22

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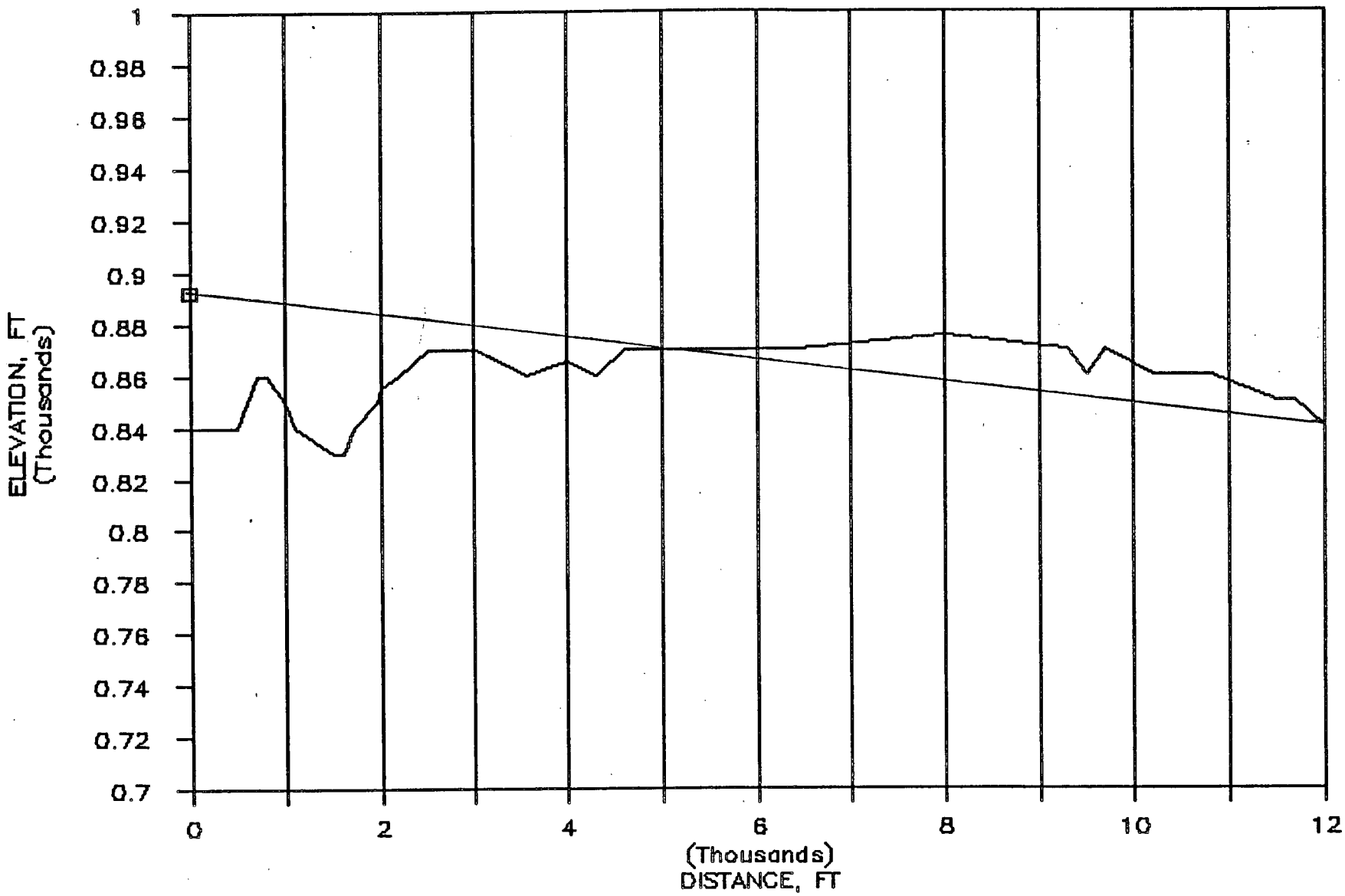

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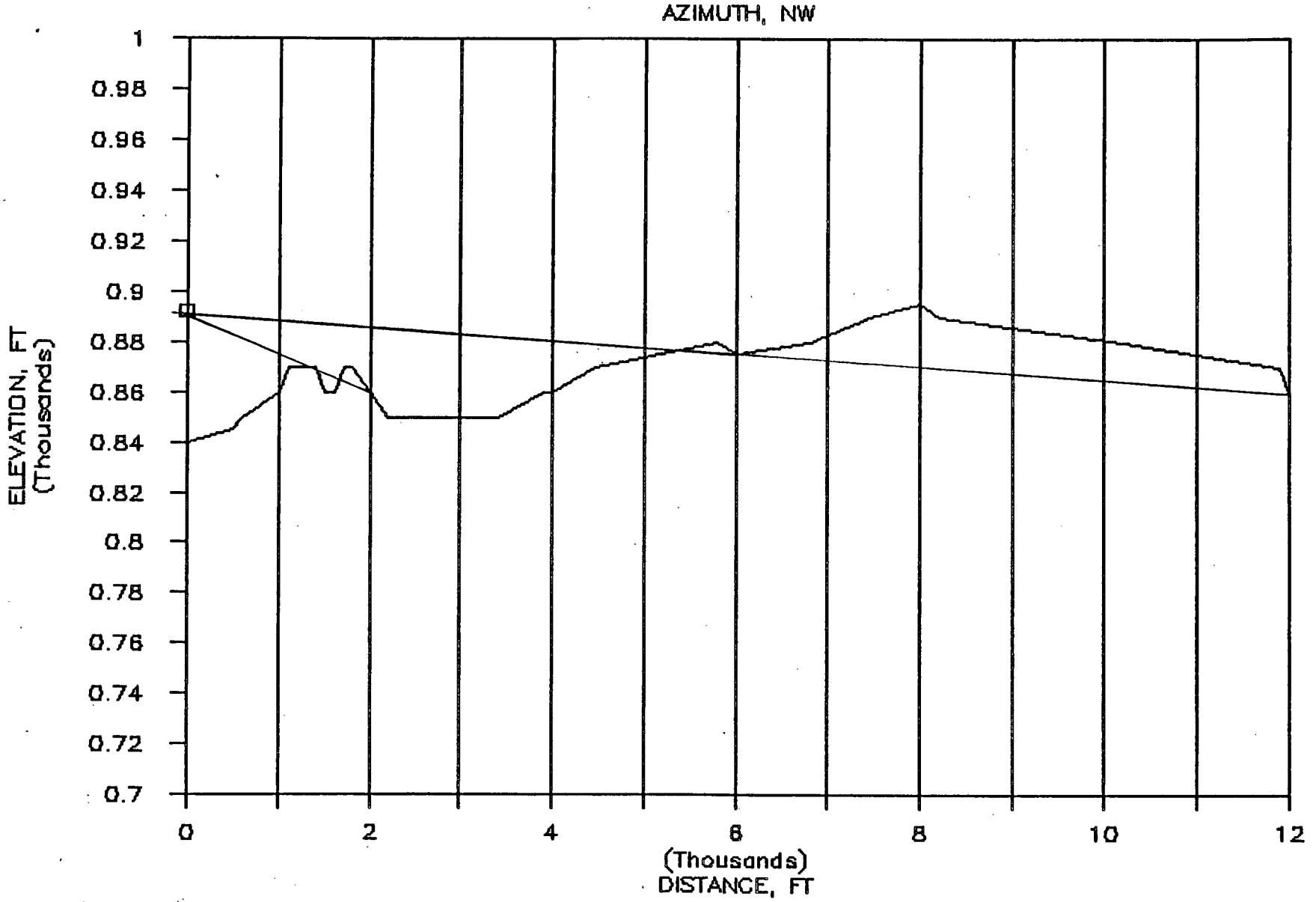

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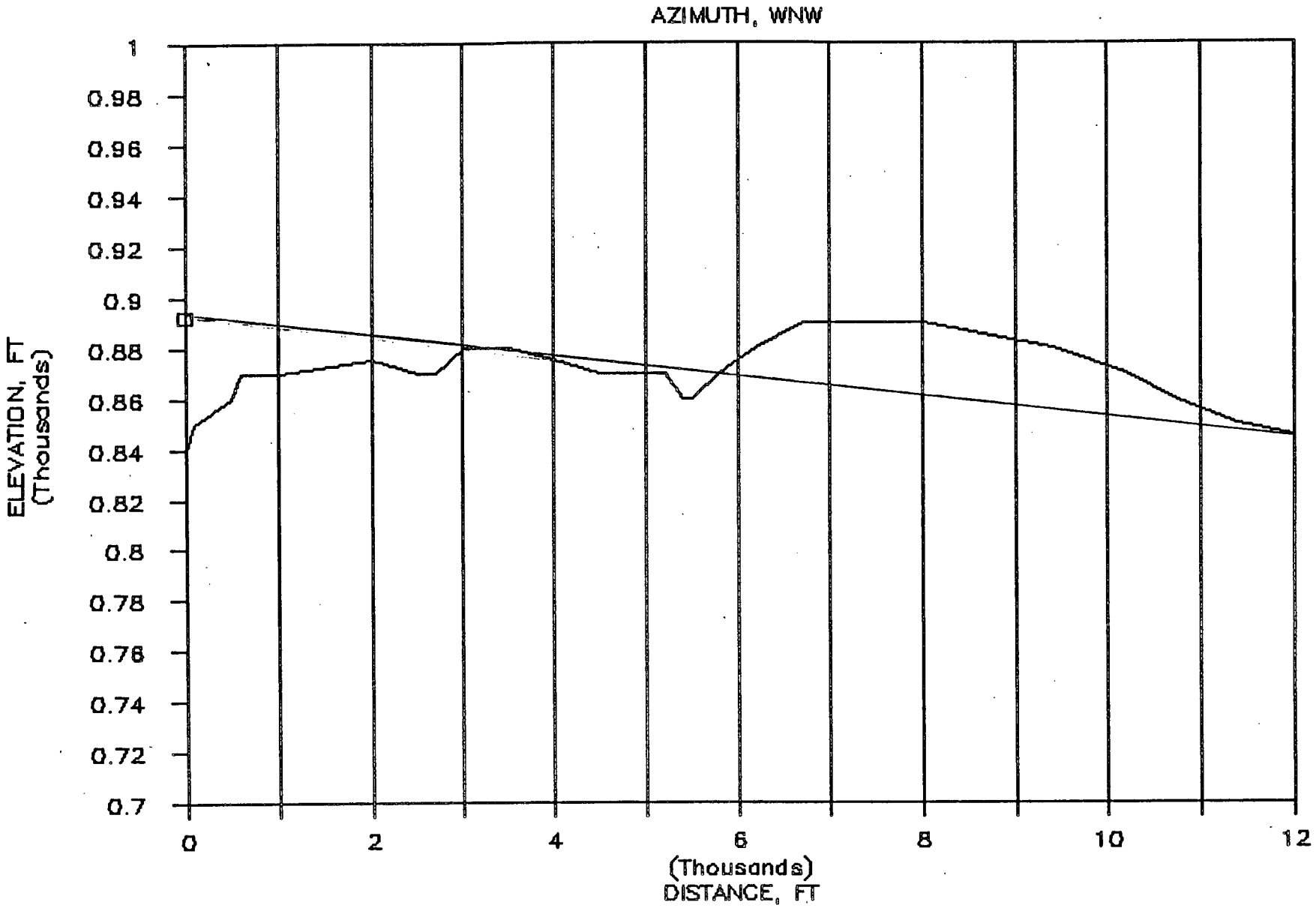

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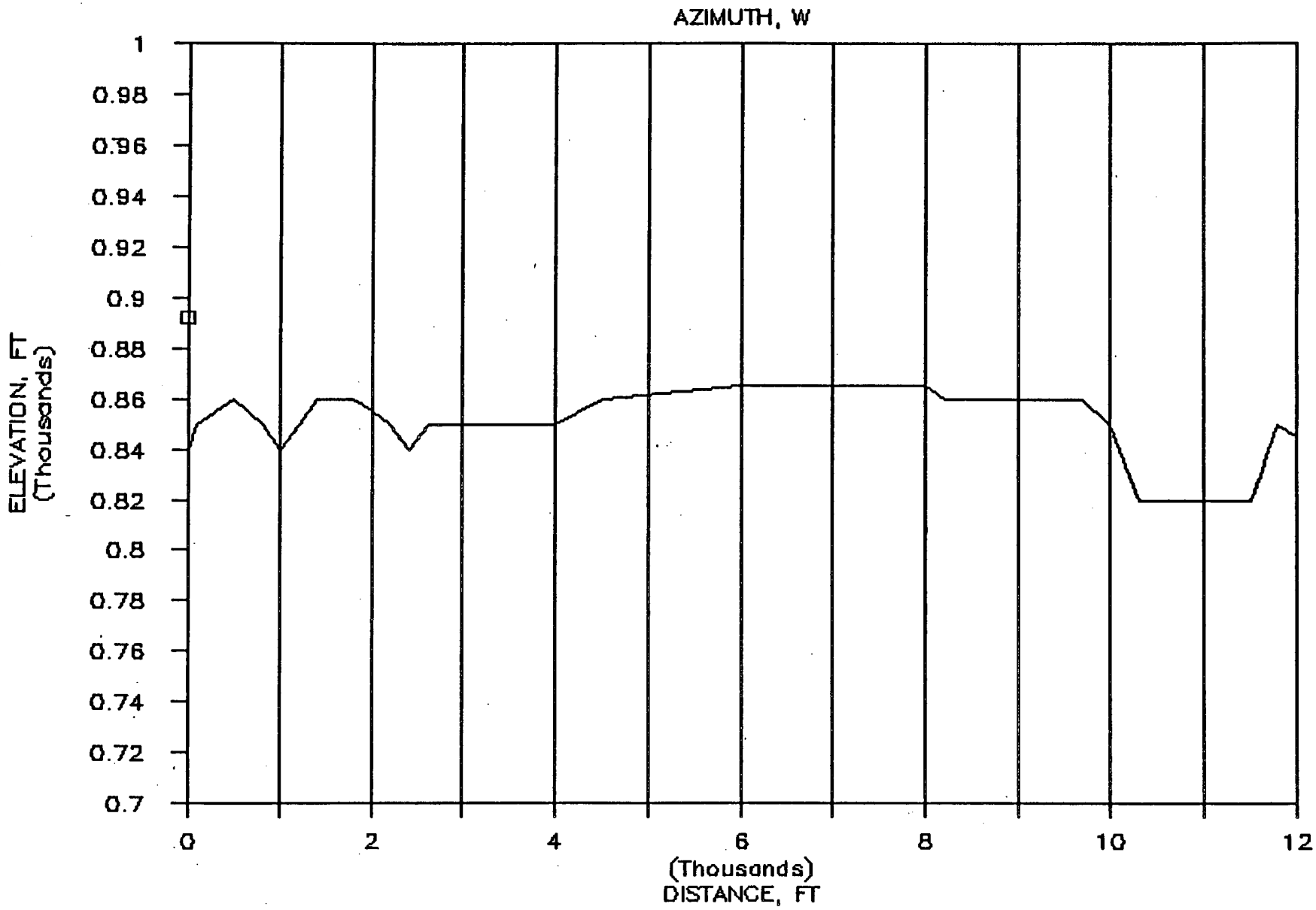

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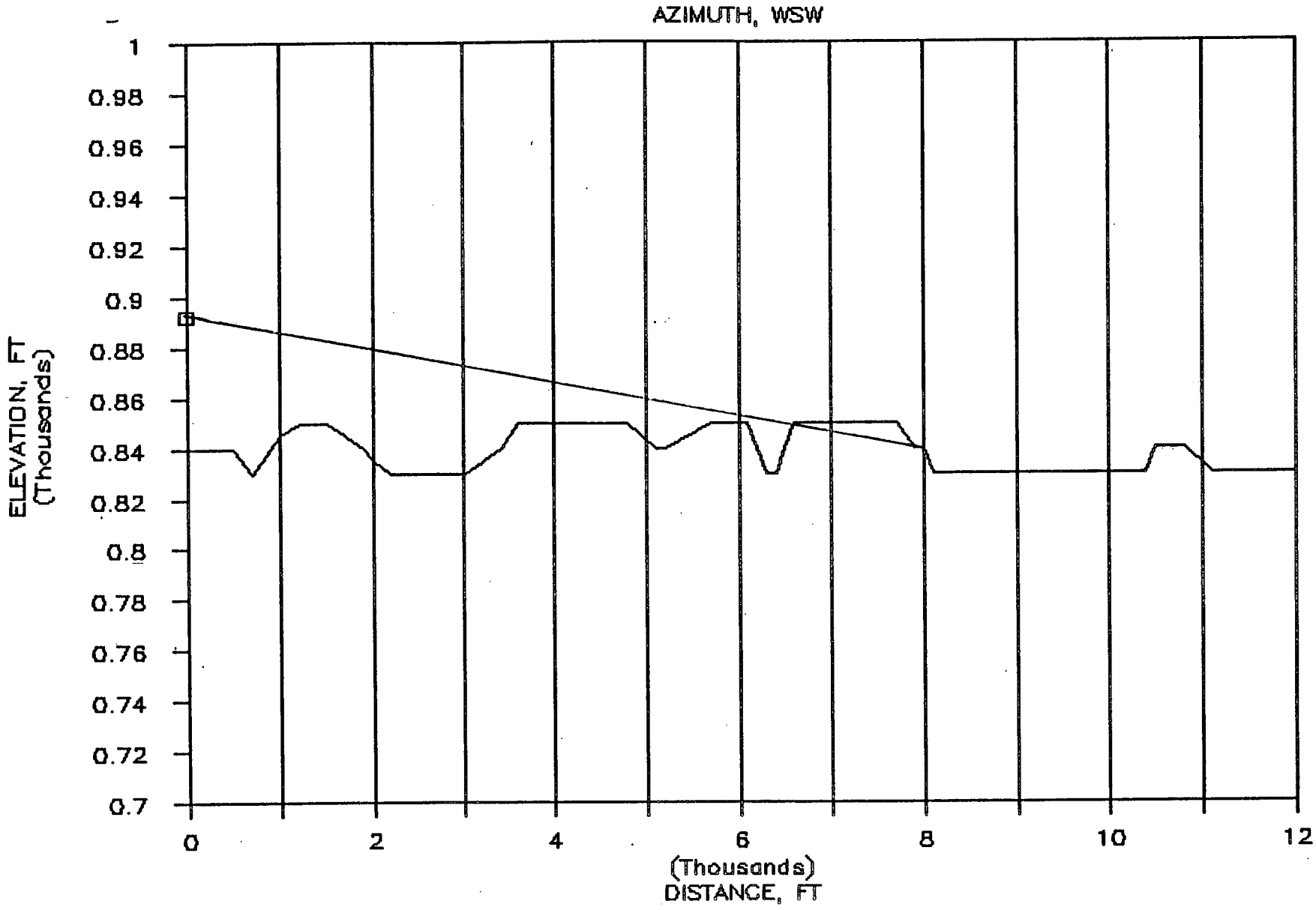

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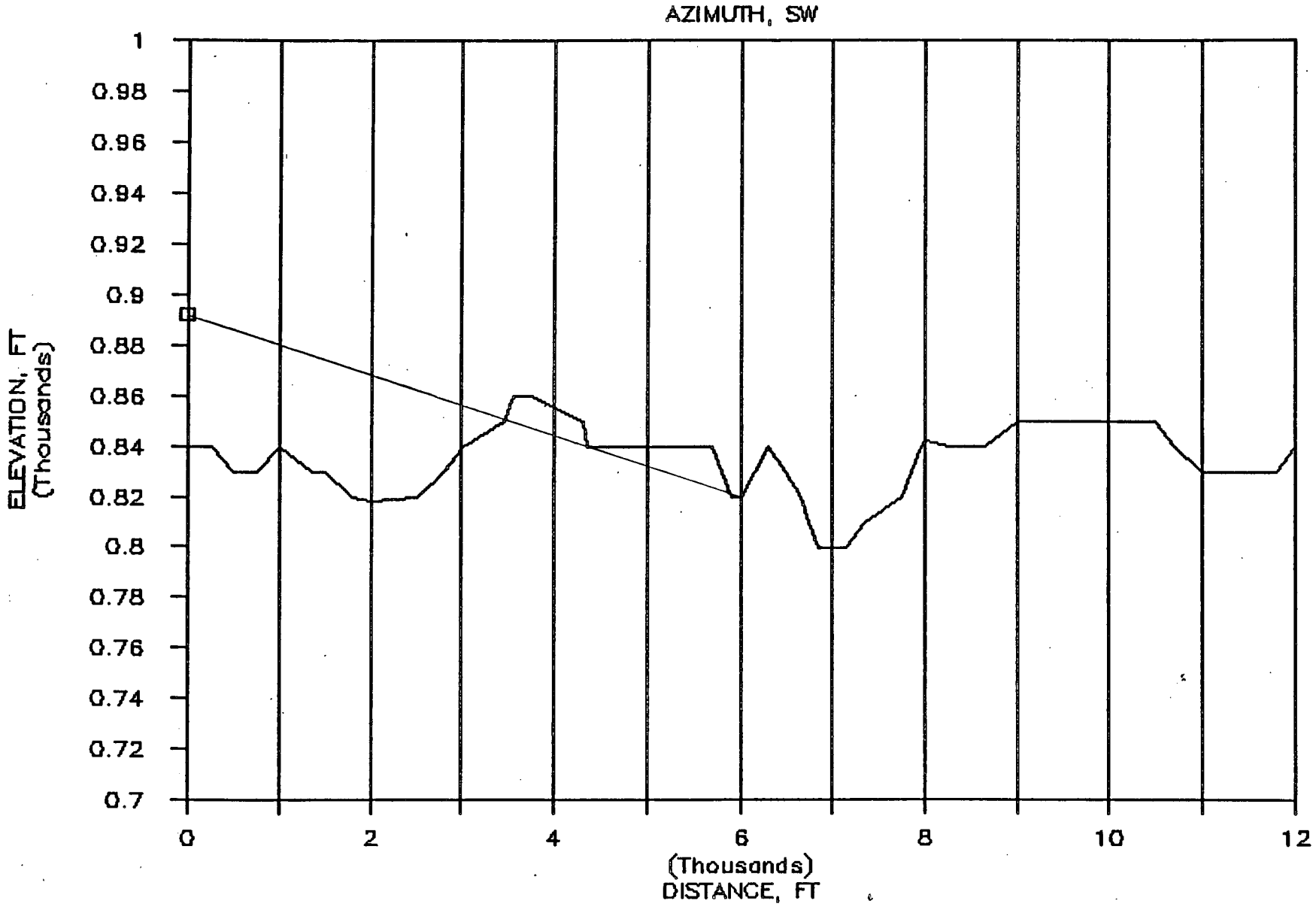

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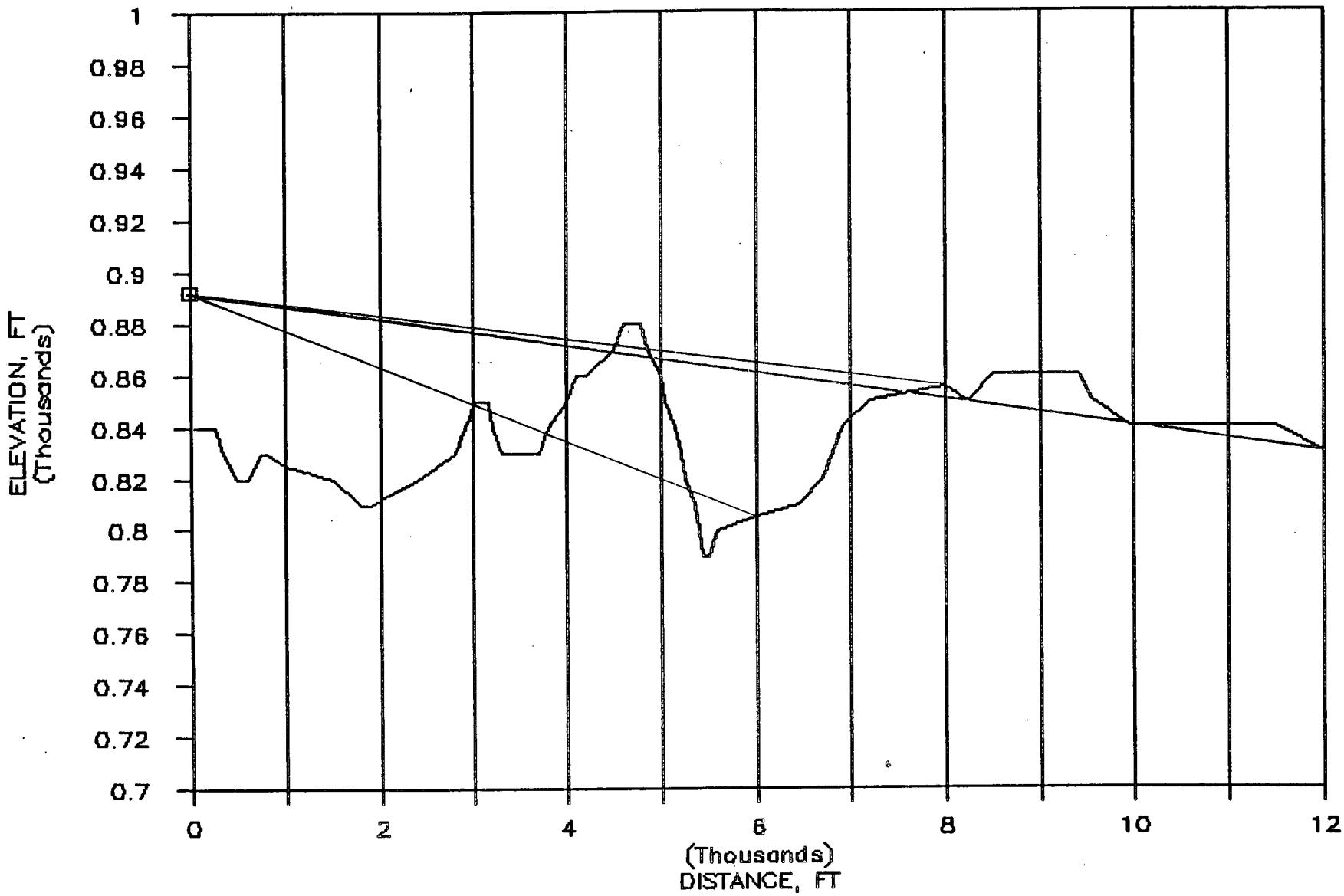

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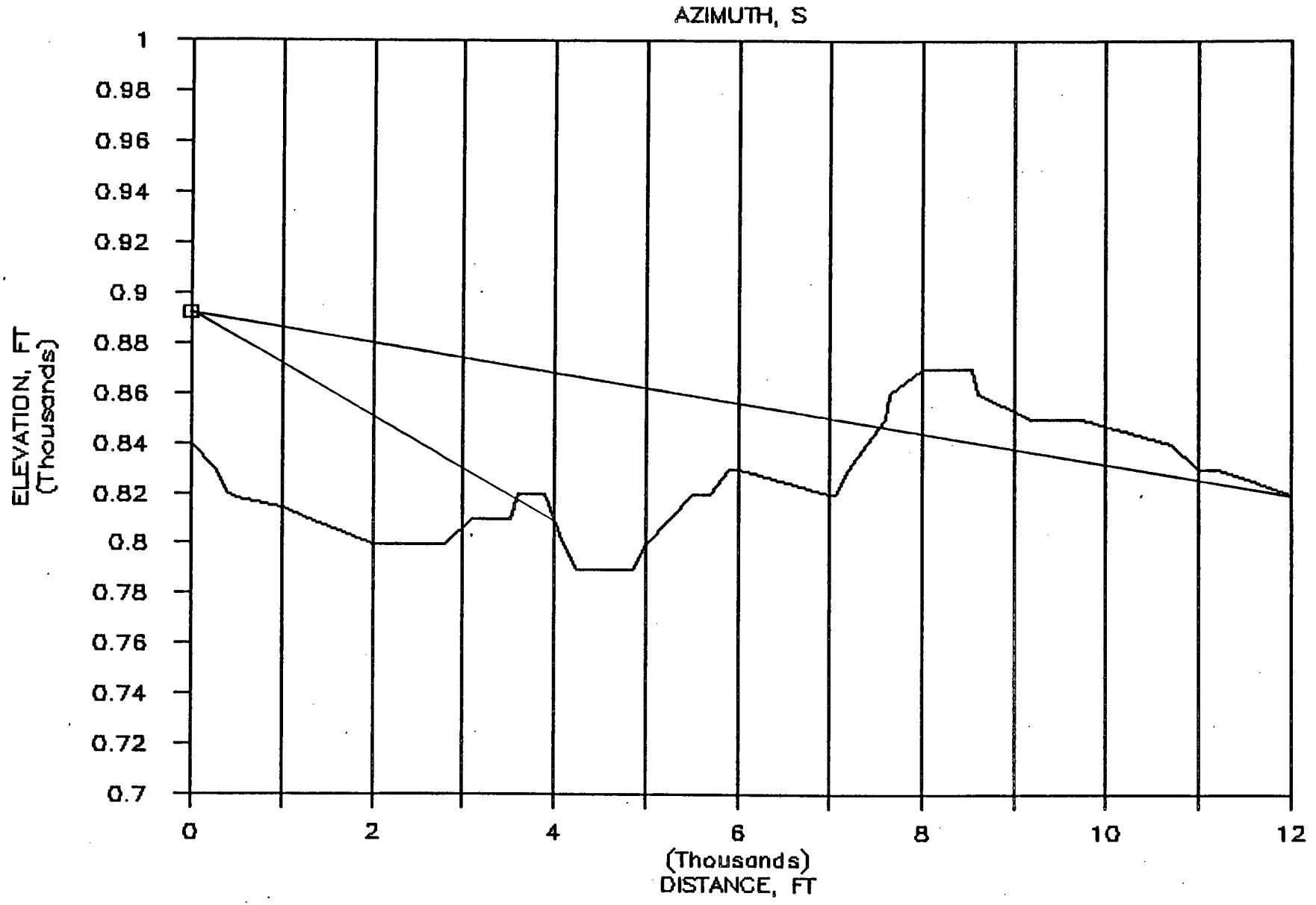

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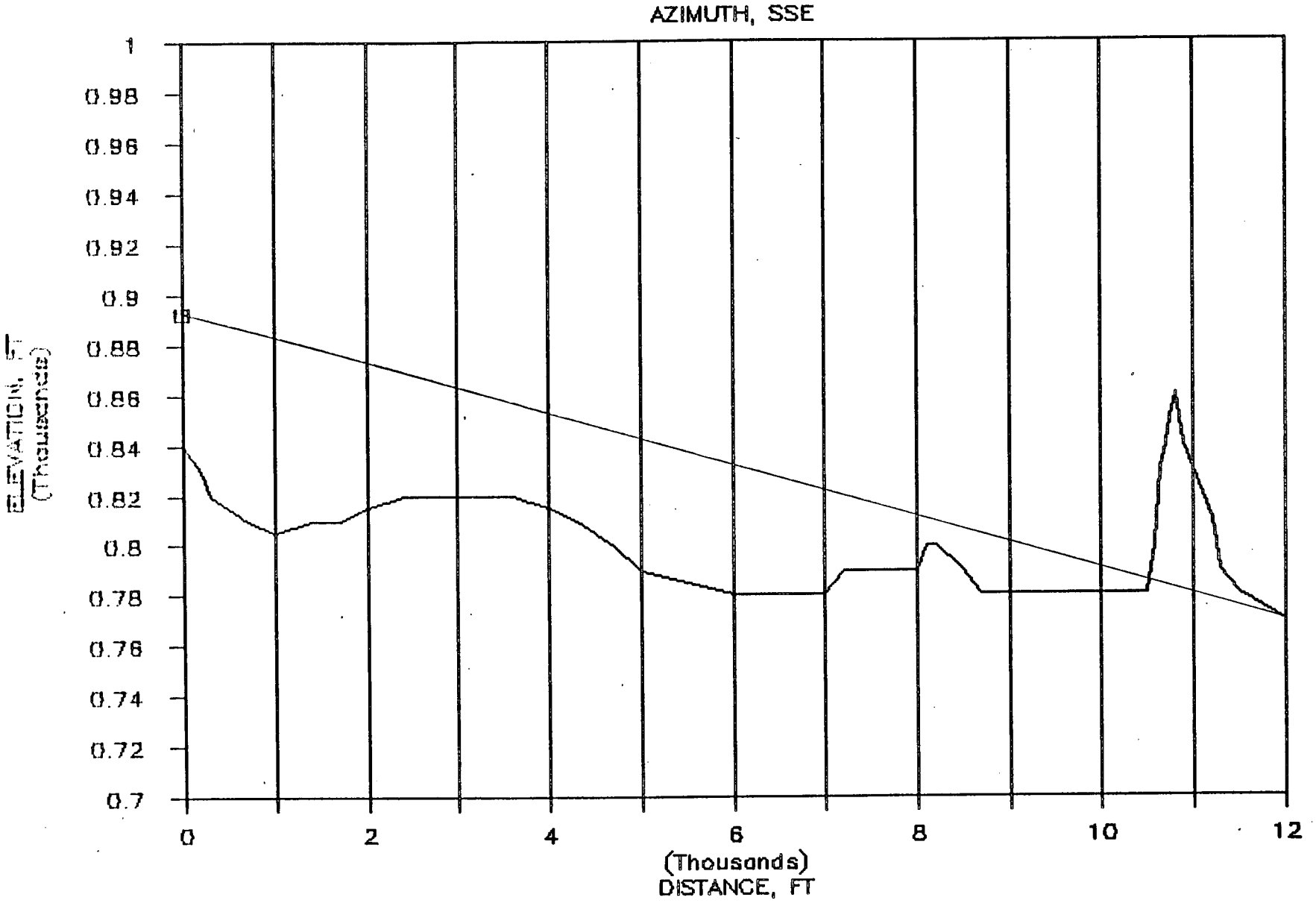

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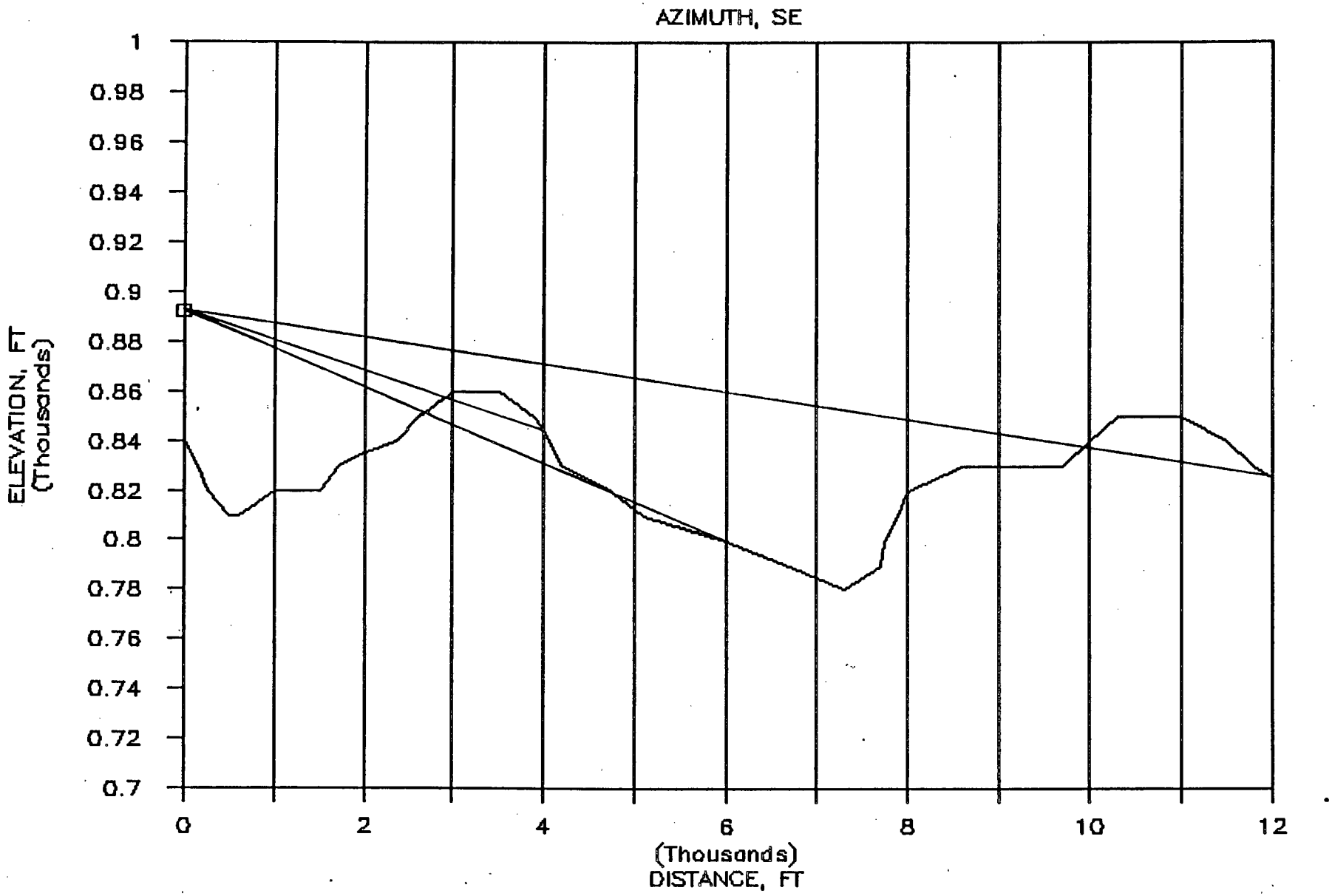
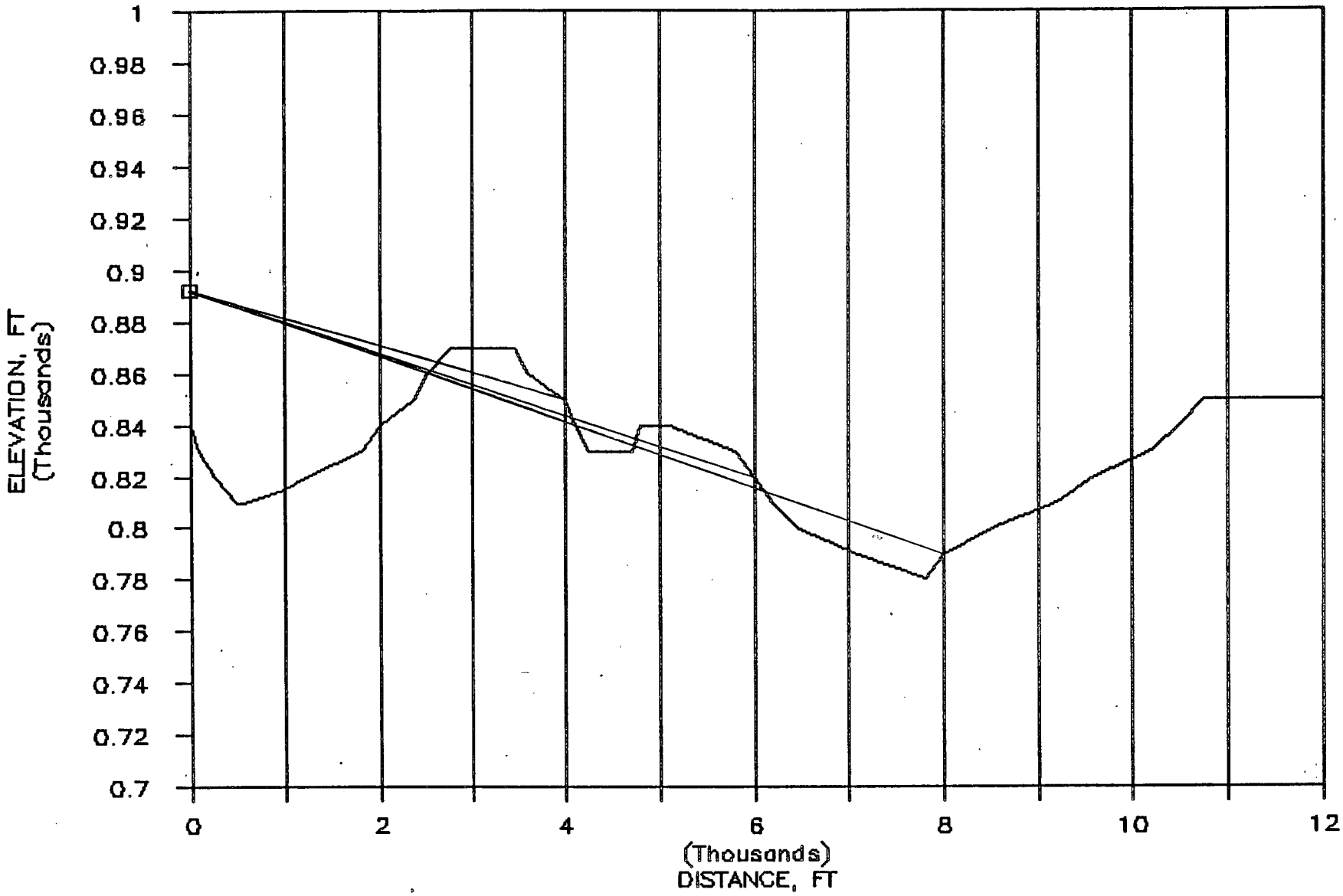


DUANE ARNOLD 22

AZIMUTH, ESE



IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #22-WS3000
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	810.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	810.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	850.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	850.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	855.00	SOFT	0.	NO	0.	0.
6	8000.	90.00	800.00	SOFT	0.	YES	2500.	870.
7	12000.	90.00	850.00	SOFT	0.	NO	0.	0.
8	500.	67.50	810.00	SOFT	0.	NO	0.	0.
9	1000.	67.50	810.00	SOFT	0.	NO	0.	0.
10	2000.	67.50	830.00	SOFT	0.	NO	0.	0.
11	4000.	67.50	850.00	SOFT	0.	YES	3200.	860.
12	6000.	67.50	850.00	SOFT	0.	NO	0.	0.
13	8000.	67.50	850.00	SOFT	0.	YES	6300.	870.
14	12000.	67.50	800.00	SOFT	0.	YES	6300.	870.
15	500.	45.00	820.00	SOFT	0.	NO	0.	0.
16	1000.	45.00	810.00	SOFT	0.	NO	0.	0.
17	2000.	45.00	820.00	SOFT	0.	NO	0.	0.
18	4000.	45.00	850.00	SOFT	0.	NO	0.	0.
19	6000.	45.00	860.00	SOFT	0.	NO	0.	0.
20	8000.	45.00	870.00	SOFT	0.	NO	0.	0.
21	12000.	45.00	820.00	SOFT	0.	YES	7500.	870.
22	500.	22.50	835.00	SOFT	0.	NO	0.	0.
23	1000.	22.50	820.00	SOFT	0.	NO	0.	0.
24	2000.	22.50	835.00	SOFT	0.	NO	0.	0.
25	4000.	22.50	830.00	SOFT	0.	NO	0.	0.
26	6000.	22.50	840.00	SOFT	0.	NO	0.	0.
27	8000.	22.50	860.00	SOFT	0.	NO	0.	0.
28	12000.	22.50	865.00	SOFT	0.	YES	9100.	880.
29	500.	.00	840.00	SOFT	0.	NO	0.	0.
30	1000.	.00	825.00	SOFT	0.	NO	0.	0.
31	2000.	.00	850.00	SOFT	0.	NO	0.	0.
32	4000.	.00	845.00	SOFT	0.	YES	3200.	860.
33	6000.	.00	835.00	SOFT	0.	NO	0.	0.
34	8000.	.00	860.00	SOFT	0.	NO	0.	0.
35	12000.	.00	880.00	SOFT	0.	NO	0.	0.
36	500.	337.50	840.00	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	850.00	SOFT	0.	NO	0.	0.
38	2000.	337.50	855.00	SOFT	0.	NO	0.	0.
39	4000.	337.50	865.00	SOFT	0.	NO	0.	0.
40	6000.	337.50	870.00	SOFT	0.	NO	0.	0.
41	8000.	337.50	875.00	SOFT	0.	NO	0.	0.
42	12000.	337.50	840.00	SOFT	0.	YES	8000.	875.
43	500.	315.00	845.00	SOFT	0.	NO	0.	0.
44	1000.	315.00	860.00	SOFT	0.	NO	0.	0.
45	2000.	315.00	860.00	SOFT	0.	YES	1800.	870.
46	4000.	315.00	860.00	SOFT	0.	NO	0.	
47	6000.	315.00	875.00	SOFT	0.	YES	5800.	88
48	8000.	315.00	895.00	SOFT	0.	NO	0.	0.
49	12000.	315.00	860.00	SOFT	0.	YES	8000.	895.
50	500.	292.50	860.00	SOFT	0.	NO	0.	0.
51	1000.	292.50	870.00	SOFT	0.	NO	0.	0.
52	2000.	292.50	875.00	SOFT	0.	NO	0.	0.
53	4000.	292.50	875.00	SOFT	0.	NO	0.	0.
54	6000.	292.50	875.00	SOFT	0.	NO	0.	0.
55	8000.	292.50	890.00	SOFT	0.	NO	0.	0.
56	12000.	292.50	845.00	SOFT	0.	YES	6700.	890.
57	500.	270.00	860.00	SOFT	0.	NO	0.	0.
58	1000.	270.00	840.00	SOFT	0.	NO	0.	0.
59	2000.	270.00	855.00	SOFT	0.	NO	0.	0.
60	4000.	270.00	850.00	SOFT	0.	NO	0.	0.
61	6000.	270.00	865.00	SOFT	0.	NO	0.	0.
62	8000.	270.00	865.00	SOFT	0.	NO	0.	0.
63	12000.	270.00	845.00	SOFT	0.	NO	0.	0.
64	500.	247.50	840.00	SOFT	0.	NO	0.	0.
65	1000.	247.50	845.00	SOFT	0.	NO	0.	0.
66	2000.	247.50	835.00	SOFT	0.	NO	0.	0.
67	4000.	247.50	850.00	SOFT	0.	NO	0.	0.
68	6000.	247.50	850.00	SOFT	0.	NO	0.	0.
69	8000.	247.50	840.00	SOFT	0.	YES	6600.	850.
70	12000.	247.50	830.00	SOFT	0.	NO	0.	0.
71	500.	225.00	830.00	SOFT	0.	NO	0.	0.
72	1000.	225.00	840.00	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	818.00	SOFT	0.	NO	0.	0.
74	4000.	225.00	855.00	SOFT	0.	NO	0.	0.
75	6000.	225.00	820.00	SOFT	0.	YES	3550.	860.
76	8000.	225.00	842.00	SOFT	0.	NO	0.	0.
77	12000.	225.00	840.00	SOFT	0.	NO	0.	0.
78	500.	202.50	820.00	SOFT	0.	NO	0.	0.
79	1000.	202.50	825.00	SOFT	0.	NO	0.	0.
80	2000.	202.50	812.00	SOFT	0.	NO	0.	0.
81	4000.	202.50	850.00	SOFT	0.	NO	0.	0.
82	6000.	202.50	805.00	SOFT	0.	YES	4600.	880.
83	8000.	202.50	855.00	SOFT	0.	YES	4600.	880.
[illegible]	12000.	202.50	830.00	SOFT	0.	YES	4600.	880.
[illegible]	500.	180.00	818.00	SOFT	0.	NO	0.	0.
86	1000.	180.00	814.00	SOFT	0.	NO	0.	0.
87	2000.	180.00	800.00	SOFT	0.	NO	0.	0.
88	4000.	180.00	810.00	SOFT	0.	YES	3600.	820.
89	6000.	180.00	830.00	SOFT	0.	NO	0.	0.
90	8000.	180.00	870.00	SOFT	0.	NO	0.	0.
91	12000.	180.00	820.00	SOFT	0.	YES	8000.	870.
92	500.	157.50	815.00	SOFT	0.	NO	0.	0.
93	1000.	157.50	805.00	SOFT	0.	NO	0.	0.
94	2000.	157.50	815.00	SOFT	0.	NO	0.	0.
95	4000.	157.50	815.00	SOFT	0.	NO	0.	0.
96	6000.	157.50	780.00	SOFT	0.	NO	0.	0.
97	8000.	157.50	790.00	SOFT	0.	NO	0.	0.
98	12000.	157.50	770.00	SOFT	0.	YES	10800.	860.
99	500.	135.00	810.00	SOFT	0.	NO	0.	0.
100	1000.	135.00	820.00	SOFT	0.	NO	0.	0.
101	2000.	135.00	835.00	SOFT	0.	NO	0.	0.
102	4000.	135.00	845.00	SOFT	0.	YES	3000.	860.
103	6000.	135.00	800.00	SOFT	0.	YES	3000.	860.
104	8000.	135.00	820.00	SOFT	0.	NO	0.	0.
105	12000.	135.00	825.00	SOFT	0.	YES	10300.	850.
106	500.	112.50	810.00	SOFT	0.	NO	0.	0.
107	1000.	112.50	815.00	SOFT	0.	NO	0.	0.
108	2000.	112.50	840.00	SOFT	0.	NO	0.	0.
109	4000.	112.50	850.00	SOFT	0.	YES	2750.	870.
110	6000.	112.50	820.00	SOFT	0.	YES	2750.	870.
111	8000.	112.50	790.00	SOFT	0.	YES	2750.	870.
[illegible]	12000.	112.50	850.00	SOFT	0.	NO	0.	0.

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #22-WS3000
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	DUANE - WS3000	158.1	158.0	.0	.0	.0	.0	147.0	157.0	149.0	141.0	124.0

XO= .00 YO= .00 ZO= 896.00 HEIGHT ABOVE GROUND= 52.00

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #22-WS3000
METEOROLOGICAL INPUT CONDITIONS

H1= 10.67 METERS H2= 50.29 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)
1981		8	21	12	177.0	2.1	2.6	23.9	23.2	30.0	742.0

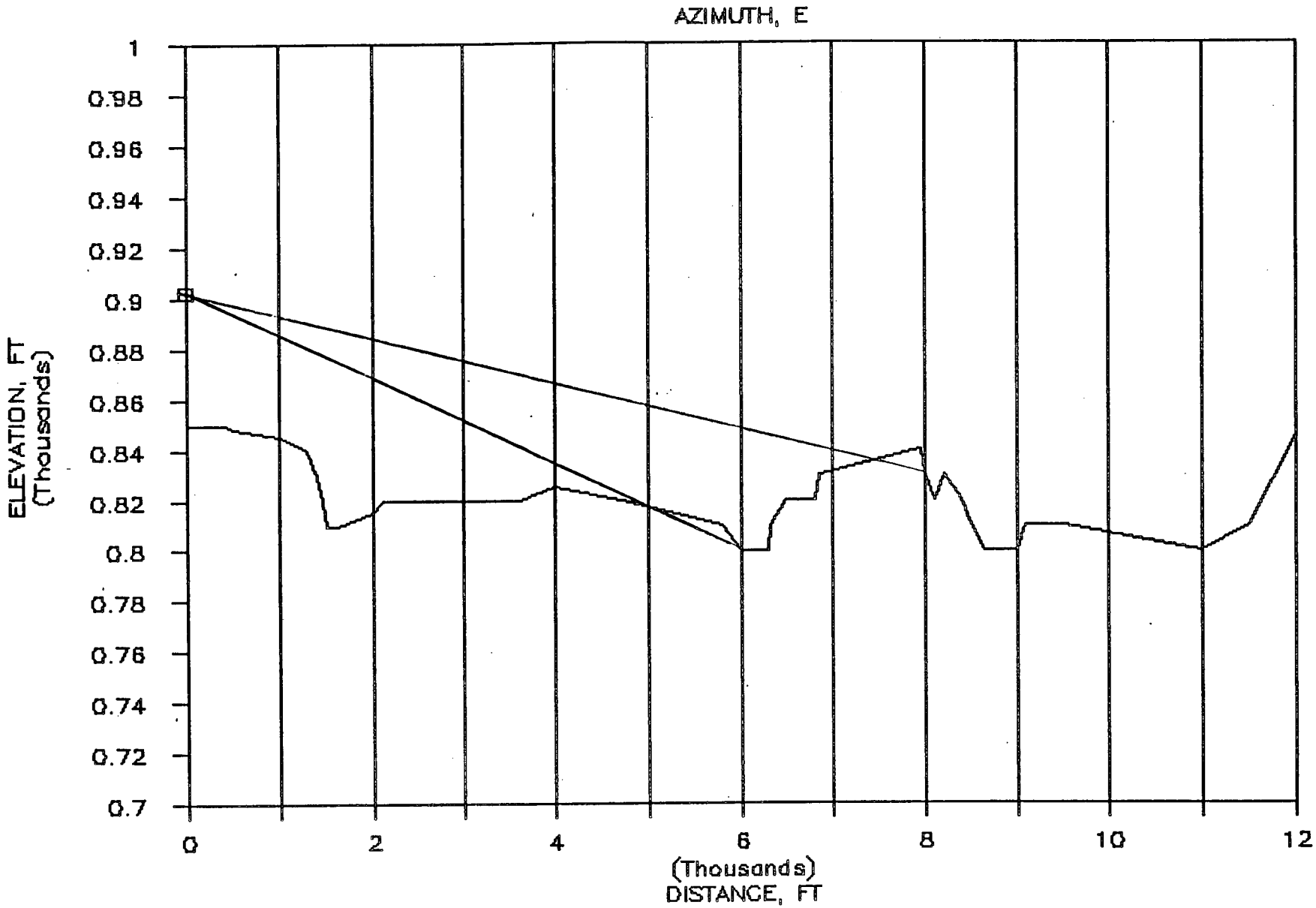
IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #22-WS3000

SOUND PRESSURE LEVELS IN DBC
UNDER MET CONDITION 1

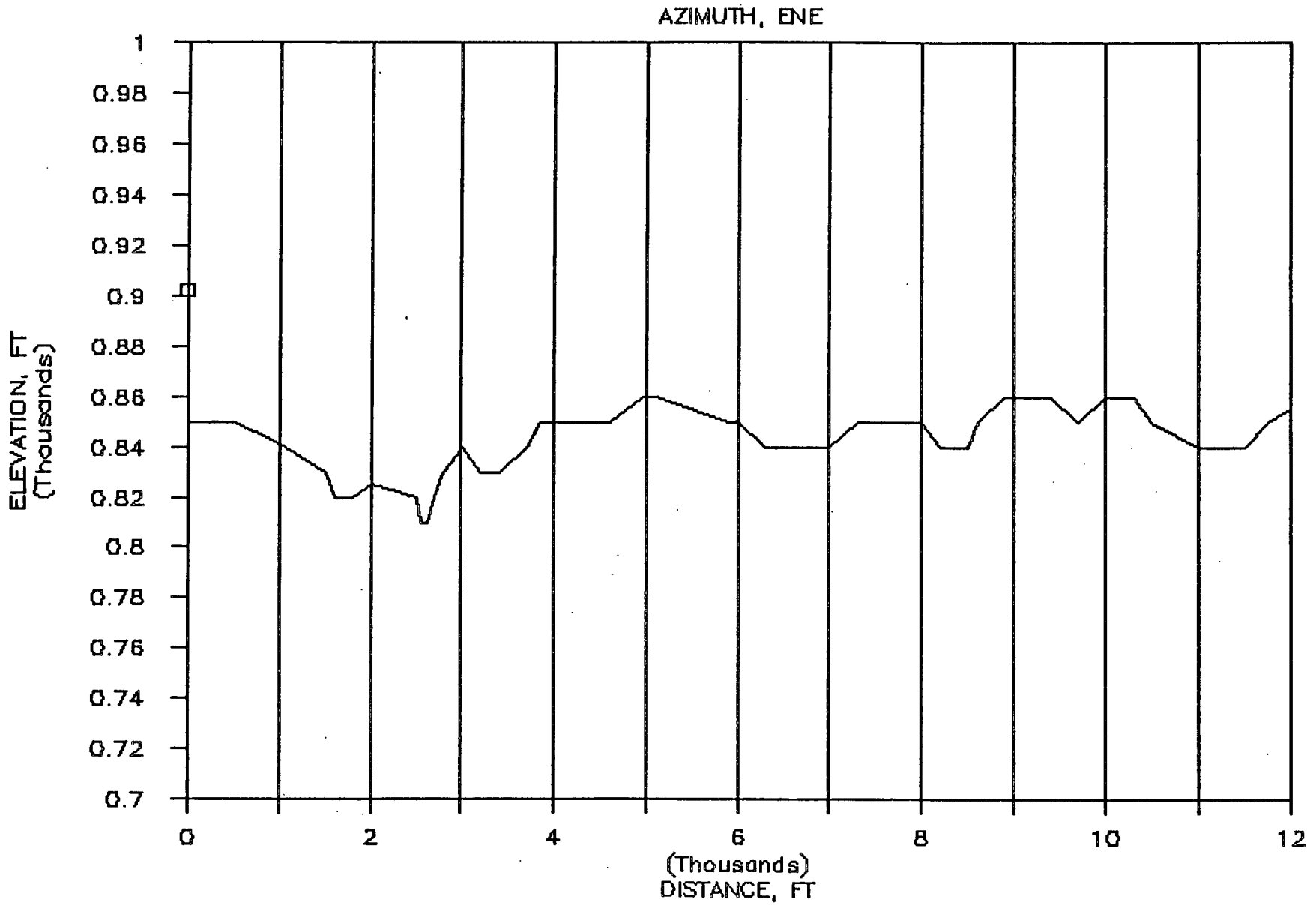
DISTANCE IN FEET

AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	104.6	90.5	75.6	65.7	61.3	53.0	51.3
ENE	104.6	90.5	75.6	60.9	61.3	52.5	45.4
NE	104.7	90.5	75.6	65.7	60.0	53.9	36.4
NNE	104.7	90.6	75.6	65.7	61.3	57.8	46.4
N	104.7	90.6	75.6	60.7	61.3	57.8	51.3
NNW	104.7	90.6	75.6	65.7	61.3	57.8	45.9
NW	104.7	90.6	69.2	65.7	55.9	57.8	45.4
WNW	104.7	90.6	75.6	65.7	61.3	57.8	45.5
W	104.7	90.6	75.6	65.7	61.3	57.8	51.3
WSW	104.7	90.6	75.6	65.7	60.3	54.3	42.6
SW	104.7	90.6	75.6	65.7	56.2	57.8	51.3
SSW	104.7	90.6	75.6	65.7	49.4	52.8	46.4
S	104.6	90.5	75.6	60.9	61.3	57.8	45.2
SSE	104.6	90.5	75.6	65.7	61.3	57.3	32.7
SE	104.6	90.6	75.6	60.9	54.7	53.9	36.4
ESE	104.6	90.5	75.6	60.7	56.2	52.6	51.3

DUANE ARNOLD 23



DUANE ARNOLD 23



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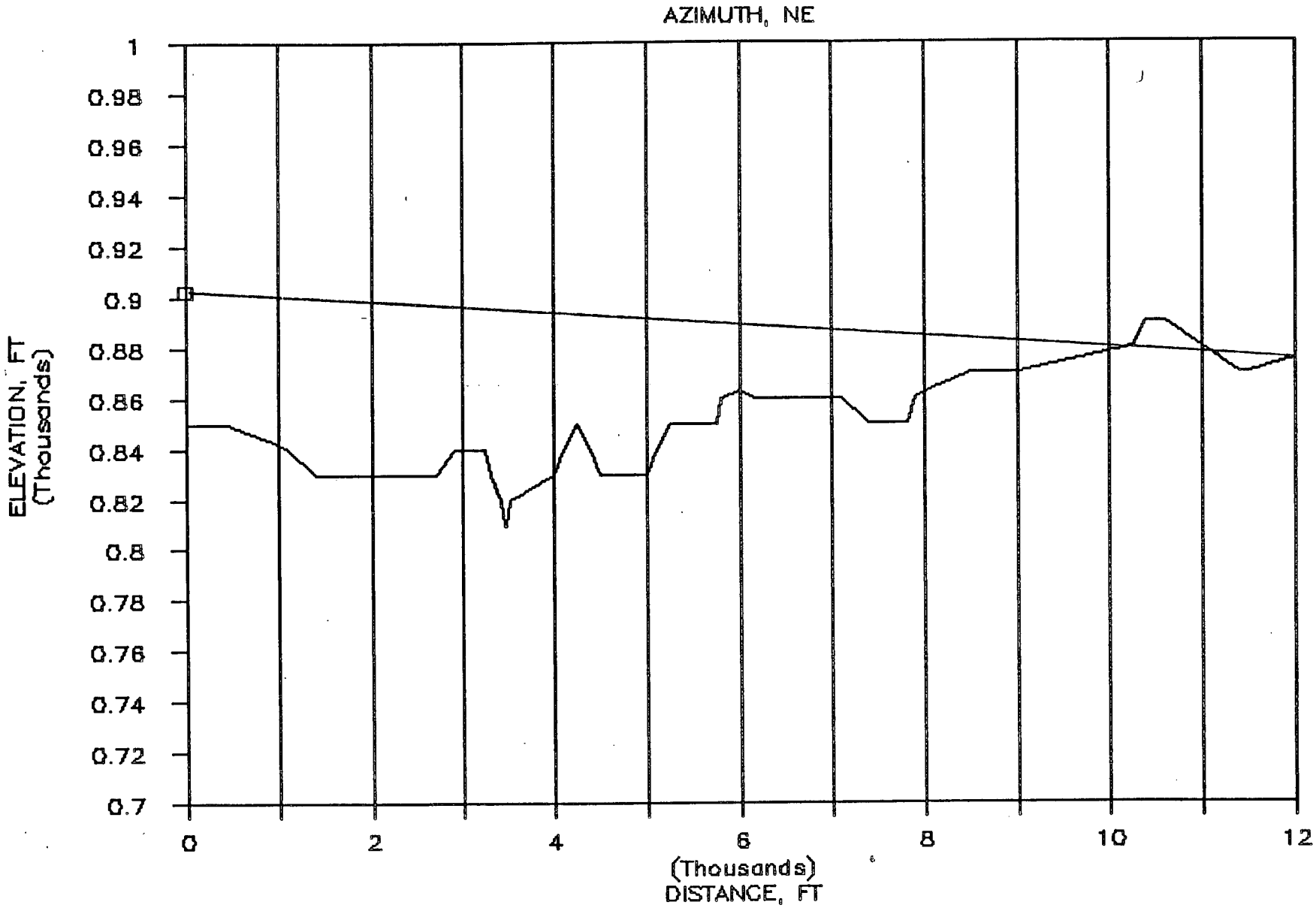

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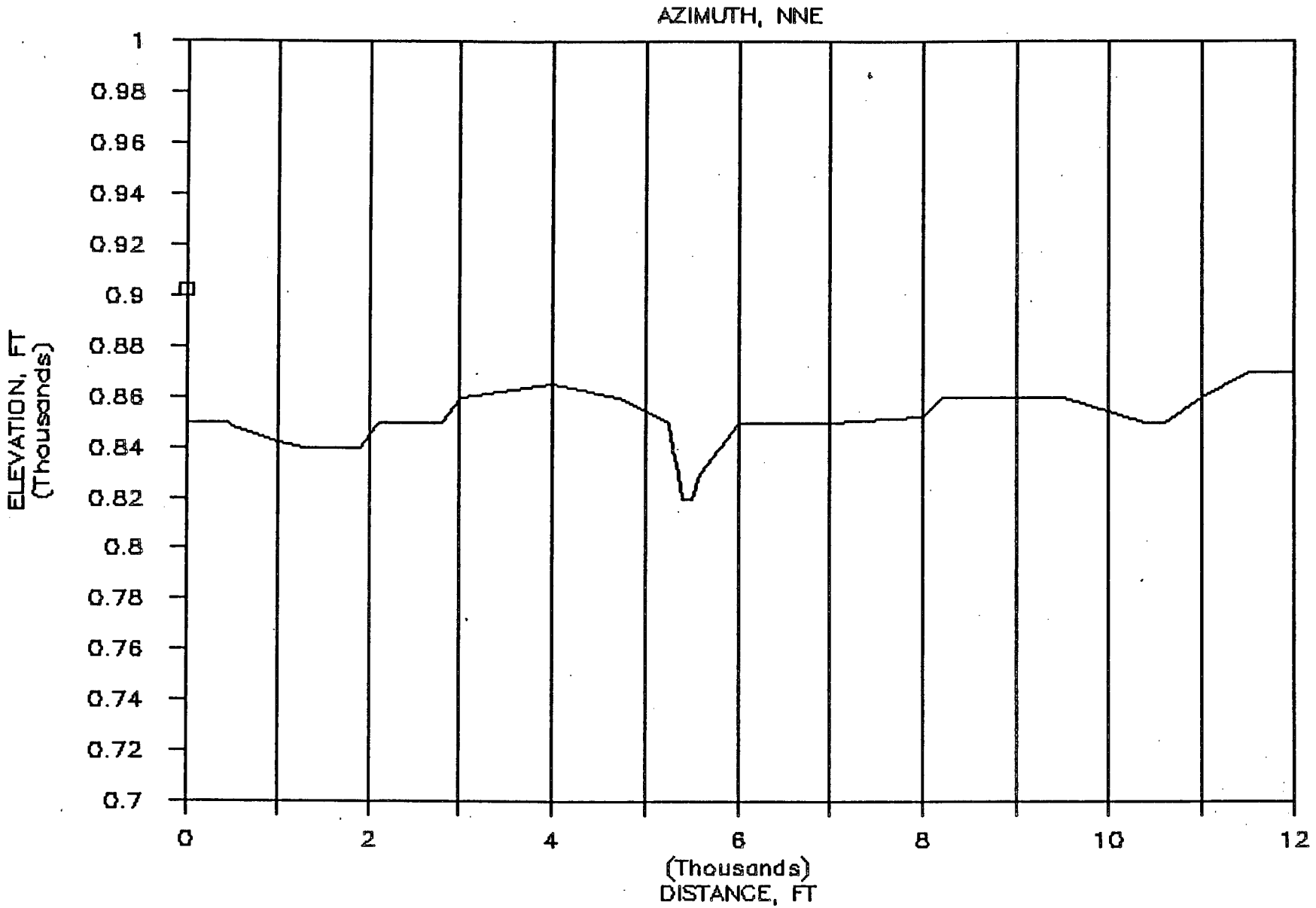
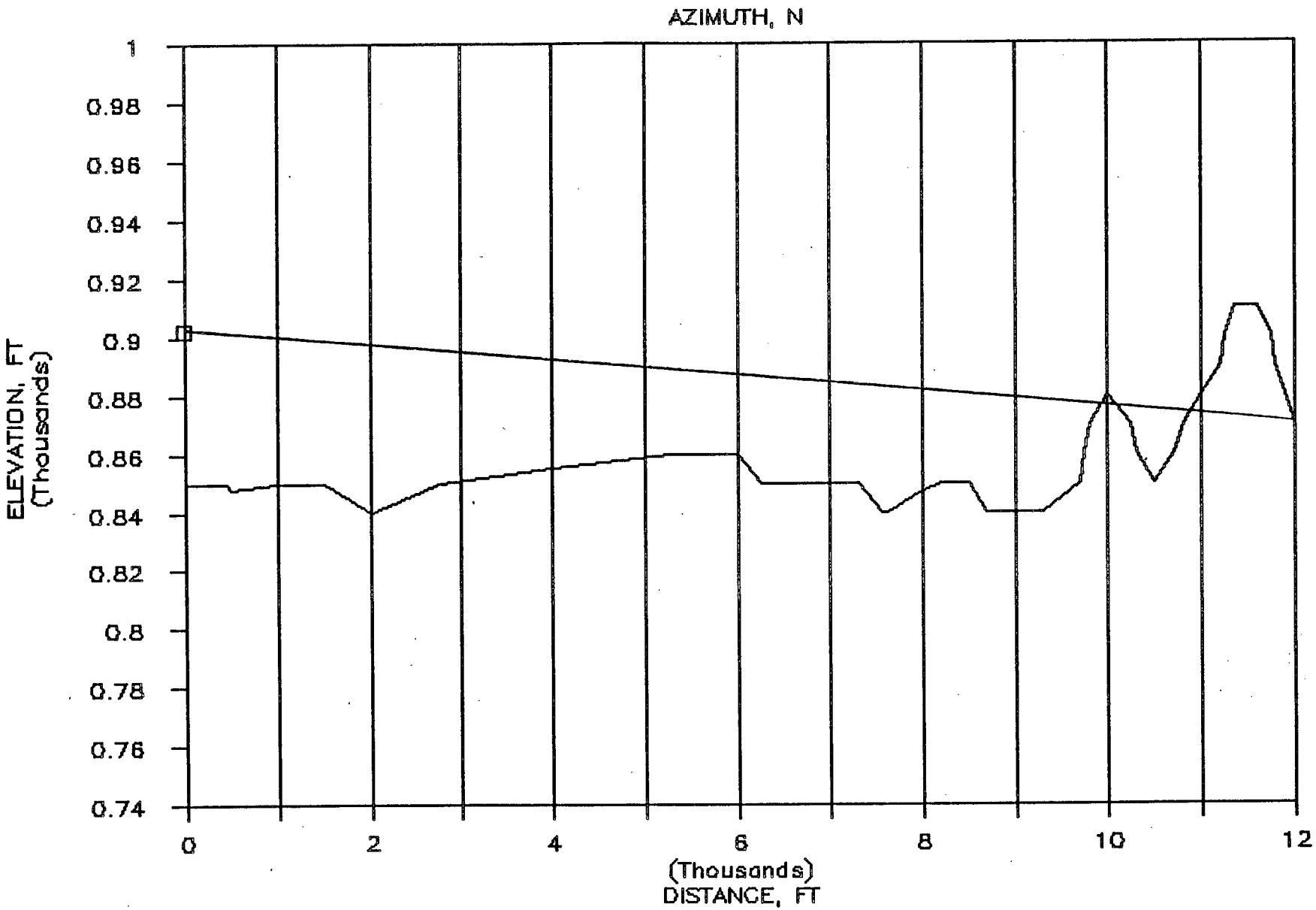
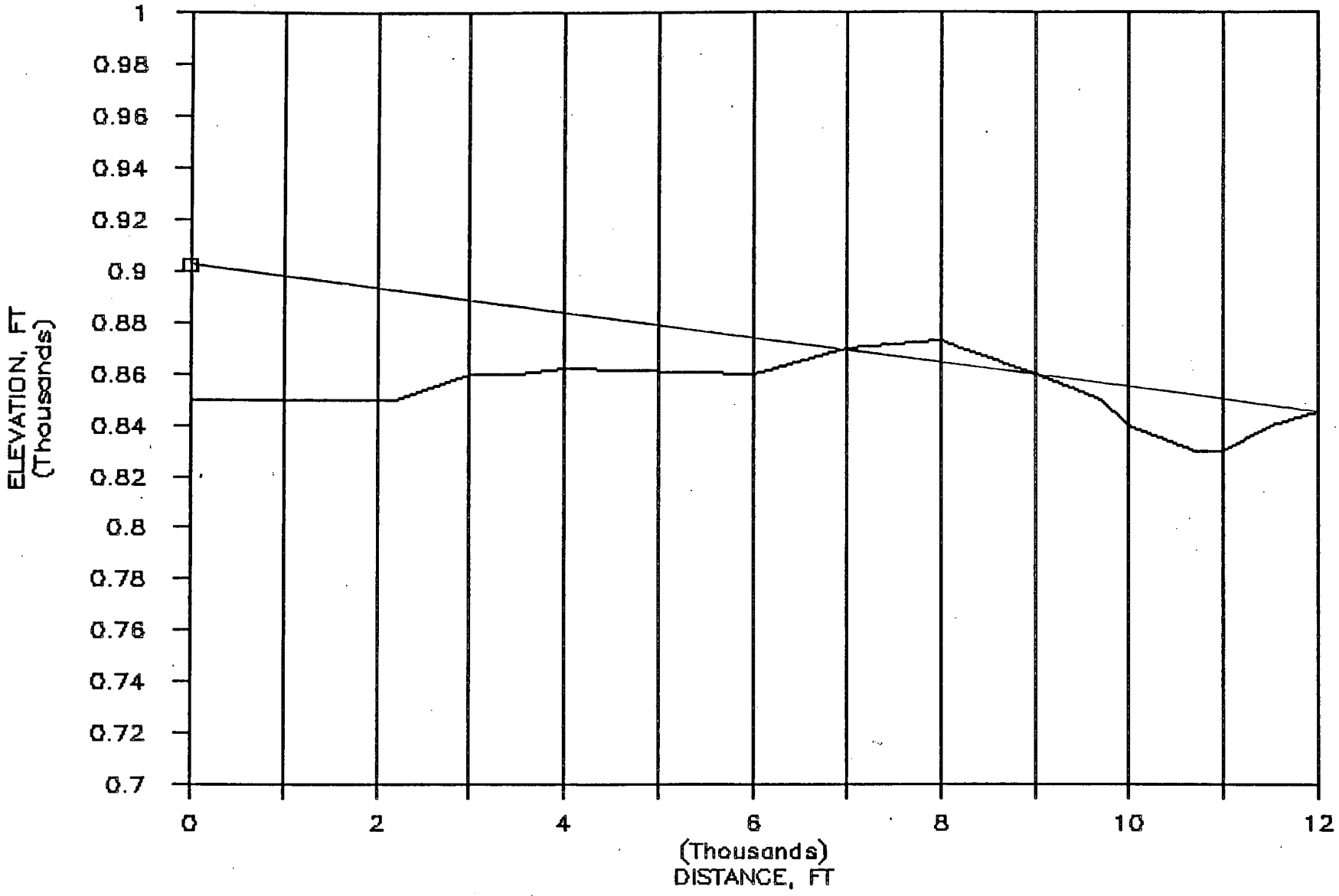


DUANE ARNOLD 23

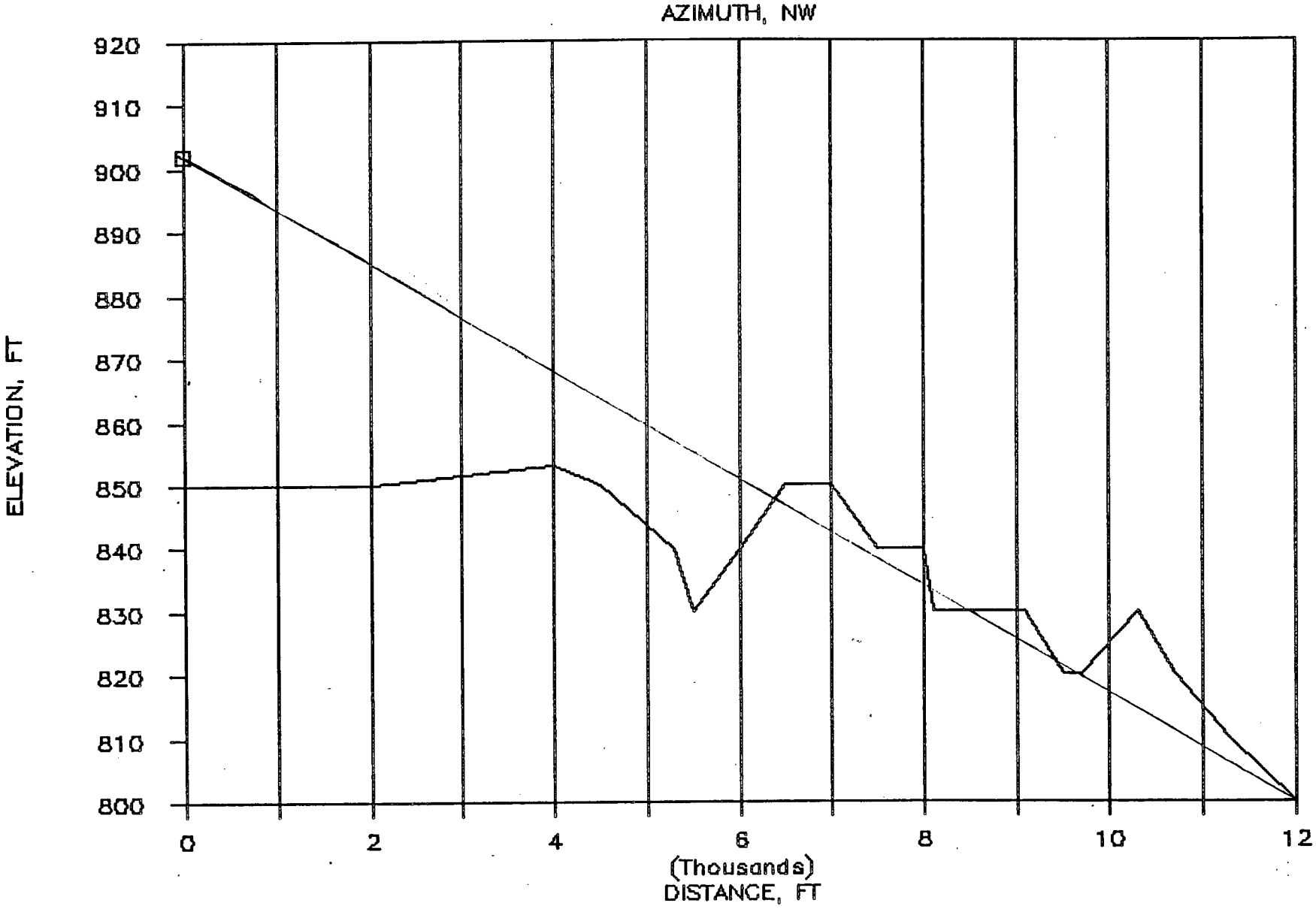


DUANE ARNOLD 23

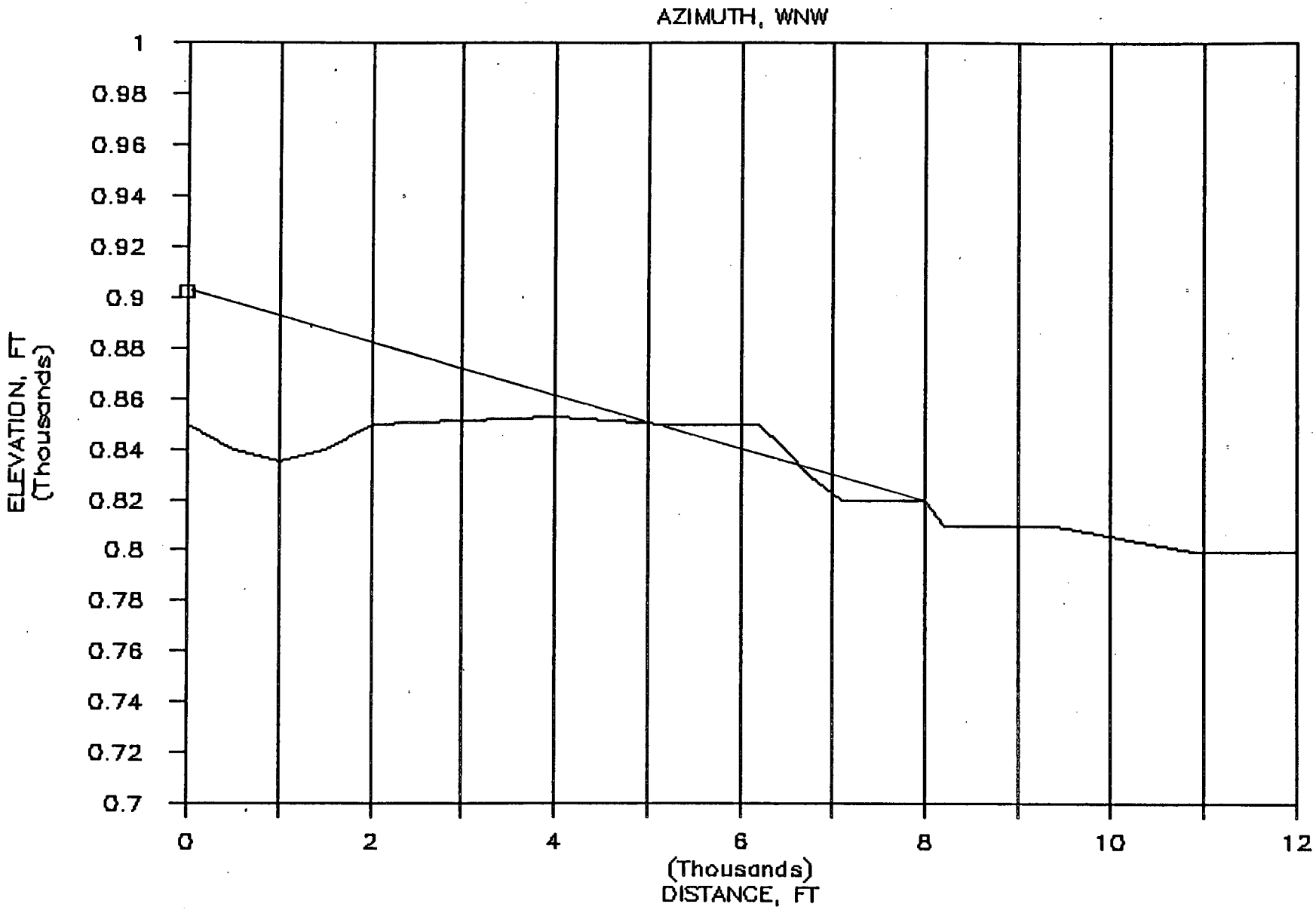
AZIMUTH, NNW



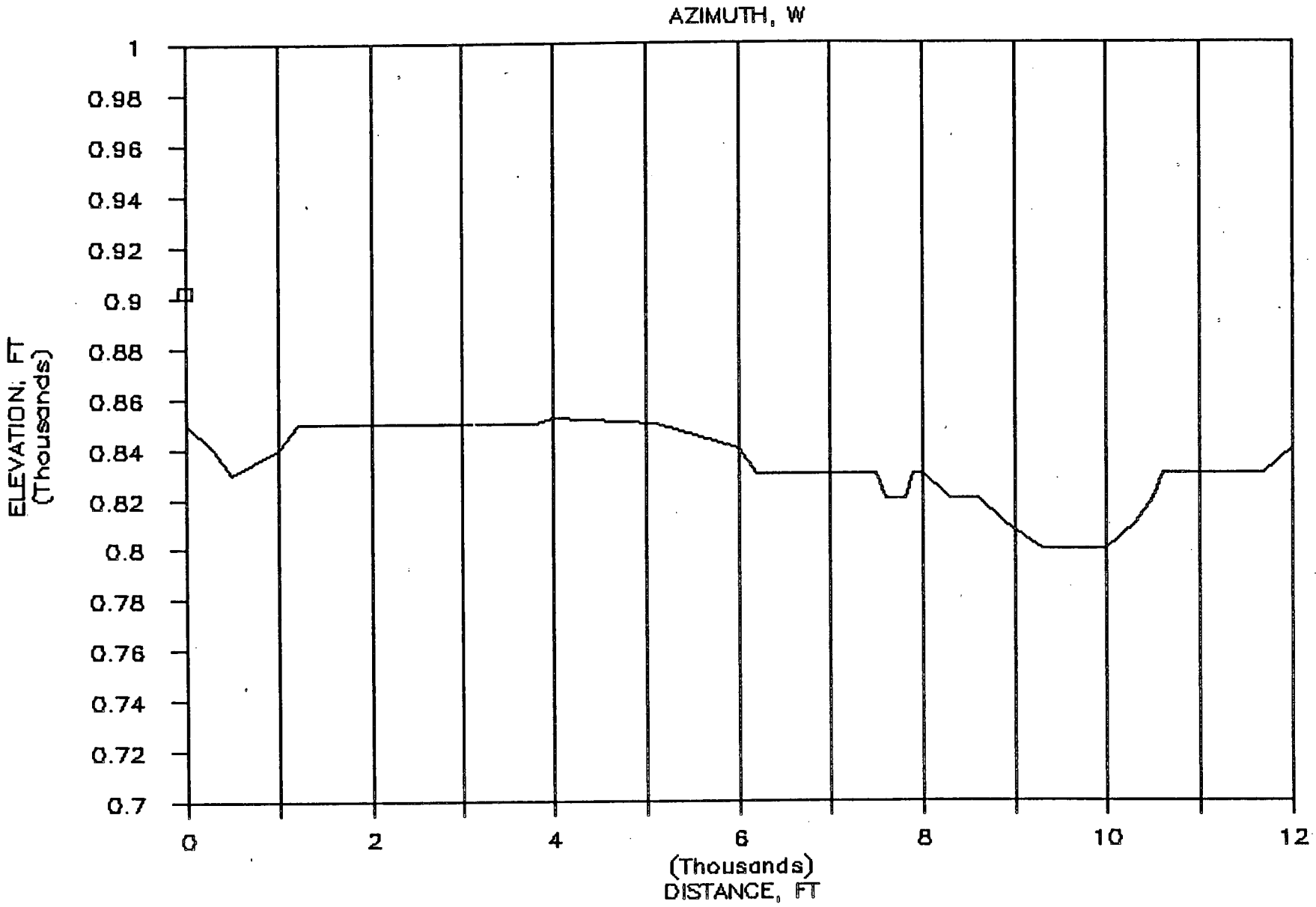
DUANE ARNOLD 23



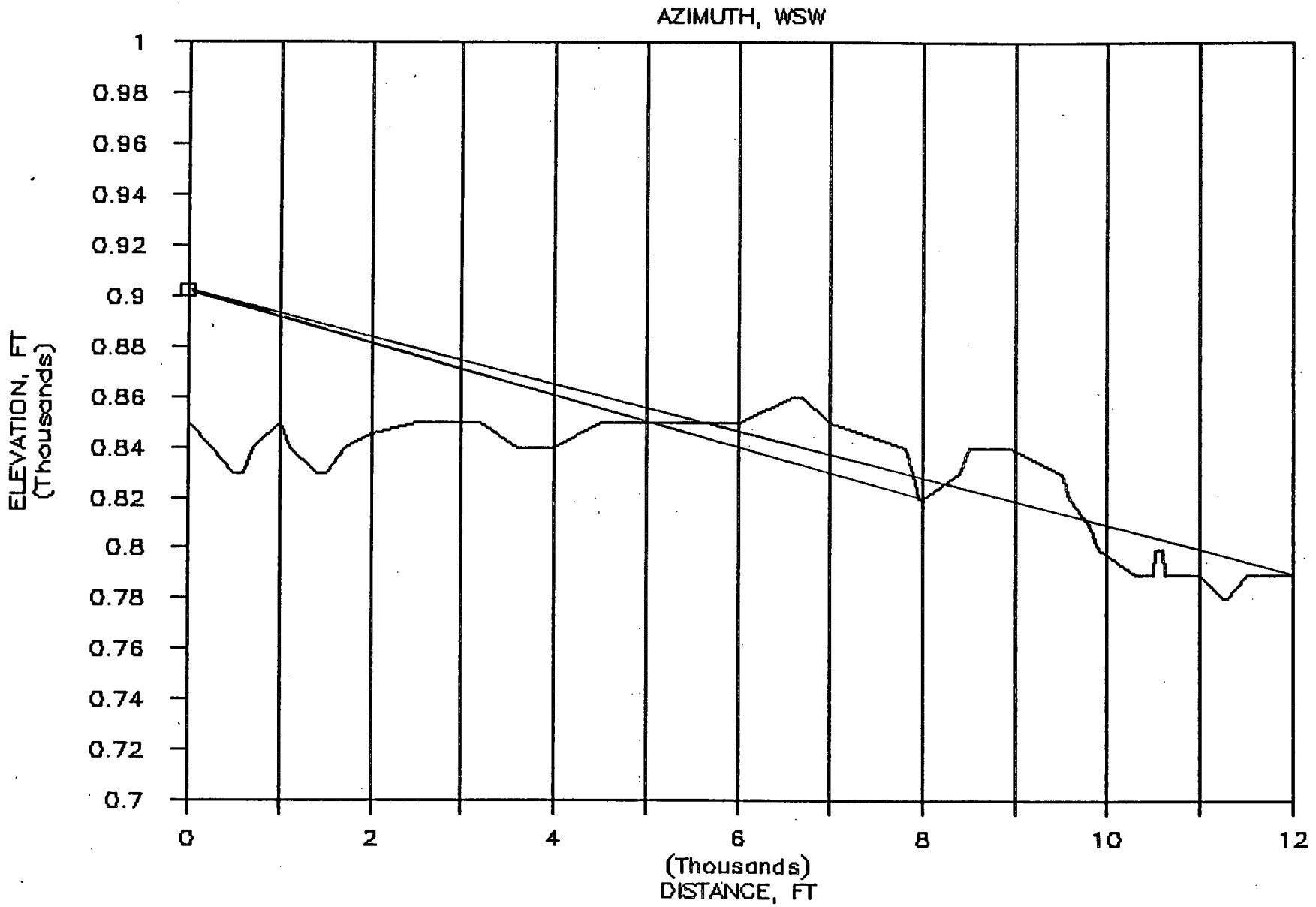
DUANE ARNOLD 23



DUANE ARNOLD 23



DUANE ARNOLD 23



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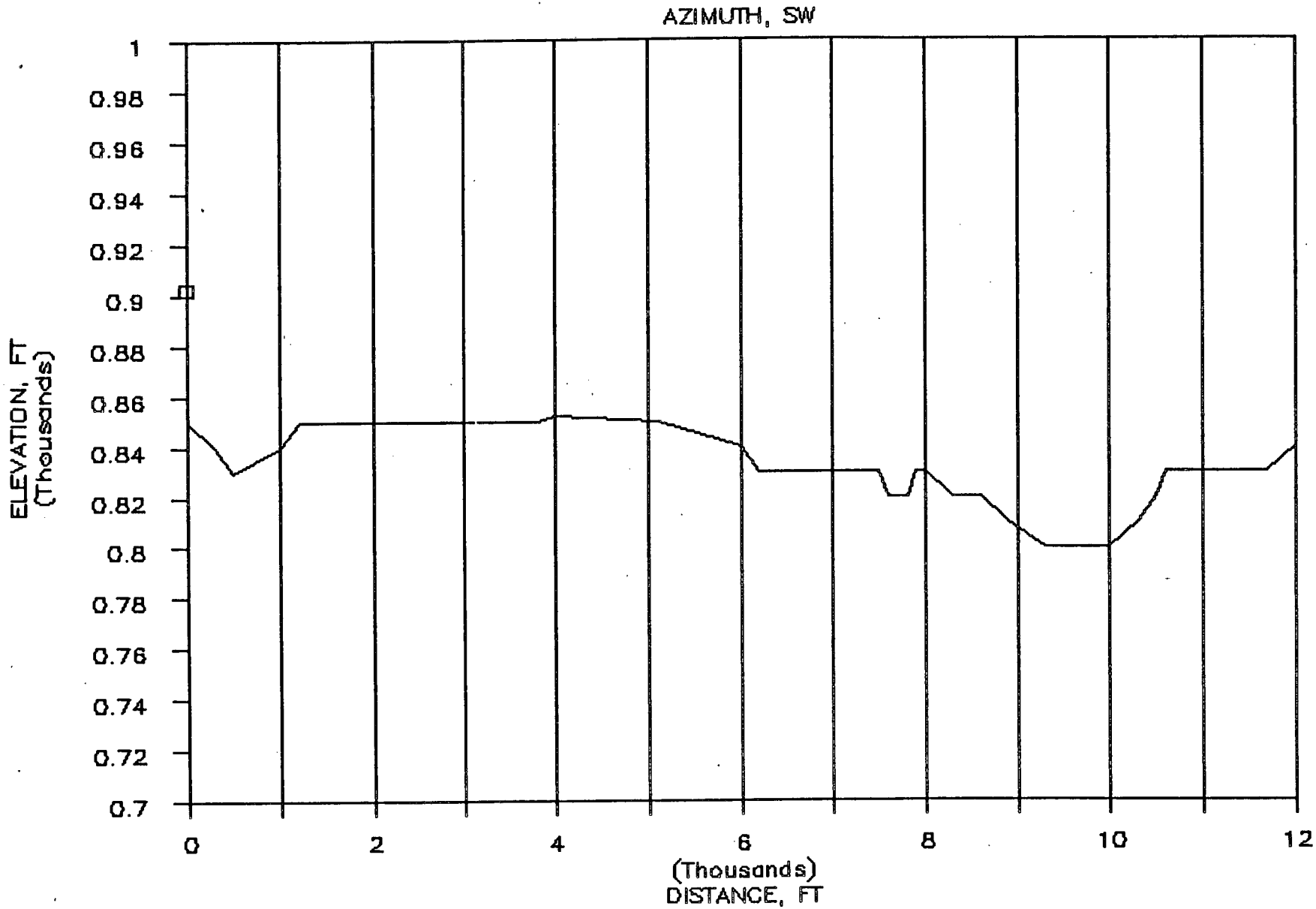

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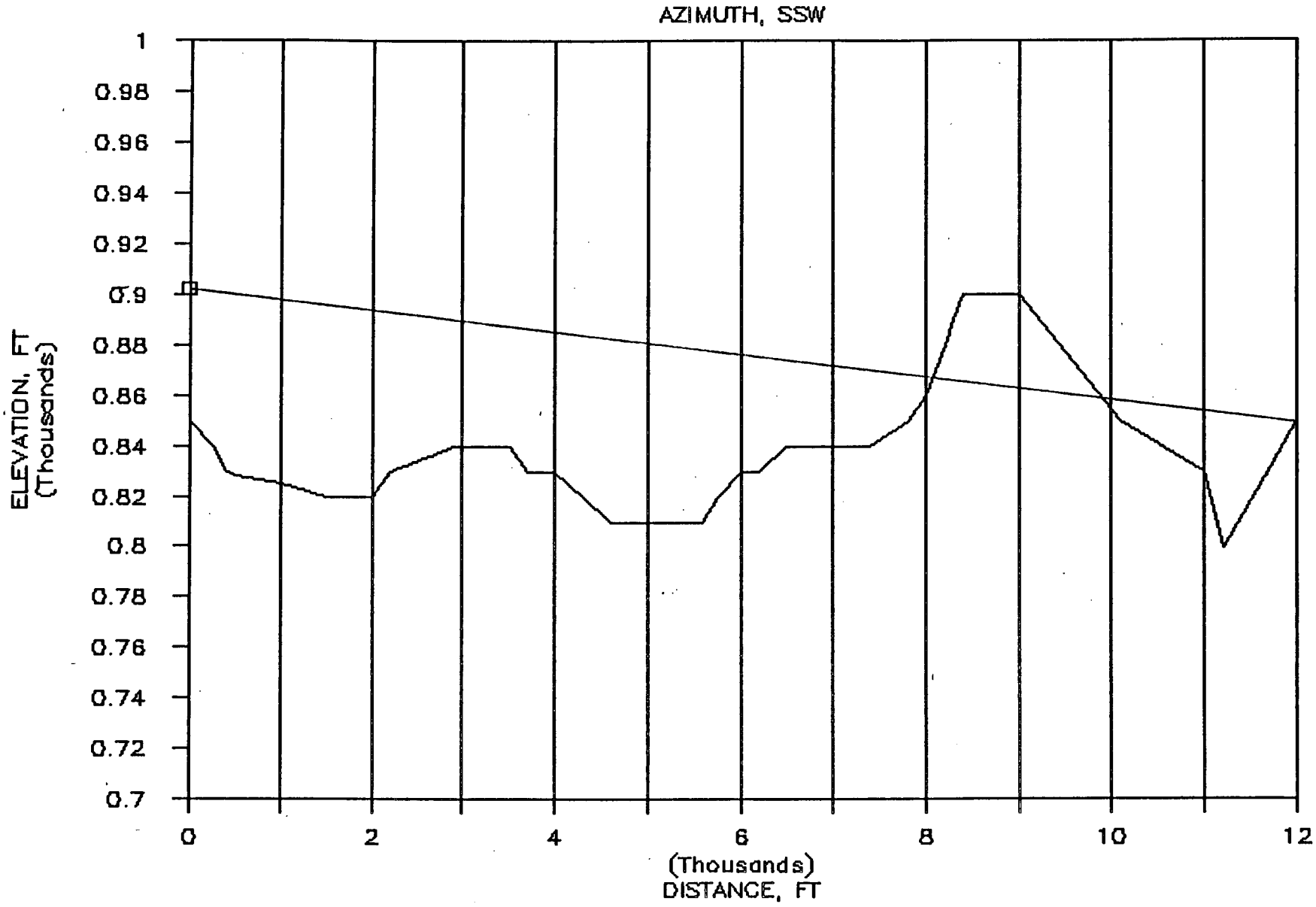

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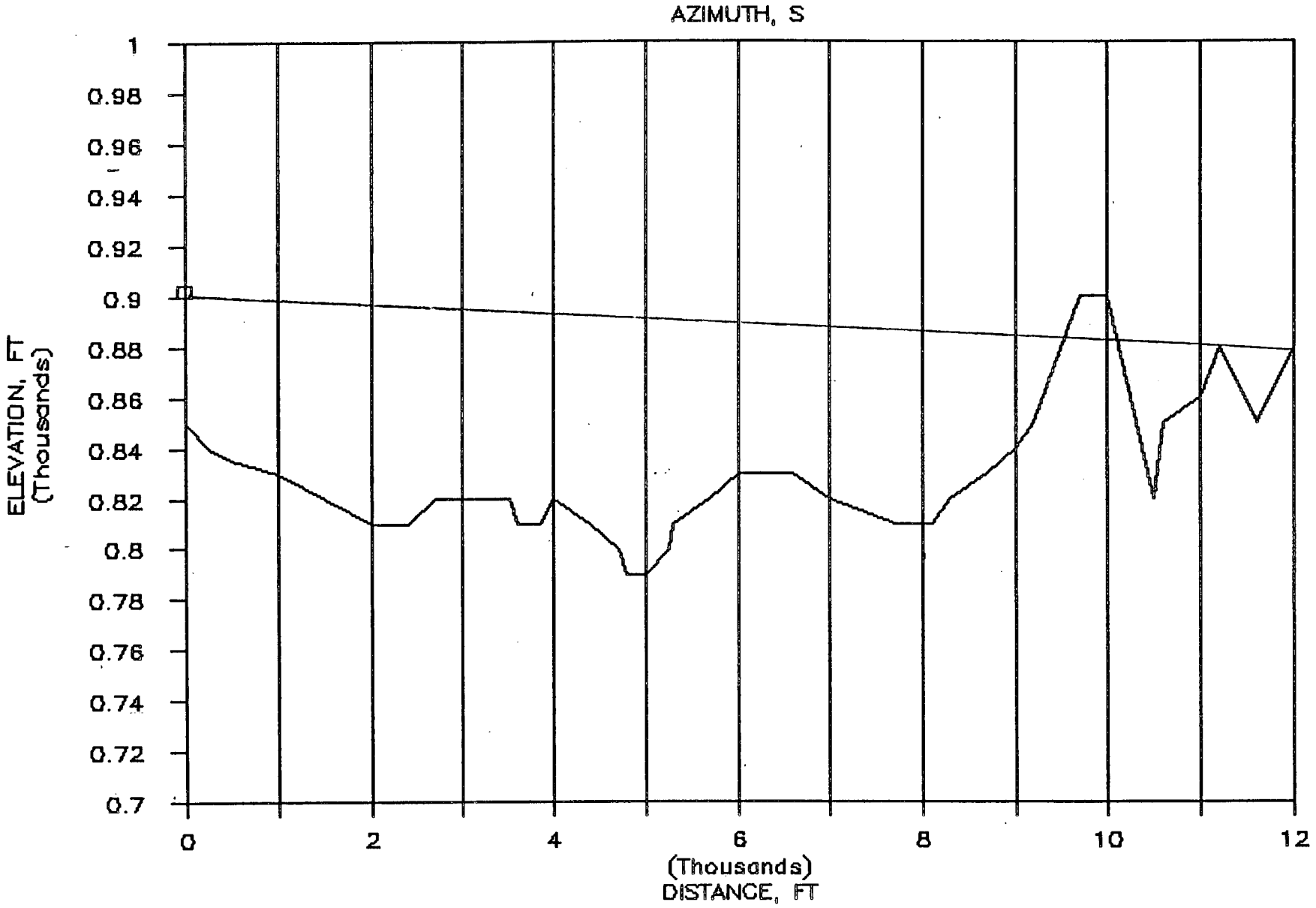

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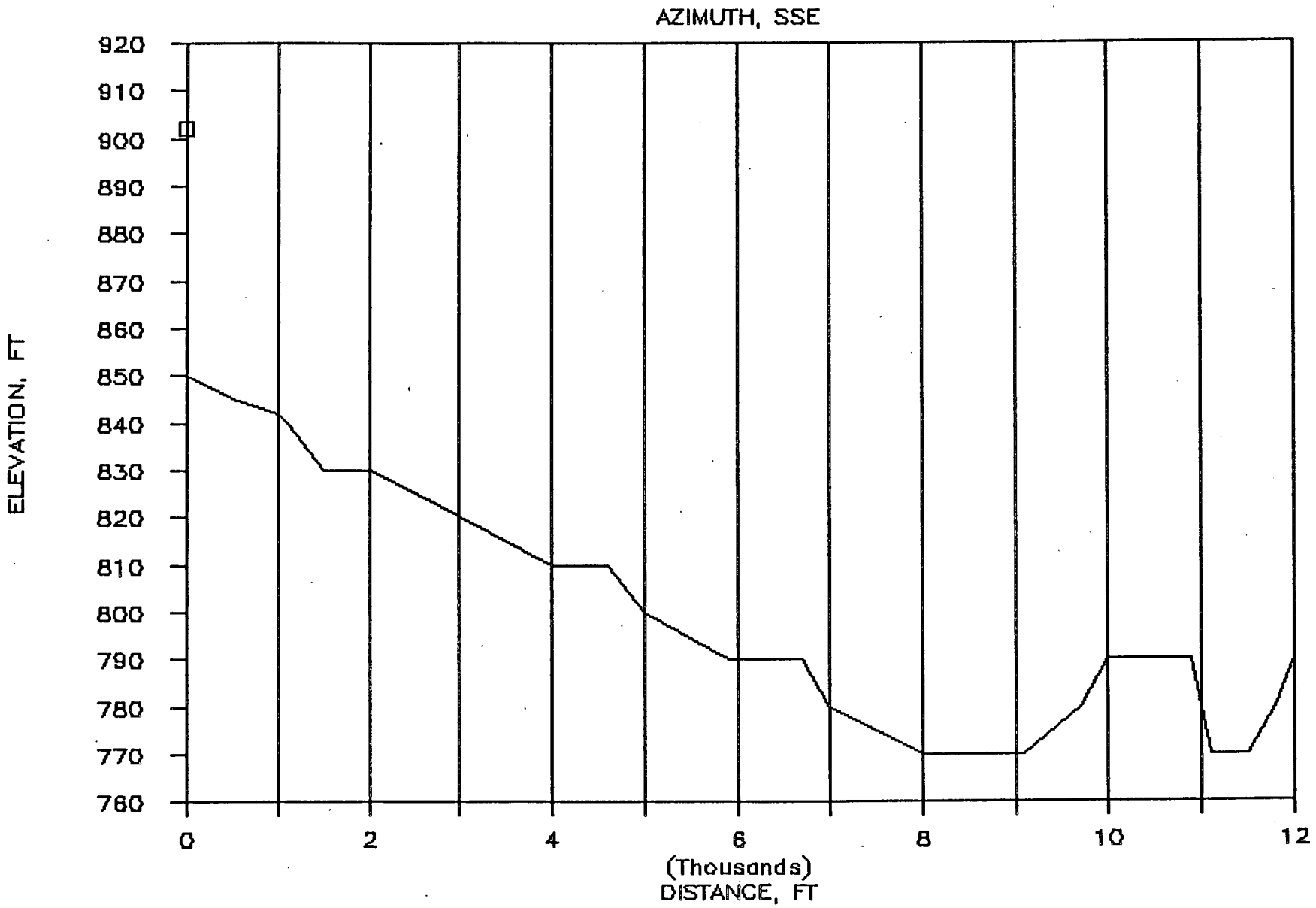

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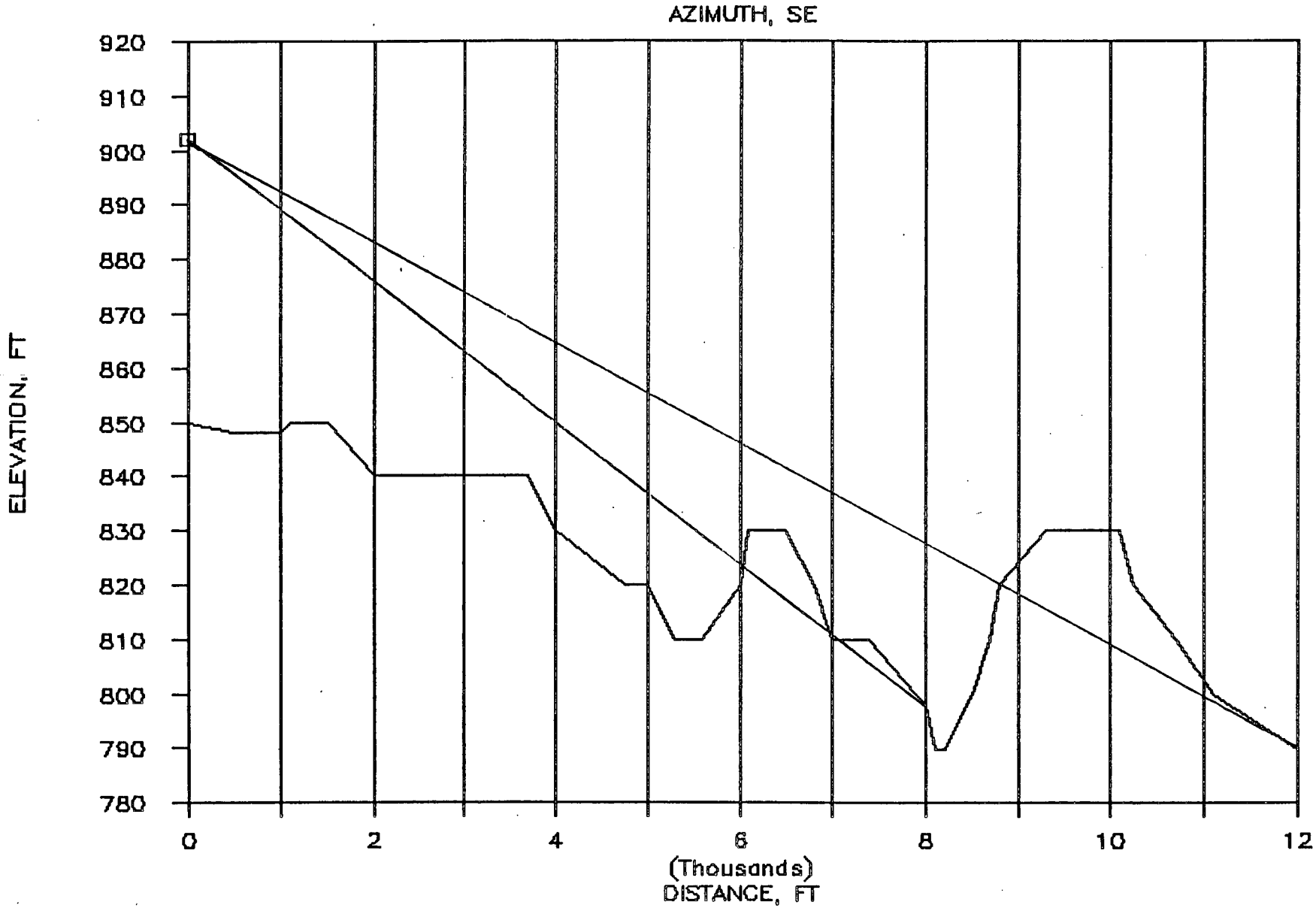

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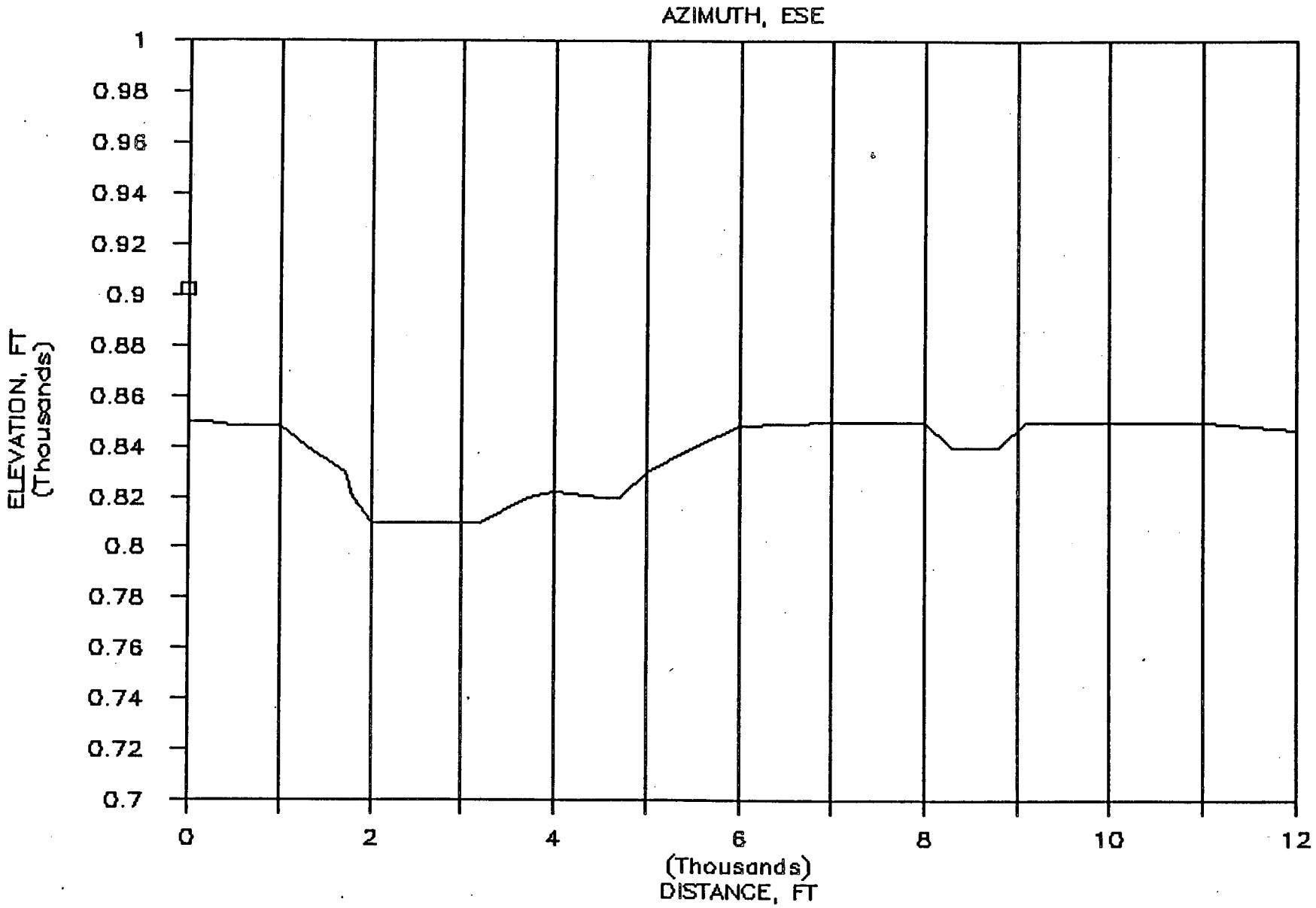


IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #23-WS3000
SOURCE-RECEIVER TOPOGRAPHICAL INPUTS

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	848.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	845.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	815.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	825.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	800.00	SOFT	0.	YES	5000.	820.
6	8000.	90.00	830.00	SOFT	0.	YES	7950.	840.
7	12000.	90.00	845.00	SOFT	0.	NO	0.	0.
8	500.	67.50	850.00	SOFT	0.	NO	0.	0.
9	1000.	67.50	841.00	SOFT	0.	NO	0.	0.
10	2000.	67.50	825.00	SOFT	0.	NO	0.	0.
11	4000.	67.50	850.00	SOFT	0.	NO	0.	0.
12	6000.	67.50	850.00	SOFT	0.	NO	0.	0.
13	8000.	67.50	850.00	SOFT	0.	NO	0.	0.
14	12000.	67.50	855.00	SOFT	0.	NO	0.	0.
15	500.	45.00	849.00	SOFT	0.	NO	0.	0.
16	1000.	45.00	842.00	SOFT	0.	NO	0.	0.
17	2000.	45.00	830.00	SOFT	0.	NO	0.	0.
18	4000.	45.00	830.00	SOFT	0.	NO	0.	0.
19	6000.	45.00	863.00	SOFT	0.	NO	0.	0.
20	8000.	45.00	862.00	SOFT	0.	NO	0.	0.
21	12000.	45.00	875.00	SOFT	0.	YES	10400.	890.
22	500.	22.50	848.00	SOFT	0.	NO	0.	0.
23	1000.	22.50	842.00	SOFT	0.	NO	0.	0.
24	2000.	22.50	845.00	SOFT	0.	NO	0.	0.
25	4000.	22.50	865.00	SOFT	0.	NO	0.	0.
26	6000.	22.50	850.00	SOFT	0.	NO	0.	0.
27	8000.	22.50	852.00	SOFT	0.	NO	0.	0.
28	12000.	22.50	870.00	SOFT	0.	NO	0.	0.
29	500.	.00	848.00	SOFT	0.	NO	0.	0.
30	1000.	.00	850.00	SOFT	0.	NO	0.	0.
31	2000.	.00	840.00	SOFT	0.	NO	0.	0.
32	4000.	.00	855.00	SOFT	0.	NO	0.	0.
33	6000.	.00	860.00	SOFT	0.	NO	0.	0.
34	8000.	.00	847.00	SOFT	0.	NO	0.	0.
35	12000.	.00	870.00	SOFT	0.	YES	11350.	910.
36	500.	337.50	850.00	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	850.00	SOFT	0.	NO	0.	0.
38	2000.	337.50	850.00	SOFT	0.	NO	0.	0.
39	4000.	337.50	862.00	SOFT	0.	NO	0.	0.
40	6000.	337.50	860.00	SOFT	0.	NO	0.	0.
41	8000.	337.50	873.00	SOFT	0.	NO	0.	0.
42	12000.	337.50	845.00	SOFT	0.	YES	8000.	873.
43	500.	315.00	850.00	SOFT	0.	NO	0.	0.
44	1000.	315.00	850.00	SOFT	0.	NO	0.	0.
45	2000.	315.00	850.00	SOFT	0.	NO	0.	0.
[illegible]	4000.	315.00	853.00	SOFT	0.	NO	0.	0.
[illegible]	6000.	315.00	840.00	SOFT	0.	NO	0.	0.
48	8000.	315.00	840.00	SOFT	0.	NO	0.	0.
49	12000.	315.00	800.00	SOFT	0.	YES	7000.	850.
50	500.	292.50	840.00	SOFT	0.	NO	0.	0.
51	1000.	292.50	835.00	SOFT	0.	NO	0.	0.
52	2000.	292.50	850.00	SOFT	0.	NO	0.	0.
53	4000.	292.50	853.00	SOFT	0.	NO	0.	0.
54	6000.	292.50	850.00	SOFT	0.	NO	0.	0.
55	8000.	292.50	820.00	SOFT	0.	YES	6200.	850.
56	12000.	292.50	800.00	SOFT	0.	NO	0.	0.
57	500.	270.00	830.00	SOFT	0.	NO	0.	0.
58	1000.	270.00	840.00	SOFT	0.	NO	0.	0.
59	2000.	270.00	850.00	SOFT	0.	NO	0.	0.
60	4000.	270.00	852.00	SOFT	0.	NO	0.	0.
61	6000.	270.00	840.00	SOFT	0.	NO	0.	0.
62	8000.	270.00	830.00	SOFT	0.	NO	0.	0.
63	12000.	270.00	840.00	SOFT	0.	NO	0.	0.
64	500.	247.50	830.00	SOFT	0.	NO	0.	0.
65	1000.	247.50	850.00	SOFT	0.	NO	0.	0.
66	2000.	247.50	845.00	SOFT	0.	NO	0.	0.
67	4000.	247.50	840.00	SOFT	0.	NO	0.	0.
68	6000.	247.50	850.00	SOFT	0.	NO	0.	0.
69	8000.	247.50	820.00	SOFT	0.	YES	6600.	860.
70	12000.	247.50	790.00	SOFT	0.	YES	6600.	860.
71	500.	225.00	830.00	SOFT	0.	NO	0.	0.
72	1000.	225.00	830.00	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	830.00	SOFT	0.	NO	0.	0.
74	4000.	225.00	832.00	SOFT	0.	NO	0.	0.
75	6000.	225.00	840.00	SOFT	0.	NO	0.	0.
76	8000.	225.00	853.00	SOFT	0.	NO	0.	0.
77	12000.	225.00	830.00	SOFT	0.	YES	9600.	870.
78	500.	202.50	828.00	SOFT	0.	NO	0.	0.
79	1000.	202.50	825.00	SOFT	0.	NO	0.	0.
80	2000.	202.50	820.00	SOFT	0.	NO	0.	0.
81	4000.	202.50	830.00	SOFT	0.	NO	0.	0.
82	6000.	202.50	830.00	SOFT	0.	NO	0.	0.
83	8000.	202.50	860.00	SOFT	0.	NO	0.	0.
84	12000.	202.50	850.00	SOFT	0.	YES	8400.	900.
85	500.	180.00	835.00	SOFT	0.	NO	0.	0.
86	1000.	180.00	830.00	SOFT	0.	NO	0.	0.
87	2000.	180.00	810.00	SOFT	0.	NO	0.	0.
88	4000.	180.00	820.00	SOFT	0.	NO	0.	0.
89	6000.	180.00	830.00	SOFT	0.	NO	0.	0.
90	8000.	180.00	810.00	SOFT	0.	NO	0.	0.
91	12000.	180.00	880.00	SOFT	0.	YES	9700.	900.
92	500.	157.50	845.00	SOFT	0.	NO	0.	0.
93	1000.	157.50	842.00	SOFT	0.	NO	0.	0.
94	2000.	157.50	830.00	SOFT	0.	NO	0.	0.
95	4000.	157.50	810.00	SOFT	0.	NO	0.	0.
96	6000.	157.50	790.00	SOFT	0.	NO	0.	0.
97	8000.	157.50	770.00	SOFT	0.	NO	0.	0.
98	12000.	157.50	790.00	SOFT	0.	NO	0.	0.
99	500.	135.00	848.00	SOFT	0.	NO	0.	0.
100	1000.	135.00	848.00	SOFT	0.	NO	0.	0.
101	2000.	135.00	840.00	SOFT	0.	NO	0.	0.
102	4000.	135.00	830.00	SOFT	0.	NO	0.	0.
103	6000.	135.00	820.00	SOFT	0.	NO	0.	0.
104	8000.	135.00	798.00	SOFT	0.	YES	6100.	830.
105	12000.	135.00	790.00	SOFT	0.	YES	9300.	830.
106	500.	112.50	848.00	SOFT	0.	NO	0.	0.
107	1000.	112.50	848.00	SOFT	0.	NO	0.	0.
108	2000.	112.50	810.00	SOFT	0.	NO	0.	0.
109	4000.	112.50	822.00	SOFT	0.	NO	0.	0.
110	6000.	112.50	848.00	SOFT	0.	NO	0.	0.
111	8000.	112.50	850.00	SOFT	0.	NO	0.	0.
112	12000.	112.50	847.00	SOFT	0.	NO	0.	0.

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #23-WS3000
NOISE SOURCE POWER LEVEL INPUT

NDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	DUANE - WS3000	158.1	158.0	.0	.0	.0	.0	147.0	157.0	149.0	141.0	124.0

XO= .00 YO= .00 ZO= 902.00 HEIGHT ABOVE GROUND= 52.00

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #23-WS3000
METEOROLOGICAL INPUT CONDITIONS

H1= 10.67 METERS H2= 50.29 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)
1981		8	21	12	177.0	2.1	2.6	23.9	23.2	30.0	742.0

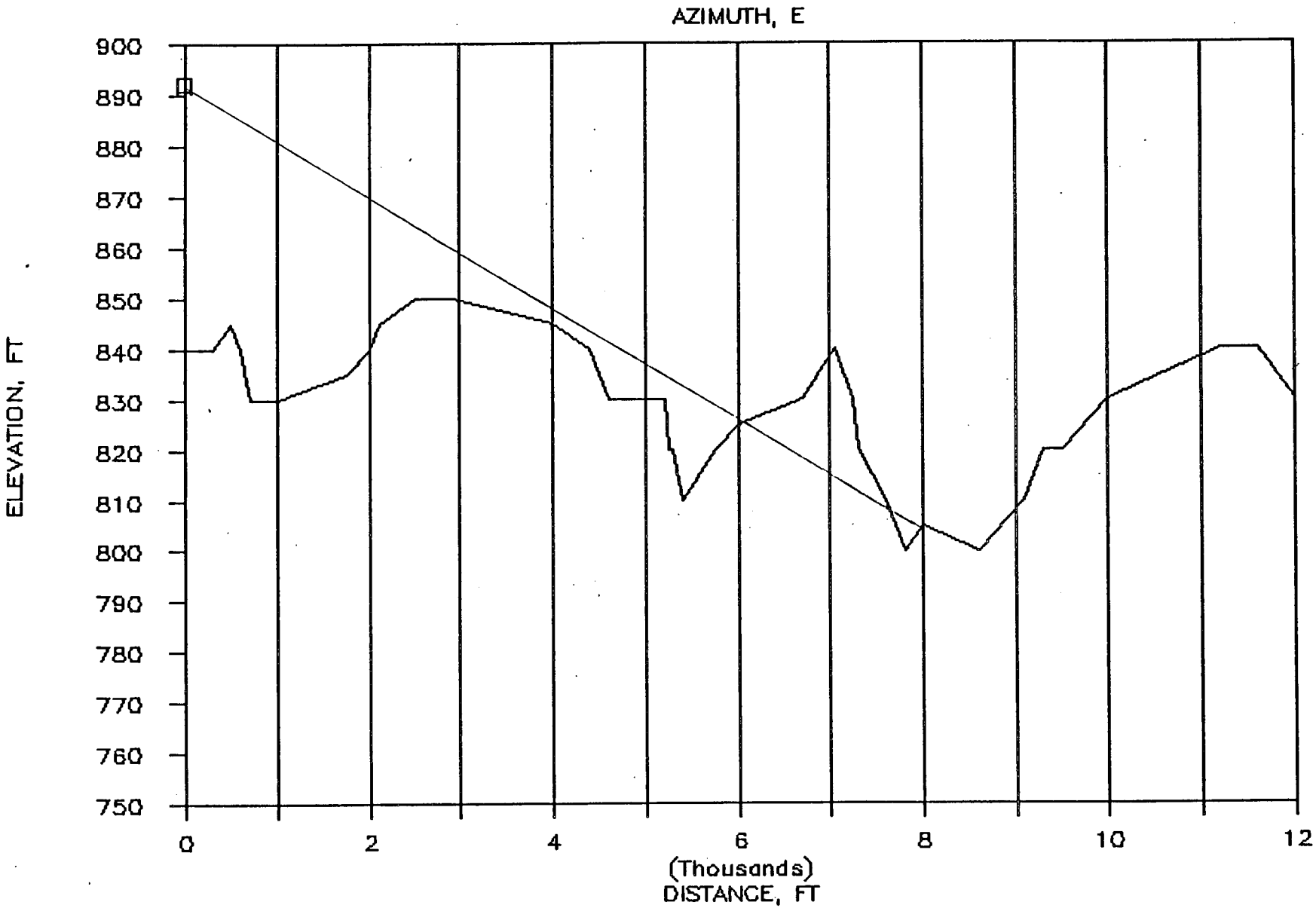
IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #23-WS3000

SOUND PRESSURE LEVELS IN DBC
UNDER MET CONDITION 1

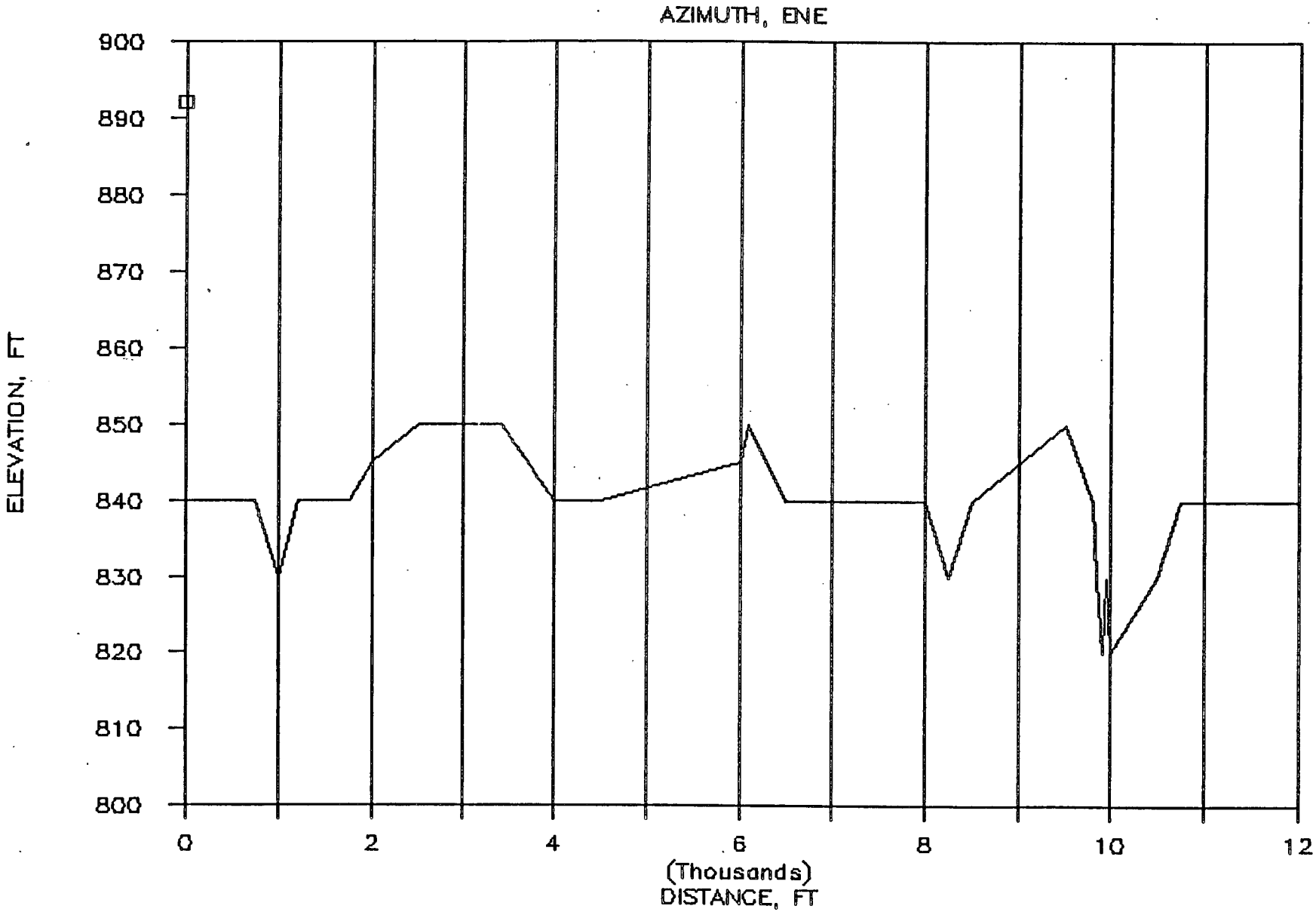
DISTANCE IN FEET

AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	104.7	90.6	75.6	65.7	56.5	47.2	51.3
ENE	104.7	90.6	75.6	65.7	61.3	57.8	51.3
NE	104.7	90.6	75.6	65.7	60.0	53.9	36.8
NNE	104.7	90.6	75.6	65.7	61.3	57.8	51.3
N	104.7	90.6	75.6	65.7	61.3	57.8	39.9
NNW	104.7	90.6	75.6	65.7	61.3	57.8	46.3
NW	104.7	90.6	75.6	65.7	61.3	57.8	46.4
WNW	104.7	90.6	75.6	65.7	61.3	52.4	51.3
W	104.7	90.6	75.6	65.7	61.3	57.8	51.3
WSW	104.7	90.6	75.6	65.7	60.3	46.7	37.1
SW	104.7	90.6	75.6	65.7	61.3	57.8	44.7
SSW	104.7	90.6	75.6	65.7	61.3	57.8	44.2
S	104.7	90.6	75.6	65.7	61.3	57.8	45.7
SSE	104.7	90.6	75.6	65.7	61.3	57.3	47.3
SE	104.7	90.6	75.6	65.7	60.0	48.9	36.7
ESE	104.7	90.6	75.6	65.7	61.3	57.8	51.3

DUANE ARNOLD 24



DUANE ARNOLD 24



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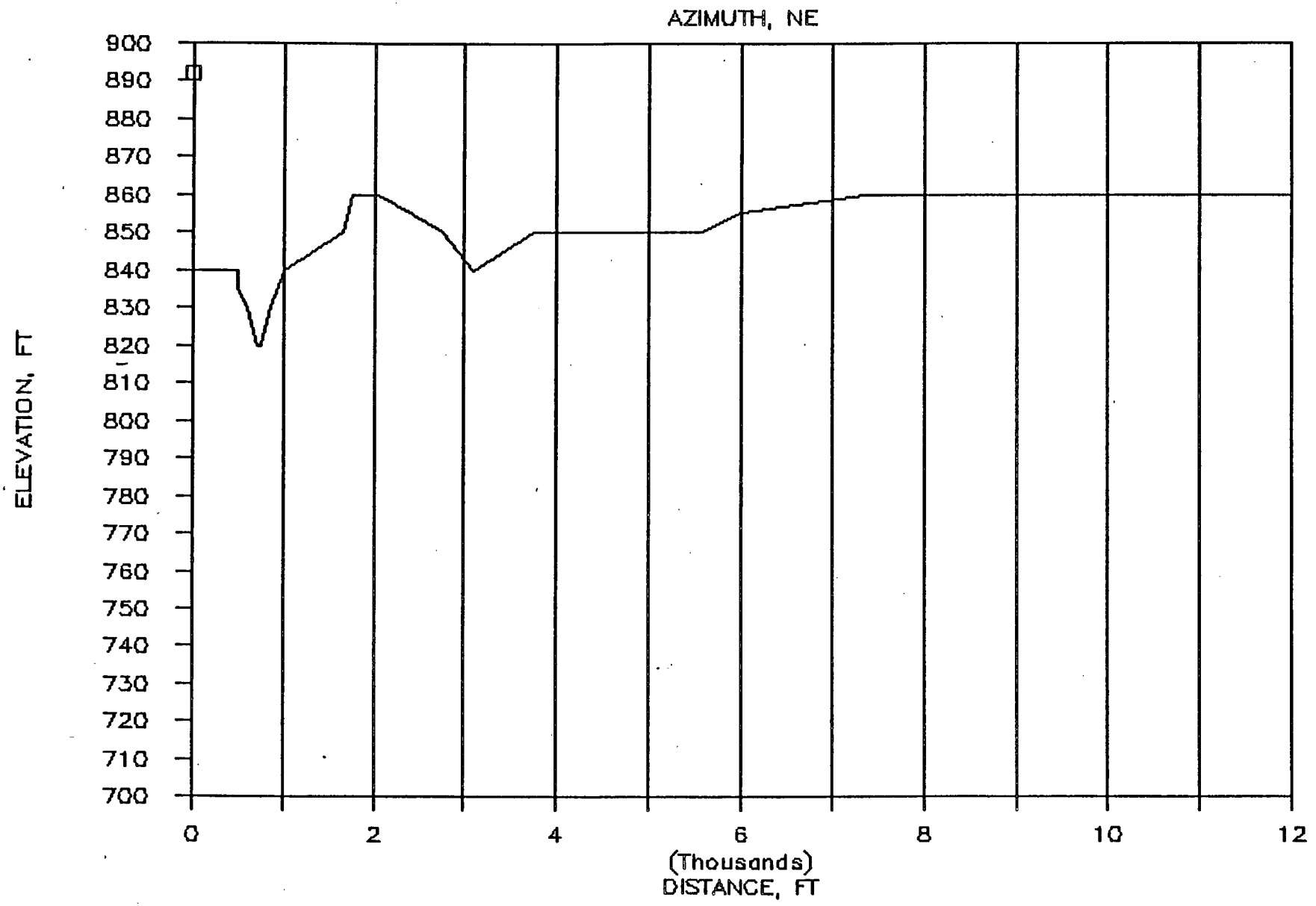

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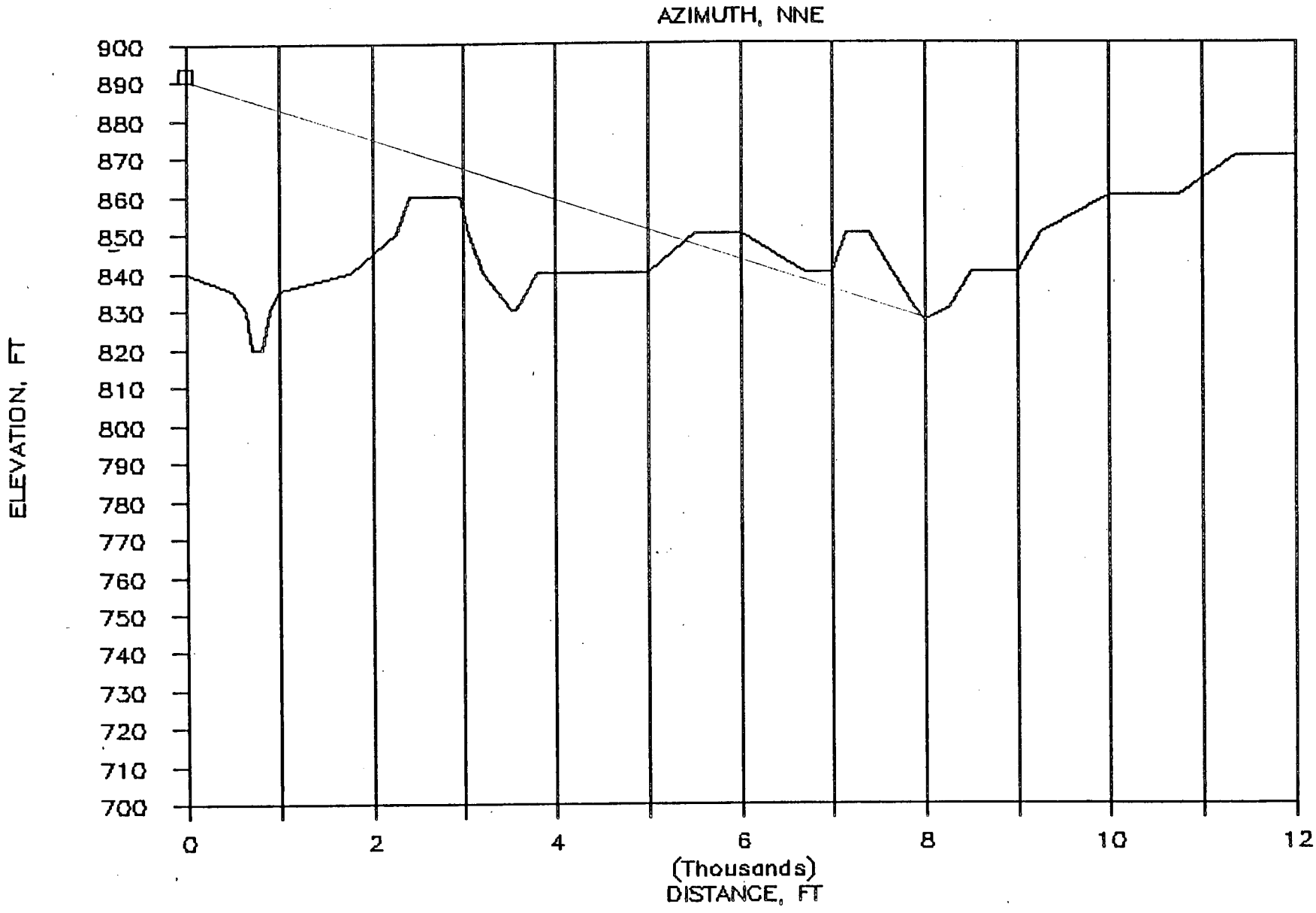

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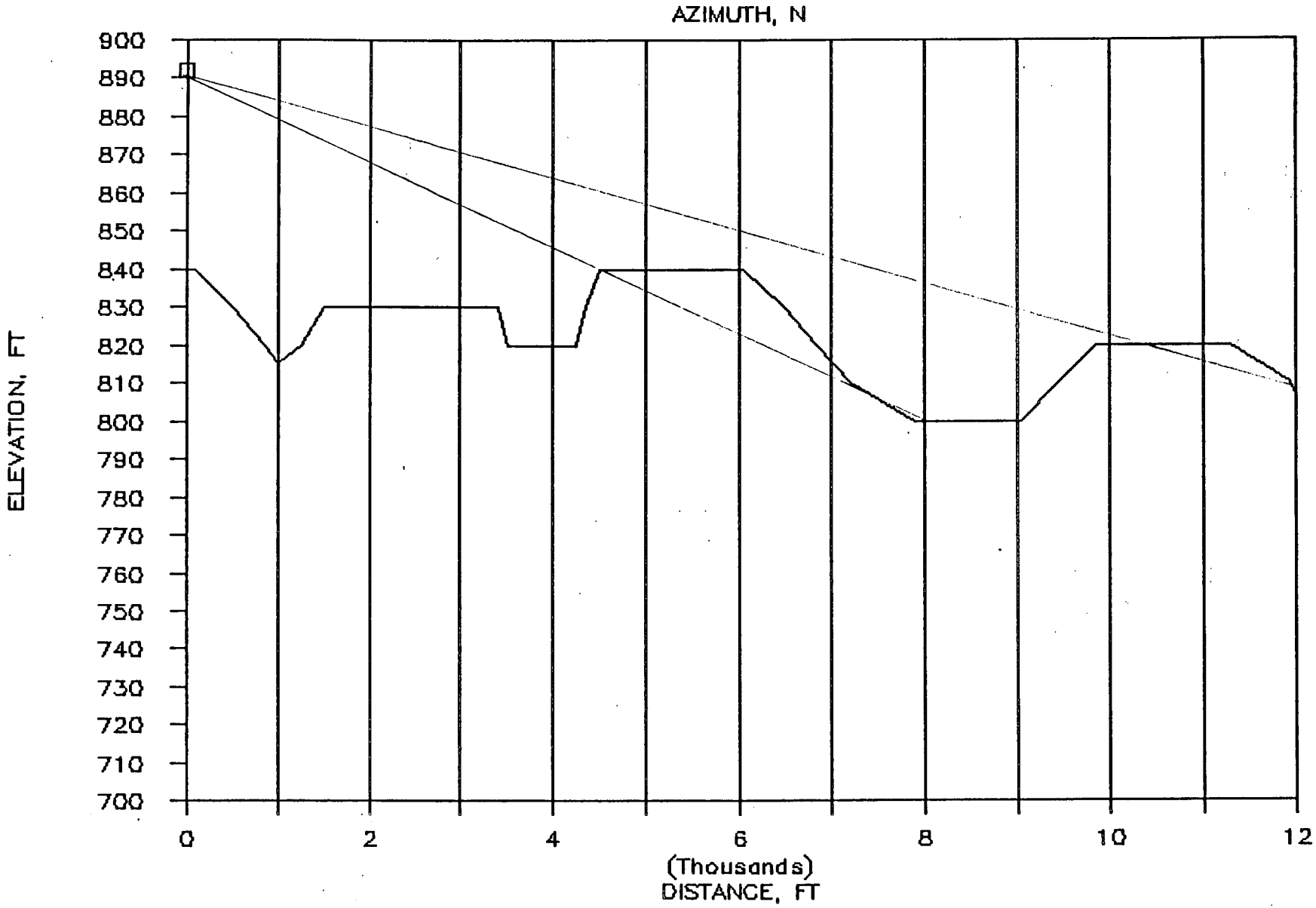

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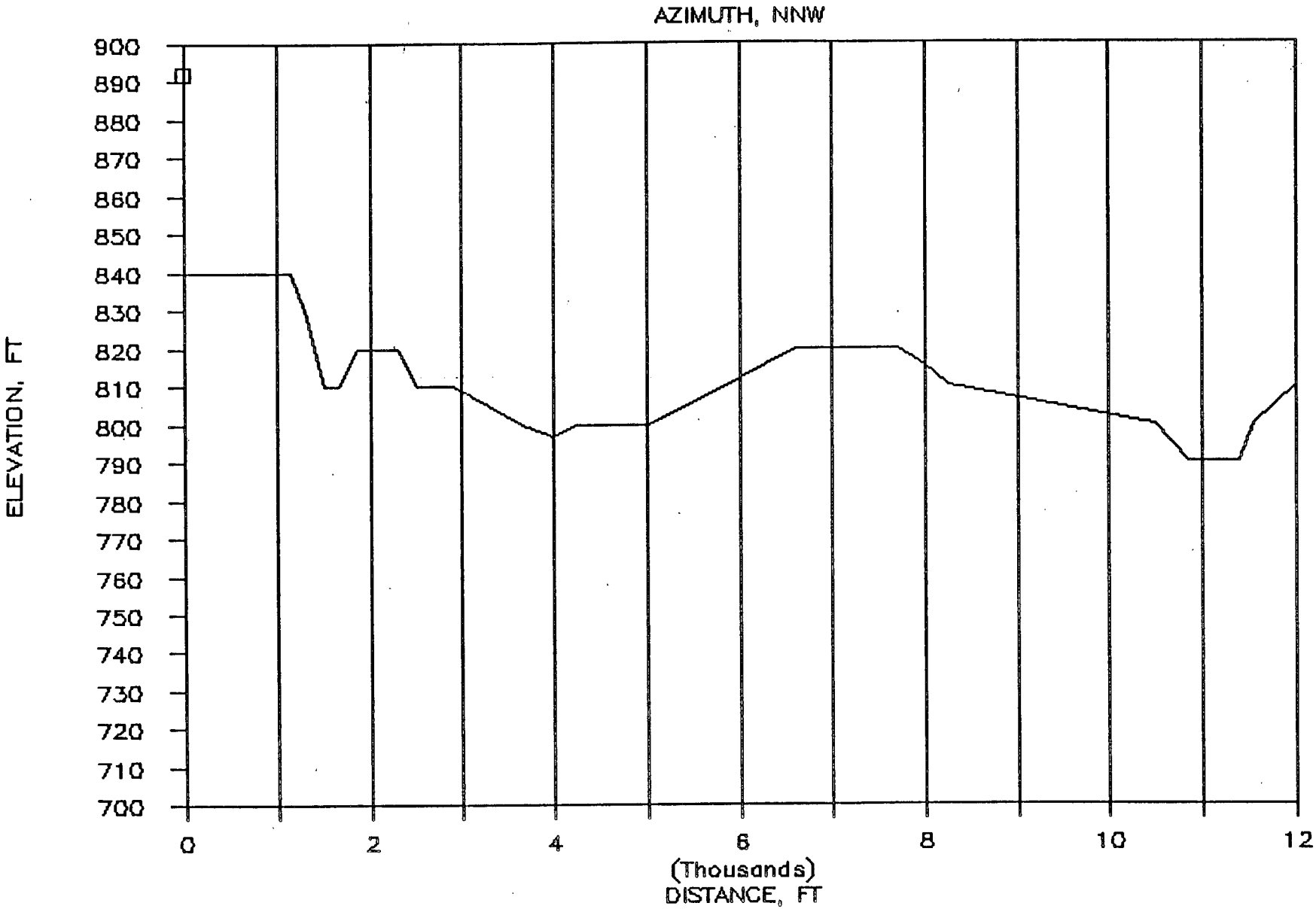

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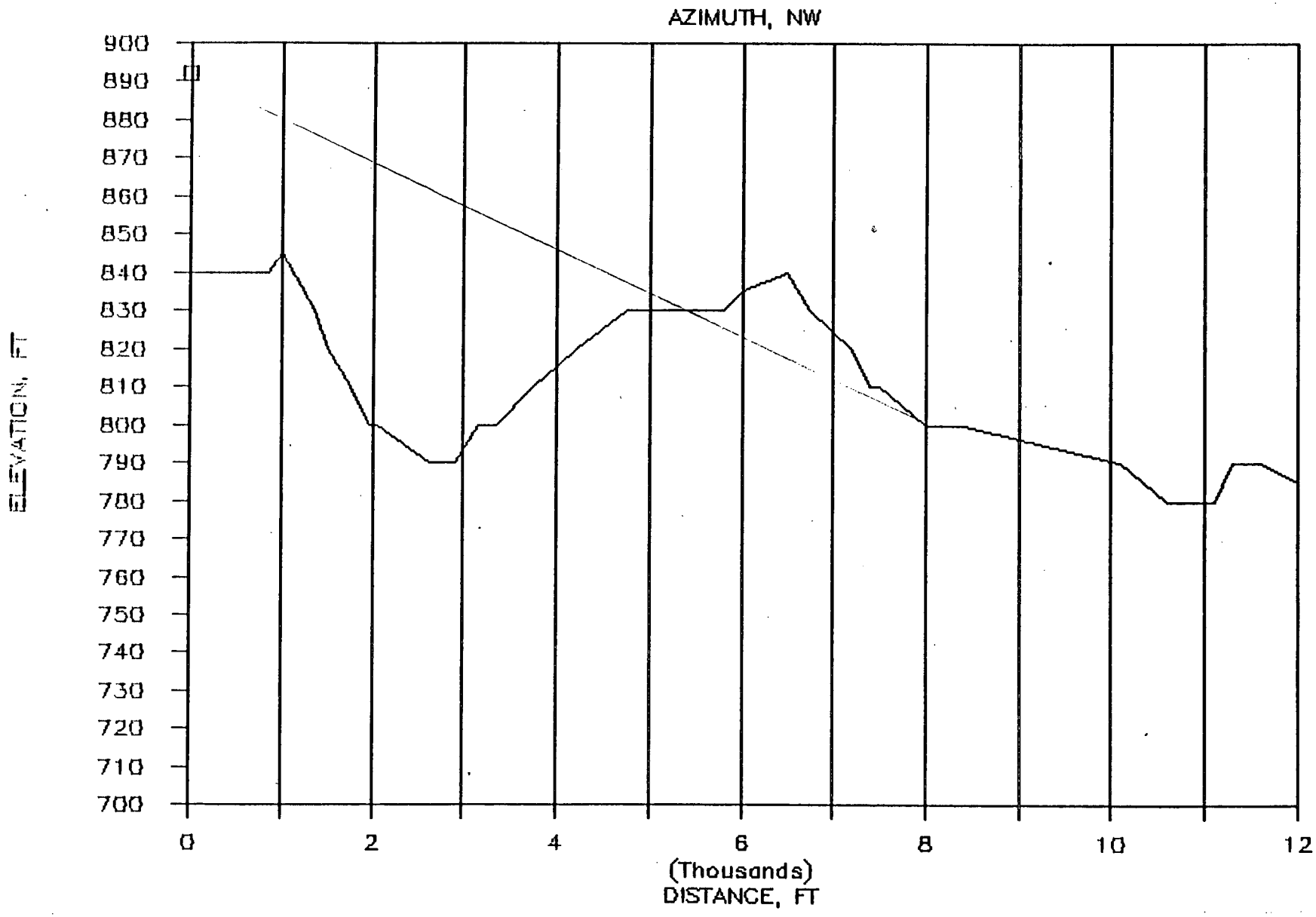
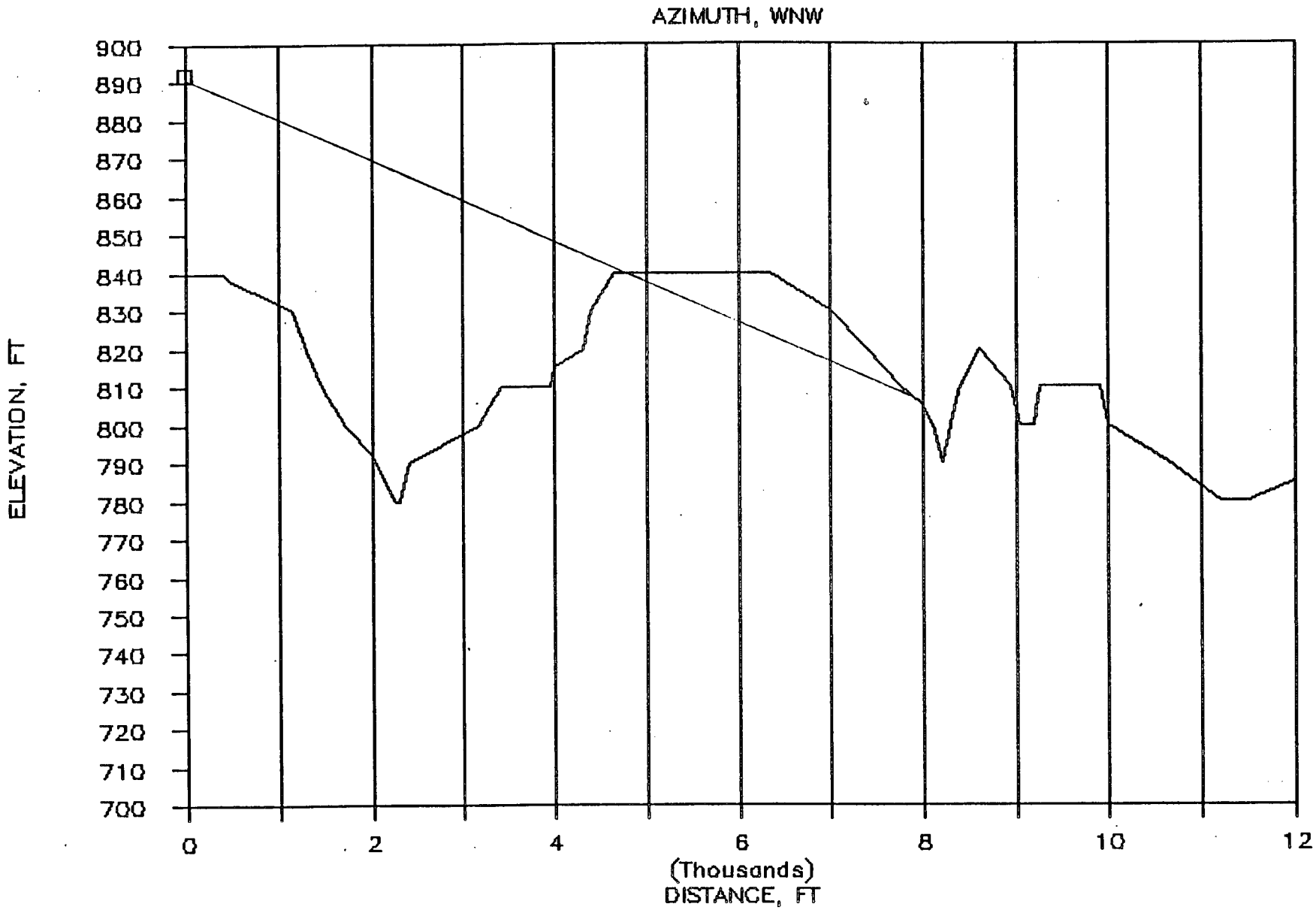


DUANE ARNOLD 24



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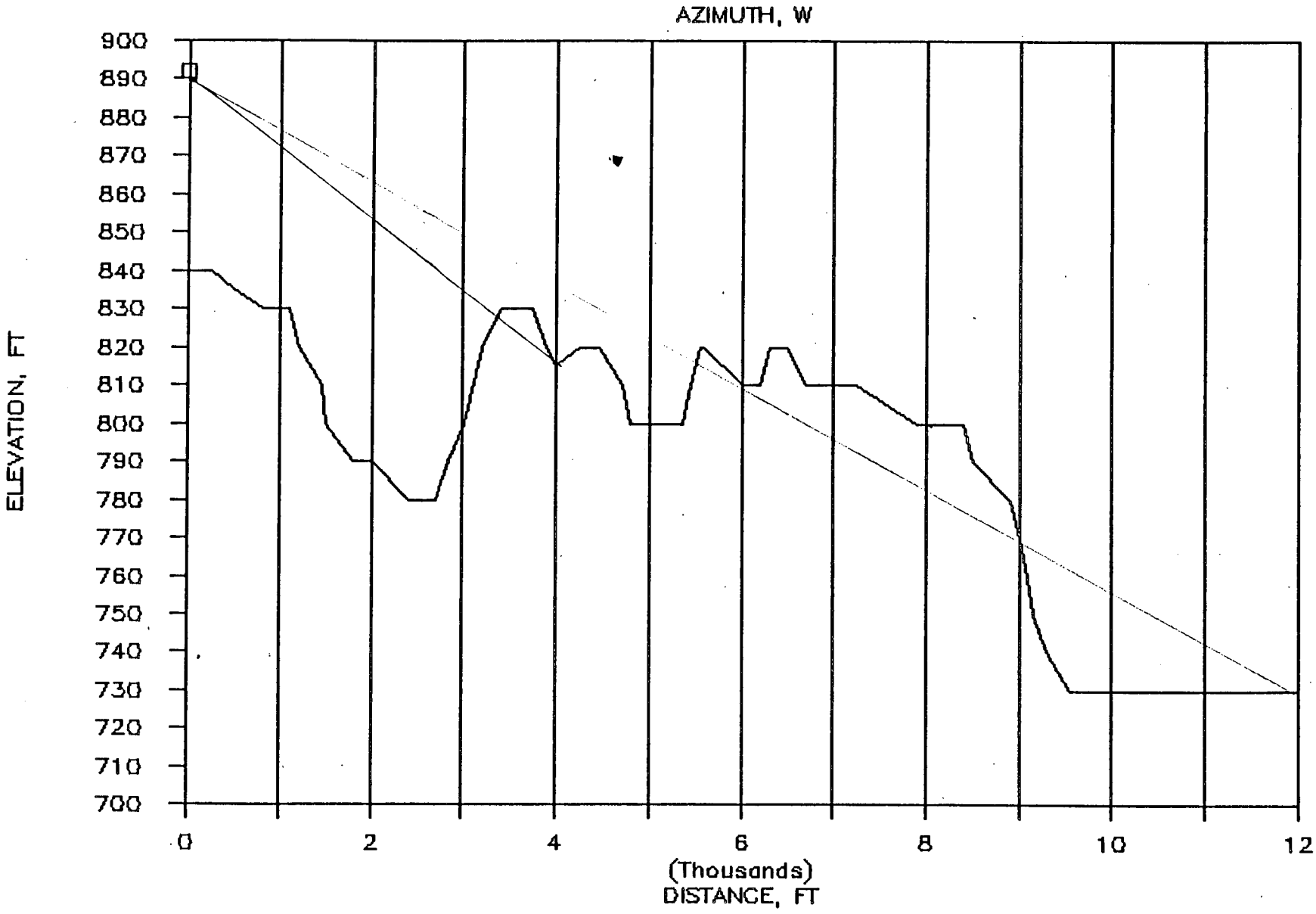

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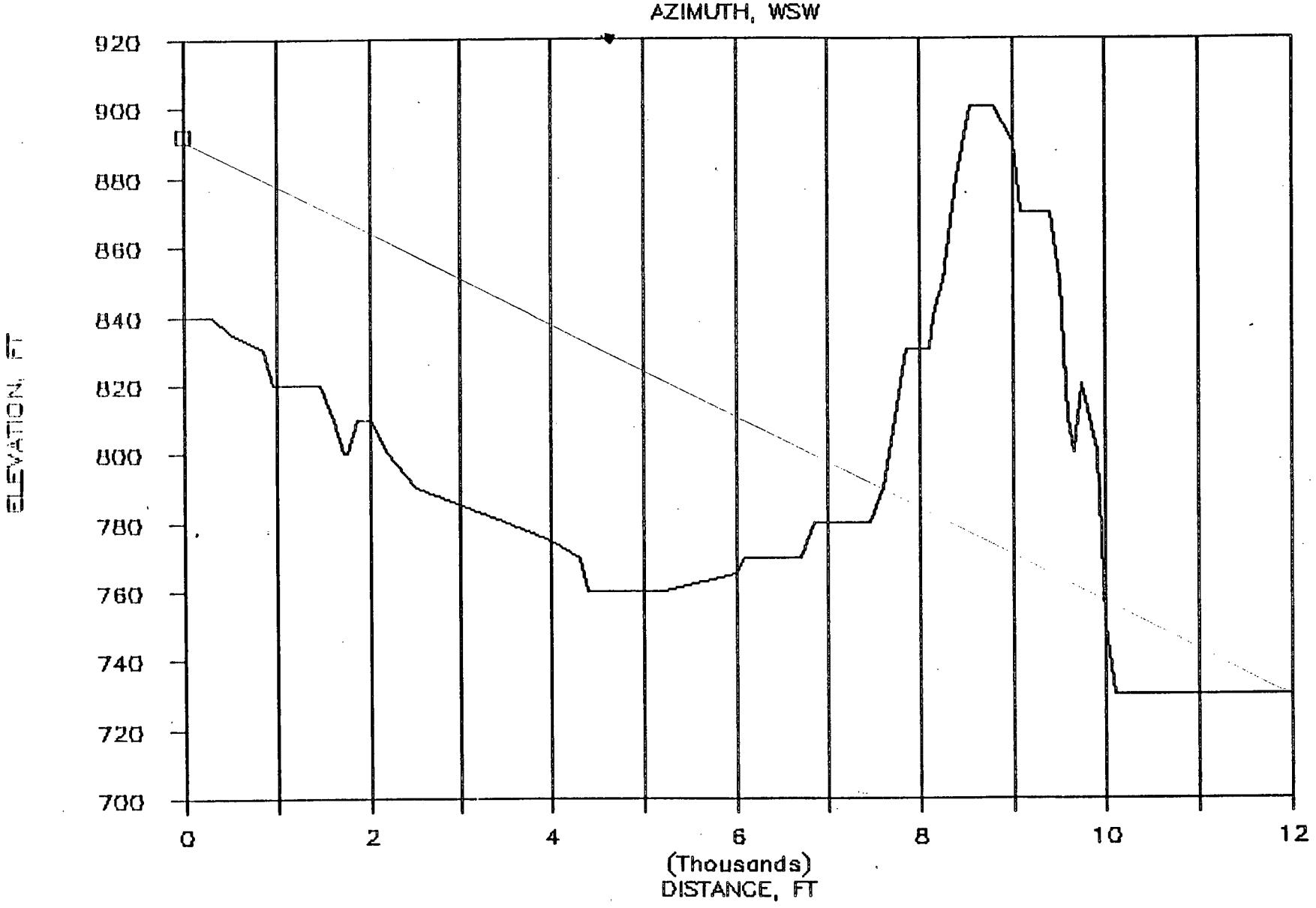

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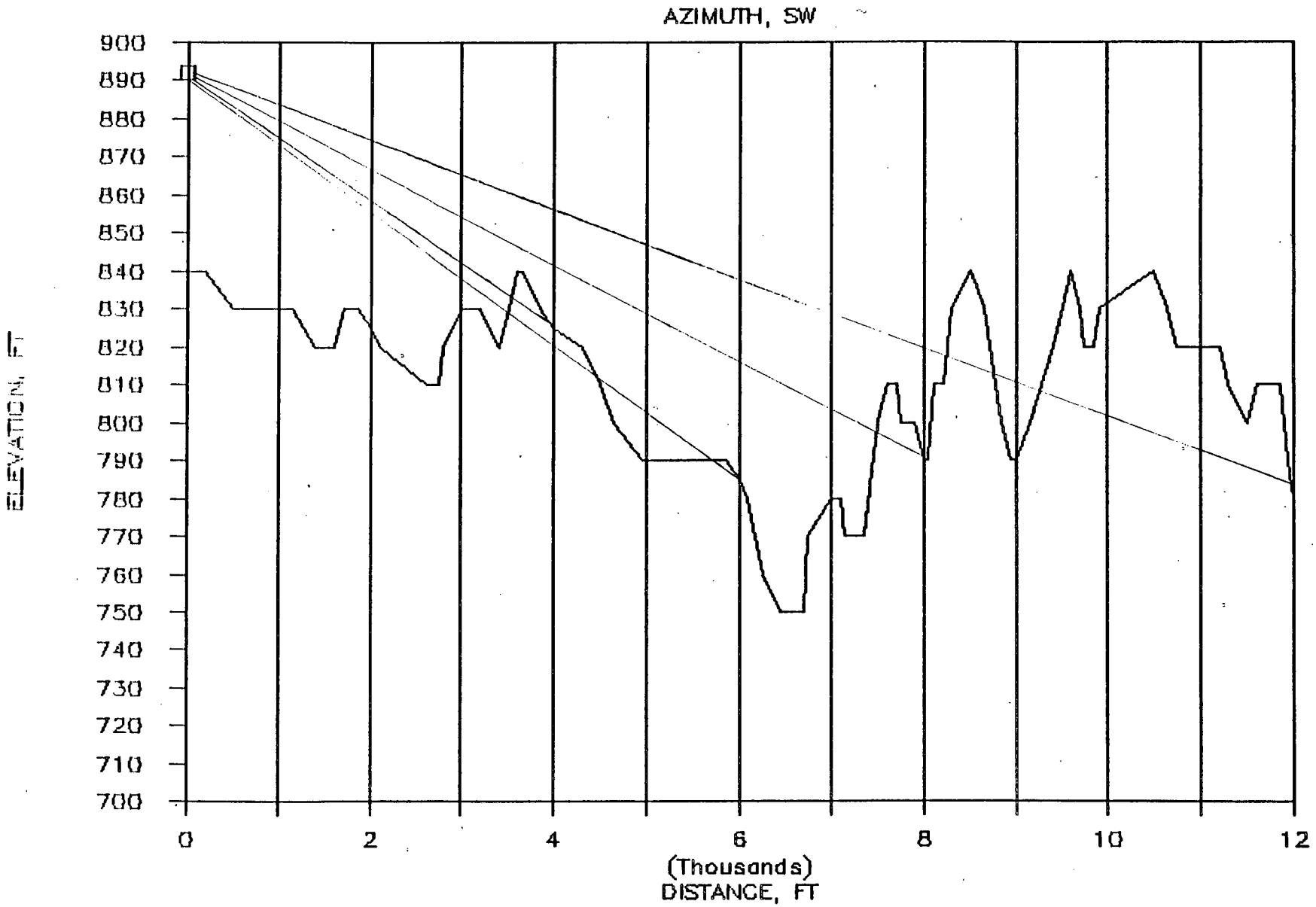

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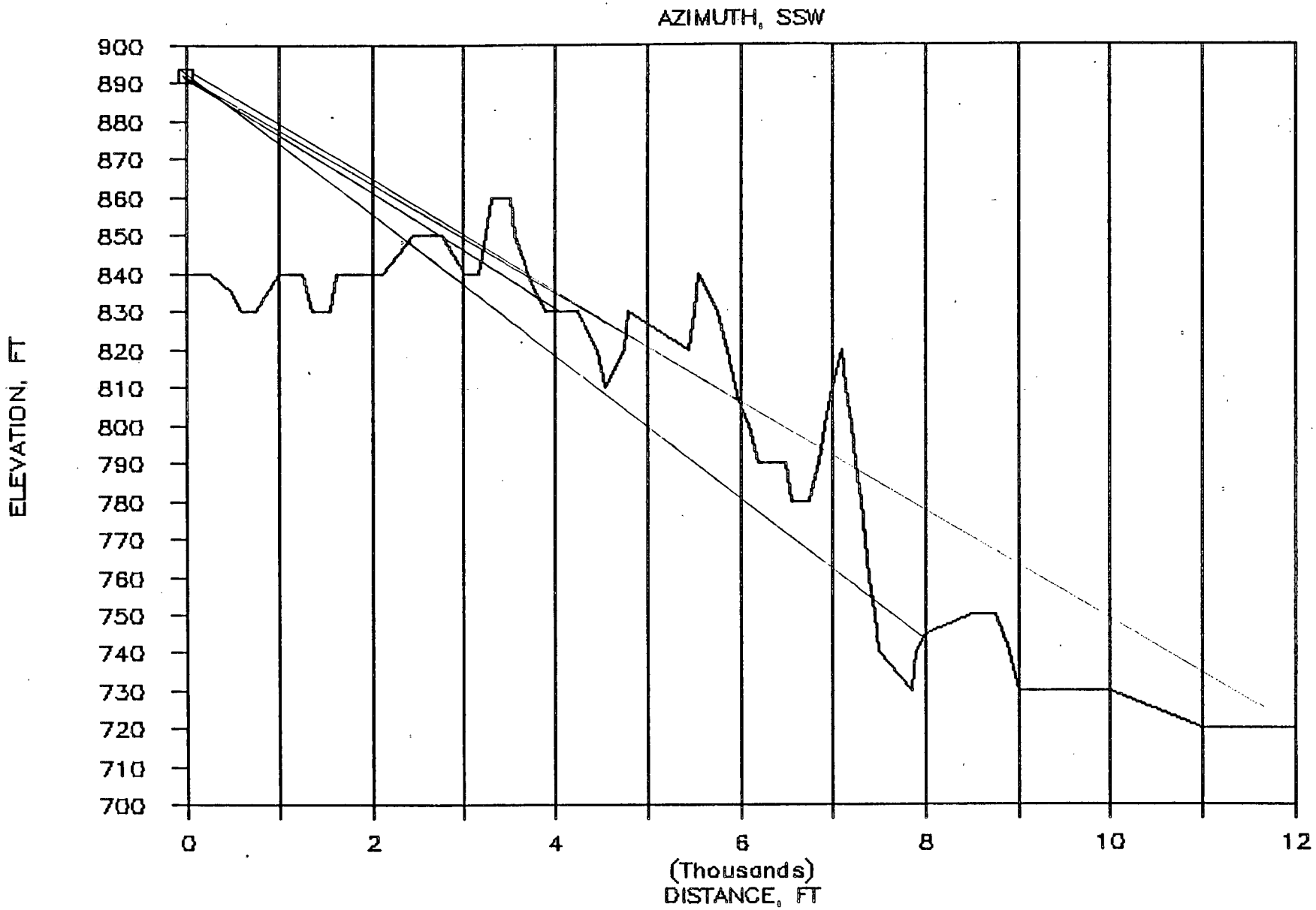
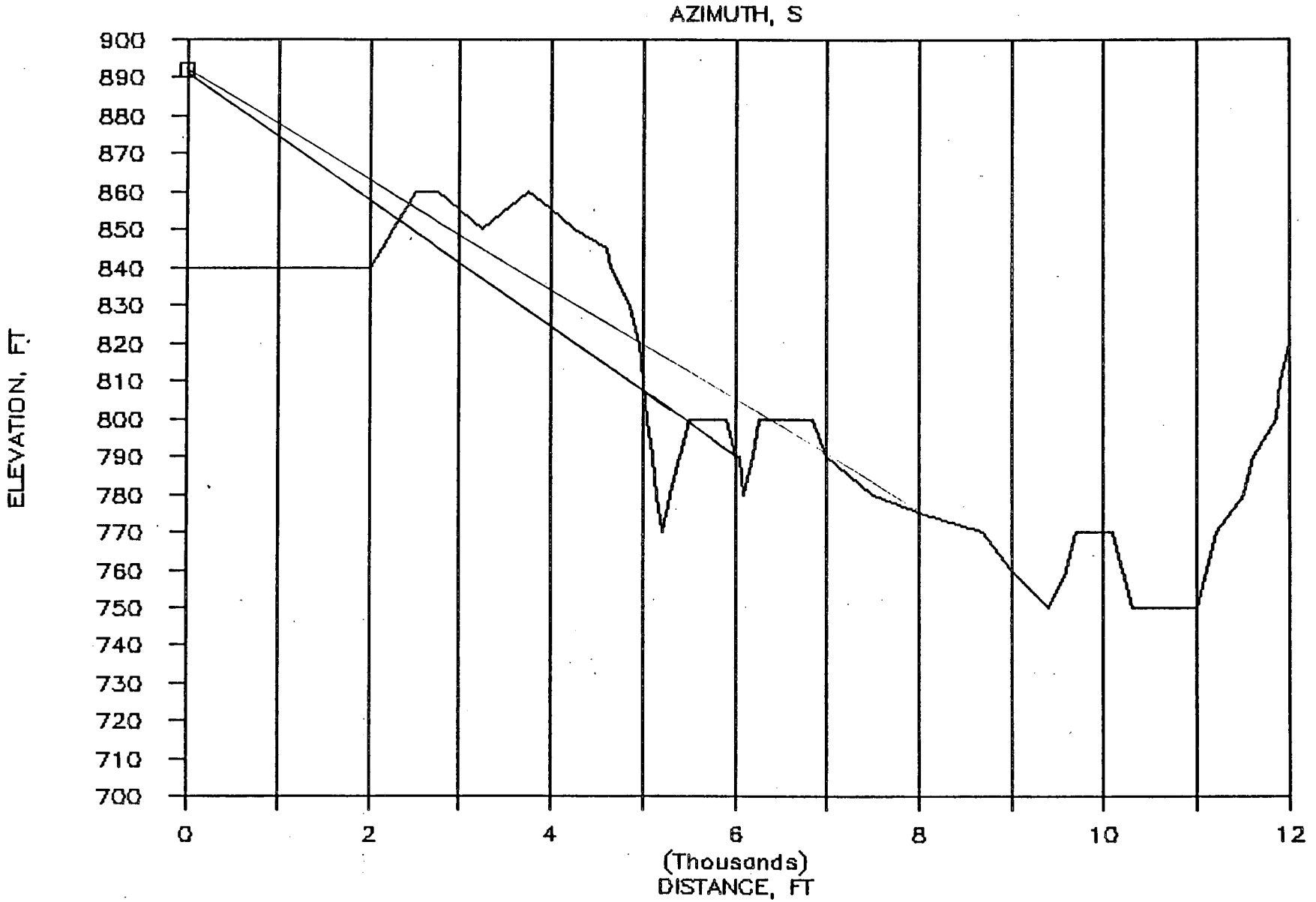


DUANE ARNOLD 24



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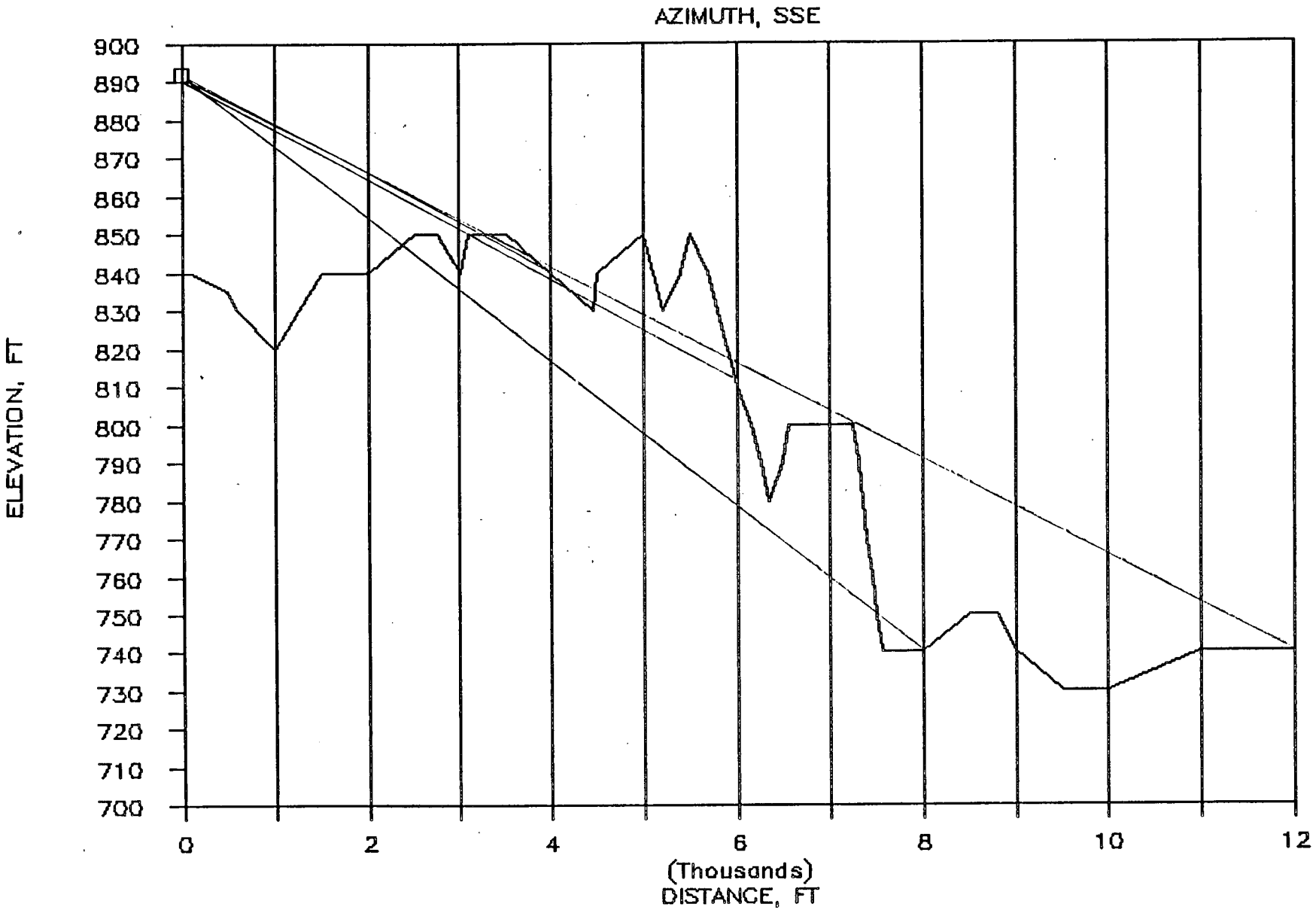

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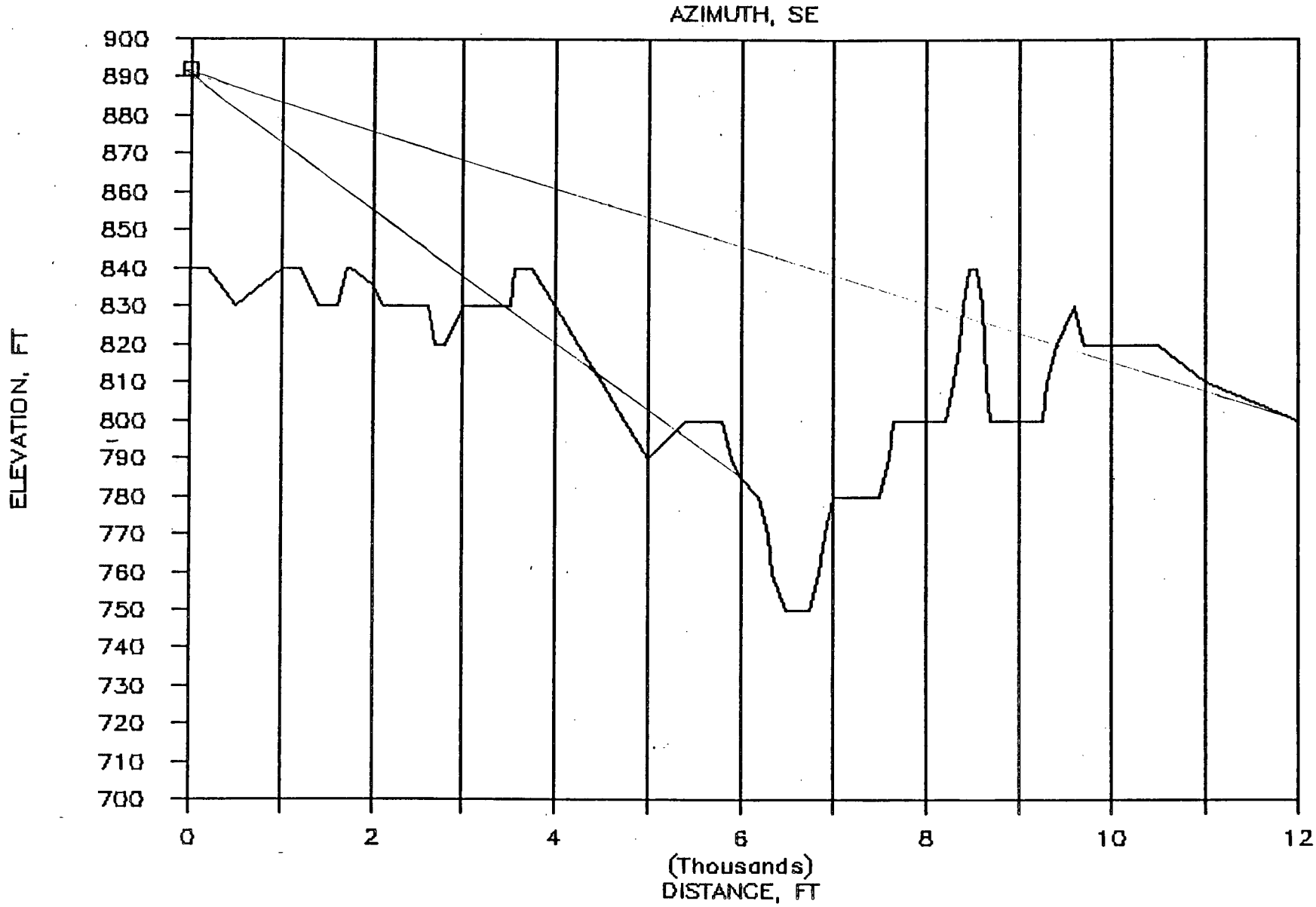
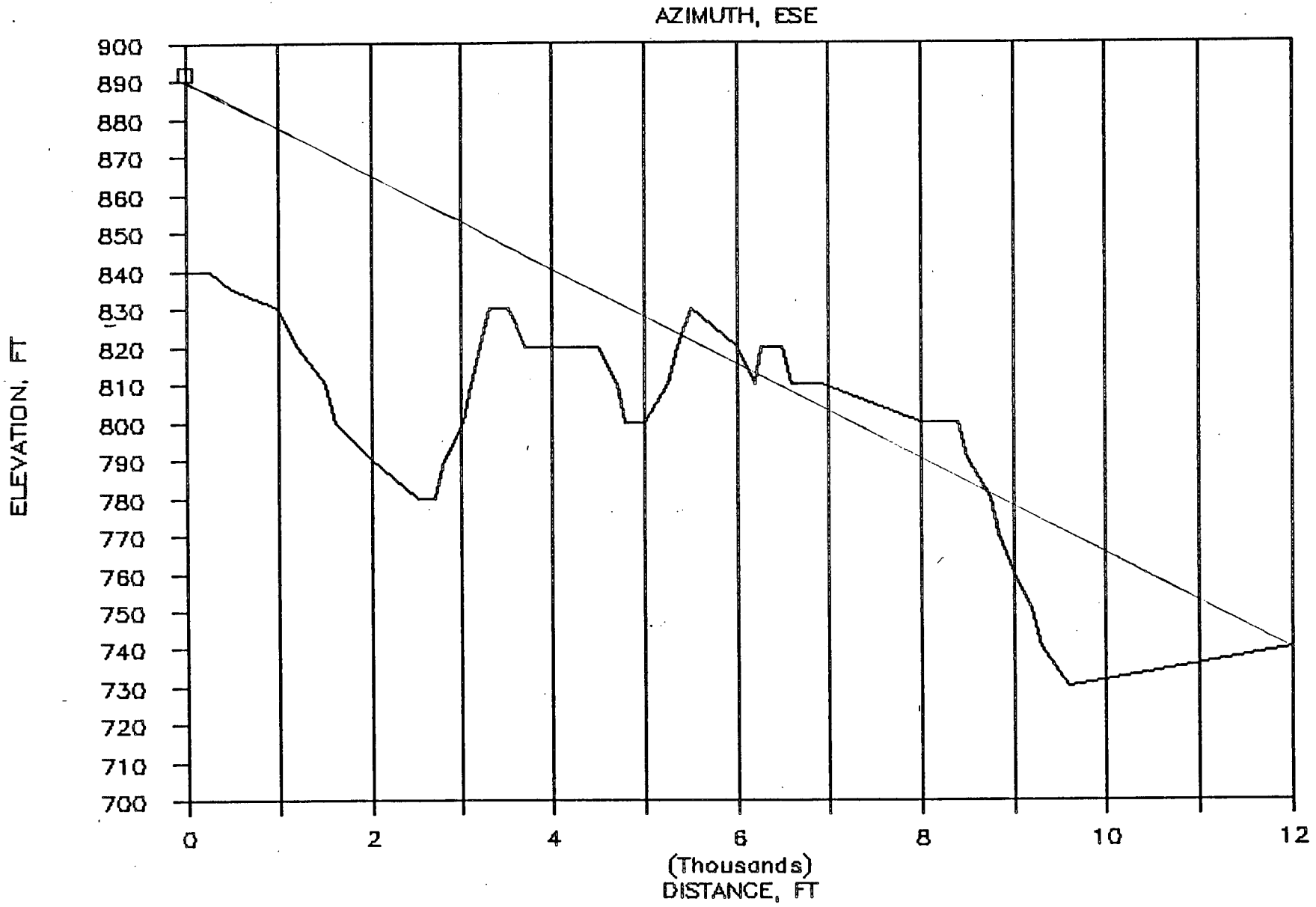


DUANE ARNOLD 24



IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #24-WS3000
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	845.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	835.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	845.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	845.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	825.00	SOFT	0.	NO	0.	0.
6	8000.	90.00	805.00	SOFT	0.	YES	7100.	840.
7	12000.	90.00	830.00	SOFT	0.	NO	0.	0.
8	500.	67.50	840.00	SOFT	0.	NO	0.	0.
9	1000.	67.50	830.00	SOFT	0.	NO	0.	0.
10	2000.	67.50	845.00	SOFT	0.	NO	0.	0.
11	4000.	67.50	840.00	SOFT	0.	NO	0.	0.
12	6000.	67.50	845.00	SOFT	0.	NO	0.	0.
13	8000.	67.50	840.00	SOFT	0.	NO	0.	0.
14	12000.	67.50	840.00	SOFT	0.	NO	0.	0.
15	500.	45.00	835.00	SOFT	0.	NO	0.	0.
16	1000.	45.00	840.00	SOFT	0.	NO	0.	0.
17	2000.	45.00	860.00	SOFT	0.	NO	0.	0.
18	4000.	45.00	850.00	SOFT	0.	NO	0.	0.
19	6000.	45.00	855.00	SOFT	0.	NO	0.	0.
20	8000.	45.00	860.00	SOFT	0.	NO	0.	0.
21	12000.	45.00	860.00	SOFT	0.	NO	0.	0.
22	500.	22.50	835.00	SOFT	0.	NO	0.	0.
23	1000.	22.50	835.00	SOFT	0.	NO	0.	0.
24	2000.	22.50	845.00	SOFT	0.	NO	0.	0.
25	4000.	22.50	840.00	SOFT	0.	NO	0.	0.
26	6000.	22.50	850.00	SOFT	0.	NO	0.	0.
27	8000.	22.50	827.00	SOFT	0.	YES	7100.	850.
28	12000.	22.50	827.00	SOFT	0.	NO	0.	0.
29	500.	.00	830.00	SOFT	0.	NO	0.	0.
30	1000.	.00	815.00	SOFT	0.	NO	0.	0.
31	2000.	.00	830.00	SOFT	0.	NO	0.	0.
32	4000.	.00	820.00	SOFT	0.	NO	0.	0.
33	6000.	.00	840.00	SOFT	0.	NO	0.	0.
34	8000.	.00	800.00	SOFT	0.	YES	6000.	840.
35	12000.	.00	807.00	SOFT	0.	YES	1140.	820.
36	500.	337.50	840.00	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	840.00	SOFT	0.	NO	0.	0.
38	2000.	337.50	820.00	SOFT	0.	NO	0.	0.
39	4000.	337.50	797.00	SOFT	0.	NO	0.	0.
40	6000.	337.50	812.00	SOFT	0.	NO	0.	0.
41	8000.	337.50	815.00	SOFT	0.	NO	0.	0.
42	12000.	337.50	810.00	SOFT	0.	NO	0.	0.
43	500.	315.00	840.00	SOFT	0.	NO	0.	0.
44	1000.	315.00	845.00	SOFT	0.	NO	0.	0.
45	2000.	315.00	800.00	SOFT	0.	NO	0.	0.
46	4000.	315.00	815.00	SOFT	0.	NO	0.	0.
47	6000.	315.00	835.00	SOFT	0.	NO	0.	0.
48	8000.	315.00	800.00	SOFT	0.	YES	6500.	840.
49	12000.	315.00	785.00	SOFT	0.	NO	0.	
50	500.	292.50	838.00	SOFT	0.	NO	0.	
51	1000.	292.50	832.00	SOFT	0.	NO	0.	0.
52	2000.	292.50	792.00	SOFT	0.	NO	0.	0.
53	4000.	292.50	815.00	SOFT	0.	NO	0.	0.
54	6000.	292.50	840.00	SOFT	0.	NO	0.	0.
55	8000.	292.50	805.00	SOFT	0.	YES	4700.	840.
56	12000.	292.50	785.00	SOFT	0.	NO	0.	0.
57	500.	270.00	835.00	SOFT	0.	NO	0.	0.
58	1000.	270.00	830.00	SOFT	0.	NO	0.	0.
59	2000.	270.00	790.00	SOFT	0.	NO	0.	0.
60	4000.	270.00	815.00	SOFT	0.	YES	2400.	830.
61	6000.	270.00	810.00	SOFT	0.	NO	0.	0.
62	8000.	270.00	800.00	SOFT	0.	NO	0.	0.
63	12000.	270.00	730.00	SOFT	0.	YES	5500.	820.
64	500.	247.50	835.00	SOFT	0.	NO	0.	0.
65	1000.	247.50	820.00	SOFT	0.	NO	0.	0.
66	2000.	247.50	810.00	SOFT	0.	NO	0.	0.
67	4000.	247.50	775.00	SOFT	0.	NO	0.	0.
68	6000.	247.50	765.00	SOFT	0.	NO	0.	0.
69	8000.	247.50	830.00	SOFT	0.	NO	0.	0.
70	12000.	247.50	730.00	SOFT	0.	YES	8500.	910.
71	500.	225.00	830.00	SOFT	0.	NO	0.	0.
72	1000.	225.00	830.00	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	825.00	SOFT	0.	NO	0.	0.
74	4000.	225.00	825.00	SOFT	0.	YES	3600.	840.
75	6000.	225.00	785.00	SOFT	0.	YES	3600.	840.
76	8000.	225.00	790.00	SOFT	0.	YES	7600.	810.
77	12000.	225.00	780.00	SOFT	0.	YES	8500.	840.
78	500.	202.50	830.00	SOFT	0.	NO	0.	0.
79	1000.	202.50	840.00	SOFT	0.	NO	0.	0.
80	2000.	202.50	840.00	SOFT	0.	NO	0.	0.
81	4000.	202.50	830.00	SOFT	0.	YES	3300.	860.
82	6000.	202.50	805.00	SOFT	0.	YES	3300.	860.
83	8000.	202.50	745.00	SOFT	0.	YES	3300.	860.
84	12000.	202.50	720.00	SOFT	0.	YES	3300.	860.
85	500.	180.00	840.00	SOFT	0.	NO	0.	0.
86	1000.	180.00	840.00	SOFT	0.	NO	0.	0.
87	2000.	180.00	840.00	SOFT	0.	NO	0.	0.
88	4000.	180.00	855.00	SOFT	0.	YES	2400.	860.
89	6000.	180.00	790.00	SOFT	0.	NO	0.	0.
90	8000.	180.00	775.00	SOFT	0.	YES	2400.	860.
91	12000.	180.00	820.00	SOFT	0.	NO	0.	0.
92	500.	157.50	840.00	SOFT	0.	NO	0.	0.
93	1000.	157.50	820.00	SOFT	0.	NO	0.	0.
94	2000.	157.50	840.00	SOFT	0.	NO	0.	0.
95	4000.	157.50	840.00	SOFT	0.	YES	3100.	850.
96	6000.	157.50	810.00	SOFT	0.	YES	3100.	850.
97	8000.	157.50	740.00	SOFT	0.	YES	2500.	850.
98	12000.	157.50	740.00	SOFT	0.	YES	3100.	850.
99	500.	135.00	830.00	SOFT	0.	NO	0.	0.
100	1000.	135.00	840.00	SOFT	0.	NO	0.	0.
101	2000.	135.00	835.00	SOFT	0.	NO	0.	0.
102	4000.	135.00	830.00	SOFT	0.	YES	3500.	840.
103	6000.	135.00	785.00	SOFT	0.	NO	0.	0.
104	8000.	135.00	800.00	SOFT	0.	NO	0.	0.
105	12000.	135.00	800.00	SOFT	0.	YES	8500.	845.
106	500.	112.50	835.00	SOFT	0.	NO	0.	0.
107	1000.	112.50	830.00	SOFT	0.	NO	0.	0.
108	2000.	112.50	790.00	SOFT	0.	NO	0.	0.
109	4000.	112.50	820.00	SOFT	0.	NO	0.	0.
110	6000.	112.50	820.00	SOFT	0.	NO	0.	0.
111	8000.	112.50	800.00	SOFT	0.	NO	0.	0.
112	12000.	112.50	740.00	SOFT	0.	YES	5500.	830.

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #24-WS3000
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	DUANE - WS3000	158.1	158.0	.0	.0	.0	.0	147.0	157.0	149.0	141.0	124.0

XO= .00 YO= .00 ZO= 892.00 HEIGHT ABOVE GROUND= 52.00

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #24-WS3000
METEOROLOGICAL INPUT CONDITIONS

H1= 10.67 METERS H2= 50.29 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)
1981		8	21	12	177.0	2.1	2.6	23.9	23.2	30.0	742.0

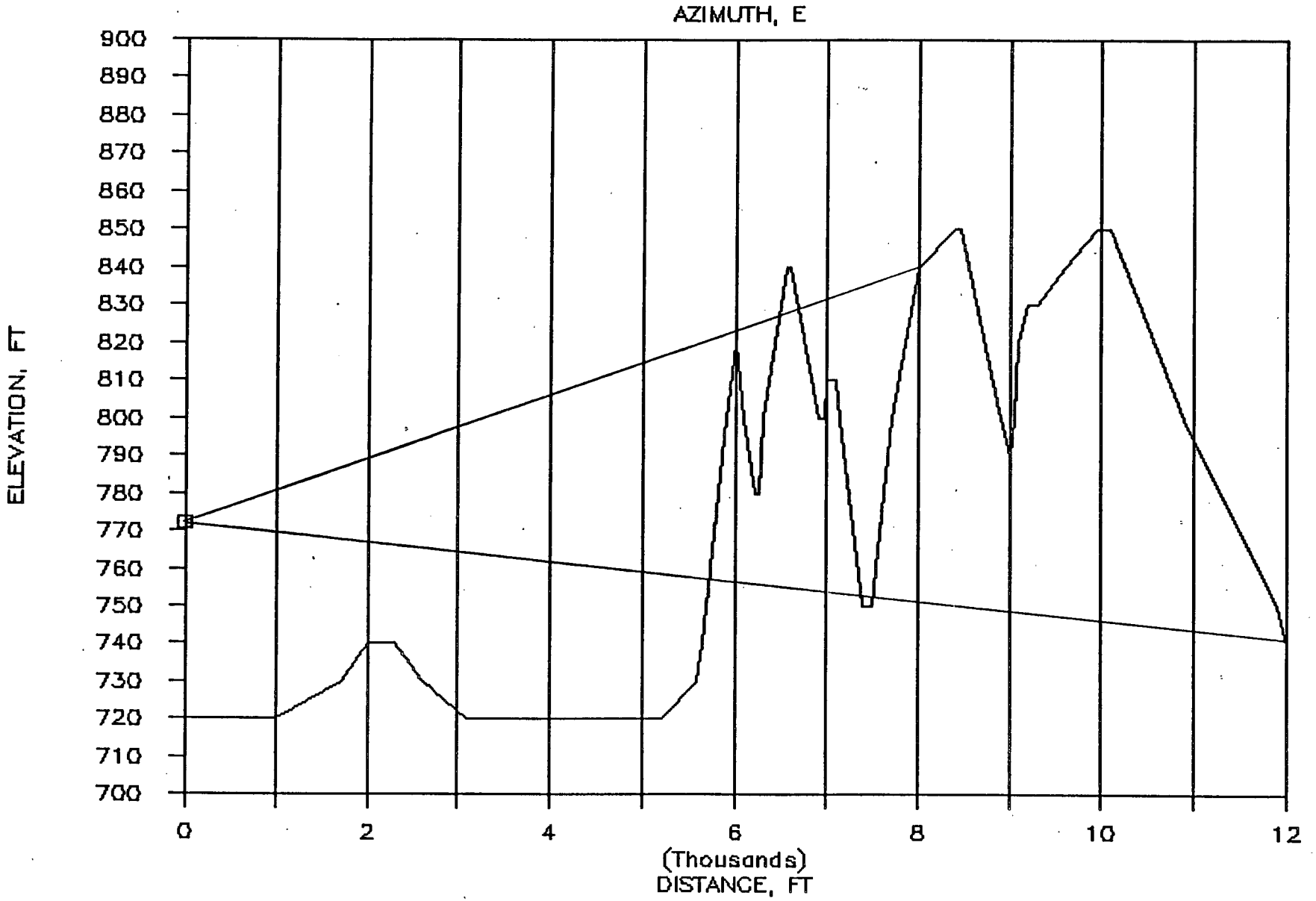
IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #24-WS3000

SOUND PRESSURE LEVELS IN DBC
UNDER MET CONDITION 1

DISTANCE IN FEET

AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	104.7	90.6	75.6	65.7	61.3	49.5	51.3
ENE	104.7	90.6	75.6	65.7	61.3	57.8	51.3
NE	104.7	90.6	75.6	65.7	60.0	53.9	42.1
NNE	104.7	90.6	75.6	65.7	61.3	51.3	51.3
N	104.7	90.6	75.6	65.7	61.3	51.9	38.0
NNW	104.7	90.6	75.6	65.7	61.3	57.8	51.3
NW	104.7	90.6	75.6	40.7	61.3	50.8	51.3
WNW	104.7	90.6	75.6	65.7	61.3	57.8	51.3
W	104.7	90.6	75.6	59.4	61.3	57.8	46.5
WSW	104.7	90.6	75.6	65.7	60.3	54.3	27.1
SW	104.7	90.6	75.6	59.8	55.9	50.2	44.9
SSW	104.7	90.6	75.6	57.9	55.5	50.8	45.9
S	104.7	90.6	75.6	60.3	61.3	53.0	51.3
SSE	104.7	90.6	75.6	60.9	61.3	52.4	42.5
SE	104.7	90.6	75.6	60.8	60.0	53.9	36.5
ESE	104.7	90.6	75.6	65.7	61.3	57.8	46.4

DUANE ARNOLD 26



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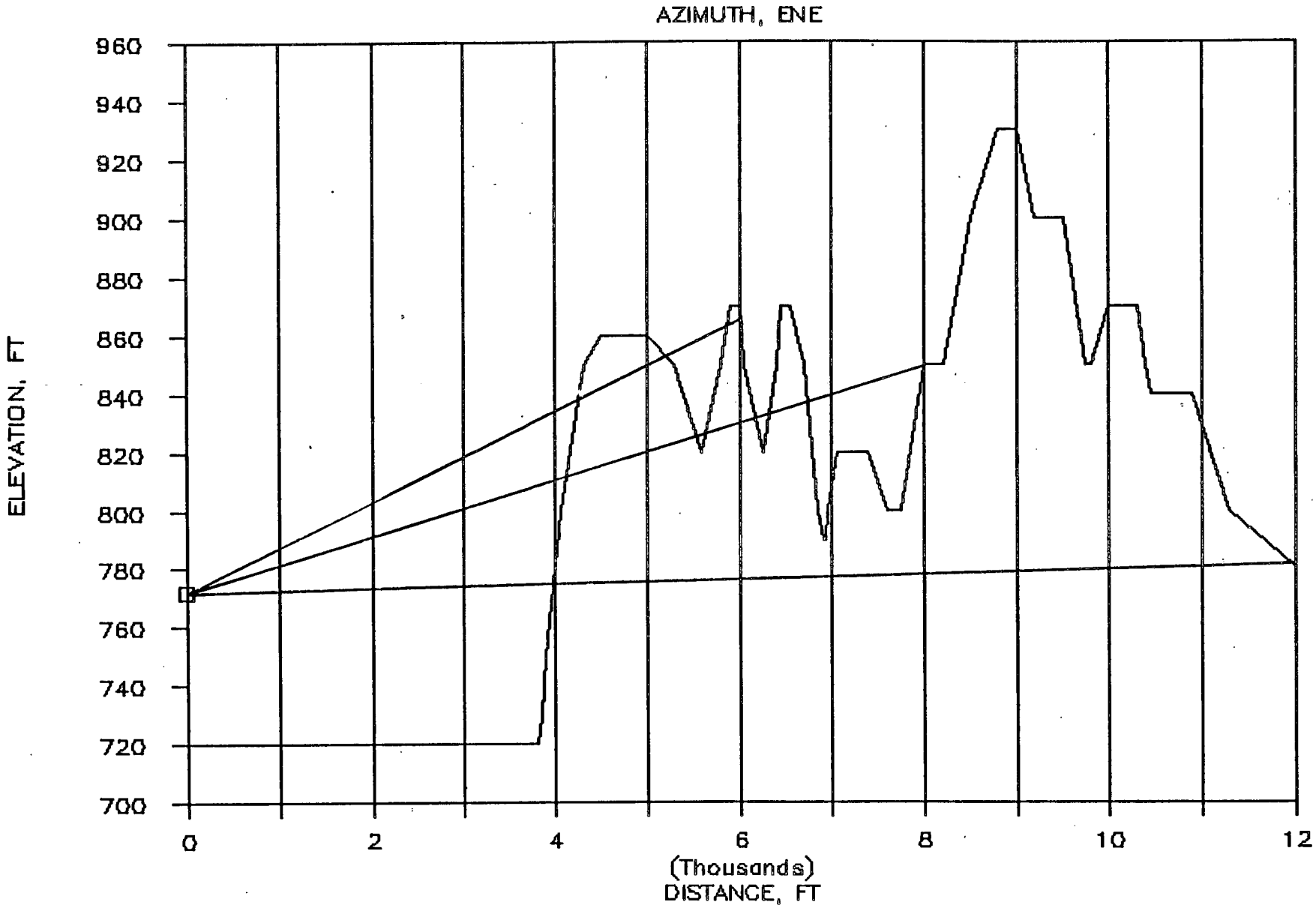

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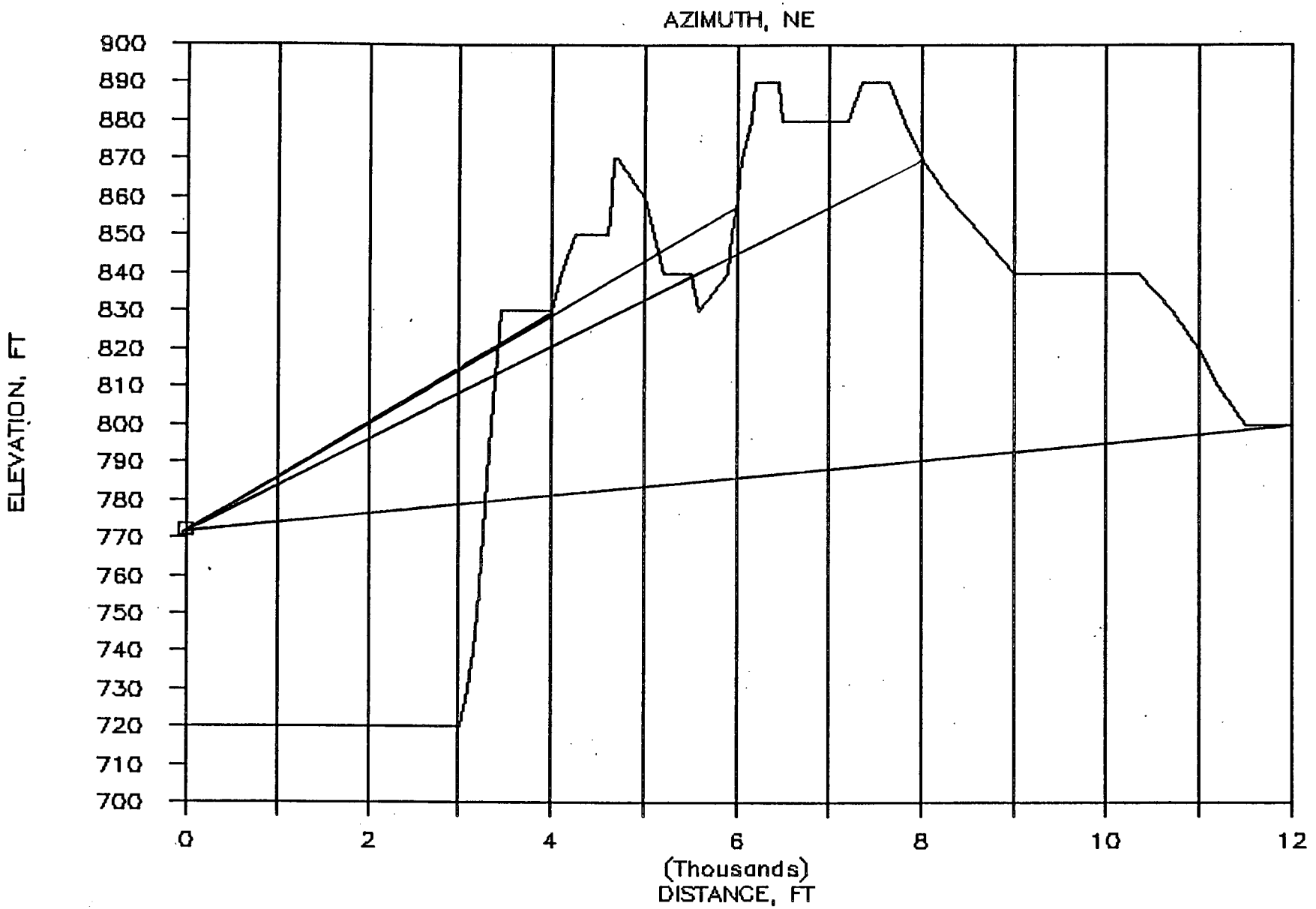

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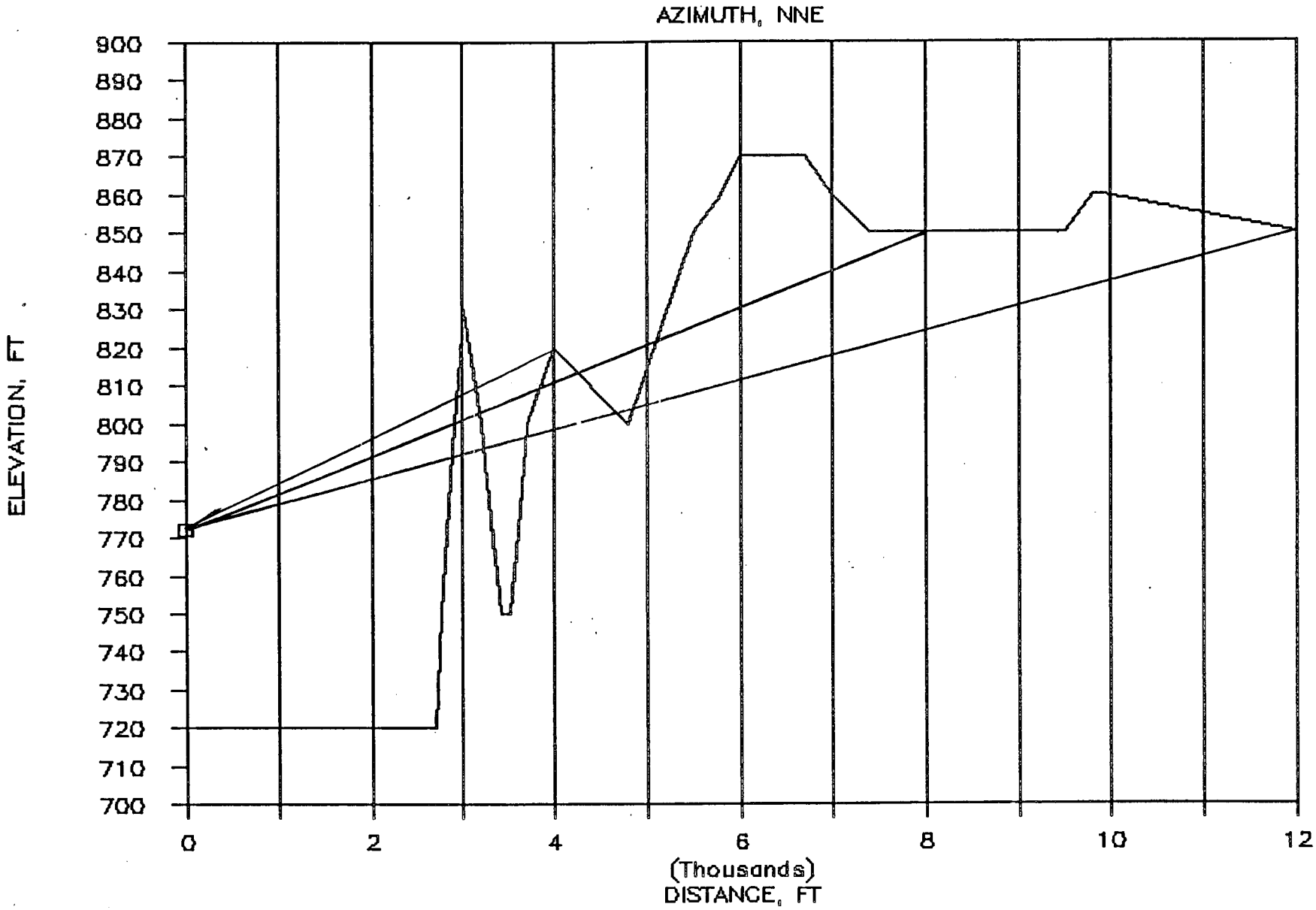

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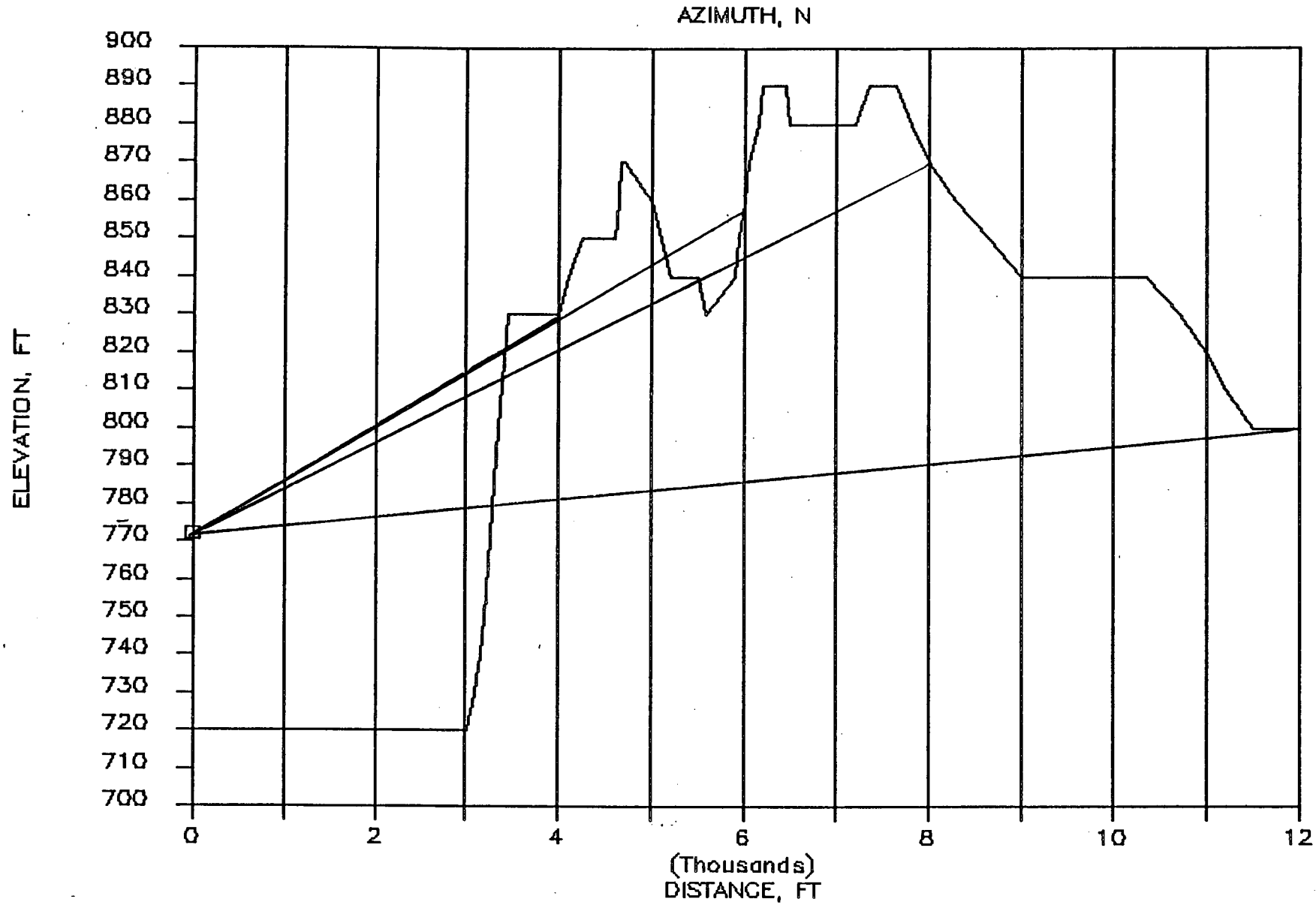
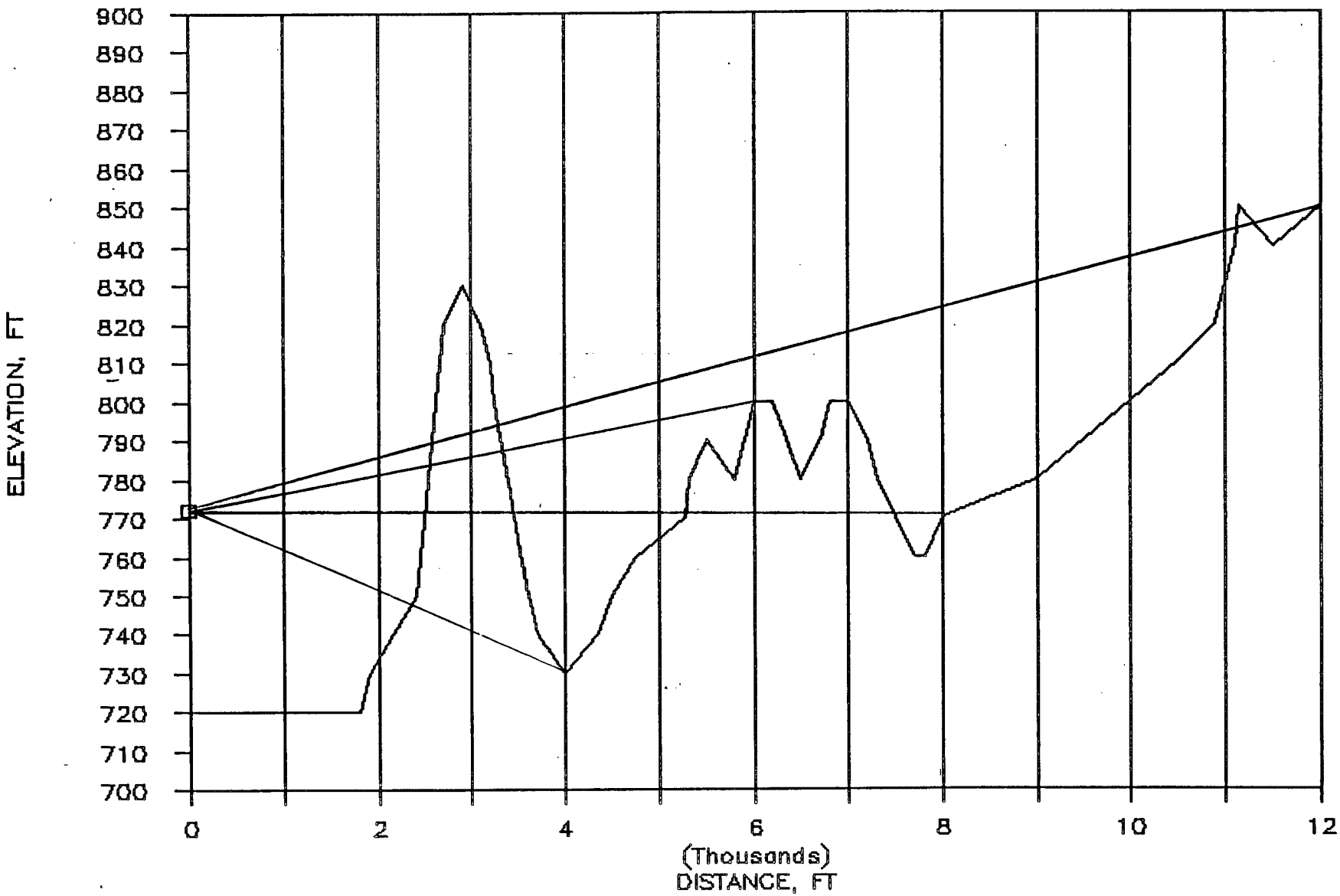


DUANE ARNOLD 26

AZIMUTH, NNW



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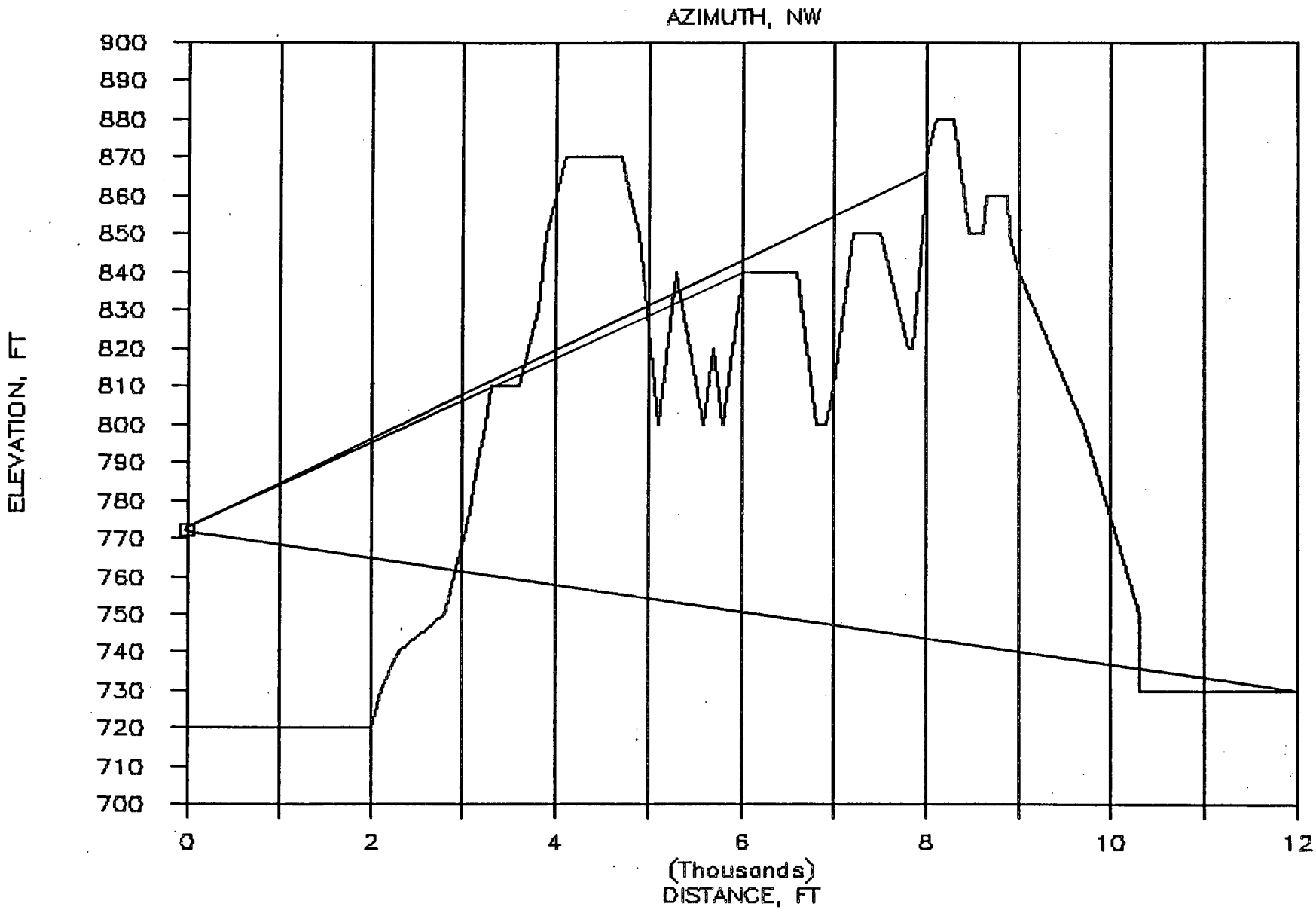

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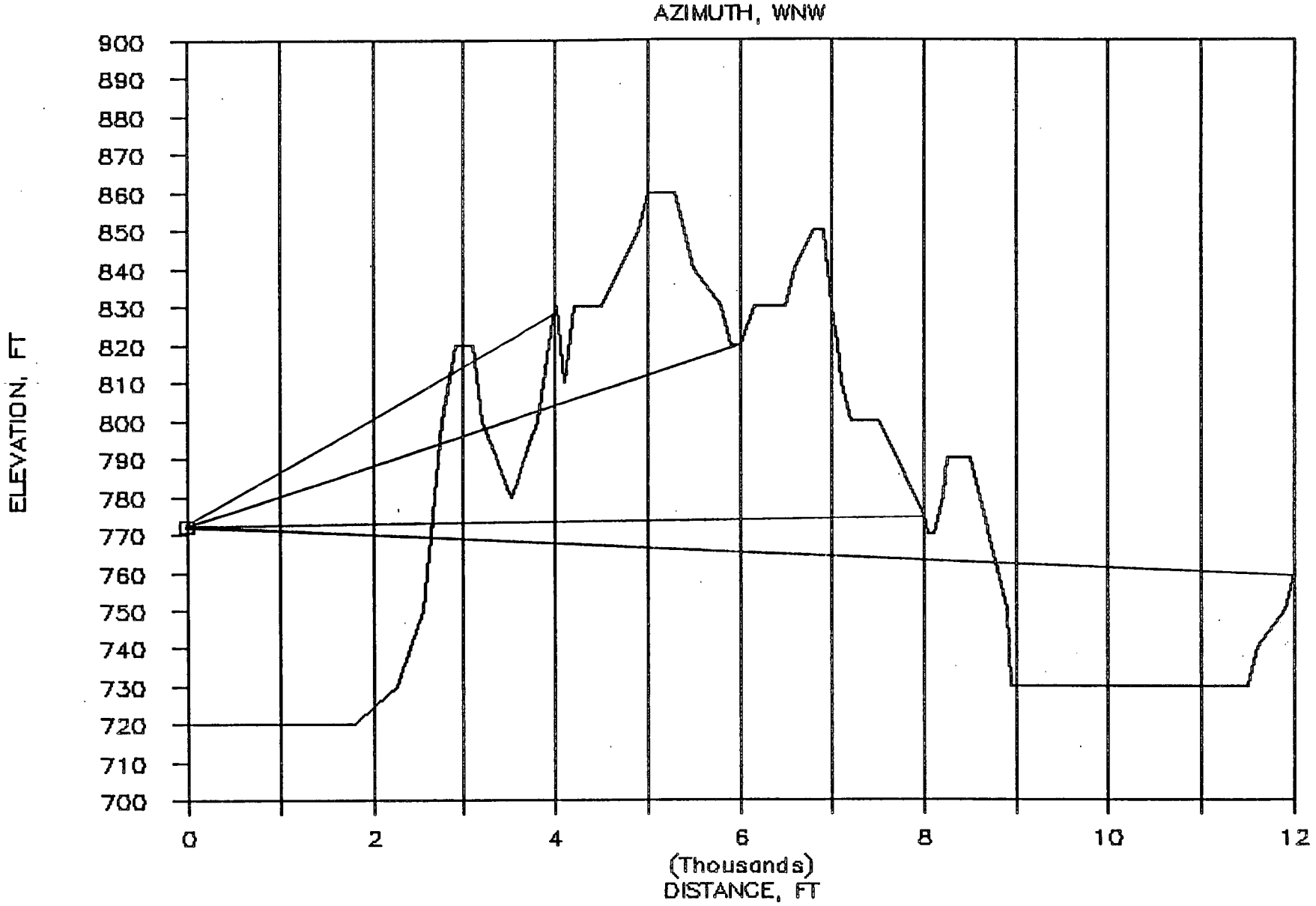

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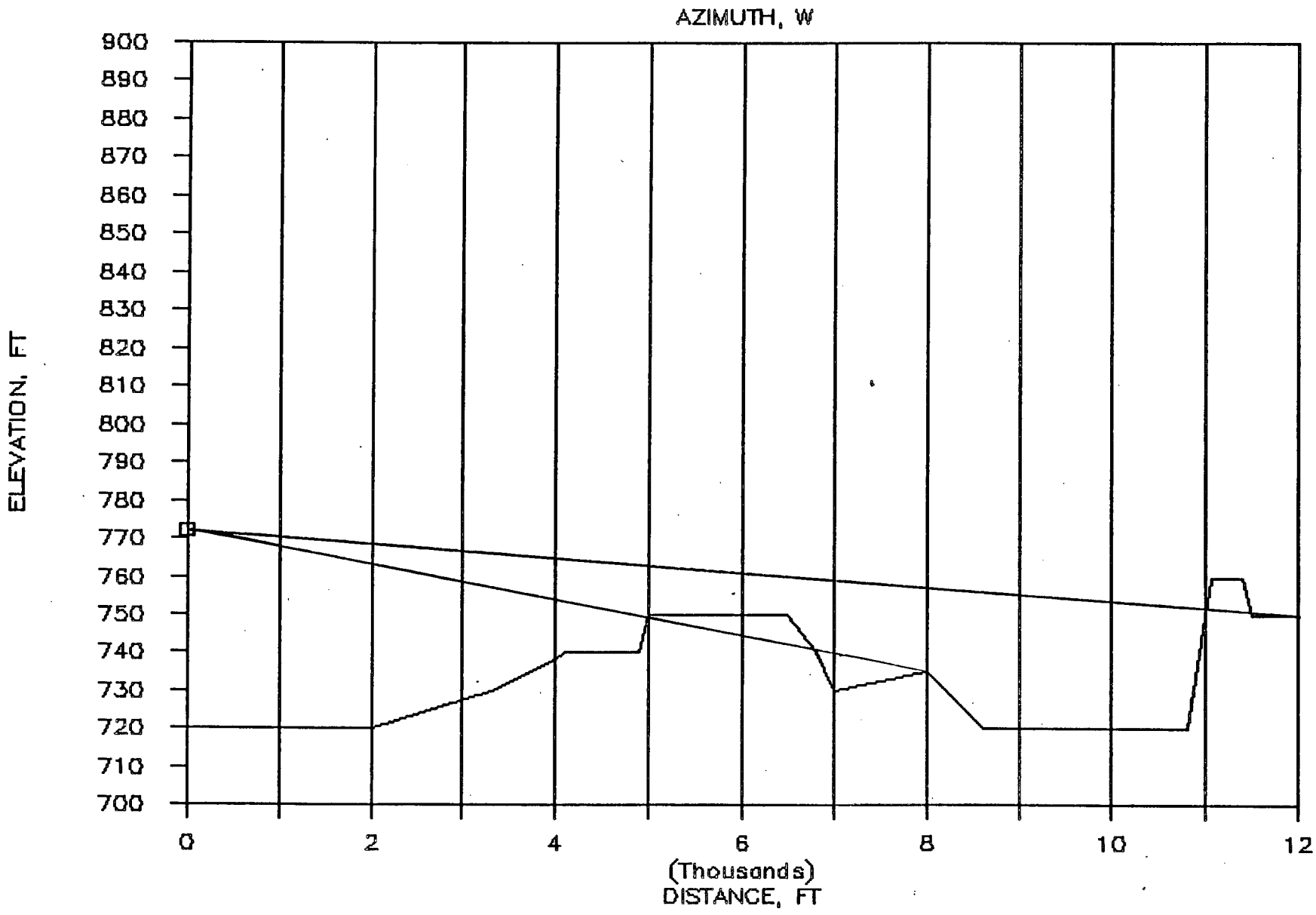
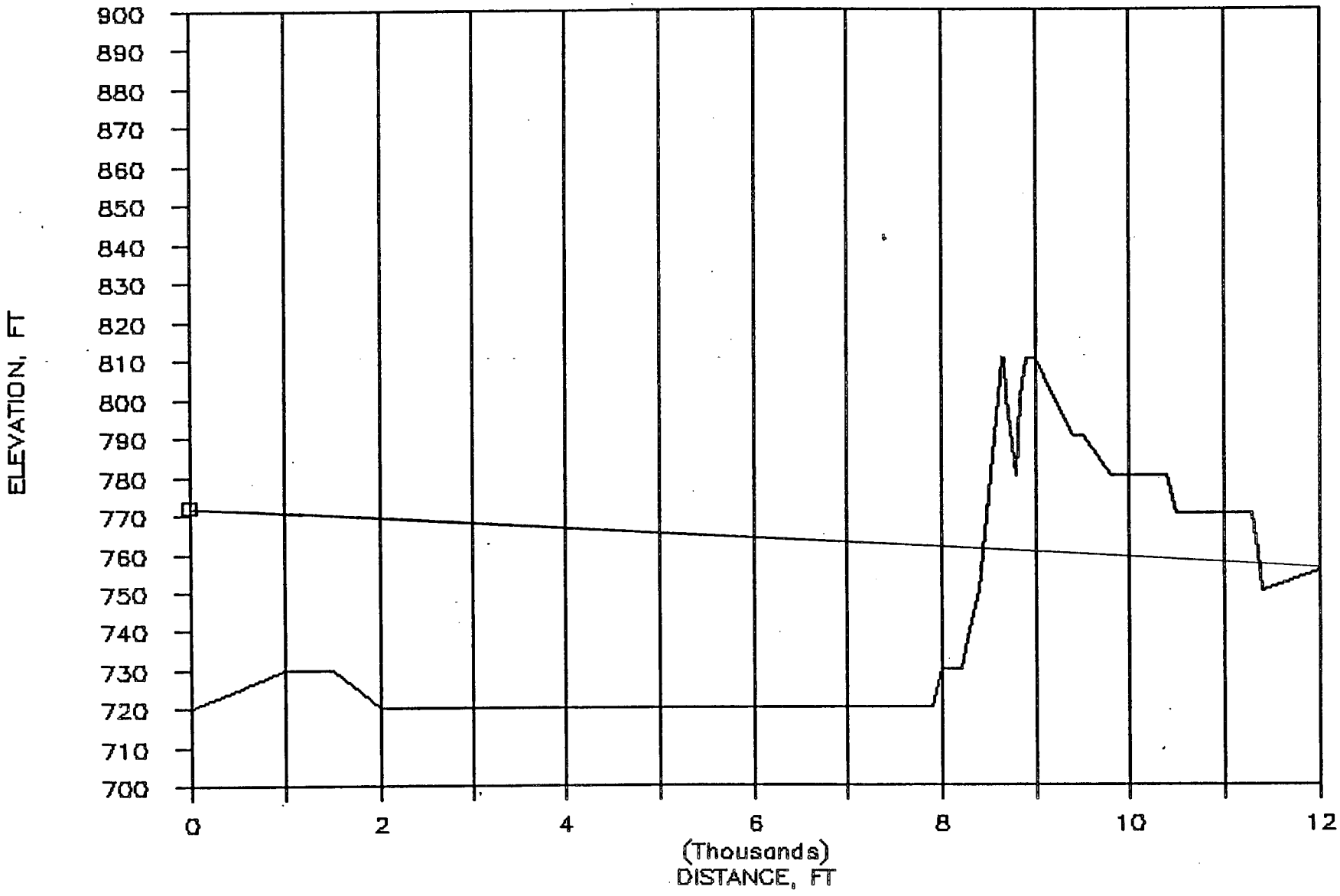


DUANE ARNOLD 26

AZIMUTH, WSW



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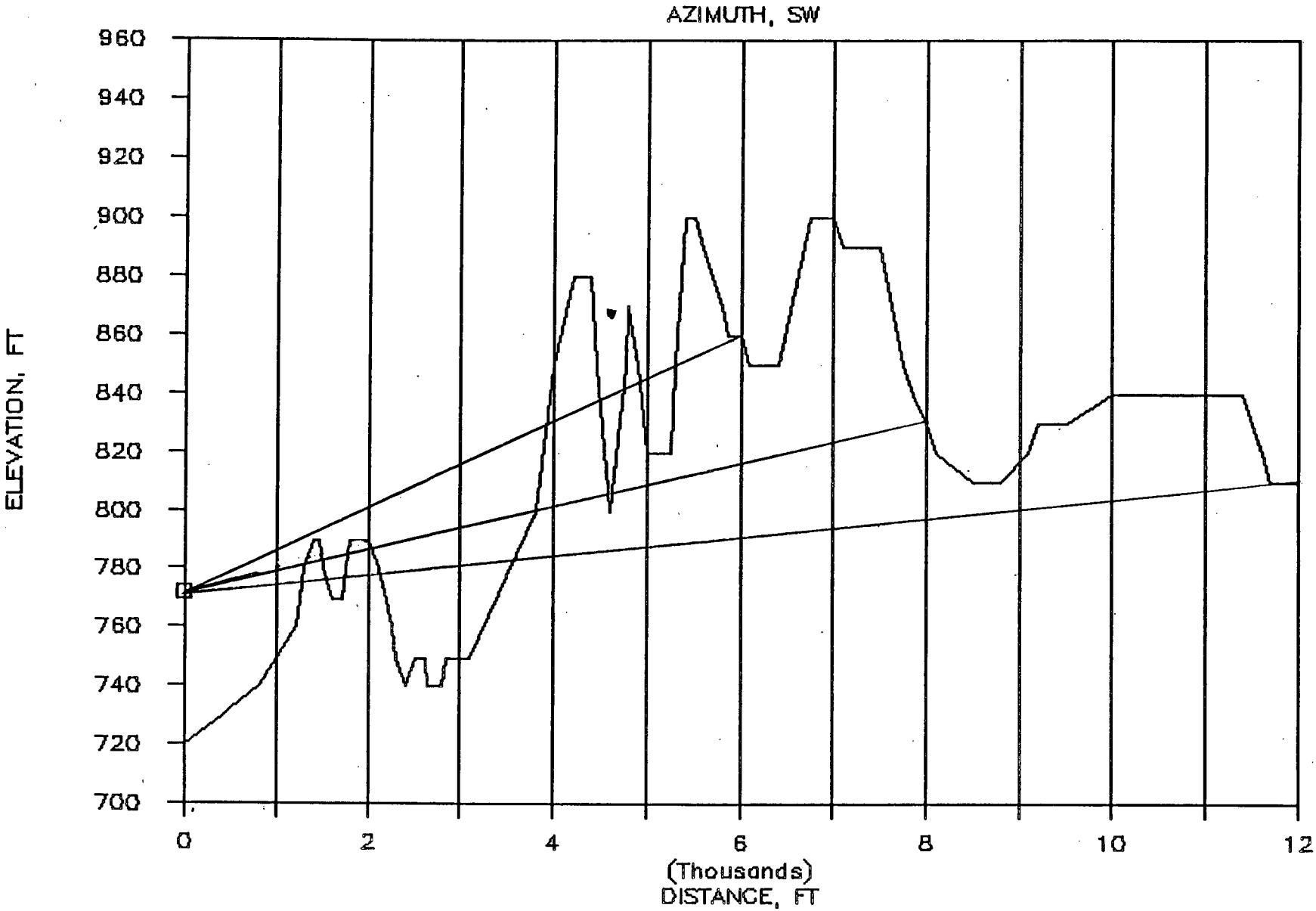
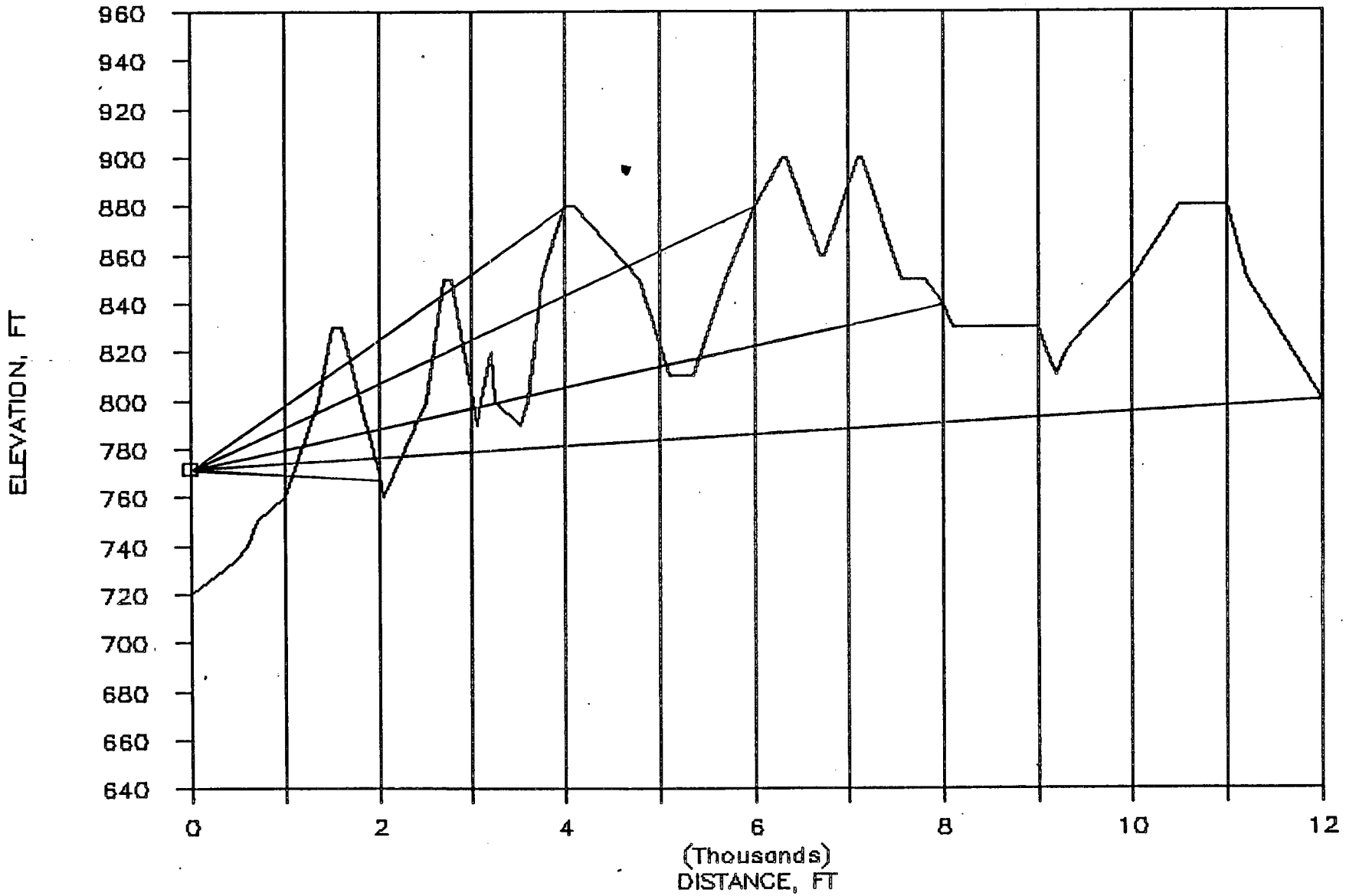


DUANE ARNOLD 26

AZIMUTH, SSW



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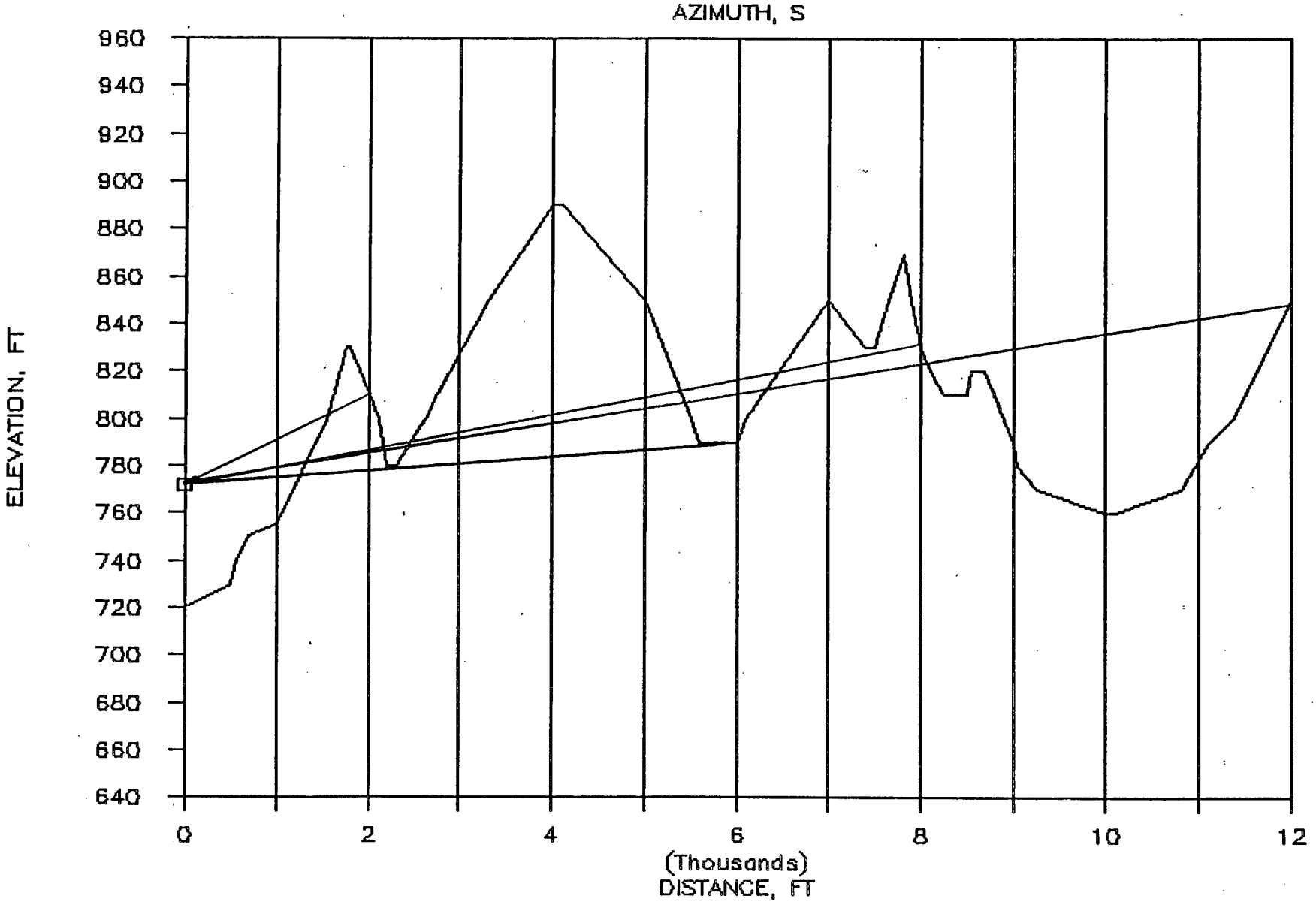

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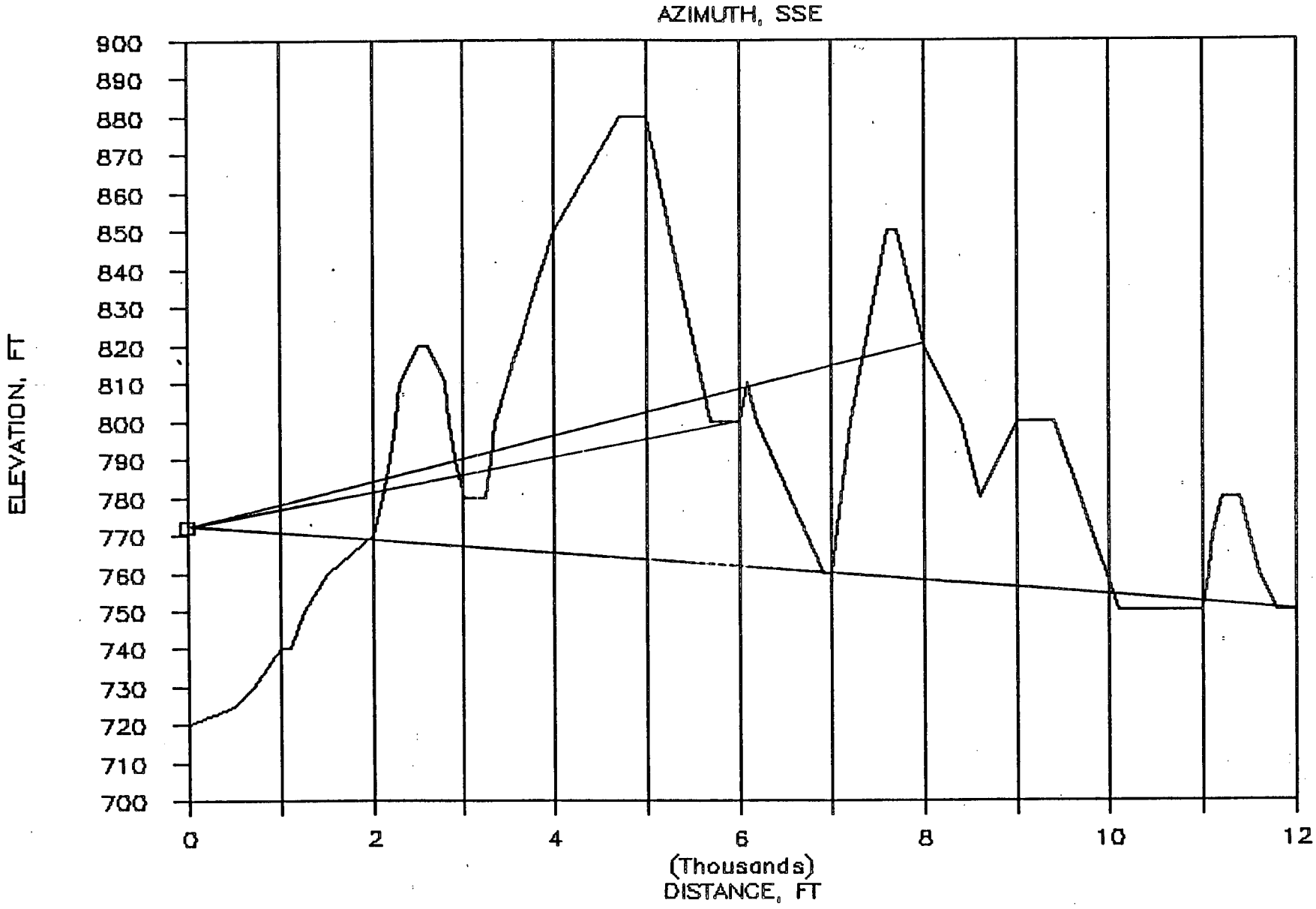

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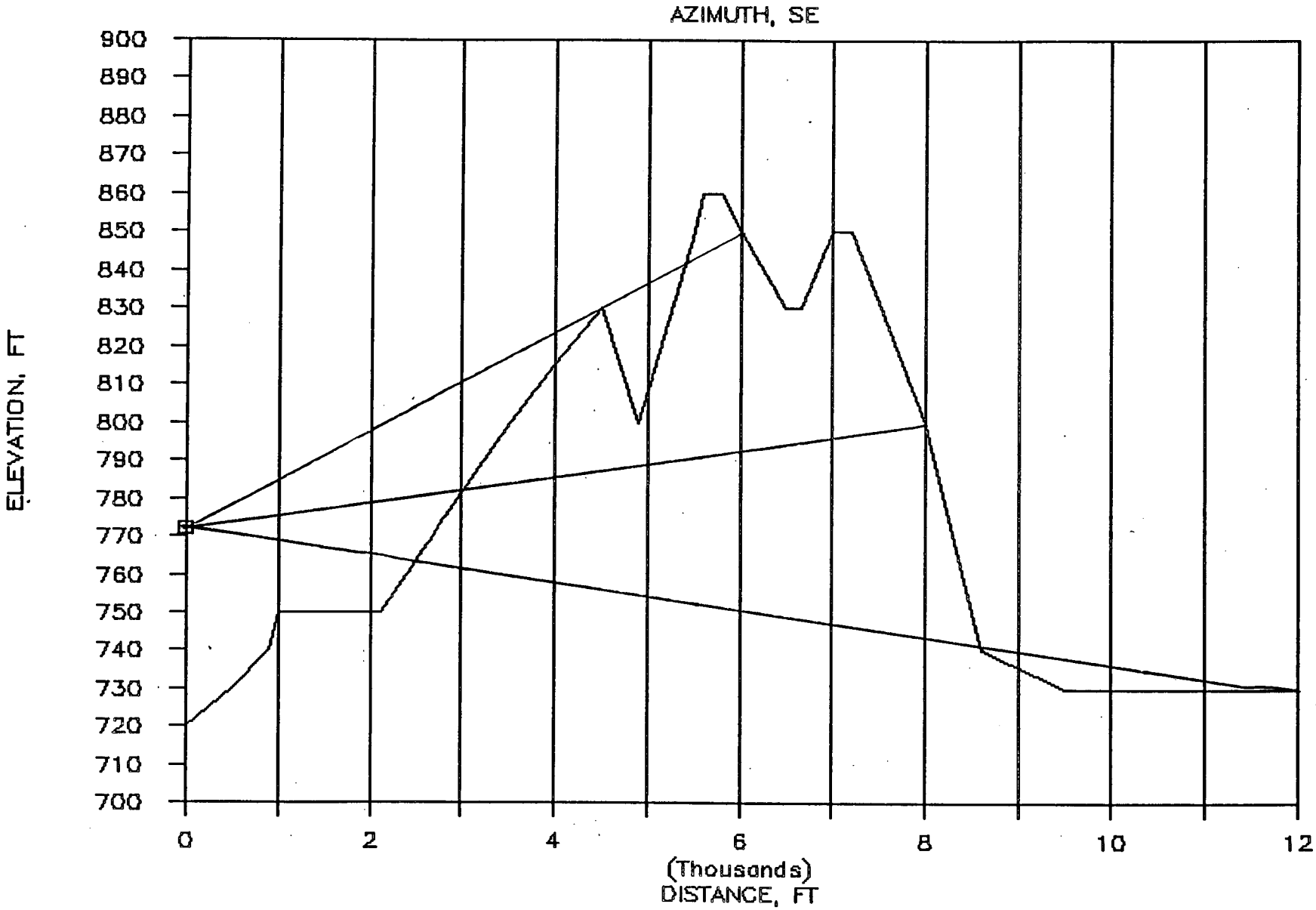
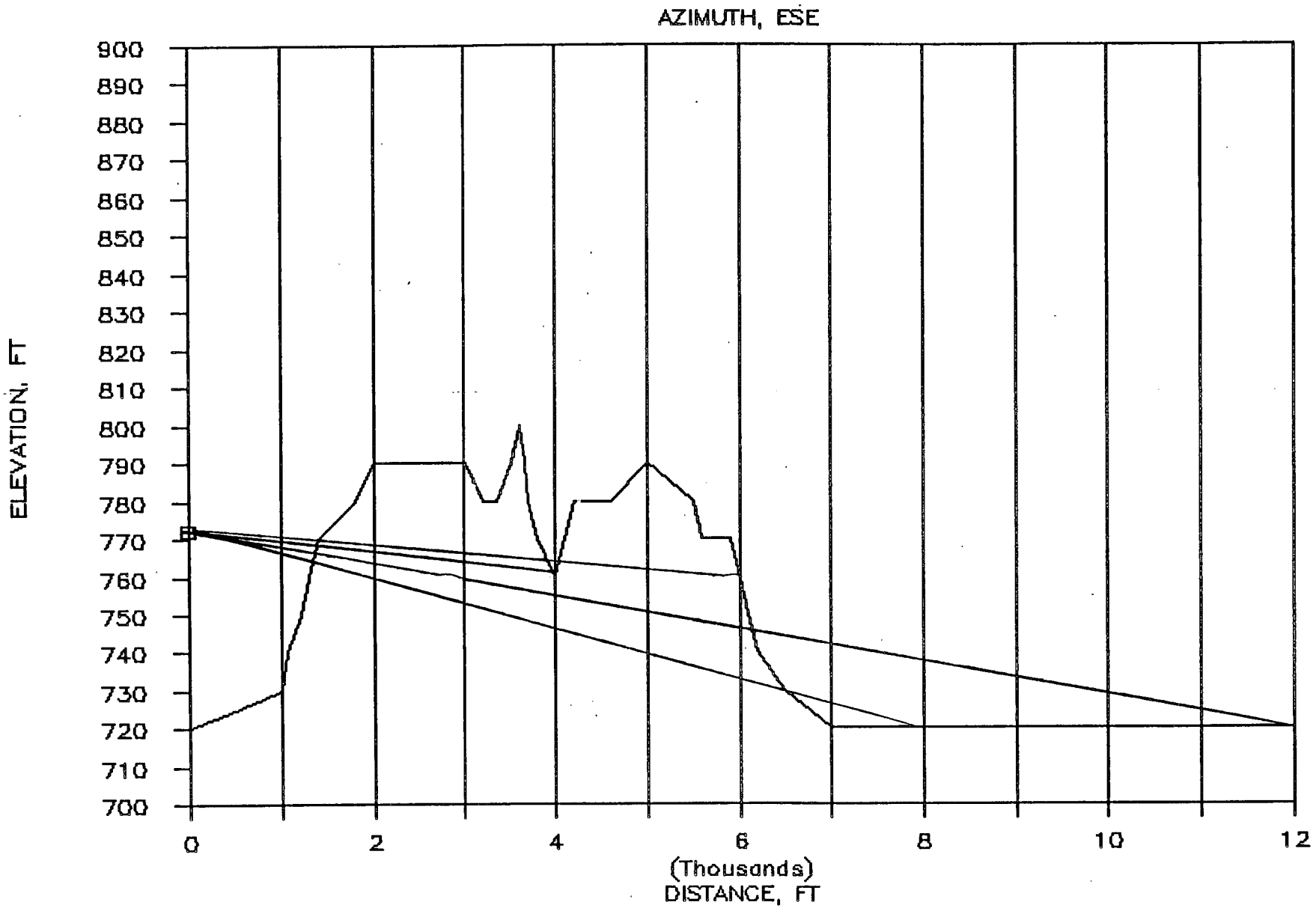


DUANE ARNOLD 26



IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #26-WS3000
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	720.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	720.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	740.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	720.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	820.00	SOFT	0.	NO	0.	0.
6	8000.	90.00	840.00	SOFT	0.	YES	6550.	840.
7	12000.	90.00	740.00	SOFT	0.	YES	8400.	850.
8	500.	67.50	720.00	SOFT	0.	NO	0.	0.
9	1000.	67.50	720.00	SOFT	0.	NO	0.	0.
10	2000.	67.50	720.00	SOFT	0.	NO	0.	0.
11	4000.	67.50	790.00	SOFT	0.	NO	0.	0.
12	6000.	67.50	870.00	SOFT	0.	YES	5900.	870.
13	8000.	67.50	850.00	SOFT	0.	YES	5900.	870.
14	12000.	67.50	780.00	SOFT	0.	YES	8800.	930.
15	500.	45.00	720.00	SOFT	0.	NO	0.	0.
16	1000.	45.00	720.00	SOFT	0.	NO	0.	0.
17	2000.	45.00	720.00	SOFT	0.	NO	0.	0.
18	4000.	45.00	830.00	SOFT	0.	YES	3450.	830.
19	6000.	45.00	860.00	SOFT	0.	YES	4675.	870.
20	8000.	45.00	870.00	SOFT	0.	YES	6200.	890.
21	12000.	45.00	800.00	SOFT	0.	YES	6200.	890.
22	500.	22.50	720.00	SOFT	0.	NO	0.	0.
23	1000.	22.50	720.00	SOFT	0.	NO	0.	0.
24	2000.	22.50	720.00	SOFT	0.	NO	0.	0.
25	4000.	22.50	820.00	SOFT	0.	YES	3000.	830.
26	6000.	22.50	870.00	SOFT	0.	NO	0.	0.
27	8000.	22.50	850.00	SOFT	0.	YES	6000.	870.
28	12000.	22.50	850.00	SOFT	0.	YES	6000.	870.
29	500.	.00	720.00	SOFT	0.	NO	0.	0.
30	1000.	.00	720.00	SOFT	0.	NO	0.	0.
31	2000.	.00	720.00	SOFT	0.	NO	0.	0.
32	4000.	.00	860.00	SOFT	0.	NO	0.	0.
33	6000.	.00	850.00	SOFT	0.	YES	4000.	860.
34	8000.	.00	820.00	SOFT	0.	YES	6300.	890.
35	12000.	.00	800.00	SOFT	0.	YES	6300.	890.
7	500.	337.50	720.00	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	720.00	SOFT	0.	NO	0.	0.
38	2000.	337.50	735.00	SOFT	0.	NO	0.	0.
39	4000.	337.50	730.00	SOFT	0.	YES	2900.	830.
40	6000.	337.50	800.00	SOFT	0.	YES	2900.	830.
41	8000.	337.50	770.00	SOFT	0.	YES	2900.	830.
42	12000.	337.50	850.00	SOFT	0.	YES	2900.	830.
43	500.	315.00	720.00	SOFT	0.	NO	0.	0.
44	1000.	315.00	720.00	SOFT	0.	NO	0.	0.
45	2000.	315.00	720.00	SOFT	0.	NO	0.	0.
46	4000.	315.00	860.00	SOFT	0.	NO	0.	0.
47	6000.	315.00	840.00	SOFT	0.	YES	4100.	870.
48	8000.	315.00	870.00	SOFT	0.	YES	4100.	87
49	12000.	315.00	730.00	SOFT	0.	YES	4100.	870
50	500.	292.50	720.00	SOFT	0.	NO	0.	0.
51	1000.	292.50	720.00	SOFT	0.	NO	0.	0.
52	2000.	292.50	725.00	SOFT	0.	NO	0.	0.
53	4000.	292.50	830.00	SOFT	0.	YES	2900.	820.
54	6000.	292.50	820.00	SOFT	0.	YES	5000.	860.
55	8000.	292.50	775.00	SOFT	0.	YES	5000.	860.
56	12000.	292.50	760.00	SOFT	0.	YES	5000.	860.
57	500.	270.00	720.00	SOFT	0.	NO	0.	0.
58	1000.	270.00	720.00	SOFT	0.	NO	0.	0.
59	2000.	270.00	720.00	SOFT	0.	NO	0.	0.
60	4000.	270.00	738.00	SOFT	0.	NO	0.	0.
61	6000.	270.00	750.00	SOFT	0.	NO	0.	0.
62	8000.	270.00	735.00	SOFT	0.	YES	5000.	750.
63	12000.	270.00	750.00	SOFT	0.	YES	11050.	760.
64	500.	247.50	725.00	SOFT	0.	NO	0.	0.
65	1000.	247.50	730.00	SOFT	0.	NO	0.	0.
66	2000.	247.50	720.00	SOFT	0.	NO	0.	0.
67	4000.	247.50	720.00	SOFT	0.	NO	0.	0.
68	6000.	247.50	720.00	SOFT	0.	NO	0.	0.
69	8000.	247.50	730.00	SOFT	0.	NO	0.	0.
70	12000.	247.50	755.00	SOFT	0.	YES	8650.	810.
71	500.	225.00	732.00	SOFT	0.	NO	0.	0.
72	1000.	225.00	750.00	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	790.00	SOFT	0.	NO	0.	0.
74	4000.	225.00	850.00	SOFT	0.	NO	0.	0.
75	6000.	225.00	860.00	SOFT	0.	YES	5400.	900.
76	8000.	225.00	830.00	SOFT	0.	YES	5400.	900.
77	12000.	225.00	810.00	SOFT	0.	YES	5400.	900.
78	500.	202.50	735.00	SOFT	0.	NO	0.	0.
79	1000.	202.50	760.00	SOFT	0.	NO	0.	0.
80	2000.	202.50	770.00	SOFT	0.	YES	1500.	830.
81	4000.	202.50	880.00	SOFT	0.	YES	2700.	850.
82	6000.	202.50	880.00	SOFT	0.	YES	4000.	880.
83	8000.	202.50	840.00	SOFT	0.	YES	6300.	900.
[illegible]	12000.	202.50	800.00	SOFT	0.	YES	6300.	900.
[illegible]	500.	180.00	730.00	SOFT	0.	NO	0.	0.
[illegible]	1000.	180.00	755.00	SOFT	0.	NO	0.	0.
87	2000.	180.00	810.00	SOFT	0.	YES	1750.	830.
88	4000.	180.00	890.00	SOFT	0.	NO	0.	0.
89	6000.	180.00	790.00	SOFT	0.	YES	4000.	890.
90	8000.	180.00	830.00	SOFT	0.	YES	4000.	890.
91	12000.	180.00	850.00	SOFT	0.	YES	4000.	890.
92	500.	157.50	725.00	SOFT	0.	NO	0.	0.
93	1000.	157.50	740.00	SOFT	0.	NO	0.	0.
94	2000.	157.50	770.00	SOFT	0.	NO	0.	0.
95	4000.	157.50	850.00	SOFT	0.	NO	0.	0.
96	6000.	157.50	800.00	SOFT	0.	YES	4700.	880.
97	8000.	157.50	820.00	SOFT	0.	YES	4700.	880.
98	12000.	157.50	750.00	SOFT	0.	YES	4700.	880.
99	500.	135.00	730.00	SOFT	0.	NO	0.	0.
100	1000.	135.00	750.00	SOFT	0.	NO	0.	0.
101	2000.	135.00	750.00	SOFT	0.	NO	0.	0.
102	4000.	135.00	815.00	SOFT	0.	NO	0.	0.
103	6000.	135.00	850.00	SOFT	0.	YES	5600.	860.
104	8000.	135.00	800.00	SOFT	0.	YES	5600.	860.
105	12000.	135.00	730.00	SOFT	0.	YES	5600.	860.
106	500.	112.50	725.00	SOFT	0.	NO	0.	0.
107	1000.	112.50	730.00	SOFT	0.	NO	0.	0.
108	2000.	112.50	790.00	SOFT	0.	NO	0.	0.
109	4000.	112.50	760.00	SOFT	0.	YES	3600.	800.
110	6000.	112.50	760.00	SOFT	0.	YES	3600.	800.
111	8000.	112.50	720.00	SOFT	0.	YES	3600.	800.
112	12000.	112.50	720.00	SOFT	0.	YES	3600.	800.

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #26-WS3000
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	DUANE - WS3000	158.1	158.0	.0	.0	.0	.0	147.0	157.0	149.0	141.0	124.0

XO= .00 YO= .00 ZO= 772.00 HEIGHT ABOVE GROUND= 52.00

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #26-WS3000
METEOROLOGICAL INPUT CONDITIONS

H1= 10.67 METERS H2= 50.29 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)
1981		8	21	12	177.0	2.1	2.6	23.9	23.2	30.0	742.0

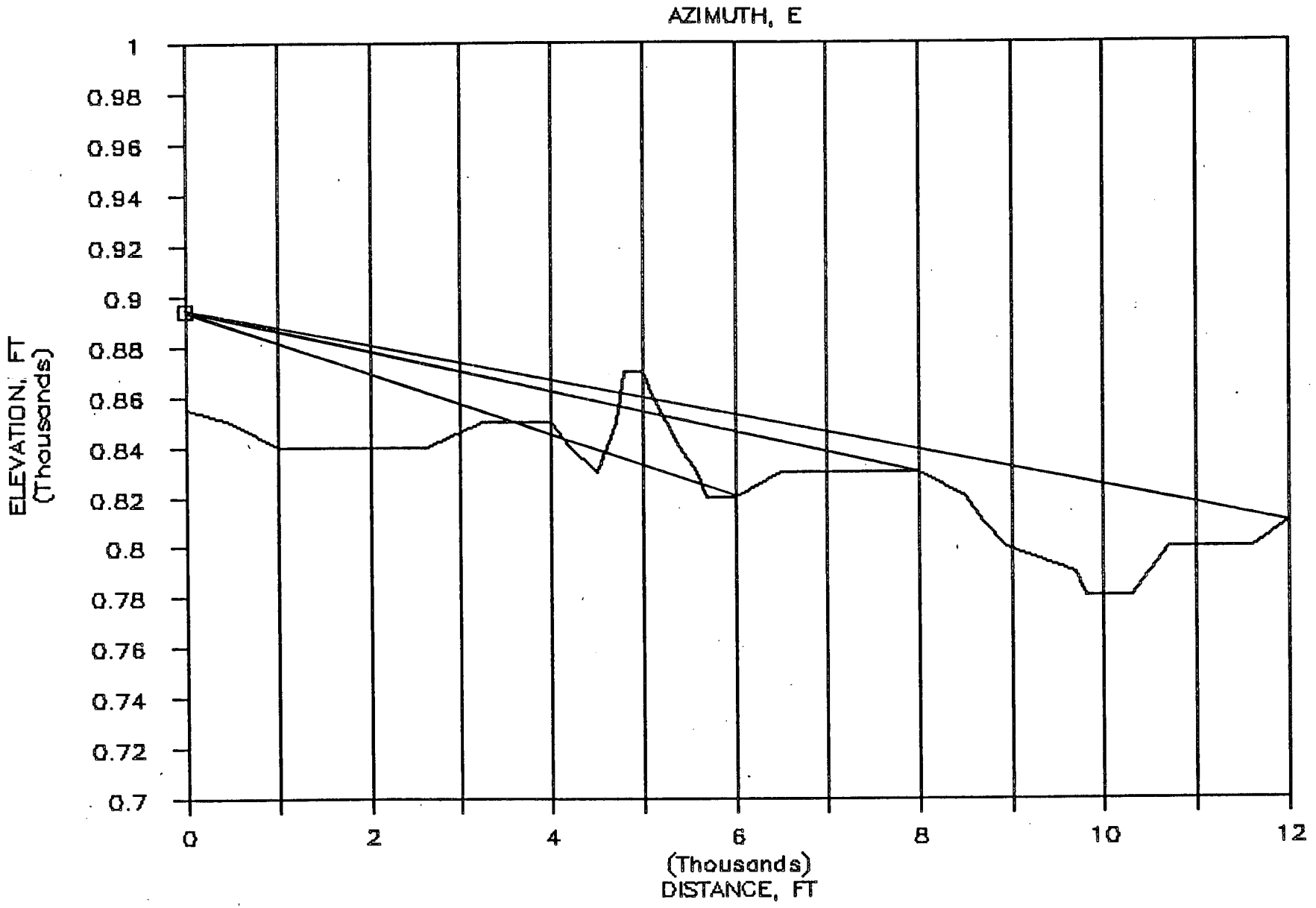
IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #26-WS3000

SOUND PRESSURE LEVELS IN DBC
UNDER MET CONDITION 1

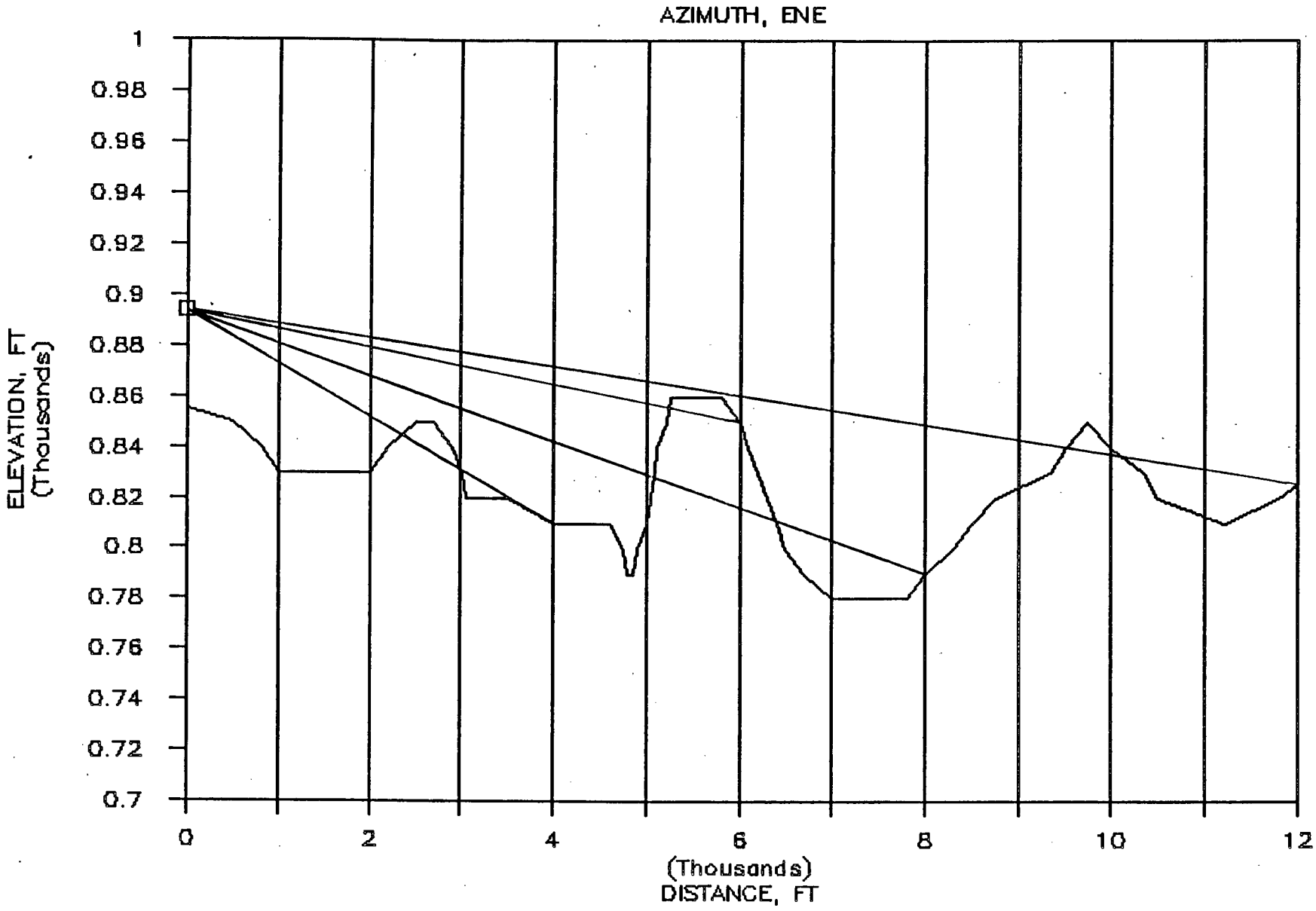
DISTANCE IN FEET

AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	104.7	90.6	75.6	65.7	61.3	52.2	38.0
ENE	104.7	90.6	75.6	65.7	56.3	48.8	34.5
NE	104.7	90.6	75.6	60.1	51.6	44.4	29.2
NNE	104.7	90.6	75.6	57.9	61.3	48.8	42.1
N	104.7	90.6	75.6	65.7	52.5	43.8	38.4
NNW	104.7	90.6	75.6	48.8	51.7	47.1	43.4
NW	104.7	90.6	75.6	65.7	50.3	48.6	37.4
WNW	104.7	90.6	75.6	60.6	49.3	44.5	39.1
W	104.7	90.6	75.6	65.7	61.3	57.8	46.0
WSW	104.7	90.6	75.6	65.7	60.3	54.3	33.7
SW	104.7	90.6	75.6	65.7	47.6	44.0	37.9
SSW	104.7	90.6	58.0	60.7	52.5	44.3	37.8
S	104.7	90.6	62.7	65.7	45.1	44.5	38.9
SSE	104.7	90.6	75.6	65.7	45.6	44.7	33.3
SE	104.7	90.6	75.6	65.7	52.3	41.9	28.9
ESE	104.7	90.6	75.6	52.2	52.8	48.1	43.2

DUANE ARNOLD 28



DUANE ARNOLD 28



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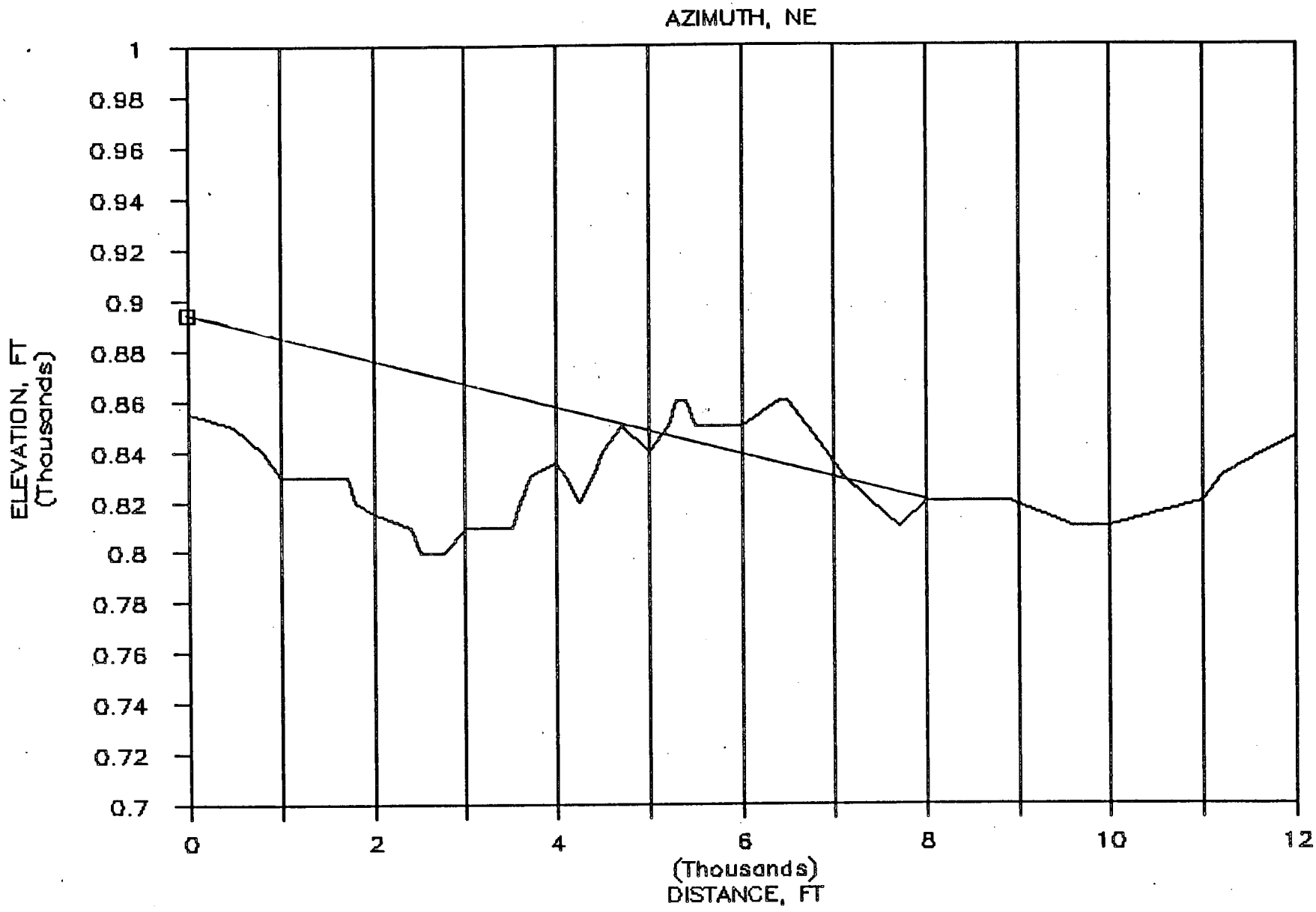

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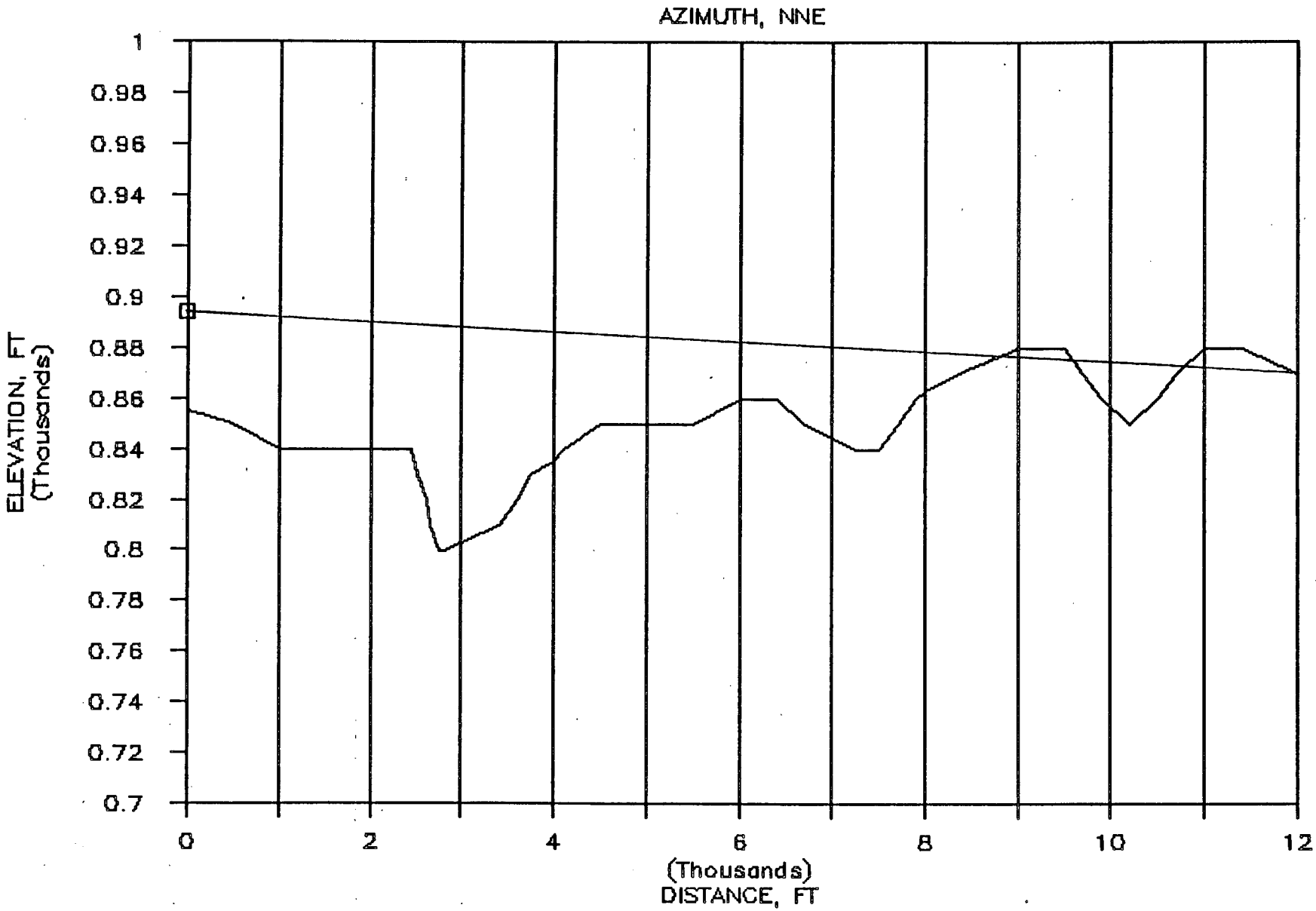

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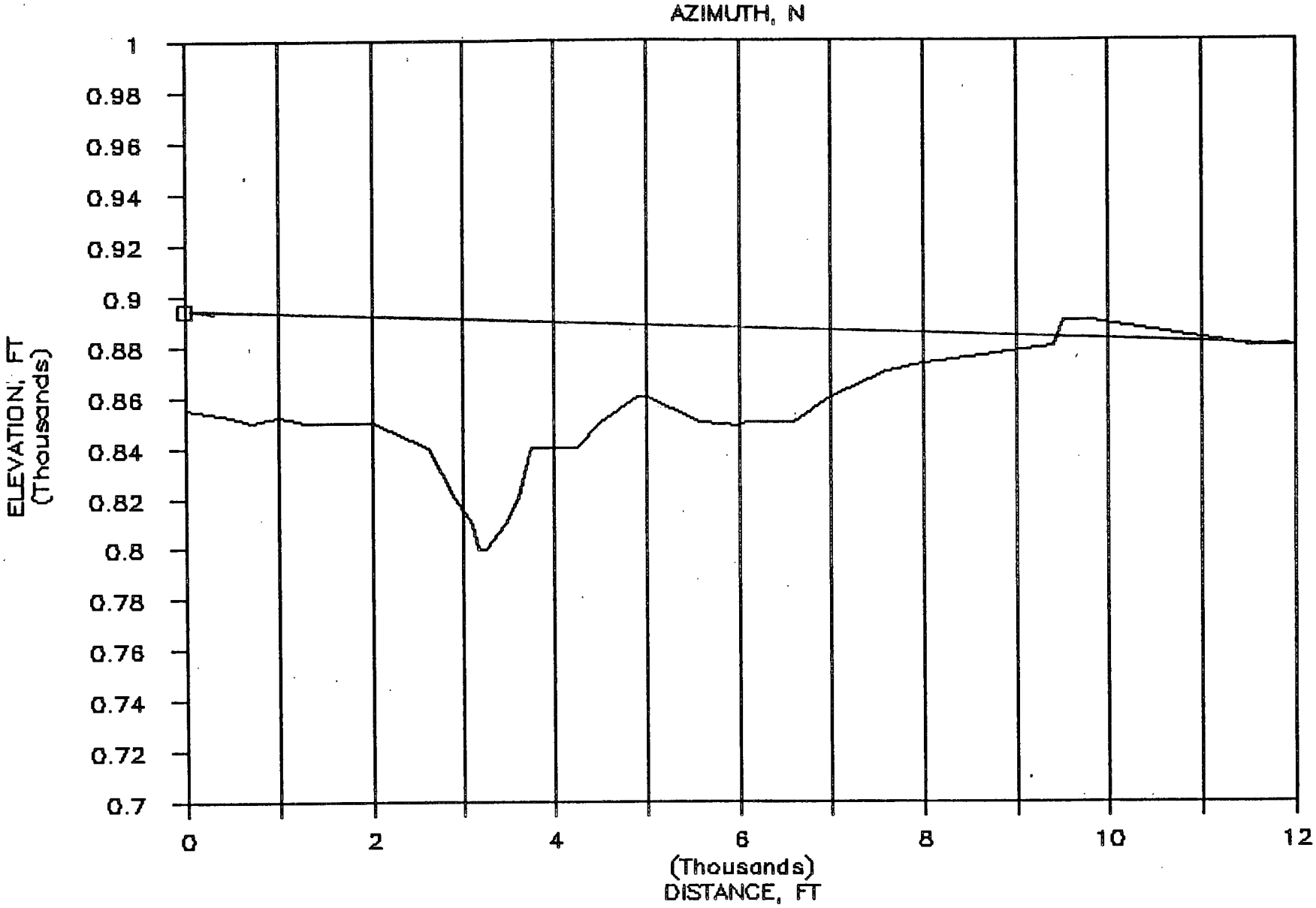

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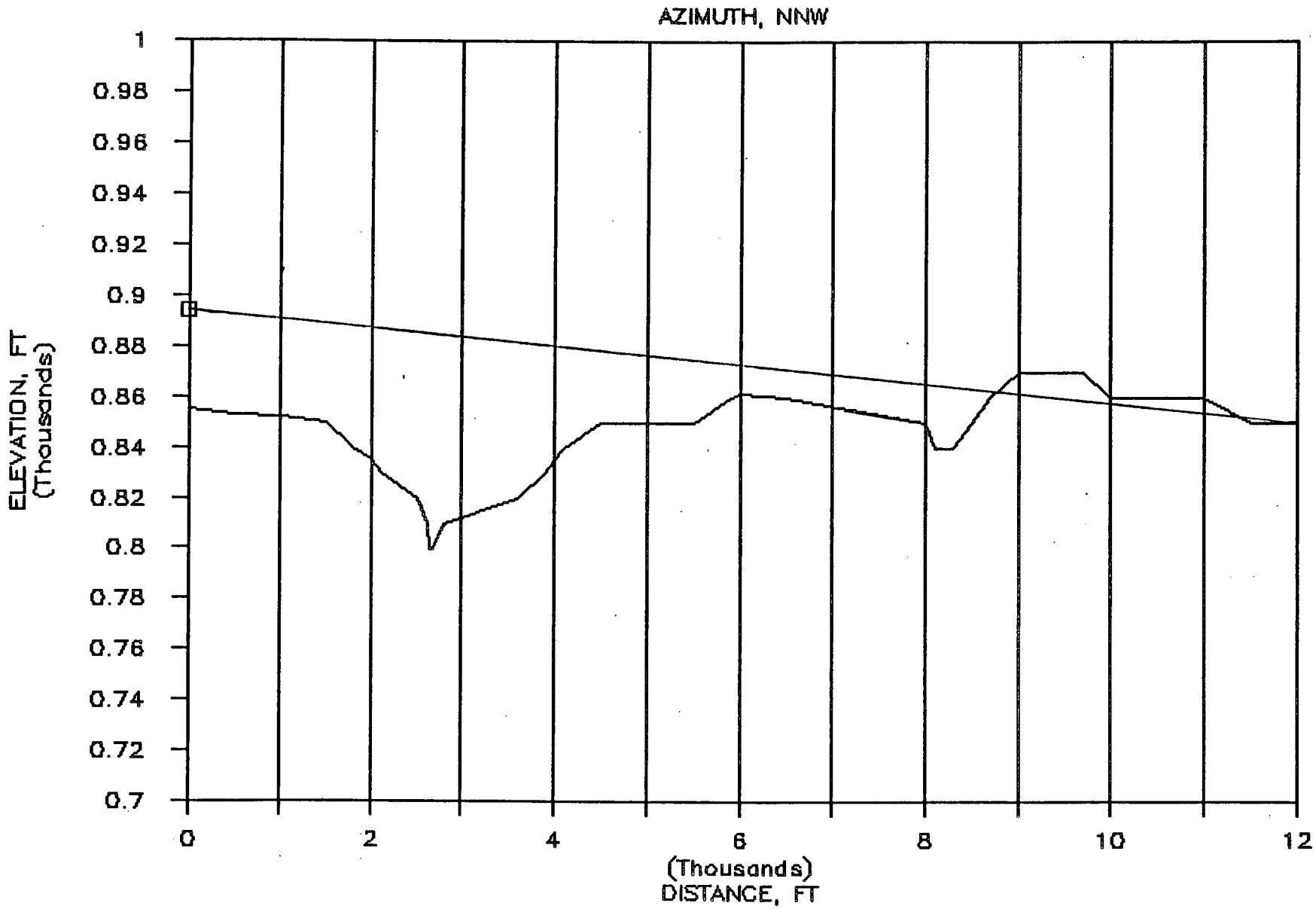

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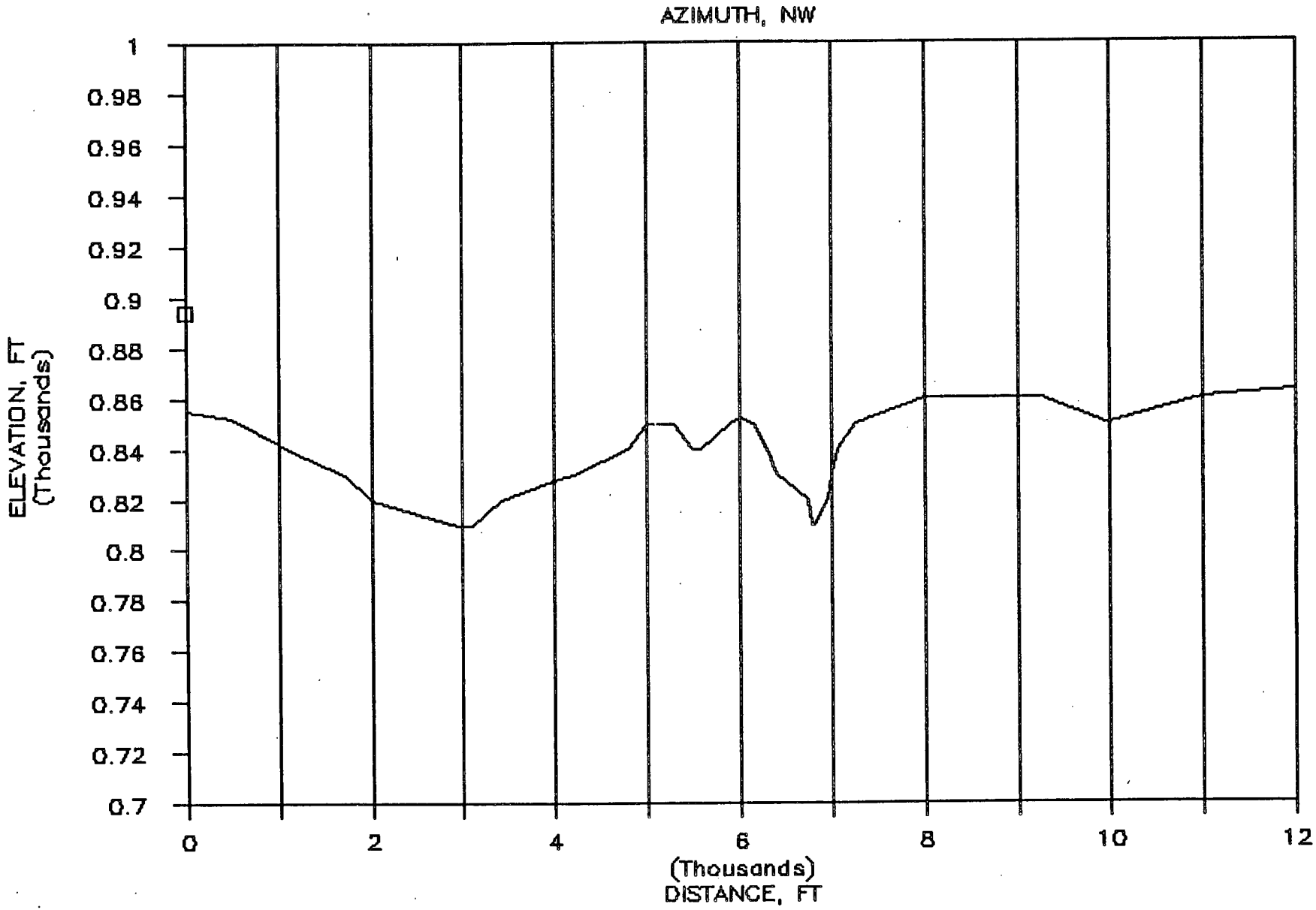

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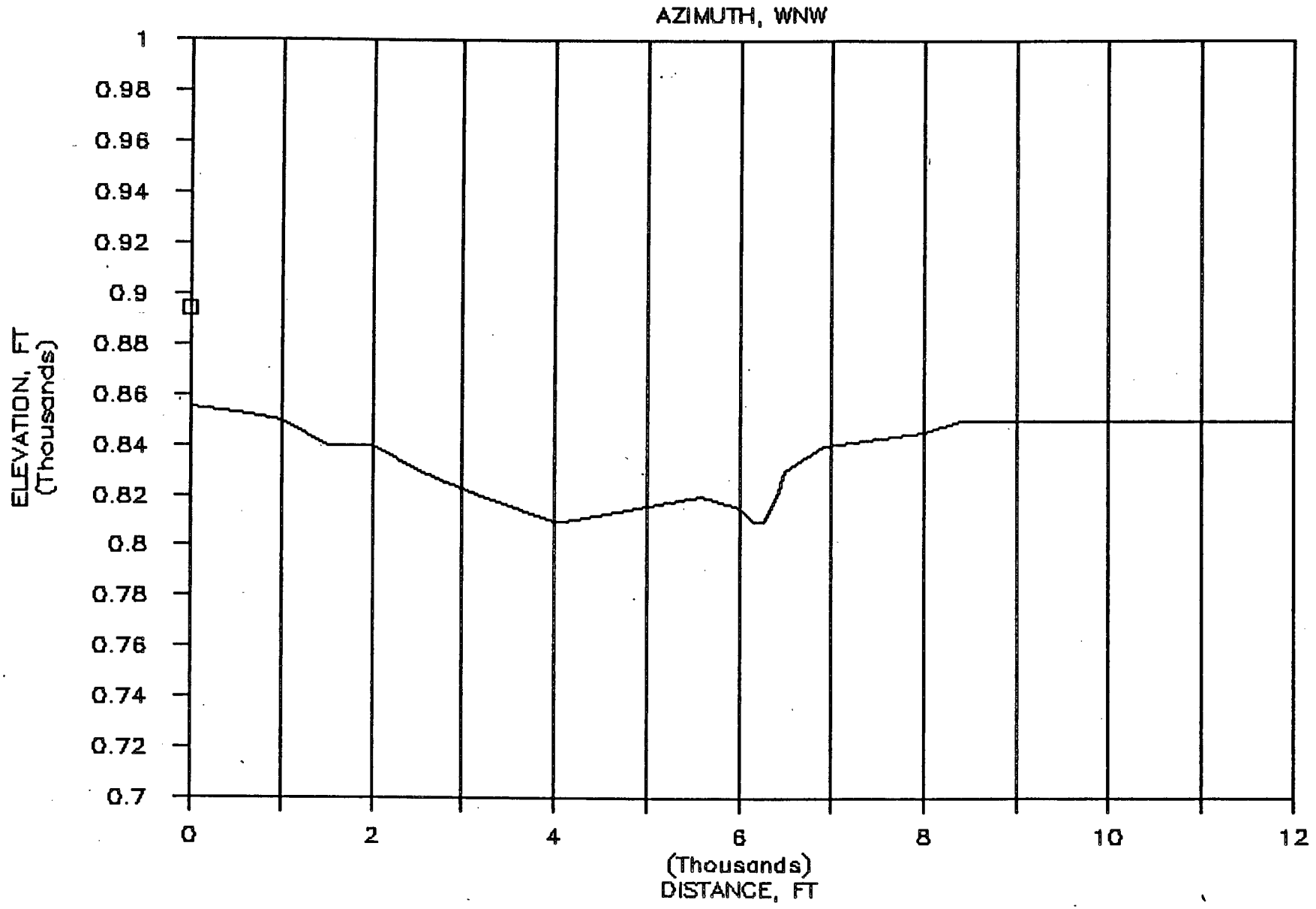

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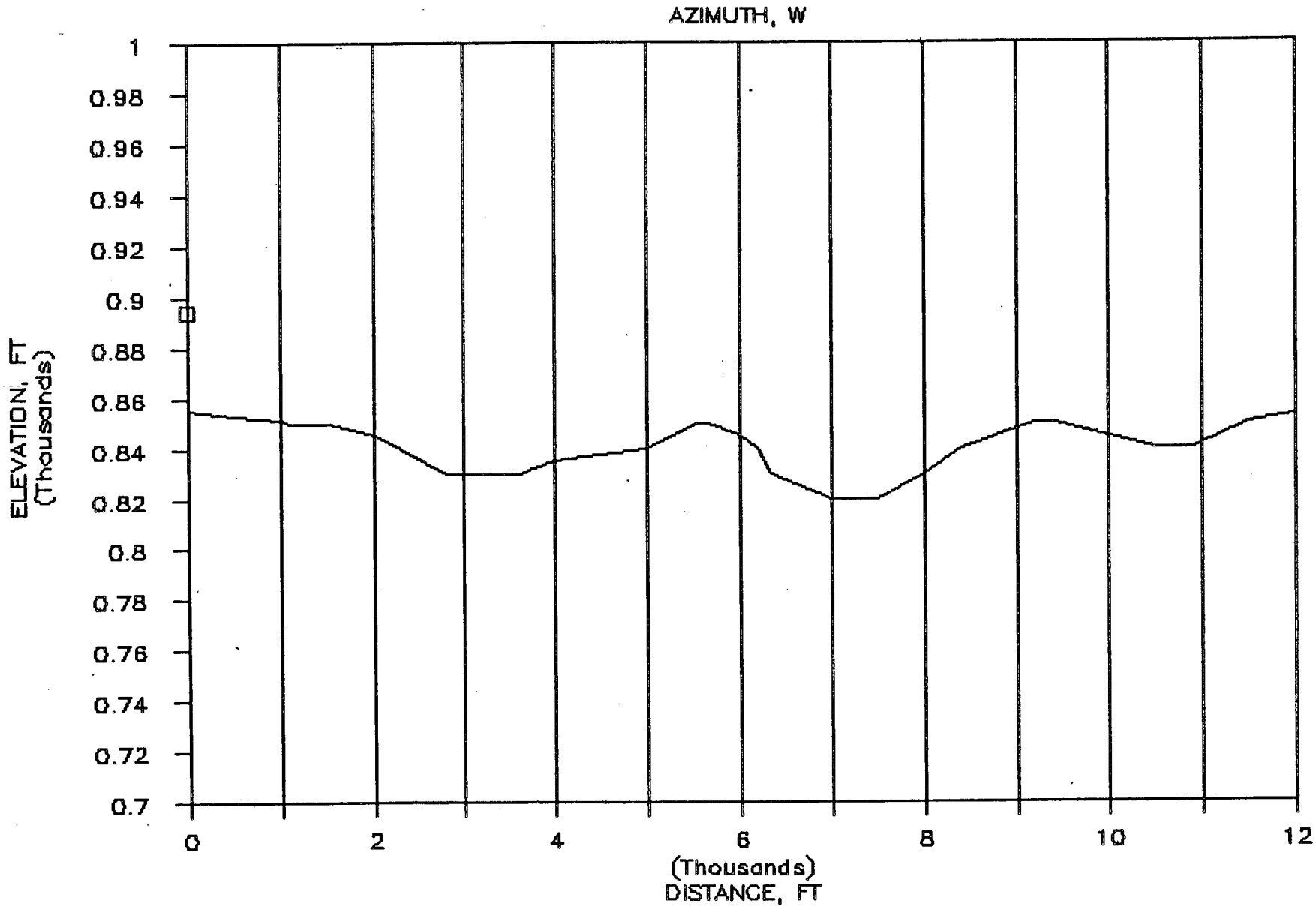

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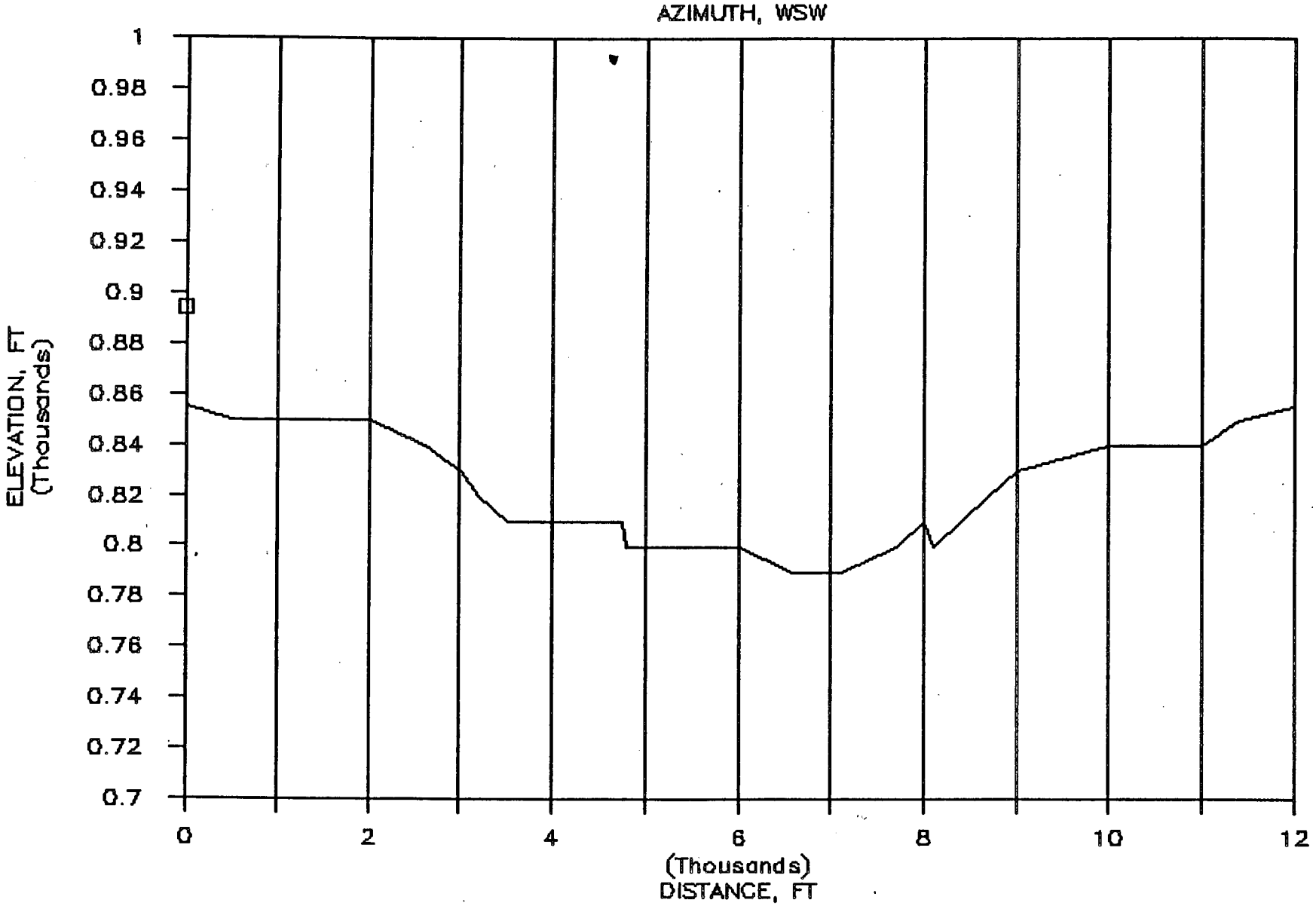
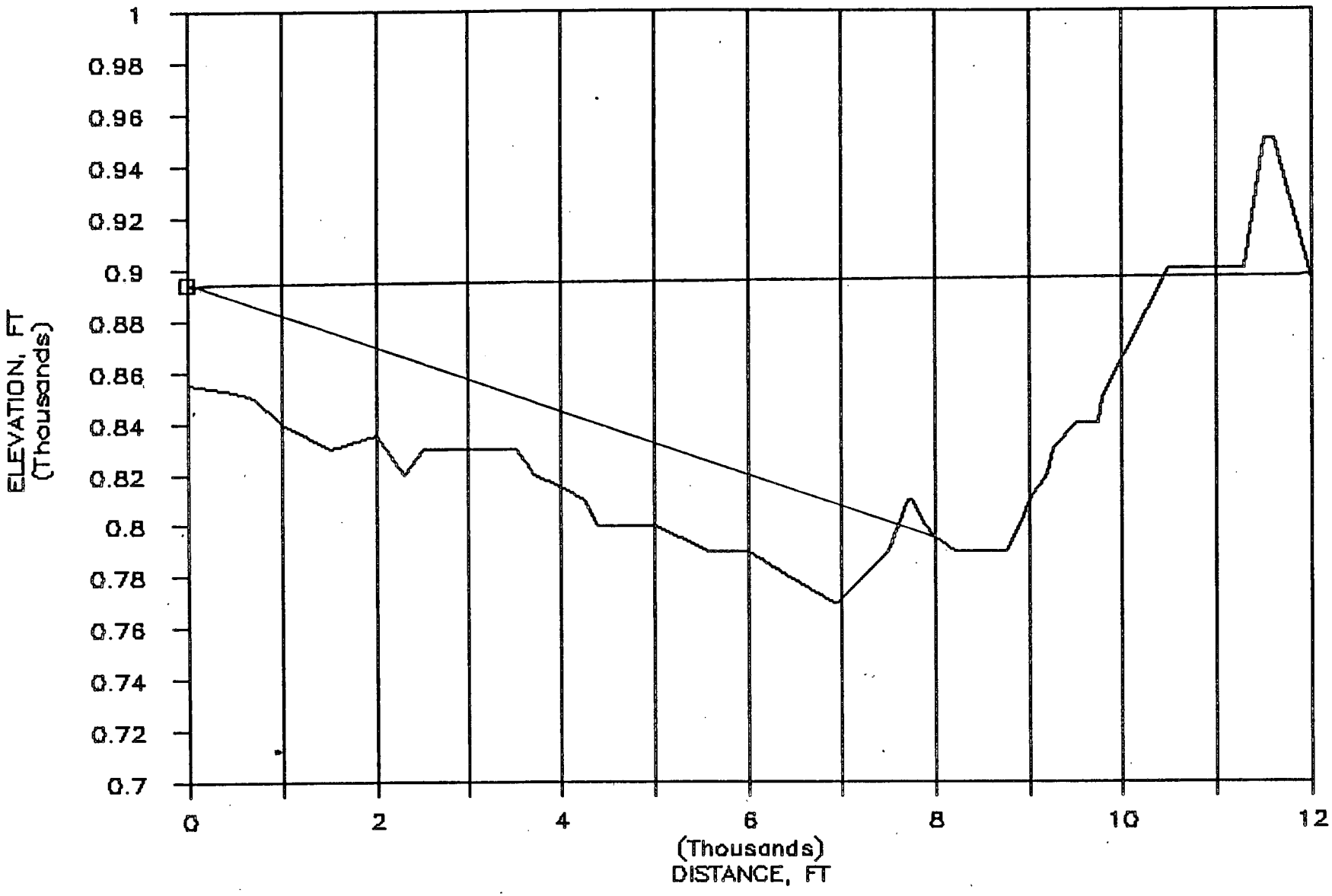


DUANE ARNOLD 28

AZIMUTH, SW



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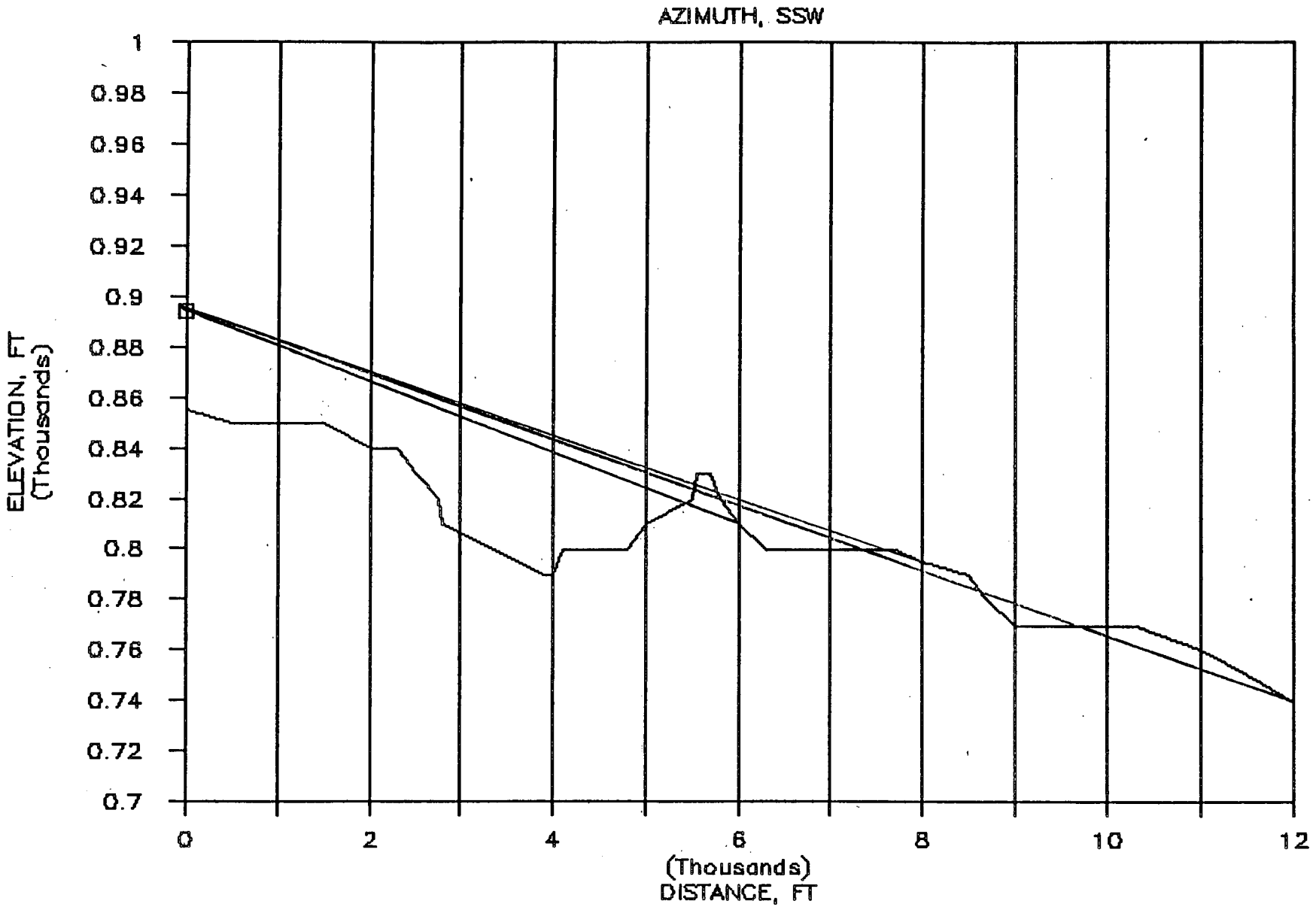

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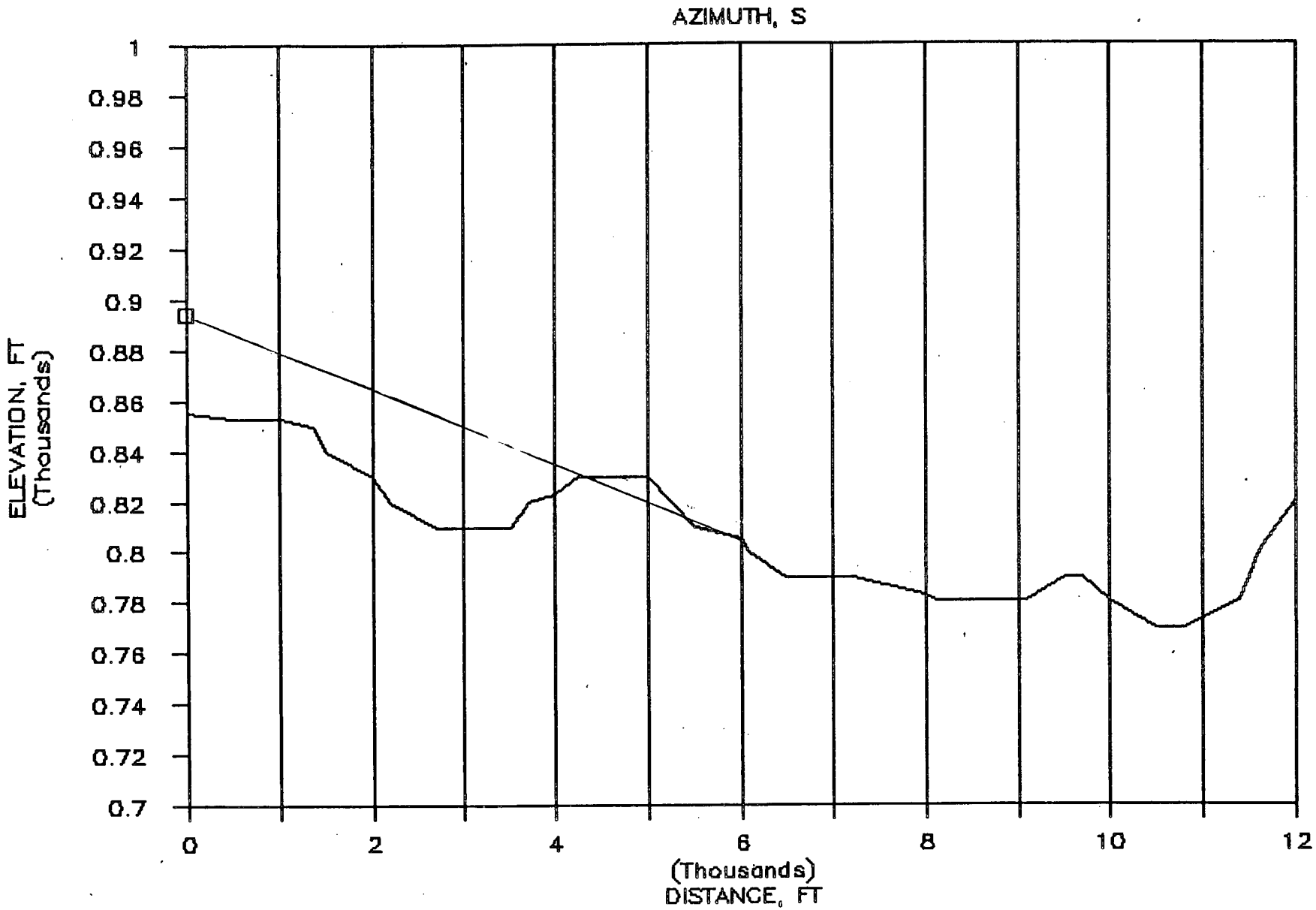

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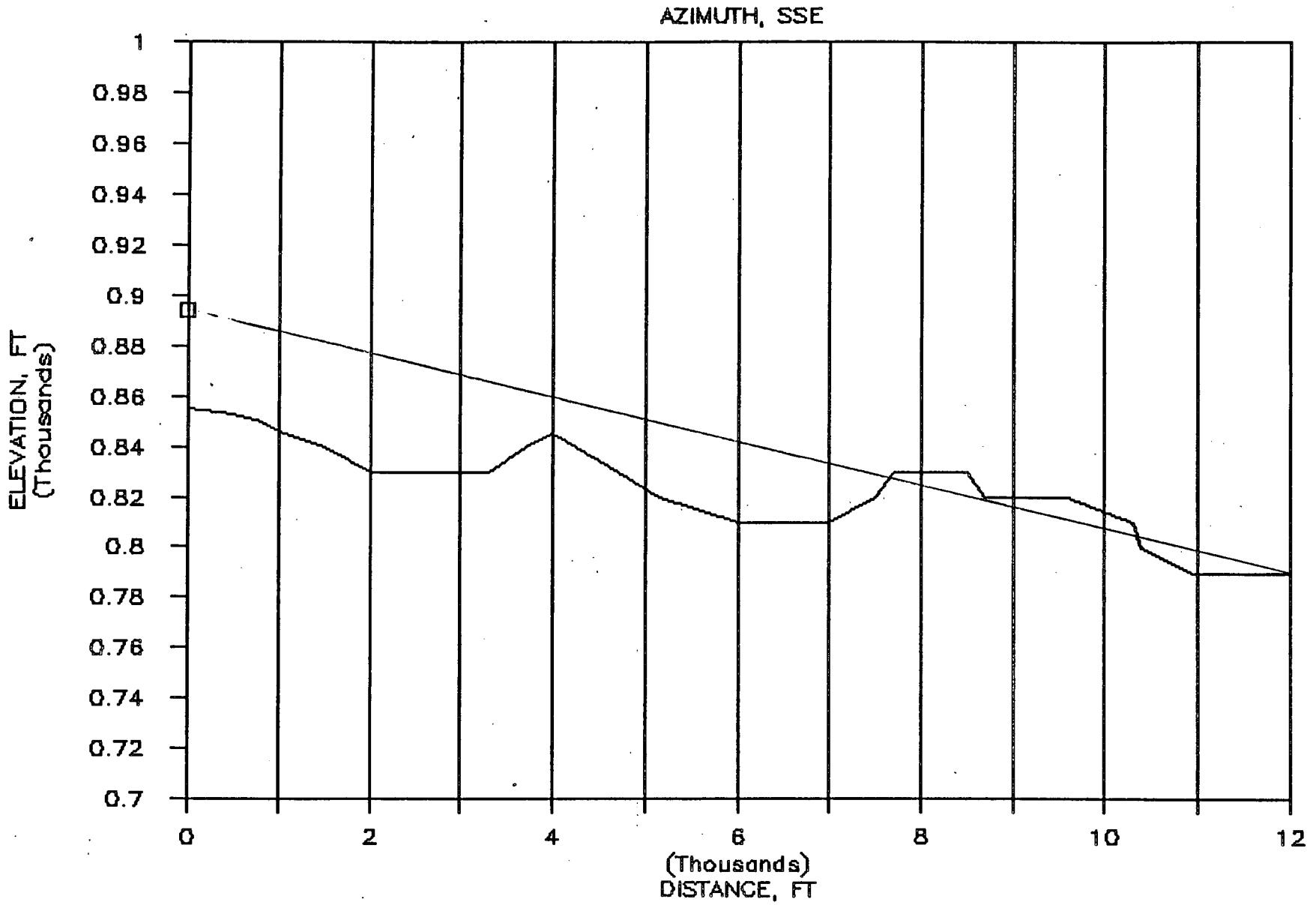

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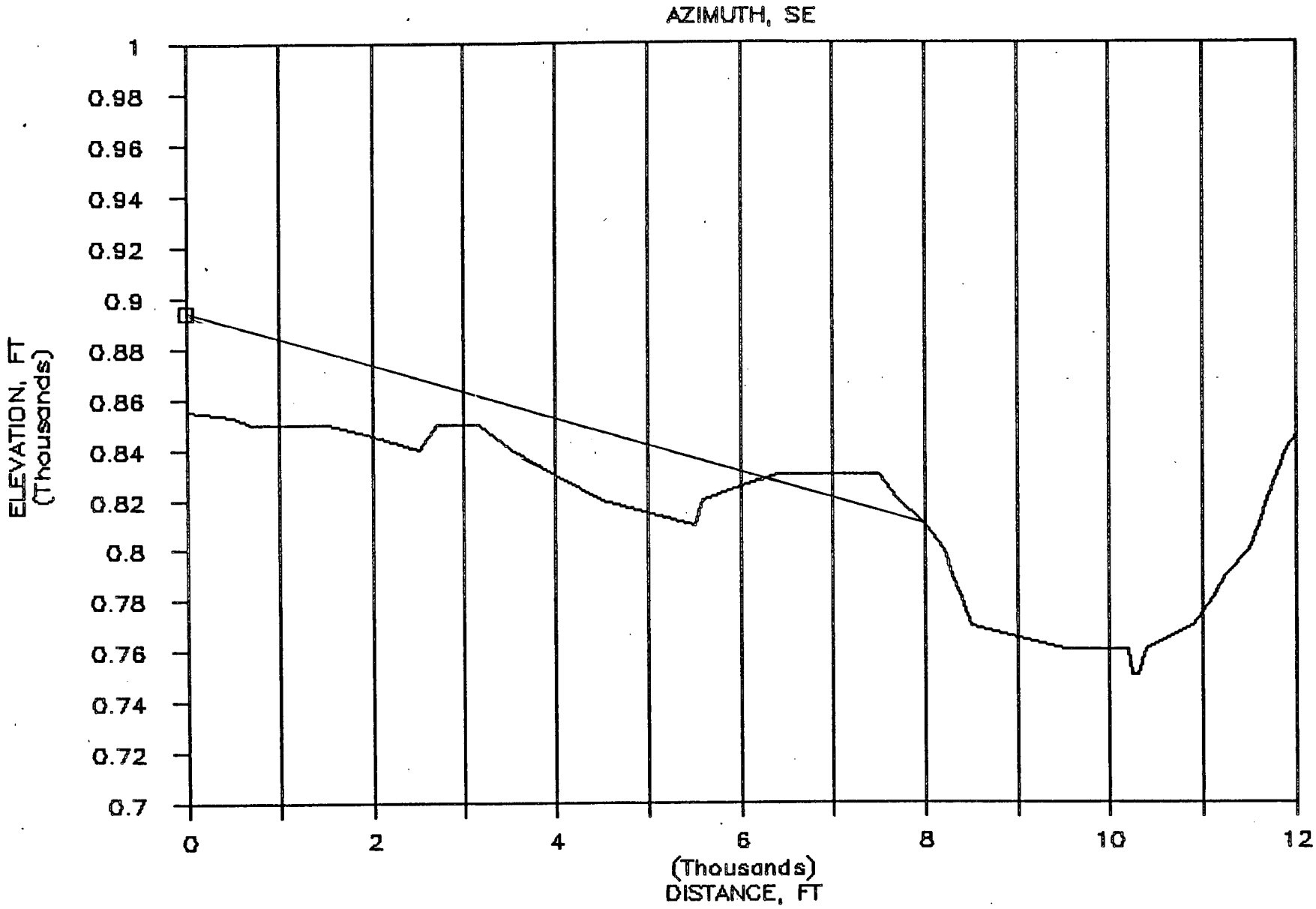
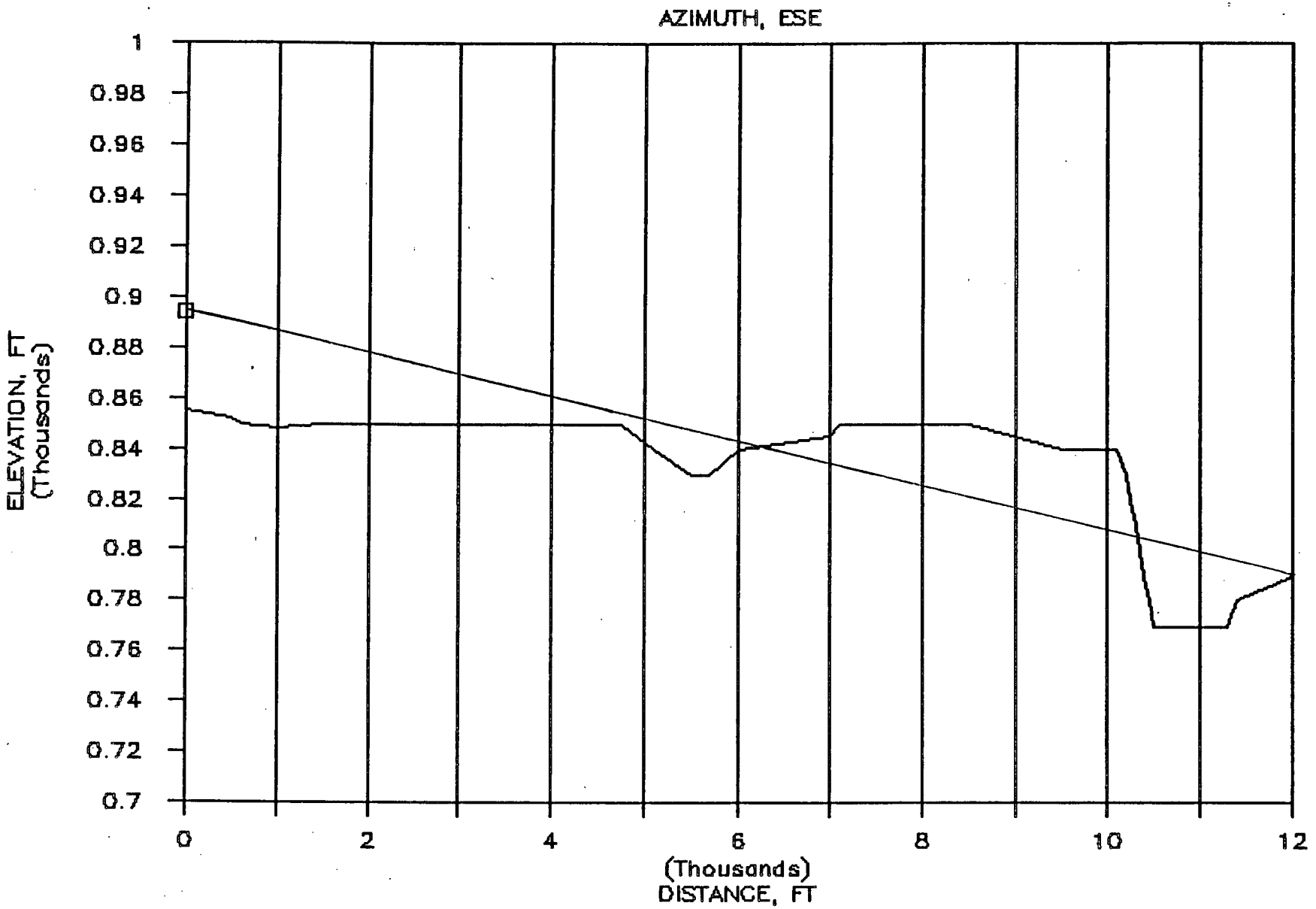


DUANE ARNOLD 28



IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #28-FS1003
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	850.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	840.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	840.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	850.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	820.00	SOFT	0.	YES	4800.	870.
6	8000.	90.00	830.00	SOFT	0.	YES	4800.	870.
7	12000.	90.00	810.00	SOFT	0.	YES	4800.	87
8	500.	67.50	850.00	SOFT	0.	NO	0.	
9	1000.	67.50	830.00	SOFT	0.	NO	0.	0.
10	2000.	67.50	830.00	SOFT	0.	NO	0.	0.
11	4000.	67.50	810.00	SOFT	0.	YES	2500.	850.
12	6000.	67.50	850.00	SOFT	0.	YES	5250.	860.
13	8000.	67.50	790.00	SOFT	0.	YES	5250.	860.
14	12000.	67.50	825.00	SOFT	0.	YES	9750.	850.
15	500.	45.00	850.00	SOFT	0.	NO	0.	0.
16	1000.	45.00	830.00	SOFT	0.	NO	0.	0.
17	2000.	45.00	815.00	SOFT	0.	NO	0.	0.
18	4000.	45.00	835.00	SOFT	0.	NO	0.	0.
19	6000.	45.00	850.00	SOFT	0.	NO	0.	0.
20	8000.	45.00	820.00	SOFT	0.	YES	5300.	860.
21	12000.	45.00	845.00	SOFT	0.	NO	0.	0.
22	500.	22.50	850.00	SOFT	0.	NO	0.	0.
23	1000.	22.50	840.00	SOFT	0.	NO	0.	0.
24	2000.	22.50	840.00	SOFT	0.	NO	0.	0.
25	4000.	22.50	835.00	SOFT	0.	NO	0.	0.
26	6000.	22.50	860.00	SOFT	0.	NO	0.	0.
27	8000.	22.50	863.00	SOFT	0.	NO	0.	0.
28	12000.	22.50	870.00	SOFT	0.	YES	9000.	880.
29	500.	.00	852.00	SOFT	0.	NO	0.	0.
30	1000.	.00	852.00	SOFT	0.	NO	0.	0.
31	2000.	.00	850.00	SOFT	0.	NO	0.	0.
32	4000.	.00	840.00	SOFT	0.	NO	0.	0.
33	6000.	.00	848.00	SOFT	0.	NO	0.	0.
34	8000.	.00	873.00	SOFT	0.	NO	0.	0.
35	12000.	.00	880.00	SOFT	0.	YES	9500.	890.
36	500.	337.50	853.00	SOFT	0.	NO	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	852.00	SOFT	0.	NO	0.	0.
38	2000.	337.50	835.00	SOFT	0.	NO	0.	0.
39	4000.	337.50	835.00	SOFT	0.	NO	0.	0.
40	6000.	337.50	861.00	SOFT	0.	NO	0.	0.
41	8000.	337.50	850.00	SOFT	0.	NO	0.	0.
42	12000.	337.50	850.00	SOFT	0.	YES	9000.	870.
43	500.	315.00	852.00	SOFT	0.	NO	0.	0.
44	1000.	315.00	842.00	SOFT	0.	NO	0.	0.
45	2000.	315.00	820.00	SOFT	0.	NO	0.	0.
46	4000.	315.00	827.00	SOFT	0.	NO	0.	0.
47	6000.	315.00	852.00	SOFT	0.	NO	0.	0.
48	8000.	315.00	860.00	SOFT	0.	NO	0.	0.
[illegible]	12000.	315.00	863.00	SOFT	0.	NO	0.	0.
[illegible]	500.	292.50	853.00	SOFT	0.	NO	0.	0.
51	1000.	292.50	850.00	SOFT	0.	NO	0.	0.
52	2000.	292.50	840.00	SOFT	0.	NO	0.	0.
53	4000.	292.50	810.00	SOFT	0.	NO	0.	0.
54	6000.	292.50	815.00	SOFT	0.	NO	0.	0.
55	8000.	292.50	845.00	SOFT	0.	NO	0.	0.
56	12000.	292.50	850.00	SOFT	0.	NO	0.	0.
57	500.	270.00	853.00	SOFT	0.	NO	0.	0.
58	1000.	270.00	851.00	SOFT	0.	NO	0.	0.
59	2000.	270.00	845.00	SOFT	0.	NO	0.	0.
60	4000.	270.00	835.00	SOFT	0.	NO	0.	0.
61	6000.	270.00	845.00	SOFT	0.	NO	0.	0.
62	8000.	270.00	830.00	SOFT	0.	NO	0.	0.
63	12000.	270.00	853.00	SOFT	0.	NO	0.	0.
64	500.	247.50	850.00	SOFT	0.	NO	0.	0.
65	1000.	247.50	850.00	SOFT	0.	NO	0.	0.
66	2000.	247.50	850.00	SOFT	0.	NO	0.	0.
67	4000.	247.50	810.00	SOFT	0.	NO	0.	0.
68	6000.	247.50	800.00	SOFT	0.	NO	0.	0.
69	8000.	247.50	810.00	SOFT	0.	NO	0.	0.
70	12000.	247.50	855.00	SOFT	0.	NO	0.	0.
71	500.	225.00	852.00	SOFT	0.	NO	0.	0.
72	1000.	225.00	840.00	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	835.00	SOFT	0.	NO	0.	0.
74	4000.	225.00	815.00	SOFT	0.	NO	0.	0.
75	6000.	225.00	790.00	SOFT	0.	NO	0.	0.
76	8000.	225.00	795.00	SOFT	0.	YES	7700.	810.
77	12000.	225.00	895.00	SOFT	0.	YES	11500.	950.
78	500.	202.50	850.00	SOFT	0.	NO	0.	0.
79	1000.	202.50	850.00	SOFT	0.	NO	0.	0.
80	2000.	202.50	840.00	SOFT	0.	NO	0.	0.
81	4000.	202.50	790.00	SOFT	0.	NO	0.	0.
82	6000.	202.50	810.00	SOFT	0.	YES	5550.	830.
83	8000.	202.50	795.00	SOFT	0.	YES	5550.	8
84	12000.	202.50	740.00	SOFT	0.	YES	5550.	8
85	500.	180.00	853.00	SOFT	0.	NO	0.	0.
86	1000.	180.00	853.00	SOFT	0.	NO	0.	0.
87	2000.	180.00	830.00	SOFT	0.	NO	0.	0.
88	4000.	180.00	823.00	SOFT	0.	NO	0.	0.
89	6000.	180.00	805.00	SOFT	0.	YES	5000.	830.
90	8000.	180.00	783.00	SOFT	0.	NO	0.	0.
91	12000.	180.00	820.00	SOFT	0.	NO	0.	0.
92	500.	157.50	853.00	SOFT	0.	NO	0.	0.
93	1000.	157.50	846.00	SOFT	0.	NO	0.	0.
94	2000.	157.50	830.00	SOFT	0.	NO	0.	0.
95	4000.	157.50	845.00	SOFT	0.	NO	0.	0.
96	6000.	157.50	810.00	SOFT	0.	NO	0.	0.
97	8000.	157.50	830.00	SOFT	0.	NO	0.	0.
98	12000.	157.50	790.00	SOFT	0.	YES	7700.	830.
99	500.	135.00	853.00	SOFT	0.	NO	0.	0.
100	1000.	135.00	850.00	SOFT	0.	NO	0.	0.
101	2000.	135.00	845.00	SOFT	0.	NO	0.	0.
102	4000.	135.00	830.00	SOFT	0.	YES	2700.	850.
103	6000.	135.00	825.00	SOFT	0.	NO	0.	0.
104	8000.	135.00	810.00	SOFT	0.	YES	6400.	830.
105	12000.	135.00	845.00	SOFT	0.	NO	0.	0.
106	500.	112.50	852.00	SOFT	0.	NO	0.	0.
107	1000.	112.50	848.00	SOFT	0.	NO	0.	0.
108	2000.	112.50	850.00	SOFT	0.	NO	0.	0.
109	4000.	112.50	850.00	SOFT	0.	NO	0.	0.
110	6000.	112.50	840.00	SOFT	0.	NO	0.	0.
111	8000.	112.50	850.00	SOFT	0.	NO	0.	0.
112	12000.	112.50	790.00	SOFT	0.	YES	7100.	8

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #28-FS1003
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	DUANE - FS1003	160.4	160.3	.0	.0	.0	.0	.0	160.0	148.0	140.0	135.0

XO= .00 YO= .00 ZO= 894.00 HEIGHT ABOVE GROUND= 39.00

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #28-FS1003
METEOROLOGICAL INPUT CONDITIONS

H1= 10.67 METERS H2= 50.29 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)
1981		8	21	12	177.0	2.1	2.6	23.9	23.2	30.0	742.0

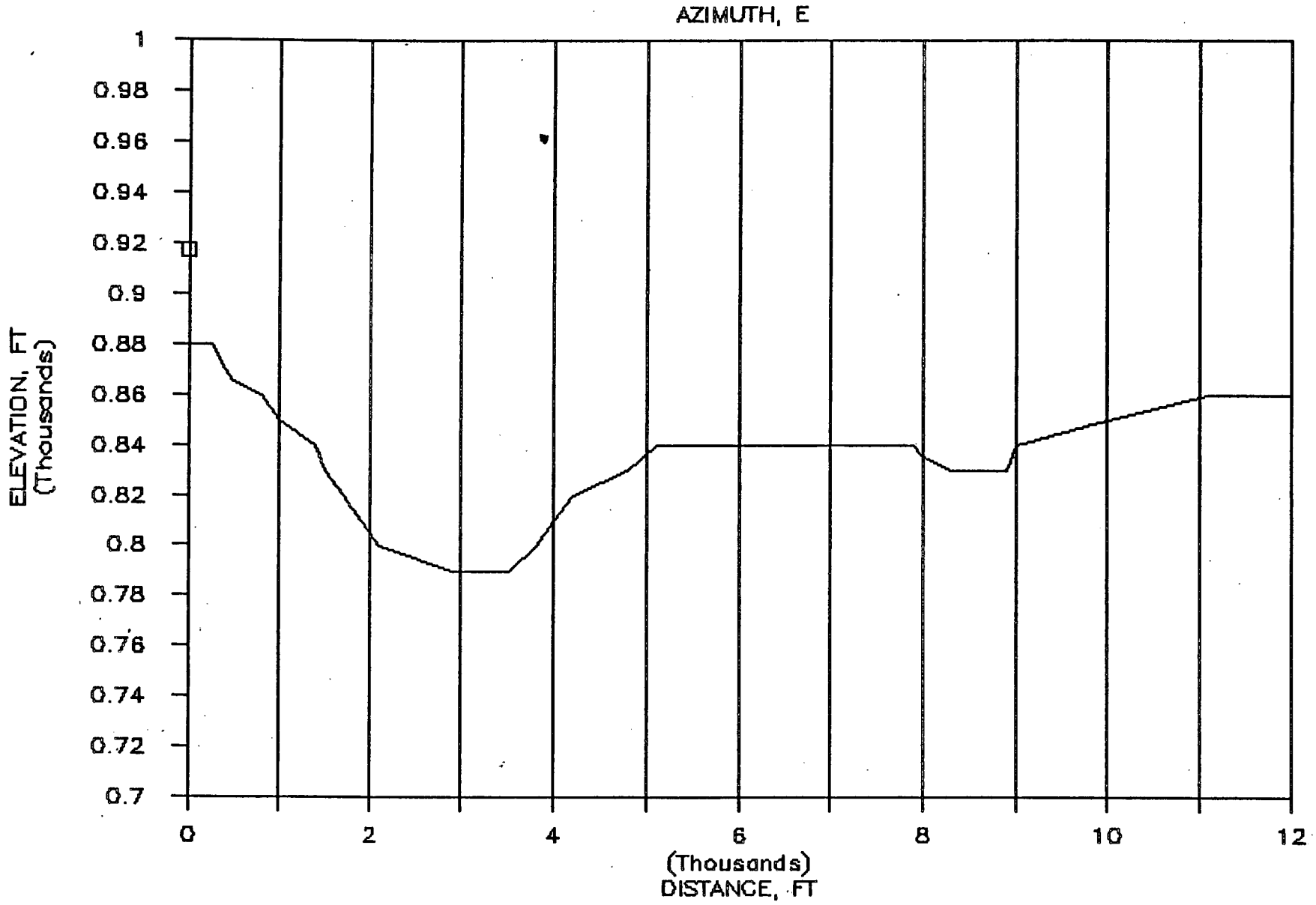
IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #28-FS1003

SOUND PRESSURE LEVELS IN DBC
UNDER MET CONDITION 1

DISTANCE IN FEET

AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	107.1	91.4	73.7	55.1	37.1	39.5	35.0
ENE	107.1	91.4	73.7	49.5	43.5	36.0	34.5
NE	107.1	91.4	73.7	54.7	44.7	31.8	25.7
NNE	107.1	91.4	73.7	55.1	48.6	45.4	35.3
N	107.1	91.4	73.7	55.1	48.6	45.4	35.1
NNW	107.1	91.4	73.7	55.1	48.6	45.4	35.0
NW	107.1	91.4	73.7	55.1	48.6	45.4	40.2
WNW	107.1	91.4	73.7	55.1	48.6	45.4	40.2
W	107.1	91.4	73.7	55.1	48.6	45.4	40.2
WSW	107.1	91.4	73.7	55.0	45.1	38.5	26.4
SW	107.1	91.4	73.7	55.1	48.6	37.0	22.5
SSW	107.1	91.4	73.7	55.1	40.2	40.5	35.2
S	107.1	91.4	73.7	55.1	42.5	45.4	40.2
SSE	107.1	91.4	73.7	55.1	48.2	42.6	27.7
SE	107.1	91.4	73.7	50.0	44.7	33.1	25.7
ESE	107.1	91.4	73.7	55.1	48.6	45.4	34.2

DUANE ARNOLD 29



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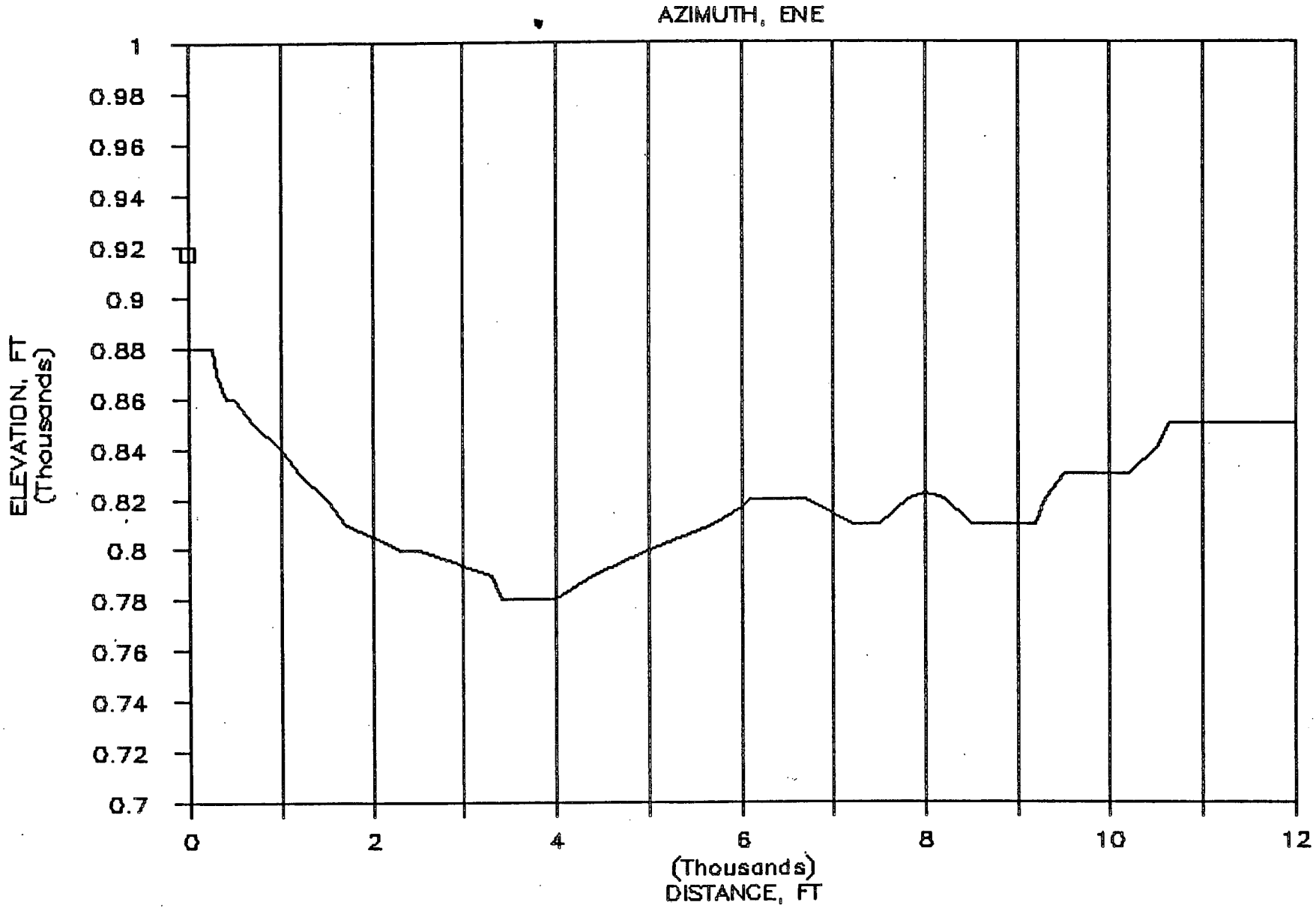

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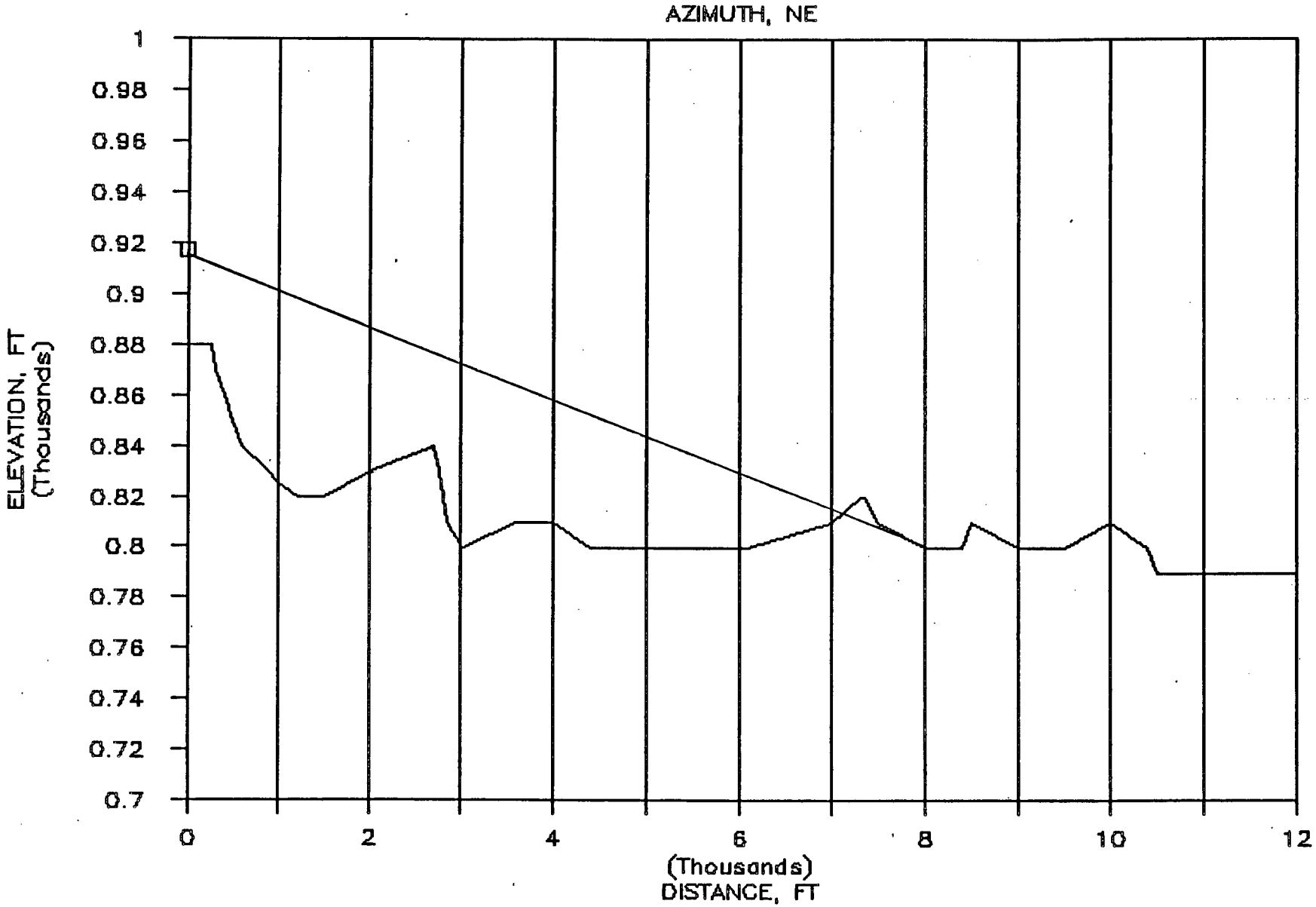
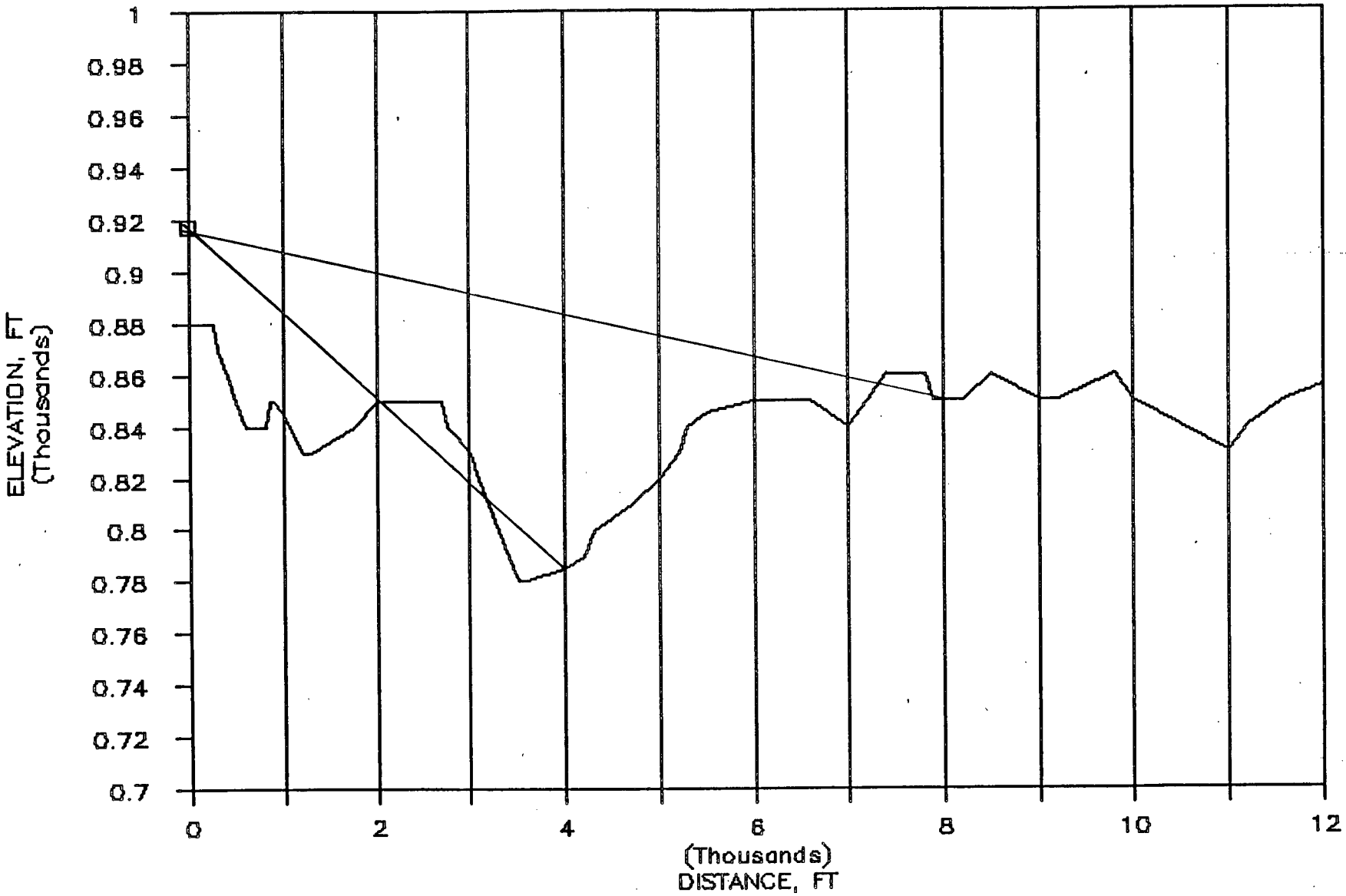


DUANE ARNOLD 29

AZIMUTH, NNE



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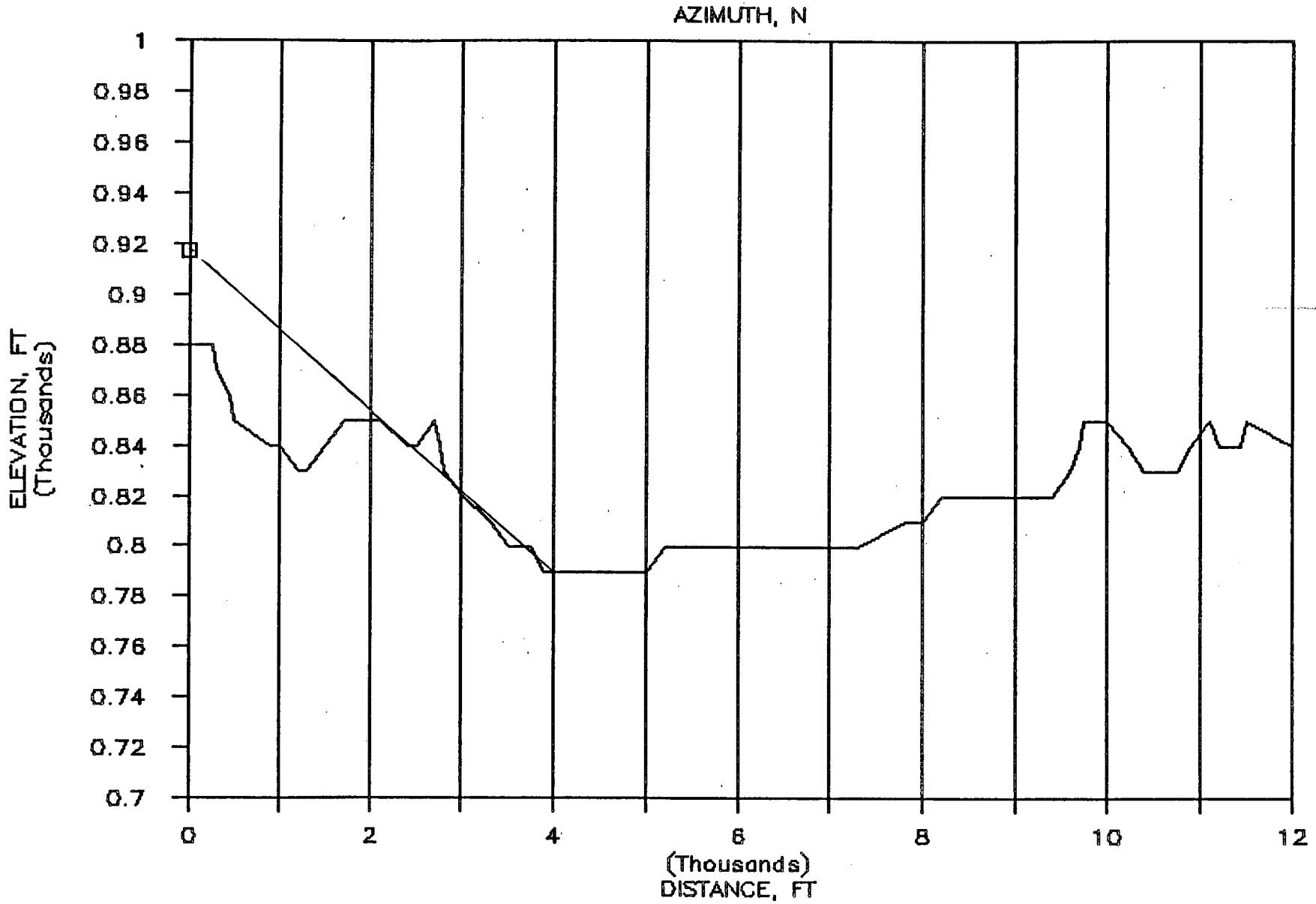

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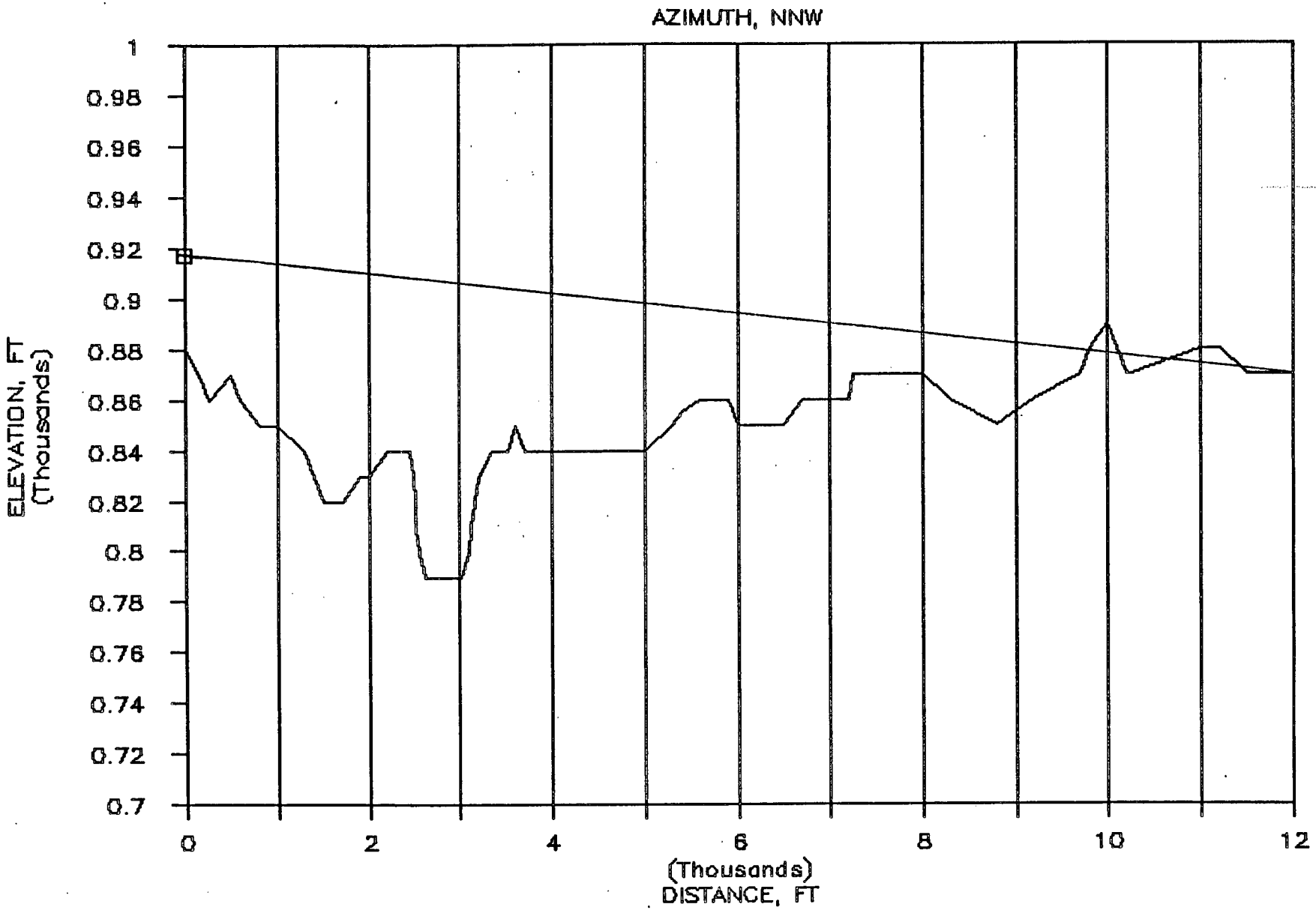

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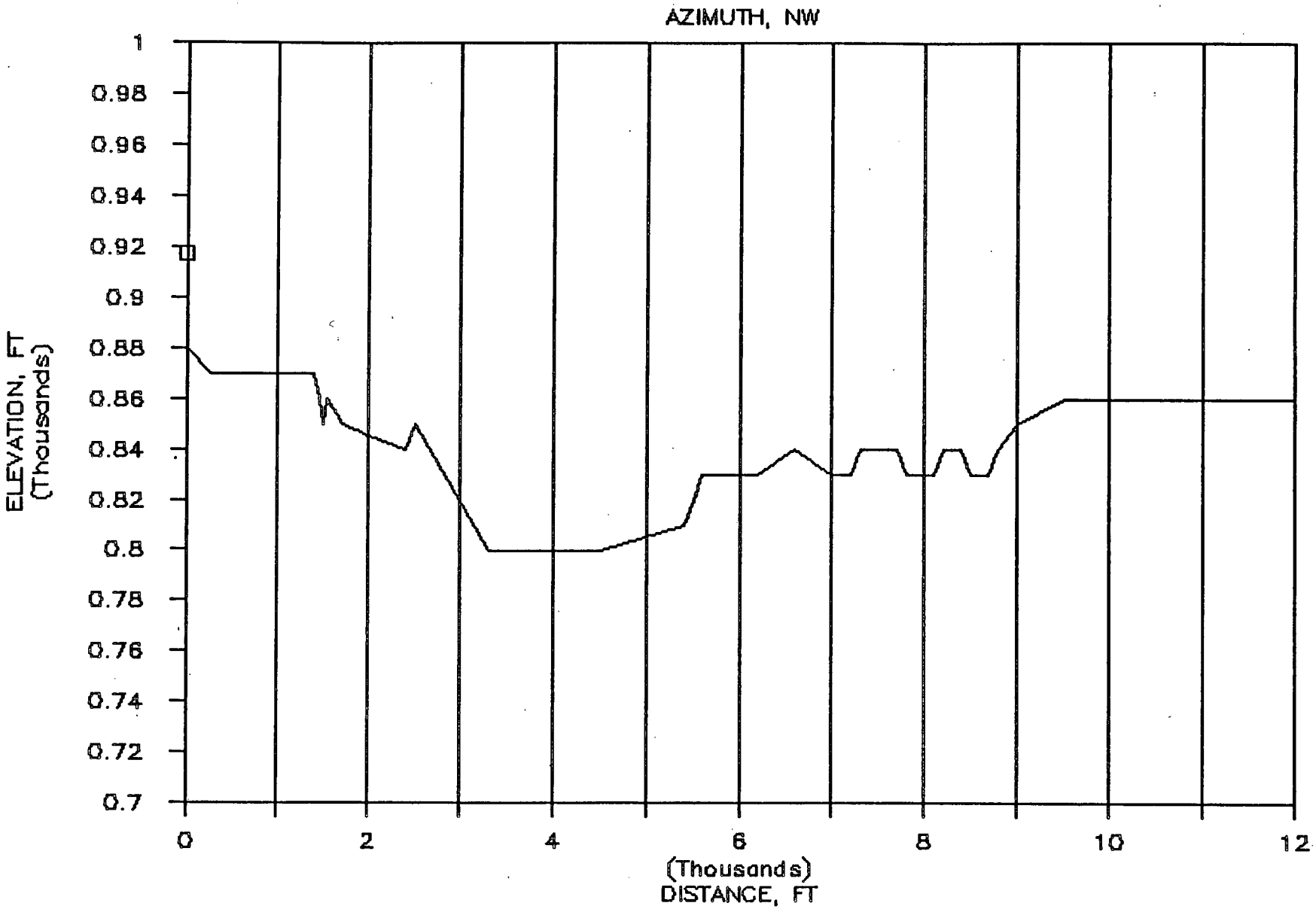

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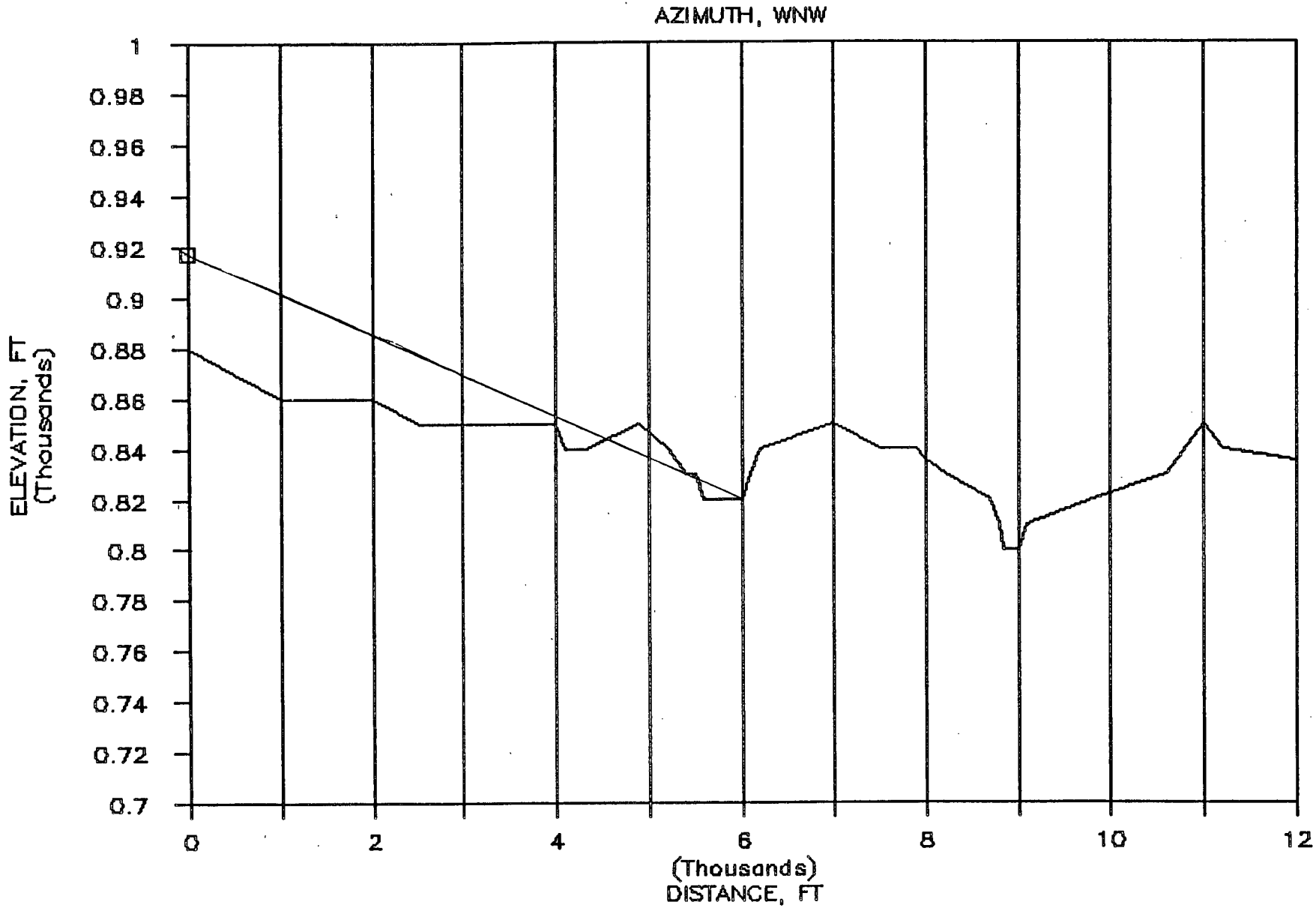

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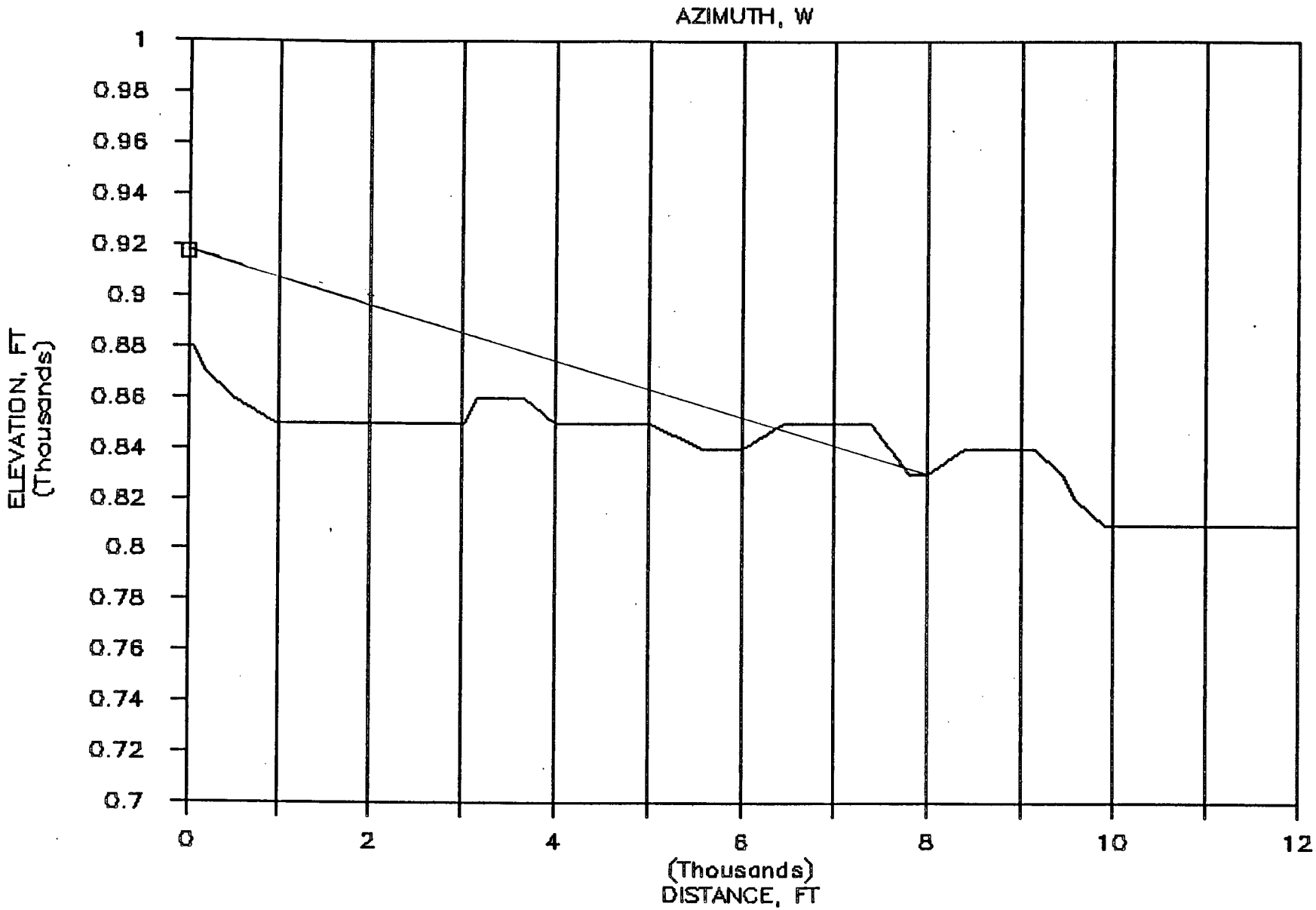
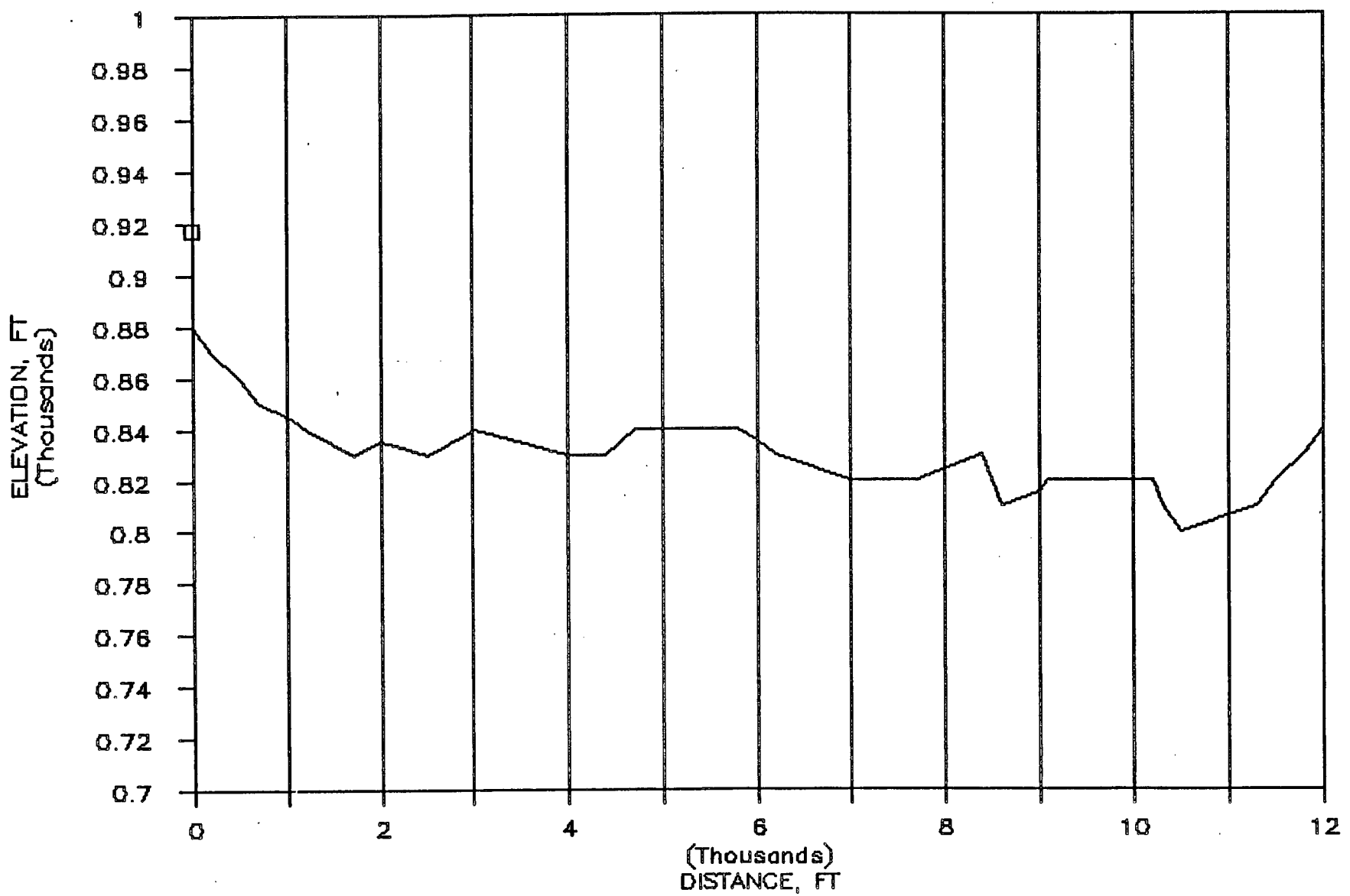


DUANE ARNOLD 29

AZIMUTH, WSW



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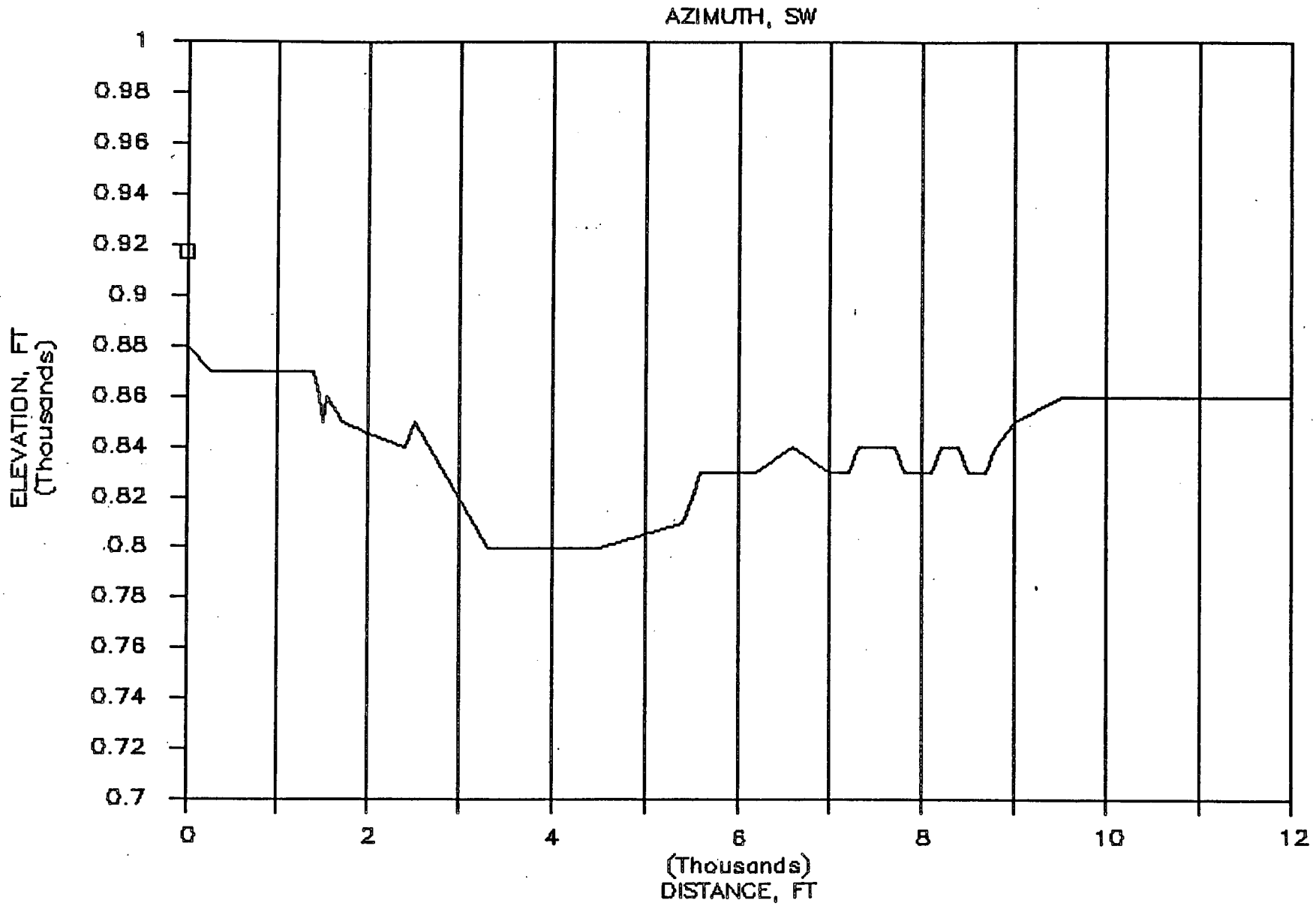

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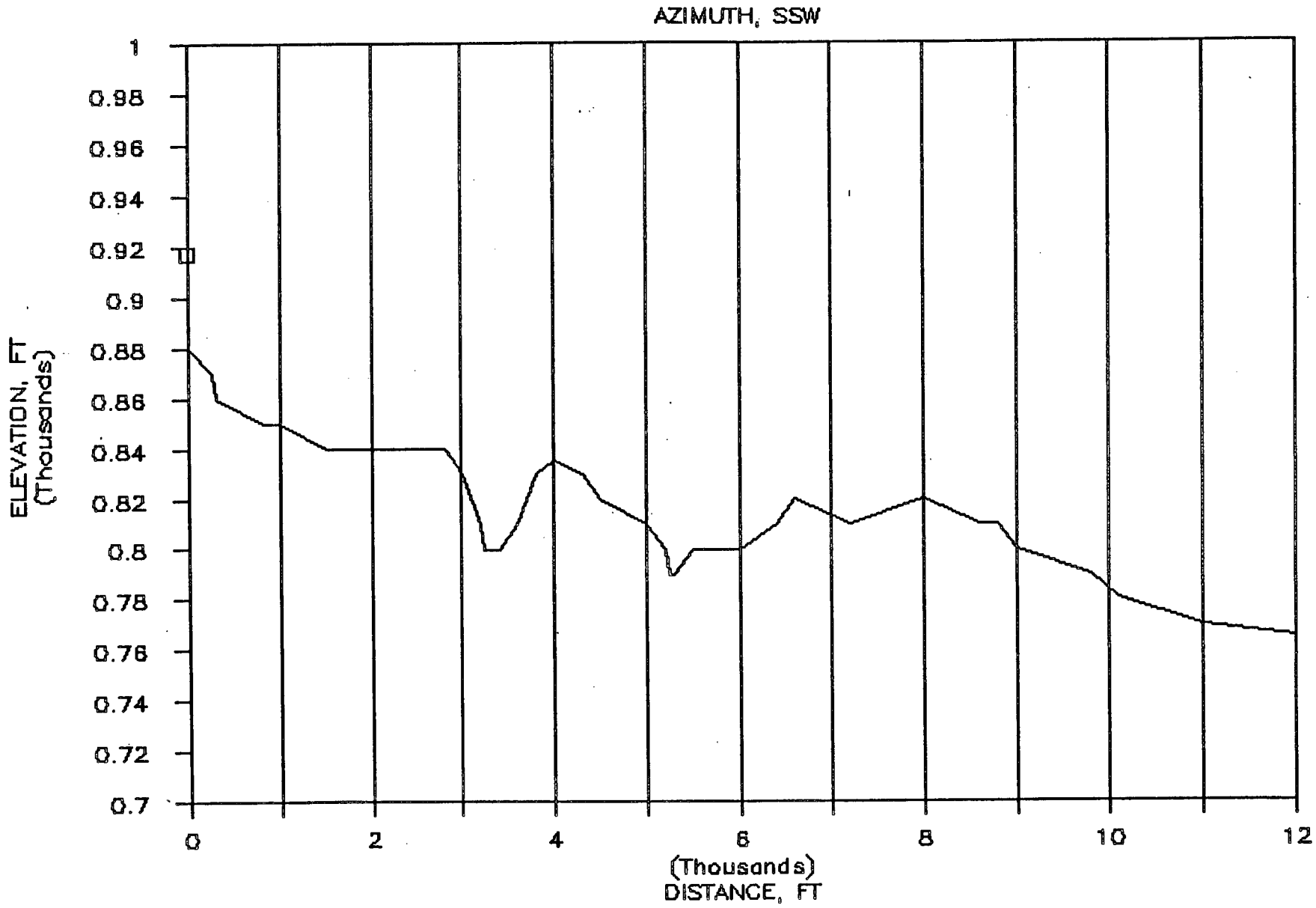

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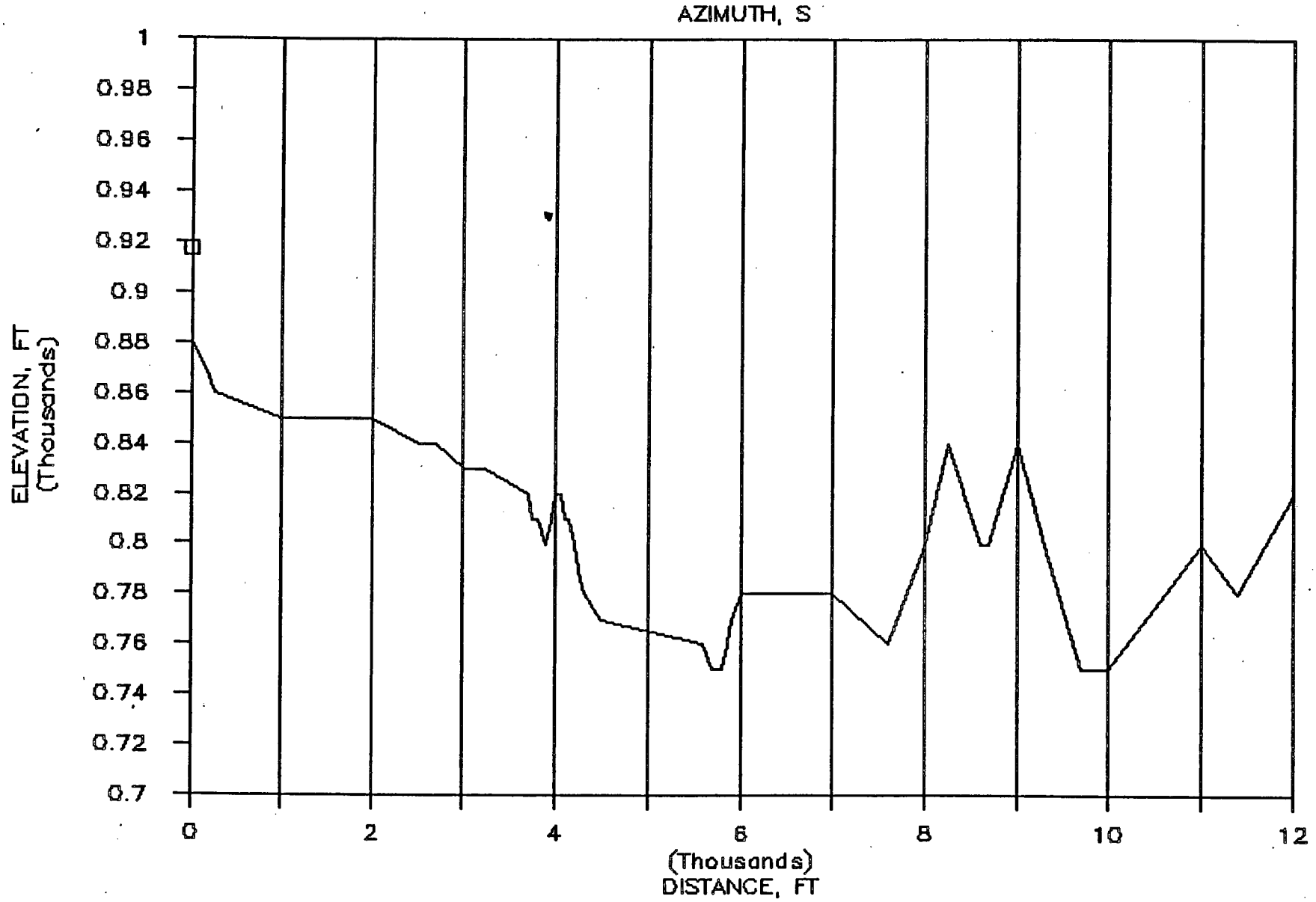
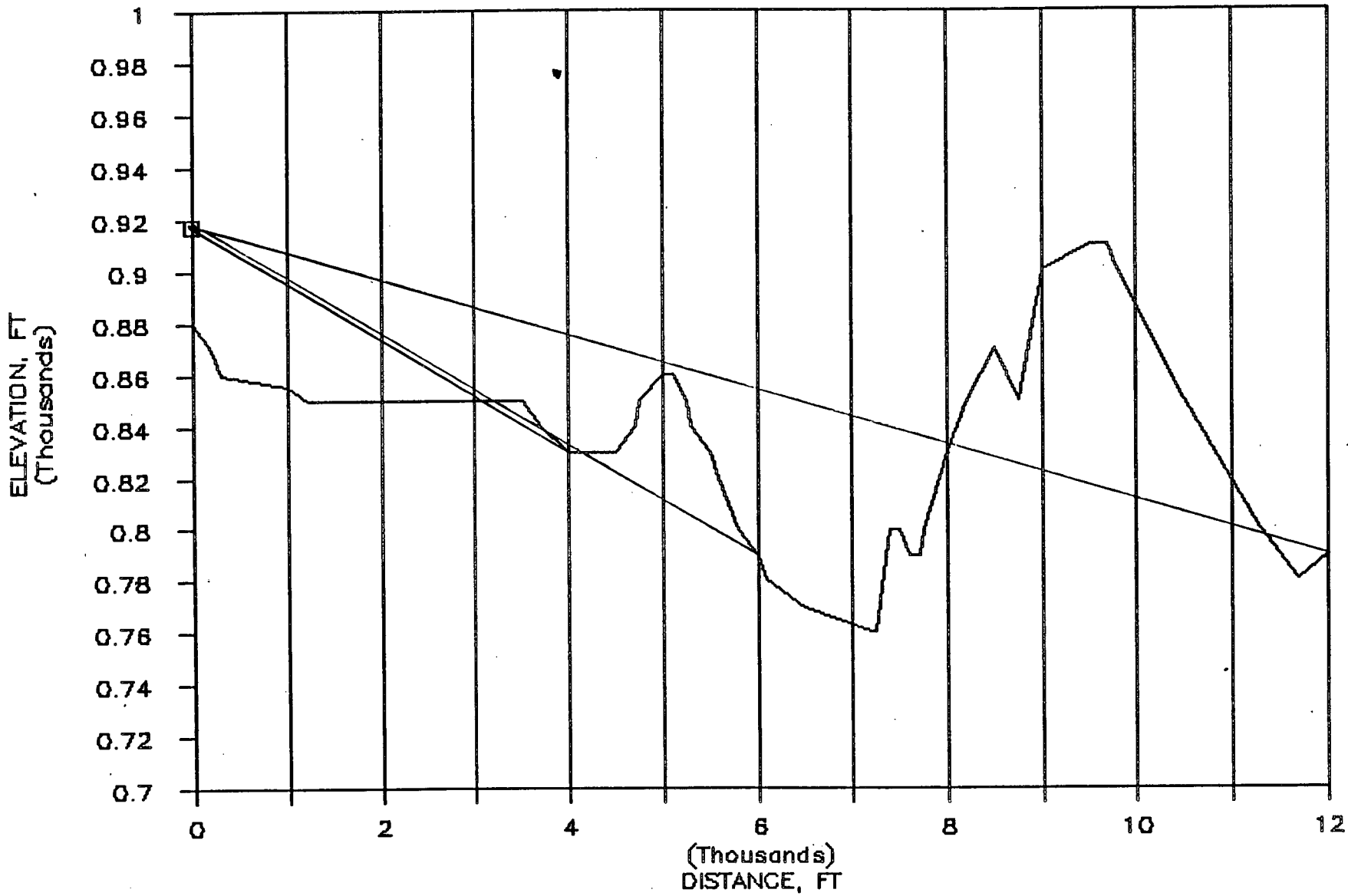


DUANE ARNOLD 29

AZIMUTH, SSE



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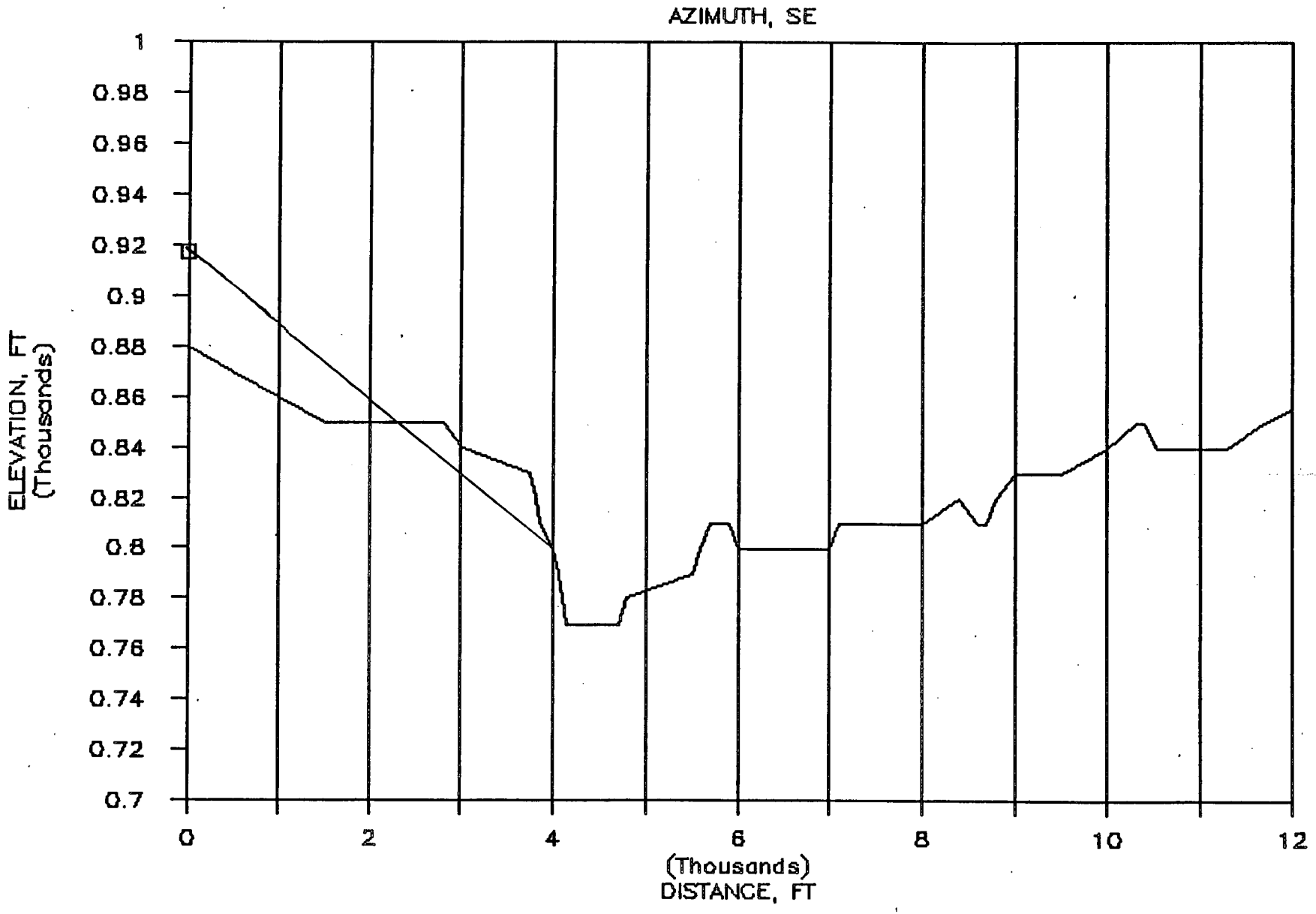

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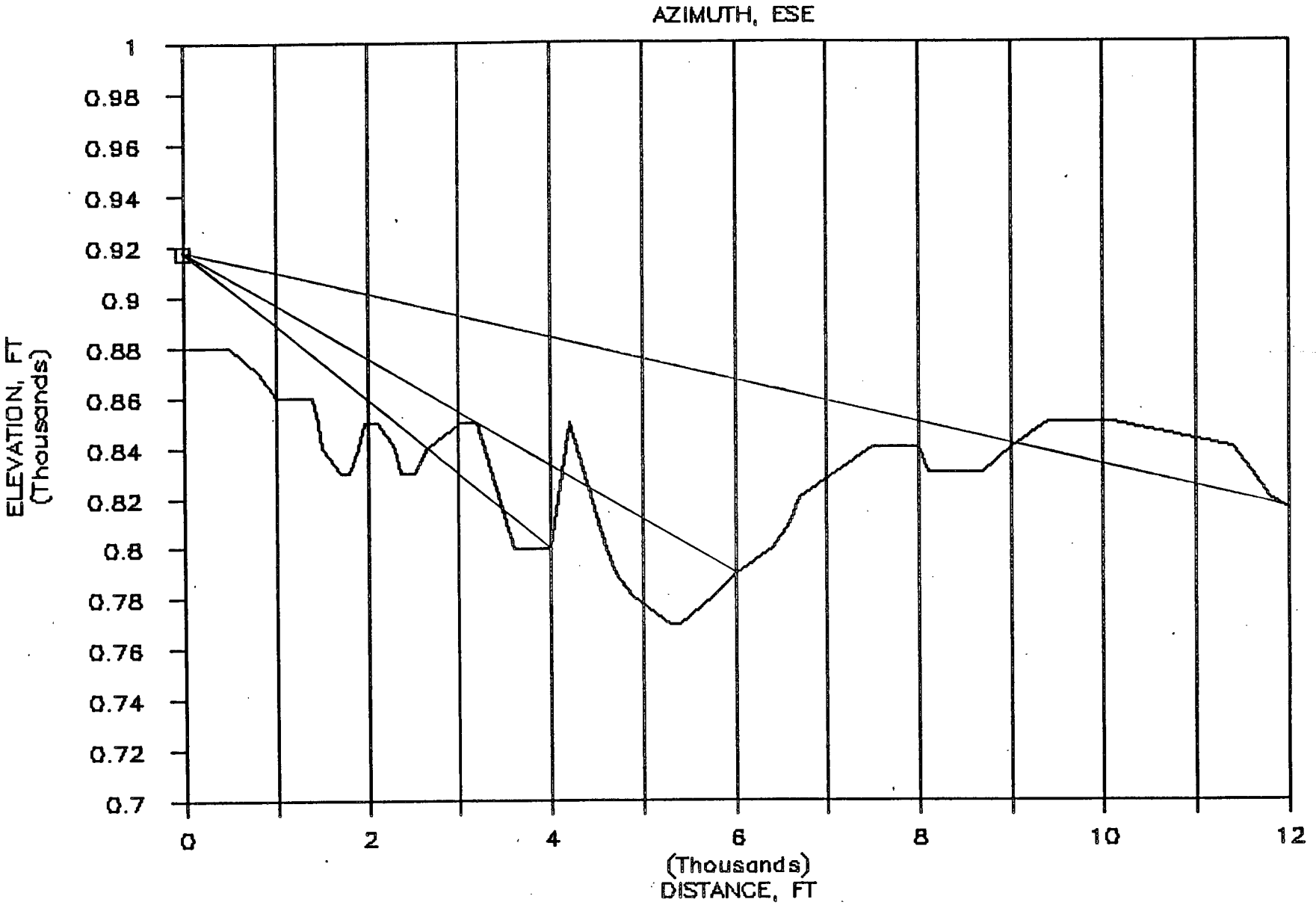


IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #29-FS1003
SOURCE-RECEIVER TOPOGRAPHICAL INPUTS

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	865.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	850.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	805.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	810.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	840.00	SOFT	0.	NO	0.	0.
6	8000.	90.00	835.00	SOFT	0.	NO	0.	0.
[illegible]	12000.	90.00	860.00	SOFT	0.	NO	0.	0.
[illegible]	500.	67.50	860.00	SOFT	0.	NO	0.	0.
9	1000.	67.50	840.00	SOFT	0.	NO	0.	0.
10	2000.	67.50	805.00	SOFT	0.	NO	0.	0.
11	4000.	67.50	780.00	SOFT	0.	NO	0.	0.
12	6000.	67.50	817.00	SOFT	0.	NO	0.	0.
13	8000.	67.50	822.00	SOFT	0.	NO	0.	0.
14	12000.	67.50	850.00	SOFT	0.	NO	0.	0.
15	500.	45.00	850.00	SOFT	0.	NO	0.	0.
16	1000.	45.00	825.00	SOFT	0.	NO	0.	0.
17	2000.	45.00	830.00	SOFT	0.	NO	0.	0.
18	4000.	45.00	810.00	SOFT	0.	NO	0.	0.
19	6000.	45.00	800.00	SOFT	0.	NO	0.	0.
20	8000.	45.00	800.00	SOFT	0.	YES	7300.	820.
21	12000.	45.00	790.00	SOFT	0.	NO	0.	0.
22	500.	22.50	850.00	SOFT	0.	NO	0.	0.
23	1000.	22.50	845.00	SOFT	0.	NO	0.	0.
24	2000.	22.50	850.00	SOFT	0.	NO	0.	0.
25	4000.	22.50	785.00	SOFT	0.	YES	2750.	840.
26	6000.	22.50	850.00	SOFT	0.	NO	0.	0.
27	8000.	22.50	850.00	SOFT	0.	YES	7400.	860.
28	12000.	22.50	855.00	SOFT	0.	NO	0.	0.
29	500.	.00	850.00	SOFT	0.	NO	0.	0.
30	1000.	.00	840.00	SOFT	0.	NO	0.	0.
31	2000.	.00	850.00	SOFT	0.	NO	0.	0.
32	4000.	.00	790.00	SOFT	0.	YES	2700.	850.
33	6000.	.00	800.00	SOFT	0.	NO	0.	0.
34	8000.	.00	810.00	SOFT	0.	NO	0.	0.
35	12000.	.00	840.00	SOFT	0.	NO	0.	0.
[illegible]	500.	337.50	870.00	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	850.00	SOFT	0.	NO	0.	0.
38	2000.	337.50	830.00	SOFT	0.	NO	0.	0.
39	4000.	337.50	840.00	SOFT	0.	NO	0.	0.
40	6000.	337.50	850.00	SOFT	0.	NO	0.	0.
41	8000.	337.50	870.00	SOFT	0.	NO	0.	0.
42	12000.	337.50	870.00	SOFT	0.	YES	10000.	890.
43	500.	315.00	870.00	SOFT	0.	NO	0.	0.
44	1000.	315.00	870.00	SOFT	0.	NO	0.	0.
45	2000.	315.00	845.00	SOFT	0.	NO	0.	0.
46	4000.	315.00	800.00	SOFT	0.	NO	0.	0.
47	6000.	315.00	830.00	SOFT	0.	NO	0.	0.
48	8000.	315.00	830.00	SOFT	0.	NO	0.	0.
49	12000.	315.00	860.00	SOFT	0.	NO	0.	0.
50	500.	292.50	870.00	SOFT	0.	NO	0.	0.
51	1000.	292.50	860.00	SOFT	0.	NO	0.	0.
52	2000.	292.50	860.00	SOFT	0.	NO	0.	0.
53	4000.	292.50	850.00	SOFT	0.	NO	0.	0.
54	6000.	292.50	820.00	SOFT	0.	YES	4900.	850.
55	8000.	292.50	835.00	SOFT	0.	NO	0.	0.
56	12000.	292.50	835.00	SOFT	0.	NO	0.	0.
57	500.	270.00	860.00	SOFT	0.	NO	0.	0.
58	1000.	270.00	850.00	SOFT	0.	NO	0.	0.
59	2000.	270.00	850.00	SOFT	0.	NO	0.	0.
60	4000.	270.00	850.00	SOFT	0.	NO	0.	0.
61	6000.	270.00	840.00	SOFT	0.	NO	0.	0.
62	8000.	270.00	830.00	SOFT	0.	YES	6450.	850.
63	12000.	270.00	810.00	SOFT	0.	NO	0.	0.
64	500.	247.50	860.00	SOFT	0.	NO	0.	0.
65	1000.	247.50	845.00	SOFT	0.	NO	0.	0.
66	2000.	247.50	835.00	SOFT	0.	NO	0.	0.
67	4000.	247.50	830.00	SOFT	0.	NO	0.	0.
68	6000.	247.50	835.00	SOFT	0.	NO	0.	0.
69	8000.	247.50	825.00	SOFT	0.	NO	0.	0.
70	12000.	247.50	840.00	SOFT	0.	NO	0.	0.
71	500.	225.00	860.00	SOFT	0.	NO	0.	0.
72	1000.	225.00	850.00	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	840.00	SOFT	0.	NO	0.	0.
74	4000.	225.00	820.00	SOFT	0.	NO	0.	0.
75	6000.	225.00	820.00	SOFT	0.	NO	0.	0.
76	8000.	225.00	800.00	SOFT	0.	NO	0.	0.
77	12000.	225.00	800.00	SOFT	0.	YES	10000.	820.
78	500.	202.50	855.00	SOFT	0.	NO	0.	0.
79	1000.	202.50	850.00	SOFT	0.	NO	0.	0.
80	2000.	202.50	840.00	SOFT	0.	NO	0.	0.
81	4000.	202.50	835.00	SOFT	0.	NO	0.	0.
82	6000.	202.50	800.00	SOFT	0.	NO	0.	0.
83	8000.	202.50	820.00	SOFT	0.	NO	0.	0.
[illegible]	12000.	202.50	765.00	SOFT	0.	NO	0.	0.
[illegible]	500.	180.00	855.00	SOFT	0.	NO	0.	0.
86	1000.	180.00	850.00	SOFT	0.	NO	0.	0.
87	2000.	180.00	850.00	SOFT	0.	NO	0.	0.
88	4000.	180.00	820.00	SOFT	0.	NO	0.	0.
89	6000.	180.00	780.00	SOFT	0.	NO	0.	0.
90	8000.	180.00	800.00	SOFT	0.	NO	0.	0.
91	12000.	180.00	820.00	SOFT	0.	NO	0.	0.
92	500.	157.50	858.00	SOFT	0.	NO	0.	0.
93	1000.	157.50	855.00	SOFT	0.	NO	0.	0.
94	2000.	157.50	850.00	SOFT	0.	NO	0.	0.
95	4000.	157.50	830.00	SOFT	0.	YES	3500.	850.
96	6000.	157.50	790.00	SOFT	0.	YES	5000.	860.
97	8000.	157.50	830.00	SOFT	0.	NO	0.	0.
98	12000.	157.50	790.00	SOFT	0.	YES	9500.	910.
99	500.	135.00	870.00	SOFT	0.	NO	0.	0.
100	1000.	135.00	860.00	SOFT	0.	NO	0.	0.
101	2000.	135.00	850.00	SOFT	0.	NO	0.	0.
102	4000.	135.00	800.00	SOFT	0.	YES	2800.	850.
103	6000.	135.00	800.00	SOFT	0.	NO	0.	0.
104	8000.	135.00	810.00	SOFT	0.	NO	0.	0.
105	12000.	135.00	855.00	SOFT	0.	NO	0.	0.
106	500.	112.50	860.00	SOFT	0.	NO	0.	0.
107	1000.	112.50	860.00	SOFT	0.	NO	0.	0.
108	2000.	112.50	850.00	SOFT	0.	NO	0.	0.
109	4000.	112.50	800.00	SOFT	0.	YES	3000.	850.
110	6000.	112.50	790.00	SOFT	0.	YES	4200.	850.
111	8000.	112.50	840.00	SOFT	0.	NO	0.	0.
112	12000.	112.50	815.00	SOFT	0.	YES	9400.	850.

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #29-FS1003
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	DUANE - FS1003	160.4	160.3	.0	.0	.0	.0	.0	160.0	148.0	140.0	135.0

XO= .00 YO= .00 ZO= 917.00 HEIGHT ABOVE GROUND= 37.00

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #29-FS1003
METEOROLOGICAL INPUT CONDITIONS

H1= 10.67 METERS H2= 50.29 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)
1981		8	21	12	177.0	2.1	2.6	23.9	23.2	30.0	742.0

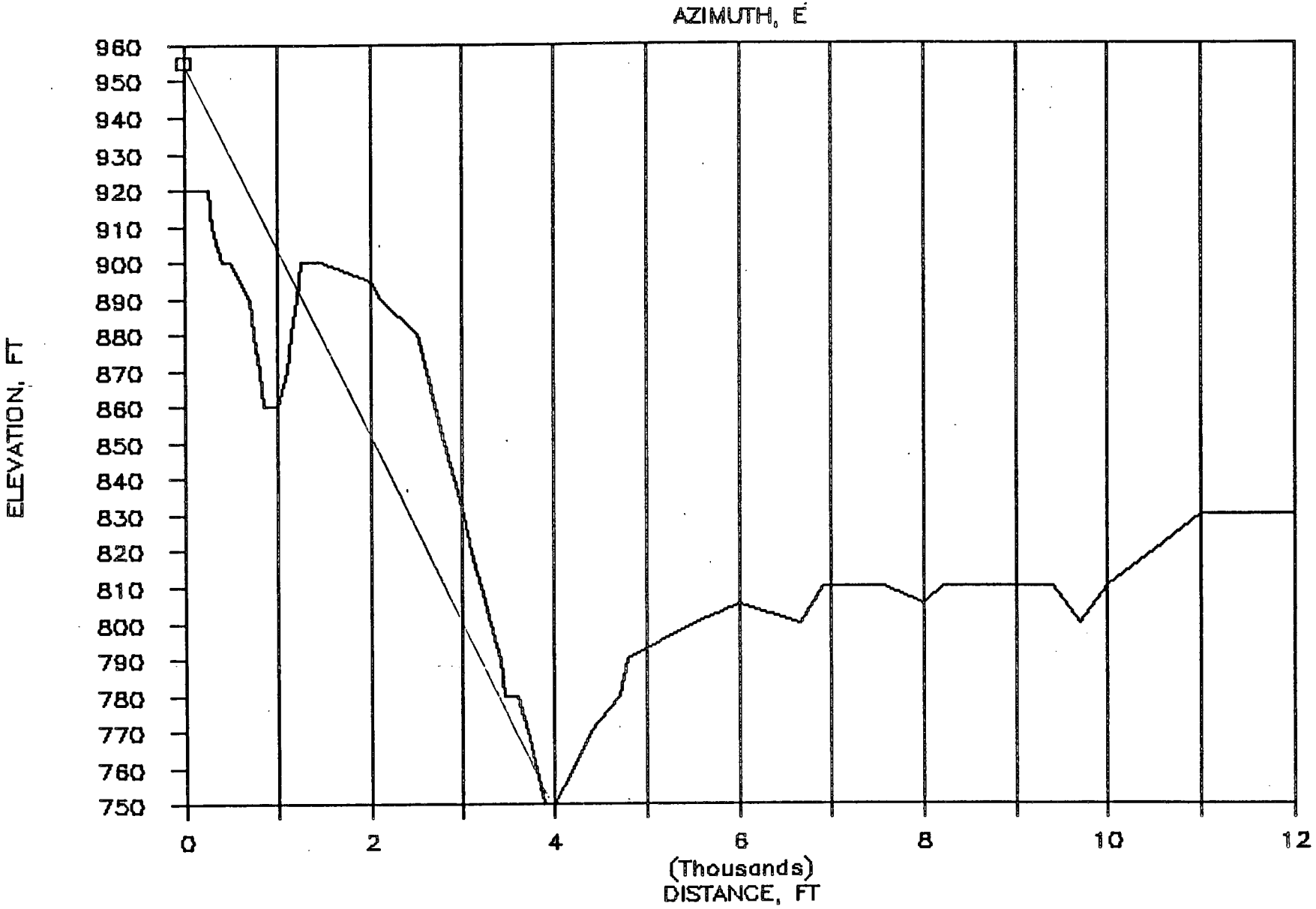
IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #29-FS1003

SOUND PRESSURE LEVELS IN DBC
UNDER MET CONDITION 1

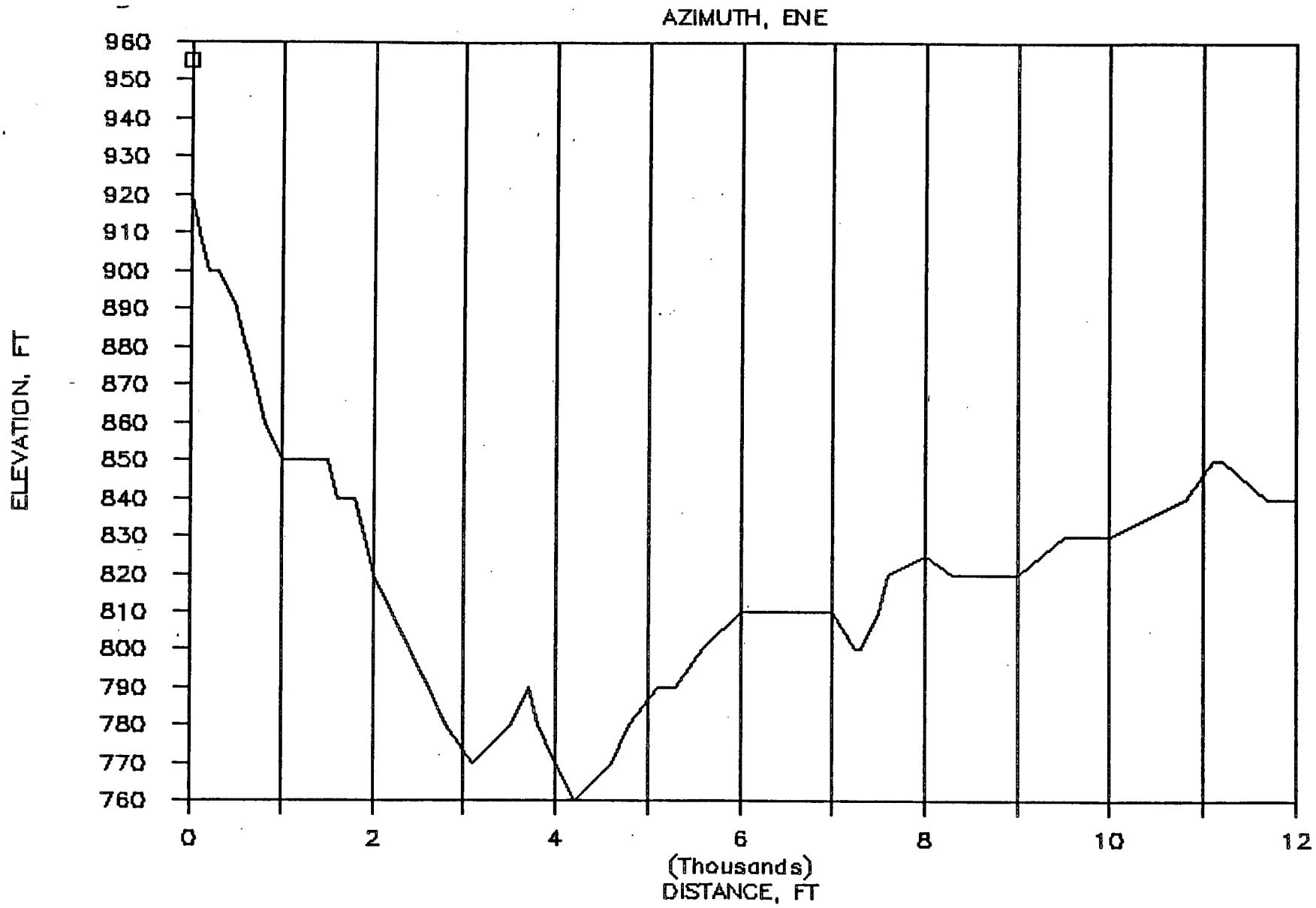
DISTANCE IN FEET

AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	106.7	91.2	73.5	55.4	47.7	44.4	39.2
ENE	106.6	91.2	73.5	55.4	47.7	44.4	38.9
NE	106.6	91.1	73.5	54.6	43.2	29.8	23.5
NNE	106.6	91.2	73.5	48.4	47.7	39.1	39.2
N	106.6	91.2	73.5	47.2	47.7	44.4	39.2
NNW	106.7	91.2	73.5	55.4	47.7	44.4	33.4
NW	106.7	91.2	73.5	55.4	47.7	44.4	39.2
WNW	106.7	91.2	73.5	55.4	41.2	44.4	39.2
W	106.6	91.2	73.5	55.4	47.7	39.5	39.2
WSW	106.6	91.2	73.5	54.8	43.6	36.7	24.3
SW	106.6	91.2	73.5	55.4	47.7	44.4	39.2
SSW	106.6	91.2	73.5	55.4	47.7	44.4	39.2
S	106.6	91.2	73.5	55.4	47.7	44.4	39.2
SSE	106.6	91.2	73.5	48.7	32.3	41.0	14.6
SE	106.7	91.2	73.5	47.3	43.2	36.2	23.6
ESE	106.7	91.2	73.5	46.3	39.6	44.4	33.5

DUANE ARNOLD 31

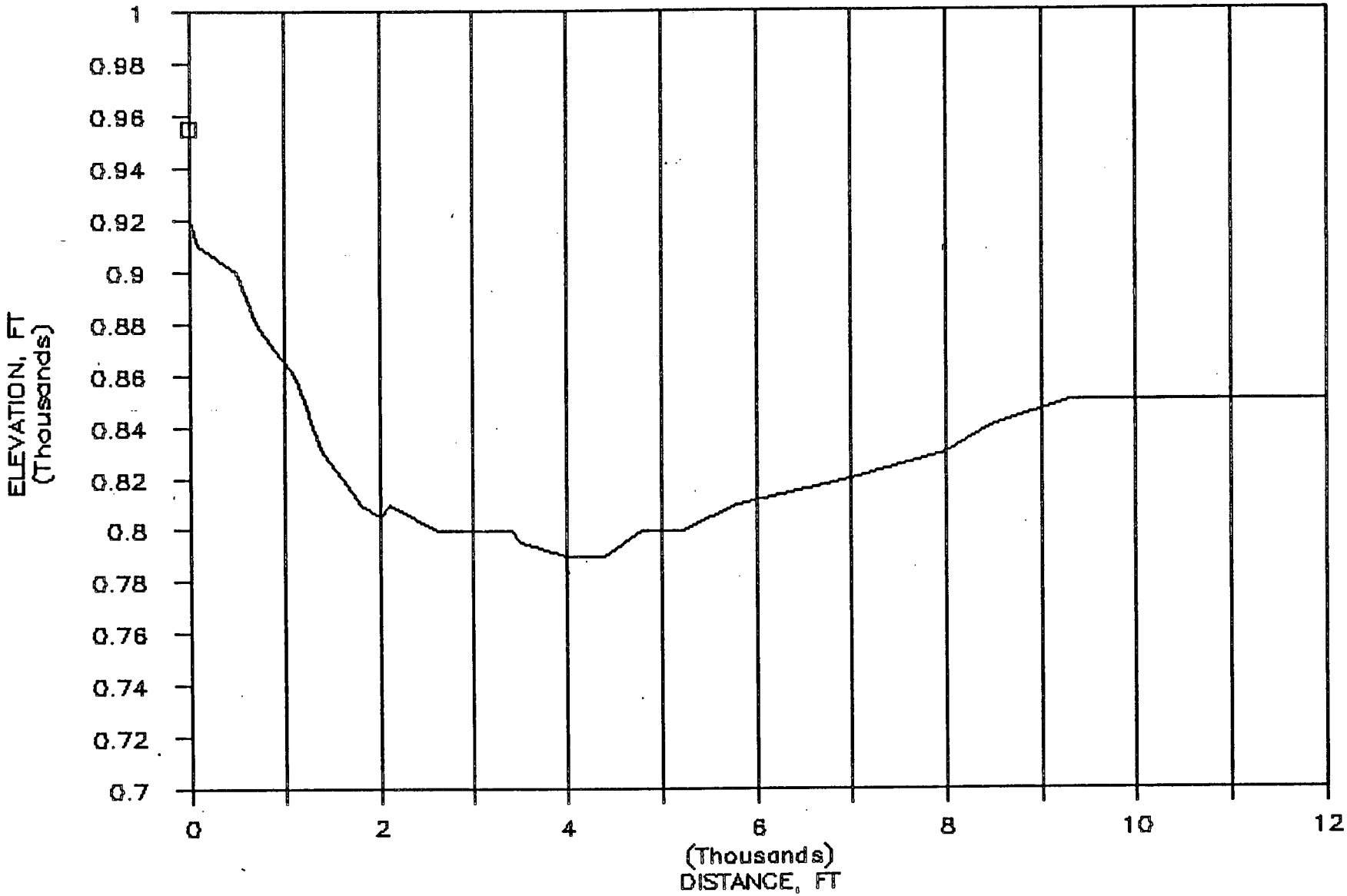


DUANE ARNOLD 31

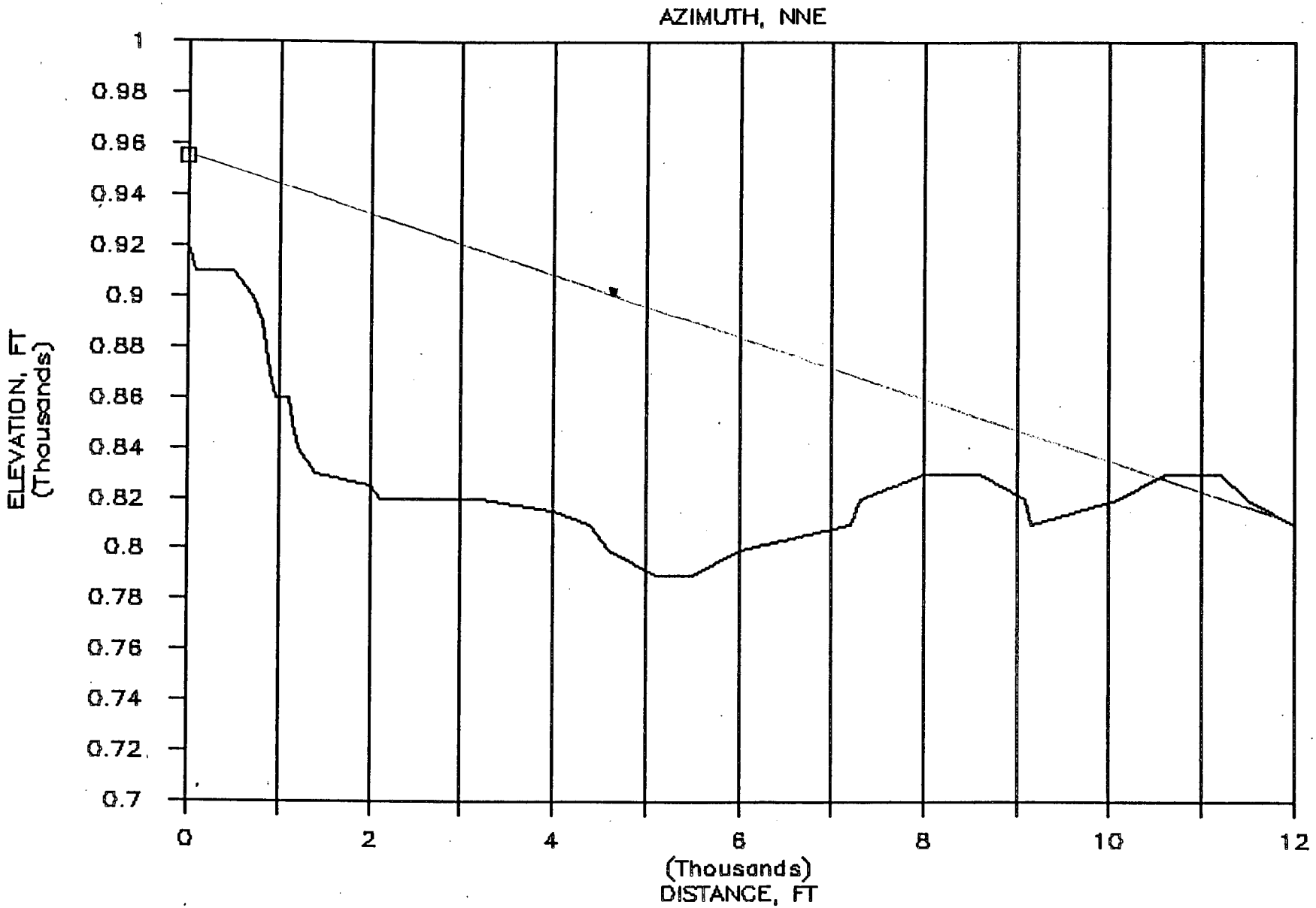


DUANE ARNOLD 31

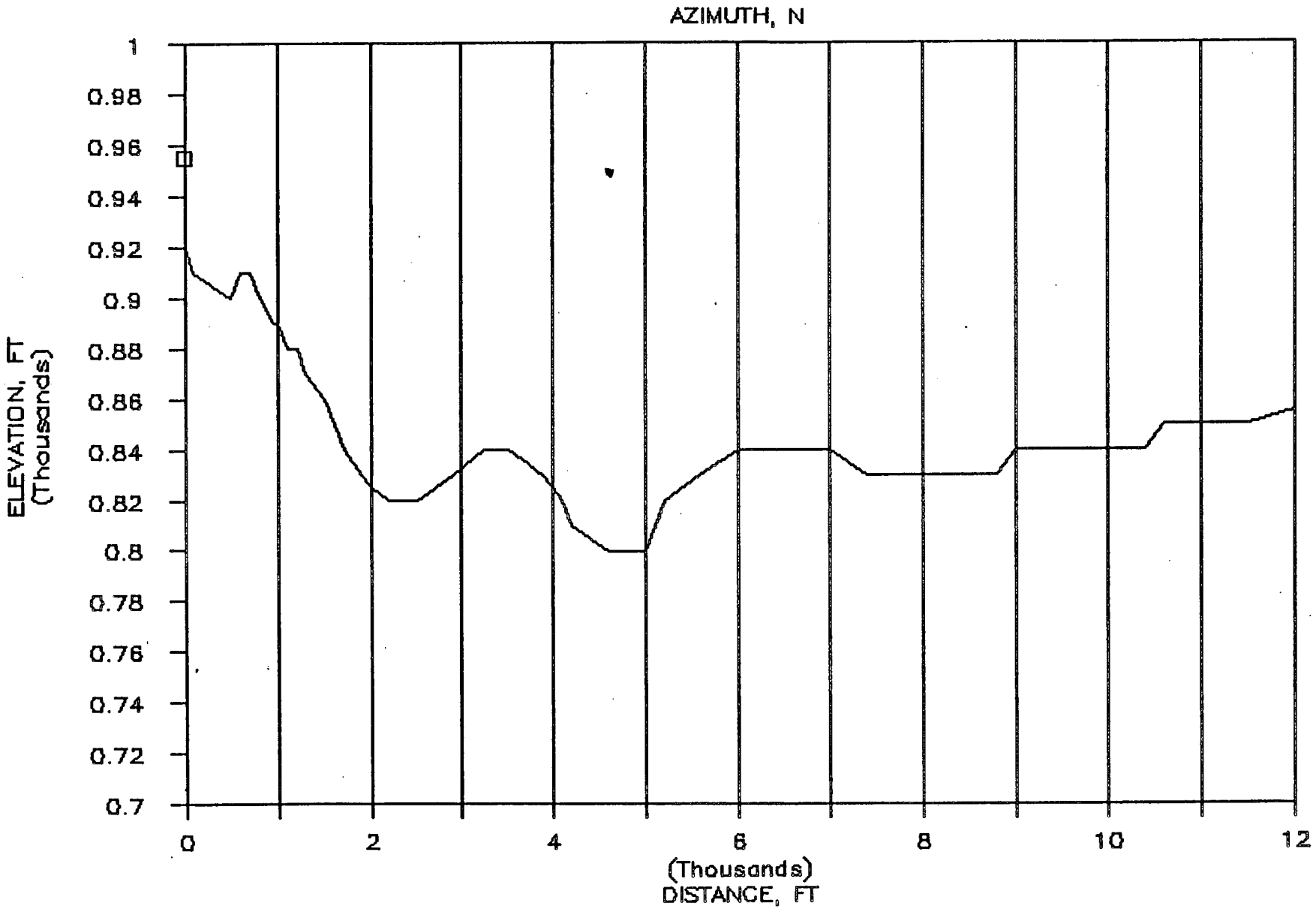
AZIMUTH, NE



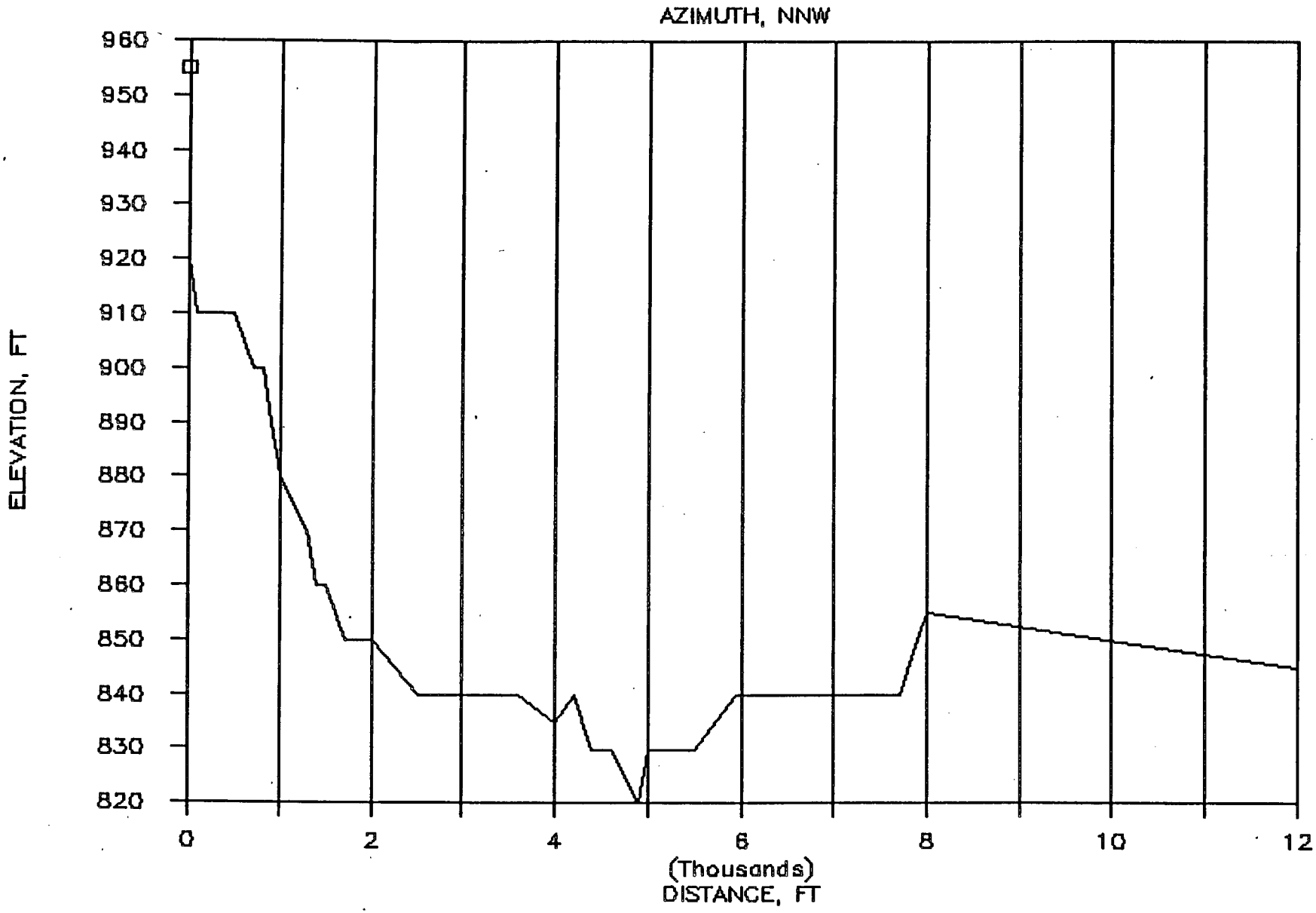
DUANE ARNOLD 31



DUANE ARNOLD 31

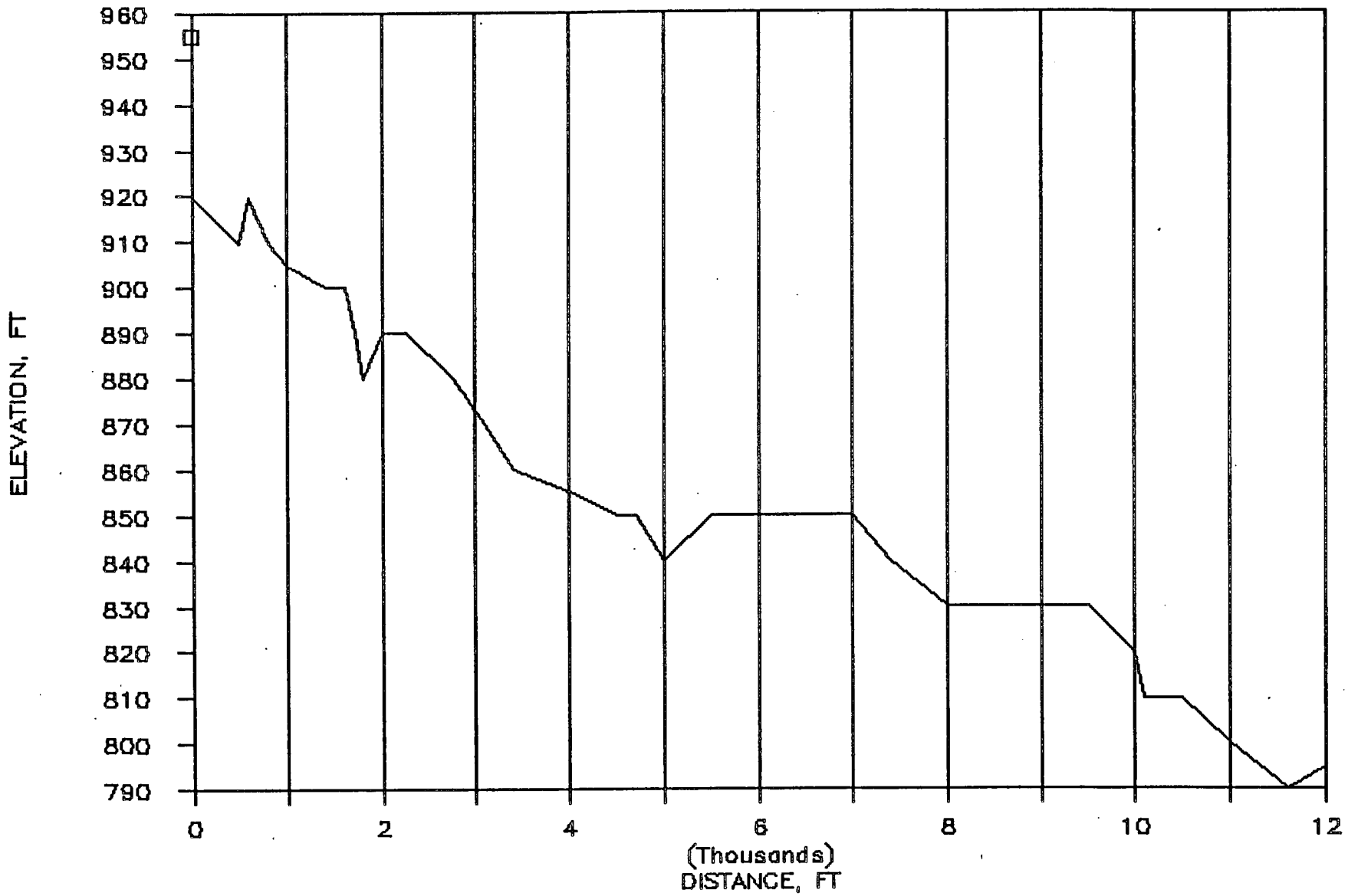


DUANE ARNOLD 31

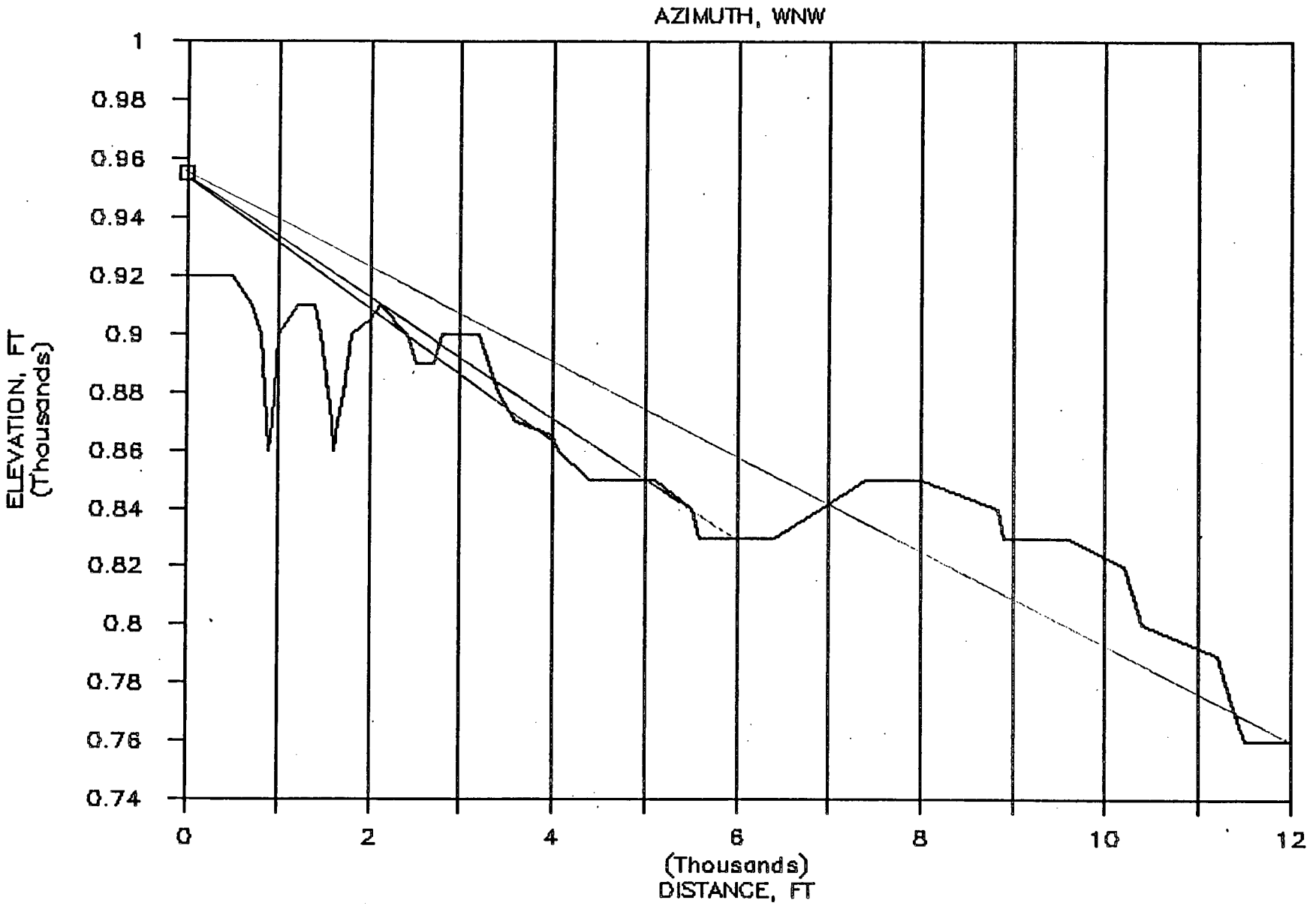


DUANE ARNOLD 31

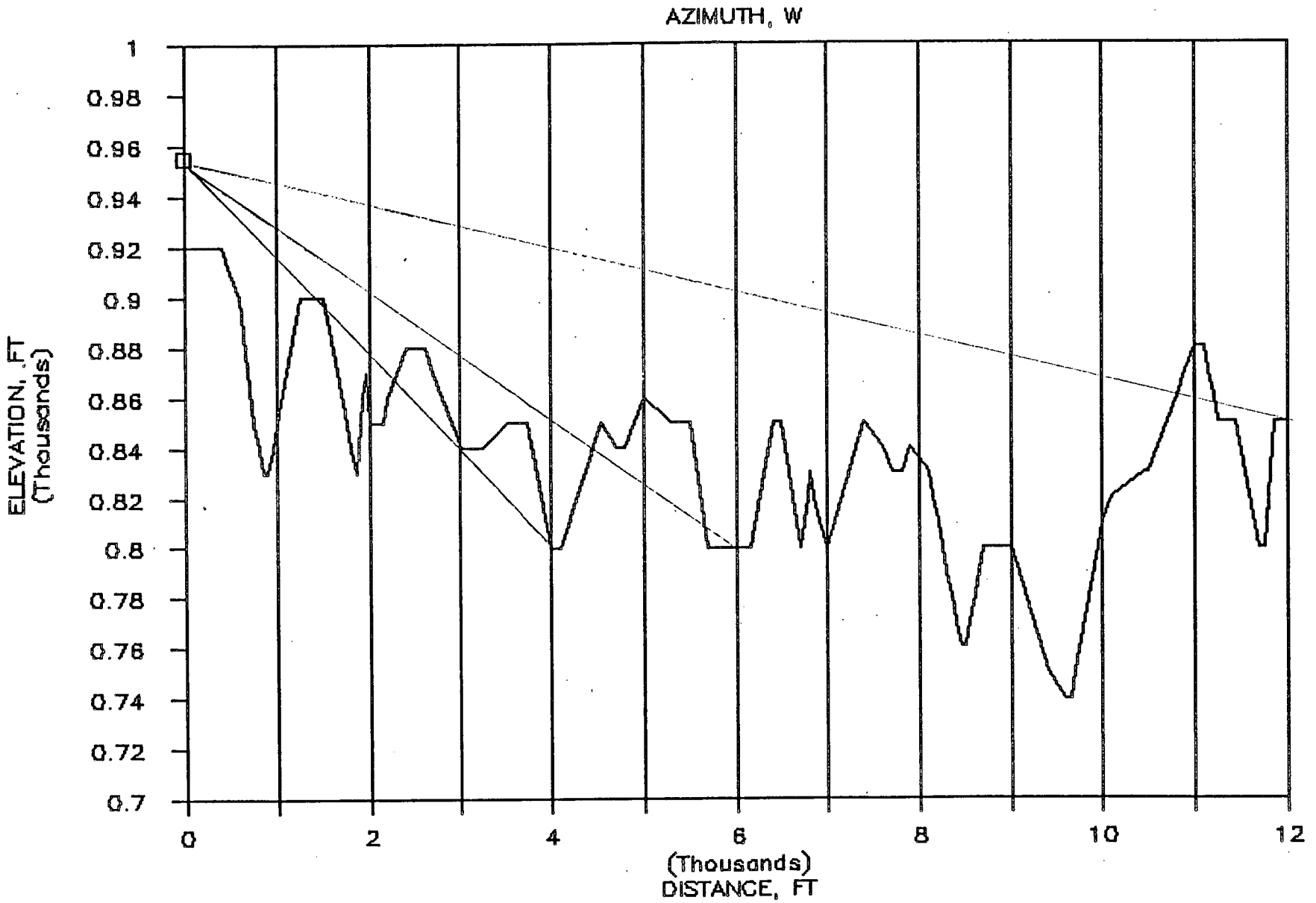
AZIMUTH, NW



DUANE ARNOLD 31



DUANE ARNOLD 31



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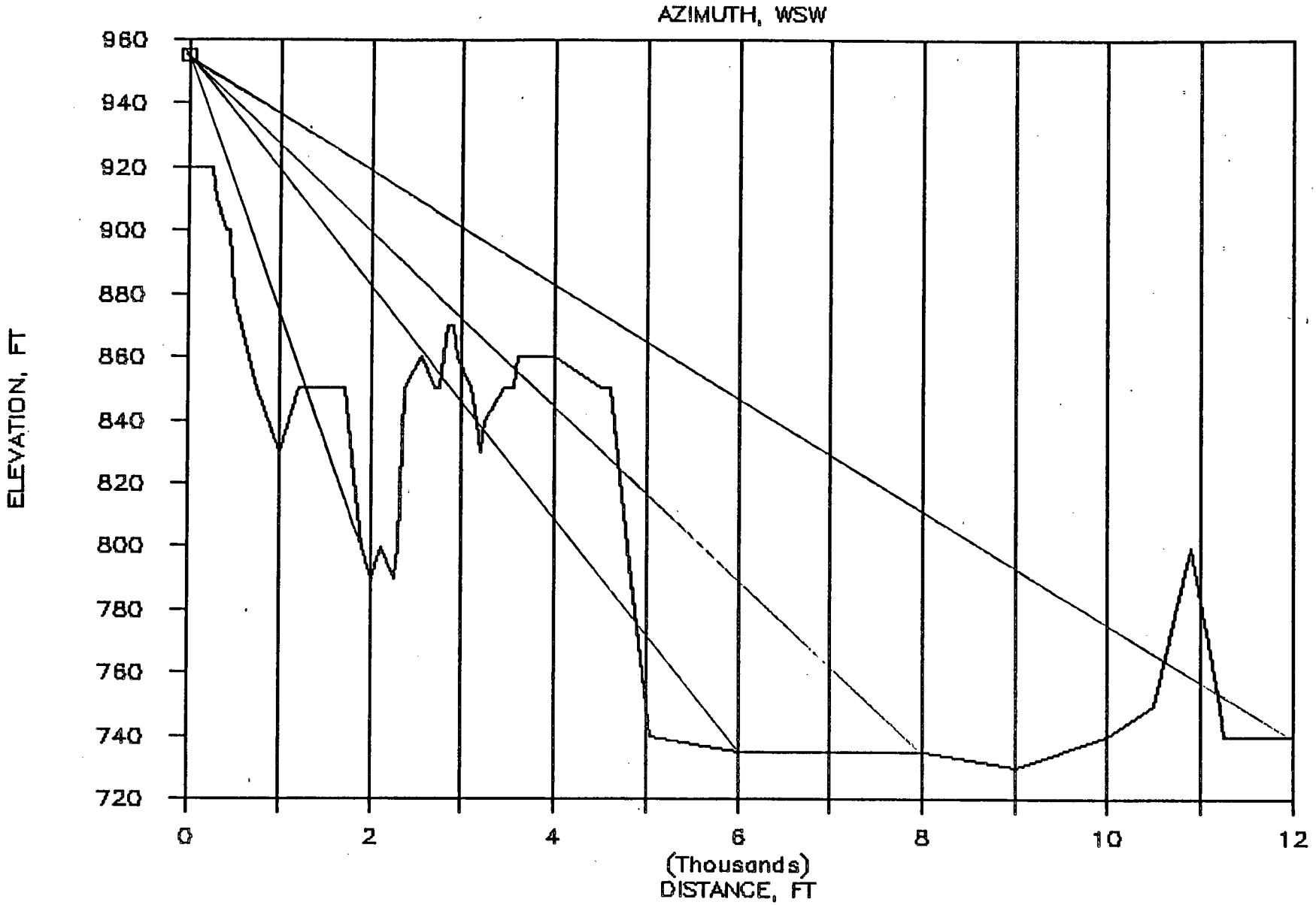

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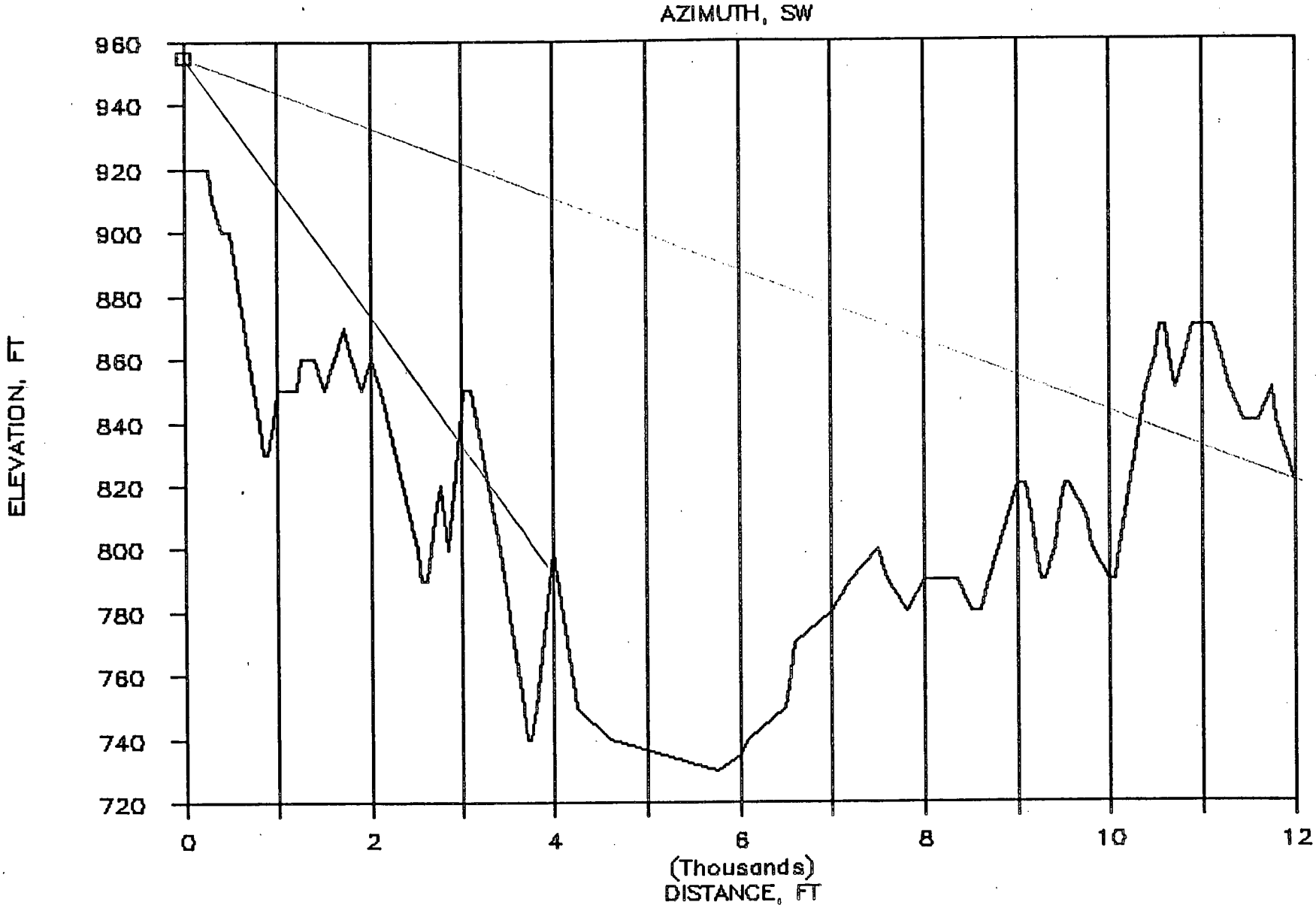

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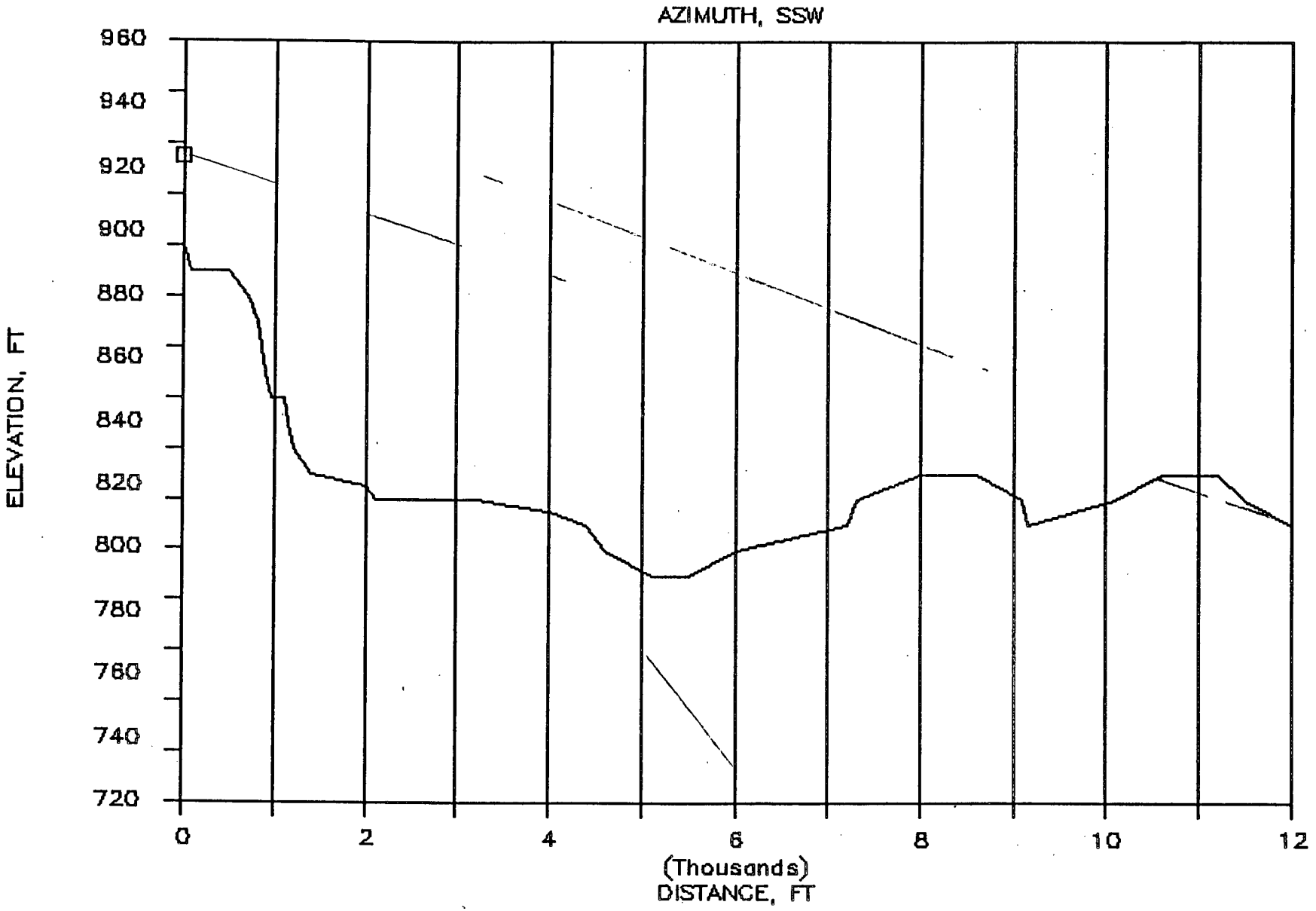

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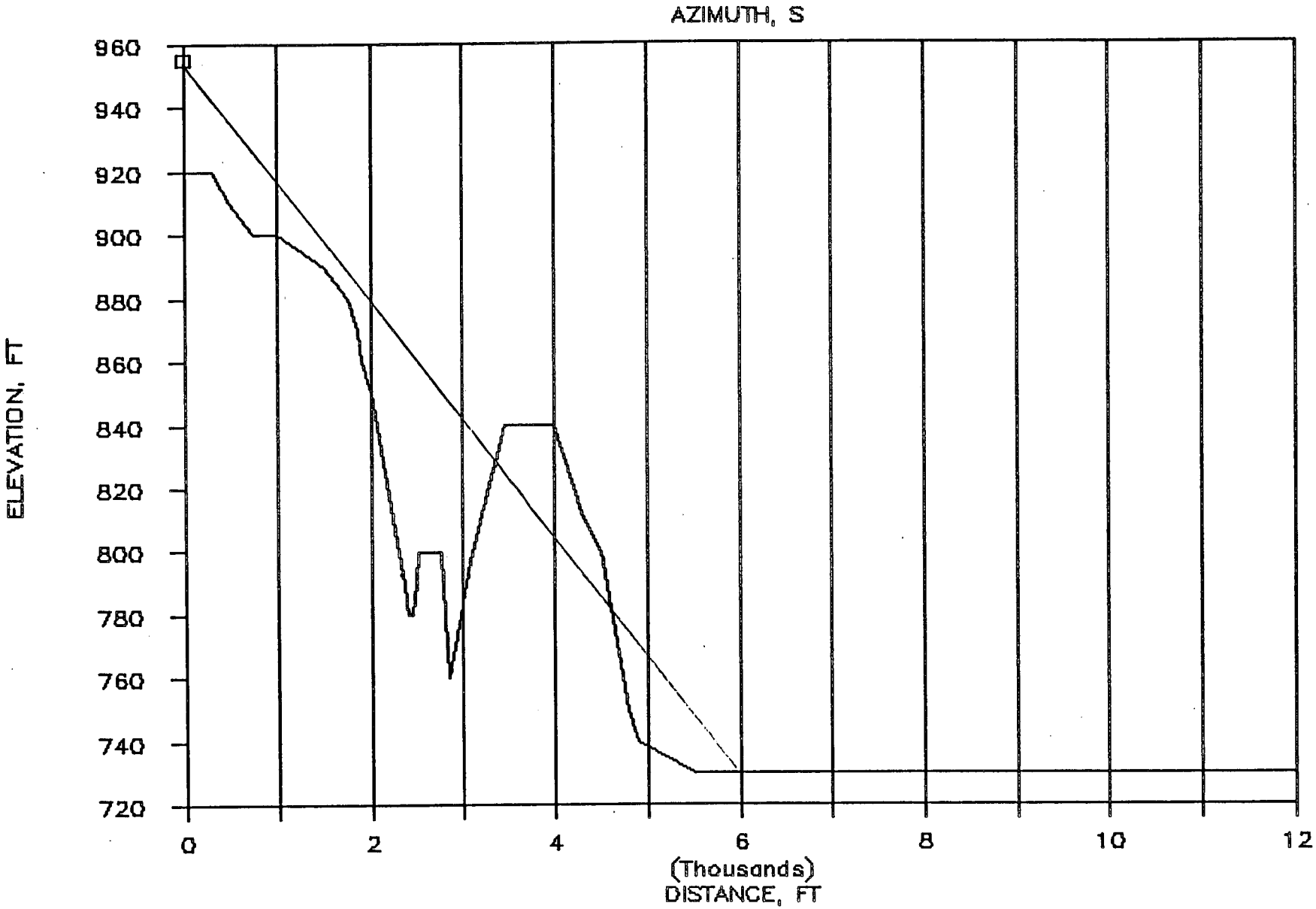

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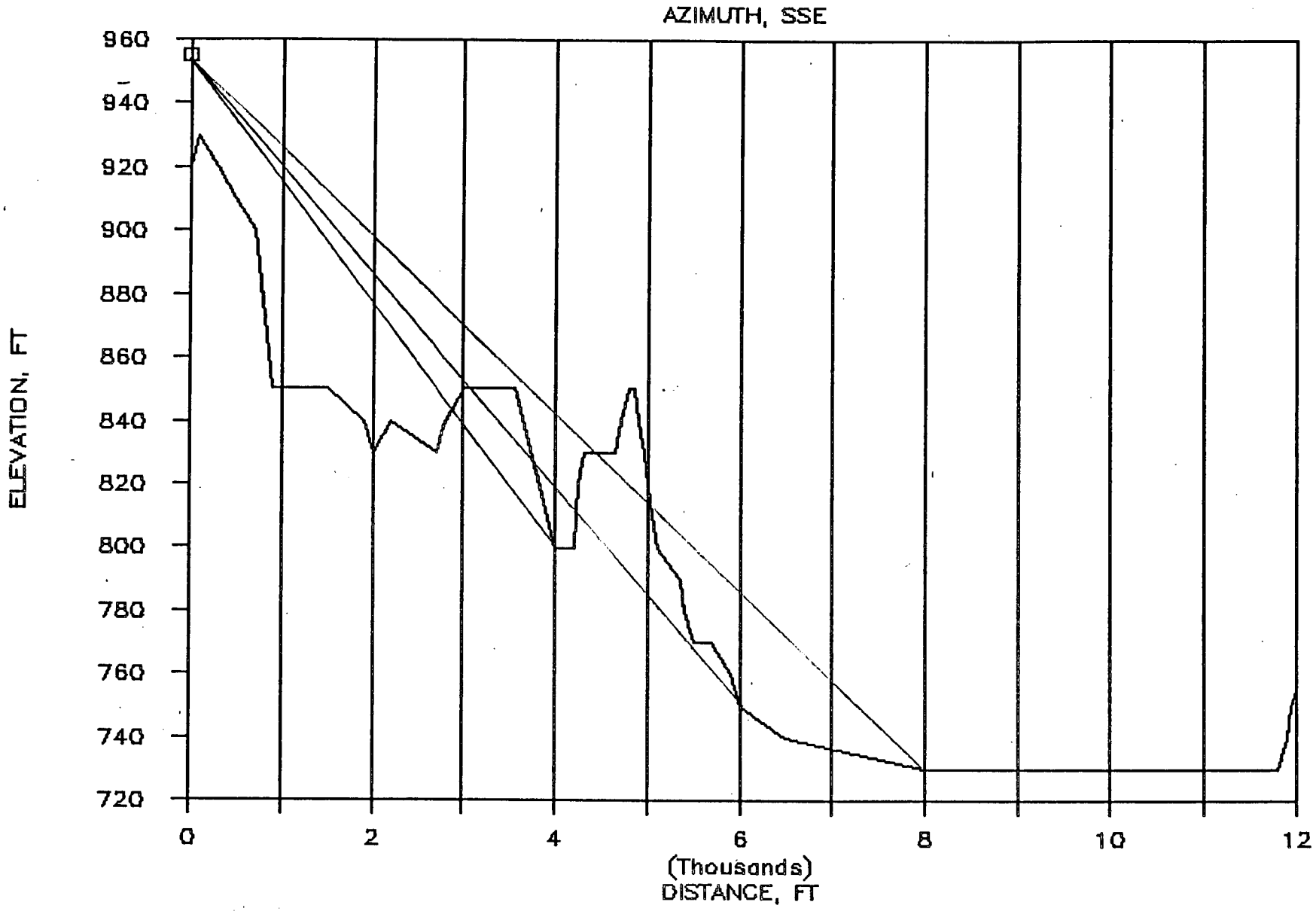

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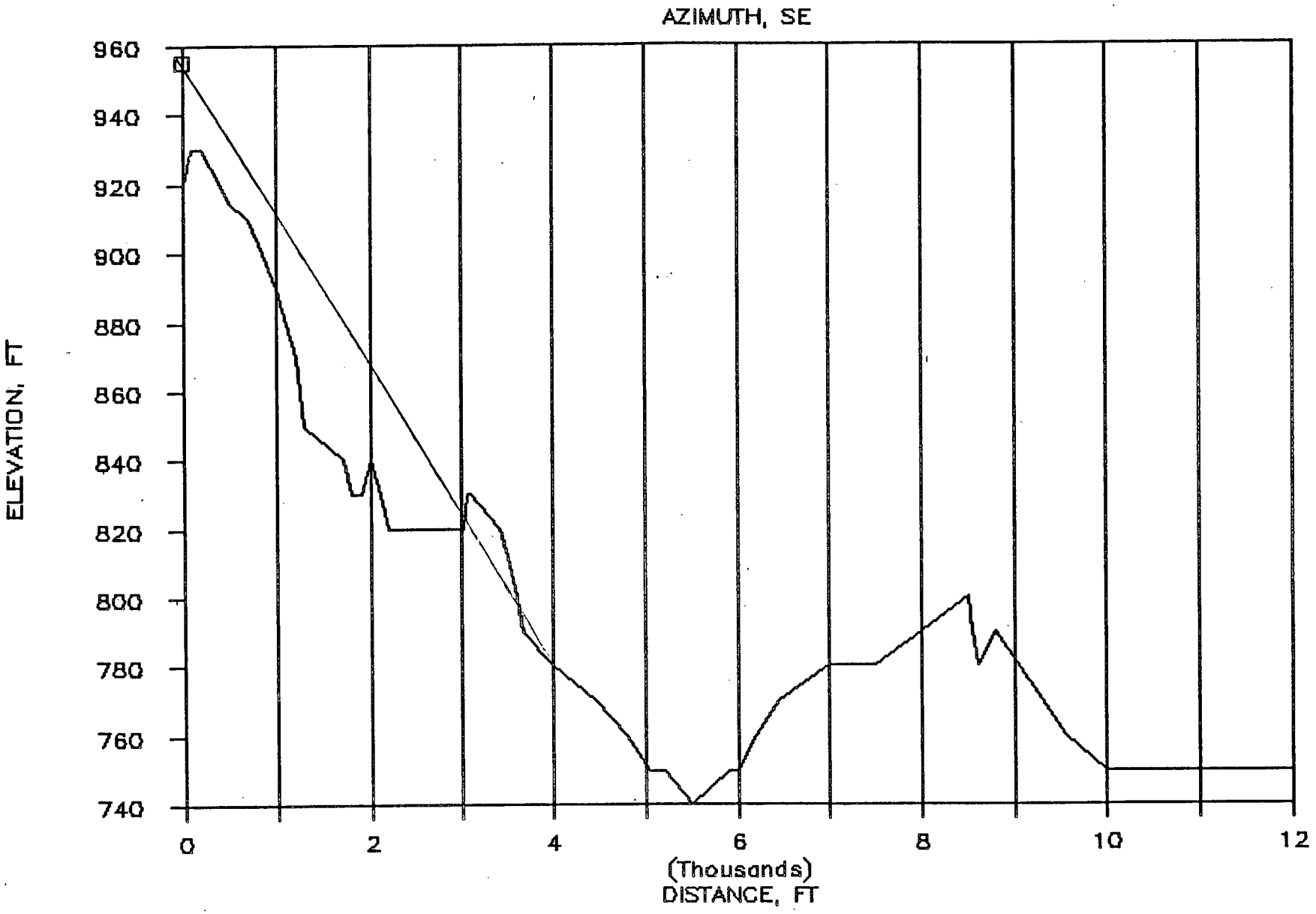

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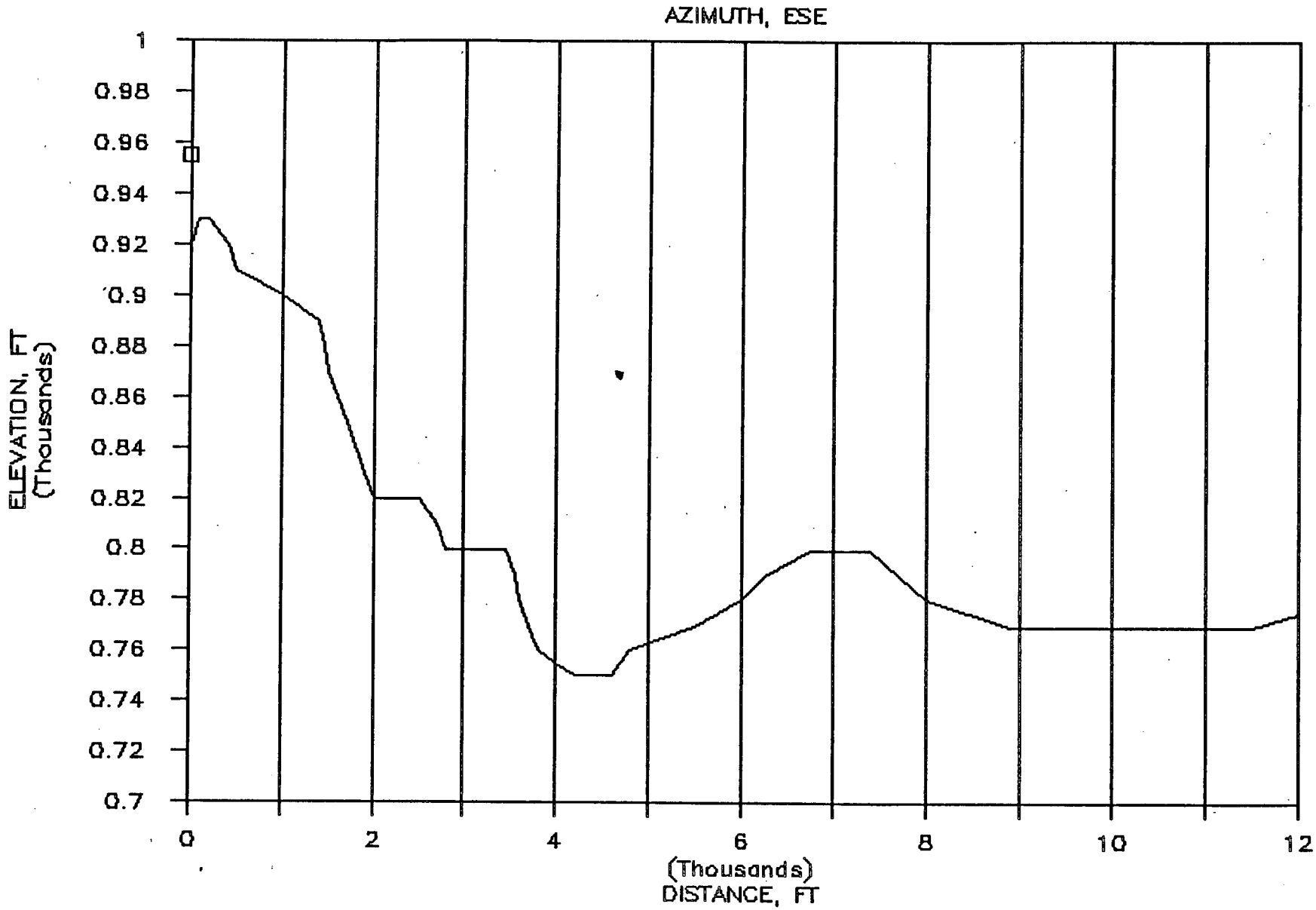


IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #31-FS1003
SOURCE-RECEIVER TOPOGRAPHICAL INPUTS

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	900.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	860.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	895.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	750.00	SOFT	0.	YES	1200.	900.
5	6000.	90.00	805.00	SOFT	0.	NO	0.	0.
6	8000.	90.00	805.00	SOFT	0.	NO	0.	0.
7	12000.	90.00	830.00	SOFT	0.	NO	0.	0.
8	500.	67.50	890.00	SOFT	0.	NO	0.	
9	1000.	67.50	850.00	SOFT	0.	NO	0.	
10	2000.	67.50	820.00	SOFT	0.	NO	0.	0.
11	4000.	67.50	770.00	SOFT	0.	NO	0.	0.
12	6000.	67.50	810.00	SOFT	0.	NO	0.	0.
13	8000.	67.50	825.00	SOFT	0.	NO	0.	0.
14	12000.	67.50	840.00	SOFT	0.	NO	0.	0.
15	500.	45.00	900.00	SOFT	0.	NO	0.	0.
16	1000.	45.00	865.00	SOFT	0.	NO	0.	0.
17	2000.	45.00	805.00	SOFT	0.	NO	0.	0.
18	4000.	45.00	795.00	SOFT	0.	NO	0.	0.
19	6000.	45.00	810.00	SOFT	0.	NO	0.	0.
20	8000.	45.00	830.00	SOFT	0.	NO	0.	0.
21	12000.	45.00	850.00	SOFT	0.	NO	0.	0.
22	500.	22.50	910.00	SOFT	0.	NO	0.	0.
23	1000.	22.50	860.00	SOFT	0.	NO	0.	0.
24	2000.	22.50	825.00	SOFT	0.	NO	0.	0.
25	4000.	22.50	815.00	SOFT	0.	NO	0.	0.
26	6000.	22.50	800.00	SOFT	0.	NO	0.	0.
27	8000.	22.50	830.00	SOFT	0.	NO	0.	0.
28	12000.	22.50	810.00	SOFT	0.	YES	10500.	830.
29	500.	.00	900.00	SOFT	0.	NO	0.	0.
30	1000.	.00	890.00	SOFT	0.	NO	0.	0.
31	2000.	.00	825.00	SOFT	0.	NO	0.	0.
32	4000.	.00	825.00	SOFT	0.	NO	0.	0.
33	6000.	.00	840.00	SOFT	0.	NO	0.	0.
34	8000.	.00	830.00	SOFT	0.	NO	0.	0.
35	12000.	.00	855.00	SOFT	0.	NO	0.	0.
36	500.	337.50	910.00	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	880.00	SOFT	0.	NO	0.	0.
38	2000.	337.50	850.00	SOFT	0.	NO	0.	0.
39	4000.	337.50	835.00	SOFT	0.	NO	0.	0.
40	6000.	337.50	840.00	SOFT	0.	NO	0.	0.
41	8000.	337.50	855.00	SOFT	0.	NO	0.	0.
42	12000.	337.50	845.00	SOFT	0.	NO	0.	0.
43	500.	315.00	910.00	SOFT	0.	NO	0.	0.
44	1000.	315.00	905.00	SOFT	0.	NO	0.	0.
45	2000.	315.00	890.00	SOFT	0.	NO	0.	0.
46	4000.	315.00	855.00	SOFT	0.	NO	0.	0.
47	6000.	315.00	850.00	SOFT	0.	NO	0.	0.
[illegible]	8000.	315.00	830.00	SOFT	0.	NO	0.	0.
[illegible]	12000.	315.00	795.00	SOFT	0.	NO	0.	0.
50	500.	292.50	920.00	SOFT	0.	NO	0.	0.
51	1000.	292.50	900.00	SOFT	0.	NO	0.	0.
52	2000.	292.50	905.00	SOFT	0.	NO	0.	0.
53	4000.	292.50	865.00	SOFT	0.	YES	2100.	910.
54	6000.	292.50	830.00	SOFT	0.	YES	2800.	900.
55	8000.	292.50	850.00	SOFT	0.	NO	0.	0.
56	12000.	292.50	760.00	SOFT	0.	YES	7300.	850.
57	500.	270.00	910.00	SOFT	0.	NO	0.	0.
58	1000.	270.00	850.00	SOFT	0.	NO	0.	0.
59	2000.	270.00	850.00	SOFT	0.	NO	0.	0.
60	4000.	270.00	800.00	SOFT	0.	YES	1200.	900.
61	6000.	270.00	800.00	SOFT	0.	YES	5000.	860.
62	8000.	270.00	835.00	SOFT	0.	NO	0.	0.
63	12000.	270.00	850.00	SOFT	0.	YES	11000.	880.
64	500.	247.50	880.00	SOFT	0.	NO	0.	0.
65	1000.	247.50	830.00	SOFT	0.	NO	0.	0.
66	2000.	247.50	790.00	SOFT	0.	YES	1200.	850.
67	4000.	247.50	860.00	SOFT	0.	NO	0.	0.
68	6000.	247.50	735.00	SOFT	0.	YES	2800.	870.
69	8000.	247.50	735.00	SOFT	0.	YES	3600.	860.
70	12000.	247.50	740.00	SOFT	0.	YES	10900.	800.
71	500.	225.00	900.00	SOFT	0.	NO	0.	0.
72	1000.	225.00	850.00	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	860.00	SOFT	0.	NO	0.	0.
74	4000.	225.00	800.00	SOFT	0.	YES	3000.	850.
75	6000.	225.00	735.00	SOFT	0.	NO	0.	0.
76	8000.	225.00	790.00	SOFT	0.	NO	0.	0.
77	12000.	225.00	820.00	SOFT	0.	YES	10500.	870.
78	500.	202.50	905.00	SOFT	0.	NO	0.	0.
79	1000.	202.50	900.00	SOFT	0.	NO	0.	0.
80	2000.	202.50	890.00	SOFT	0.	NO	0.	0.
81	4000.	202.50	810.00	SOFT	0.	YES	1200.	900.
82	6000.	202.50	730.00	SOFT	0.	YES	1200.	900.
83	8000.	202.50	790.00	SOFT	0.	NO	0.	0.
84	12000.	202.50	820.00	SOFT	0.	YES	8500.	860.
85	500.	180.00	910.00	SOFT	0.	NO	0.	
86	1000.	180.00	900.00	SOFT	0.	NO	0.	
87	2000.	180.00	850.00	SOFT	0.	NO	0.	0.
88	4000.	180.00	840.00	SOFT	0.	NO	0.	0.
89	6000.	180.00	730.00	SOFT	0.	YES	2400.	840.
90	8000.	180.00	730.00	SOFT	0.	NO	0.	0.
91	12000.	180.00	730.00	SOFT	0.	NO	0.	0.
92	500.	157.50	910.00	SOFT	0.	NO	0.	0.
93	1000.	157.50	850.00	SOFT	0.	NO	0.	0.
94	2000.	157.50	830.00	SOFT	0.	NO	0.	0.
95	4000.	157.50	800.00	SOFT	0.	YES	3000.	850.
96	6000.	157.50	750.00	SOFT	0.	YES	3000.	850.
97	8000.	157.50	730.00	SOFT	0.	YES	4200.	850.
98	12000.	157.50	755.00	SOFT	0.	NO	0.	0.
99	500.	135.00	915.00	SOFT	0.	NO	0.	0.
100	1000.	135.00	890.00	SOFT	0.	NO	0.	0.
101	2000.	135.00	840.00	SOFT	0.	NO	0.	0.
102	4000.	135.00	780.00	SOFT	0.	YES	3100.	830.
103	6000.	135.00	750.00	SOFT	0.	NO	0.	0.
104	8000.	135.00	790.00	SOFT	0.	NO	0.	0.
105	12000.	135.00	755.00	SOFT	0.	NO	0.	0.
106	500.	112.50	910.00	SOFT	0.	NO	0.	0.
107	1000.	112.50	900.00	SOFT	0.	NO	0.	0.
108	2000.	112.50	820.00	SOFT	0.	NO	0.	0.
109	4000.	112.50	755.00	SOFT	0.	NO	0.	0.
110	6000.	112.50	780.00	SOFT	0.	NO	0.	0.
111	8000.	112.50	780.00	SOFT	0.	NO	0.	0.
112	12000.	112.50	775.00	SOFT	0.	NO	0.	0.

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #31-FS1003
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	DUANE - FS1003	160.4	160.3	.0	.0	.0	.0	.0	160.0	148.0	140.0	135.0

XO= .00 YO= .00 ZO= 955.00 HEIGHT ABOVE GROUND= 35.00

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #31-FS1003
METEOROLOGICAL INPUT CONDITIONS

H1= 10.67 METERS H2= 50.29 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)
1981		8	21	12	177.0	2.1	2.6	23.9	23.2	30.0	742.0

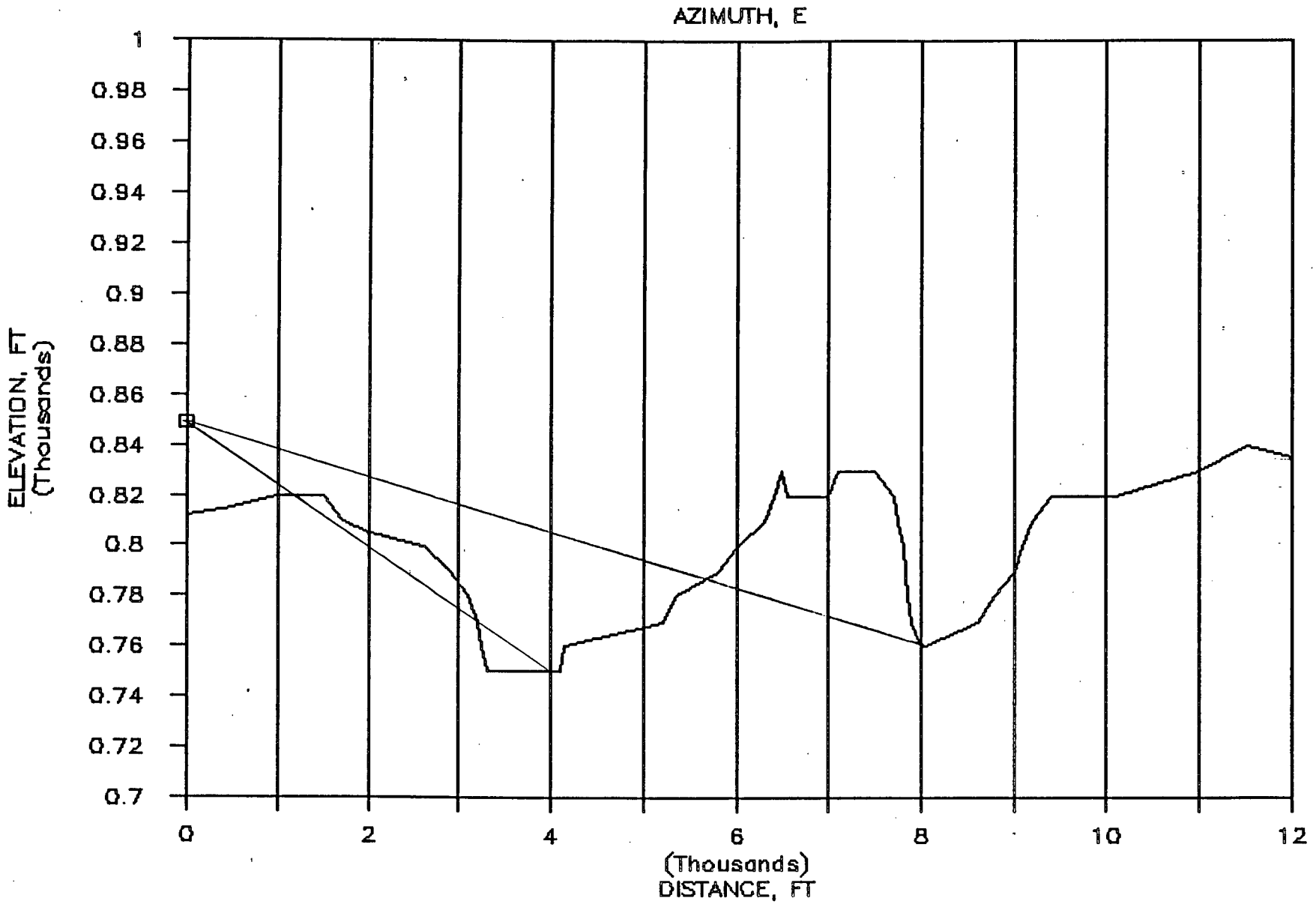
IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #31-FS1003

SOUND PRESSURE LEVELS IN DBC
UNDER MET CONDITION 1

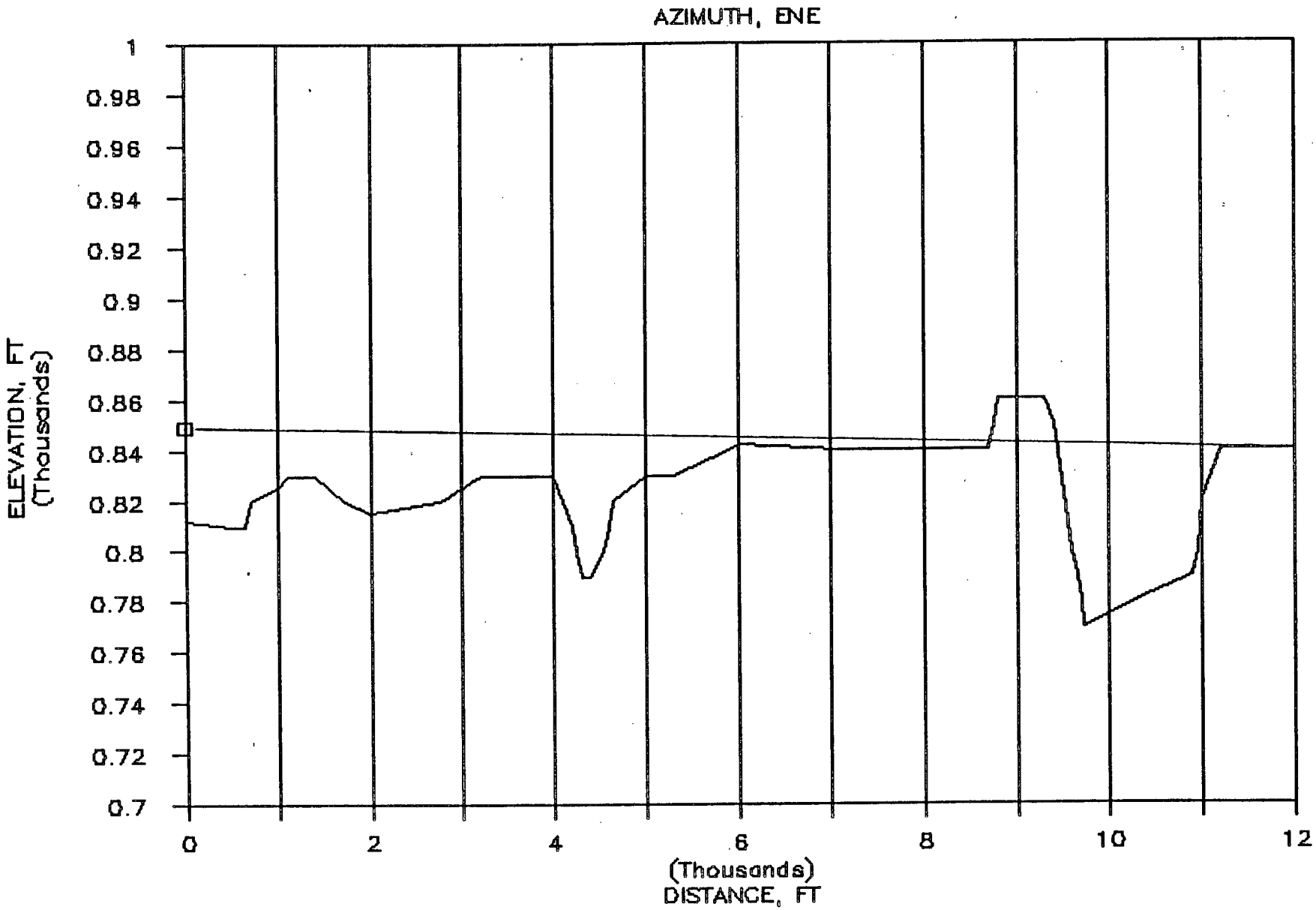
DISTANCE IN FEET

AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	106.3	90.9	73.3	50.2	46.7	43.3	38.1
ENE	106.2	90.9	73.2	55.6	46.7	43.3	37.4
NE	106.3	90.9	73.2	54.4	41.6	34.2	21.2
NNE	106.3	90.9	73.2	55.6	46.7	43.3	33.3
N	106.3	90.9	73.2	55.6	46.7	43.3	38.1
NNW	106.3	90.9	73.3	55.6	46.7	43.3	38.1
NW	106.3	91.0	73.3	55.6	46.7	43.3	38.1
WNW	106.3	91.0	73.3	50.8	41.8	43.3	32.6
W	106.3	90.9	73.3	49.9	34.8	43.3	29.5
WSW	106.1	90.8	67.6	54.7	35.1	29.9	9.6
SW	106.3	90.9	73.3	49.1	46.7	43.3	28.0
SSW	106.3	91.0	73.3	49.2	40.8	43.3	33.3
S	106.3	91.0	73.3	55.6	38.4	43.3	38.1
SSE	106.3	90.9	73.2	49.1	40.6	33.6	28.9
SE	106.3	90.9	73.2	48.0	41.6	34.3	21.2
ESE	106.3	91.0	73.2	55.6	46.7	43.3	38.1

DUANE ARNOLD 32



DUANE ARNOLD 32



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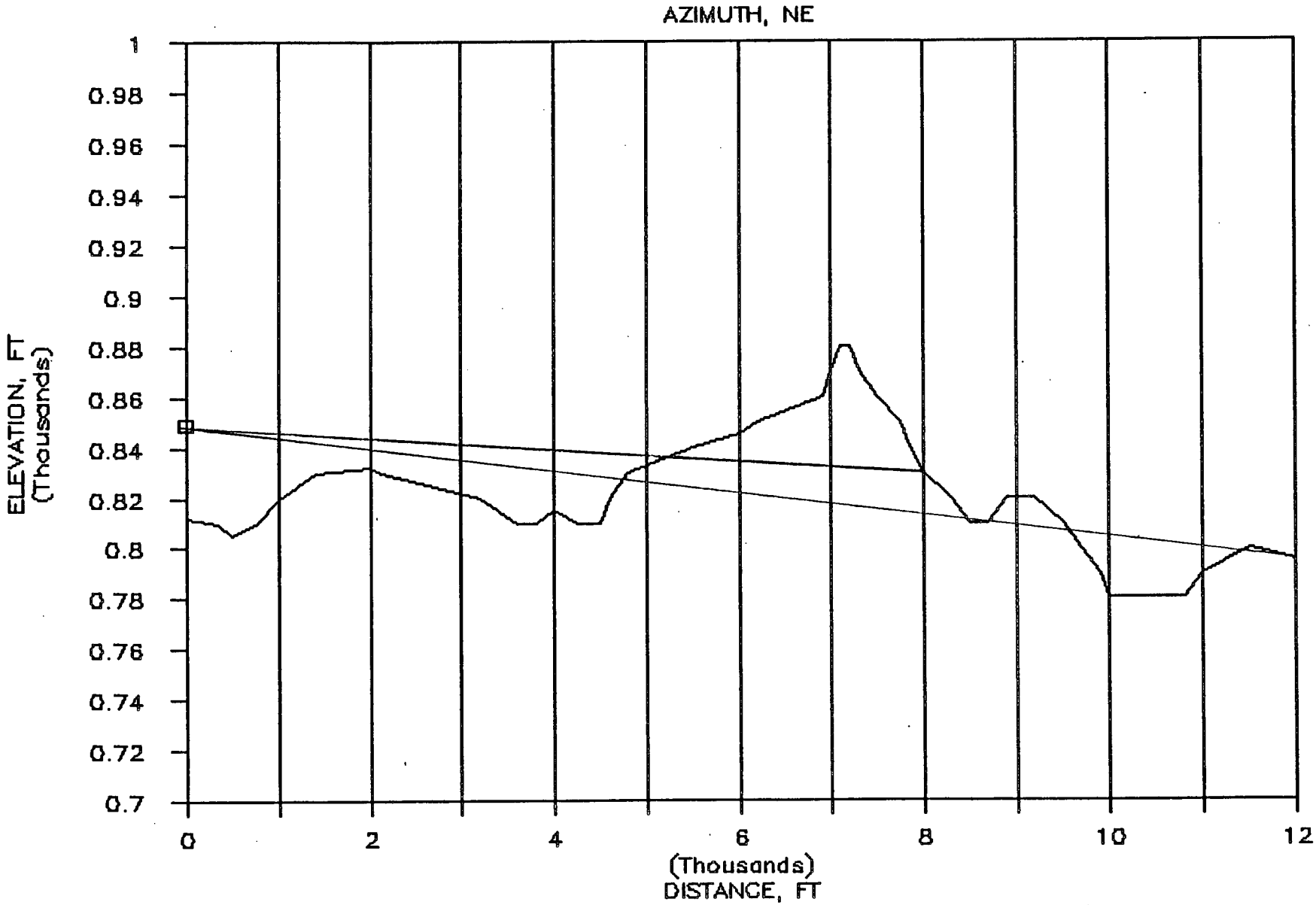

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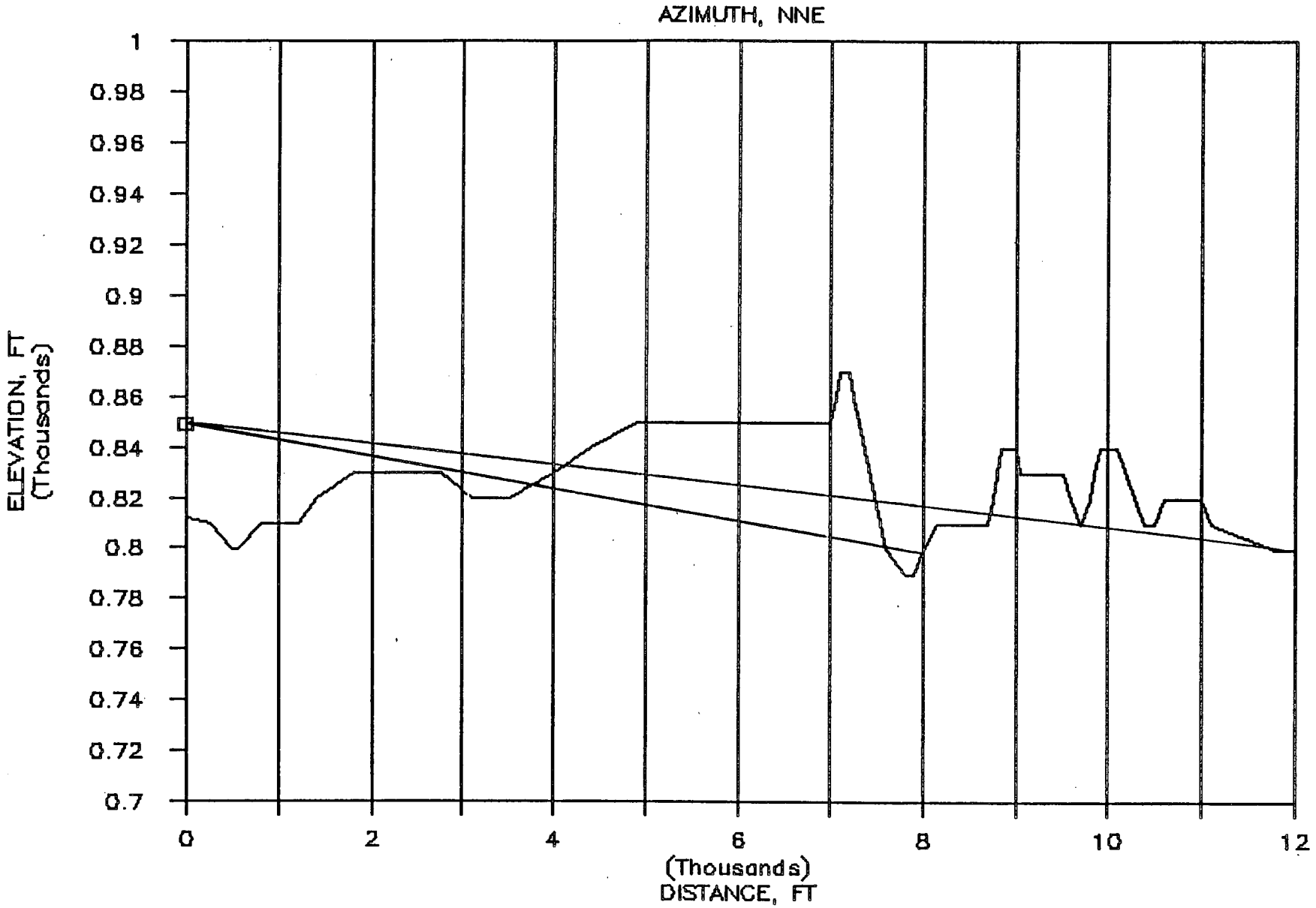

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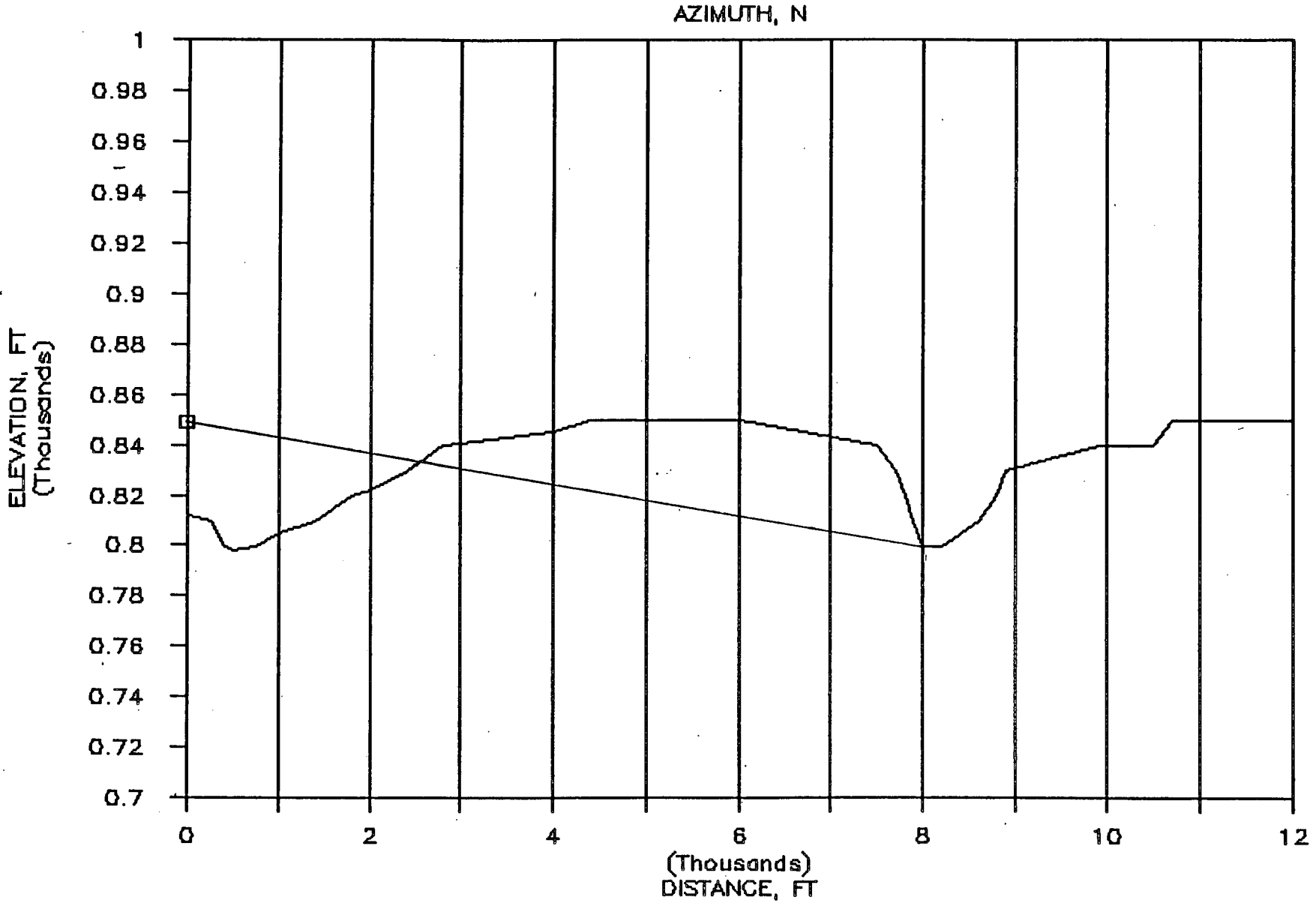

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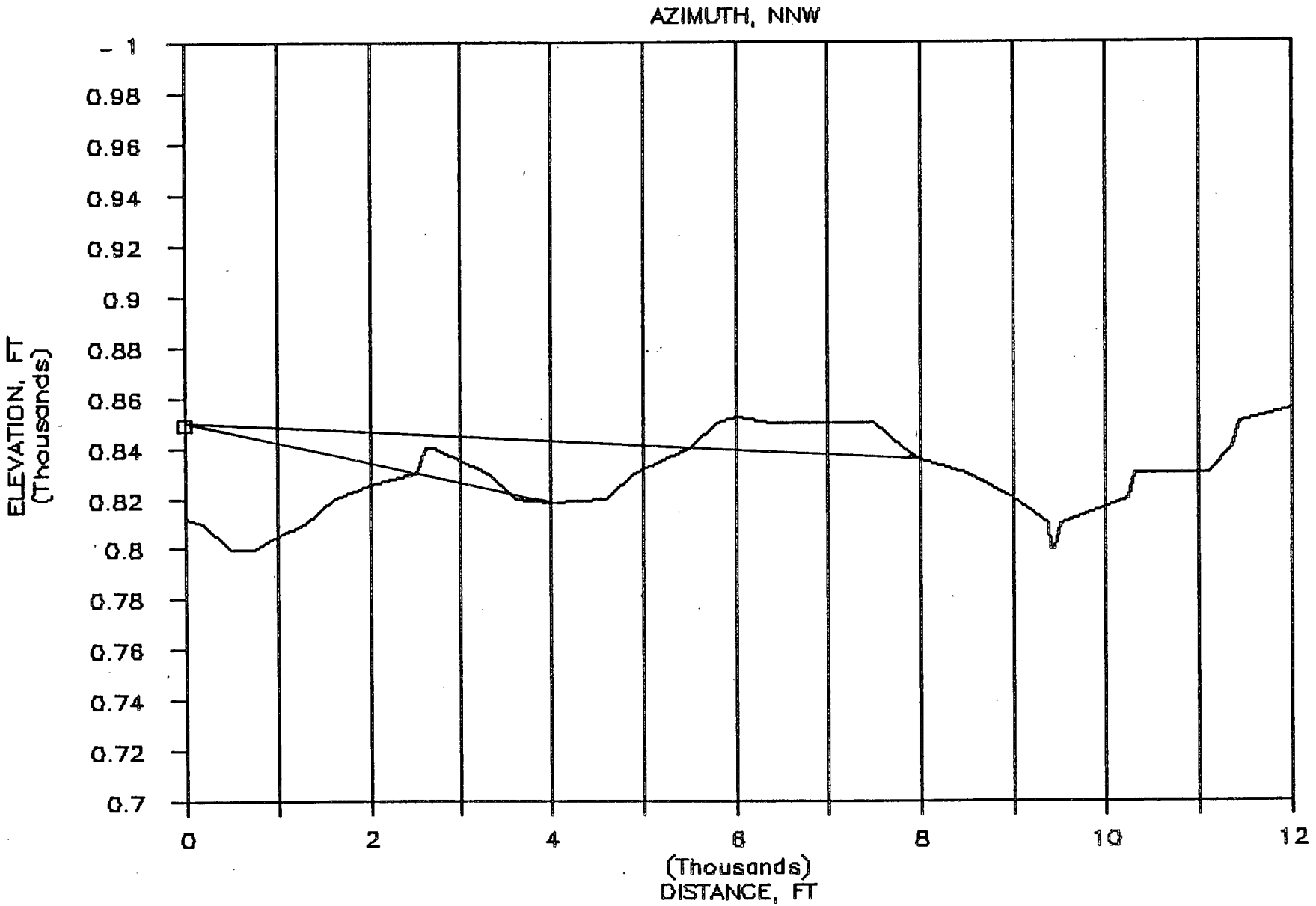

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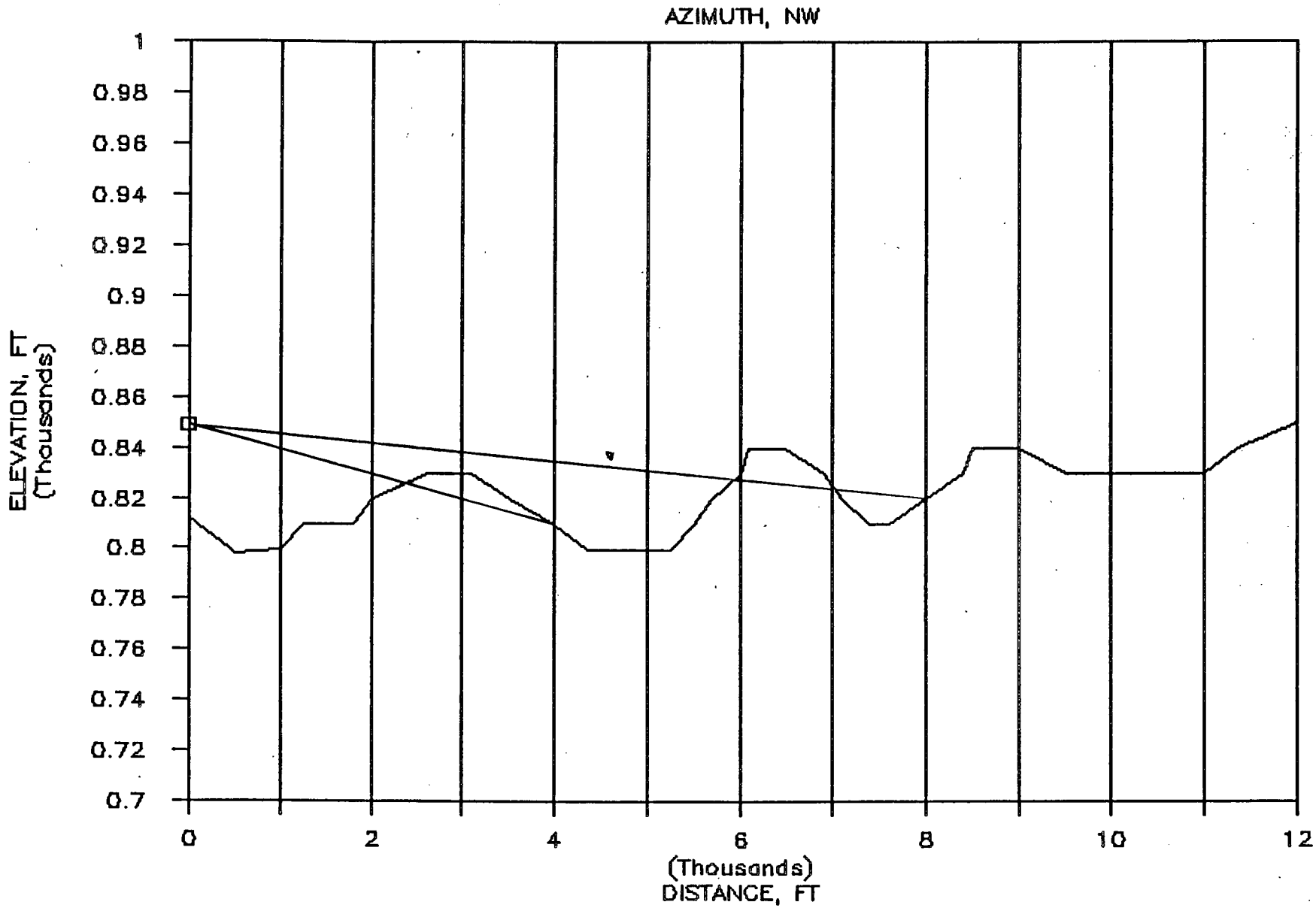
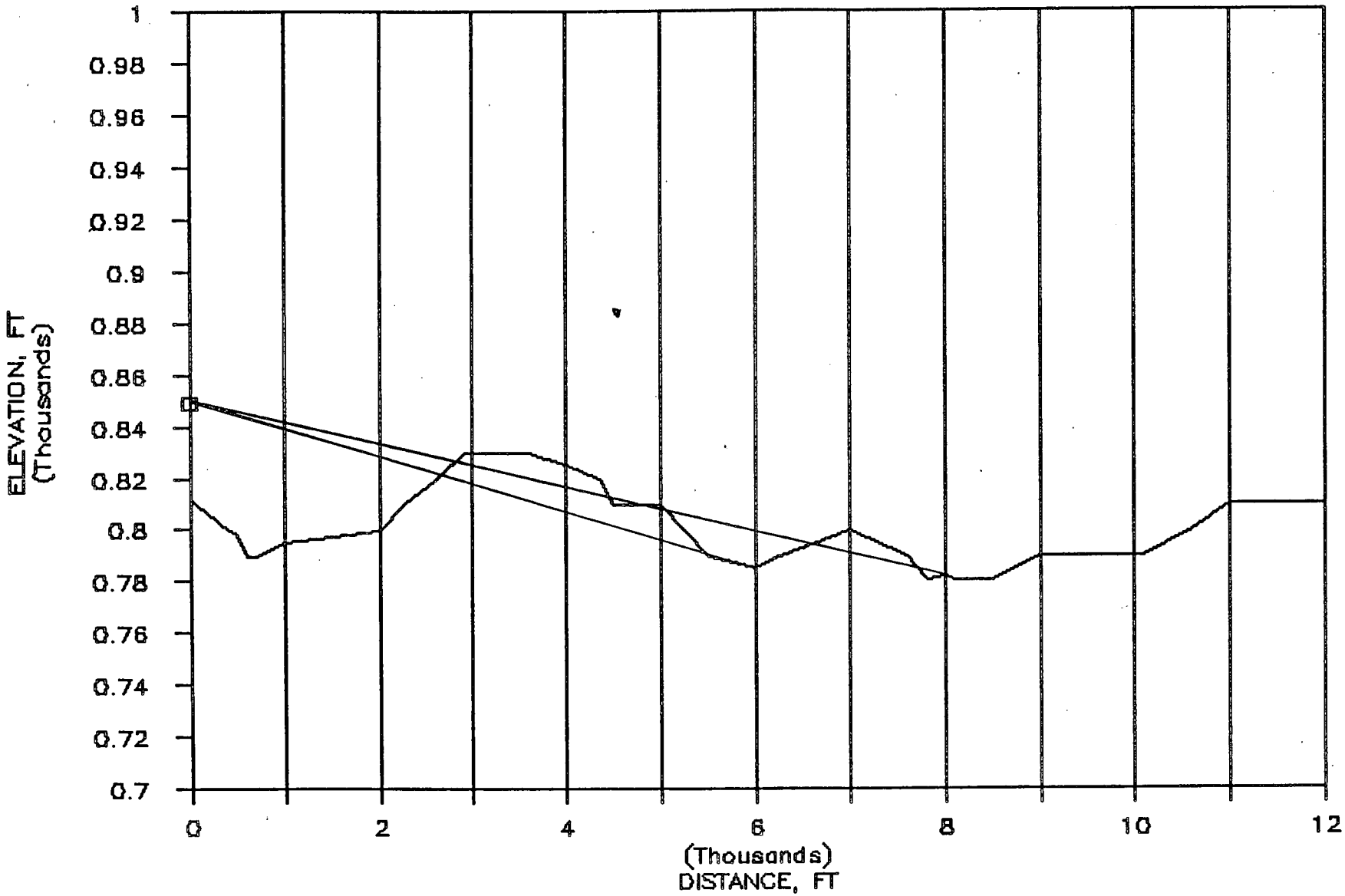


DUANE ARNOLD 32

AZIMUTH, WNW



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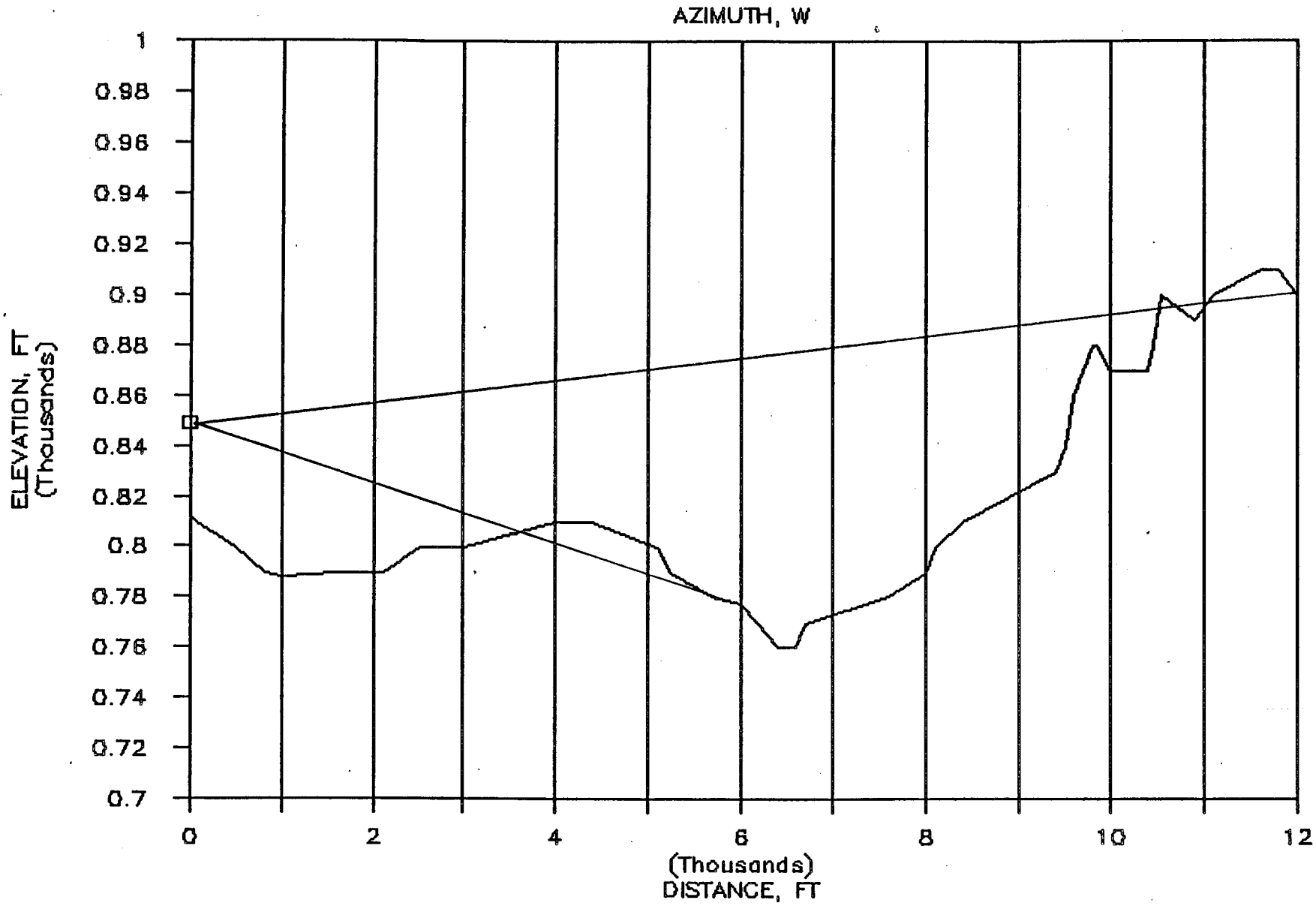

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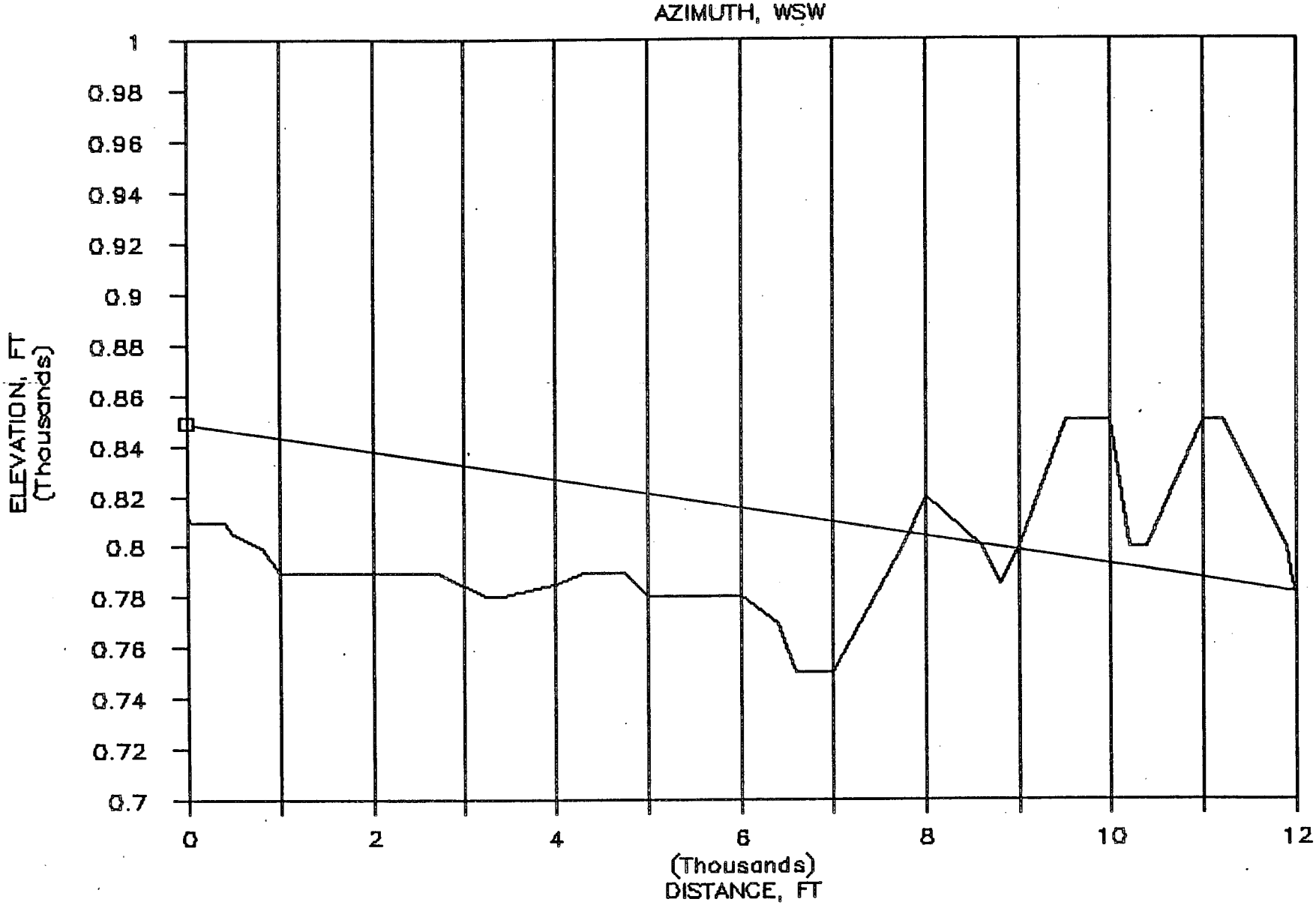
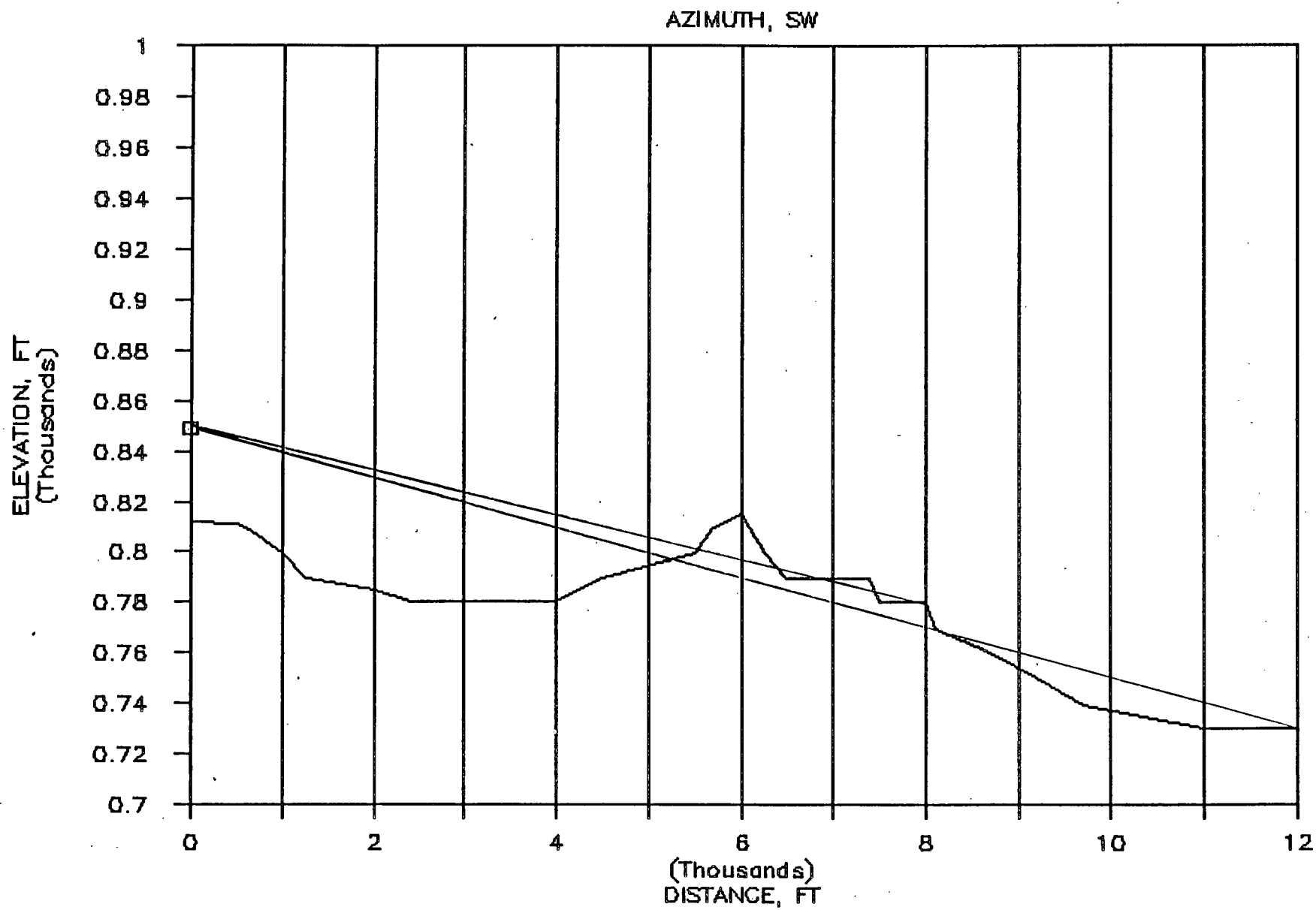
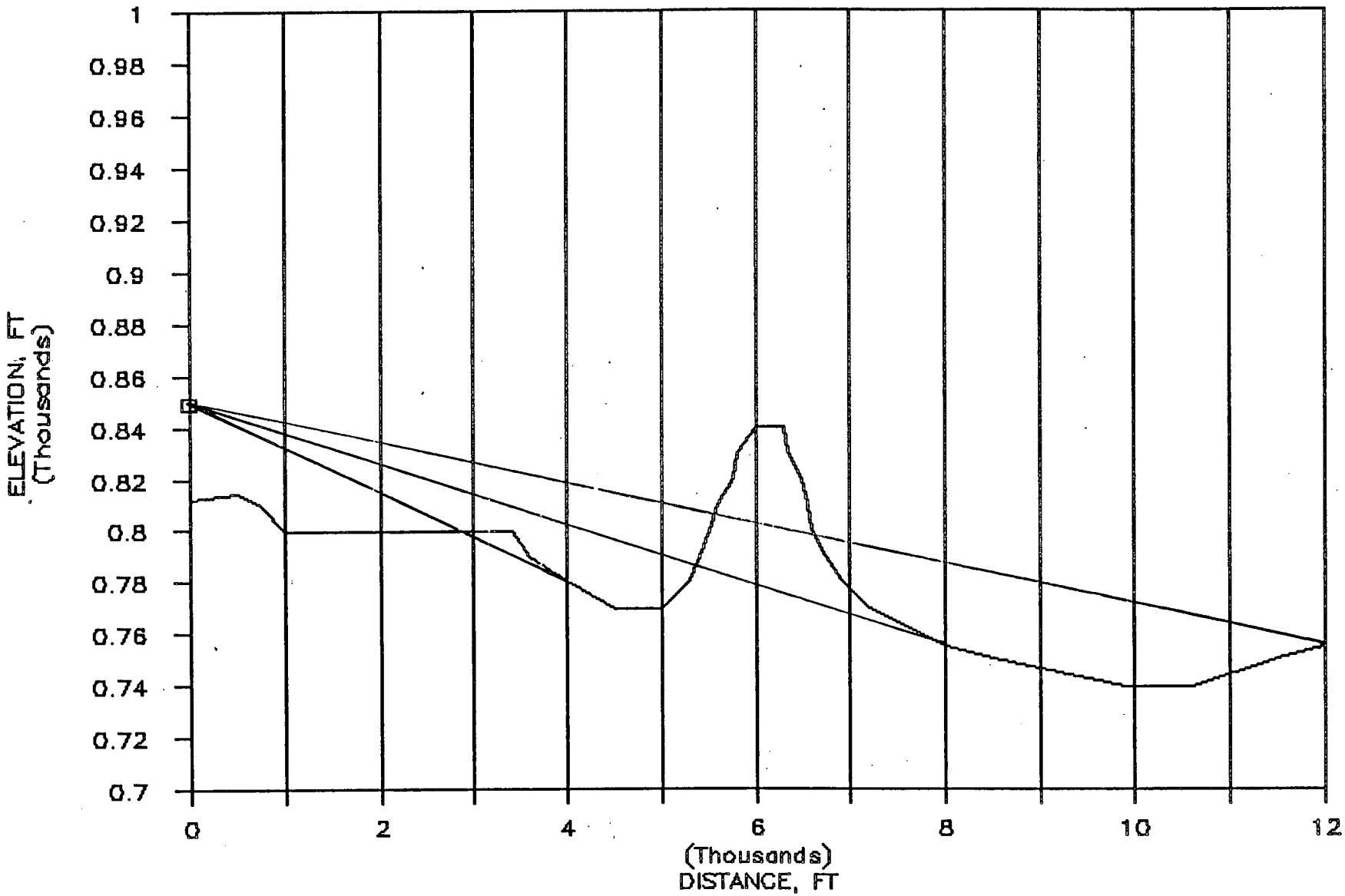


DUANE ARNOLD 32

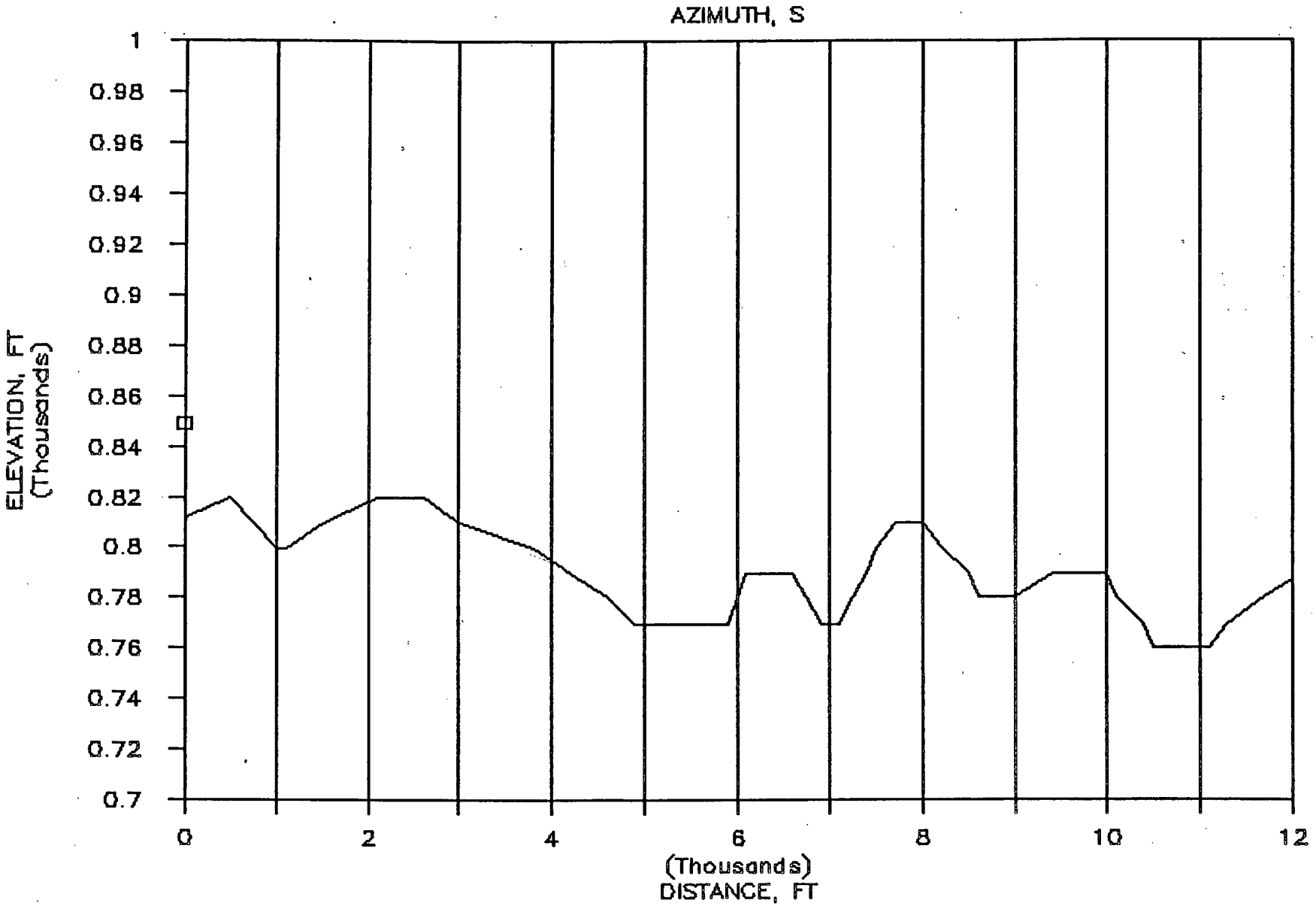


DUANE ARNOLD 32

AZIMUTH, SSW

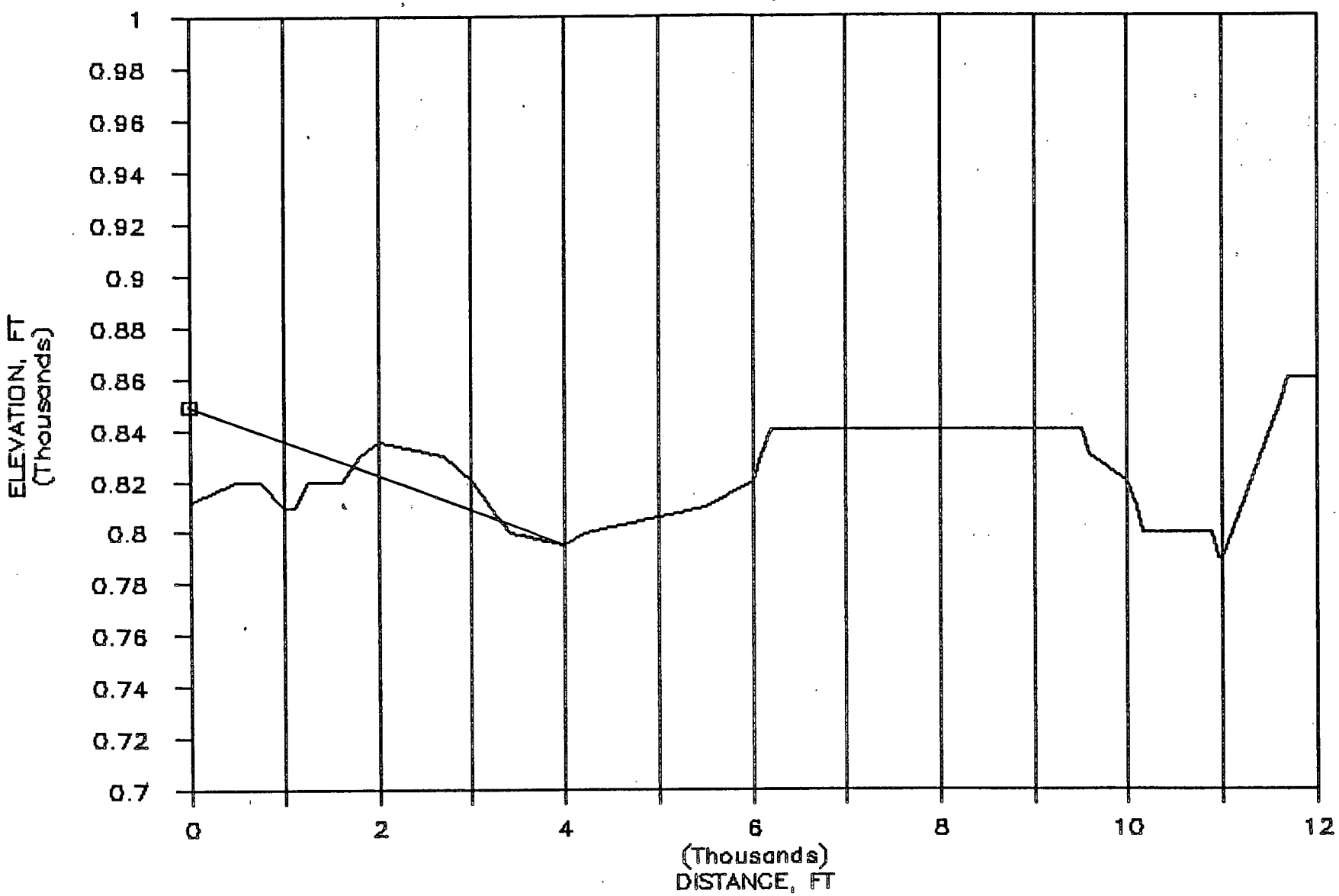


DUANE ARNOLD 32

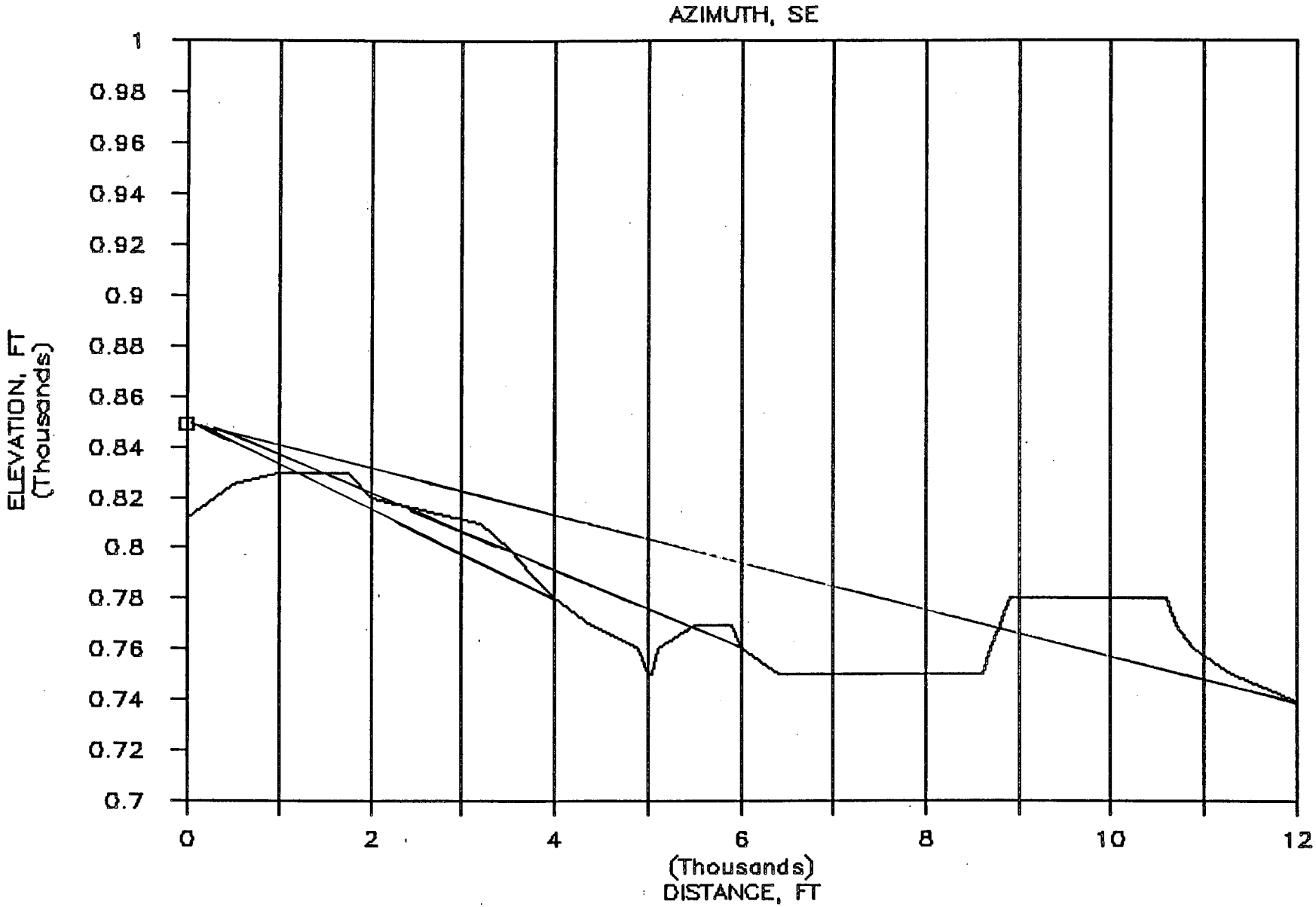


DUANE ARNOLD 32

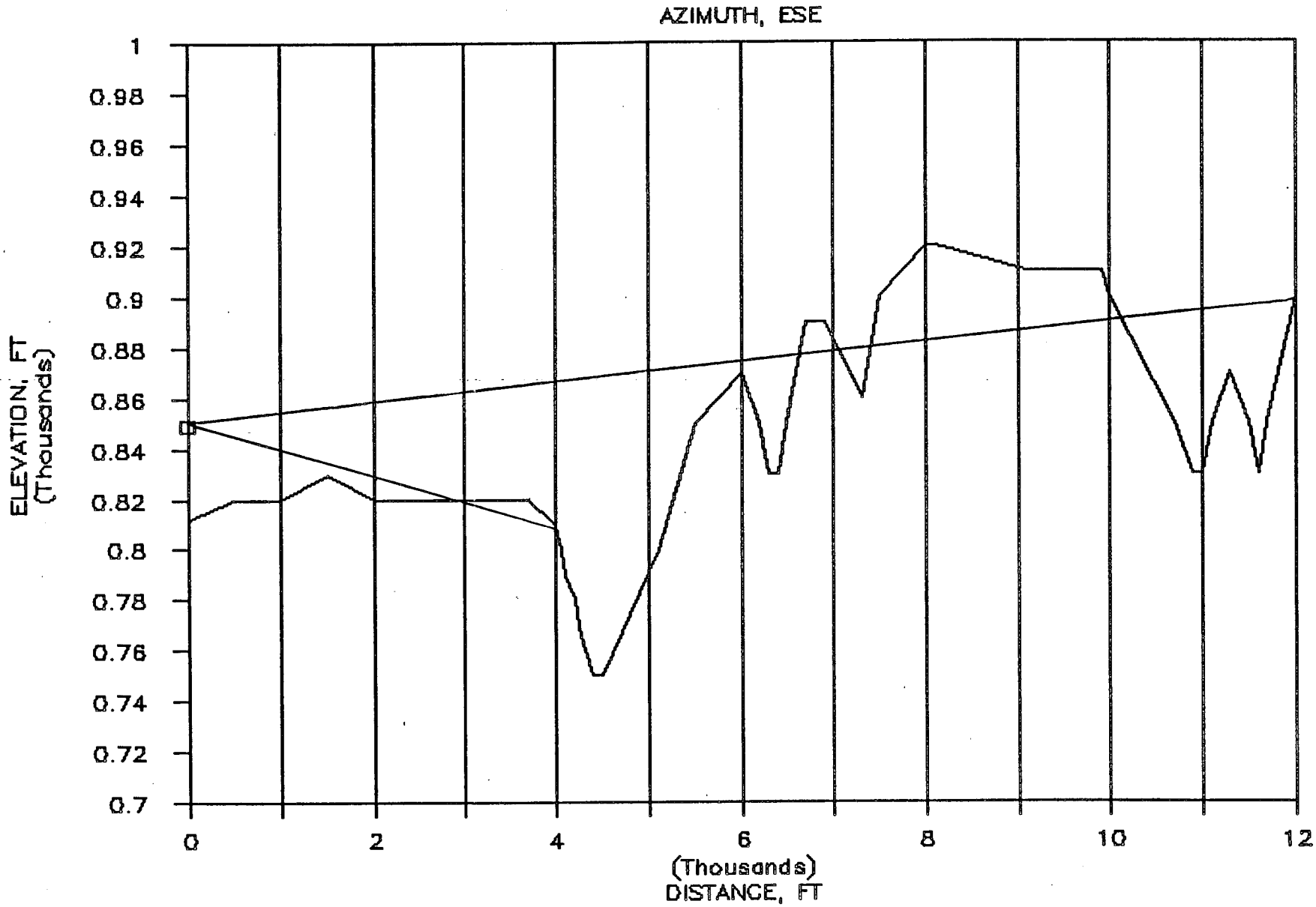
AZIMUTH, SSE



DUANE ARNOLD 32



DUANE ARNOLD 32



IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIRN #32-FS1003
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	815.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	820.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	805.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	750.00	SOFT	0.	YES	1500.	820.
5	6000.	90.00	800.00	SOFT	0.	NO	0.	0.
6	8000.	90.00	760.00	SOFT	0.	YES	6500.	830.
7	12000.	90.00	835.00	SOFT	0.	NO	0.	0.
[illegible]	500.	67.50	810.00	SOFT	0.	NO	0.	0.
[illegible]	1000.	67.50	825.00	SOFT	0.	NO	0.	0.
[illegible]	2000.	67.50	815.00	SOFT	0.	NO	0.	0.
11	4000.	67.50	830.00	SOFT	0.	NO	0.	0.
12	6000.	67.50	842.00	SOFT	0.	NO	0.	0.
13	8000.	67.50	840.00	SOFT	0.	NO	0.	0.
14	12000.	67.50	840.00	SOFT	0.	YES	8800.	860.
15	500.	45.00	805.00	SOFT	0.	NO	0.	0.
16	1000.	45.00	820.00	SOFT	0.	NO	0.	0.
17	2000.	45.00	832.00	SOFT	0.	NO	0.	0.
18	4000.	45.00	815.00	SOFT	0.	NO	0.	0.
19	6000.	45.00	845.00	SOFT	0.	NO	0.	0.
20	8000.	45.00	830.00	SOFT	0.	YES	7100.	880.
21	12000.	45.00	795.00	SOFT	0.	YES	7100.	880.
22	500.	22.50	800.00	SOFT	0.	NO	0.	0.
23	1000.	22.50	810.00	SOFT	0.	NO	0.	0.
24	2000.	22.50	830.00	SOFT	0.	NO	0.	0.
25	4000.	22.50	830.00	SOFT	0.	NO	0.	0.
26	6000.	22.50	850.00	SOFT	0.	NO	0.	0.
27	8000.	22.50	800.00	SOFT	0.	YES	7100.	870.
28	12000.	22.50	800.00	SOFT	0.	YES	7100.	870.
29	500.	.00	798.00	SOFT	0.	NO	0.	0.
30	1000.	.00	805.00	SOFT	0.	NO	0.	0.
31	2000.	.00	822.00	SOFT	0.	NO	0.	0.
32	4000.	.00	845.00	SOFT	0.	NO	0.	0.
33	6000.	.00	850.00	SOFT	0.	NO	0.	0.
34	8000.	.00	800.00	SOFT	0.	YES	4400.	850.
35	12000.	.00	850.00	SOFT	0.	NO	0.	0.
36	500.	337.50	800.00	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	805.00	SOFT	0.	NO	0.	0.
38	2000.	337.50	825.00	SOFT	0.	NO	0.	0.
39	4000.	337.50	818.00	SOFT	0.	YES	2600.	840.
40	6000.	337.50	852.00	SOFT	0.	NO	0.	0.
41	8000.	337.50	835.00	SOFT	0.	YES	6000.	852.
42	12000.	337.50	855.00	SOFT	0.	NO	0.	0.
43	500.	315.00	798.00	SOFT	0.	NO	0.	0.
44	1000.	315.00	800.00	SOFT	0.	NO	0.	0.
45	2000.	315.00	820.00	SOFT	0.	NO	0.	0.
46	4000.	315.00	810.00	SOFT	0.	YES	2600.	830.
47	6000.	315.00	830.00	SOFT	0.	NO	0.	
48	8000.	315.00	820.00	SOFT	0.	YES	6100.	84
49	12000.	315.00	850.00	SOFT	0.	NO	0.	0.
50	500.	292.50	798.00	SOFT	0.	NO	0.	0.
51	1000.	292.50	795.00	SOFT	0.	NO	0.	0.
52	2000.	292.50	800.00	SOFT	0.	NO	0.	0.
53	4000.	292.50	825.00	SOFT	0.	NO	0.	0.
54	6000.	292.50	785.00	SOFT	0.	YES	2900.	830.
55	8000.	292.50	782.00	SOFT	0.	YES	2900.	830.
56	12000.	292.50	810.00	SOFT	0.	NO	0.	0.
57	500.	270.00	800.00	SOFT	0.	NO	0.	0.
58	1000.	270.00	788.00	SOFT	0.	NO	0.	0.
59	2000.	270.00	790.00	SOFT	0.	NO	0.	0.
60	4000.	270.00	810.00	SOFT	0.	NO	0.	0.
61	6000.	270.00	777.00	SOFT	0.	YES	4000.	810.
62	8000.	270.00	790.00	SOFT	0.	NO	0.	0.
63	12000.	270.00	900.00	SOFT	0.	YES	11600.	910.
64	500.	247.50	805.00	SOFT	0.	NO	0.	0.
65	1000.	247.50	790.00	SOFT	0.	NO	0.	0.
66	2000.	247.50	790.00	SOFT	0.	NO	0.	0.
67	4000.	247.50	785.00	SOFT	0.	NO	0.	0.
68	6000.	247.50	780.00	SOFT	0.	NO	0.	0.
69	8000.	247.50	820.00	SOFT	0.	NO	0.	0.
70	12000.	247.50	780.00	SOFT	0.	YES	9500.	850.
71	500.	225.00	811.00	SOFT	0.	NO	0.	0.
72	1000.	225.00	800.00	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	785.00	SOFT	0.	NO	0.	0.
74	4000.	225.00	780.00	SOFT	0.	NO	0.	0.
75	6000.	225.00	815.00	SOFT	0.	NO	0.	0.
76	8000.	225.00	780.00	SOFT	0.	YES	6000.	815.
77	12000.	225.00	730.00	SOFT	0.	YES	6000.	815.
78	500.	202.50	814.00	SOFT	0.	NO	0.	0.
79	1000.	202.50	800.00	SOFT	0.	NO	0.	0.
80	2000.	202.50	800.00	SOFT	0.	NO	0.	0.
81	4000.	202.50	780.00	SOFT	0.	NO	0.	0.
82	6000.	202.50	840.00	SOFT	0.	NO	0.	0.
83	8000.	202.50	755.00	SOFT	0.	YES	3000.	800.
84	12000.	202.50	755.00	SOFT	0.	YES	6000.	840.
[illegible]	500.	180.00	820.00	SOFT	0.	NO	0.	0.
[illegible]	1000.	180.00	800.00	SOFT	0.	NO	0.	0.
[illegible]	2000.	180.00	818.00	SOFT	0.	NO	0.	0.
88	4000.	180.00	795.00	SOFT	0.	YES	6000.	840.
89	6000.	180.00	780.00	SOFT	0.	NO	0.	0.
90	8000.	180.00	810.00	SOFT	0.	NO	0.	0.
91	12000.	180.00	787.00	SOFT	0.	NO	0.	0.
92	500.	157.50	820.00	SOFT	0.	NO	0.	0.
93	1000.	157.50	810.00	SOFT	0.	NO	0.	0.
94	2000.	157.50	835.00	SOFT	0.	NO	0.	0.
95	4000.	157.50	795.00	SOFT	0.	YES	2000.	835.
96	6000.	157.50	820.00	SOFT	0.	NO	0.	0.
97	8000.	157.50	840.00	SOFT	0.	NO	0.	0.
98	12000.	157.50	860.00	SOFT	0.	NO	0.	0.
99	500.	135.00	825.00	SOFT	0.	NO	0.	0.
100	1000.	135.00	830.00	SOFT	0.	NO	0.	0.
101	2000.	135.00	820.00	SOFT	0.	YES	1750.	830.
102	4000.	135.00	780.00	SOFT	0.	YES	1750.	830.
103	6000.	135.00	760.00	SOFT	0.	YES	1750.	830.
104	8000.	135.00	750.00	SOFT	0.	NO	0.	0.
105	12000.	135.00	740.00	SOFT	0.	YES	8900.	780.
106	500.	112.50	820.00	SOFT	0.	NO	0.	0.
107	1000.	112.50	820.00	SOFT	0.	NO	0.	0.
108	2000.	112.50	820.00	SOFT	0.	NO	0.	0.
109	4000.	112.50	810.00	SOFT	0.	YES	3700.	820.
110	6000.	112.50	870.00	SOFT	0.	NO	0.	0.
111	8000.	112.50	920.00	SOFT	0.	NO	0.	0.
112	12000.	112.50	900.00	SOFT	0.	YES	8000.	920.

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIRN #32-FS1003
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	DUANE - FS1003	160.4	160.3	.0	.0	.0	.0	.0	160.0	148.0	140.0	135.0

XO= .00 YO= .00 ZO= 849.00 HEIGHT ABOVE GROUND= 37.00

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIRN #32-FS1003
METEOROLOGICAL INPUT CONDITIONS

H1= 10.67 METERS H2= 50.29 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)
1981		6	21	12	177.0	2.1	2.6	23.9	23.2	30.0	742.0

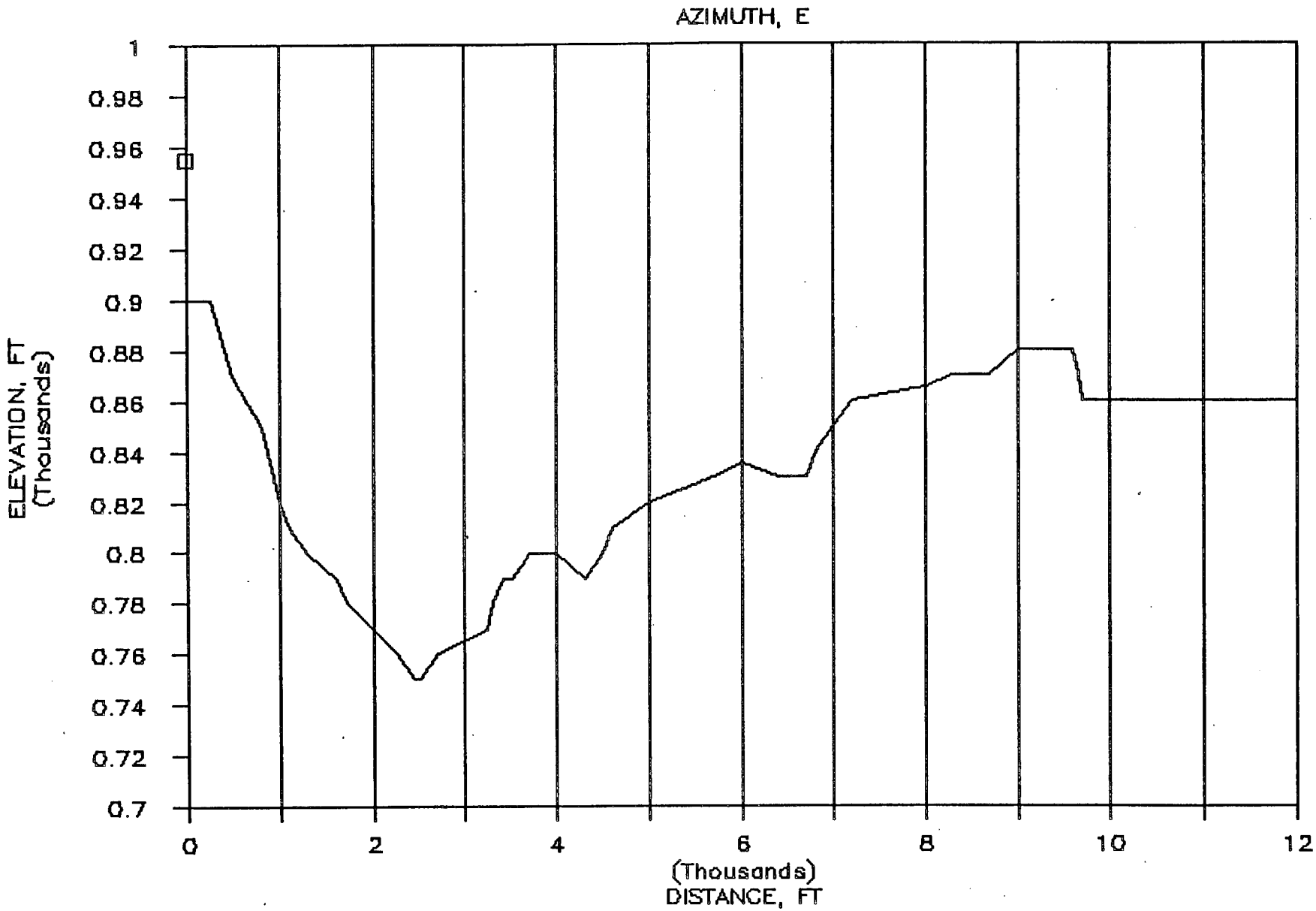
IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIRN #32-FS1003

SOUND PRESSURE LEVELS IN DBC
UNDER MET CONDITION 1

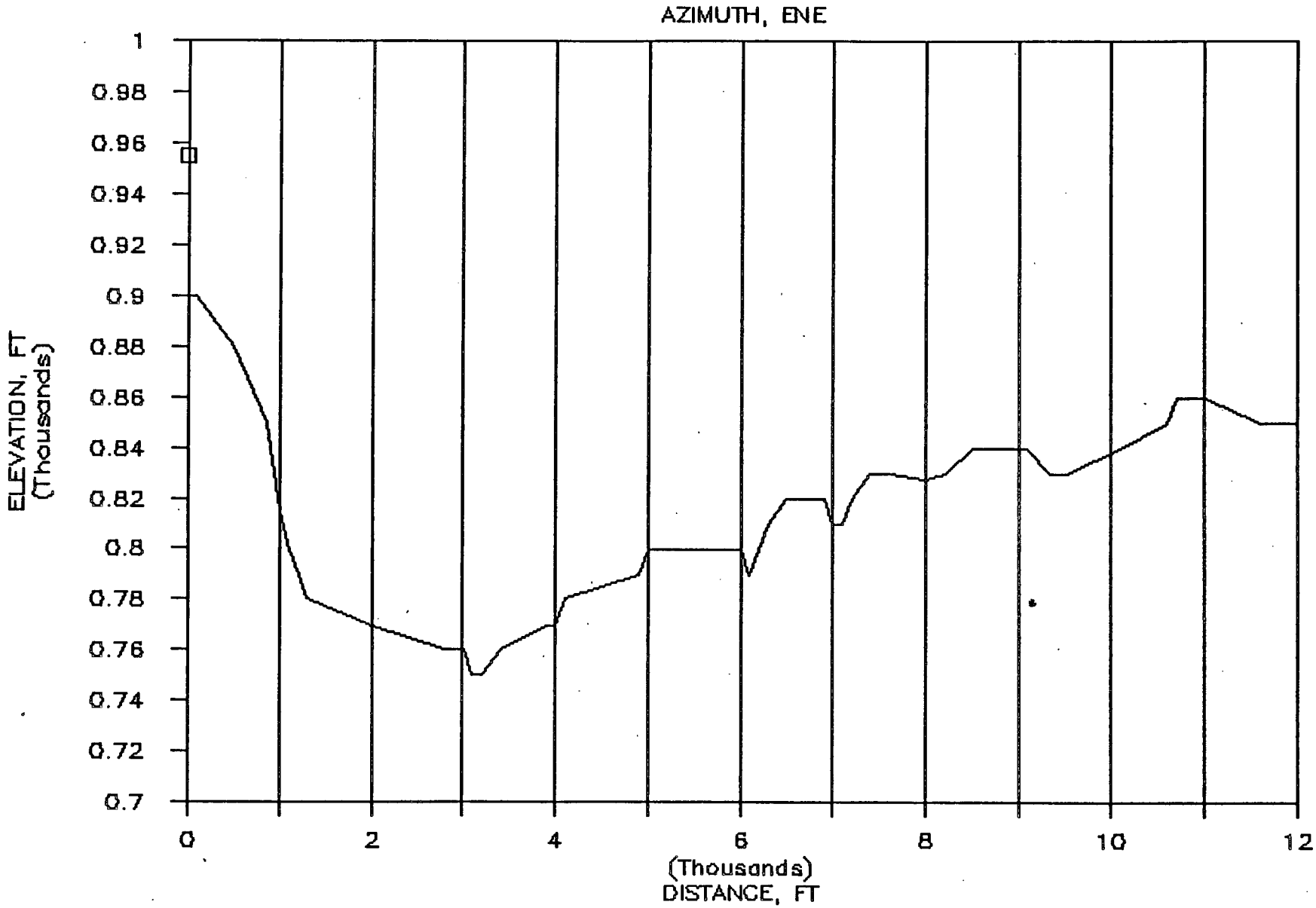
DISTANCE IN FEET

AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	106.7	91.2	73.5	49.8	47.7	30.7	39.2
ENE	106.7	91.2	73.5	55.4	47.7	44.4	32.7
NE	106.7	91.2	73.5	54.6	43.2	21.7	11.8
NNE	106.7	91.2	73.5	55.4	47.7	27.5	28.9
N	106.7	91.2	73.5	55.4	47.7	36.3	39.2
NNW	106.7	91.2	73.5	49.1	47.7	38.3	39.2
NW	106.7	91.2	73.5	50.1	47.7	38.3	39.2
WNW	106.7	91.2	73.5	55.4	41.8	39.4	39.2
W	106.7	91.2	73.5	55.4	42.2	44.4	31.3
WSW	106.7	91.2	73.5	54.8	43.6	36.7	12.0
SW	106.7	91.2	73.5	55.4	47.7	37.5	32.3
SSW	106.7	91.2	73.5	55.4	47.7	38.5	30.6
S	106.7	91.2	73.5	30.4	47.7	44.4	39.2
SSE	106.7	91.2	73.5	48.8	46.8	41.0	30.8
SE	106.7	91.2	66.8	48.5	38.0	36.2	18.1
ESE	106.7	91.2	73.5	48.7	47.7	44.4	30.4

DUANE ARNOLD B

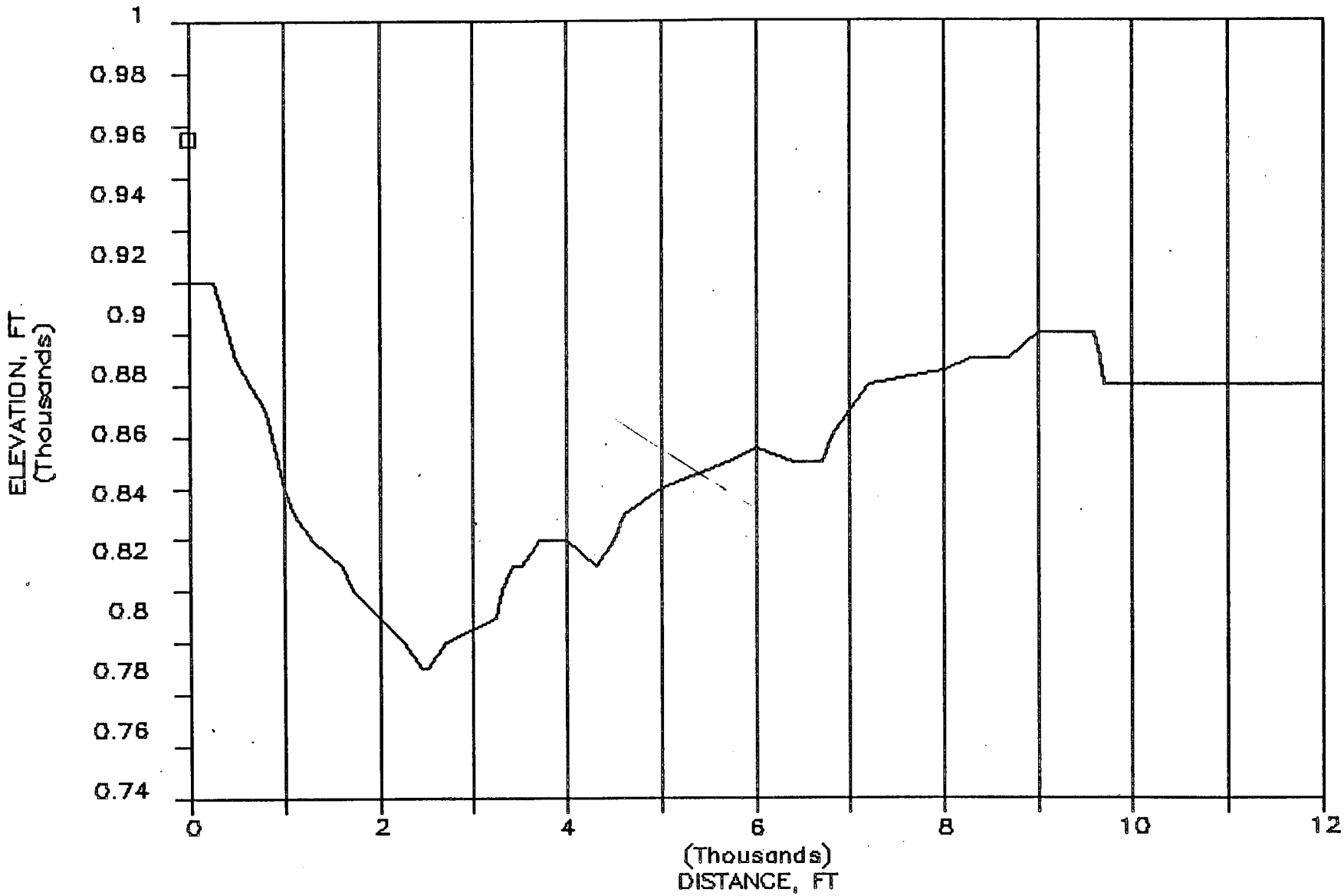


DUANE ARNOLD B

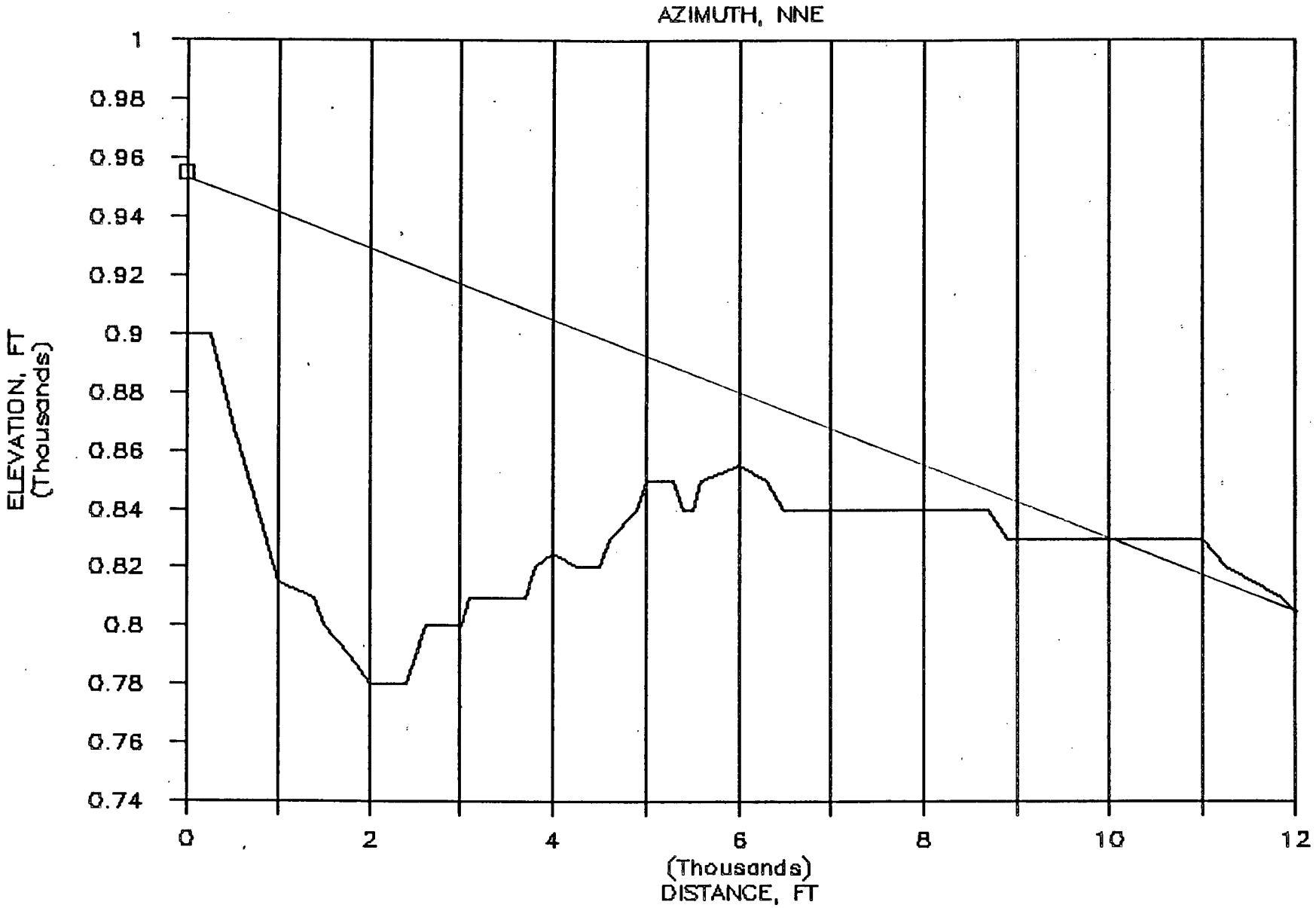


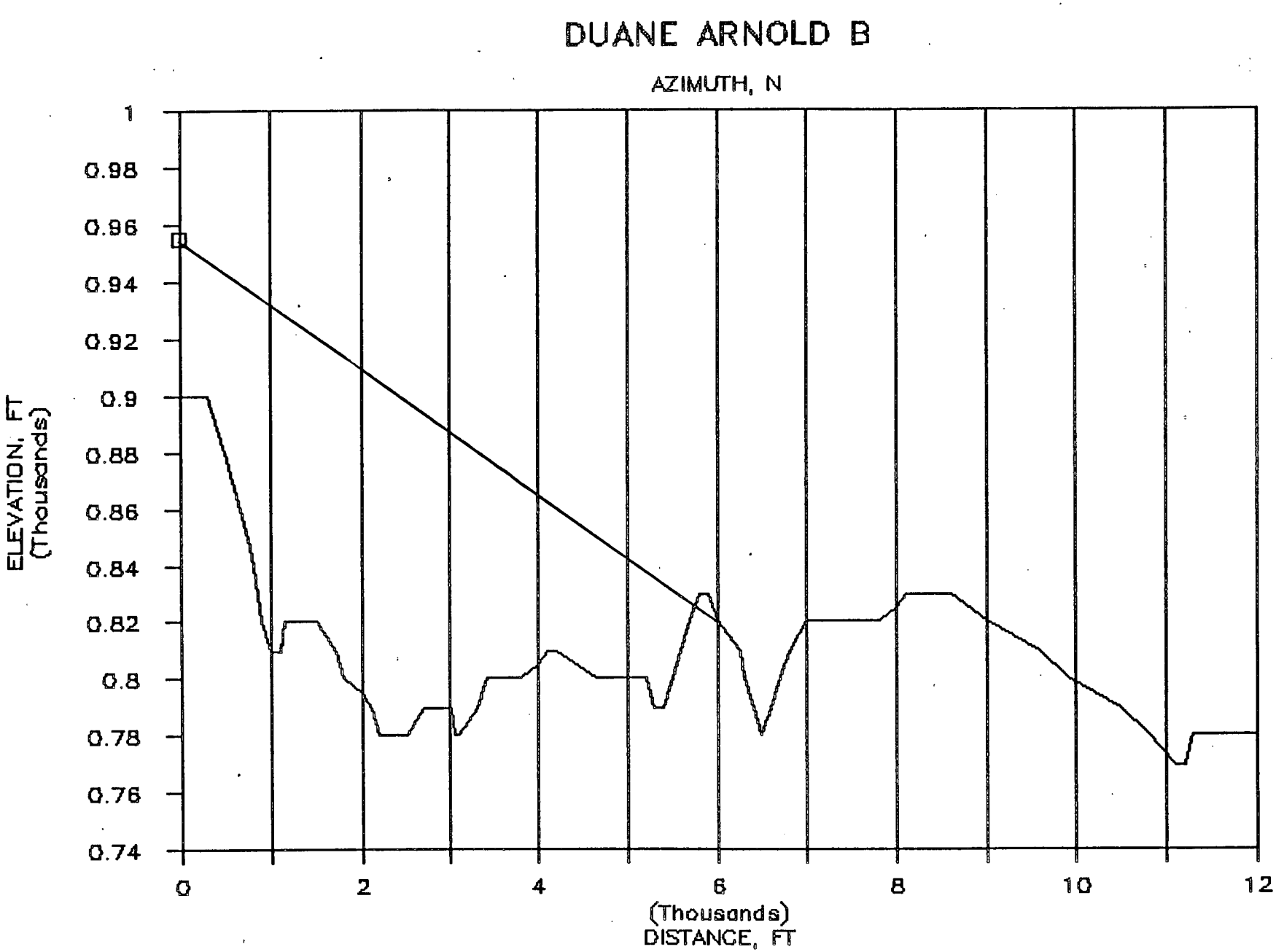
DUANE ARNOLD B

AZIMUTH, NE

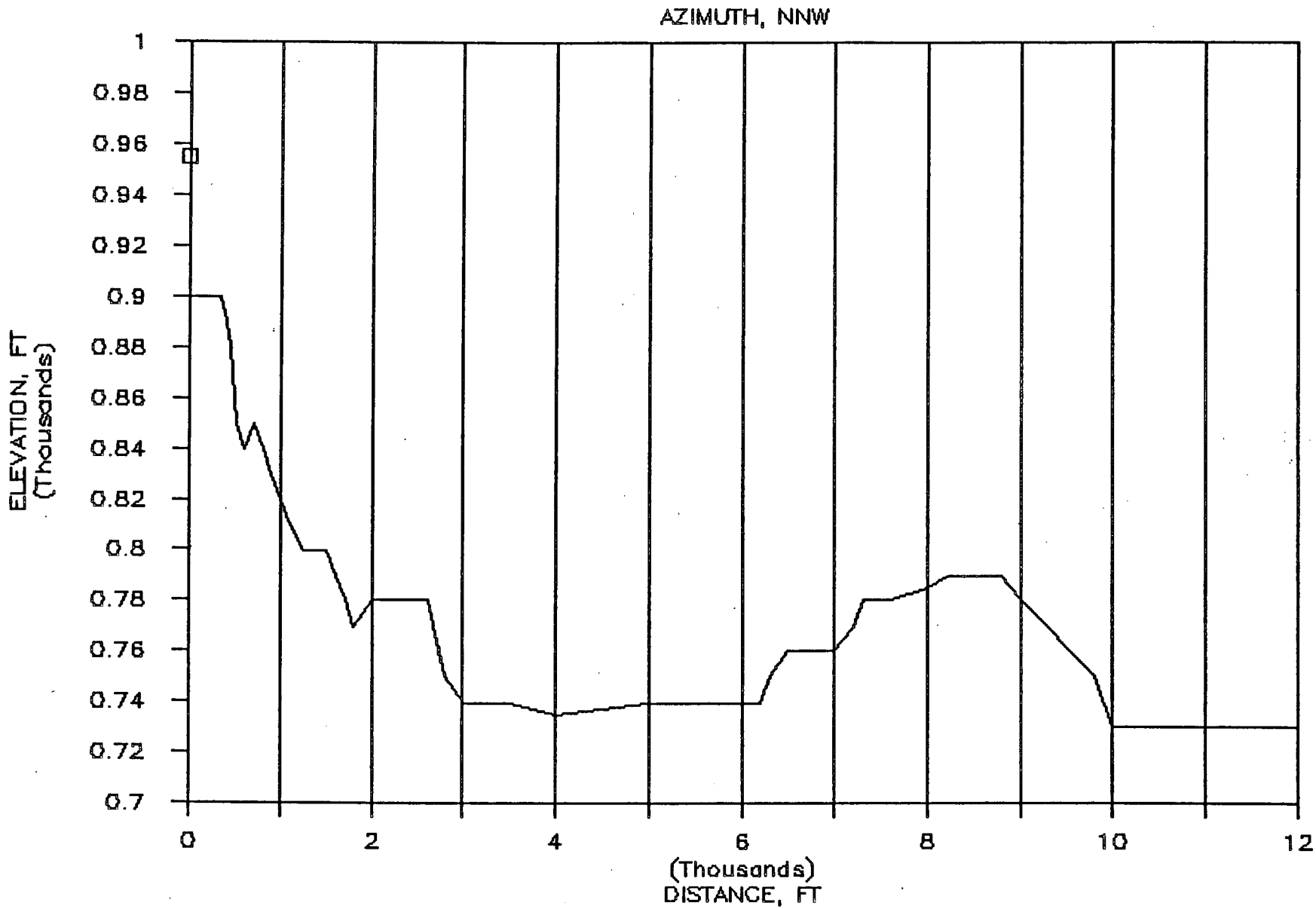


DUANE ARNOLD B



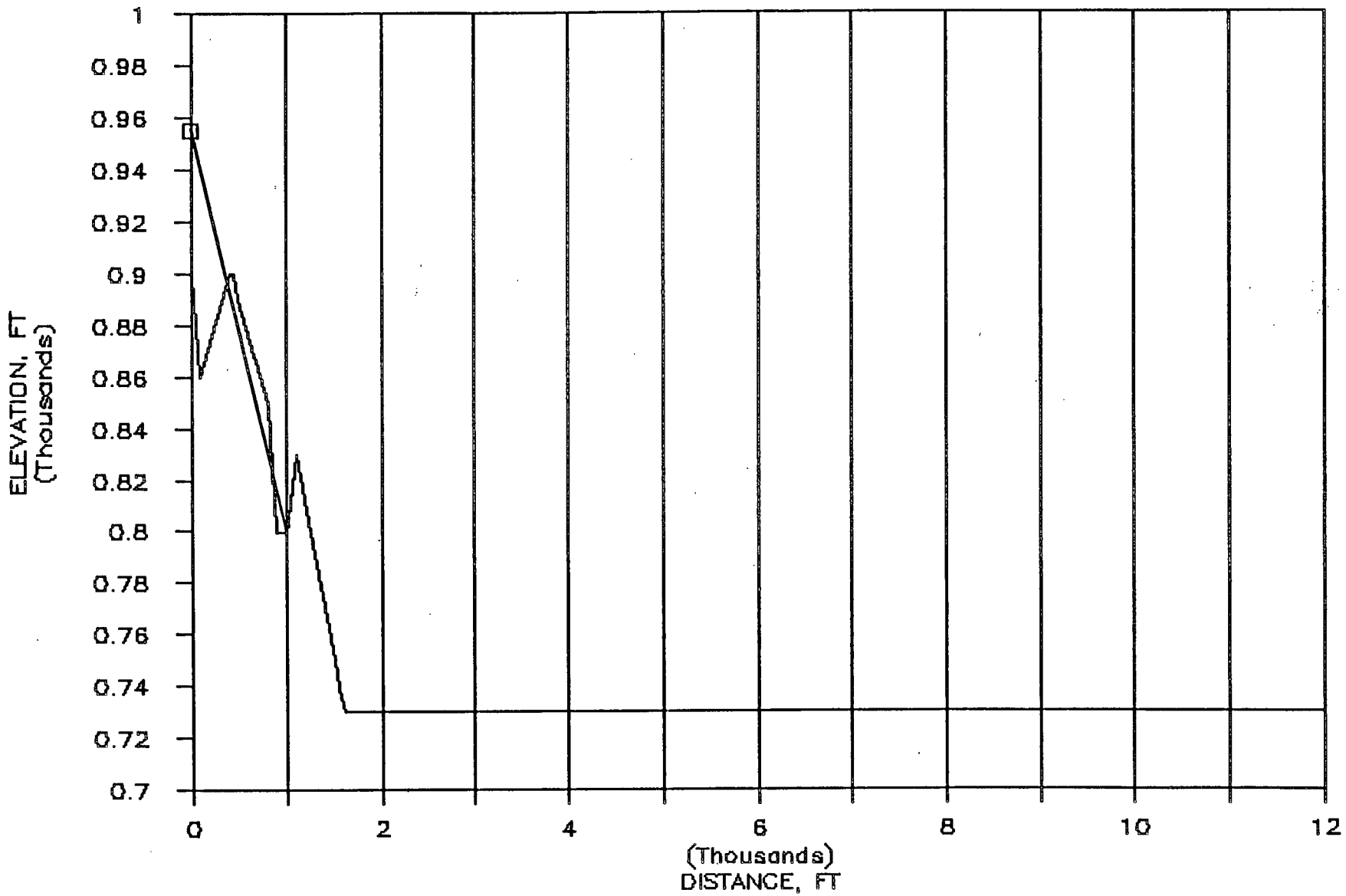

DUANE ARNOLD B
AZIMUTH, N
ELEVATION, FT
(Thousands)
1
0.98
0.96
0.94
0.92
0.9
0.88
0.86
0.84
0.82
0.8
0.78
0.76
0.74
0
2
4
6
8
10
12
(Thousands)
DISTANCE, FT

DUANE ARNOLD B

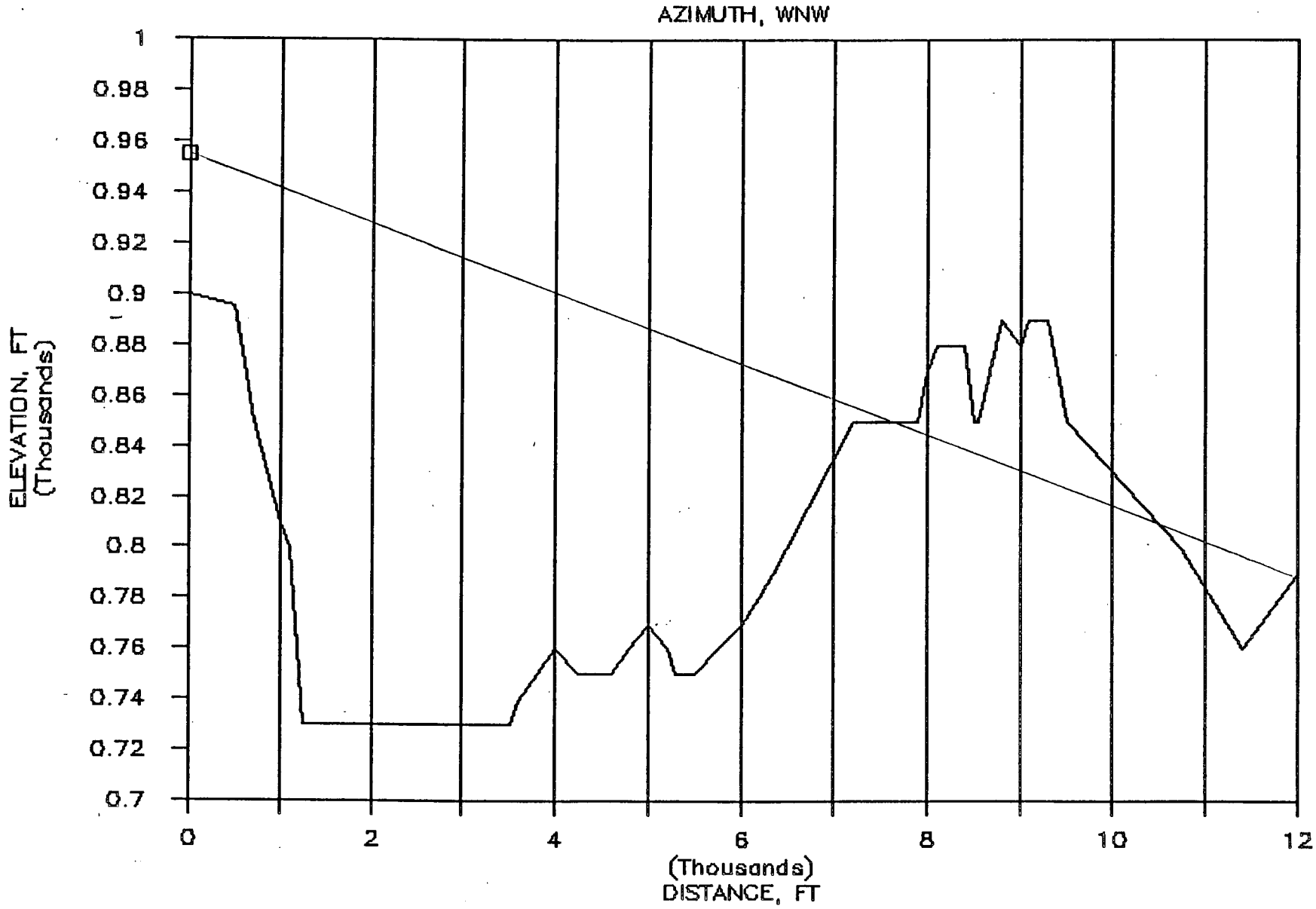


DUANE ARNOLD B

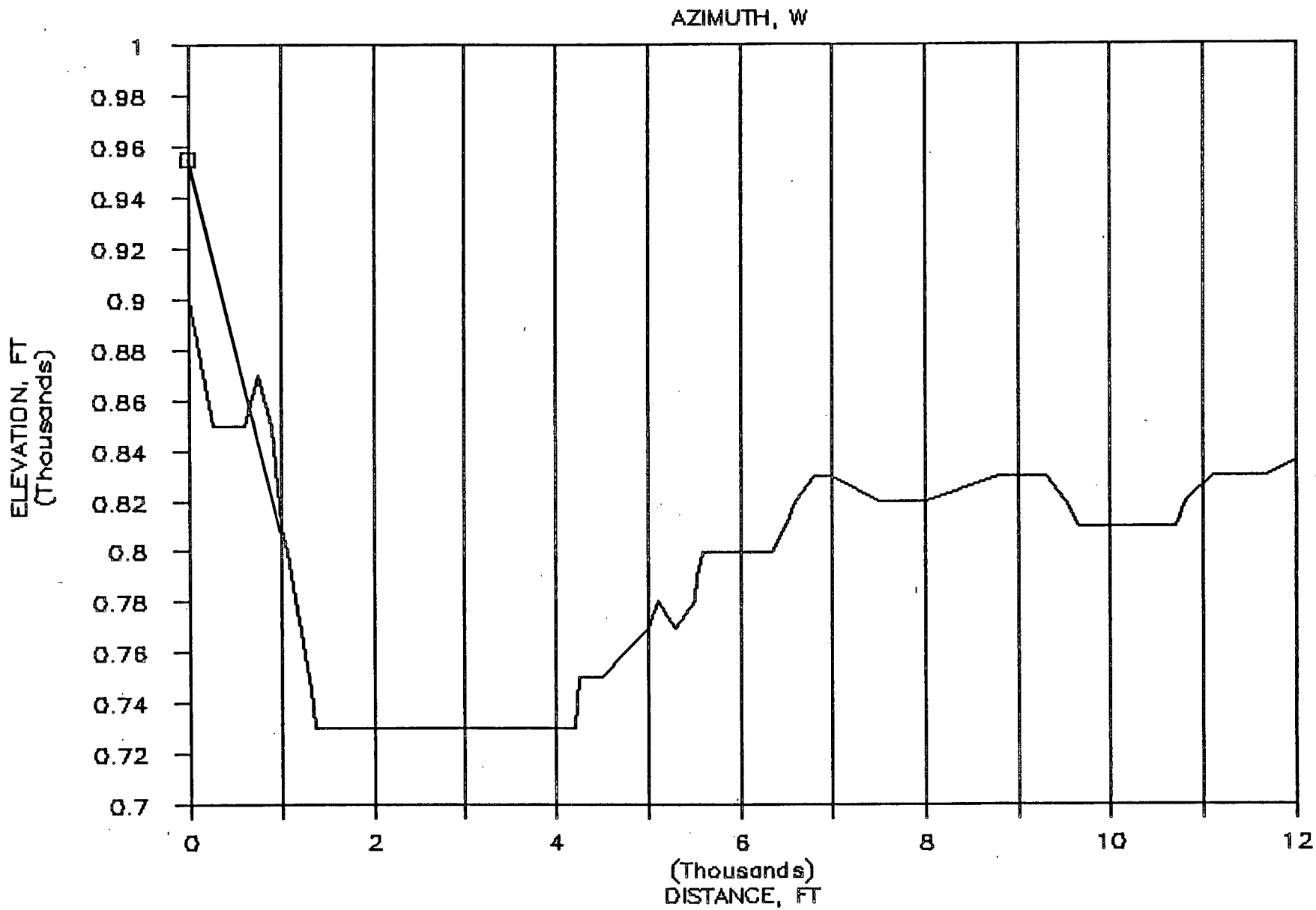
AZIMUTH, NW

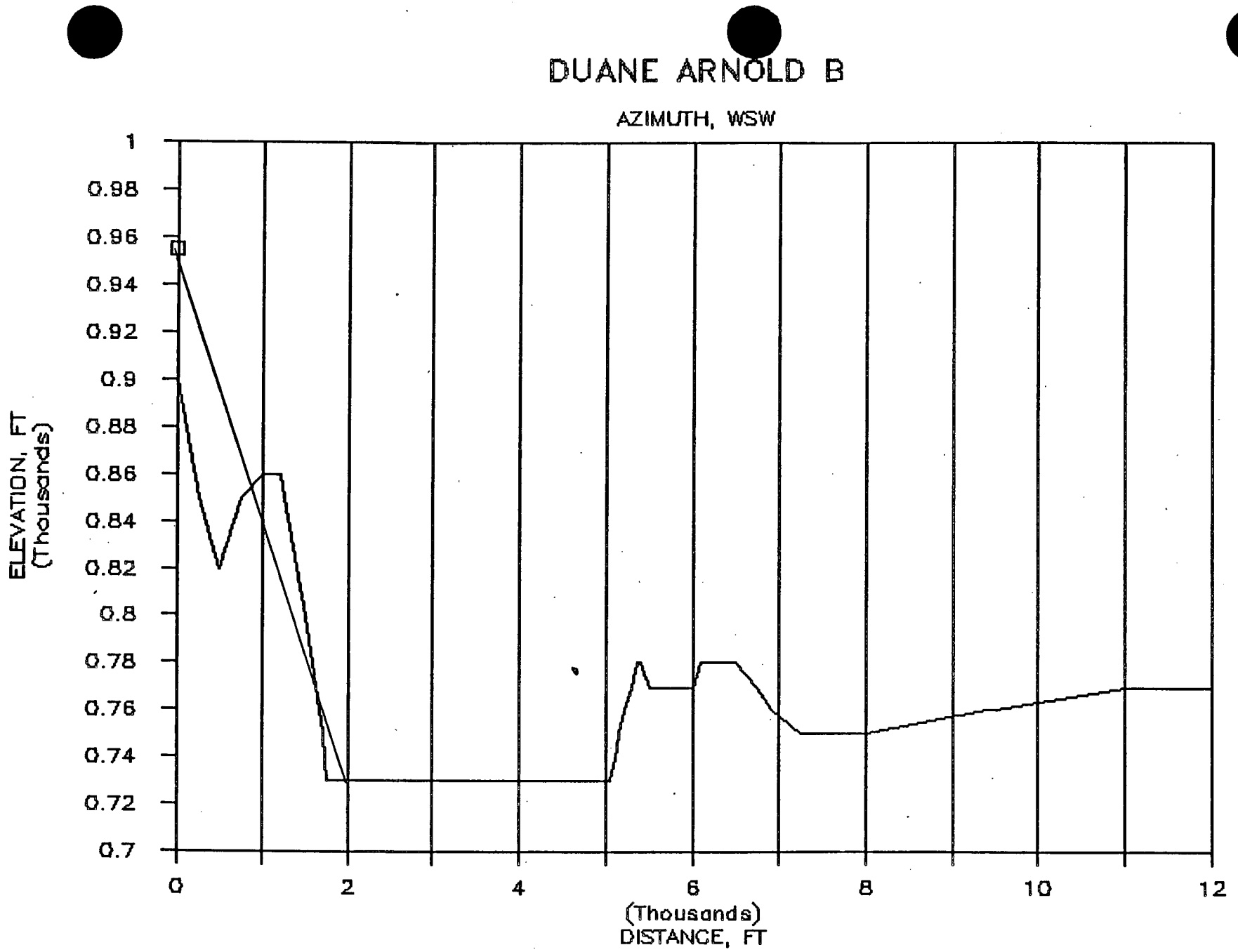


DUANE ARNOLD B

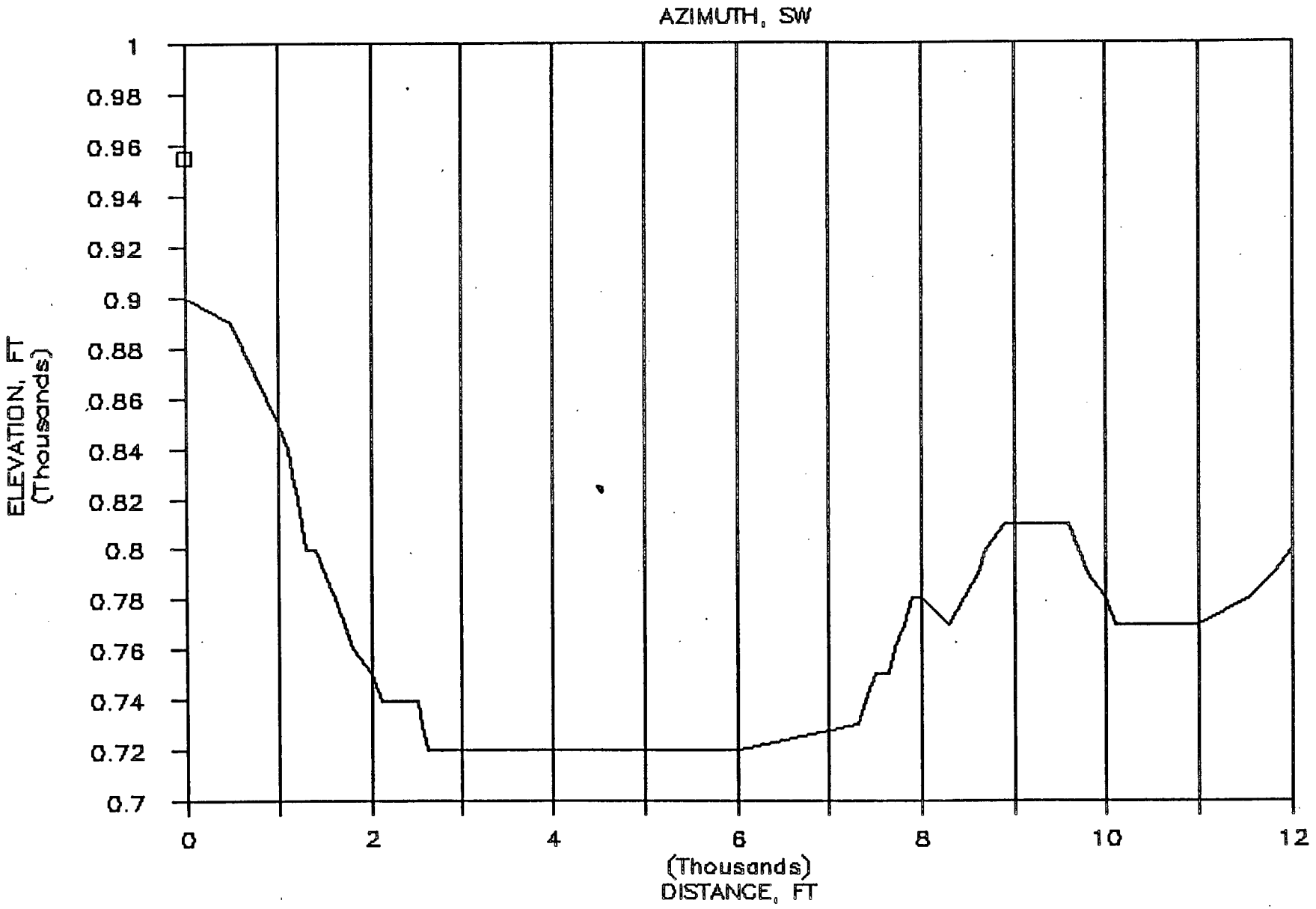


DUANE ARNOLD B

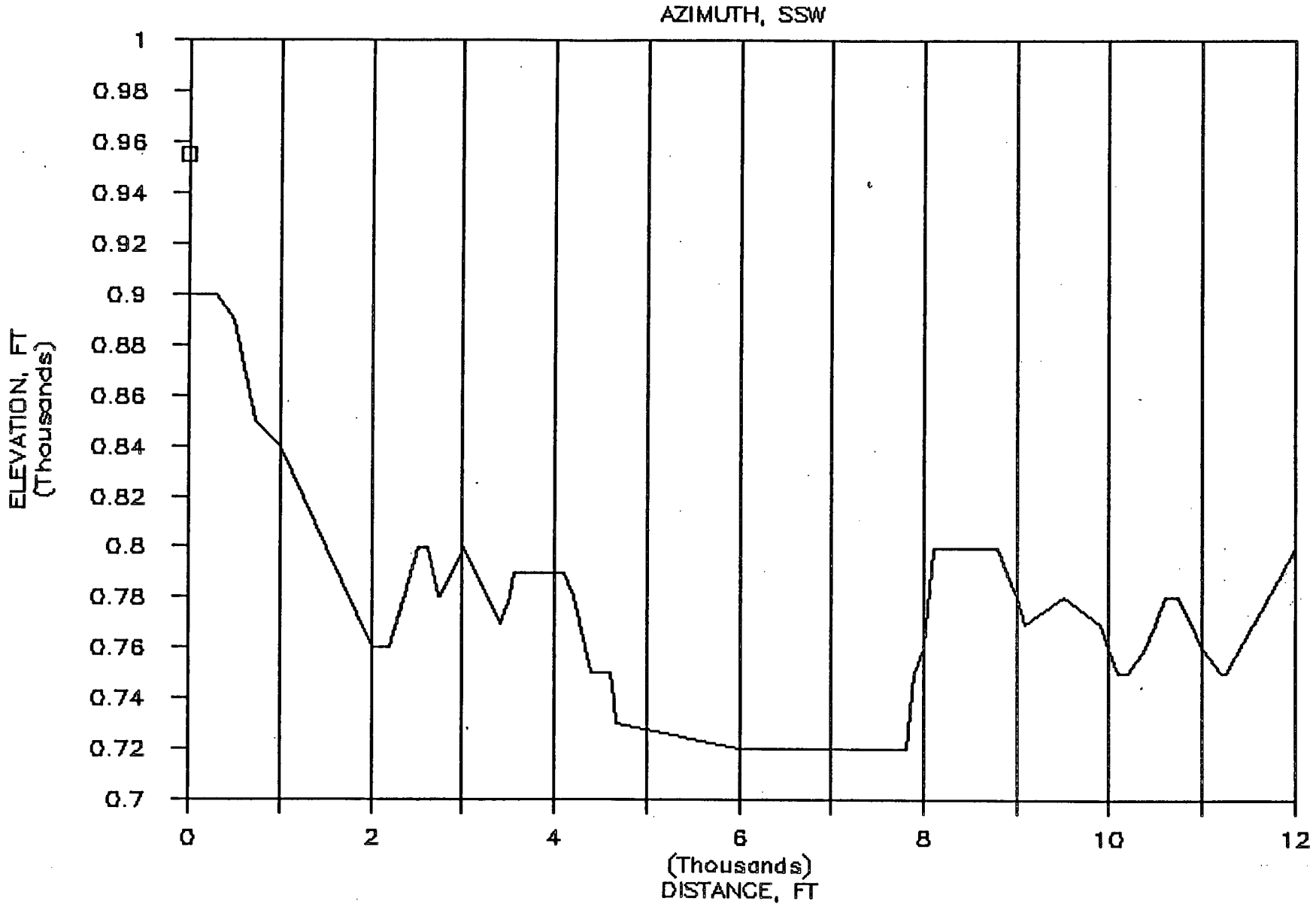



DUANE ARNOLD B
AZIMUTH, WSW
ELEVATION, FT
(Thousands)
1
0.98
0.96
0.94
0.92
0.9
0.88
0.86
0.84
0.82
0.8
0.78
0.76
0.74
0.72
0.7
0
2
4
6
8
10
12
(Thousands)
DISTANCE, FT

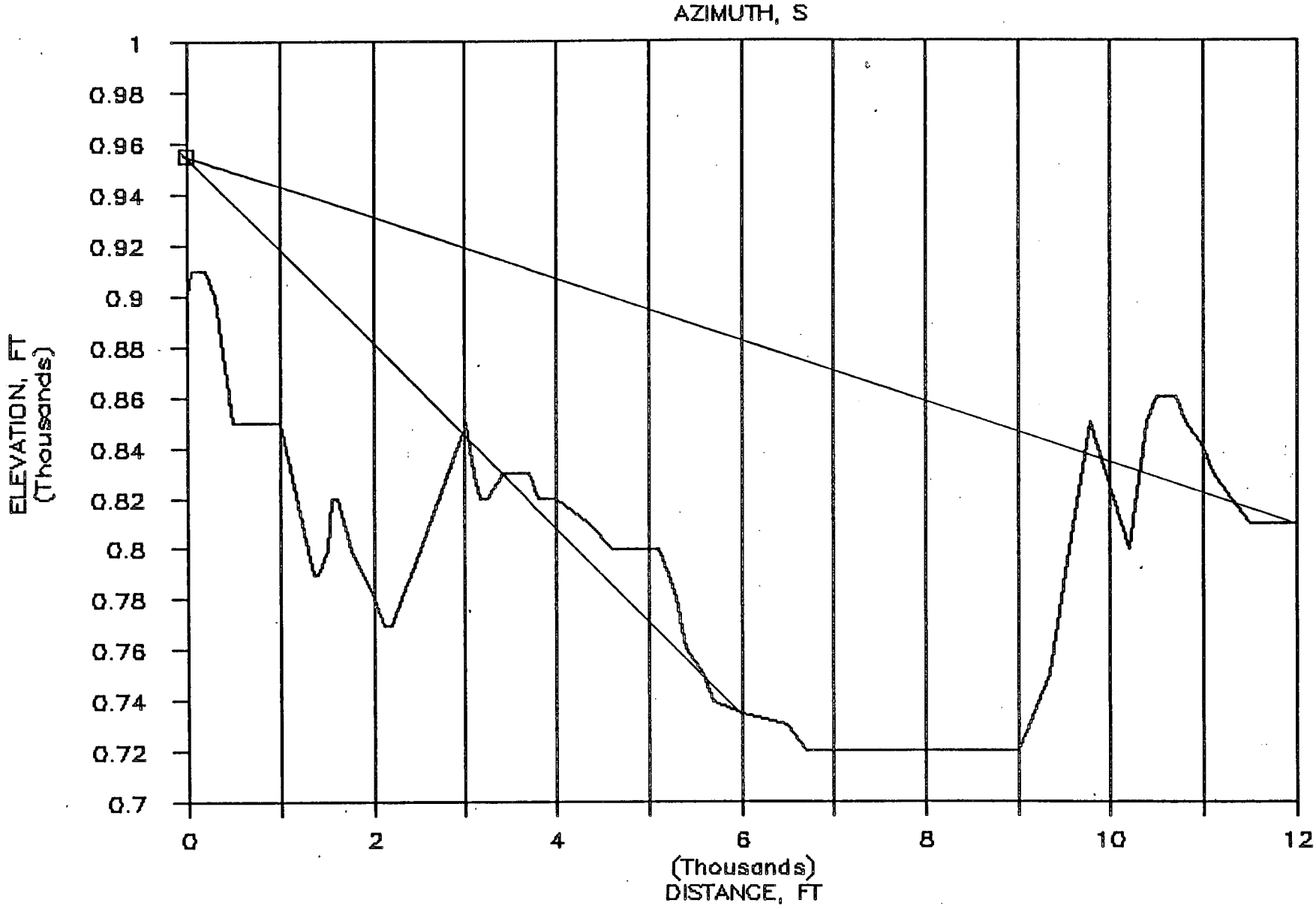
DUANE ARNOLD B



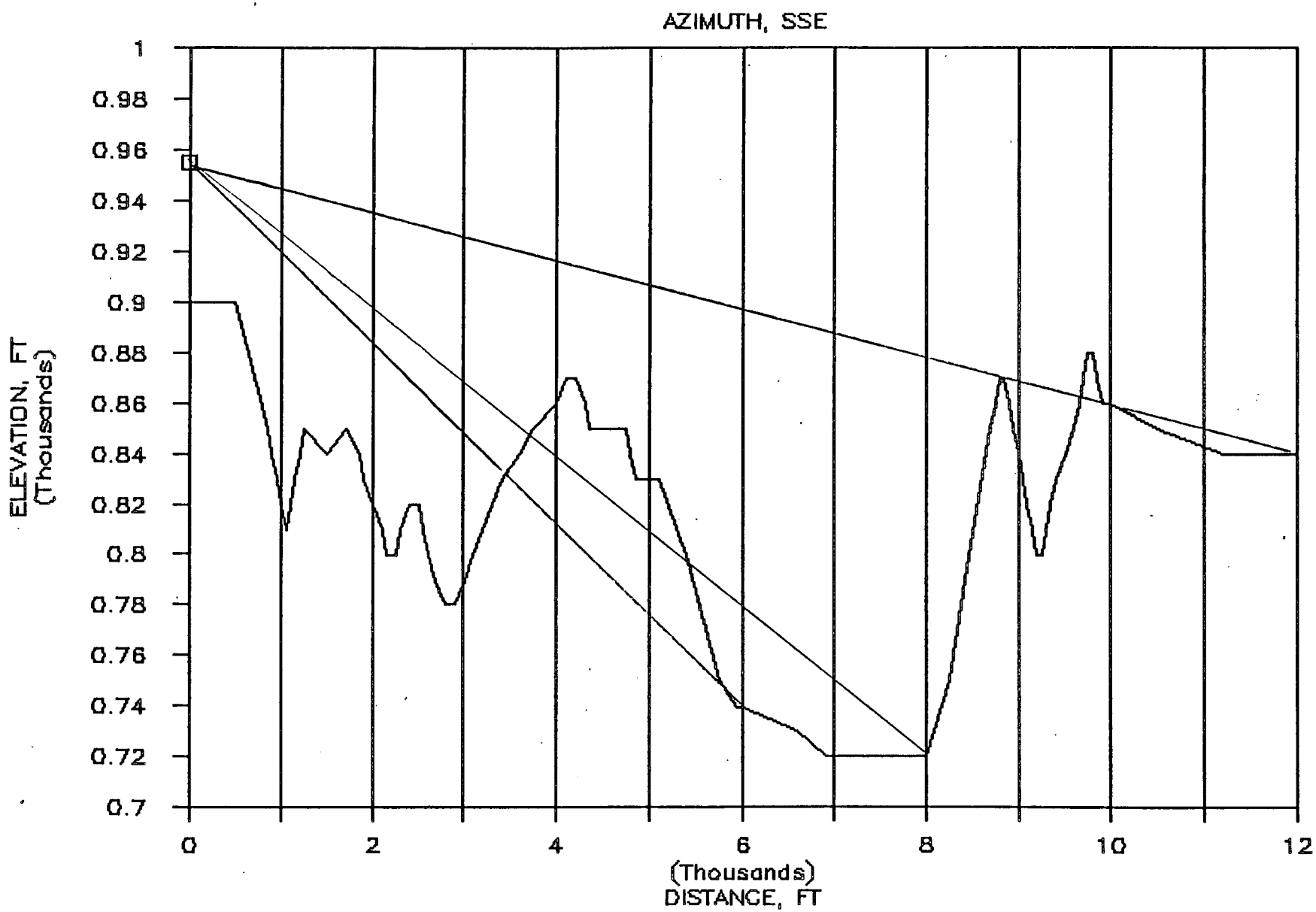
DUANE ARNOLD B



DUANE ARNOLD B

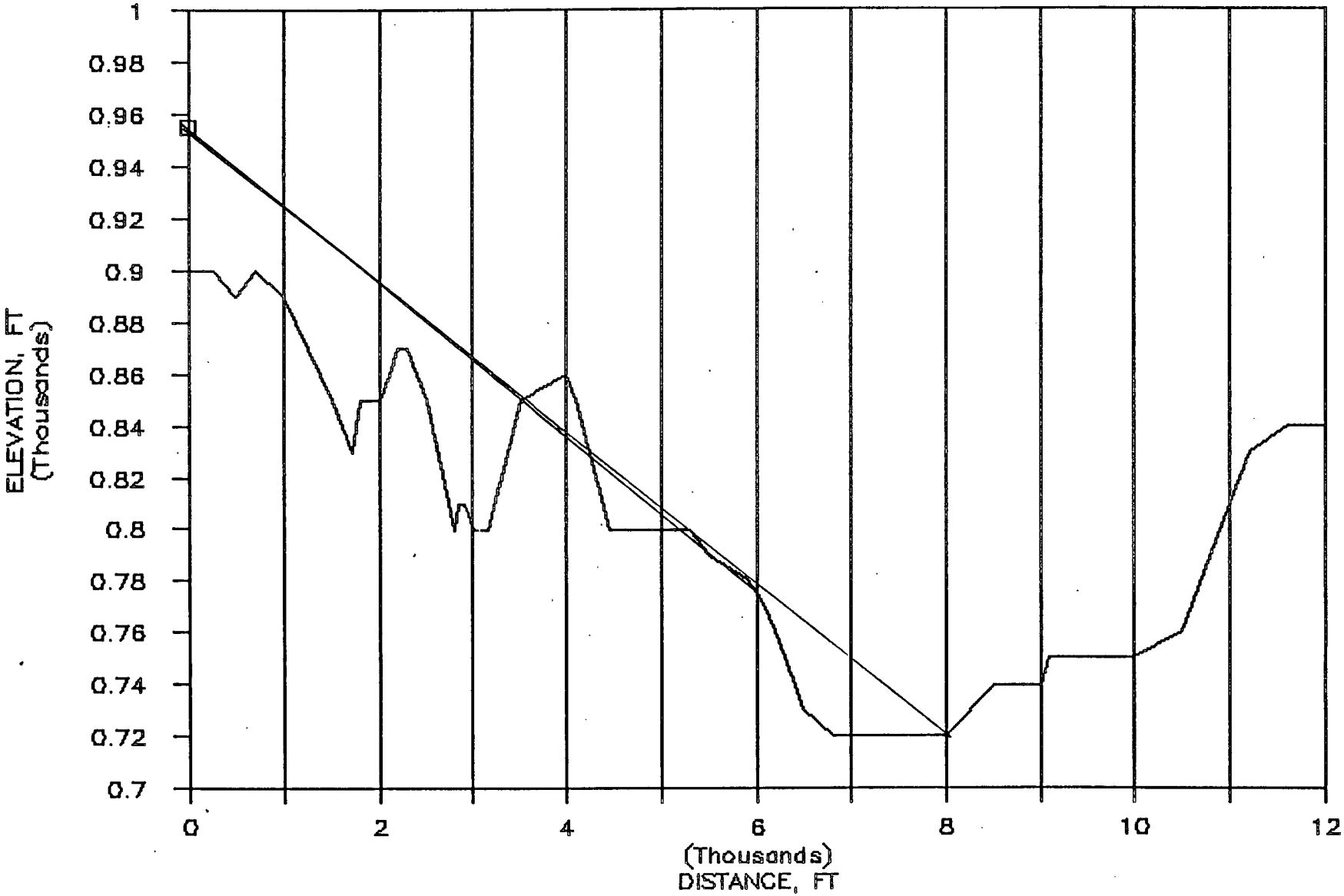


DUANE ARNOLD B

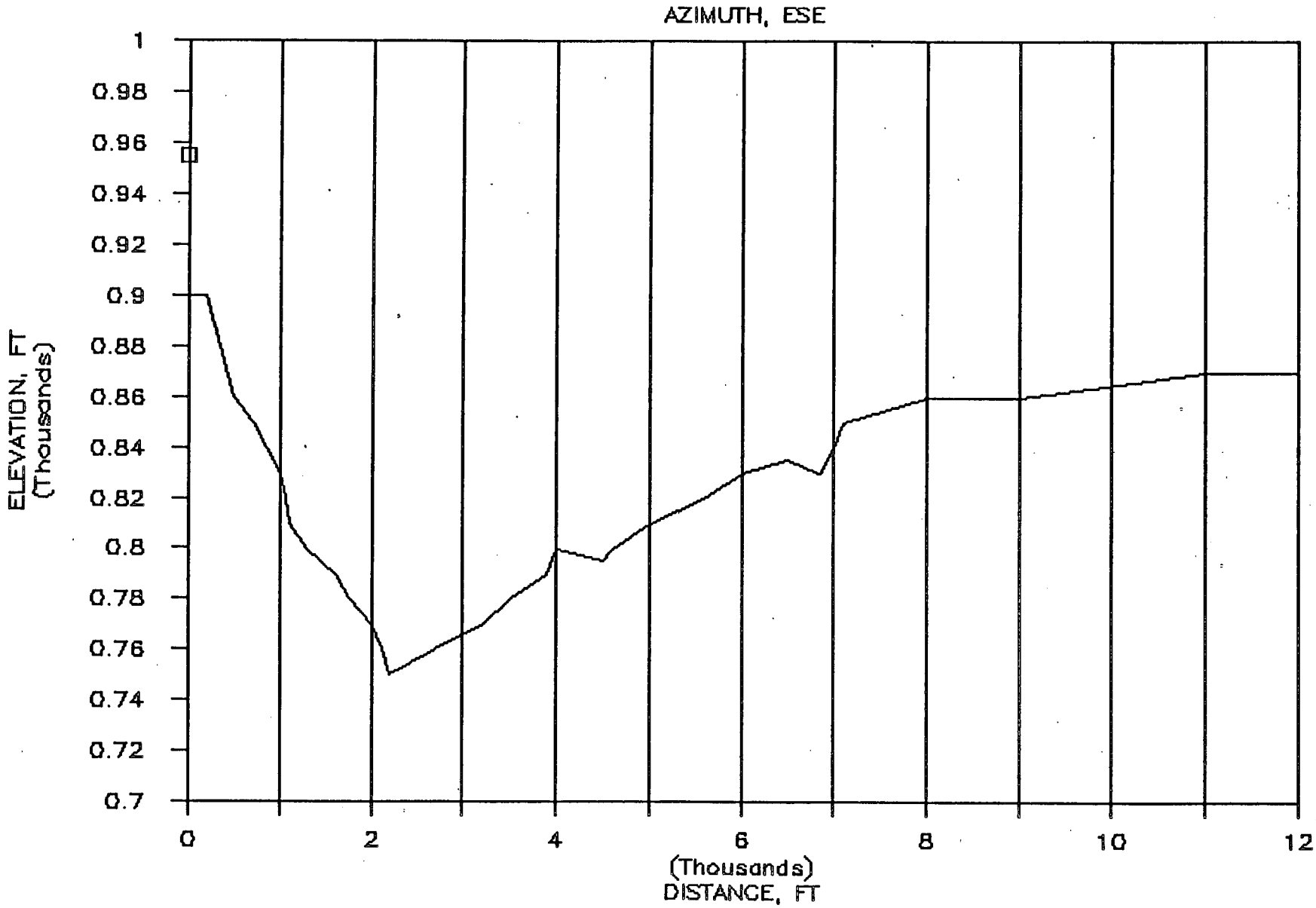


DUANE ARNOLD B

AZIMUTH, SE



DUANE ARNOLD B



IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #B-WS3000
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	870.00	SOFT	0.	NO	0.	0.
2	1000.	90.00	820.00	SOFT	0.	NO	0.	0.
3	2000.	90.00	770.00	SOFT	0.	NO	0.	0.
4	4000.	90.00	800.00	SOFT	0.	NO	0.	0.
5	6000.	90.00	835.00	SOFT	0.	NO	0.	0.
6	8000.	90.00	865.00	SOFT	0.	NO	0.	0.
7	12000.	90.00	860.00	SOFT	0.	NO	0.	0.
8	500.	67.50	880.00	SOFT	0.	NO	0.	0.
9	1000.	67.50	815.00	SOFT	0.	NO	0.	0.
10	2000.	67.50	770.00	SOFT	0.	NO	0.	0.
11	4000.	67.50	770.00	SOFT	0.	NO	0.	0.
12	6000.	67.50	800.00	SOFT	0.	NO	0.	0.
13	8000.	67.50	827.00	SOFT	0.	NO	0.	0.
14	12000.	67.50	850.00	SOFT	0.	NO	0.	0.
15	500.	45.00	850.00	SOFT	0.	NO	0.	0.
16	1000.	45.00	810.00	SOFT	0.	NO	0.	0.
17	2000.	45.00	775.00	SOFT	0.	NO	0.	0.
18	4000.	45.00	790.00	SOFT	0.	NO	0.	0.
19	6000.	45.00	835.00	SOFT	0.	YES	5600.	860.
20	8000.	45.00	800.00	SOFT	0.	NO	0.	0.
21	12000.	45.00	850.00	SOFT	0.	NO	0.	0.
22	500.	22.50	870.00	SOFT	0.	NO	0.	0.
23	1000.	22.50	815.00	SOFT	0.	NO	0.	0.
24	2000.	22.50	780.00	SOFT	0.	NO	0.	0.
25	4000.	22.50	825.00	SOFT	0.	NO	0.	0.
26	6000.	22.50	855.00	SOFT	0.	NO	0.	0.
27	8000.	22.50	840.00	SOFT	0.	NO	0.	0.
28	12000.	22.50	805.00	SOFT	0.	YES	9000.	840.
29	500.	.00	880.00	SOFT	0.	NO	0.	0.
30	1000.	.00	810.00	SOFT	0.	NO	0.	0.
31	2000.	.00	795.00	SOFT	0.	NO	0.	0.
32	4000.	.00	805.00	SOFT	0.	NO	0.	0.
33	6000.	.00	820.00	SOFT	0.	YES	5800.	830.
34	8000.	.00	825.00	SOFT	0.	NO	0.	0.
35	12000.	.00	780.00	SOFT	0.	NO	0.	0.
36	500.	337.50	860.00	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	820.00	SOFT	0.	NO	0.	0.
38	2000.	337.50	780.00	SOFT	0.	NO	0.	0.
39	4000.	337.50	735.00	SOFT	0.	NO	0.	0.
40	6000.	337.50	740.00	SOFT	0.	NO	0.	0.
41	8000.	337.50	785.00	SOFT	0.	NO	0.	0.
42	12000.	337.50	730.00	SOFT	0.	NO	0.	0.
43	500.	315.00	890.00	SOFT	0.	NO	0.	0.
44	1000.	315.00	800.00	SOFT	0.	YES	400.	900.
45	2000.	315.00	730.00	SOFT	0.	NO	0.	0.
46	4000.	315.00	730.00	SOFT	0.	NO	0.	0.
47	6000.	315.00	730.00	SOFT	0.	NO	0.	0.
48	8000.	315.00	730.00	SOFT	0.	NO	0.	0.
49	12000.	315.00	730.00	SOFT	0.	NO	0.	0.
50	500.	292.50	895.00	SOFT	0.	NO	0.	0.
51	1000.	292.50	810.00	SOFT	0.	NO	0.	0.
52	2000.	292.50	730.00	SOFT	0.	NO	0.	0.
53	4000.	292.50	760.00	SOFT	0.	NO	0.	0.
54	6000.	292.50	770.00	SOFT	0.	NO	0.	0.
55	8000.	292.50	870.00	SOFT	0.	NO	0.	0.
56	12000.	292.50	790.00	SOFT	0.	YES	8800.	900.
57	500.	270.00	850.00	SOFT	0.	NO	0.	0.
58	1000.	270.00	850.00	SOFT	0.	YES	750.	870.
59	2000.	270.00	730.00	SOFT	0.	NO	0.	0.
60	4000.	270.00	730.00	SOFT	0.	NO	0.	0.
61	6000.	270.00	800.00	SOFT	0.	NO	0.	0.
62	8000.	270.00	820.00	SOFT	0.	NO	0.	0.
63	12000.	270.00	836.00	SOFT	0.	NO	0.	0.
64	500.	247.50	820.00	SOFT	0.	NO	0.	0.
65	1000.	247.50	860.00	SOFT	0.	NO	0.	0.
66	2000.	247.50	730.00	SOFT	0.	YES	1000.	860.
67	4000.	247.50	730.00	SOFT	0.	NO	0.	0.
68	6000.	247.50	770.00	SOFT	0.	NO	0.	0.
69	8000.	247.50	750.00	SOFT	0.	NO	0.	0.
70	12000.	247.50	770.00	SOFT	0.	NO	0.	0.
71	500.	225.00	890.00	SOFT	0.	NO	0.	0.
72	1000.	225.00	850.00	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	750.00	SOFT	0.	NO	0.	0.
74	4000.	225.00	720.00	SOFT	0.	NO	0.	0.
75	6000.	225.00	720.00	SOFT	0.	NO	0.	0.
76	8000.	225.00	780.00	SOFT	0.	NO	0.	0.
77	12000.	225.00	800.00	SOFT	0.	NO	0.	0.
78	500.	202.50	890.00	SOFT	0.	NO	0.	0.
79	1000.	202.50	840.00	SOFT	0.	NO	0.	0.
80	2000.	202.50	760.00	SOFT	0.	NO	0.	0.
81	4000.	202.50	790.00	SOFT	0.	NO	0.	0.
82	6000.	202.50	720.00	SOFT	0.	NO	0.	0.
83	8000.	202.50	760.00	SOFT	0.	NO	0.	0.
84	12000.	202.50	800.00	SOFT	0.	NO	0.	0.
85	500.	180.00	850.00	SOFT	0.	NO	0.	0.
86	1000.	180.00	850.00	SOFT	0.	NO	0.	0.
87	2000.	180.00	780.00	SOFT	0.	NO	0.	0.
88	4000.	180.00	820.00	SOFT	0.	NO	0.	0.
89	6000.	180.00	735.00	SOFT	0.	YES	3000.	850.
90	8000.	180.00	720.00	SOFT	0.	NO	0.	0.
91	12000.	180.00	810.00	SOFT	0.	YES	10500.	870.
92	500.	157.50	900.00	SOFT	0.	NO	0.	0.
93	1000.	157.50	820.00	SOFT	0.	NO	0.	0.
94	2000.	157.50	820.00	SOFT	0.	NO	0.	0.
95	4000.	157.50	860.00	SOFT	0.	NO	0.	0.
96	6000.	157.50	740.00	SOFT	0.	YES	4100.	870.
97	8000.	157.50	720.00	SOFT	0.	YES	4100.	870.
98	12000.	157.50	840.00	SOFT	0.	YES	9800.	880.
99	500.	135.00	890.00	SOFT	0.	NO	0.	0.
100	1000.	135.00	890.00	SOFT	0.	NO	0.	0.
101	2000.	135.00	850.00	SOFT	0.	NO	0.	0.
102	4000.	135.00	860.00	SOFT	0.	NO	0.	0.
103	6000.	135.00	775.00	SOFT	0.	YES	3500.	860.
104	8000.	135.00	720.00	SOFT	0.	YES	3500.	860.
105	12000.	135.00	840.00	SOFT	0.	NO	0.	0.
106	500.	112.50	860.00	SOFT	0.	NO	0.	0.
107	1000.	112.50	830.00	SOFT	0.	NO	0.	0.
108	2000.	112.50	770.00	SOFT	0.	NO	0.	0.
109	4000.	112.50	795.00	SOFT	0.	NO	0.	0.
110	6000.	112.50	835.00	SOFT	0.	NO	0.	0.
111	8000.	112.50	860.00	SOFT	0.	NO	0.	0.
112	12000.	112.50	870.00	SOFT	0.	NO	0.	0.

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #8-WS3000
NOISE SOURCE POWER LEVEL INPUT

INDEX	SOURCE	DBA	DBC	31.5	63	125	250	500	1000	2000	4000	8000 (HZ)
1	DUANE - WS3000	158.1	158.0	.0	.0	.0	.0	147.0	157.0	149.0	141.0	124.0

XO= .00 YO= .00 ZO= 955.00 HEIGHT ABOVE GROUND= 55.00

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #8-WS3000
METEOROLOGICAL INPUT CONDITIONS

H1= 10.67 METERS H2= 50.29 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)
1981		8	21	12	177.0	2.1	2.6	23.9	23.2	30.0	742.0

IOWA ELECTRIC LIGHT AND POWER COMPANY
DUANE ARNOLD ANS SIREN #B-WS3000

SOUND PRESSURE LEVELS IN DBC
UNDER MET CONDITION 1

DISTANCE IN FEET

AZIMUTH	500.	1000.	2000.	4000.	6000.	8000.	12000.
E	104.7	90.8	76.2	66.5	61.8	58.2	51.5
ENE	104.7	90.7	76.2	66.5	61.8	58.2	51.5
NE	104.6	90.7	76.2	66.5	52.7	54.9	43.2
NNE	104.7	90.7	76.2	66.5	61.8	58.2	46.7
N	104.7	90.7	76.3	66.5	56.0	58.2	51.5
NNW	104.6	90.8	76.2	66.5	61.7	58.2	51.5
NW	104.7	84.0	76.2	66.5	61.7	58.2	51.5
WNW	104.7	90.7	76.2	66.5	61.8	58.2	40.9
W	104.6	84.1	76.2	66.5	61.8	58.2	51.5
WSW	104.4	90.9	68.0	66.5	61.2	55.2	43.7
SW	104.7	90.8	76.2	66.5	61.7	58.2	51.5
SSW	104.7	90.8	76.2	66.5	61.7	58.2	51.5
S	104.6	90.8	76.2	66.5	56.9	58.2	41.9
SSE	104.8	90.8	76.3	66.5	49.5	50.3	42.1
SE	104.7	90.9	76.3	66.5	55.7	49.9	43.2
ESE	104.6	90.8	76.2	66.5	61.8	58.2	51.5

APPENDIX B

SAMPLE SIZE DETERMINATION

APPENDIX B

SAMPLE SIZE DETERMINATION

mber of households that need to be surveyed is determined upon the need to obtain a sample size sufficient to obtain confidence interval with precision (half-width) of 0.05 e estimate of the proportion alerted. The exact number of olds to be surveyed can be derived from the following tical considerations. For relatively large sample sizes 0), taken without replacement from a population (N), the ng distribution for proportions (e.g., the proportion of pu ion alerted) is nearly a normal distribution, the f which is the proportion (p) of the population alerted e variance of which is

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

s the observed sample proportion, then for a particular ence level with confidence coefficient Z_c,

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

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

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

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.