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OIL GAS & MINING

SUBSIDENCE MONITORING REPORT
1992
STAR POINT MINE
ACT/007/006

Cyprus Plateau Mining Corporation
P.O. Box PMC
Price, Utah 84501

INTRODUCTION

During the months May through September, subsidence monitoring was conducted on surface lands above underground mining. The land surface above all full extraction mining was visually searched for evidence of surface disturbance. Monitoring points on the north half of the area above longwall panels 1 through 7, and 13 and 14, (Map 521.121e) were surveyed for vertical movement. The monitoring points on the south half of this area have reached effective maximum subsidence and therefore were not surveyed in 1992. Monitoring points U1, U2, U3, U4, were surveyed once for horizontal and vertical movement. Monitoring points U-5 through U-17 were surveyed for vertical movement. Monitoring point GS-1 was surveyed for horizontal and vertical movement. Monitoring points U-18 through U-32 were surveyed for vertical movement to determine the angle of draw in that area. Monitoring points G1 through G19 (Map 521.121f) were surveyed for vertical movement.

Mining during 1992 was conducted in the areas shown on Map W-4.

SURFACE EFFECTS

Longwall Mining Panels 1 - 7, 13-14, 8 - 12 and 15 and 16

Surface cracks, as shown on Map 521.121e, over longwall mining in Section 18, T15S, R8E, and Section 12, T15S, R7E, are associated with known faults in the south half and in the northeast quarter of Section 12, and with fractures in Section 18.

The cracks in the south half and in the northeast quarter of Section 12 originally varied in width from hairline to 6 inches, and displacement across the cracks varied from none to two feet. These cracks are continuing to heal nicely; there are no known open holes or unsafe areas. The cracks do not pose a safety hazard to humans, livestock or wildlife. The cracks in the northwest quarter of Section 12 developed during the winter of 1990; they vary in width from hairline to about 2 feet. These cracks were fenced during the summer of 1991 in compliance with the Manti La-Sal National Forest based upon site evaluation and recommendations.

Subsidence contours have been plotted using survey data in the Section 12 area. As can be seen on Map 521.121e, subsidence contours reflect a reaction to the east-west trending faults. On the west side of Section 12, two short cracks appeared in 1989 at north-south trending faults. These cracks are very small, and have healed to a point where they are barely noticeable.

Overburden in the Section 12 area ranges from 800 to 1,500 feet. The area is characterized by a mounded ridge with a steeply incised canyon on the north end.

Several areas of outcropping sandstone channels in Section 18 failed due to surface and near surface movement. No massive failures have occurred.

Overburden in the Section 18 area ranges from 0 to 1,100 feet. The area is characterized by a ridge at the north end with a cliff of exposed Castle Gate Sandstone. The majority of the area comprises the headwaters of a small drainage basin characterized by steep canyon sides and very rugged, tree covered terrain. Because the terrain is Section 18 is so rugged, a grid of monitoring points is impractical. Subsidence contours cannot be plotted for this same reason. The cracks in Section 18 vary in width from hairline to 60 inches; displacement across the cracks varies from none to 2 feet.

Cross sections have been plotted through Panels 1-7, 13 and 14 (Figure 1), Panel 2 (Figure 2), and Panel 4 (Figure 3). Cross Section F-F has been plotted of monitoring points U-18 through U-32 (Figure 10) showing the angle of draw at this location of 15 degrees. Please refer to Map 521.121e for cross section locations.

As can be seen on Figures 1, 2, and 3, subsidence has stopped above the longwall panels in this area. Subsidence reached its maximum during the third year after mining. Figure 1 shows the subsidence profile diagonally through the nine longwall panels. The progression of subsidence can be seen to the north as successive panels were mined.

A cross section through Points U5-U17 in Section 18 (Figure 4) indicates a maximum vertical drop of 3.4 feet. These monitoring points were not monitored in 1991 due to hazardous conditions but, were monitored again in 1992. As can be seen on the cross section, mining of longwall panels 16 and 17 in the Third Seam caused additional movement.

Horizontal and vertical movement graphs have been made of monitoring points U1, U2, U3, and U4, Figures 5, 6, 7, and 8 respectively. Point U1, which is located directly above the north edge of longwall mining in the Wattis coal seam, shows the most vertical and horizontal movement. Point U4 which is located north of mining in the Wattis Seam and at the north edge of mining in the Third Seam shows the least movement.

A horizontal and vertical movement graph (Figure 9) has been plotted of monitoring point GS-1 near the stream in Section 18. Probably because of the shallow overburden at the GS-1 point location, maximum subsidence occurred within 15 weeks of the longwall face passing the point. This monitoring point was not surveyed in 1991 because of the hazardous condition previously discussed but, was surveyed again in 1992. Mining of the Third seam was approximately 220 feet away and appears to have had only minor additional impact on this point.

Longwall Mining Panels 18 through 21

Mining in 1992 included 71% of longwall panel 18, all of panels 19 and 20, and 60% of panel 21 as shown on Map W-4. Monitoring points G1 through G 19 as shown on Map 521.121f were surveyed for vertical movement. Cross sections D-D and E-E were plotted from the data at these monitoring points. As can be seen on the cross sections, maximum subsidence was slightly over 3 feet.

As shown on Cross Sections D-D and E-E, the angle of draw at these locations is 26 degrees and 24 degrees respectively.

MITIGATION

The surface cracks crossing the U.S. Forest Service development road in Section 12 were repaired in 1987, and have shown no further cracking, or movement.

A portion of the surface cracks near monitoring points U1 and U2 in Section 18 have been repaired to reduce the likelihood of accidents. The cracks were backfilled and the area fenced. Signs were placed in the area warning the public of the potential danger of the unstable ground. This area is fee land owned by the U.S. Fuel Company; Cyprus Plateau Mining Corporation has an agreement with U.S. Fuel which allows mining impacts.

The new cracks in the northwest quarter of Section 12 were fenced and danger signs placed to warn the public of the hazards. They are in a very rugged area where very few people travel.

VEGETATION

Subsidence in the Section 12 area has caused minimal vegetation loss. Grasses, shrubs and trees near the cracks do not appear to be affected.

Some vegetation in Section 18 has been lost to the small outcrop failures. When the area has stabilized after mining, the area will be hand seeded if necessary.

SURFACE WATER AND GROUND WATER

There has been no identified impact to ground water in the Section 12 area and there is no surface water in the area.

The Section 18 area is the subject of a study of the effects of longwall mining on ground water and surface water; the study ran through 1992, with the final report published in 1993. The study is being undertaken in conjunction with the U.S. Geological Survey and

the Division of Oil, Gas and Mining, the U.S.G.S. will publish the final report.

Some stream water has been diverted into the mine near monitoring point GS-1 because of subsidence. The stream at this location is small, averaging 13 gallons per minute. Springs and base flow from the canyon bottom recharge the stream below this point. A section of stream approximately 800 feet long has been affected. An important point to be learned from the study is whether mudstones and siltstones will expand and stop the downflow of stream water. Water rights in the stream are held by U.S. Fuel Company, with which Cyprus Plateau has an agreement allowing impacts due to mining.

A small side canyon to the North Fork of the Right Fork of Miller Creek in the southeast quarter of the northwest quarter of Section 12 had a small flow prior to mining; the flow in this stream channel was diverted into the ground presumably due to subsidence in 1989. There was flow from the channel in early July of 1990, but no flow in September of 1990. In early July of 1991, there was a flow of 1.5 GPM coming from the channel again. The flow may be an indication that the mudstone and siltstones are healing, however, there was no flow in 1992. The impact of the prolonged drought on the flow from this canyon may also be a factor. Additional time is needed to monitor this channel for flows to determine healing.

A complete discussion of hydrologic impacts can be found in the 1992 Annual Hydrologic Report.

SURFACE STRUCTURES

The only impact to surface structures has been the settling of the U.S. Forest Service development road discussed previously in this report. Repairs to this road were made in 1987, and no further road damage has occurred.

PROJECTED MINING - 1993

Mining will be done in the areas as shown on Maps W-4 and W-5.

MONITORING

Monitoring in 1993 will include the following:

1. Survey monitoring points above longwall panels 18 through 25, as shown on Map 521.121f.

2. Take ground based photographs of the cliff in Section 18.

5. Visual observations of the ground surface above all mined areas for surface effects of mining.

6. Visually inspect the Wild Cattle Hollow stream west of longwall panels 18 through 25 for evidence of surface impacts from mining.

7. Install monitoring points as shown on Map 521.121f at the west end of longwall panels 27 and 30 to monitor impacts to the stream.

Mine Layout

If visual inspection of the area west of longwall panels 18 through 22 finds any surface impacts to the Wild Cattle Hollow Stream channel, the layout of future panels will be adjusted to provide protection to the stream. Panels 23 through 30 have been designed using an angle of draw of 26 degrees from the stream channel to protect the stream.

FIGURE 1
CROSS SECTION A-A

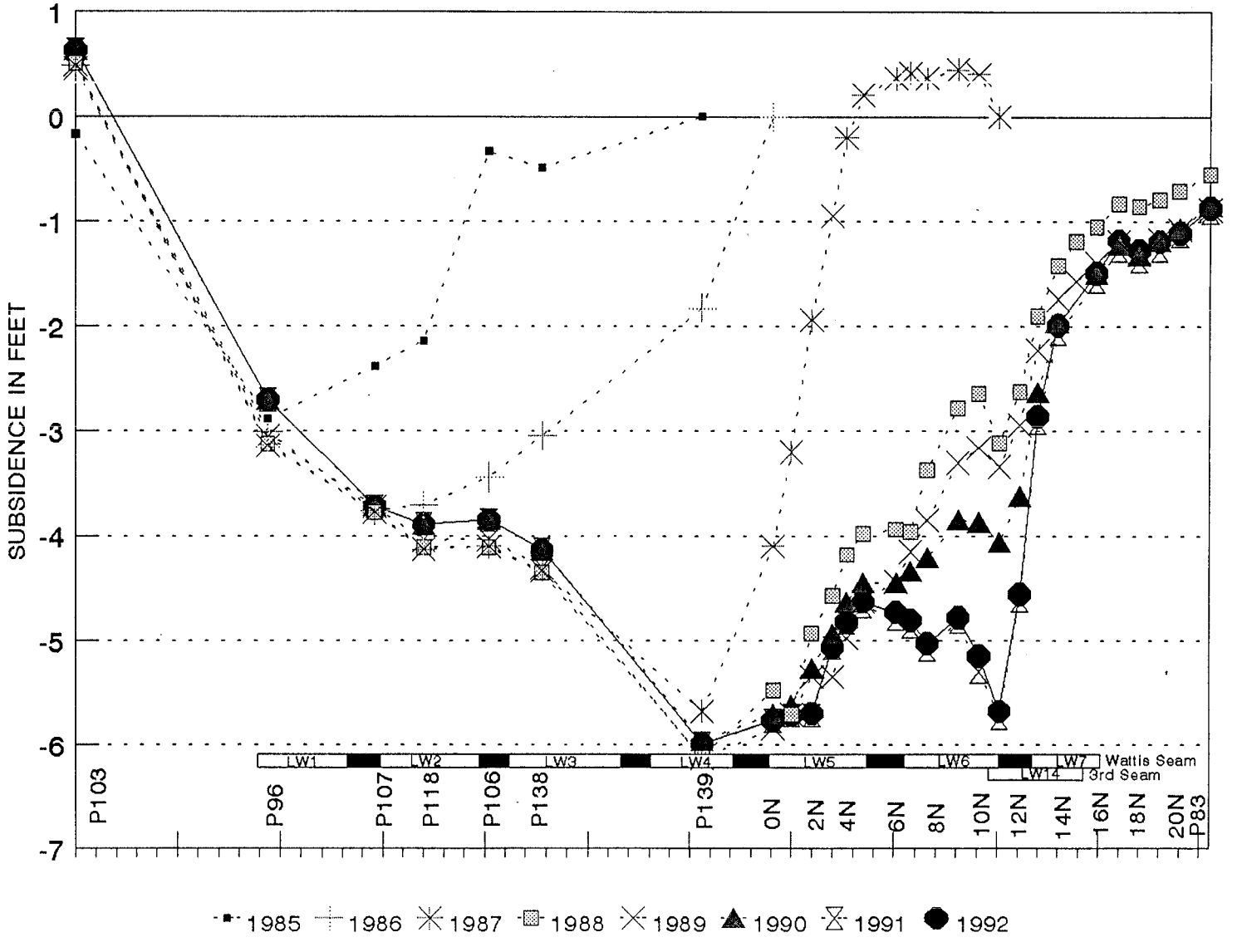
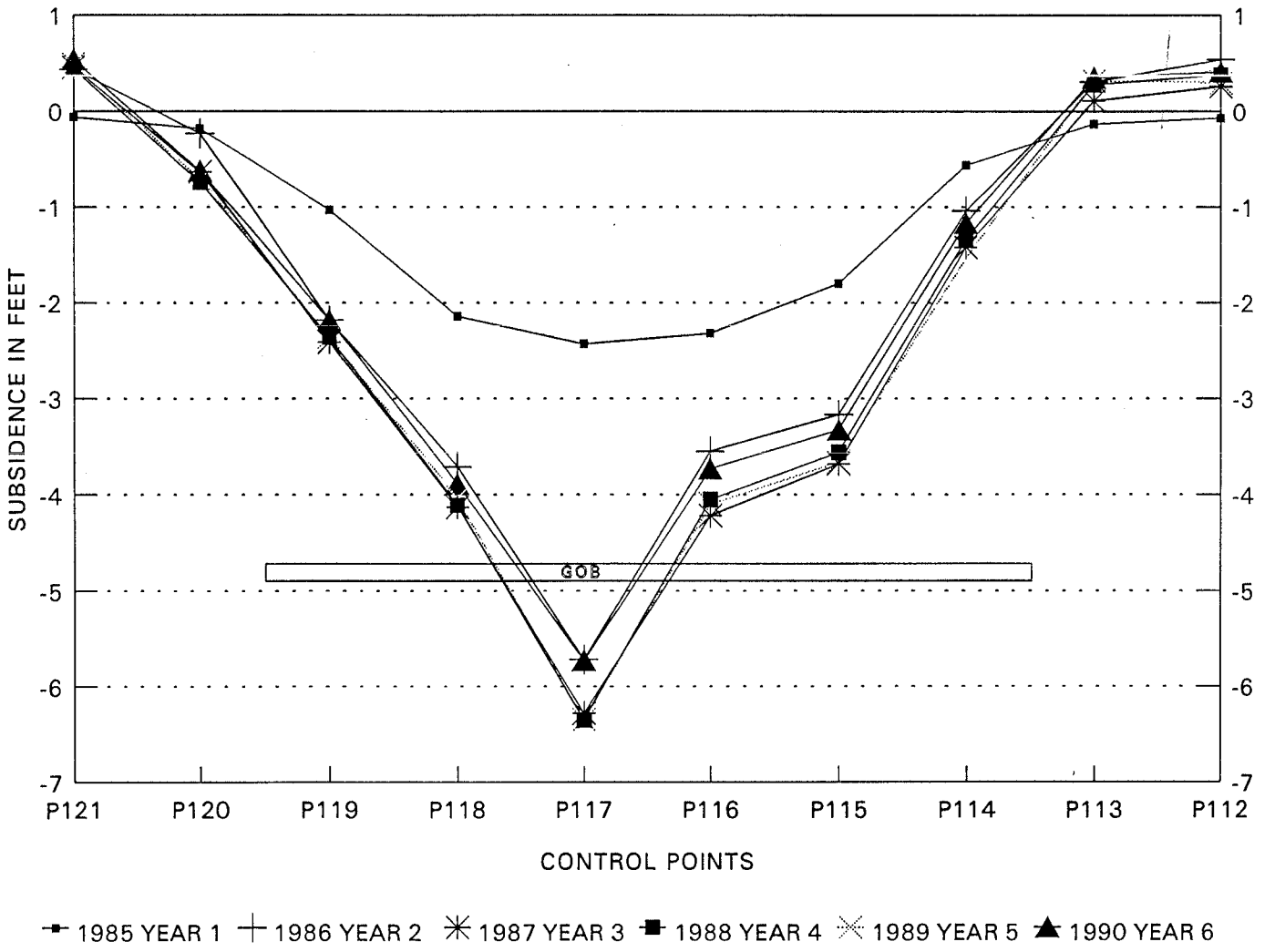
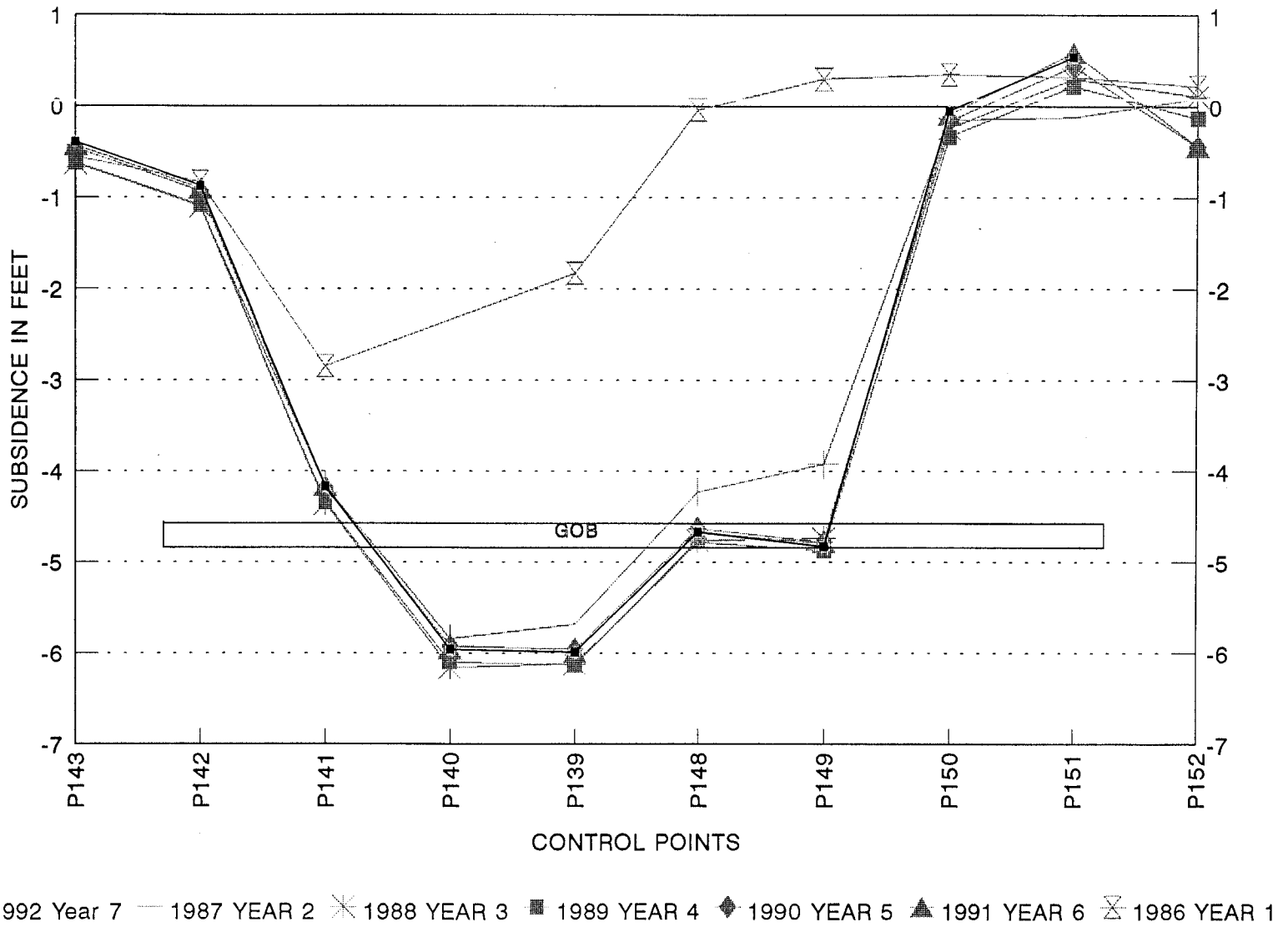


FIGURE 2
CROSS SECTION B-B LONGWALL PANEL 2



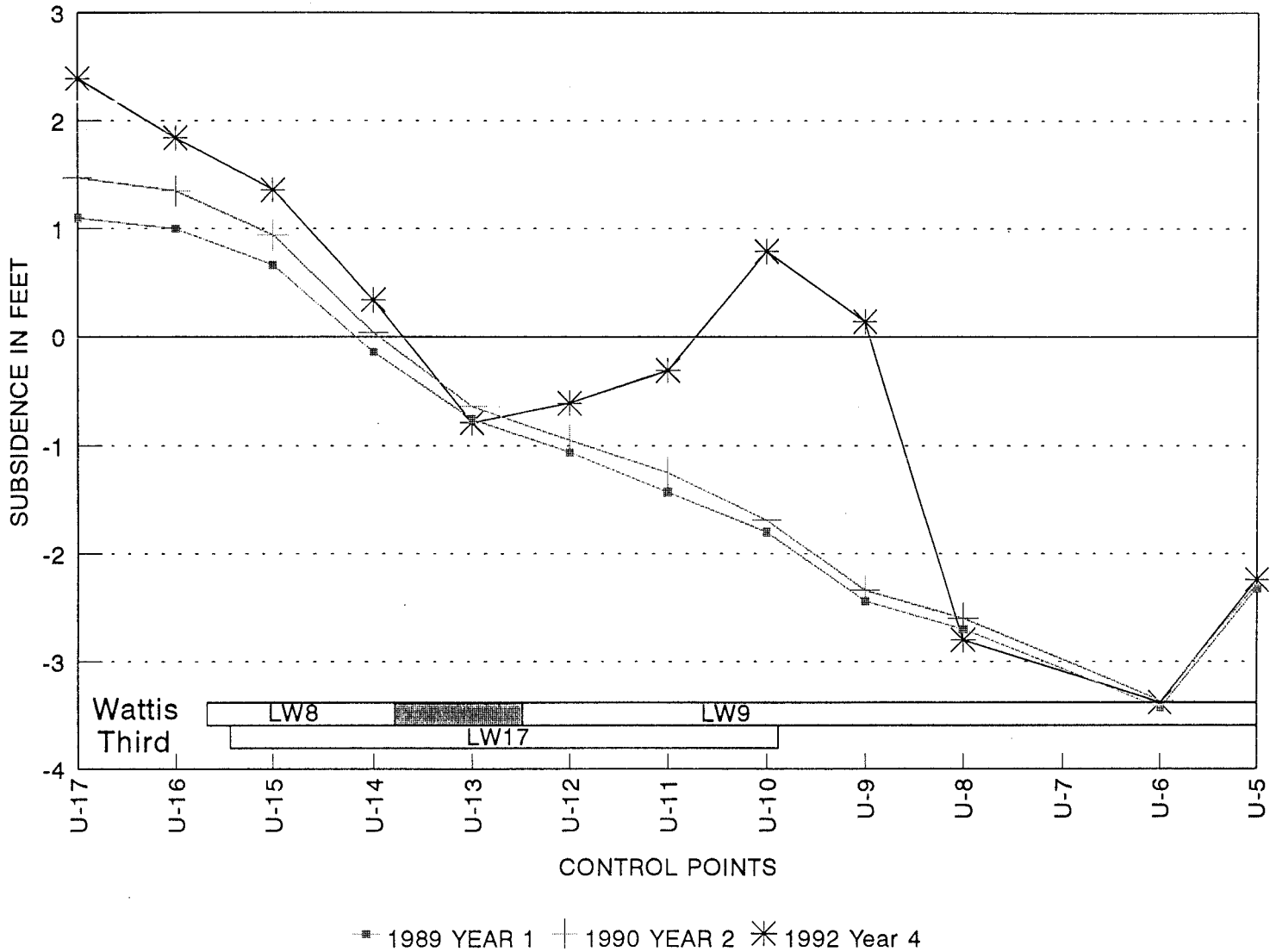
1- Control points are not to scale horizontally - shown in relative position to each other.

FIGURE 3
CROSS SECTION C-C LONGWALL PANEL 4



1- Control points are not to scale horizontally - shown in relative position to each other.

FIGURE 4
U-NORTH NEAR-STREAM PROFILE



1- Control points are not to scale horizontally - shown in relative position to each other.

FIGURE 5

U-NORTH SUBSIDENCE MONITORING
HORIZONTAL AND VERTICAL MOVEMENT GRAPH
STATION U1

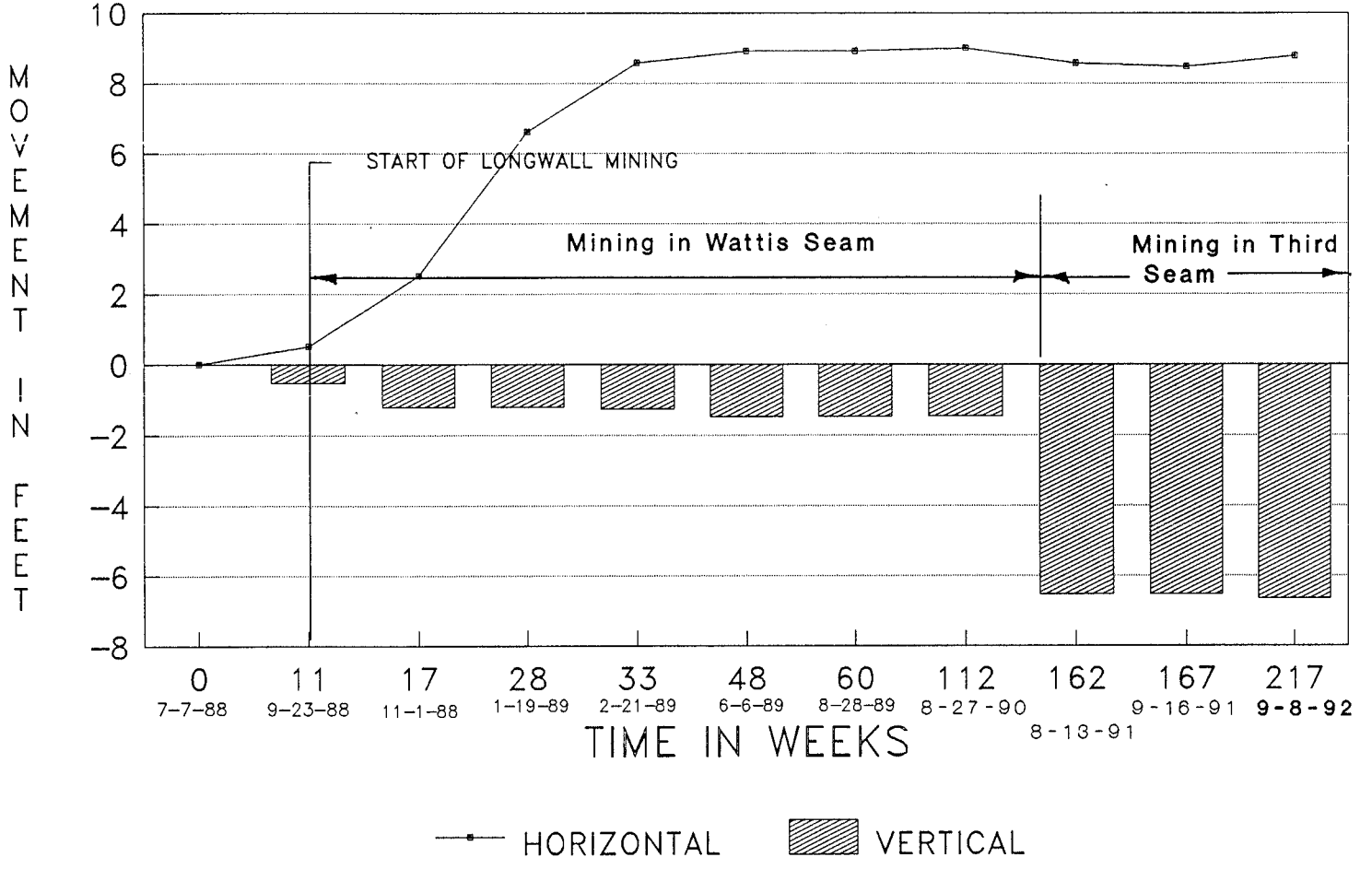


FIGURE 6

U-NORTH SUBSIDENCE MONITORING

HORIZONTAL AND VERTICAL MOVEMENT GRAPH

STATION U2

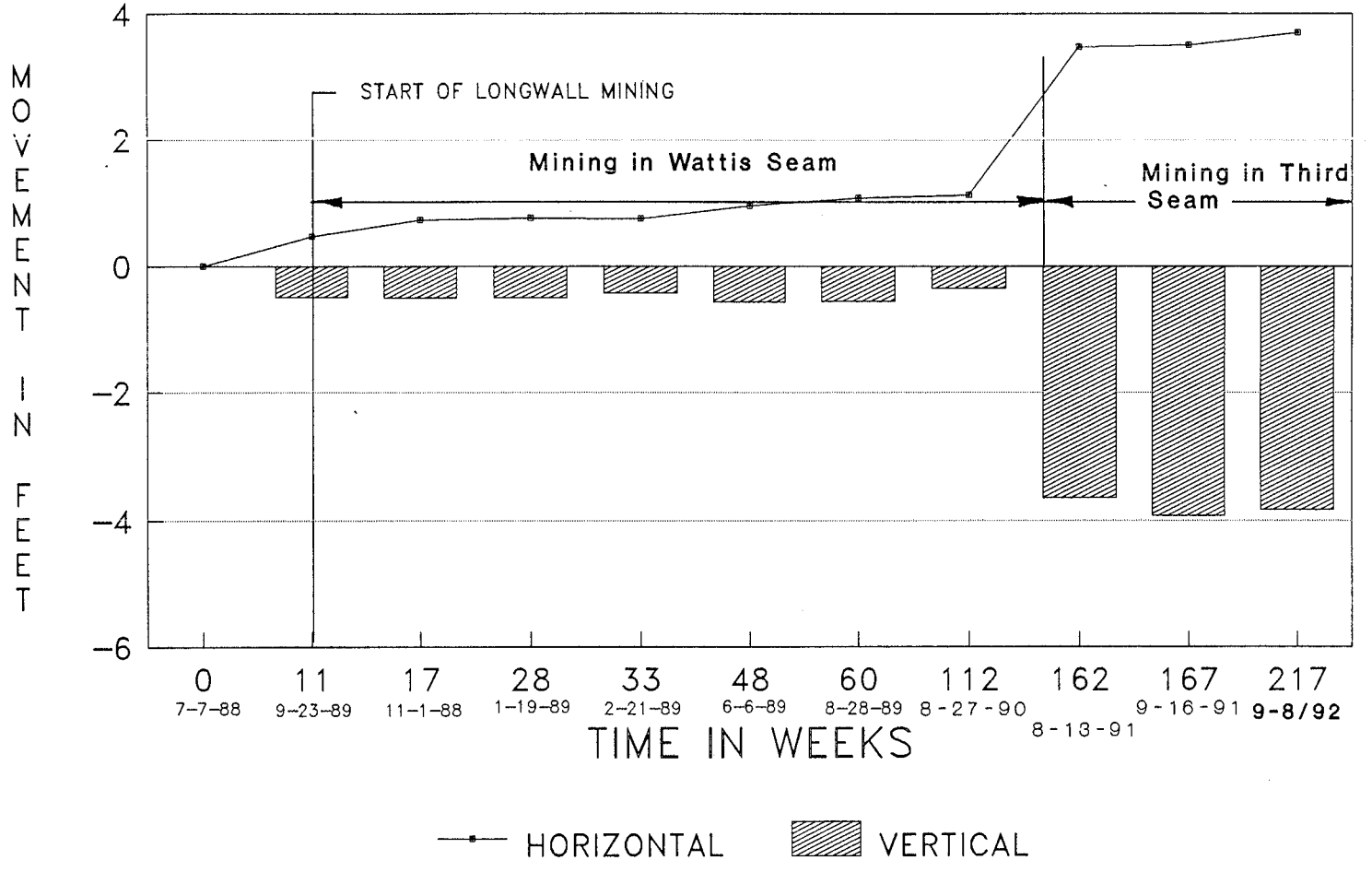


FIGURE 7

U-NORTH SUBSIDENCE MONITORING
HORIZONTAL AND VERTICAL MOVEMENT GRAPH
STATION U3

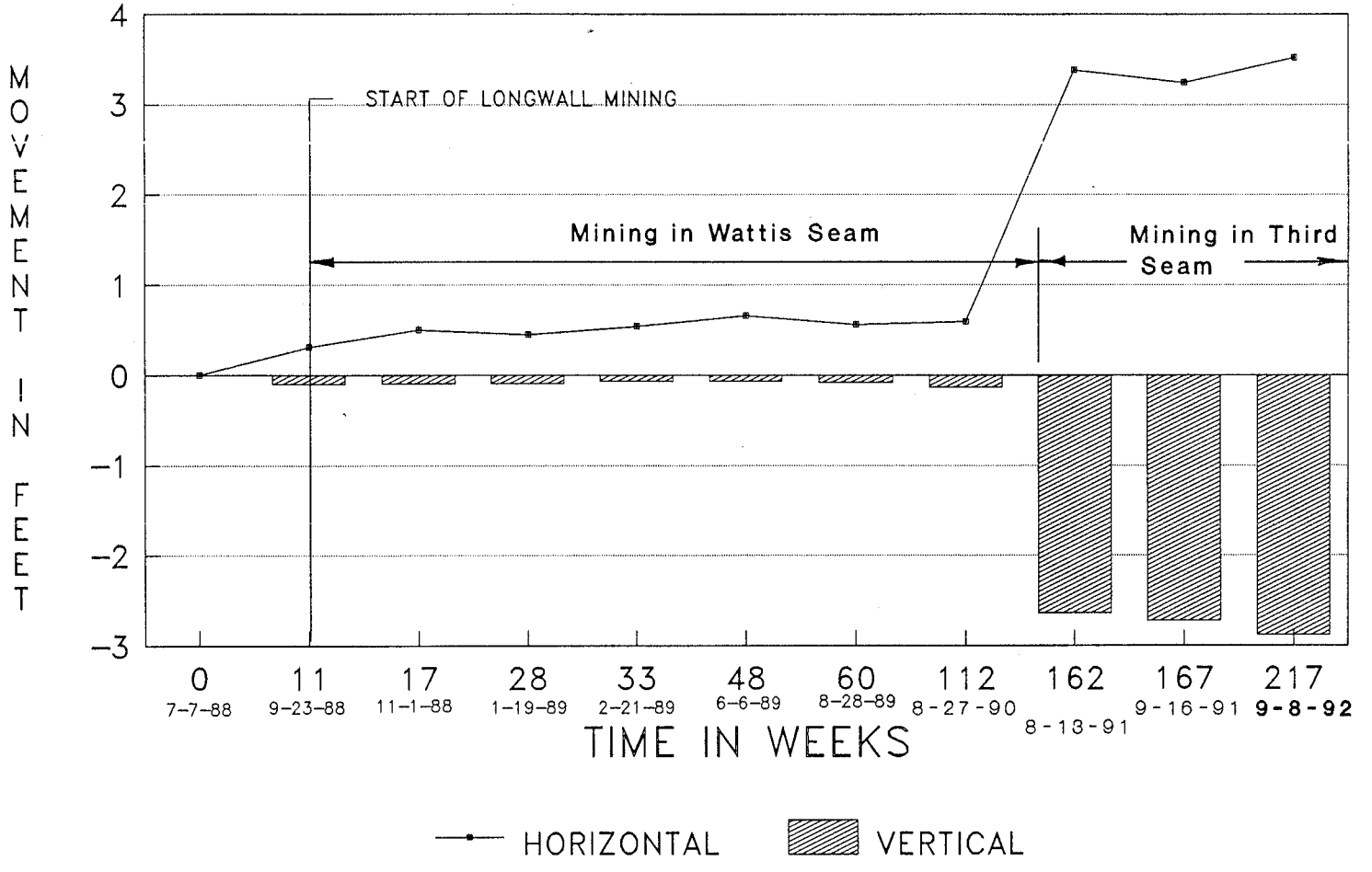


FIGURE 8

U–NORTH SUBSIDENCE MONITORING
HORIZONTAL AND VERTICAL MOVEMENT GRAPH
STATION U4

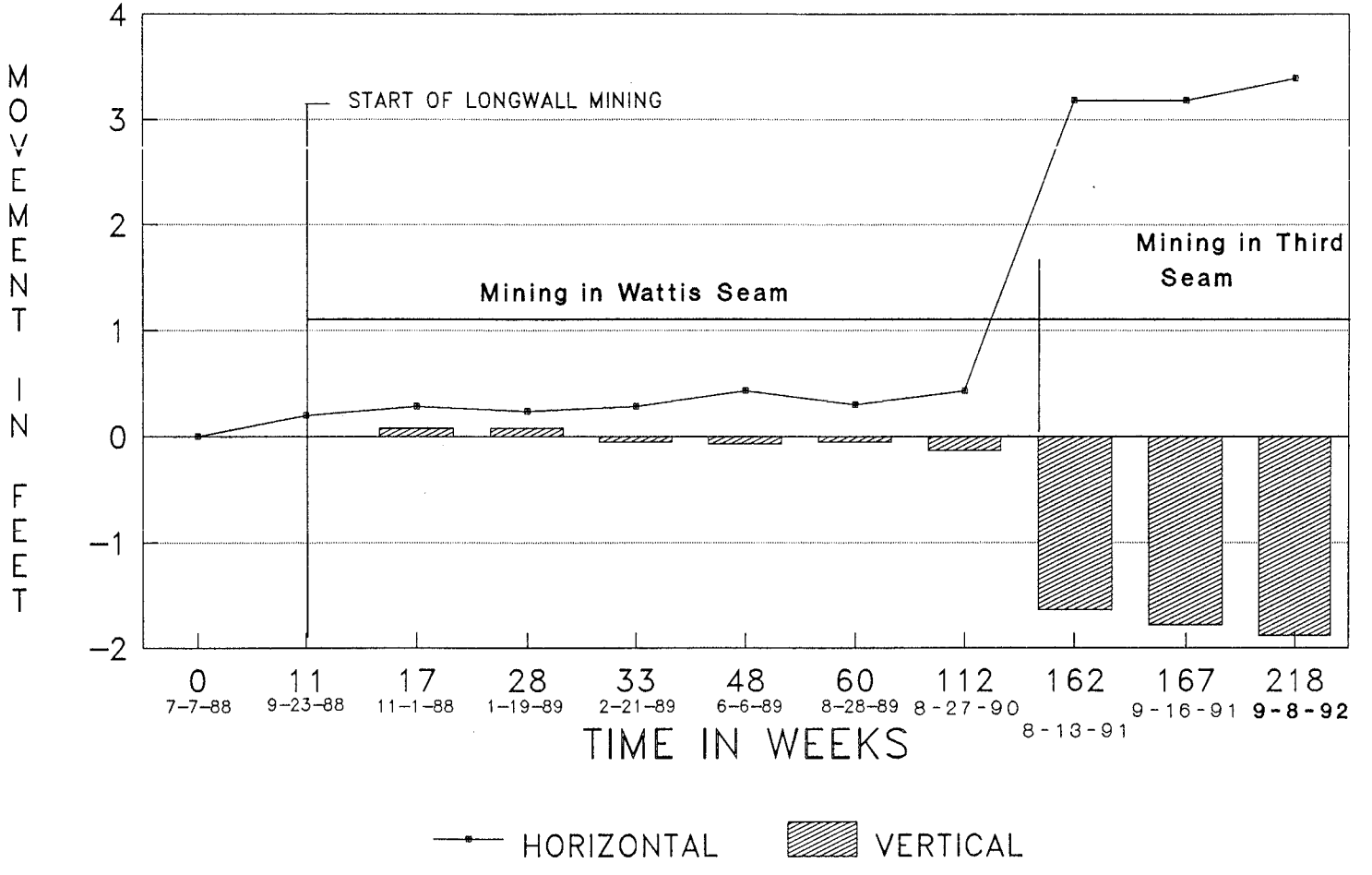


FIGURE 9
STATION GS-1 U-NORTH
HORIZONTAL AND VERTICAL MOVEMENT GRAPH

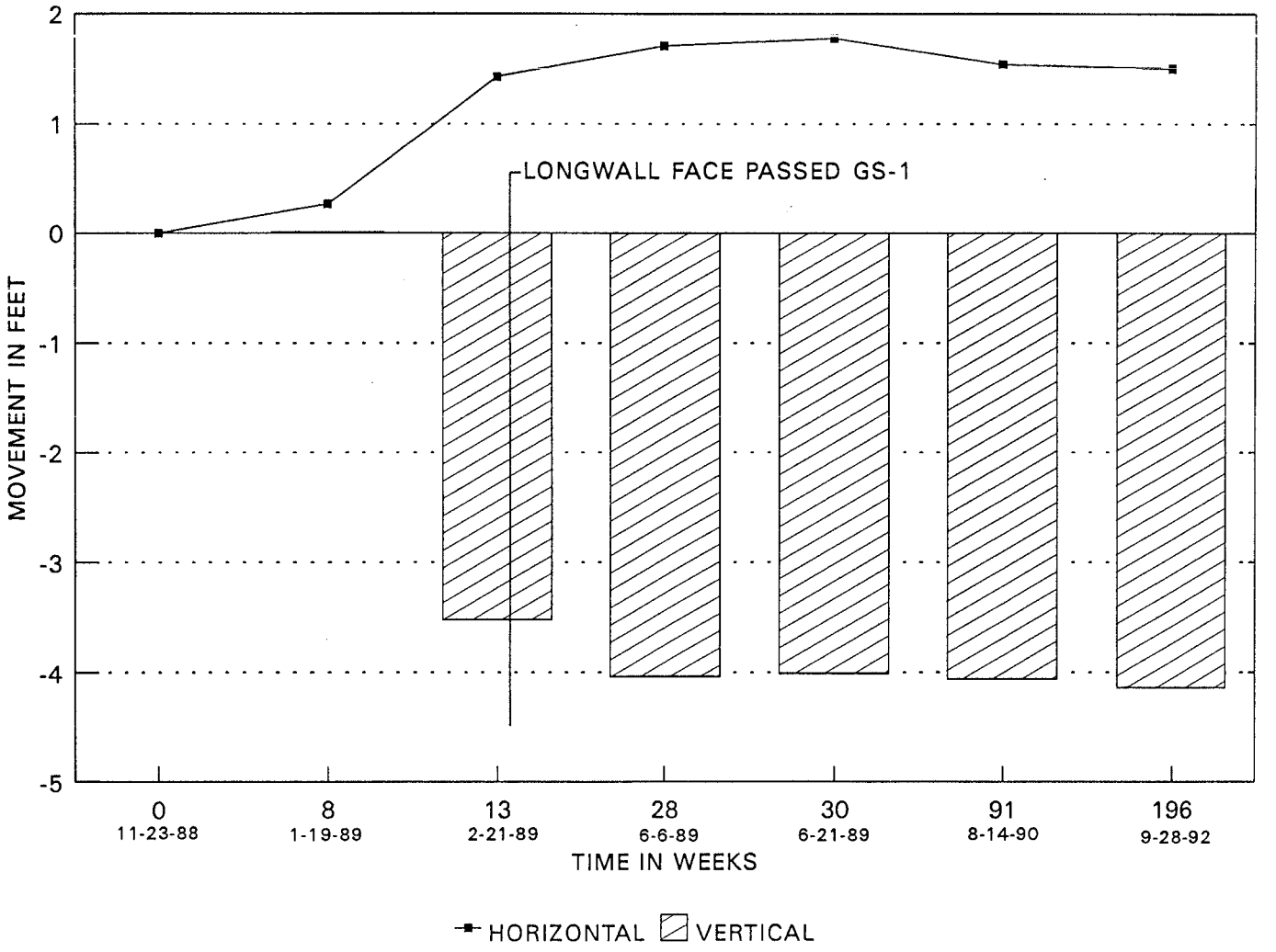


FIGURE 10
CROSS SECTION F-F

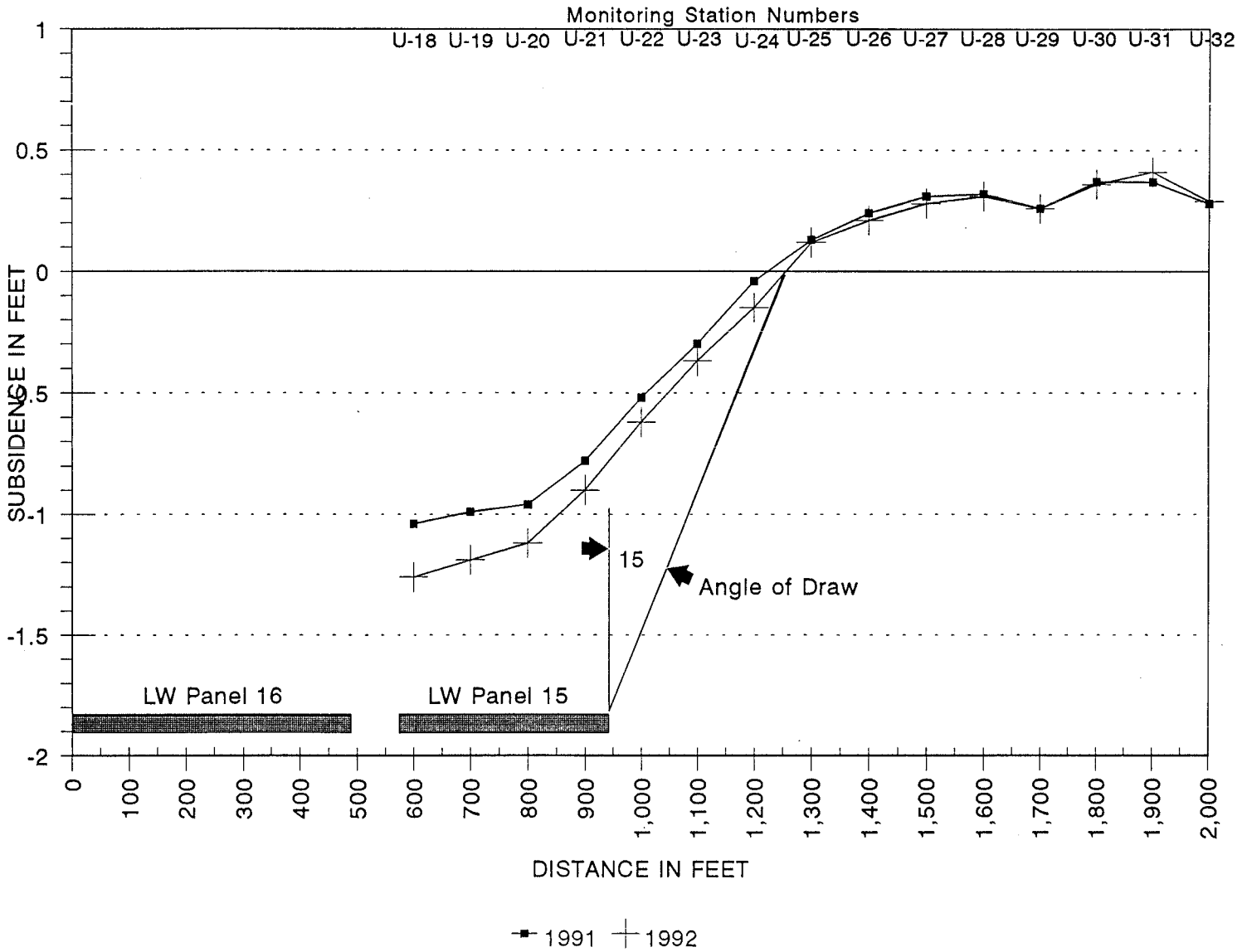


FIGURE 11
CROSS SECTION D-D

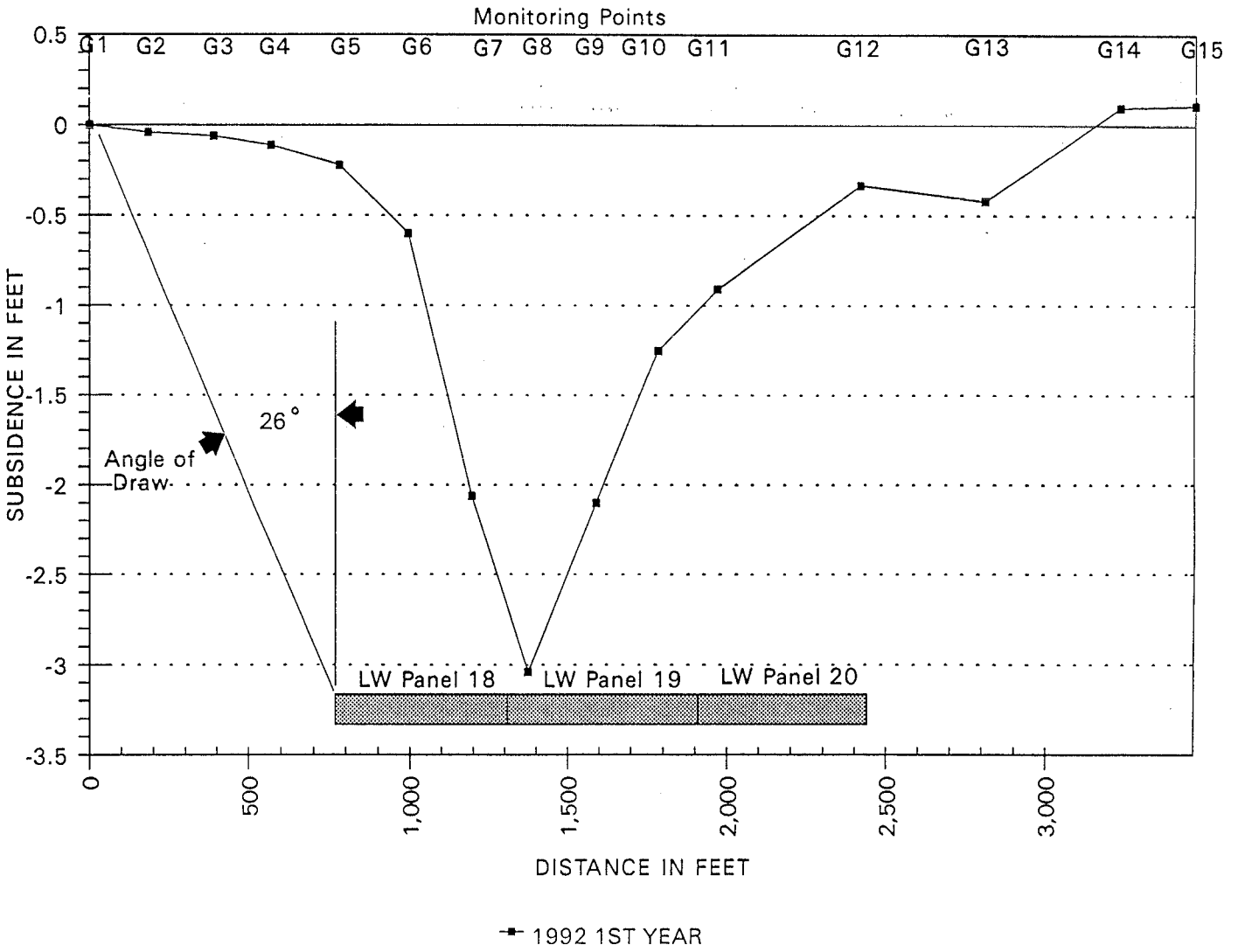
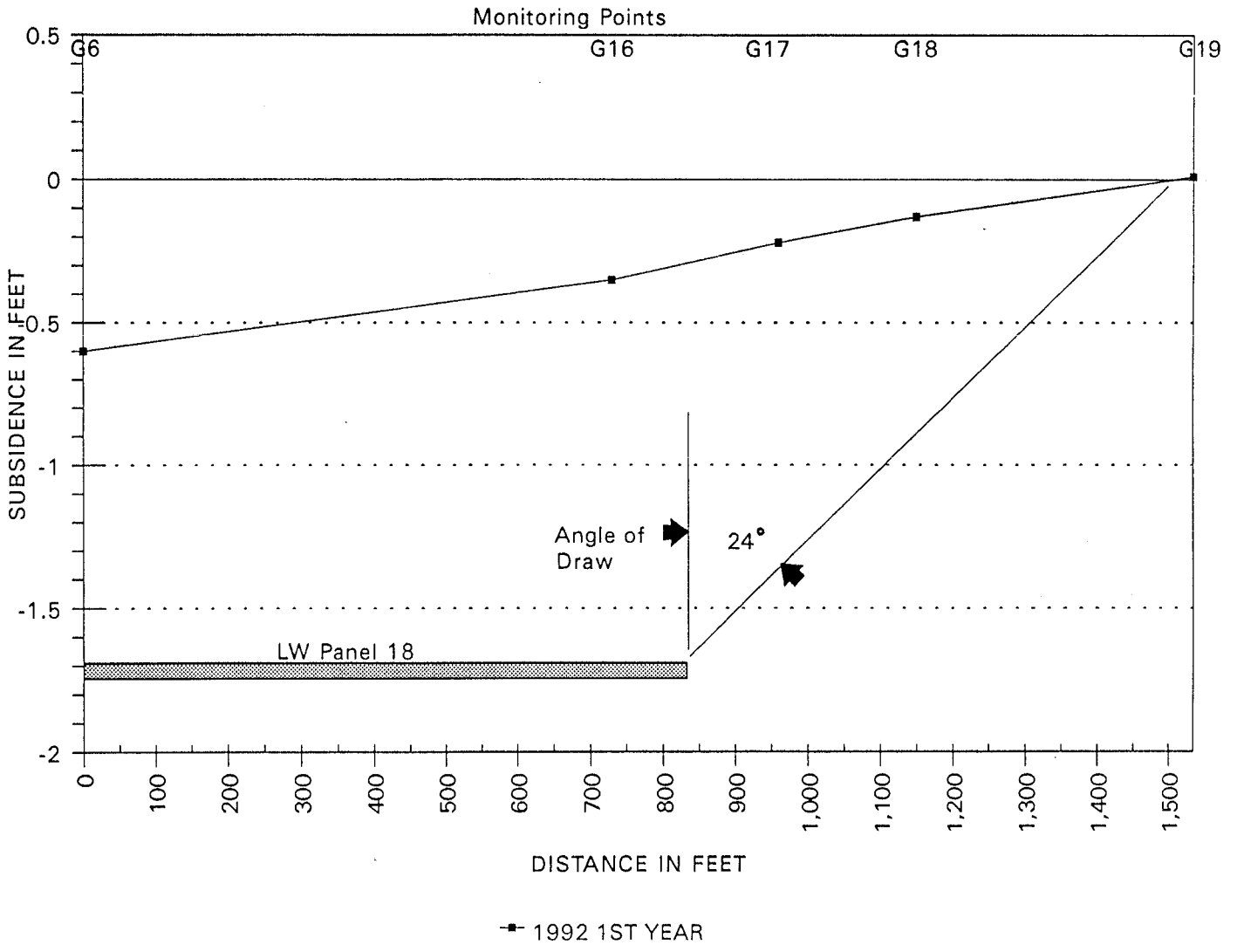



FIGURE 12
CROSS SECTION E-E