SUBSIDENCE MONITORING REPORT
1990
STAR POINT MINE
ACT/007/006

Cyprus Plateau Mining Corporation
P.O. Box PMC
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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. All monitoring points above the longwall mining areas were surveyed for vertical movement. Monitoring points U1, U2, U3, U4, and GS-1 were surveyed once during August for horizontal and vertical movement.

Mining during 1990 was conducted in the areas shown on Maps 1 and 2.

Monitoring of points U1, U2, U3, and U4 were done in conjunction with special permits with the U.S. Fish and Wildlife Service and the Utah Division of Wildlife Resources. A report containing data on these points is entitled "Annual Report, 1990, Permit PRT-719890."

SURFACE EFFECTS

Surface cracks, as shown on Map 61A, over the longwall mining in Sections 18, T15S, R8E, and Section 12, T15S, R7E, are associated with known faults in Section 12, and with fractures in Section 18.

The cracks in 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.

Subsidence contours have been plotted using survey data on the Section 12 area. As can be seen on Map 61A, 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.

The cracks in Section 18 vary in width from hairline to 30 inches. Displacement across the cracks varies from none to 2 feet.

Several small 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 reason.

Cross sections have been plotted through Panels 1-7 (Figure 1), Panel 2 (Figure 2), and Panel 4 (Figure 3). Please refer to Map 61A for cross sections locations.

As can be seen on Figures 2 and 3, subsidence has basically stopped at Panels 2 and 4. Subsidence reached its maximum during the third year after mining. Figure 1 shows the subsidence profile diagonally through the seven longwall panels. The progression of subsidence can be seen to the north as successive panels were mined. Further drop in the longwall Panel 5, 6 and 7 area is expected in the future, and should reach its maximum in 1991, three years after mining was completed in Panel 7.

A cross section through Points U5-U17 in Section 18 (Figure 4) indicates a maximum vertical drop of 3.36 feet.

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 is farthest from mining and shows the least movement.

A horizontal and vertical movement graph (Figure 9) has been made 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.

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.

VEGETATION

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

Some vegetation in Section 18 has been lost to the small outcrop failures. When the area has stabilized after mining the Middle Seam, 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. 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 will run through 1993. The study is being undertaken in conjunction with the U.S. Geological Survey and the Division of Oil, Gas and Mining.

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. Only 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 complete discussion of hydrologic impacts can be found in the 1990 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 - 1991

Mining will be done in the areas as shown on Maps 1 and 2, and on Map 61C.

MONITORING

Monitoring in 1991 will include the following:

1. Survey monitoring points above longwall panels 4 through 7 in Section 12, as shown on Map 61A.

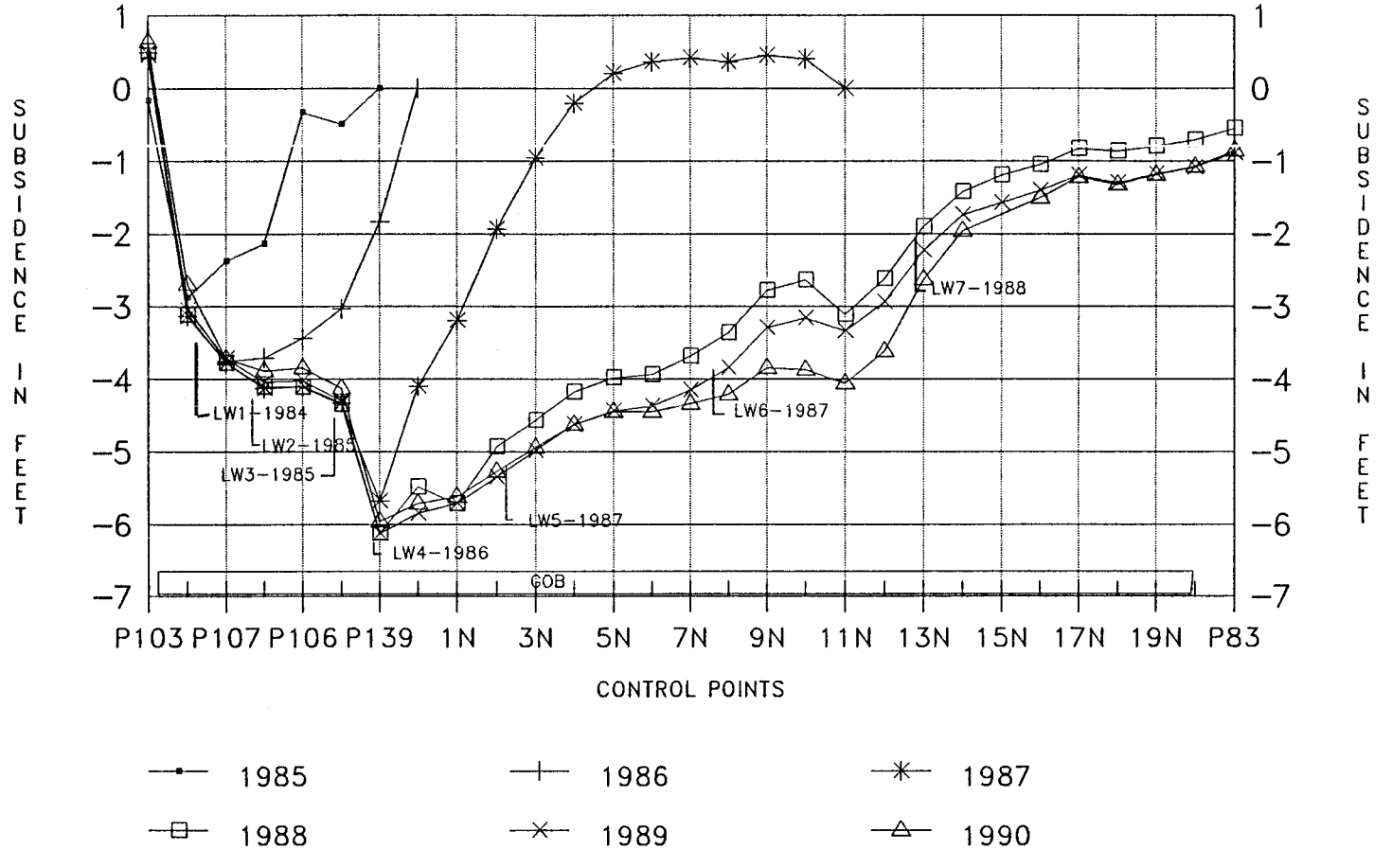
2. Survey monitoring points above longwall panels 8 through 12, and 15 and 16 in Section 18, as shown on Map 61A.

3. Establish new monitoring points above longwall panels 18 through 22 as shown on Map 61C. Point locations were selected where minimum interference with trees will occur, and at locations that will allow verification of surface subsidence aver the longwall area.

4. Take ground based photographs of the cliff in Section 18 according to the approved special permits with the U.S. Fish and Wildlife Service and the Utah Division of Wildlife Resources.

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

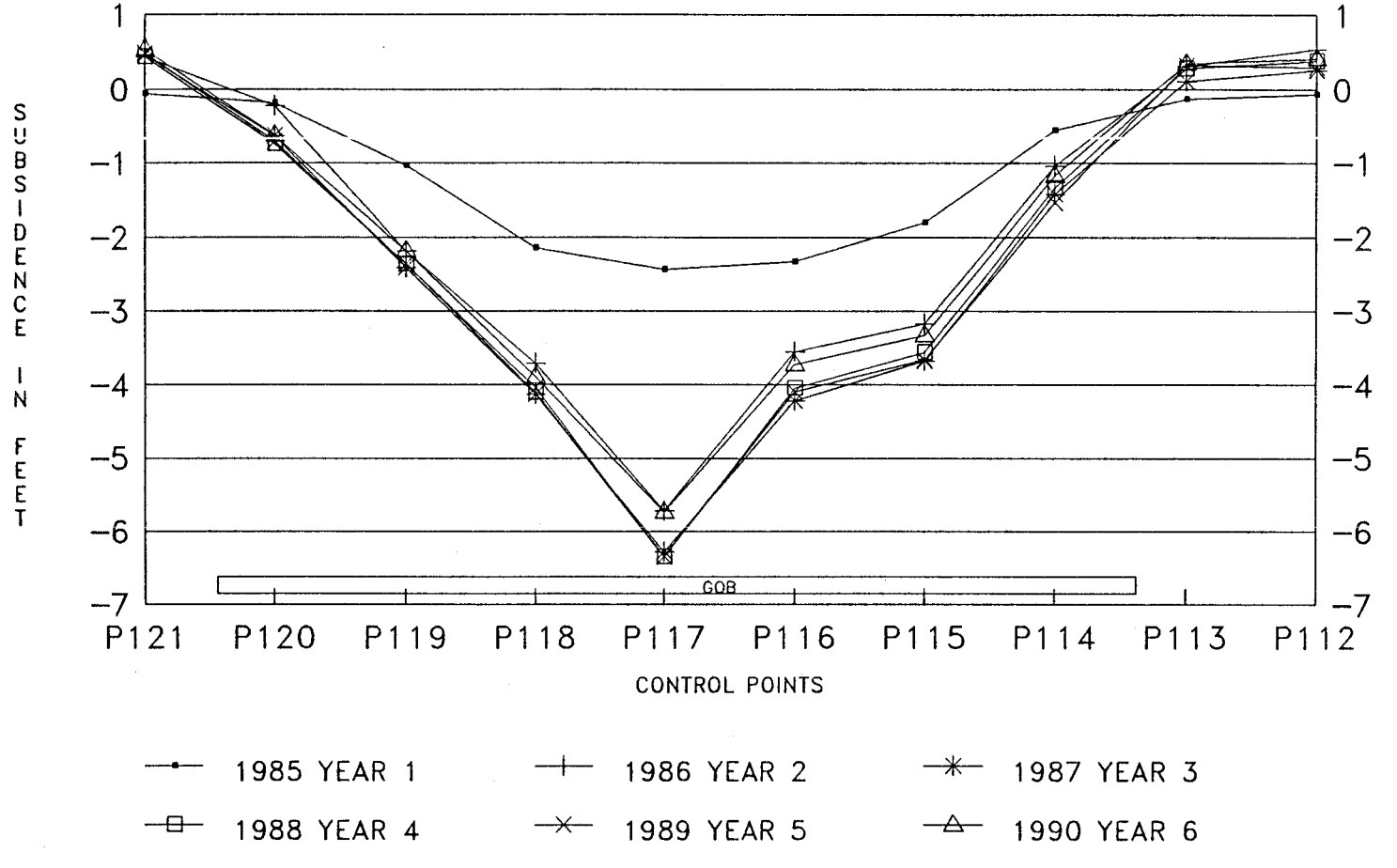
FIGURE 1
CROSS SECTION A–A



NOTE –1– CONTROL POINTS ARE NOT TO SCALE HORIZONTALLY – SHOWN IN RELATIVE POSITION TO EACH OTHER

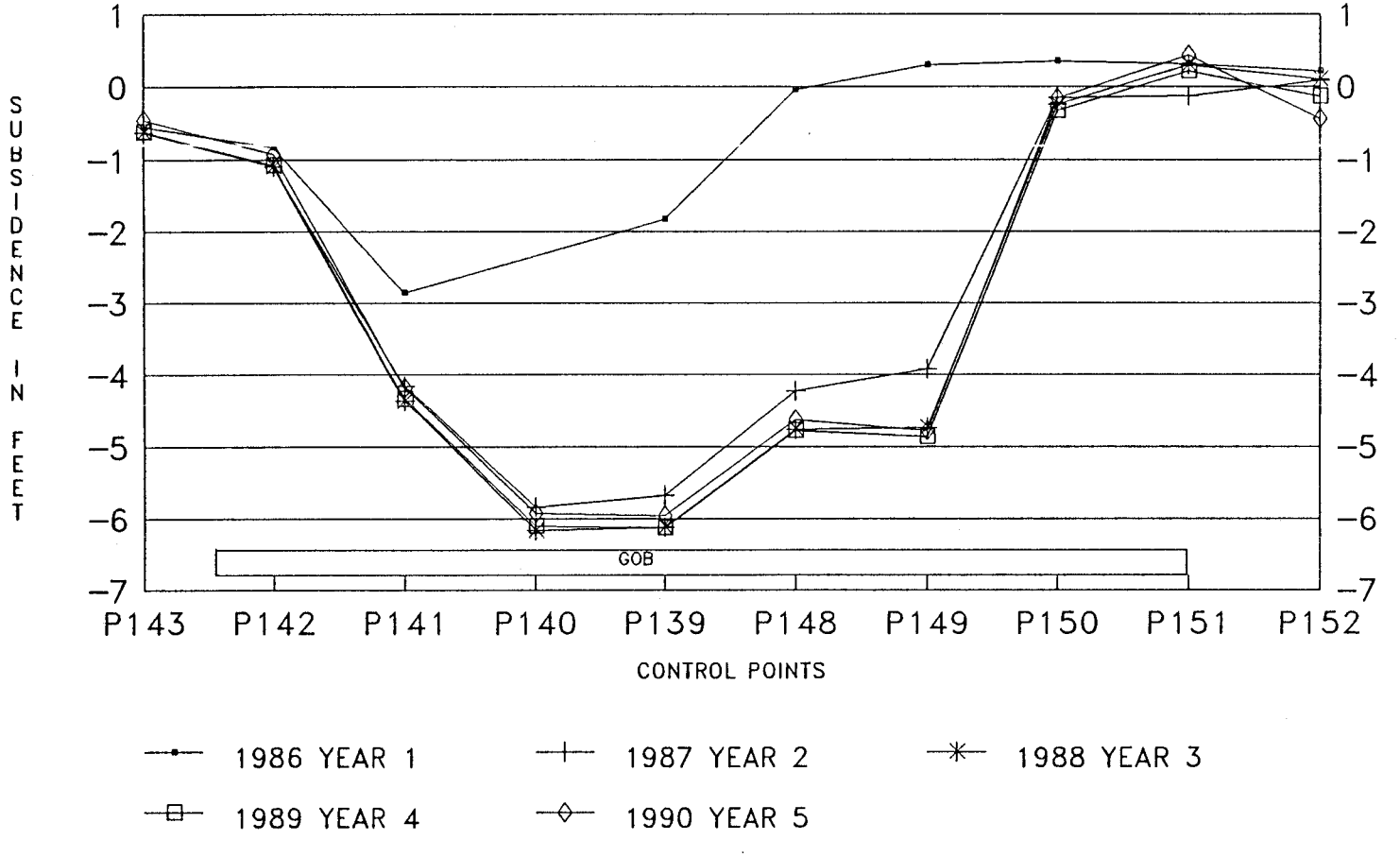
2– LW_–1985 INDICATES CENTER OF LONGWALL PANELS & YEAR MINED

FIGURE 2
CROSS SECTION B–B LONGWALL PANEL 2



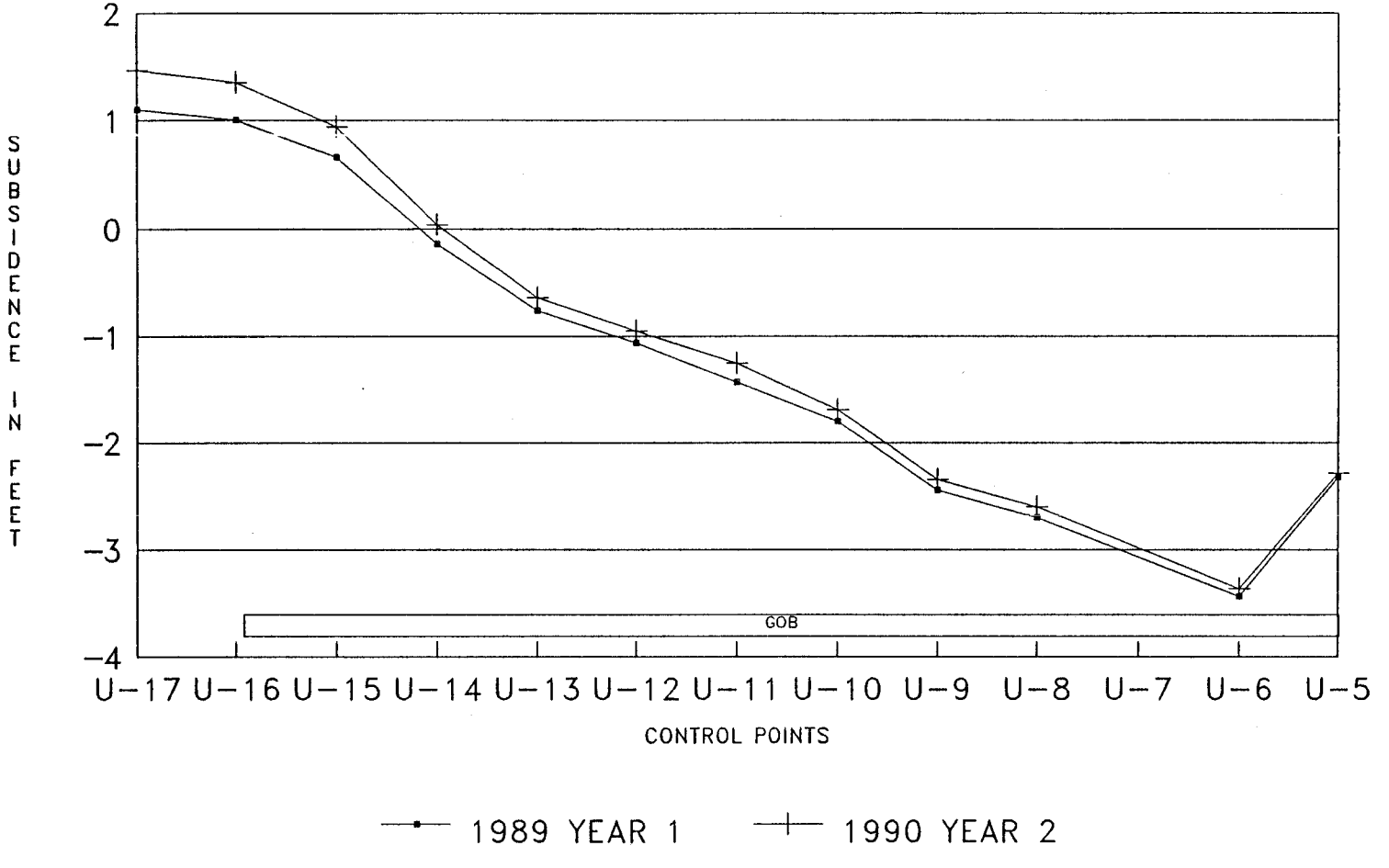
NOTE – CONTROL POINTS ARE NOT TO SCALE HORIZONTALLY – SHOWN IN RELATIVE POSITION TO EACH OTHER

FIGURE 3
CROSS SECTION C–C LONGWALL PANEL 4



NOTE – CONTROL POINTS ARE NOT TO SCALE HORIZONTALLY – SHOWN IN RELATIVE POSITION TO EACH OTHER

FIGURE 4
U-NORTH NEAR-STREAM PROFILE



NOTE - CONTROL POINTS ARE NOT TO SCALE
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POSITION TO EACH OTHER

FIGURE 5

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

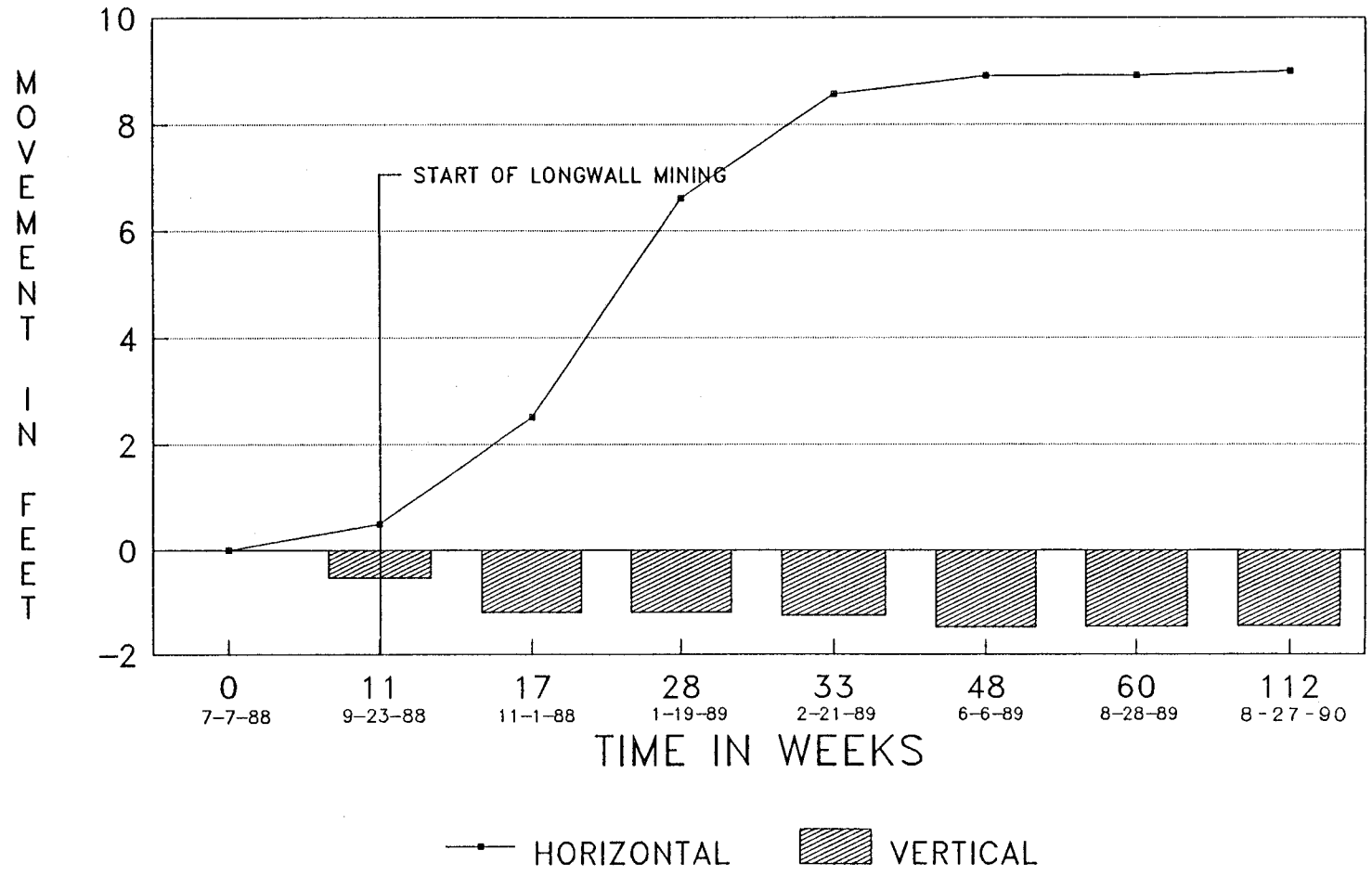

FIGURE 6

U-NORTH SUBSIDENCE MONITORING
HORIZONTAL AND VERTICAL MOVEMENT GRAPH
STATION U2

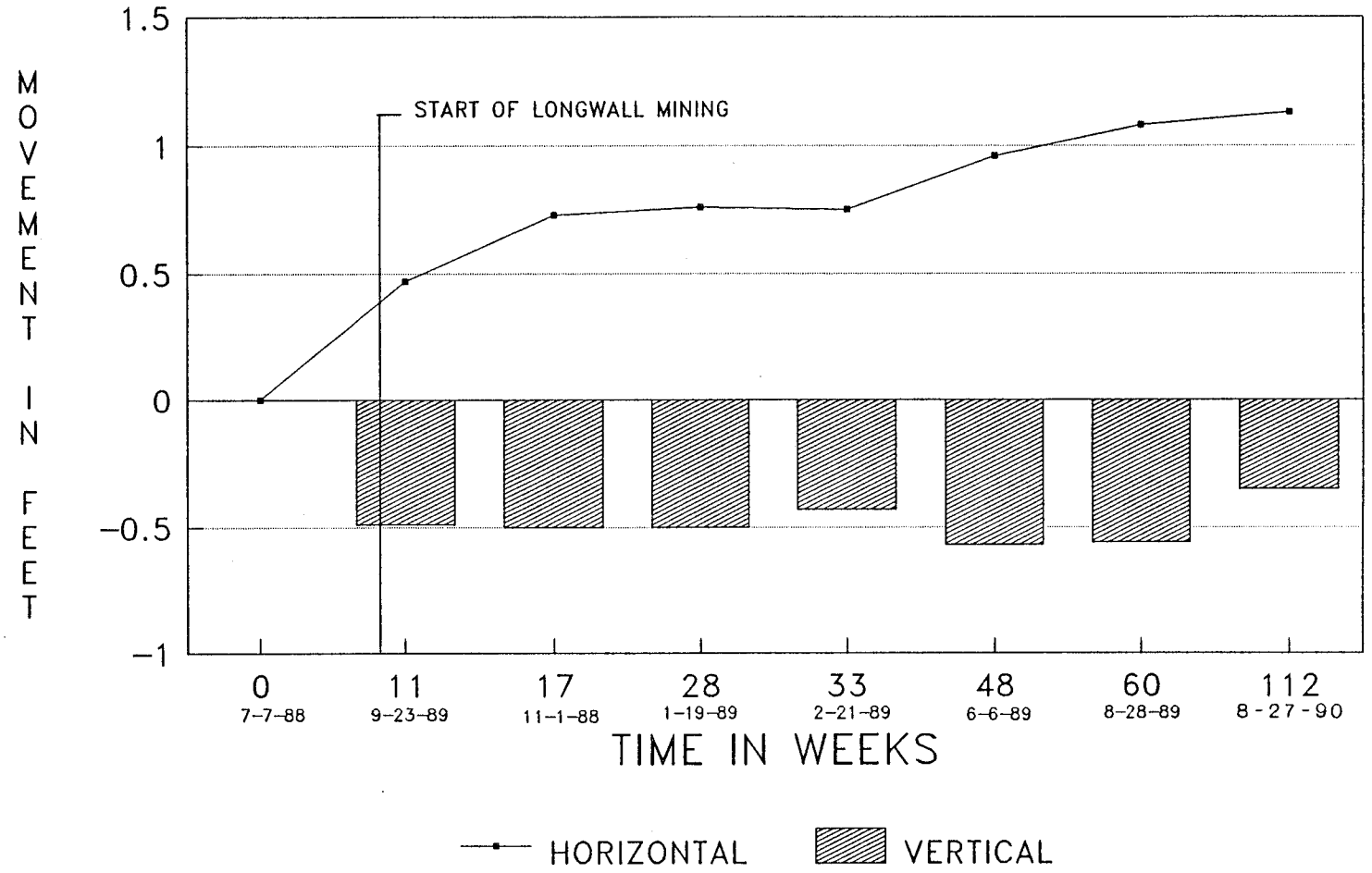

FIGURE 7

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

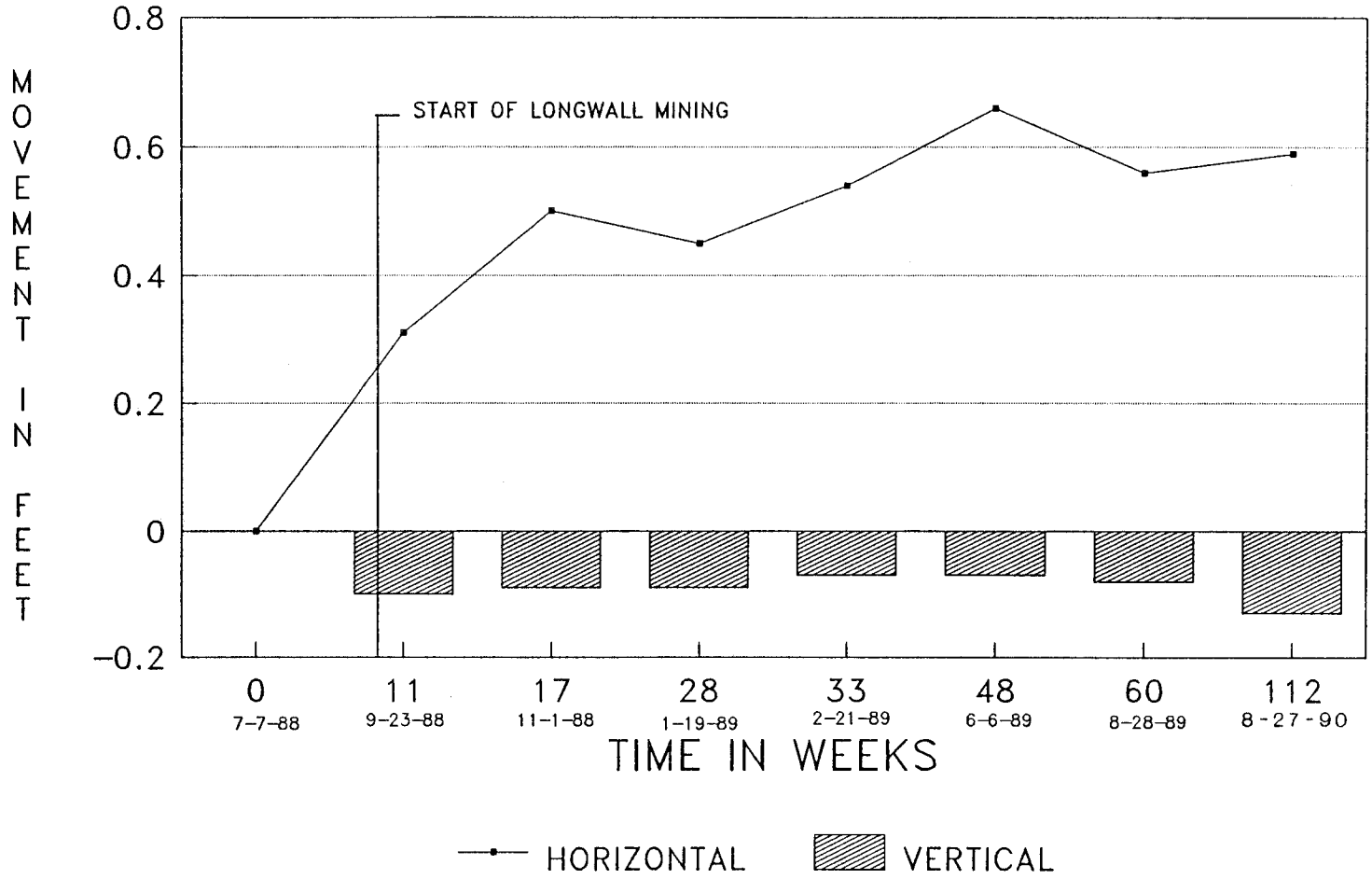

FIGURE 8

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

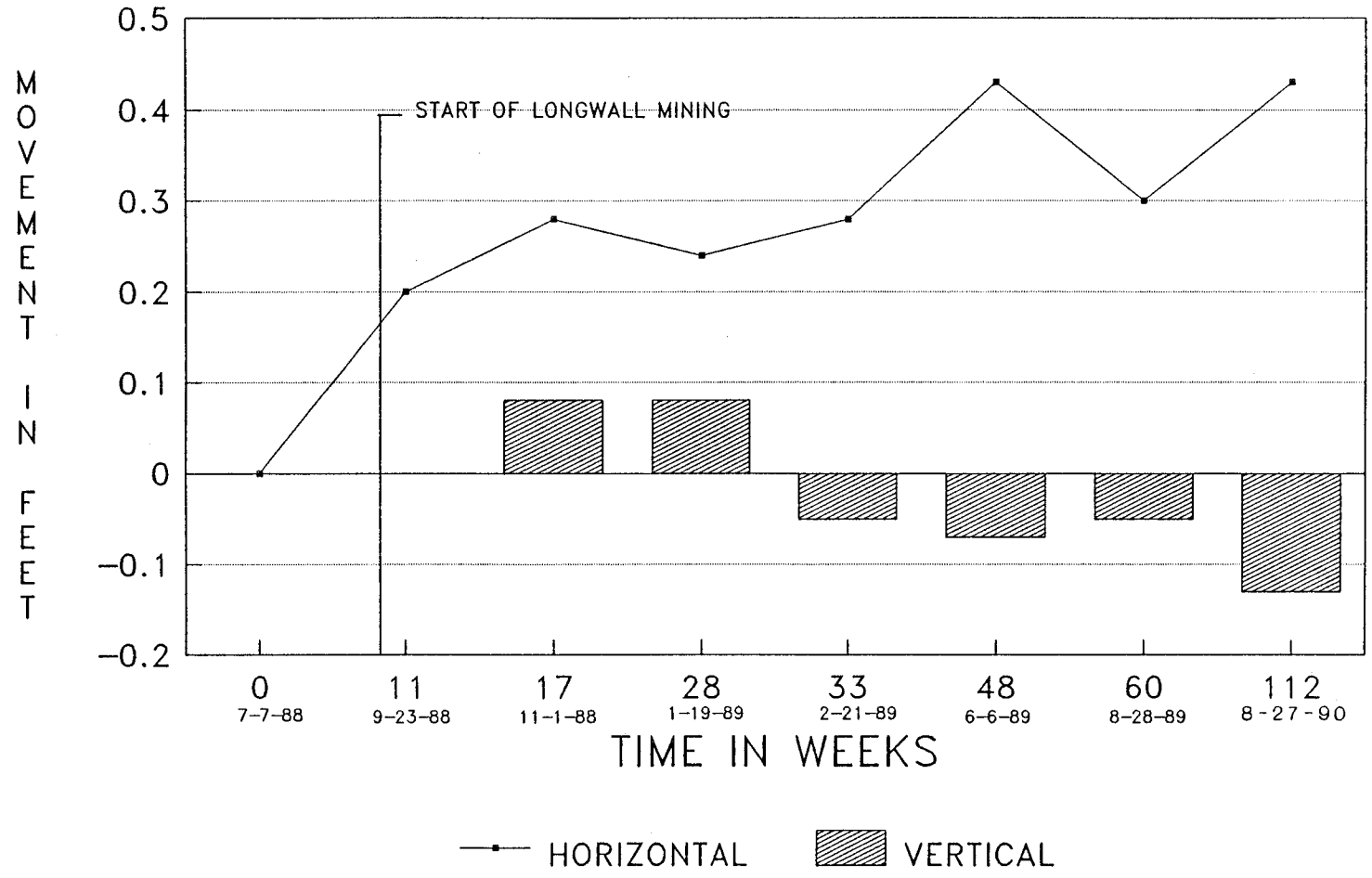

FIGURE 9

U-NORTH SUBSIDENCE MONITORING

HORIZONTAL AND VERTICAL MOVEMENT GRAPH

STATION GS-1