ENERGY WEST MINING COMPANY

SUBSIDENCE MONITORING PROGRAM

ANNUAL REPORT FOR 2002

March, 2003

Submitted to:

United States Department of the Interior
Office of Surface Mining
Minerals Management Service
Utah Division of Oil, Gas and Mining

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INTRODUCTION

Energy West's East Mountain/Trail Mountain subsidence monitoring study is an ongoing project designed to detect, observe, and report the effects of mining-induced subsidence above the Deer Creek, Trail Mountain, Wilberg/Cottonwood, and Des-Bee-Dove Mines (see Figure 1). This is the twenty-first such annual report submitted, and covers the period between August 31, 2001 and August 31, 2002.

The initial report submitted in 1982 details the monitoring methods used in the study; therefore, they are not discussed in depth here. Energy West uses aerial photogrammetric survey methods and annual helicopter reconnaissance flights to monitor subsidence.

The aerial photogrammetry work is contracted to a commercial mapping company. Contracts for the work are bid and awarded for three-year periods. Between 1982 and 1987 the work was contracted through Intermountain Aerial Surveys. They established reading points on generally a 200-foot grid but adjusted the location of each point to be on easily reproducible locations. Between 1988 and 1990 the work was contracted to Maps Inc. Because of the type of equipment used by Maps, Inc., it was better for them to establish uniform grid points on 200-foot spacing. In 1991 the work was contracted to MapCon Mapping Consultants. The owners of this company were previously employed by Intermountain Aerial Surveys and felt that better results could be obtained by using the original grid established by Intermountain Aerial Surveys. Therefore, the photogrammetric process reverted back to the original monitoring grid. A change in the method of reading the aerial photographs may result in some slight changes in measured subsidence in some

areas. Also, it is crucial that accurate paneled ground control points be surveyed and recorded on the photographs to enable close subsidence readings. Between 1987 and 1990, some of the survey control points in the more difficult to reach areas were not properly paneled and could not be identified on the photographs. It appears that this diminished the precision of the subsidence reading in some of the areas during those years.

Using the aerial photographs derived from a flight conducted on September 20, 2002, elevations were measured at 21,520 different points. These elevations were then compared with the baseline survey elevations measured from the aerial photos collected in 1980, 1986, 1987 and 1994. The difference in elevation between the original surveys and the 2002 survey constitutes the total amount of subsidence that has occurred.

Between 1991 and 1999, the subsidence data were contoured using Exploration Computer Services Minex program on a Digital/VAX computer. The VAX system became obsolete and was retired in mid-2000. Since 1999, Surfer 8 and Surfer 9, contouring programs by Golden Software, have been used to produce the subsidence contour maps. A comparison of the maps produced by Minex in 1999 and by Surfer in 2000 showed close agreement in contouring results. A map of all areas of subsidence is included in the appendix to this report (East Mountain/Trail Mountain 2002 Subsidence Map). The raw data is included as an appendix to this report on a 3-½ inch disk in an ASCII file called 2002SUB.TXT. A helicopter reconnaissance flight July 11, 2002 revealed new surface fracturing in Area 25 (Figure 24), but no new fracturing or visible signs of subsidence in any of the other monitored areas. Prior to PacifiCorp's acquisition of the Trail Mountain Mine

from ARCO Coal Co. in 1992, subsidence was monitored with conventional ground monuments and transit surveys. Nowhere did that monitoring identify subsidence greater than a few tenths of feet. Substantial longwall mining has now been completed in the Trail Mountain Mine. As a result, subsidence has been detected and is reported herein.

Location

Figure 2 shows all areas above Energy West's mines that have potential for mining-induced subsidence. In 2002, twenty-two areas of potential subsidence were monitored and mapped. In areas where subsidence has been detected, data is shown in the form of contour maps and profiles. Both indicate ground elevation changes from pre-mining ground elevations. The profile charts present data for all years monitored with the exception of the 1990 data, which was irretrievably lost. In many areas of subsidence the angle-of-draw has been calculated and reported; however, in some of the cases the angle should not be considered the actual final angle-of-draw due to several factors. For example, the zone of subsidence to date may be small and contained within the underlying mined area, suggesting that the subsidence has not yet reached its maximum extent. Also, many mined sections are surrounded by other older workings that influence the calculation. In a few areas where the mined-out workings are surrounded by burned coal, the failure of clinker beds promotes subsidence outside the mined area resulting in an angle-of-draw greater than might be expected.

Three of the original twenty-five areas chosen for subsidence monitoring have been

either incorporated into other maps (Areas 9 and 10) or not been represented on an individual map (Area 12) due to complete lack of subsidence over time. These areas are still mentioned in the report, but are not shown on individual maps or profiles.

Area 1

Deer Creek 9th East - Wilberg 1st Right

This is a dual-seam mining area with room-and-pillar extraction only. Deer Creek 9th East was pillared in 1980 – 1981. The most recent mining in this area occurred in the Wilberg 1st Right section in June 1984. Subsidence in Area 1 was first documented in the 1981 Subsidence Monitoring Report submitted in 1982. The relationship of the subsidence to the underlying Deer Creek and Wilberg mine workings is shown in Figure 3.

Profile charts 1 and 2 are north-south and west-east profiles showing the amount of subsidence in this area during the past seventeen years. The location of each profile line is shown on Figure 3. The area has seen little change since 1985 and appears to have totally stabilized. Maximum subsidence remains at about twenty-eight (28) feet. Detailed reconnaissance from helicopters has shown that the subsidence maximum is located on a steep slope, about 200 feet south of the southernmost mining, where a large rotational slump has occurred. The workings here are also surrounded by burned coal. It is probable that the combination of steep slopes and crushing of clinker (burned coal and rock) beds adjacent to the mine workings have allowed subsidence to occur well outside the area of mine workings. Inspections of the area from the ground indicated that many of the open fractures forming the graben-like structure began to fill in with soil shortly after the fracturing occurred. Calculation of the angle-of-draw is complicated because the workings are nearly surrounded by faults, burned coal, and other mine workings. Due to this complexity, angle-of-draw was not determined for Area 1.

In the summer of 1997, some of the fractures in this area were reclaimed based on U. S. D. A. Forest Service recommendations. This reclamation consisted of knocking down the abrupt escarpments and filling in the fractures in accessible areas. The top soil was then evenly distributed and the area re-seeded. This reclamation was completed by September 1, 1997 and encompassed 1.5 acres. Visual inspection of the area in the summers of 1999 and 2000 indicated that the vegetation has grown over the disturbed area to where it blends in with the surrounding areas.

There are no springs in the area, and no hydrologic impacts due to mining have been observed at this location.

Area 2

Deer Creek 5th, 6th, 7th, and 8th East Longwall Panels

Wilberg 3rd through 13th Right Panels

This is a dual-seam mining area. Mining at the Deer Creek Mine in Area 2 was completed by February 1985 (Figure 4). Coal extraction in the underlying Wilberg Mine 3rd and 4th Right panels was completed between September 1987 and the end of January 1988 (Figure 4).

Maximum subsidence in Area 2 has stabilized at 13 feet in one area above the center of the multiple-seam mining area (Figure 4). The subsidence profile charts 3 and 4 indicate that the subsidence has been stable for the past 8 years or more. Neither Energy West nor other contracted personnel have detected any surface fractures or other visible disturbance in the area.

Angle-of-draw has been calculated where possible. On the eastern side of Area 2, the angle is influenced by the Deer Creek Fault and the adjacent Little Dove Mine workings across the fault; thus, no angle was calculated. On other sides it ranges from less than zero to 11 degrees.

No springs have been identified over the subsidence area but two springs, one-fourth to one-third mile to the west, show no effects from mining (see Hydrologic Monitoring Report, 2002).

Area 3

Deer Creek 1st North Area

Most of the 1st North section of the Deer Creek Mine was abandoned and sealed in 1978 after being mined out. Pillar extraction in the 3rd Left and 1 ½ North sections was completed early in 1980 (Figure 5).

The subsidence above 1st North occurs on a narrow ridge capped by a highly fractured sandstone. The subsidence measured is depicted in Figure 5. Profile chart 5 is a profile of total subsidence as it occurred above the workings. The subsidence in Area 3 has shown no significant change in the past 7 years.

A helicopter survey in 2002 did not reveal any new surface cracks or new areas of cliff failure.

No angle-of-draw was determined due to the steep slopes,and the presence of burned coal. No surface springs have been affected by mining in 1st North.

Area 4

Deer Creek 2nd through 17th Right Longwall Panels

Cottonwood 9th, 8th, 5th – 2nd Left Longwall Panels

This is a dual-seam mining area. Longwall mining began in Deer Creek in the 2nd Right longwall panel in 1980 and ended in August 1991 with the completion of the 17th Right panel (Figure 6). In the underlying Cottonwood mine, longwall mining began in September of 1992 in the 9th Left Panel off 2nd North. The 8th Left Panel was completed February 1993. Mining resumed in this area in the 5th Left Longwall Panel in August of 1994 and continued through August of 1995 when mining was active in the 2nd Left Longwall Panel (Figure 6). Subsidence in Area 4 was detected for the first time in 1984 by photogrammetric methods.

Maximum subsidence increased dramatically between 1994 and 1995, from eight feet caused by mining in Deer Creek to over thirteen feet (Figure 6) due to the additional mining in the Hiawatha seam in Cottonwood mine. The subsidence has been virtually unchanged between 1995 and 2002 as shown in the profiles (Charts 6 and 7).

Surface fractures were identified in the field in late May of 1995. These fractures were located on Fee surface land.Energy West filled in the fractures with a motor grader and reseeded the area. The location of the fractures are shown on Figure 16. The revegetation in these areas is now established and no further fracturing has been identified.

The calculated angle-of-draw of the subsidence ranges from less than zero to

22 degrees. Several springs are located on East Mountain above these longwall panels and the 2nd through 5th Left panels located directly to the east (see Area 5). Fluctuations in spring flow occur from year to year but are to be related to variations in precipitation rather than mining. Flows are generally low in dry years and higher in wetter years (see Hydrologic Monitoring Report, 2002, and the Appendices to this report).

The left fork of the Grimes Wash drainage crosses the middle of the subsidence area. Stream monitoring has revealed no changes attributable to mining. This stream has been called Perennial by the U.S.D.A. Forest Service, but our data indicates that it is ephemeral.

Area 5

Deer Creek 2nd through 5th Left Longwall Panels

Cottonwood 6th through 1st Right Longwall Panels

This is a dual-seam mining area. Mining of the 2nd Left longwall panel in the Deer Creek Mine began in January 1983, and by October 1985 all four panels (2nd through 5th Left) had been completed (Figure 7). In the underlying Cottonwood Mine, longwall mining began in the 6th Right Longwall Panel in February 1993 and the last mining was completed in the 1st Right Longwall Panel in August 1994, completing all mining in this area (Figure 7). Photogrammetry revealed subsidence in Area 5 for the first time in 1984.

Maximum subsidence over the panels is slightly greater than thirteen (13) feet where both seams have been mined (Figure 7). The maximum subsidence showed a substantial increase between 1993 and 1994 but showed slight change between 1994 and 1998. The 2002 monitoring showed virtually no change as compared with the 2001 data (Profile charts 8 and 9). No surface disturbance has been identified over the panels.

As mentioned in the previous section, none of the springs located above the workings show any adverse effects due to mining or subsidence.

Measured angle-of-draw is between zero and 13 degrees.

Area 6

Wilberg 1st and 2nd West Longwall Panels

Mining in the Wilberg 1st and 2nd West longwall panels was completed in June 1983 (Figure 8). This area of subsidence has now reached a maximum of between four and five feet over the Second West Longwall Panel (Figure 8). The subsidence in this area has been stable for the past five years. The subsidence profiles (Profile charts 10 and 11) show the change in subsidence since 1983.

Calculated angle-of-draw ranges from zero to 15 degrees where not influenced by other workings.

Four springs located just north of the area show no adverse effects from the nearby subsidence (see Hydrologic Monitoring Report, 2002).

Area 7

Beehive Mine 2nd North off 8th West

Pillar extraction mining in 2nd North was completed in 1983 as shown in Figure 9. Very little subsidence has occurred over the workings since 1984. The workings are surrounded by burned coal. Maximum subsidence is as much as seven (7) feet. In examining the area by helicopter and aerial photography, it is apparent that much of the elevation change measured was due to cliff failure and mass wasting on the steep slopes above the workings, where the rocks were highly fractured prior to mining. The Profile chart 12 shows no measurable subsidence since 1991. This area is very steep and rugged, limiting the accuracy of the photogrammetric monitoring. Hence, the fluctuations in the subsidence readings are experienced from year to year.

It was not possible to get an accurate angle-of-draw because crushing of the surrounding clinker beds allowed subsidence to occur several thousand feet from the mine workings in some cases.

The subsidence has had no known influence on the hydrology on the springs in the area.

Area 8

Beehive 3rd Through 8th West and 3rd Through 9th East

Deseret 3rd Through 9th West and 1st Through 5th East

This is a dual-seam mining area, with room-and-pillar mining only. Some of the subsidence in Area 8 may have gone undetected because of the pillar extraction method being used, and because subsidence in part of the area was completed before the establishment of baseline survey data (Figure 10). The west to east subsidence profile of the area depicted in Profile chart 13 indicates that subsidence as much as slightly less than seven (7) feet has occurred. The profile shows a fair amount of variability. This is due to the rugged terrain in the area. The profile indicates that no detectable change in subsidence has occurred in the past five years. Where not influenced by other workings, the angle-of-draw reached a maximum of 31 degrees on the eastern edge of the area.

The strata in this area are dry and the subsidence that has occurred has had no impact on the hydrology of the area.

Areas 9 and 10

Little Dove 1st North and the old American Fuel Mine

The 1st North section of the Little Dove Mine and the American Fuel Mine workings are located in a graben formed by the Deer Creek and Bear Creek Canyon faults (see figures for Areas 7 and 8). In August 1982 the Little Dove workings, mining in a northerly direction, intersected the old workings of the American Fuel Mine about 1000 feet south of where available maps indicated they extended. Mining conditions in that area of Little Dove revealed that strata were highly stressed. In some cases pillars were crushed before they could be extracted. At that time pillar extraction mining was begun in 1st North and continued to the south with minor interruptions from 1982 through much of 1987.

To date the maximum observed subsidence over 1st North is about three to four feet, occurring over some of the most recently extracted pillars (see Subsidence Map in Appendix). No other notable subsidence has been detected over the remainder of 1st North.

Subsidence of over six (6) feet has been measured above the American Fuel Mine workings.

Any angle-of-draw calculation would be affected by both the surrounding mine workings and the faults on either side; therefore, no angle-of-draw was calculated for either the 1st North area of the Little Dove Mine or the old American Fuel Mine.

No fractures are known over the 1st North workings, but some cliff failure and

fractures are probably present over the American Fuel Mine on the cliffs and steep slopes.

Mining has had no known effect on the hydrology of the areas.

Area 11

Deer Creek C and D North Longwall Panels

Cottonwood 11th Right Longwall Panel off 2 ½ North

Cottonwood 6th & 7th Right Longwall Panel off of 2nd North

This is a dual-seam mining area. Longwall mining in the Deer Creek C North panel began in December 1984 and was terminated prematurely in April 1986. New setup entries were driven further south and mining resumed in September 1986; the panel was completed in March 1987. The D North longwall panel began production in July 1987, but after October 1987 production was limited due to poor coal quality. The panel was terminated in August 1988 at a length of 1750 feet. Pillar extraction mining in A North and A South was completed in June 1983 (Figure 11).

Mining in the 11th Right Panel in the Cottonwood Mine began In July of 1992 and was completed in September 1992 (Figure 11). The 10th Right Panel to the south was developed but could not be mined with longwall methods due to thin coal and poor coal quality. Mining began in the 7th Right Panel in February 1993 and by August 1993 mining in the 6th Right Panel was completed.

Measurable subsidence to date has exceeded twelve (12) feet in the area of multiple seam mining above the 6th and 7th Right Longwall Panels in the Cottonwood mine (Figures 11). The maximum subsidence showed an increase between 1993 and 1994 but has been stable the past eight years (Charts 14 and 15).

Fractures were discovered at the western end of coal extraction above the 7th Right

Longwall Panel on June 17, 1993. Mining of the longwall panel was completed on May 12, 1993. An aerial reconnaissance of the area on May 18, 1993 revealed no surface fractures at that time. This places the occurrence of the fractures between May 18, 1993 and June 17, 1993. Burnt Tree Spring is located approximately 800 feet to the southeast of the fractures. Measurements of the spring discharge throughout the summer of 1993 through 2002 indicated that the fracturing has had no effect on the spring. The angle-of-draw measured ranges from less than zero to 28 degrees.

Area 12

Wilberg 2nd Left Longwall Panel

The 2nd Left longwall panel is located in the western portion of the Wilberg Mine (Figure 2). A block of coal measuring 2300 feet by 530 feet was extracted during 1981 and 1982. To date no measurable subsidence has occurred and no visible surface disturbance has been observed. Overburden ranges from 1500 to 1900 feet over the panel. It is unusual that no movement has been detected in this area since subsidence has been observed in other areas where smaller blocks of coal were extracted and overburden was of similar thickness.

One spring is located approximately 800 feet northeast of the extracted workings on the surface. It has not been affected by mining.

Area 13

Des-Bee-Dove Southern Areas

This is a dual-seam mining area with room-and-pillar extraction. Area 13, covering the southern portions of the Deseret, Beehive, and Little Dove Mines was first monitored for subsidence in 1986. Some of the sections were mined before baseline survey data were established; therefore, subsidence measured over these sections will likely not represent what actually occurred. The 4th North section in the Little Dove Mine was completed in February 1987 (Figure 12).

Maximum subsidence over the area as of August 1998 was about three (3) feet over the 2nd and 3rd north sections of the Little Dove Mine. No change in subsidence has occurred in the past six years (Charts 16 and 17).

The subsidence profile charts 16 and 17 show subsidence yearly since 1986. These profiles show that the readings in 1993 and 1994 are somewhat lower than in 1995, 1996, 1997 or in previous years. This is most likely a problem with the aerial triangulation because a comparison of the survey monuments in the area show no subsidence change in that time period.

No visible surface disturbance of any kind has been found.

There are no known springs over the workings, and mining is not expected to have any effect on the hydrology of the area.

Area 14

Cottonwood 6th and 7th East Longwall Panels

Mining began in the 6th East panel in September 1986 and continued until the panel was completed in March 1987. Mining in the 7th East panel began in April 1987, and the panel was completed in September 1987 (Figure 13). Subsidence in Area 14 was first monitored and detected in 1987.

Topography consists of very steep south facing slopes and cliffs. Overburden ranges from 200 to nearly 1,400 feet.

The Castlegate Sandstone forms a 200-foot high escarpment along the north side of Newberry Canyon with numerous naturally occurring joints and fractures. Stress caused by removal of coal was transferred to the fractures resulting in brittle failure of the cliff face (spalling) in some places. Talus from the spalling has accumulated on the steep slopes below the cliffs on older natural talus slopes. The newer debris remains mostly above the coal outcrop level and reaches the canyon floor in only one location. Surface cracks have been observed and mapped along the ridge above the cliff. The cracks are discontinuous and extend for approximately 2,000 feet parallel to the northern edge of the 6th East longwall panel. A few cracks are also found directly on top of the Castlegate Sandstone escarpment. Maximum subsidence to date is over seven (7) feet above the western end of the 7th East Longwall Panel and five (5) feet over the eastern end of 6th East along the Pleasant Valley Fault (Figure 13). Because this area has rugged and steep terrain, it is the most difficult to achieve consistent results using the photogrammetric monitoring. As can

be seen on the subsidence map (Figure 13) and the profiles (Charts 18 and 19) the subsidence appears to vary substantially from one location to another and change up and down in time. This is because the photogrammetric monitoring is difficult in this type of terrain. The "bulls-eyes" of subsidence shown in 1996 are still present in the 2002 data. The helicopter aerial reconnaissance on July 11, 2002 showed no visible indication of change in these areas. Inaccuracies in the survey in this area should be expected because of the rugged terrain. Several survey targets were established in this area on the Castlegate cliff and have been surveyed since their emplacement from 1996 through 1997. This monitoring shows no changes in the last six years of the monitoring period. The angle-of-draw was not calculated to the west, south and east because of the steep slopes, burned coal, and other workings surrounding the 6th and 7th East panels. The angle of draw on the north side of the 6th East Panel is 25 degrees.

There are no springs in the vicinity of Area 14. The strata are generally dry; thus, mining is expected to have no adverse impact on the hydrology.

The major impacts associated with subsidence and resulting cliff failure, surface cracking, and talus deposition in Area 14 are: 1) possible loss of golden eagle nests and/or nest sites, 2) disruption of grazing and hunting land use, and 3) loss of wildlife habitat.

Prior to longwall mining in the area an eagle monitoring plan was developed and implemented. It went into effect in February 1986 and is an ongoing program. The purpose of the plan is to collect data whereby the impacts of subsidence and cliff spalling upon eagle nesting can be assessed. The report entitled "Assessment of Mining Related

Impacts in Newberry Canyon" submitted to the Utah Division of Oil, Gas and Mining discusses all mining related impacts in Area 14 and includes the eagle monitoring plan as an appendix.

Area 15

Cottonwood 9th and 12th West Longwall Panels

The 9th through 12th West panels were all completed by the fall of 1989 (Figure 14). Subsidence in 9th and 10th West was first monitored and detected in 1988 when longwall extraction began.

The surface above these panels is comprised mainly of steep to moderate slopes with a small flat area forming the top of East Mountain on the areas eastern edge. Overburden ranges from 800 feet to over 2000 feet.

Maximum measured subsidence in 2002 is slightly over four feet which is similar to that which was measured since 1995 above 11th West (Figure 14). This area has experienced no additional subsidence in the past eleven years (Profile charts 20 and 21).

Calculated angle-of-draw is less than zero on the south and east and reaches 20 degrees on the west.

There are no known springs in the area.

Area 16

Cottonwood 8th Through 11th East Longwall Panels

Mining in Area 16 began in the 8th East panel in June of 1989, and ended in the 8th East panel in May, 1992 (Figure 15).

Topography in Area 16 is very similar to that of Area 14 with cliffs and very steep slopes covered by a few scattered pinon, juniper, mountain brush, and grasses. Overburden ranges from near 100 feet at the outcrop to about 1,800 feet.

As with Area 14 cliff spalling has occurred in places and the resulting talus has accumulated on the slopes below the cliffs. No surface cracks have been observed to date.

Maximum subsidence observed in 2002 is similar to the 1997 measurement that exceeded five (5) feet and occurs over the 11th East panel where the overburden is less than 600 feet (Figure 15). Figure 53 shows several "bulls-eyes" in the area of the Castlegate cliff which are in very steep and rugged areas. The photogrammetric method is not reliable in these areas and it is not felt that the areas have subsided to the extent shown on figure 15. This is supported by the fact that subsidence survey targets placed along the cliff in 1986 have shown no movement in recent years.

The angle-of-draw was not calculated because the steep slopes and other adjacent workings make accurate measurement difficult.

There are no known springs in the area. Strata on both the surface and in underground mine workings are typically very dry; therefore, mining is not expected to affect the hydrology.

Area 17

Cottonwood 13th Through 16th West Longwall Panels

Mining in the 16th West longwall panel began in October 1990. This panel was completed in March 1991. Mining of all the panels in this group was finished in March, 1992 with the completion of the 13th West longwall panel (Figure 16). The topography over these longwall panels is characterized by steep slopes that extend up from the cliffs which surround the east, south and west sides of the panels. The panels are covered by overburden ranging from 800 feet at both the west and east end of the panels to over 1,800 feet in the center of the panels.

The measured subsidence exceeds seven (7) feet in an area above the 16th west panel, which follows a narrow east-west trending trough centered above the two longer panels and then extends north above the 14th and 13th west longwall panels (Figure 16). No surface fractures have been observed in the area above theses longwall panels. Subsidence in this area has been stable for over nine years (Profile charts 24, 25).

On the south side of the subsidence zone, the angle of draw is less than 10 degrees.

No springs are located above this area and the strata are not saturated. Therefore, it is not likely that this subsidence will have any effect on the hydrology of the area.

Area 18

Deer Creek Mine 2nd through 7th Right Longwall Panels

Longwall mining in this area began in November, 1990 in 2nd Right Panel, and was completed in May, 1992 with the extraction of the six adjacent longwall panels (Figure 17). The 3rd and 4th Right panels were terminated short of full length due to geologic complications. The land surface in the area of these panels contains steep slopes covered by conifer and aspen trees, and sagebrush. The longwall panels underlie the main ridge of East Mountain and have overburden ranging from over 2,200 feet in the north-central portion of the area to about 1,800 feet on the southwest corner of 7th Right Panel.

Subsidence in this area has reached a maximum of over seven (7) feet, which indicates stability since 1998. (Figure 17, Profile charts 26, 27). The subsidence zone is a broad trough running in a north - south direction. This area is overlain by several springs. Monitoring of these springs has shown no mining or subsidence-related change in the quality or quantity of water discharged (see appendix and the 2002 Hydrologic Monitoring report).

Area 19

Deer Creek 7th and 8th East Longwall Panels off 3rd North

Mining in the 7th East Longwall Panel began in May, 1992 and by January 1993 mining was completed in the 8th East Longwall Panel (Figure 18).

The land surface above these two panels is very rugged. The longwall panels are located beneath a ridge located between the left and right forks of Meetinghouse Canyon. The area is covered by sagebrush on the south facing slopes and dense stands of spruce trees on the north facing slopes. The overburden in the area of these panels ranges from 400 feet on the north to over 1,800 feet on the south.

Subsidence in this area has increased from slightly over one foot in 1992 to over four feet in 1993 but has been stable between 1993 and 2002 (Figure 18, Profile chart 28).

This area is overlain by a few springs. Monitoring of these springs has shown no mining-related change in the quality or quantity of water discharged (see Appendix and the 2002 Hydrologic Monitoring Report)

Area 20

Deer Creek 1st & 2nd Left Longwall Panels off 3½ South

Mining in the 2nd Left Longwall Panel began in February 1993 and was completed in June 1993. Mining then started in the 1st Left Longwall Panel in July 1993 and was completed in November of 1993 (Figure 18).

These longwall panels are overlain by moderately steep slopes that are heavily covered with aspen and spruce trees. The overburden above these panels range from 1,400 feet at their east end to over 2,000 feet above their west end.

The monitoring detected a maximum of slightly less than five (5) feet of subsidence in 2002 which is similar to that measured in 1997 – 2001 (Profile chart 29), but less than the maximum of slightly over six (6) feet of subsidence above the 2nd Left Longwall Panel measured in 1996. The 1996 reading showed an increase from the maximum of slightly over four feet that was measured in 1995 and a foot greater than that measured in 1994 which showed a maximum of five feet of subsidence (Profile chart 29). These data show that subsidence in this area is substantially complete. All of the subsidence detected falls within the bounds of the longwall area. Therefore; the angle of draw in this area is considered to be less than 10°.

These longwall panels are overlain by several springs. Monitoring of the springs revealed no impacts due to subsidence.

Area 21

Deer Creek Mine 2nd East Through 7th East Longwall Panels

Mining in the 2nd East Longwall panel began in November of 1993. Mining in this area, concluding with 7th East Longwall Panel, was completed in January 1996.

The topography in this area is fairly rugged. A ridge along the south side of Rilda Canyon is located through the center of the area. The slopes leading down from this ridge to Rilda Canyon on the north are heavily vegetated with conifer trees. Overburden in this area ranges from less than 200 feet in the north to greater than 1,800 feet beneath the ridge top.

Subsidence detected in 1994 had reached a maximum of over four (4) feet above the 2nd East Longwall Panel (Figure 20). Subsidence over the 3rd East longwall panel was not detected because this panel is longer than the 2nd East panel and subsidence does not usually occur until two panel widths have been mined. In 1995, subsidence had progressed to where most of the areas underlain by the 2nd through 6th East Longwall Panels had subsided between 5 and 6 feet. In 1996, the maximum subsidence that was measured had not increased from that measured in 1995 but an increase in subsidence was noted on the north end. This is in the area of the 6th and 7th East Longwall Panels that were the last to be extracted. The 1997 through 1999 monitoring indicated that subsidence has been stable during those years. The 2000 and 2001 monitoring showed a slight increase in subsidence in the center of the area (Profile charts 30, 31). This may be some additional settling that has occurred or may be a slight error in the aerial triangulation. During the helicopter

reconnaissance in 1995, several fractures were identified and several areas were noted where boulders had rolled from the Castlgate cliff. These are shown on figure 20. The area of subsidence is completely contained within the mining area; therefore, the angle of draw is nearly vertical.

Several springs are located above these longwall panels. Hydrologic monitoring has not detected any change to the spring flow that is attributable to mining or subsidence (see 2002 Hydrologic Monitoring Report).

Area 22

Deer Creek Mine 2nd through 8th West Longwall Panels off 3rd North

Longwall Mining began in the 8th West Longwall Panel in February 1996 and the entire panel was mined by July 1996 (Figure 21). Mining then moved to the 7th West Longwall Panel in July 1996 was completed in January 1997. Mining then started in the 6th west panel in January 1997 and this panel was completed in July 1997. Mining in the 5th west panel began in July 1997 and was completed in February 1998. Mining in the 4th west panel began in March 1998 and was completed in November 1998. The 3rd west panel was not mined in its entirety. The western 2,000 feet of the panel was not mined because of poor roof conditions and coal quality. The central 3,200 feet was mined between November 1998 and January 1999. The longwall moved around an area containing faults and the eastern 1,500 feet of the panel was completed between January 1999 and April 1999.

This area is located on the southern side of Rilda Canyon in an area where the overlying terrain is very rugged. Several north-south side tributaries to Rilda Canyon cross the northern half of the area and form a series of canyons and steep ridges along the flanks of Rilda Canyon. Elevations range from 8,000 feet at the coal outcrop to 9,900 feet along the ridge tops. The area is heavily vegetated with spruce trees, aspen trees at the higher elevations and pinion-junipers at the lower elevations.

The subsidence monitoring showed a slight increase in subsidence in 2000 over previous years but showed no significant change in 2002 (Profile charts 32 and 33). The maximum subsidence appears to have stabilized at slightly over seven (7) feet. The

topography in this area is fairly rugged which limits the resolution of the photogrammetric monitoring.

Several springs are located in the area and have been catalogued and are being monitored (see 2002 Annual Hydrologic Monitoring Report).

Area 23

Trail Mountain Mine 2nd through 5th East Longwall Panels off 5th Left

Mining of the 2nd East Longwall Panel began in October 1995 and continued until February 1996. In this panel only the eastern 2,600 feet was mined because the western 2,000 feet was not minable due poor coal quality. Mining began in the 3rd East Panel in February and was completed in June 1996. Mining began in the 4th East panel in June 1996 and was completed in October 1996. Mining began in the 5th East panel and was completed in March 1997 (see figure 22). All of the longwall mining conducted to date has extracted an average thickness of 8 feet of coal. Mining in this area is now complete.

This area generally contains gentle south-facing slopes that project down to a steep escarpment along the south and east end of the area. Elevations in the area range from 8,750 feet to less than 6,700 feet along the coal outcrop in Straight Canyon. The land is sparsely vegetated with grasses and brush with some dense patches of ponderosa pine at the higher elevations and pinion-juniper trees in the steeper slopes above and below the escarpment.

The subsidence monitoring has detected up to eight (8) feet of subsidence that has occurred. This maximum subsidence is located over the eastern end of the 4th East longwall panels (Figure 22, Profile charts 34 and 35). Most of the undermined area has subsided between five (5) and seven (7) feet. One point at the extreme eastern side of the 5th East panel shows subsidence of over 22 feet. This may be an inaccurate reading due to steep terrain, or a large boulder may have moved causing the change in readings between 1996

and 1997 but no additional change has been noted in the past five years. The subsidence area is entirely contained within the undermined area, therefore; the angle of draw is steeper than 10 degrees from the vertical.

No surface fractures or visual evidence of subsidence has been observed. One spring is located in the area but has not been affected (see 2002 Annual Hydrologic Monitoring Report).

Area 24

Trail Mountain Mine 1st - 10th Right off 5th Left

Mining in the 9th Right panel began in March 1997 and was completed at the end of August 1997 (Figure 23). In 1998, the western 4,800 feet of the 8th Right panel had been extracted leaving the remaining 1,600 feet unmined due to inferior coal quality. Mining then moved into the 7th Right panel and by the end of August 1998, all of this panel had been extracted. By August 1999, the entire 6th right panel had been extracted and all but the eastern750 feet of the 5th right panel had been mined. By the end of August of 2000, longwall mining had been completed in both the 4th and 3rd Right Panels. In 2001, mining extracted the remainder of the 1st Right Longwall Panel prior to the suspension of all mining in March of 2001. The mining was completed to an average mining height of nine (9) feet.

The topography within this mining area is quite variable. Elevations range from less than 7,000 feet in Straight Canyon on the southwest side of the area, where the topography is very rugged, to over 8,800 feet in the northeast portion of the area where the land is gently sloping to the south. The lower elevation areas are heavily vegetated with pinion and juniper trees interspersed with grasses. The higher elevations have stands of spruce and aspen trees separated by areas of sage brush and grasses.

The overburden above the coal seam in this area ranges from less than 1,400 feet in the southwest corner of the area to over 2,200 feet in the northeast corner of the area.

The subsidence monitoring showed a steady increase in subsidence from 1997 through 2001 (Profile charts 36, 37). A small group of fractures appeared on the surface

above 4th Right panel in October 2000. These were already partially "healed" or filled in when noticed. The subsidence profiles for 2002 actually show less subsidence than in 2001, indicating that subsidence in this area is complete. The subsidence that has occurred has not had any effect on the current land use or on the hydrology of the area (see 2002 Annual Hydrologic Monitoring Report).

Area 25

Deer Creek Mine 5th Through 14th East off 5th North Longwall Panels

Area 25 contains all of the North Rilda Ridge reserves in the Blind Canyon and Hiawatha seams and is presently being mined (Figure 24). This is an area of dual-seam mining similar to the areas where Deer Creek mine was directly above the Cottonwood/Wilberg mines. As of September 2002, the Blind Canyon reserves (8th, 9th, 10th, 11th, 12th, 14th, and 15th East panels) are completely mined out, and mining of the Hiawatha reserves 80 feet below has begun with the extraction of 5th Right and part of 4th Right panel.

Longwall Mining began in this area in the 11th West panel in April of 1999. By August 31, 1999, the eastern 4,400 feet of this panel had been mined. By the end of August 2000, the 12th East Panel had been completed and the eastern 1,900 feet of the 14th East Panel had been mine (there is no 13th East Panel). By the end of August 2001, mining had extracted the remainder of the 14th, 15th, and 9th East Panels. During 2002, 8th East panel in the Blind Canyon seam was completed (12/01), and longwall mining in the Hiawatha seam began in the 5th Right panel (2/02). 5th Right panel was completed in August 2002. 4th Right panel started in September of 2002, and about 1,000 feet were mined before the date of the 2002 aerial subsidence survey.

Overburden in this area ranges from less than 400 in both the north and south of the area to over 1,700 feet beneath North Rilda Ridge. The topography in this region is very rugged. North Rilda Ridge is situated in an east-west trend in the center of the area and the topography drops off steeply to the north into Mill Fork and the South into Rilda

Canyon. The Castlegate Sandstone forms an escarpment, which is present near the top and encircles North Rilda Ridge on the North, East and South. The south facing slopes below the cliff are covered with grass, brush, and juniper trees while the north facing slopes in Mill Canyon are densely covered with conifers. Subsidence monitoring in this area shows that subsidence has occurred over all of the area mined out in the Blind Canyon seam. The maximum amount of subsidence observed for Blind Canyon mining areas is just over 7 feet in the eastern end of 9th East panel. As the underlying 5th and 4th East panels were mined in 2002, the amount of subsidence over the 2-seam extraction area increased to over 12 feet in one spot. As longwall mining in the Hiawatha seam progresses, total subsidence in the North Rilda area should increase again to about 12-14 feet.

In February and June of 1999 several prisms were placed on the top of the Castlegate sandstone cliff or escarpment to monitor the movement of the cliffs as they are undermined. All of the prisms have moved within a few days or weeks as they were undermined. The prism movement data can be found in the Appendix. Several cliff failures and rock falls occurred as 9th and 8th East panels were mined in the Blind Canyon seam during the spring, summer, and fall of 2002. These are shown on Figure 24.

Fractures have appeared on the surface of North Rilda Ridge in several places. The most significant of these is an area where several east-west cracks have appeared above and to the south of the dual-seam extraction of 11th and 12th East in the Blind Canyon seam and 5th Right panel in the Hiawatha seam. Repair of these cracks will be left to nature, as North Rilda Ridge is inaccessible to motorized equipment.

A few minor springs are located to the west of the undermined area on top of North Rilda Ridge. No effects to these springs by mining have been observed.

Since June 1998, four survey points have been monitored for subsidence in the right fork of Rilda Canyon directly above the 5th North Mains in the Blind Canyon seam where 5th North crosses under the stream bed in the right fork (Figure 24). This is an area of first mining only, with longer pillars and offset crosscuts specifically designed to prevent subsidence. To date, no significant movement of any of the points has occurred.

Predicted Maximum Subsidence

A comparison between observed and predicted maximum subsidence for the various areas on Energy West's property has been made using a method developed by the British National Coal Board (NCB). The NCB method utilizes graphs compiled from numerous field observations and takes into consideration the length and width of the mined-out area, thickness of coal extracted, and depth of cover. The method is claimed to be correct to ±10% in the majority of cases, assuming certain limiting conditions are met. The table below compares predicted maximum subsidence with observed subsidence for areas on East Mountain.

Area	**Subsidence (feet)**		
	Predicted Maximum	**Observed**	**% of Predicted**
1* DC 9E/W 1R	15.2	28.0	184
2 DC 5-8E/W, 3-13R	13.8	13.1	95
3 DC 1N Area	7.7	5.5	71
4 DC 2-17R	13.6	13.5	99
5 DC 2-5L	13.5	15.5	114
6 W 1-2W	5.0	4.5	90
7 Bee 2N off 8W	6.6	7.4	112
8 Bee/Des E&W Sections	6.8	4.8	104
9 Little Dove 1N	4.3	3.5	81
10 Old American Fuel Mine	7.0	6.1	87

Area	Subsidence (feet)		
	Predicted Maximum	**Observed**	**% of Predicted**
11 DC C&D N	13.7	13.2	96
12 W 2L	1.5	0.0	0
13 Des-Bee-Dove Southern Areas	2.0	1.8	90
14 Cottonwood 6-7E	7.6	4.7	62
15 Cottonwood 9-12W	7.2	5.0	69
16 Cottonwood 8-11E	7.4	4.5	61
17 Cottonwood 16-15 W	8.1	7.2	89
18 Deer Creek 2nd-7th R	7.7	7.2	94
19 Deer Creek 7th & 8th E	7.9	4.5	57
20 Deer Creek 1st & 2nd L	7.8	6.1	79
21 Deer Creek 2nd- 7th E	7.5	7.5	100
22 Deer Creek 2nd-8th W	7.5	8.1	108
23 Trail Mountain 2nd-5th E	7.8	8.1	104
24 Trail Mountain 1st - 10th Right	7.5	7.0	100
25 Deer Cr. 8-15th East B.C. Seam	8.6	7.5	87
25 Deer Cr. N. Rilda Both Seams	17.1	12.5	73

* This area does not fit the NCB prediction model.

In most areas subsidence is less than the maximum predicted by the NCB model. The observed subsidence shown here represents the actual maximum subsidence for the

particular geologic conditions -- probably the case in some areas since subsidence appears to have ceased in several areas where the NCB predicted maxima were not reached. In areas showing greater than expected subsidence, chain pillars or barriers between sections are probably crushing so that strata above the workings cave as it would if a wider zone had been mined.

Mitigation of Surface Effects

Prior to mining in an area, Energy West notifies the land owner that mining will be in progress beneath his property. The land owners within the permit boundary are as follows:

Karl A. Seely, Inc.

LDS Church

USDA Forest Service

US Bureau of Land Management

Elk Springs Property Users Association

Kent Barton

We will continue to notify those owners prior to undermining their properties.

Over most areas where subsidence has been observed on East Mountain, present land use has not been affected in any way. Areas 2, 5, 6, 8, 9, 10, 12, 13, 15, 16, 17, 18, 19, 20, 23, 24 and 25 are good examples of subsidence without visible surface disturbance or adverse hydrologic effects. In such areas no mitigation is necessary.

In a few areas, such as Areas 1, 3, 4, 7, 10, 11, 14, 21 and 22, 24, and 25, surface fractures have been detected. In order to protect livestock PacifiCorp has erected a fence around Area 1 where fractures are of sufficient magnitude to pose a threat to wandering cattle. In the regions where the fractures could be reclaimed they have been filled in with heavy equipment and the escarpments have been evenly contoured and reseeded. In Area

4, the small tension fractures that formed were reclaimed by filling in the fractures using a motor-grader and reseeding the area. In Area 14, where cracks have also been observed, these were filled in by hand in 1998 and reseeded. The U. S. D. A. Forest Service accepted this mitigation as being sufficient and complete.

In Areas 3, 7, 10, 11, 21, 22, 24, and 25 where only minor fracturing has occurred on remote ridges and/or where land use has not been affected, more damage would be done by gaining access to and repairing or fencing fractures than can be justified. Therefore, mitigation is counterproductive in those areas and is not planned.

Summary

As of August 2002 PacifiCorp has identified twenty-five (25) areas for study of mining-induced subsidence on the East Mountain/Trail Mountain property. Terrain in the subsidence study areas ranges from relatively flat mountain tops with thick overburden of up to 2,200 feet to steep slopes and cliffs with overburden of less than 200 feet. The most noticeable subsidence effects occur in the steep cliff areas and where mining next to burned coal appears to have caused crushing of the clinker beds. Most of the fractures observed over mined areas have occurred under these conditions, especially where the Castlegate Sandstone (or similar lithologic unit) crops out or is near the surface. The sandstones yield to stress by brittle deformation (fracturing).

In areas where overburden is thicker and other more clay-rich formations are present above the mine workings, longwall and room-and-pillar mining methods have allowed the multiple seam mining of large quantities of coal without apparent impact on the surface environment because the overburden yields through plastic deformation. Areas such as the Beehive-Deseret east and west room-and-pillar sections (Areas 8 and 13) and the Deer Creek 4th through 8th East-Wilberg 3rd through 13th Right longwall panels (Area 2) have demonstrated that subsidence can occur over a broad area with no visible or hydrologic effects. More than eighty percent (80%) of the East Mountain property has conditions similar to those areas; therefore, the mining methods being utilized are well suited to the geologic conditions, allowing subsidence to occur without impacting the hydrology or present land use of the area.

An effort was made again this year to predict maximum possible subsidence for the various areas where subsidence has been detected. The prediction was then compared with observed subsidence for each area. It appears that the actual subsidence occurring on East Mountain/Trail Mountain is slightly less than that predicted by the NCB model.

Professional Certification of Subsidence Data

I, Kenneth S. Fleck, being a Licensed Professional Geologist in the State of Utah (#5224883-2250), with significant experience in subsidence monitoring, certify that the subsidence data contained in this document was collected under my direction, and the attached subsidence materials were prepared by me using industry-accepted methods. I further certify that the interpretations contained herein are an accurate representation of the subsidence that has occurred.

Dated this 28th day of March 2003.

Kenneth S. Fleck

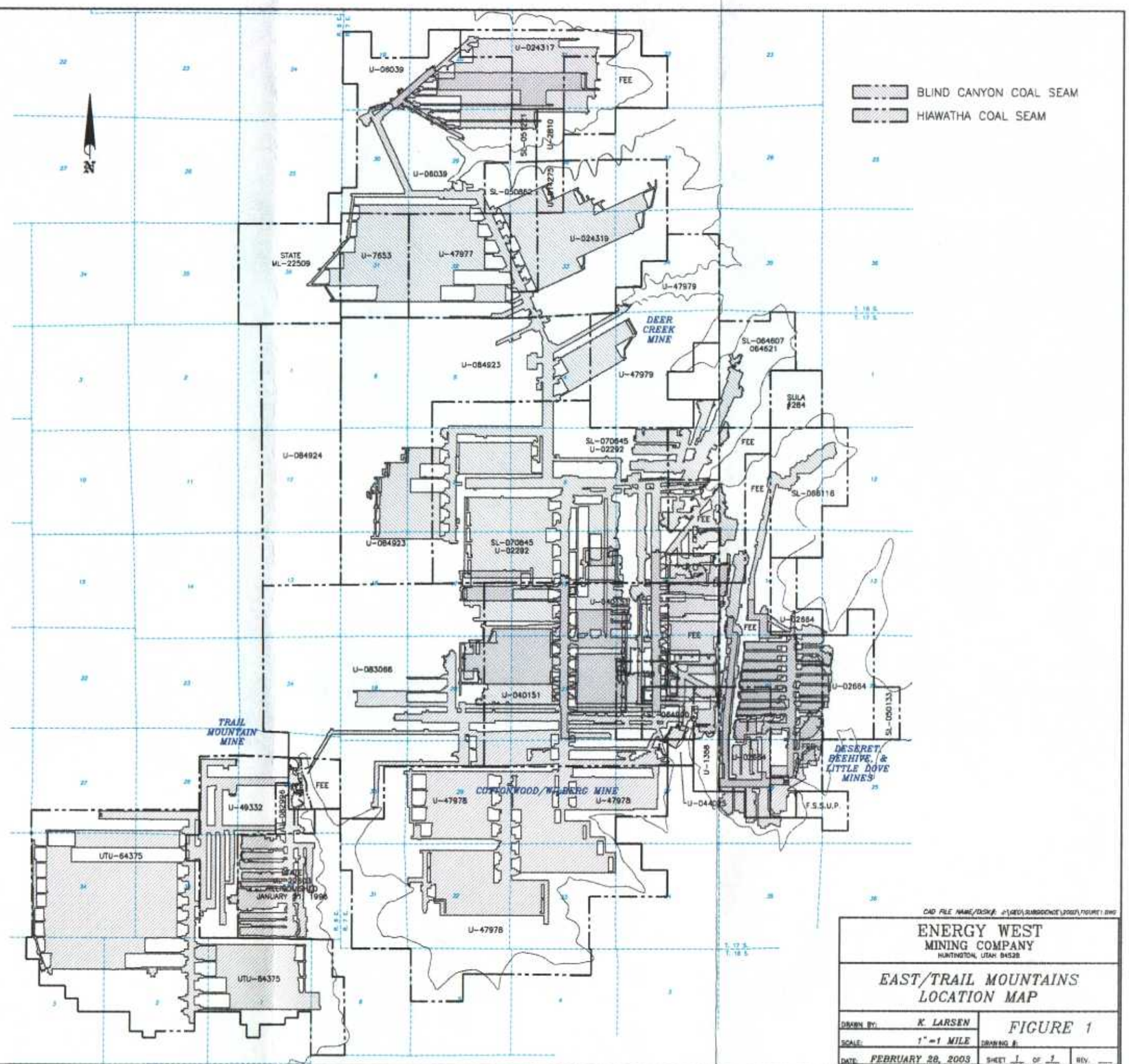
Kenneth S. Fleck

Professional Geologist

License No. 5224883-2250

FIGURES 1 & 2

LOCATION MAPS

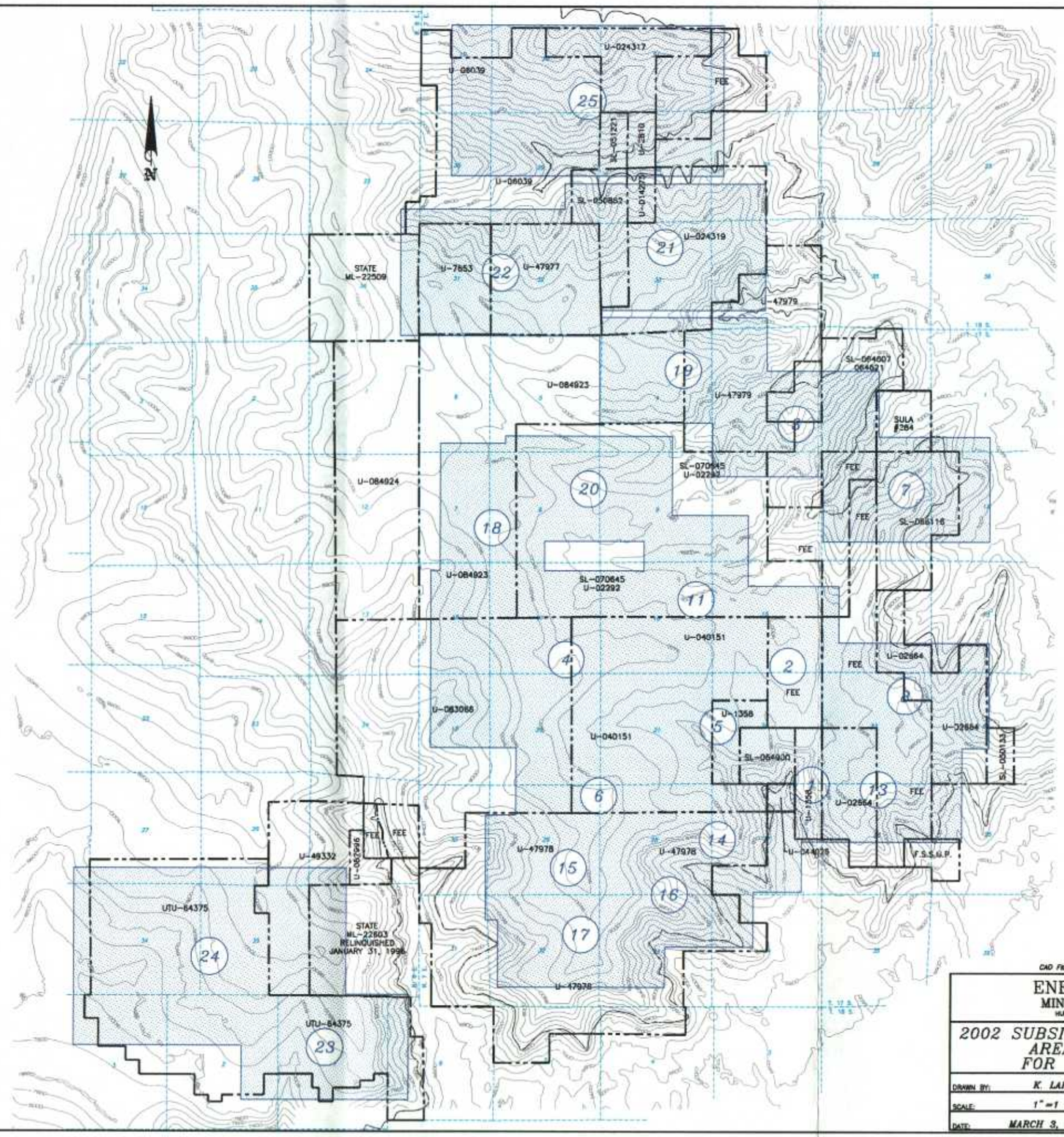


CAD FILE NAME/DISK#: J:\GEO\SUBGOODICE\2003\FIGURE1.DWG

ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528

EAST/TRAIL MOUNTAINS
LOCATION MAP

DRAWN BY: K. LARSEN	FIGURE 1	
SCALE: 1"=1 MILE	DRAWING #:	
DATE: FEBRUARY 28, 2003	SHEET 1 OF 1	REV:



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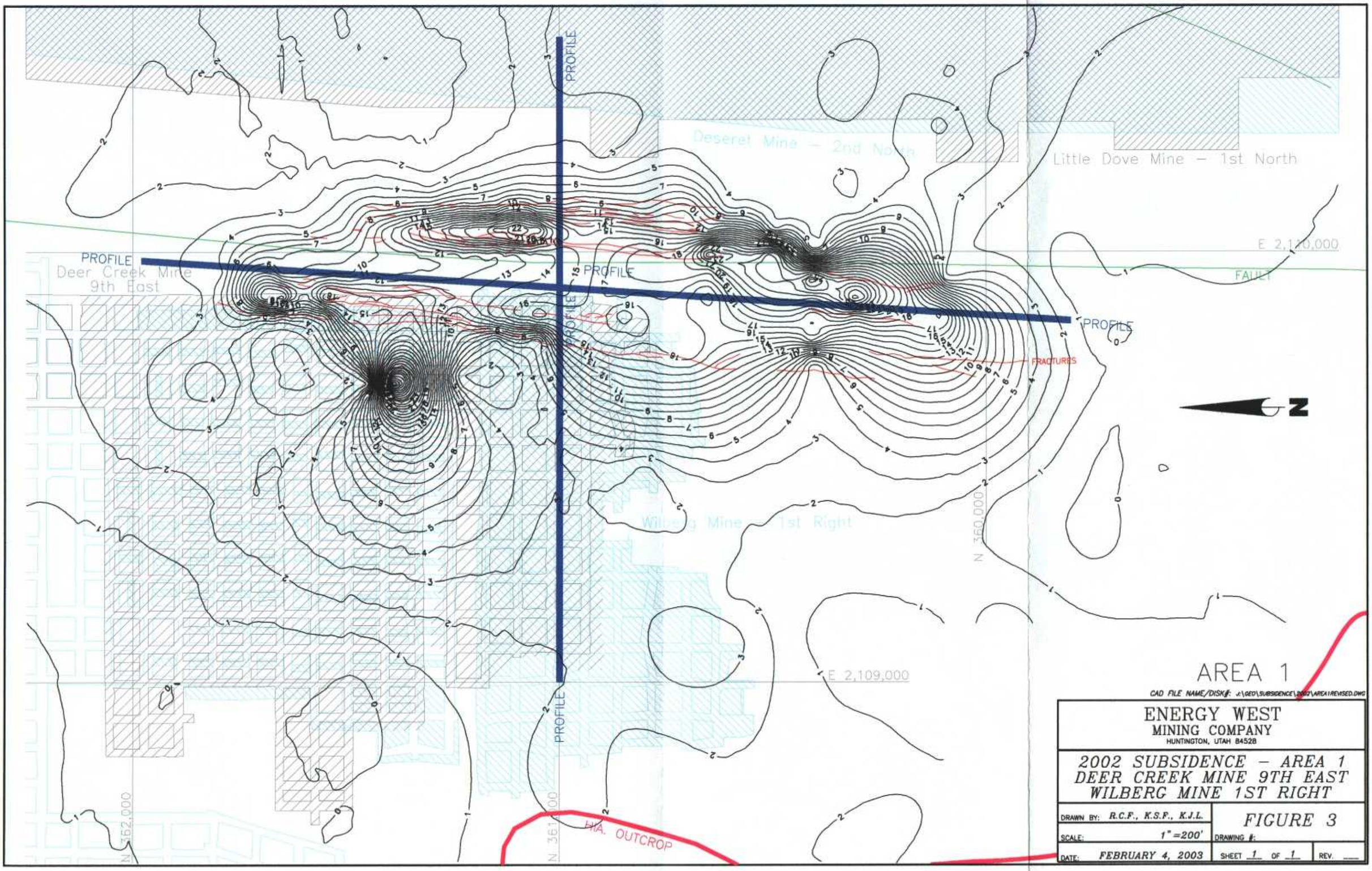
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528

2002 SUBSIDENCE MONITORING AREAS STUDIED FOR SUBSIDENCE

DRAWN BY:	K. LARSEN	FIGURE 2
SCALE:	1"=1 MILE	DRAWING #:
DATE:	MARCH 3, 2003	SHEET 1 OF 1 REV. ___

FIGURES 3 - 24

SUBSIDENCE AREA MAPS


PROFILE
Deer Creek Mine
9th East
Deseret Mine – 2nd North
Little Dove Mine – 1st North
Wilberg Mine – 1st Right
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FRACTURES
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ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528
2002 SUBSIDENCE – AREA 1
DEER CREEK MINE 9TH EAST
WILBERG MINE 1ST RIGHT
DRAWN BY: R.C.F., K.S.F., K.J.L.
SCALE: 1" =200'
DATE: FEBRUARY 4, 2003
FIGURE 3
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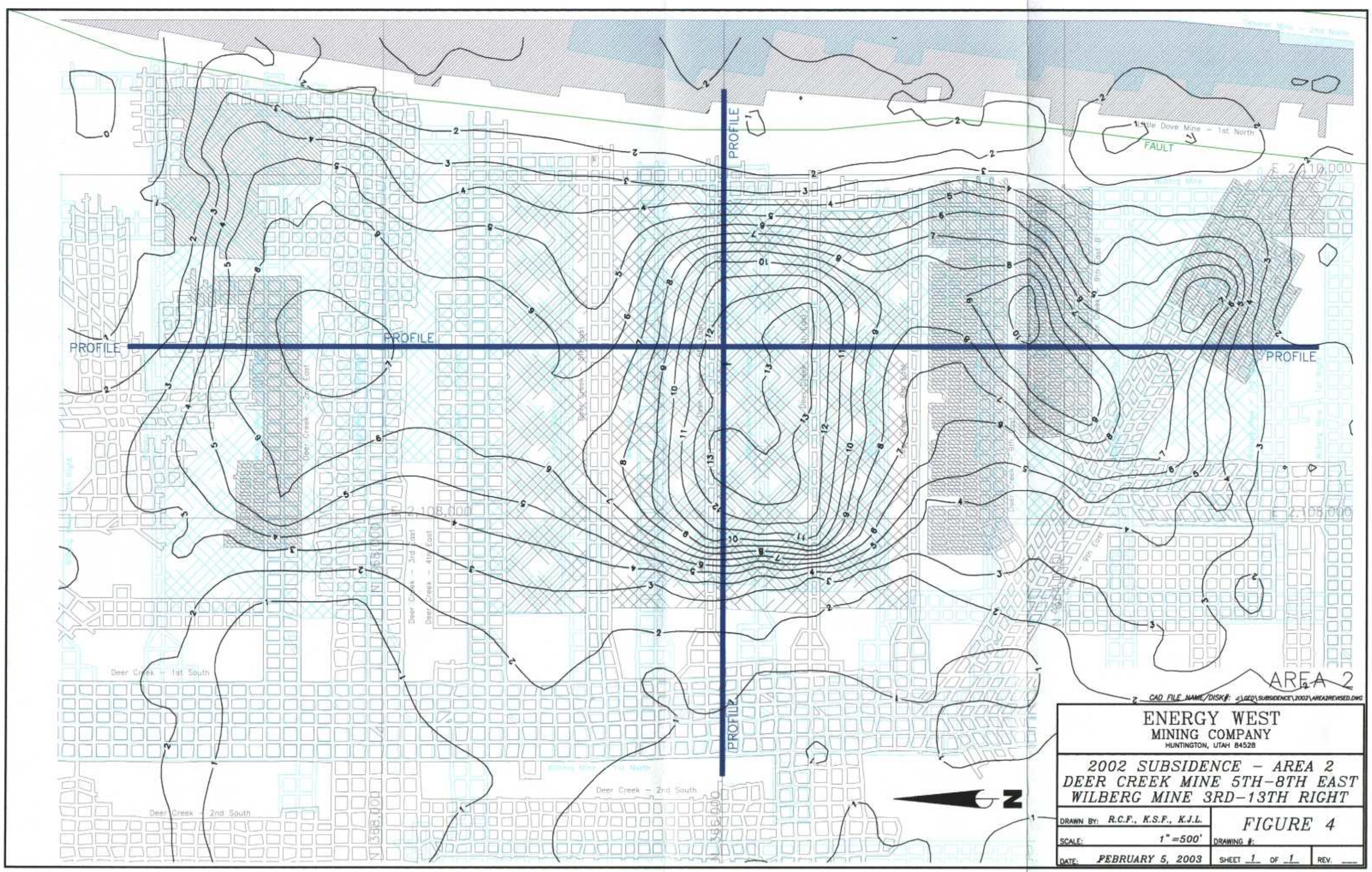
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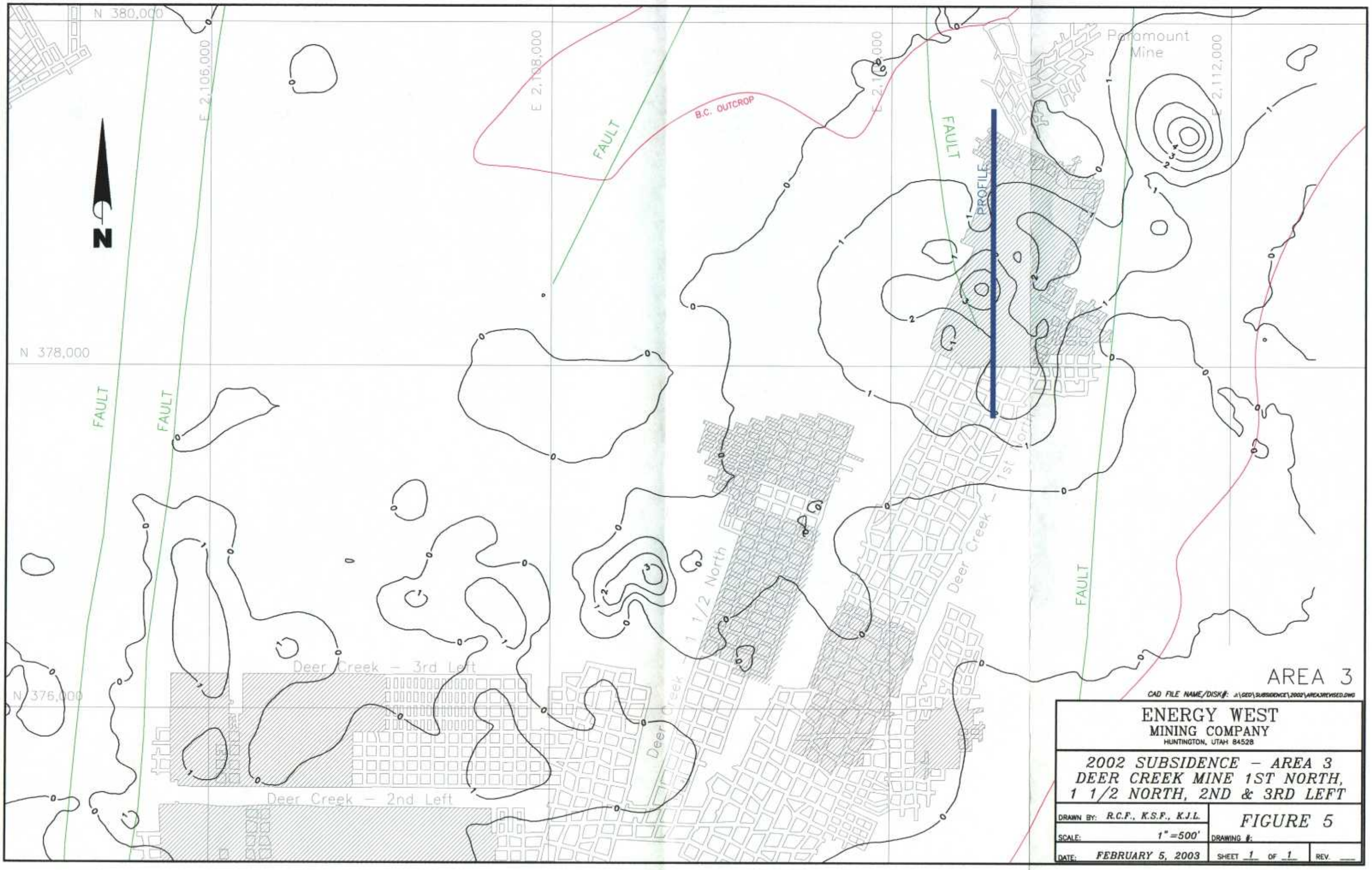
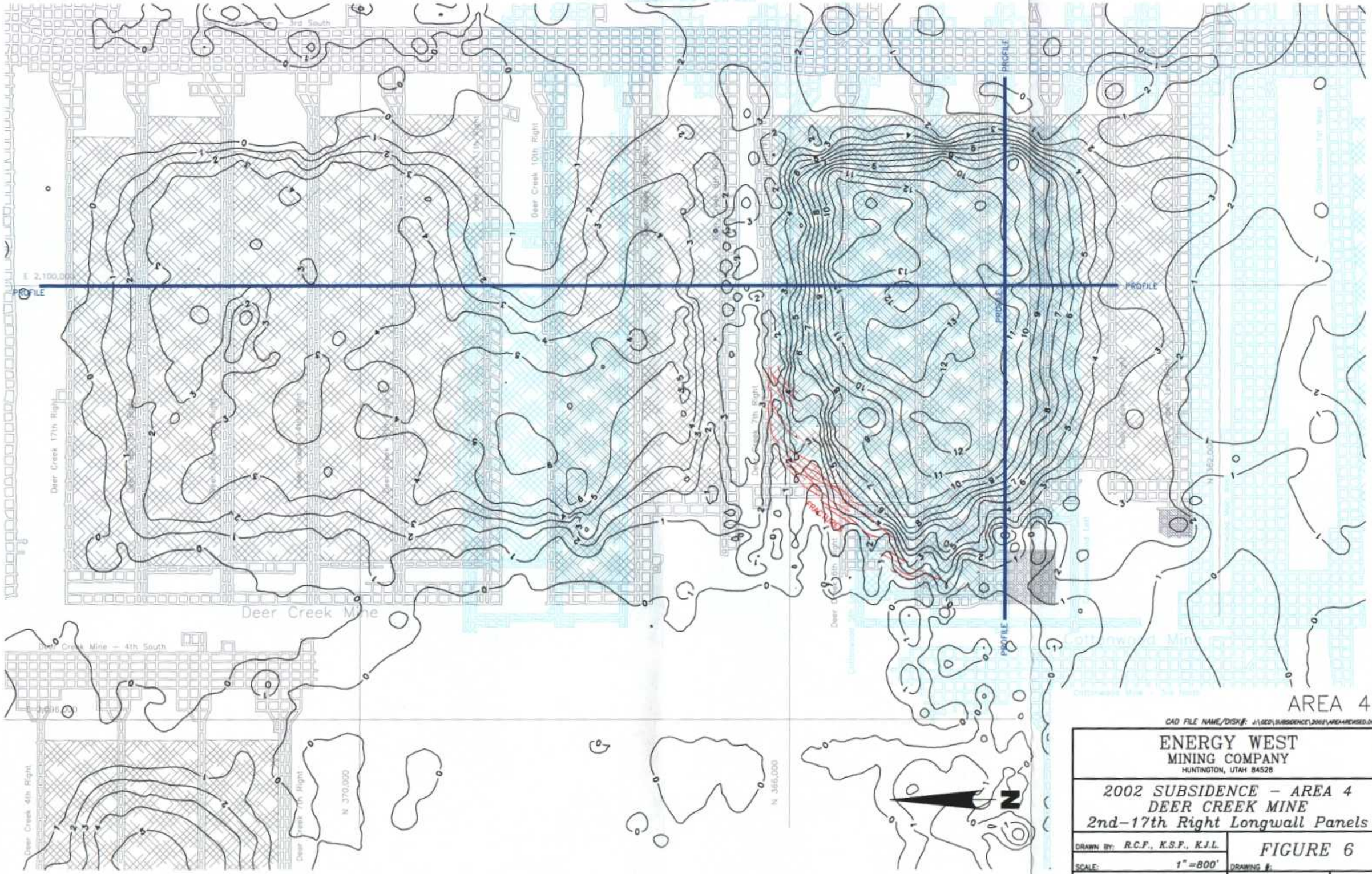
Deer Creek - 1072nd East
Deer Creek - 1073rd East
Deer Creek - 1074th East
Deer Creek - 1075th East
Deer Creek - 1076th East
Deer Creek - 1077th East
Deer Creek - 1078th East
Deer Creek - 1079th East
Deer Creek - 1080th East
Deer Creek - 1081st East
Deer Creek - 1082nd East
Deer Creek - 1083rd East
Deer Creek - 1084th East
Deer Creek - 1085th East
Deer Creek - 1086th East
Deer Creek - 1087th East
Deer Creek - 1088th East
Deer Creek - 1089th East
Deer Creek - 1090th East
Deer Creek - 1091st East
Deer Creek - 1092nd East
Deer Creek - 1093rd East
Deer Creek - 1094th East
Deer Creek - 1095th East
Deer Creek - 1096th East
Deer Creek - 1097th East
Deer Creek - 1098th East
Deer Creek - 1099th East
Deer Creek - 1100th East
Deer Creek - 1101st East
Deer Creek - 1102nd East
Deer Creek - 1103rd East
Deer Creek - 1104th East
Deer Creek - 1105th East
Deer Creek - 1106th East
Deer Creek - 1107th East
Deer Creek - 1108th East
Deer Creek - 1109th East
Deer Creek - 1110th East
Deer Creek - 1111th East
Deer Creek - 1112th East
Deer Creek - 1113th East
Deer Creek - 1114th East
Deer Creek - 1115th East
Deer Creek - 1116th East
Deer Creek - 1117th East
Deer Creek - 1118th East
Deer Creek - 1119th East
Deer Creek - 1120th East
Deer Creek - 1121st East
Deer Creek - 1122nd East
Deer Creek - 1123rd East
Deer Creek - 1124th East
Deer Creek - 1125th East
Deer Creek - 1126th East
Deer Creek - 1127th East
Deer Creek - 1128th East
Deer Creek - 1129th East
Deer Creek - 1130th East
Deer Creek - 1131st East
Deer Creek - 1132nd East
Deer Creek - 1133rd East
Deer Creek - 1134th East
Deer Creek - 1135th East
Deer Creek - 1136th East
Deer Creek - 1137th East
Deer Creek - 1138th East
Deer Creek - 1139th East
Deer Creek - 1140th East
Deer Creek - 1141st East
Deer Creek - 1142nd East
Deer Creek - 1143rd East
Deer Creek - 1144th East
Deer Creek - 1145th East
Deer Creek - 1146th East
Deer Creek - 1147th East
Deer Creek - 1148th East
Deer Creek - 1149th East
Deer Creek - 1150th East
Deer Creek - 1151st East
Deer Creek - 1152nd East
Deer Creek - 1153rd East
Deer Creek - 1154th East
Deer Creek - 1155th East
Deer Creek - 1156th East
Deer Creek - 1157th East
Deer Creek - 1158th East
Deer Creek - 1159th East
Deer Creek - 1160th East
Deer Creek - 1161st East
Deer Creek - 1162nd East
Deer Creek - 1163rd East
Deer Creek - 1164th East
Deer Creek - 1165th East
Deer Creek - 1166th East
Deer Creek - 1167th East
Deer Creek - 1168th East
Deer Creek - 1169th East
Deer Creek - 1170th East
Deer Creek - 1171st East
Deer Creek - 1172nd East
Deer Creek - 1173rd East
Deer Creek - 1174th East
Deer Creek - 1175th East
Deer Creek - 1176th East
Deer Creek - 1177th East
Deer Creek - 1178th East
Deer Creek - 1179th East
Deer Creek - 1180th East
Deer Creek - 1181st East
Deer Creek - 1182nd East
Deer Creek - 1183rd East
Deer Creek - 1184th East
Deer Creek - 1185th East
Deer Creek - 1186th East
Deer Creek - 1187th East
Deer Creek - 1188th East
Deer Creek - 1189th East
Deer Creek - 1190th East
Deer Creek - 1191st East
Deer Creek - 1192nd East
Deer Creek - 1193rd East
Deer Creek - 1194th East
Deer Creek - 1195th East
Deer Creek - 1196th East
Deer Creek - 1197th East
Deer Creek - 1198th East
Deer Creek - 1199th East
Deer Creek - 1200th East
Deer Creek - 1201st East
Deer Creek - 1202nd East
Deer Creek - 1203rd East
Deer Creek - 1204th East
Deer Creek - 1205th East
Deer Creek - 1206th East
Deer Creek - 1207th East
Deer Creek - 1208th East
Deer Creek - 1209th East
Deer Creek - 1210th East
Deer Creek - 1211th East
Deer Creek - 1212th East
Deer Creek - 1213th East
Deer Creek - 1214th East
Deer Creek - 1215th East
Deer Creek - 1216th East
Deer Creek - 1217th East
Deer Creek - 1218th East
Deer Creek - 1219th East
Deer Creek - 1220th East
Deer Creek - 1221st East
Deer Creek - 1222nd East
Deer Creek - 1223rd East
Deer Creek - 1224th East
Deer Creek - 1225th East
Deer Creek - 1226th East
Deer Creek - 1227th East
Deer Creek - 1228th East
Deer Creek - 1229th East
Deer Creek - 1230th East
Deer Creek - 1231st East
Deer Creek - 1232nd East
Deer Creek - 1233rd East
Deer Creek - 1234th East
Deer Creek - 1235th East
Deer Creek - 1236th East
Deer Creek - 1237th East
Deer Creek - 1238th East
Deer Creek - 1239th East
Deer Creek - 1240th East
Deer Creek - 1241st East
Deer Creek - 1242nd East
Deer Creek - 1243rd East
Deer Creek - 1244th East
Deer Creek - 1245th East
Deer Creek - 1246th East
Deer Creek - 1247th East
Deer Creek - 1248th East
Deer Creek - 1249th East
Deer Creek - 1250th East
Deer Creek - 1251st East
Deer Creek - 1252nd East
Deer Creek - 1253rd East
Deer Creek - 1254th East
Deer Creek - 1255th East
Deer Creek - 1256th East
Deer Creek - 1257th East
Deer Creek - 1258th East
Deer Creek - 1259th East
Deer Creek - 1260th East
Deer Creek - 1261st East
Deer Creek - 1262nd East
Deer Creek - 1263rd East
Deer Creek - 1264th East
Deer Creek - 1265th East
Deer Creek - 1266th East
Deer Creek - 1267th East
Deer Creek - 1268th East
Deer Creek - 1269th East
Deer Creek - 1270th East
Deer Creek - 1271st East
Deer Creek - 1272nd East
Deer Creek - 1273rd East
Deer Creek - 1274th East
Deer Creek - 1275th East
Deer Creek -


N 380,000
N 378,000
N 376,000
E 2,106,000
E 2,108,000
E 2,110,000
E 2,112,000
N
FAULT
FAULT
FAULT
FAULT
FAULT
B.C. OUTCROP
PROFILE
Paramount Mine
Deer Creek – 1st North
Deer Creek – 1 1/2 North
Deer Creek – 2nd Left
Deer Creek – 3rd Left
AREA 3
CAD FILE NAME/DISK#: J:\GEO\SUBSIDENCE\2002\AREA3REVISED.DWG
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528
2002 SUBSIDENCE – AREA 3
DEER CREEK MINE 1ST NORTH,
1 1/2 NORTH, 2ND & 3RD LEFT
DRAWN BY: R.C.F., K.S.F., K.J.L.
SCALE: 1"=500'
DATE: FEBRUARY 5, 2003
FIGURE 5
DRAWING #:
SHEET 1 OF 1
REV.

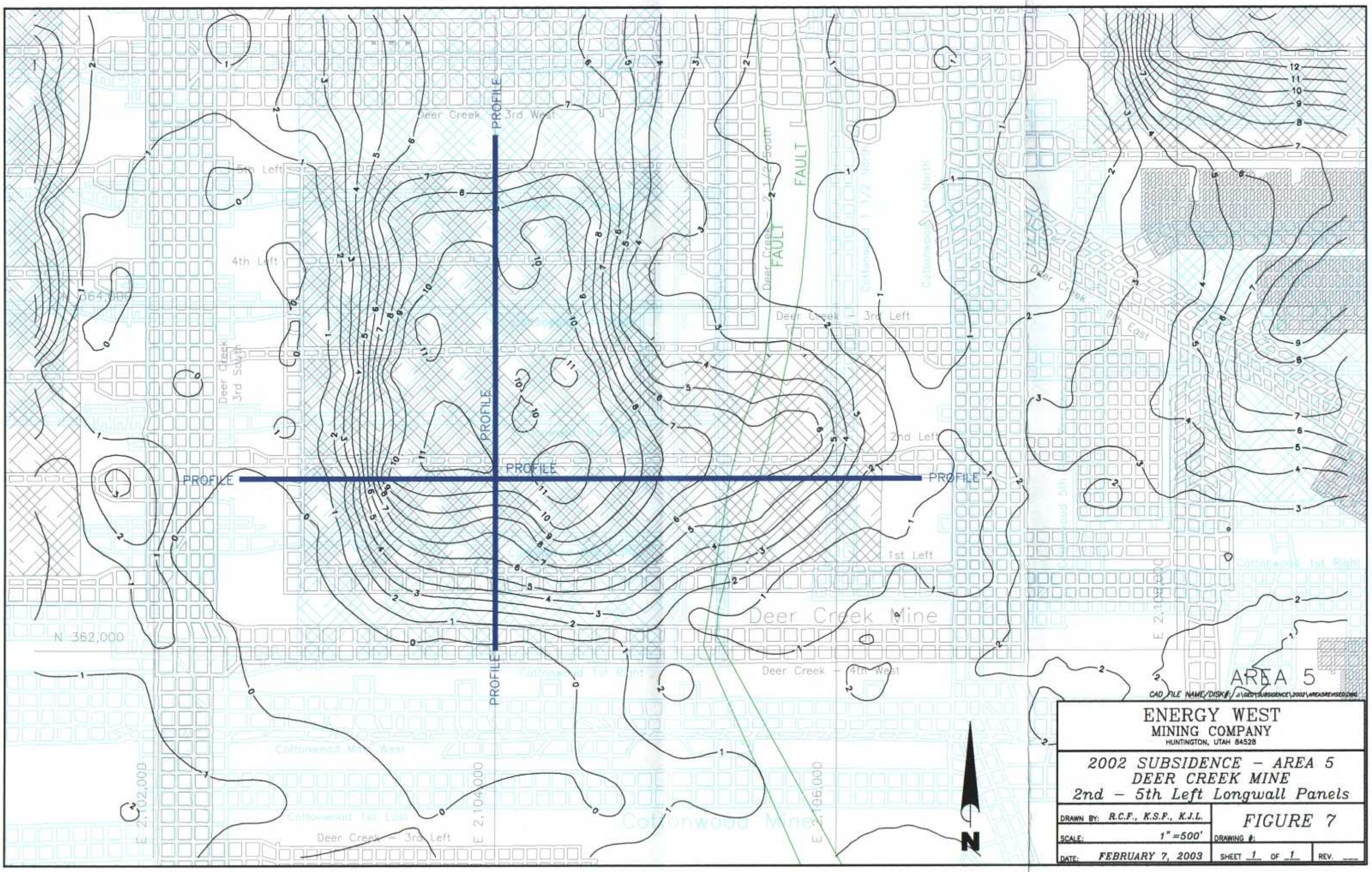


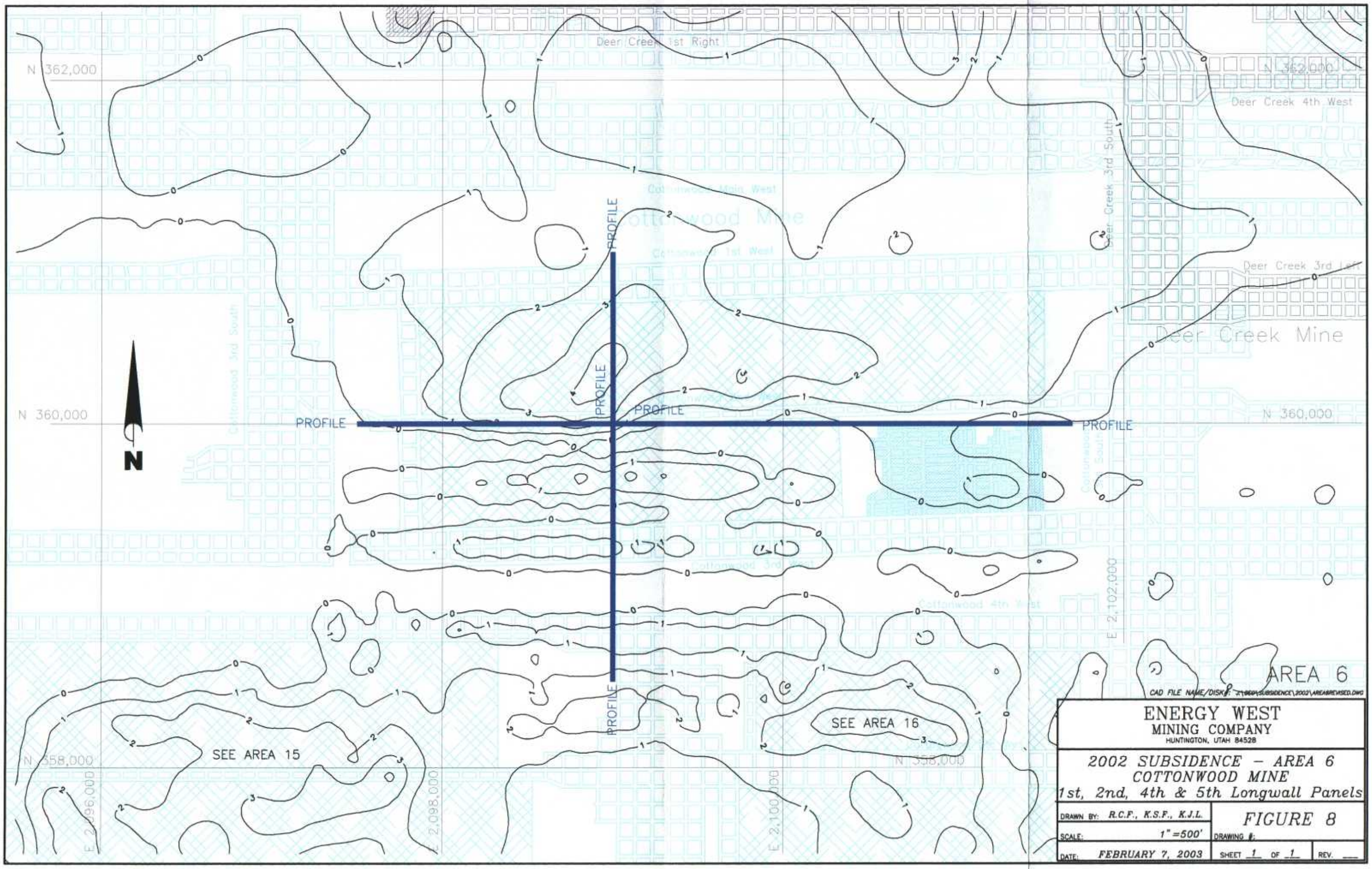
CAD FILE NAME/DISK#: J:\GED\SUBSIDENCE\2002\AREA4REVISED.DWG

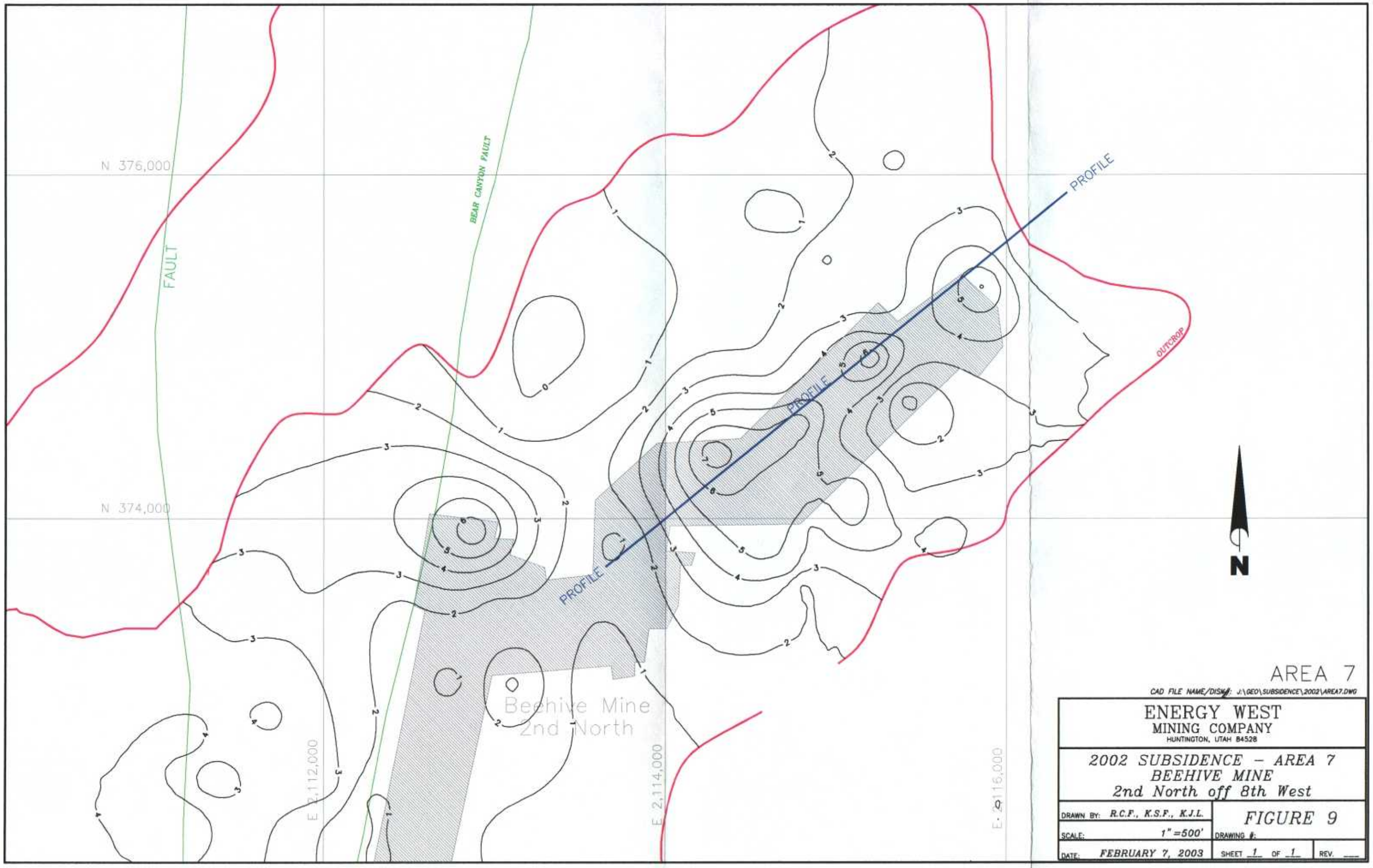
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528

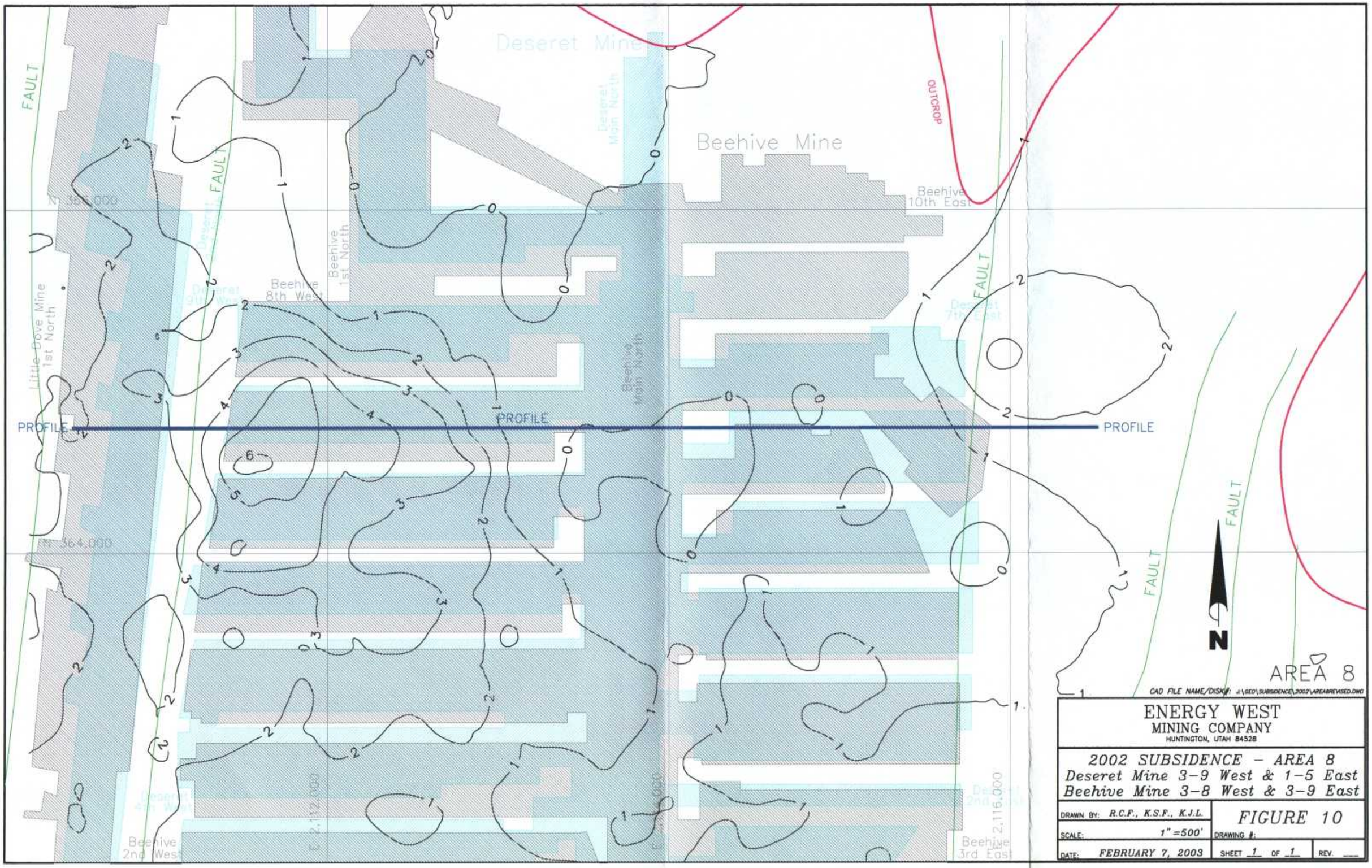
2002 SUBSIDENCE – AREA 4
DEER CREEK MINE
2nd–17th Right Longwall Panels

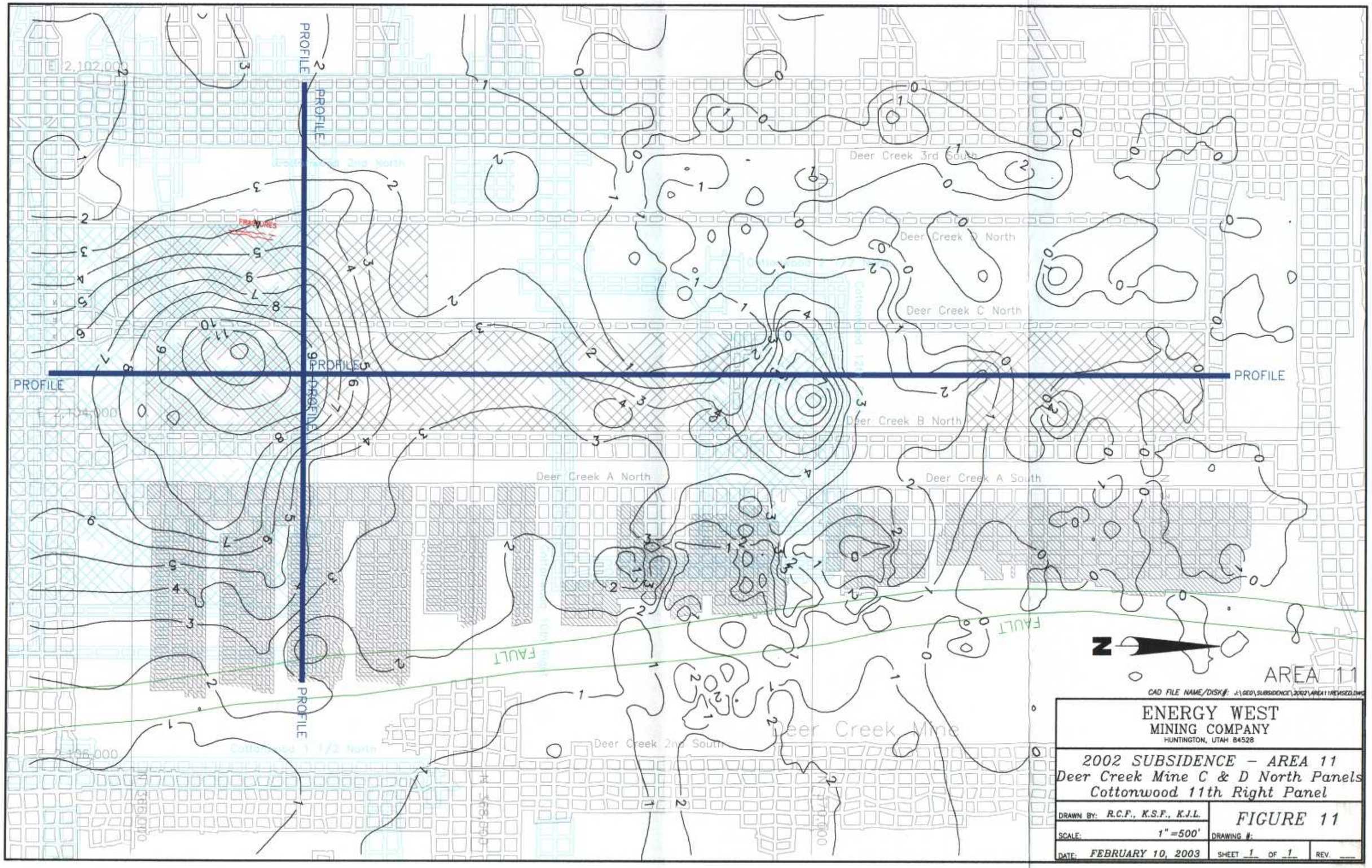
DRAWN BY: *R.C.F., K.S.F., K.J.L.*	*FIGURE 6*
SCALE: *1" =800'*	DRAWING #:
DATE: *FEBRUARY 7, 2003*	SHEET 1 OF 1 REV.

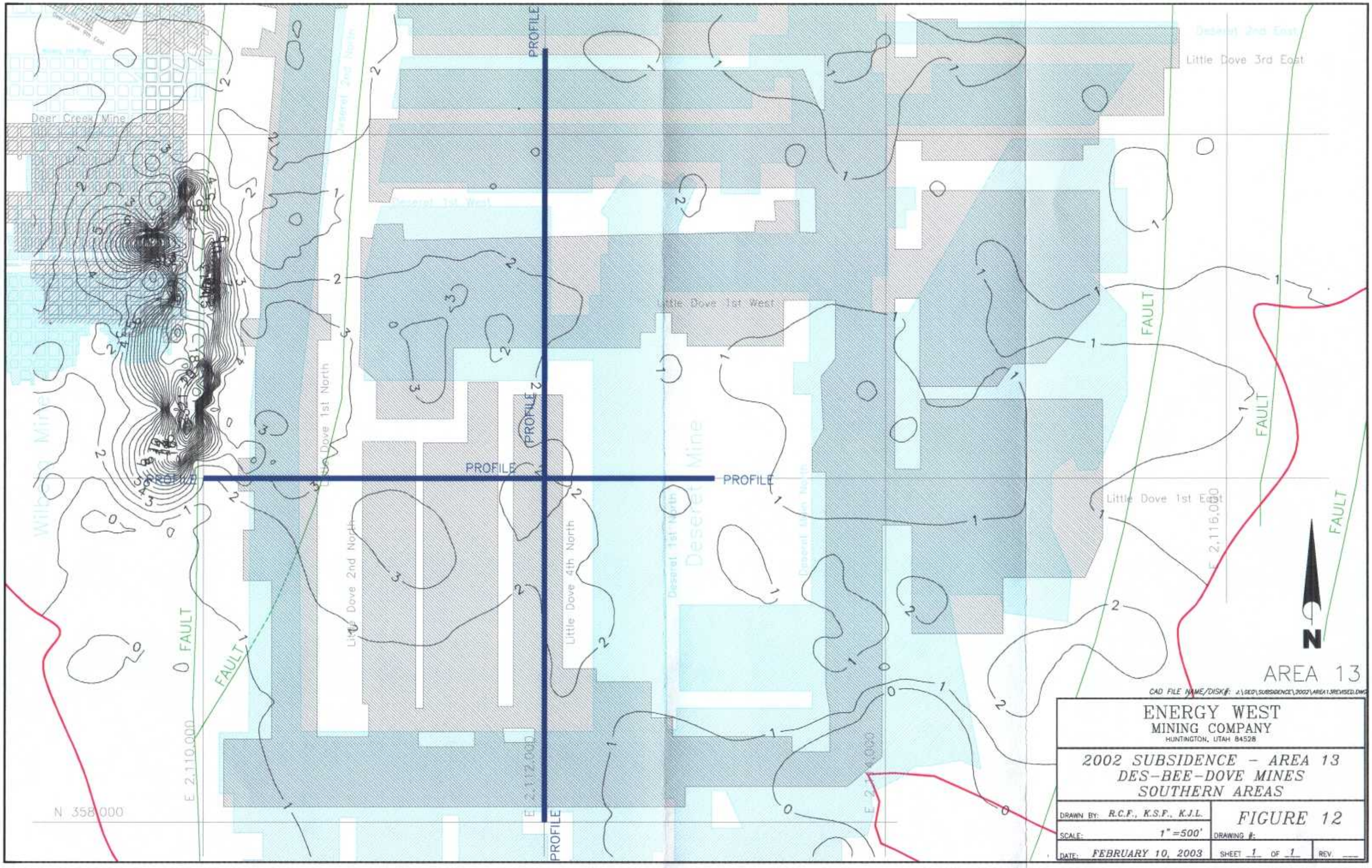

PROFILE
PROFILE
PROFILE
PROFILE
PROFILE
Deer Creek 3rd West
5th Left
4th Left
Deer Creek 3rd South
Deer Creek 2 1/2 South
FAULT
FAULT
Cottonwood 1 1/2 North
Deer Creek 9th East
Deer Creek - 3rd Left
2nd Left
1st Left
Deer Creek Mine
Deer Creek - 4th West
Cottonwood 1st Right
Cottonwood Mine West
Cottonwood 1st East
Deer Creek - 3rd Left
Cottonwood Mine
N 364,000
N 362,000
E 2,102,000
E 2,104,000
E 2,106,000
E 2,108,000
N
AREA 5
CAD FILE NAME/DISK#: J:\GEO\SUBSIDENCE\2002\AREA5REVISED.DWG
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528
2002 SUBSIDENCE – AREA 5
DEER CREEK MINE
2nd – 5th Left Longwall Panels
DRAWN BY: R.C.F., K.S.F., K.J.L.
FIGURE 7
SCALE: 1" =500'
DRAWING #:
DATE: FEBRUARY 7, 2003
SHEET 1 OF 1
REV.

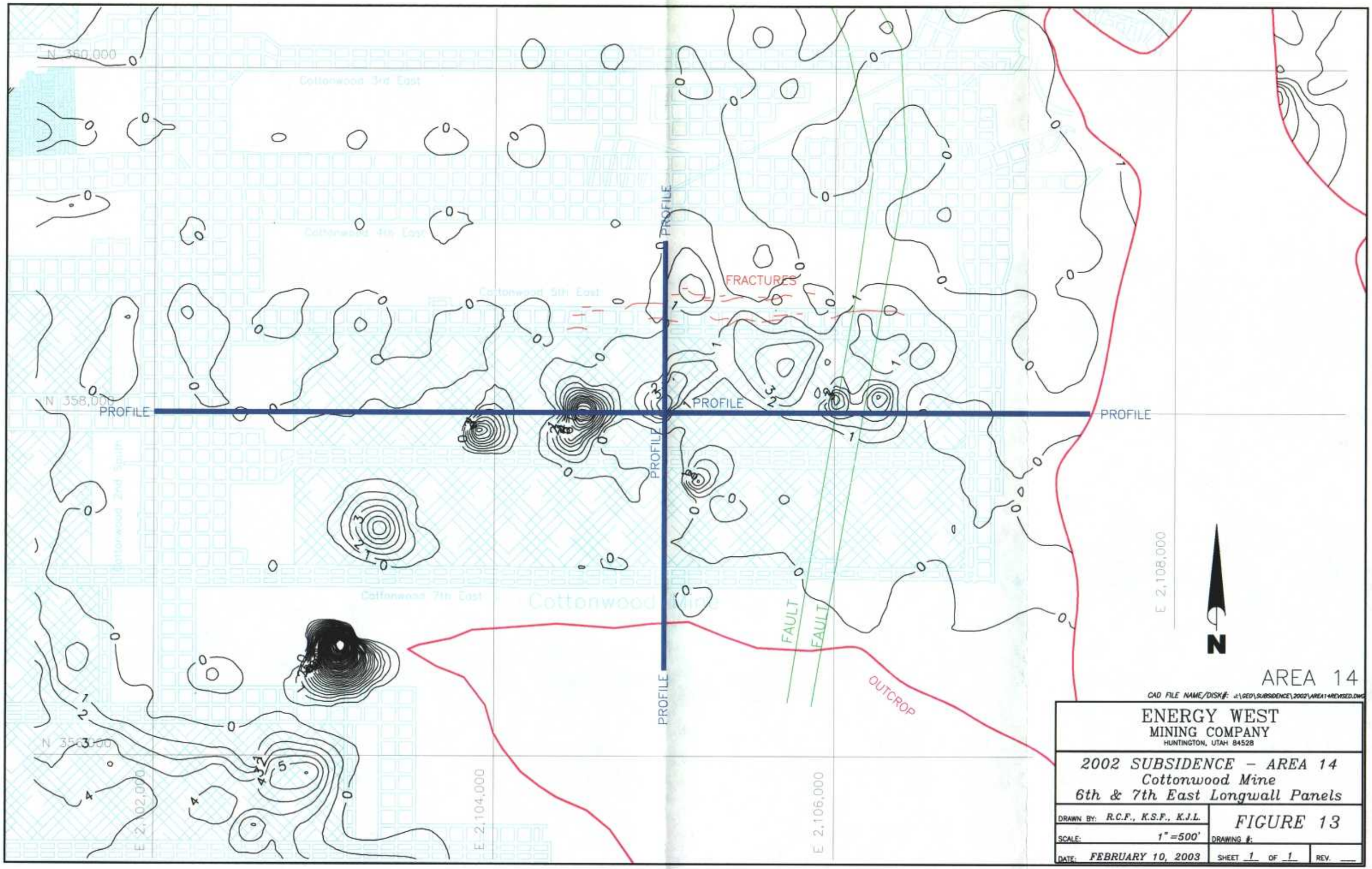

N 362,000
Deer Creek 1st Right
Deer Creek 4th West
Deer Creek 3rd South
Deer Creek 3rd Left
Deer Creek Mine
Cottonwood Main West
Cottonwood 1st West
Cottonwood 3rd South
Cottonwood 4th West
N 360,000
PROFILE
PROFILE
PROFILE
PROFILE
PROFILE
N
N 358,000
E 2,096,000
E 2,098,000
E 2,100,000
E 2,102,000
SEE AREA 15
SEE AREA 16
AREA 6
CAD FILE NAME/DISK#: Z:\660\SUBSIDENCE\2002\AREA6REVISED.DWG
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528
2002 SUBSIDENCE – AREA 6
COTTONWOOD MINE
1st, 2nd, 4th & 5th Longwall Panels
DRAWN BY: R.C.F., K.S.F., K.J.L.
SCALE: 1" =500'
DATE: FEBRUARY 7, 2003
FIGURE 8
DRAWING #:
SHEET 1 OF 1
REV.

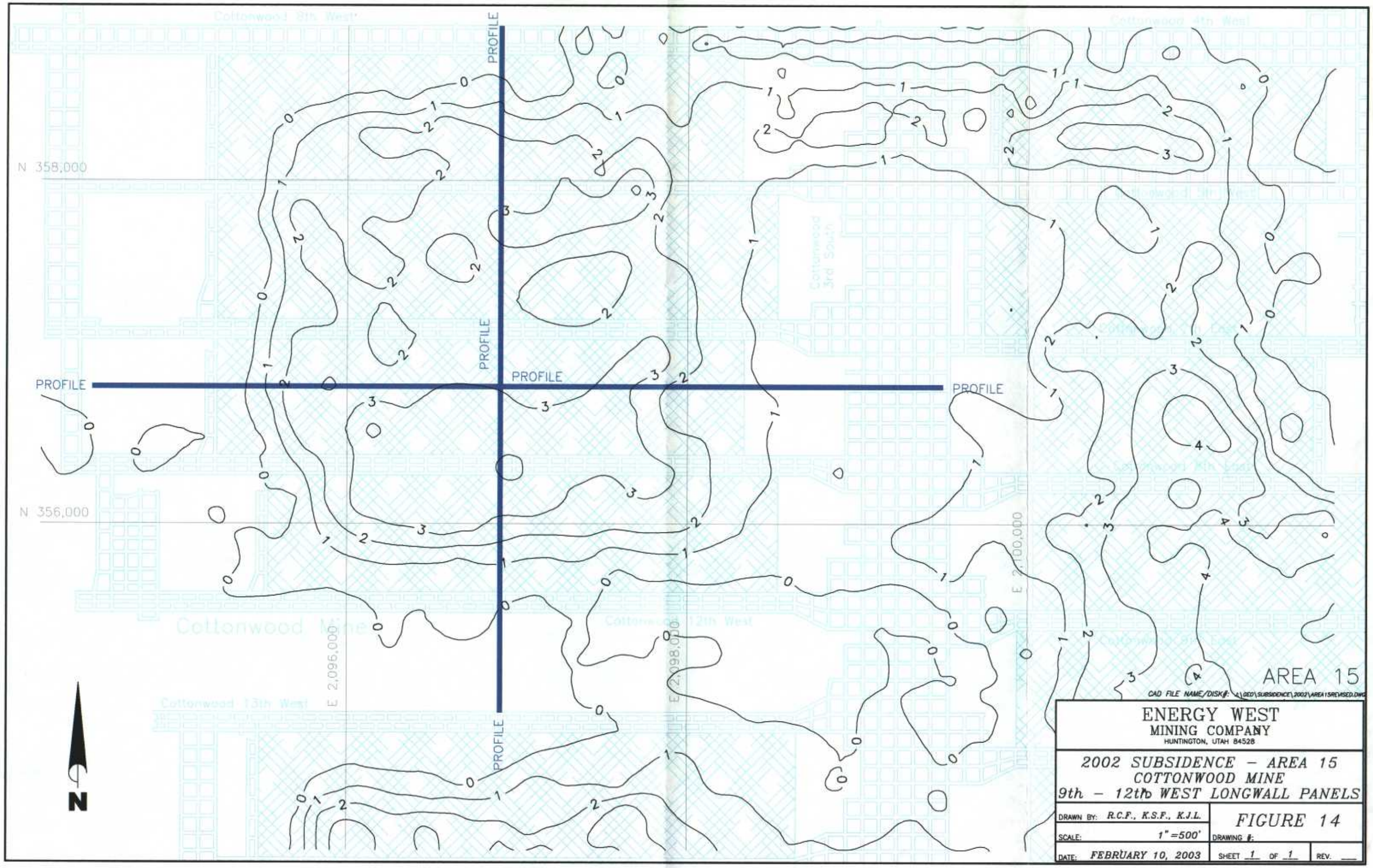

N 376,000
N 374,000
FAULT
BEAR CANYON FAULT
PROFILE
PROFILE
PROFILE
OUTCROP
Beehive Mine
2nd North
E 2,112,000
E 2,114,000
E 2,116,000
N
AREA 7
CAD FILE NAME/DISK#: J:\GEO\SUBSIDENCE\2002\AREA7.DWG
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528
2002 SUBSIDENCE – AREA 7
BEEHIVE MINE
2nd North off 8th West
DRAWN BY: R.C.F., K.S.F., K.J.L.
SCALE: 1"=500'
DATE: FEBRUARY 7, 2003
FIGURE 9
DRAWING #:
SHEET 1 OF 1
REV.

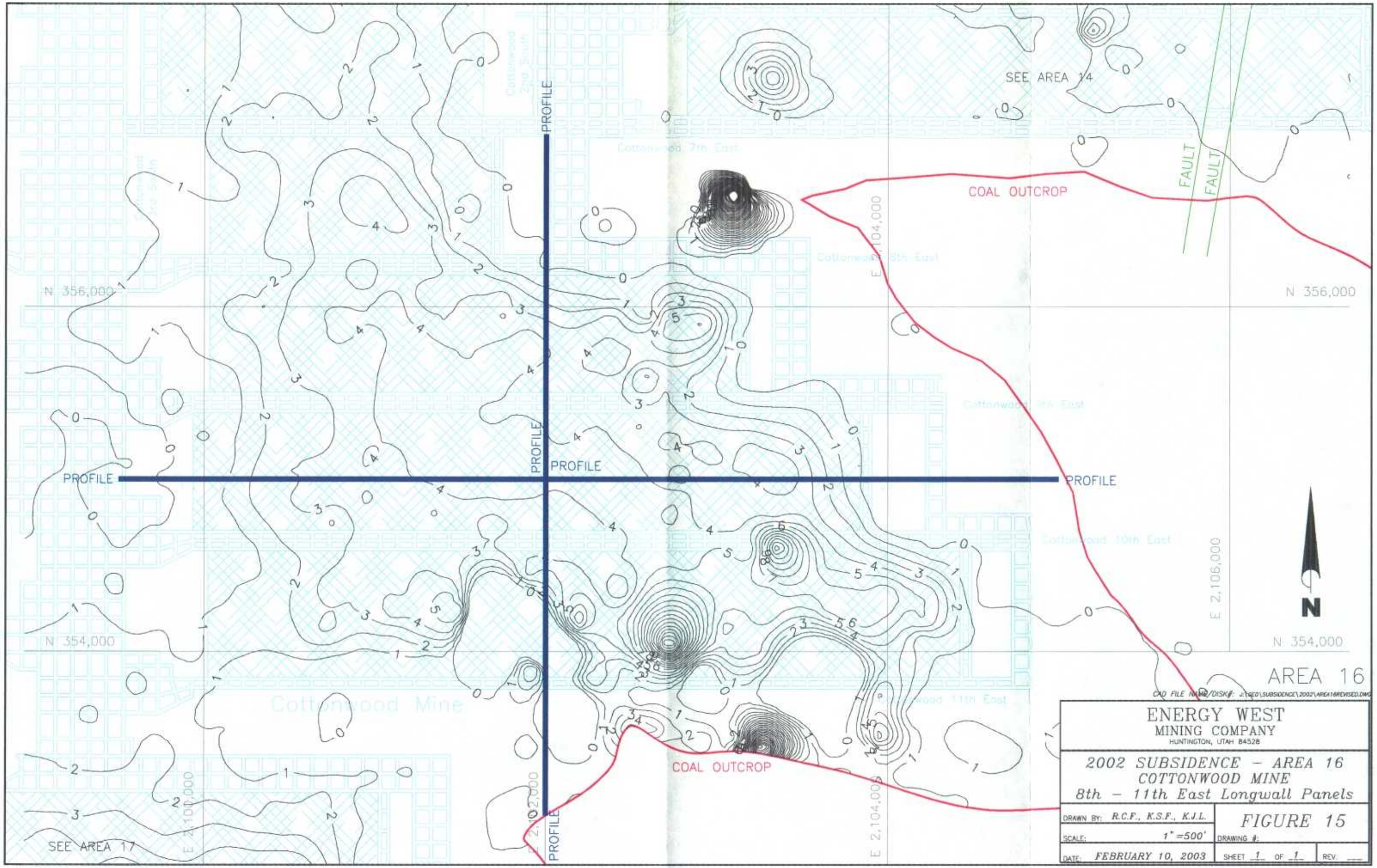

Deseret Mine
Beehive Mine
OUTCROP
FAULT
FAULT
FAULT
FAULT
Little Dove Mine
1st North
Deseret
Main North
Beehive
1st North
Beehive
8th West
Beehive
Main North
Beehive
10th East
Deseret
7th East
Deseret
4th West
Beehive
2nd West
Beehive
3rd East
N 365,000
N 364,000
E 2,112,000
E 2,116,000
PROFILE
PROFILE
N
AREA 8
CAD FILE NAME/DISK#: J:\GEO\SUBSIDENCE\2002\AREABREVISED.DWG
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528
2002 SUBSIDENCE - AREA 8
Deseret Mine 3-9 West & 1-5 East
Beehive Mine 3-8 West & 3-9 East
DRAWN BY: R.C.F., K.S.F., K.J.L.
SCALE: 1" =500'
DATE: FEBRUARY 7, 2003
FIGURE 10
DRAWING #:
SHEET 1 OF 1
REV.

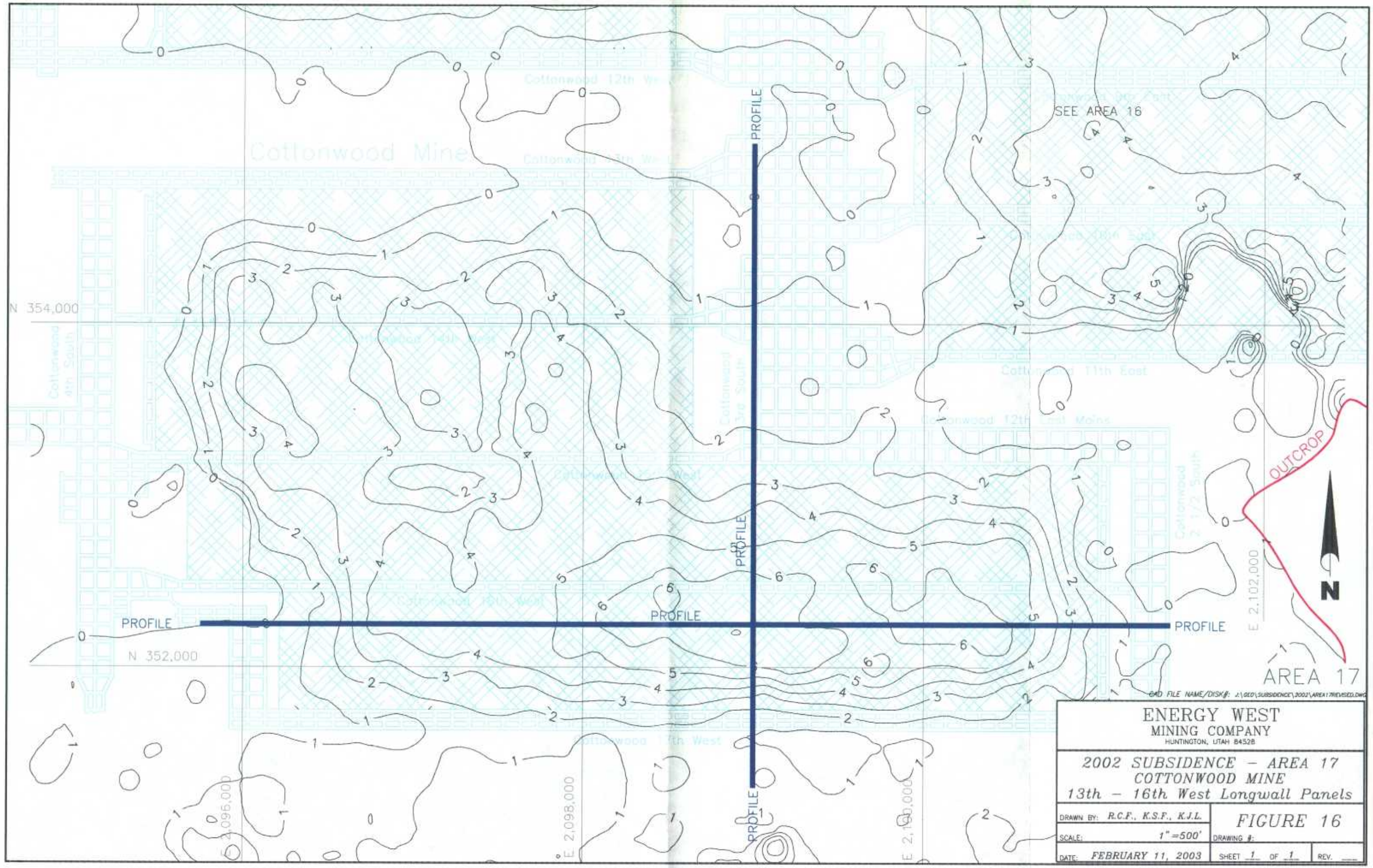

PROFILE
PROFILE
PROFILE
PROFILE
PROFILE
PROFILE
Deer Creek 3rd South
Deer Creek D North
Deer Creek C North
Deer Creek B North
Deer Creek A North
Deer Creek A South
Deer Creek 2nd South
Deer Creek Mine
FAULT
FAULT
FRACTURES
N
AREA 11
CAD FILE NAME/DISK#: J:\GEO\SUBSIDENCE\2002\AREA11REVISED.DWG
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528
2002 SUBSIDENCE – AREA 11
Deer Creek Mine C & D North Panels
Cottonwood 11th Right Panel
DRAWN BY: R.C.F., K.S.F., K.J.L.
SCALE: 1"=500'
DATE: FEBRUARY 10, 2003
FIGURE 11
DRAWING #:
SHEET 1 OF 1
REV.

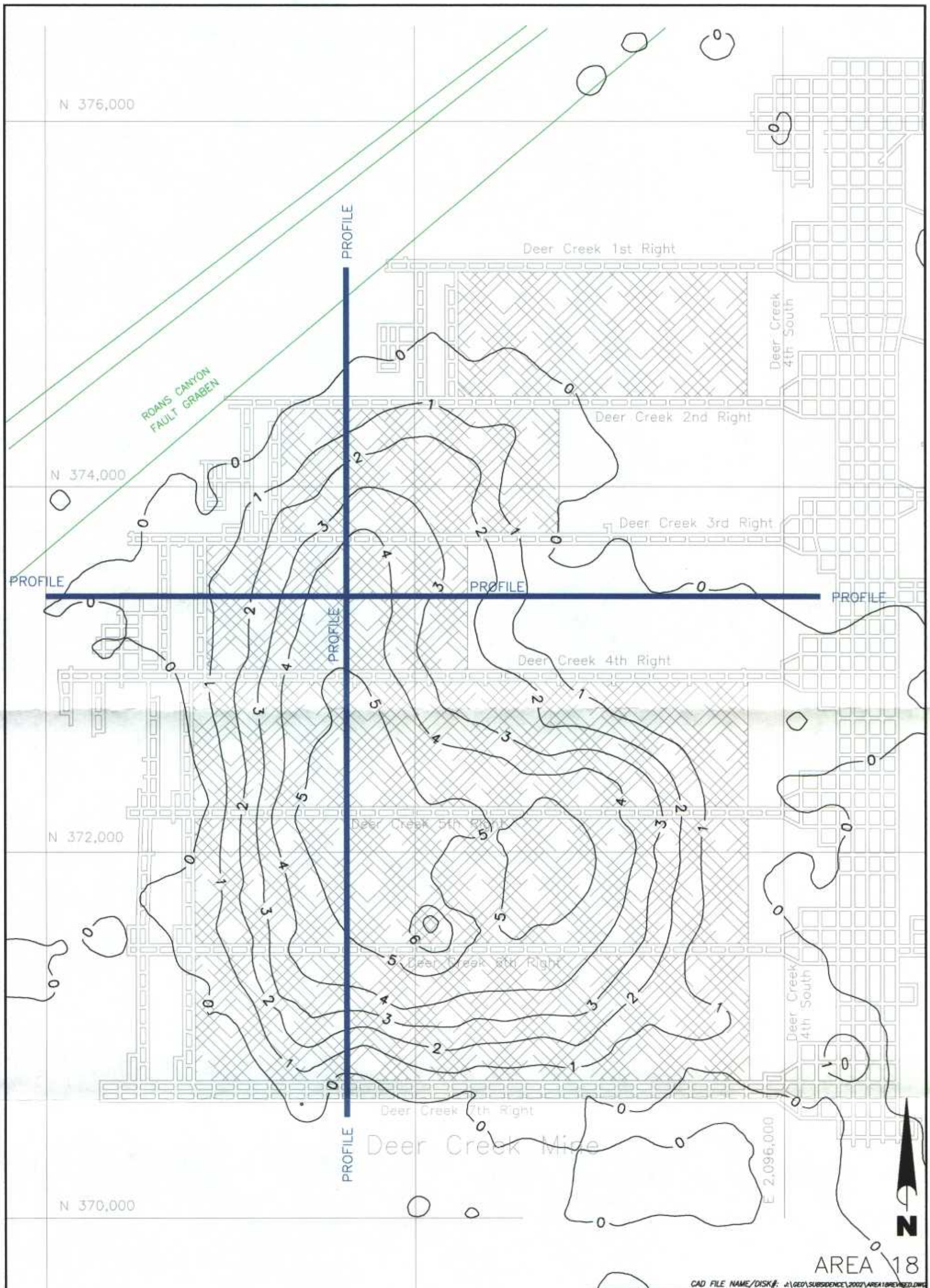

PROFILE
PROFILE
PROFILE
PROFILE
PROFILE
Deer Creek Mine
Deer Creek 9th East
Desert 2nd East
Little Dove 3rd East
Desert 1st West
Little Dove 1st West
Little Dove 1st North
Little Dove 2nd North
Little Dove 4th North
Desert 1st North
Desert 1st North
Little Dove 1st East
FAULT
FAULT
FAULT
FAULT
FAULT
E 2,110,000
E 2,112,000
E 2,116,000
N 358,000
N
AREA 13
CAD FILE NAME/DISK#: J:\SED\SUBSIDENCE\2002\AREA13REVISED.DWG
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528
2002 SUBSIDENCE - AREA 13
DES-BEE-DOVE MINES
SOUTHERN AREAS
DRAWN BY: R.C.F., K.S.F., K.J.L.
SCALE: 1" =500'
DATE: FEBRUARY 10, 2003
FIGURE 12
DRAWING #:
SHEET 1 OF 1
REV. ___


N 360,000
Cottonwood 3rd East
Cottonwood 4th East
Cottonwood 5th East
Cottonwood 7th East
Cottonwood Mine
N 358,000
N 356,000
PROFILE
PROFILE
PROFILE
PROFILE
PROFILE
FRACTURES
FAULT
FAULT
OUTCROP
E 2,102,000
E 2,104,000
E 2,106,000
E 2,108,000
N
AREA 14
CAD FILE NAME/DISK#: J:\GEO\SUBSIDENCE\2002\AREA14REVISED.DWG
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528
2002 SUBSIDENCE - AREA 14
Cottonwood Mine
6th & 7th East Longwall Panels
DRAWN BY: R.C.F., K.S.F., K.J.L.
SCALE: 1"=500'
DATE: FEBRUARY 10, 2003
FIGURE 13
DRAWING #:
SHEET 1 OF 1
REV.


PROFILE
PROFILE
PROFILE
PROFILE
PROFILE
PROFILE
N 358,000
N 356,000
E 2,096,000
E 2,098,000
E 2,100,000
Cottonwood 8th West
Cottonwood 4th West
Cottonwood 3rd South
Cottonwood Mine
Cottonwood 12th West
Cottonwood 13th West
N
AREA 15
CAD FILE NAME/DISK#: A:\GEO\SUBSIDENCE\2002\AREA15REVISED.DWG
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528
2002 SUBSIDENCE - AREA 15
COTTONWOOD MINE
9th - 12th WEST LONGWALL PANELS
DRAWN BY: R.C.F., K.S.F., K.J.L.
SCALE: 1"=500'
DATE: FEBRUARY 10, 2003
FIGURE 14
DRAWING #:
SHEET 1 OF 1
REV.


SEE AREA 14
PROFILE
PROFILE
PROFILE
PROFILE
PROFILE
COAL OUTCROP
COAL OUTCROP
FAULT
FAULT
N 356,000
N 356,000
N 354,000
N 354,000
E 2,104,000
E 2,106,000
E 2,102,000
E 2,100,000
E 2,104,000
Cottonwood Mine
SEE AREA 17
N
AREA 16
CAD FILE NAME/DISK #: J:\GEO\SUBSIDENCE\2002\AREA16REVISED.DWG
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528
2002 SUBSIDENCE - AREA 16
COTTONWOOD MINE
8th - 11th East Longwall Panels
DRAWN BY: R.C.F., K.S.F., K.J.L.
SCALE: 1" =500'
DATE: FEBRUARY 10, 2003
FIGURE 15
DRAWING #:
SHEET 1 OF 1
REV:


PROFILE
PROFILE
PROFILE
PROFILE
PROFILE
PROFILE
SEE AREA 16
OUTCROP
N
N 354,000
N 352,000
E 2,096,000
E 2,098,000
E 2,100,000
E 2,102,000
AREA 17
CAD FILE NAME/DISK#: J:\GEO\SUBSIDENCE\2002\AREA17REVISED.DWG
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528
2002 SUBSIDENCE – AREA 17
COTTONWOOD MINE
13th – 16th West Longwall Panels
DRAWN BY: R.C.F., K.S.F., K.J.L.
SCALE: 1"=500'
DATE: FEBRUARY 11, 2003
FIGURE 16
DRAWING #:
SHEET 1 OF 1
REV.



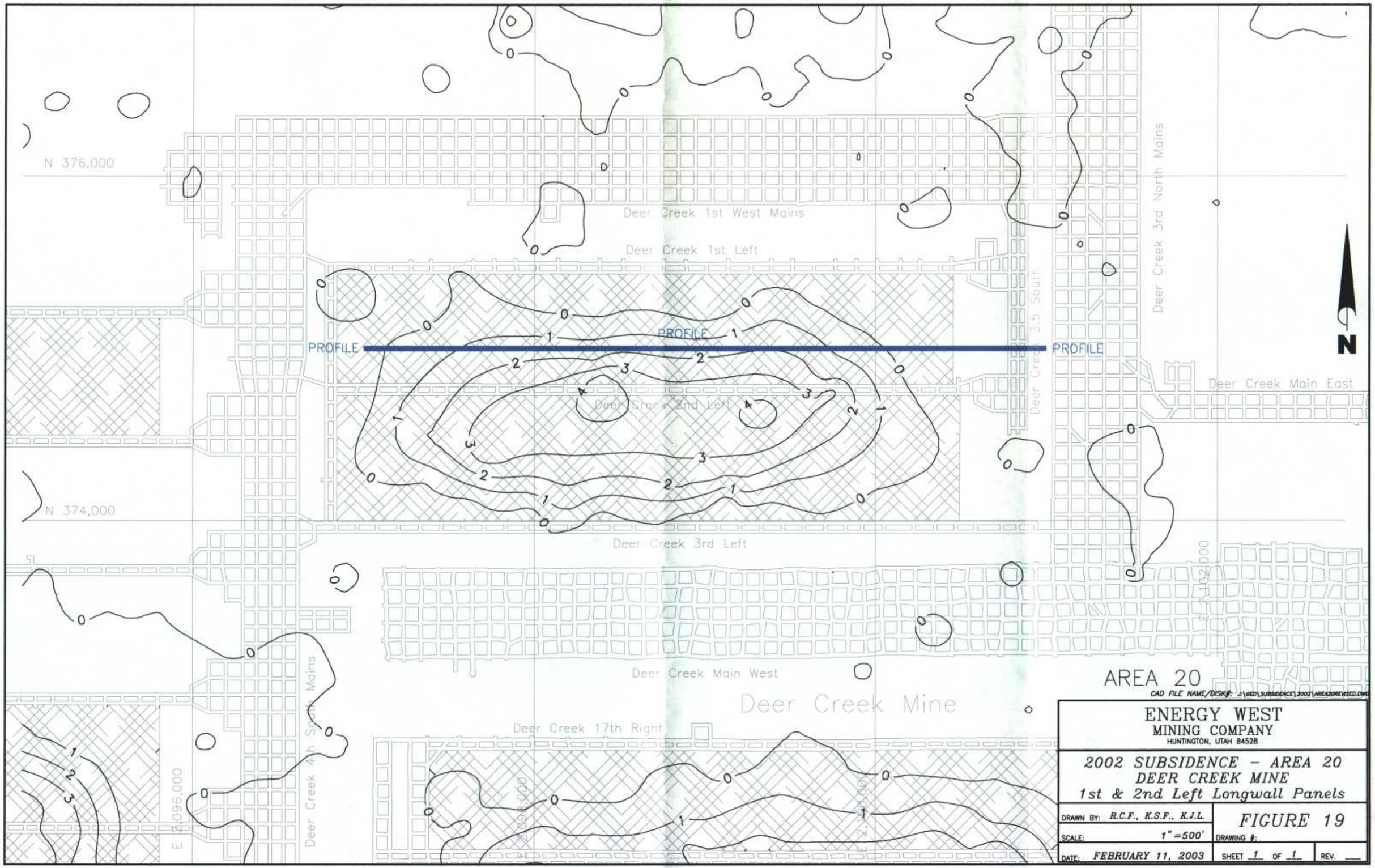
CAD FILE NAME/DISK#: J:\GEO\SUBSIDENCE\2002\AREA18REVISED.DWG

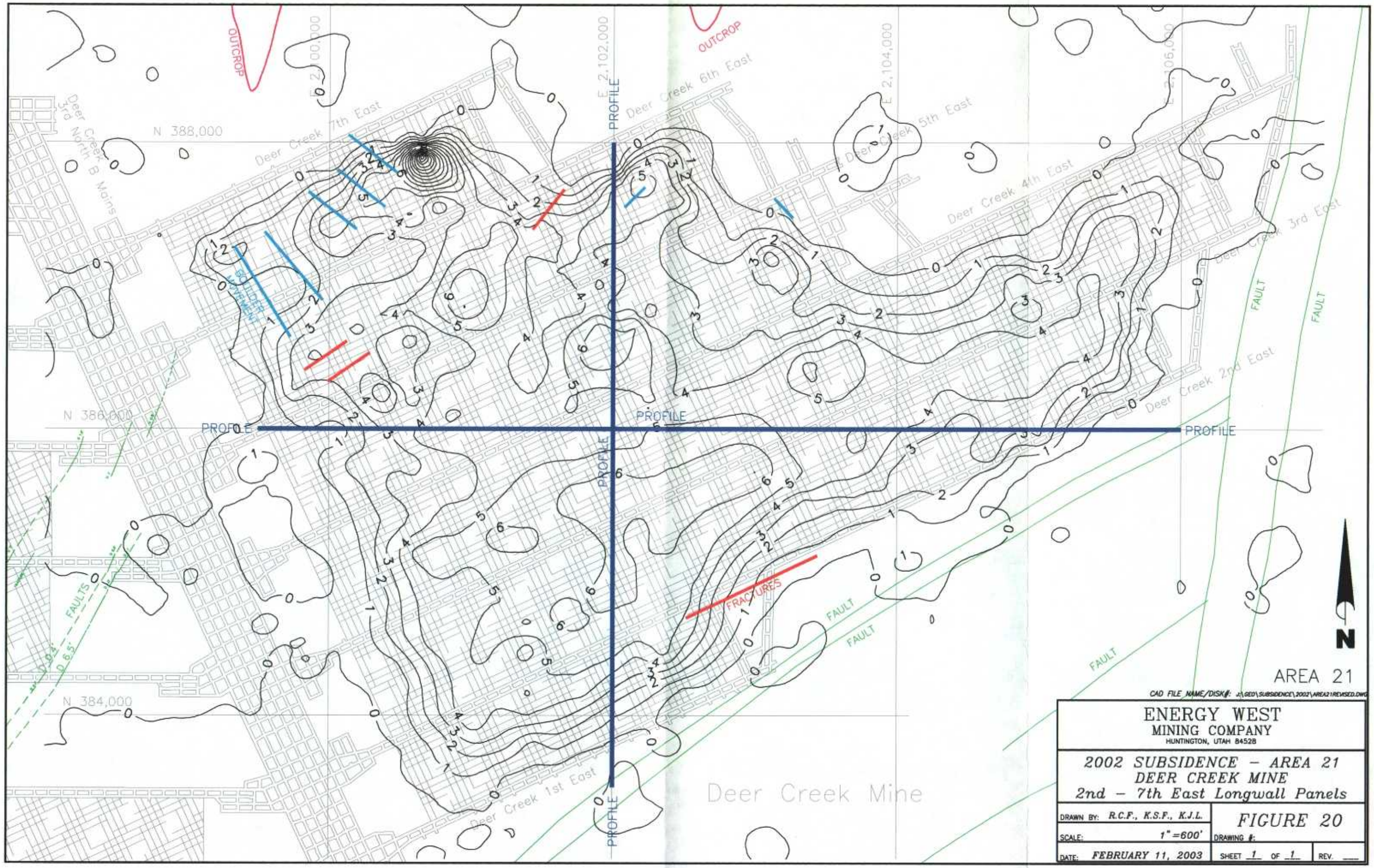
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528

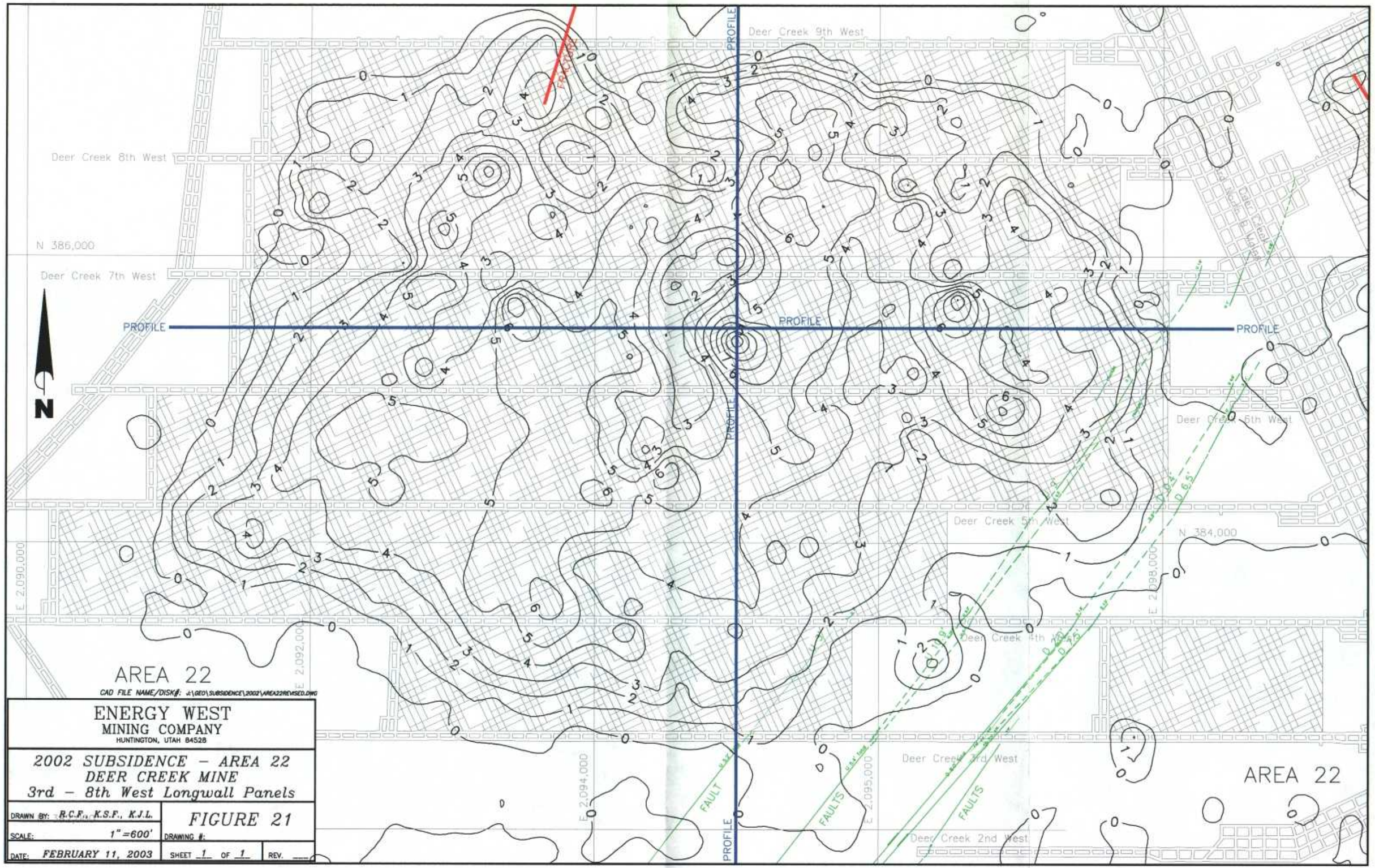
2002 SUBSIDENCE – AREA 18
DEER CREEK MINE
2nd – 7th Right Longwall Panels

DRAWN BY: *R.C.F., K.S.F., K.J.L.*	*FIGURE 17*
SCALE: *1"=500'*	DRAWING #:
DATE: *FEBRUARY 11, 2003*	SHEET 1 OF 1 REV.

OUTCROP
N 382,000
N 380,000
N 378,000
E 2,100,000
E 2,102,000
E 2,104,000
E 2,106,000
FAULT
FAULT
FAULT
FAULT
FAULT
Deer Creek 1st Left
Deer Creek 3rd North B Mains
Deer Creek 3rd North Mains
Deer Creek 9th East Breakouts
Deer Creek 8th East
Deer Creek 7th East
Deer Creek 6th East
PROFILE
PROFILE
PROFILE
N
N
AREA 19
CAD FILE NAME/DISK#: J:\GEO\SUBSIDENCE\2002\AREA19REVISED.DWG
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528
2002 SUBSIDENCE – AREA 19
DEER CREEK MINE
7th & 8th East Longwall Panels
DRAWN BY: R.C.F., K.S.F., K.J.L.
SCALE: 1" =500'
DATE: FEBRUARY 11, 2003
FIGURE 18
DRAWING #:
SHEET 1 OF 1
REV.


N 376,000
N 374,000
E 2,096,000
Deer Creek 1st West Mains
Deer Creek 1st Left
Deer Creek 2nd Left
Deer Creek 3rd Left
Deer Creek Main West
Deer Creek 17th Right
Deer Creek 4th South Mains
Deer Creek 3rd North Mains
Deer Creek Main East
Deer Creek 3.5 South
Deer Creek Mine
PROFILE
PROFILE
PROFILE
N
AREA 20
CAD FILE NAME/DISK#: J:\GED\SUBSIDENCE\2002\AREA20REVISED.DWG
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528
2002 SUBSIDENCE - AREA 20
DEER CREEK MINE
1st & 2nd Left Longwall Panels
DRAWN BY: R.C.F., K.S.F., K.J.L.
SCALE: 1" =500'
DATE: FEBRUARY 11, 2003
FIGURE 19
DRAWING #:
SHEET 1 OF 1
REV.


OUTCROP
OUTCROP
E 2,100,000
E 2,102,000
E 2,104,000
E 2,106,000
N 388,000
N 386,000
N 384,000
Deer Creek 7th East
Deer Creek 6th East
Deer Creek 5th East
Deer Creek 4th East
Deer Creek 3rd East
Deer Creek 2nd East
Deer Creek 1st East
Deer Creek 3rd North B Mains
BOULDER BOTTLENECK
PROFILE
PROFILE
PROFILE
PROFILE
PROFILE
FRACTURES
FAULT
FAULT
FAULT
FAULT
FAULT
FAULTS
D 9.4'
D 6.5'
Deer Creek Mine
N
AREA 21
CAD FILE NAME/DISK#: J:\GEO\SUBSIDENCE\2002\AREA21REVISED.DWG
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528
2002 SUBSIDENCE – AREA 21
DEER CREEK MINE
2nd – 7th East Longwall Panels
DRAWN BY: R.C.F., K.S.F., K.J.L.
SCALE: 1"=600'
DATE: FEBRUARY 11, 2003
FIGURE 20
DRAWING #:
SHEET 1 OF 1
REV.

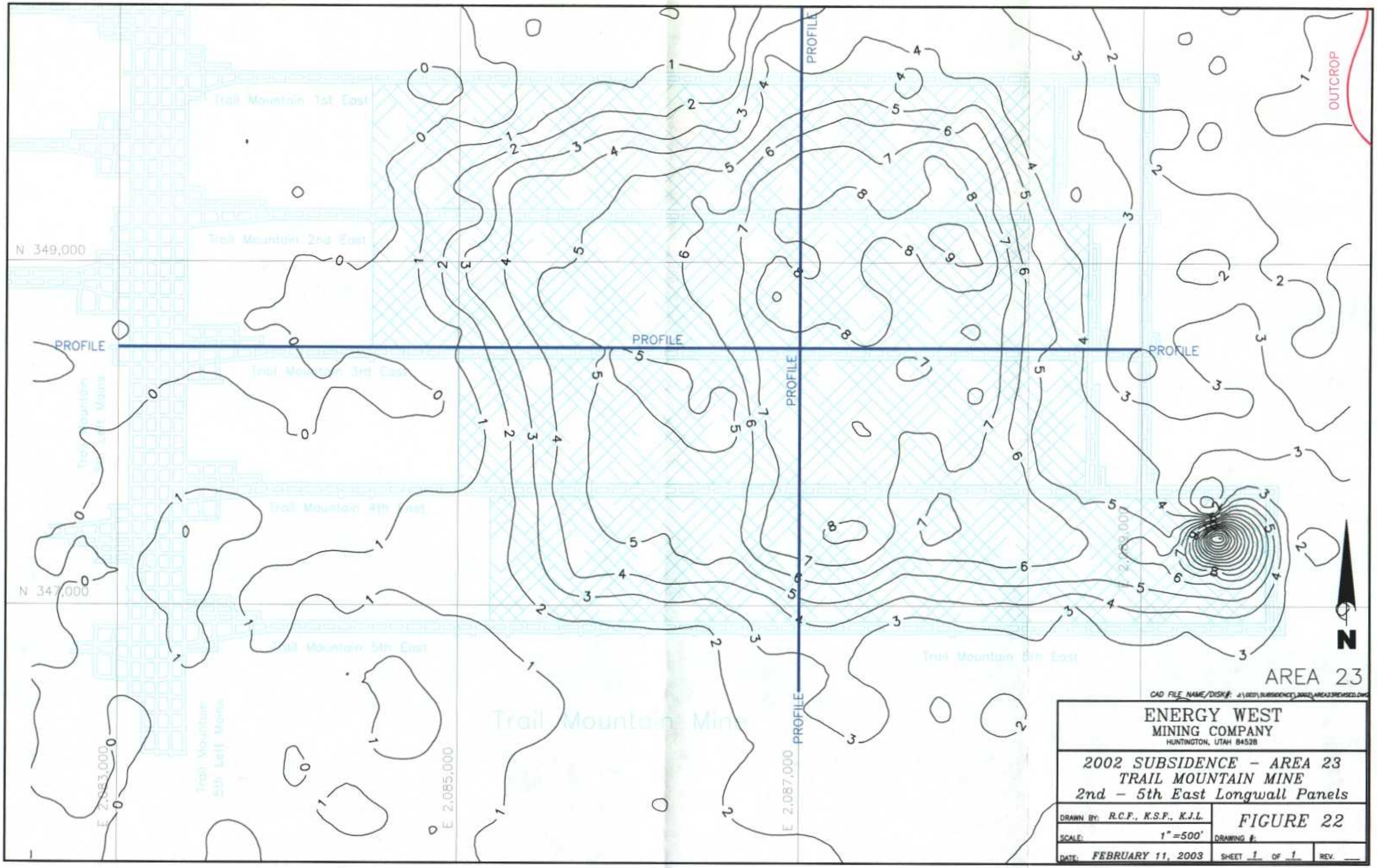


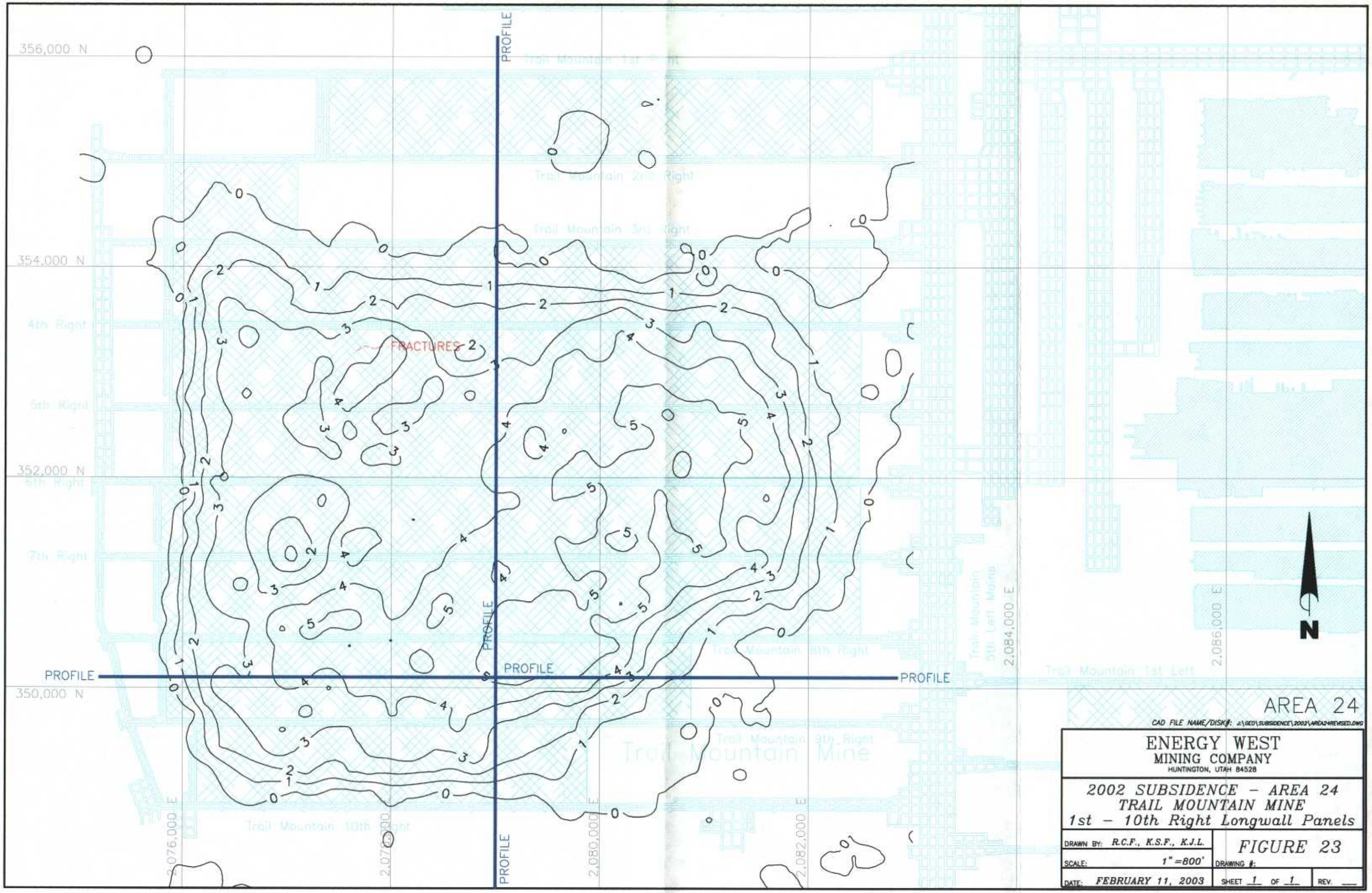
CAD FILE NAME/DISK#: J:\GEO\SUBSIDENCE\2002\AREA22REVISED.DWG

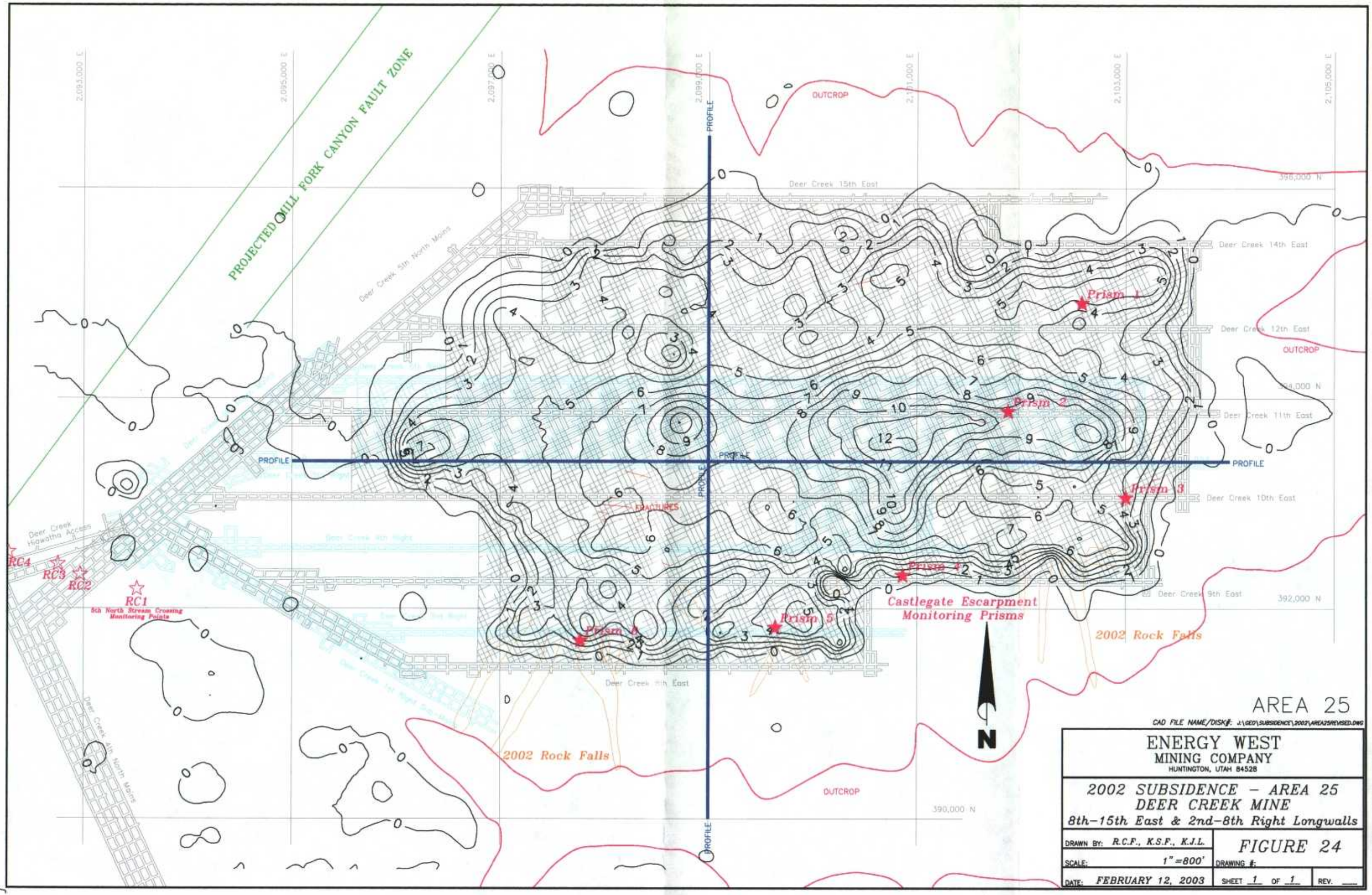
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528

2002 SUBSIDENCE – AREA 22
DEER CREEK MINE
3rd – 8th West Longwall Panels

DRAWN BY: B.C.F., K.S.F., K.J.L.	FIGURE 21
SCALE: 1"=600'	DRAWING #:
DATE: FEBRUARY 11, 2003	SHEET 1 OF 1 REV. —


PROFILE
PROFILE
PROFILE
PROFILE
PROFILE
PROFILE
OUTCROP
N 349,000
N 347,000
E 2,083,000
E 2,085,000
E 2,087,000
E 2,089,000
Trail Mountain 1st East
Trail Mountain 2nd East
Trail Mountain 3rd East
Trail Mountain 4th East
Trail Mountain 5th East
Trail Mountain 5th Left Mains
Trail Mountain Mine
N
AREA 23
CAD FILE NAME/DISK#: J:\0021\SUBSIDENCE\2002\AREA23REVISED.DWG
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528
2002 SUBSIDENCE - AREA 23
TRAIL MOUNTAIN MINE
2nd - 5th East Longwall Panels
DRAWN BY: R.C.F., K.S.F., K.J.L.
SCALE: 1"=500'
DATE: FEBRUARY 11, 2003
FIGURE 22
DRAWING #:
SHEET 1 OF 1
REV.


356,000 N
354,000 N
352,000 N
350,000 N
PROFILE
PROFILE
PROFILE
PROFILE
PROFILE
FRACTURES
Trail Mountain 1st Right
Trail Mountain 2nd Right
Trail Mountain 3rd Right
4th Right
5th Right
6th Right
7th Right
Trail Mountain 4th Right
Trail Mountain 5th Right
Trail Mountain 1st Left
Trail Mountain 10th Right
Trail Mountain Mine
2,076,000 E
2,078,000 E
2,080,000 E
2,082,000 E
2,084,000 E
2,086,000 E
N
AREA 24
CAD FILE NAME/DISK#: J:\GEO\SUBSIDENCE\2002\AREA24REVISED.DWG
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528
2002 SUBSIDENCE – AREA 24
TRAIL MOUNTAIN MINE
1st – 10th Right Longwall Panels
DRAWN BY: R.C.F., K.S.F., K.J.L.
SCALE: 1" =800'
DATE: FEBRUARY 11, 2003
FIGURE 23
DRAWING #:
SHEET 1 OF 1
REV.



AREA 25

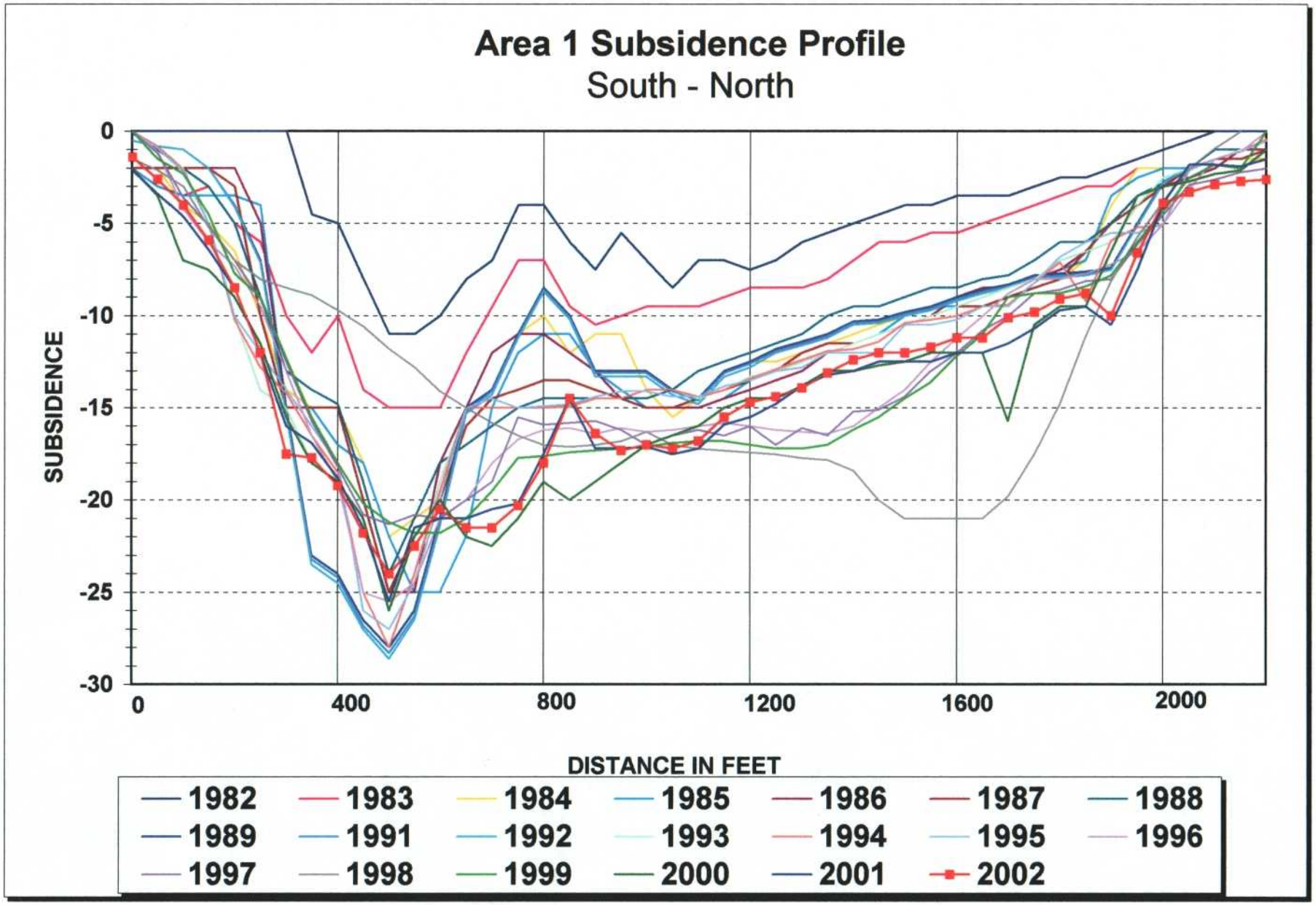
CAD FILE NAME/DISK#: J:\GEO\SUBSIDENCE\2003\AREA25REVISED.DWG

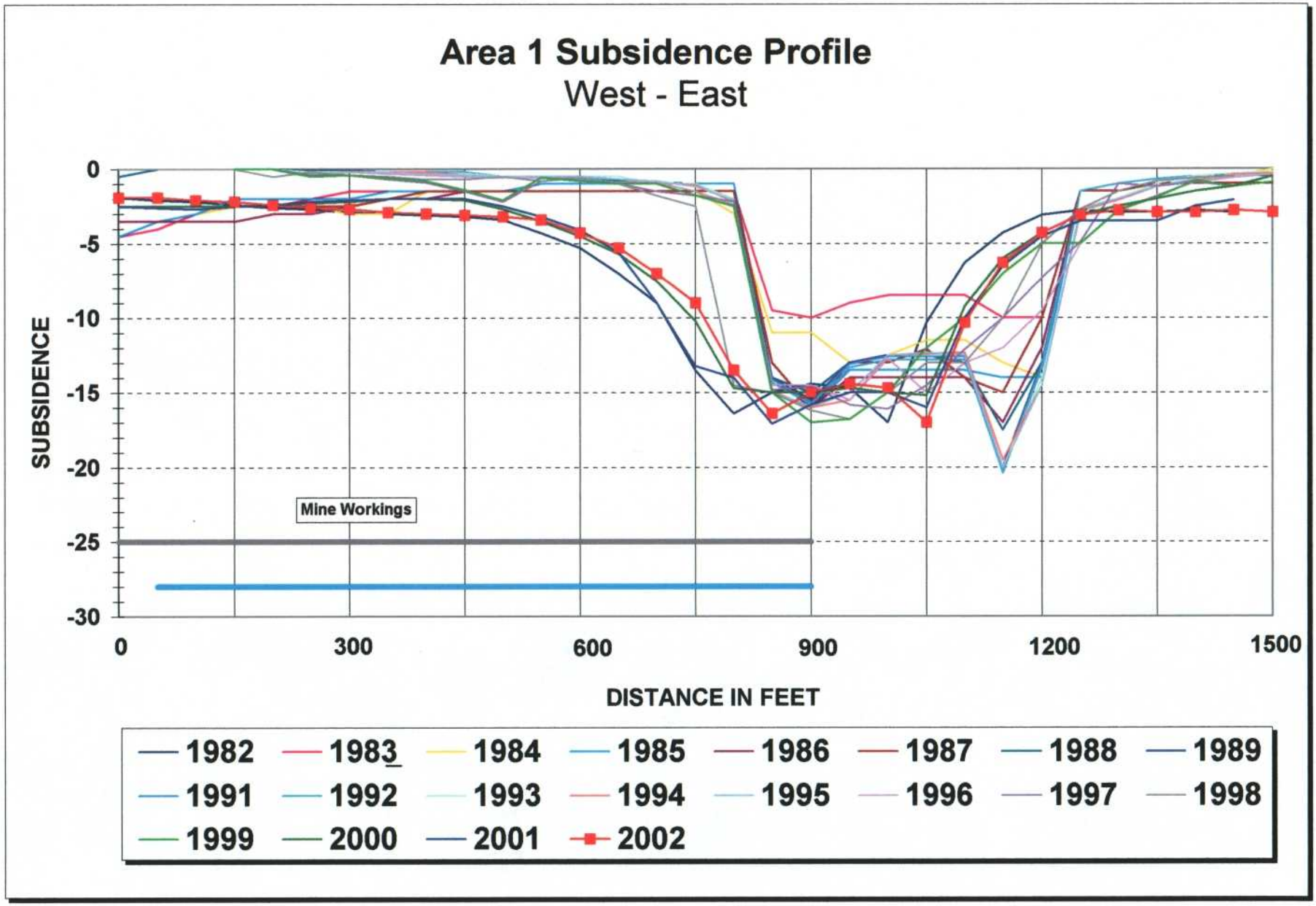
ENERGY WEST
MINING COMPANY
HUNTINGTON, UTAH 84528

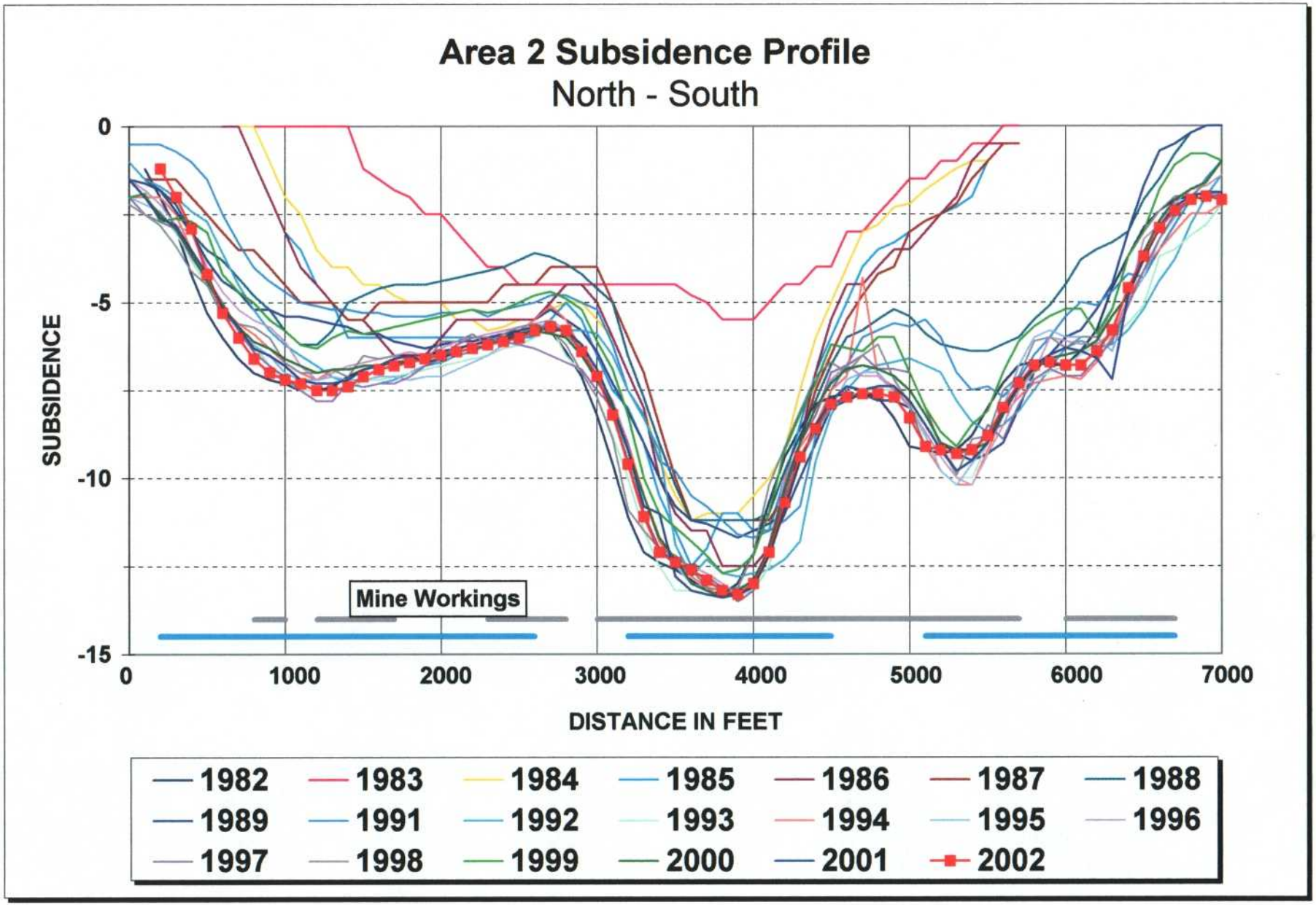
2002 SUBSIDENCE – AREA 25
DEER CREEK MINE
8th–15th East & 2nd–8th Right Longwalls

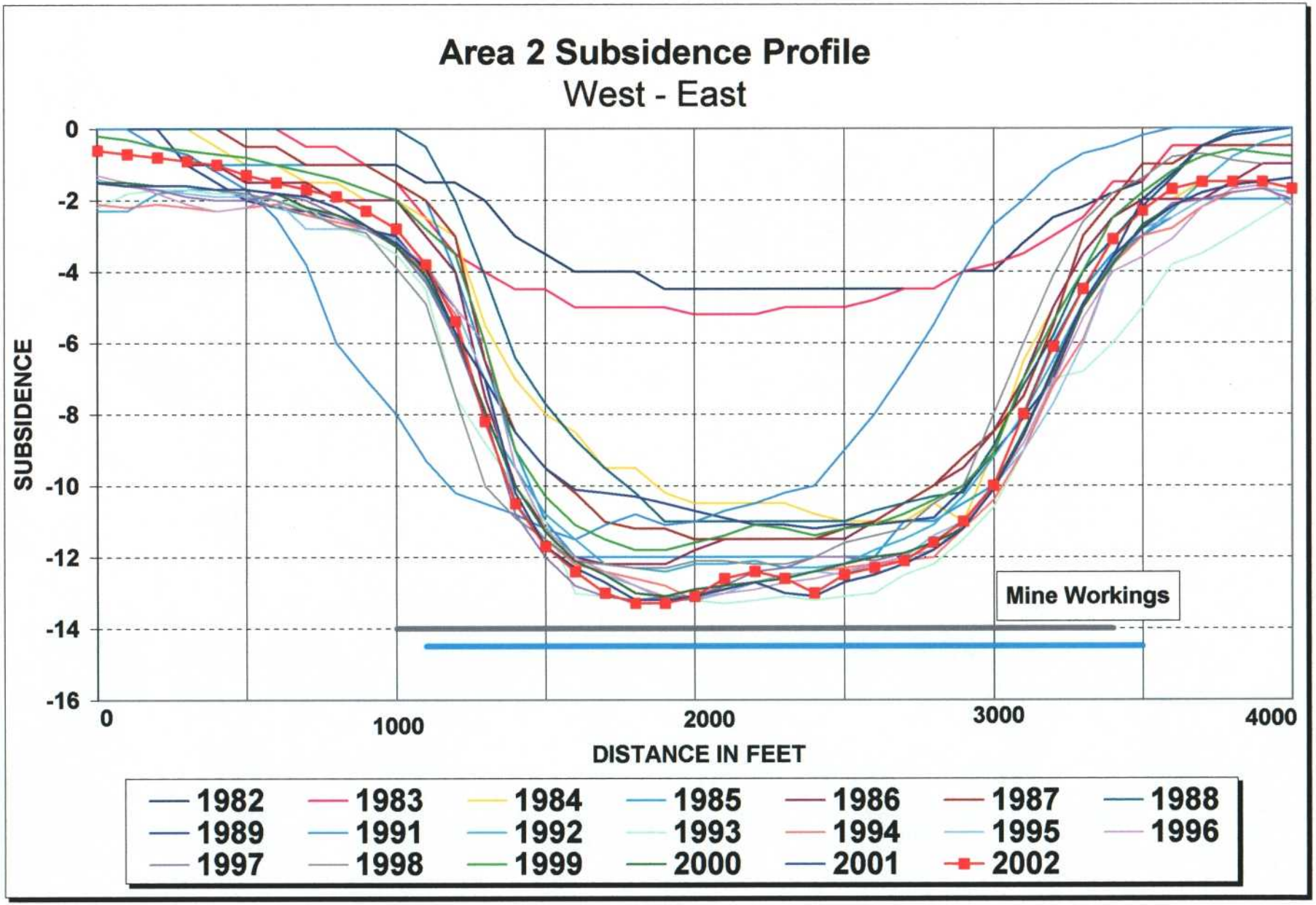
DRAWN BY: R.C.F., K.S.F., K.J.L.	FIGURE 24	
SCALE: 1"=800'	DRAWING #:	
DATE: FEBRUARY 12, 2003	SHEET 1 OF 1	REV.

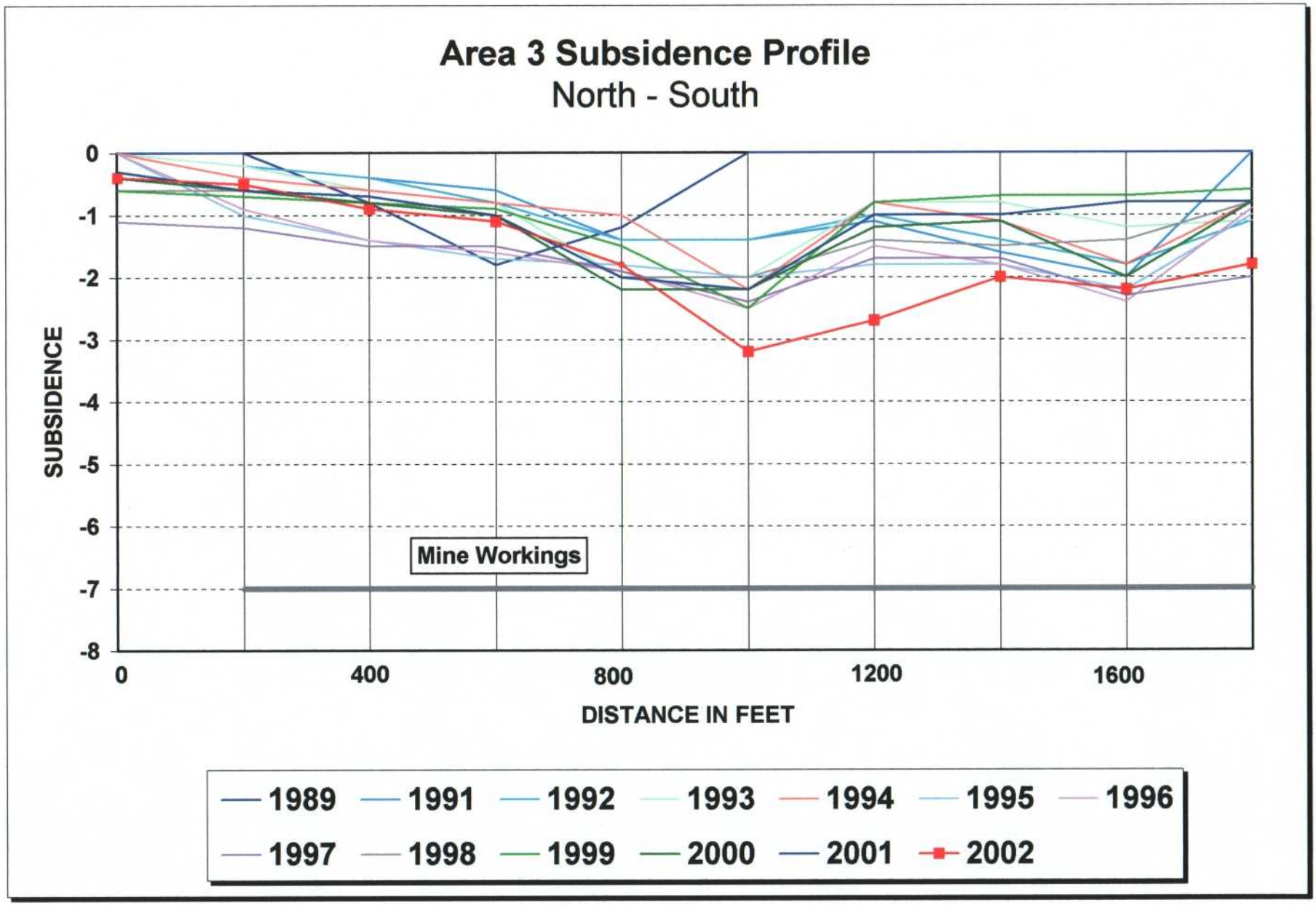
AREA SUBSIDENCE PROFILES

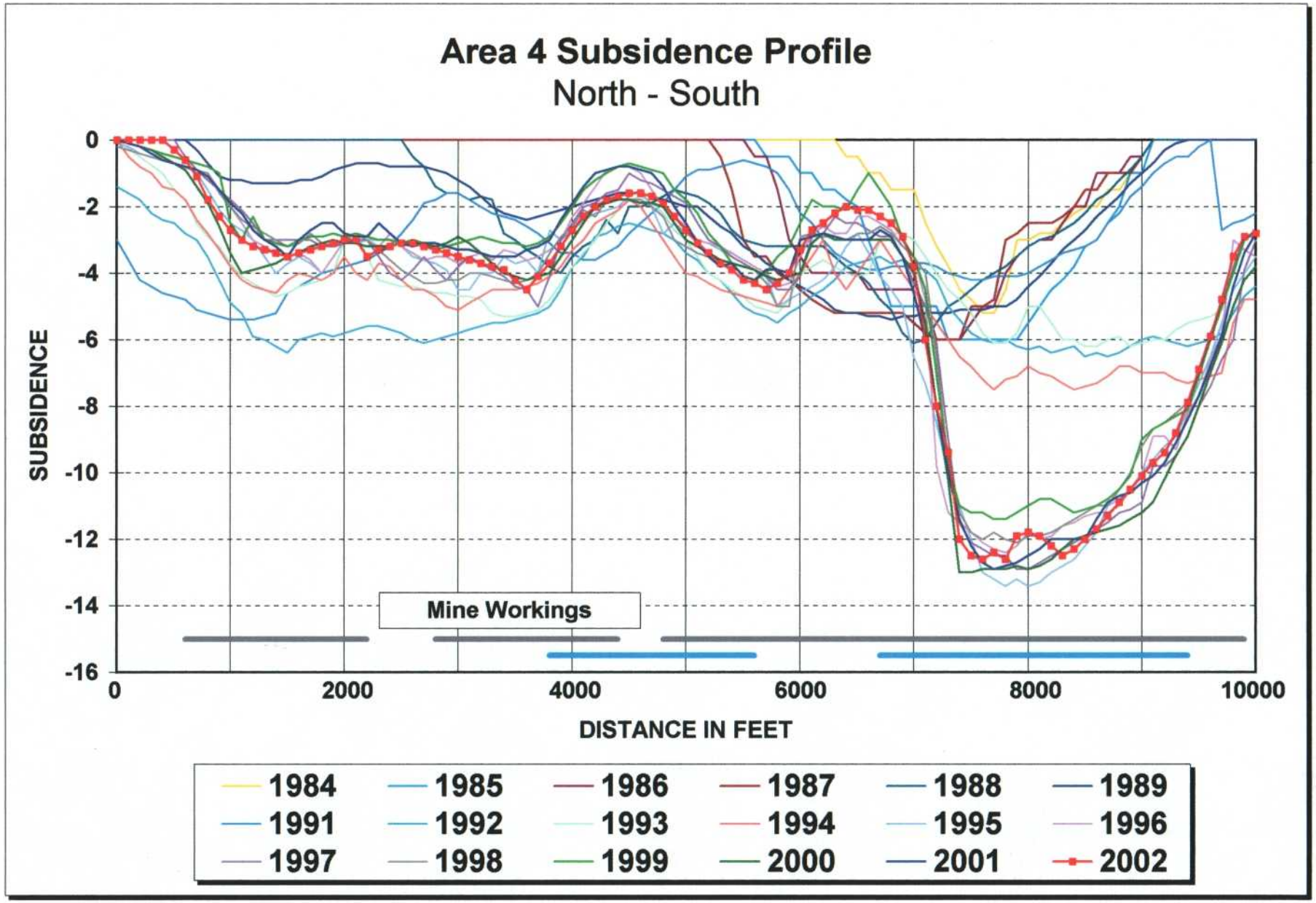

Area 1 Subsidence Profile
South - North
SUBSIDENCE
0
-5
-10
-15
-20
-25
-30
0
400
800
1200
1600
2000
DISTANCE IN FEET
1982
1983
1984
1985
1986
1987
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

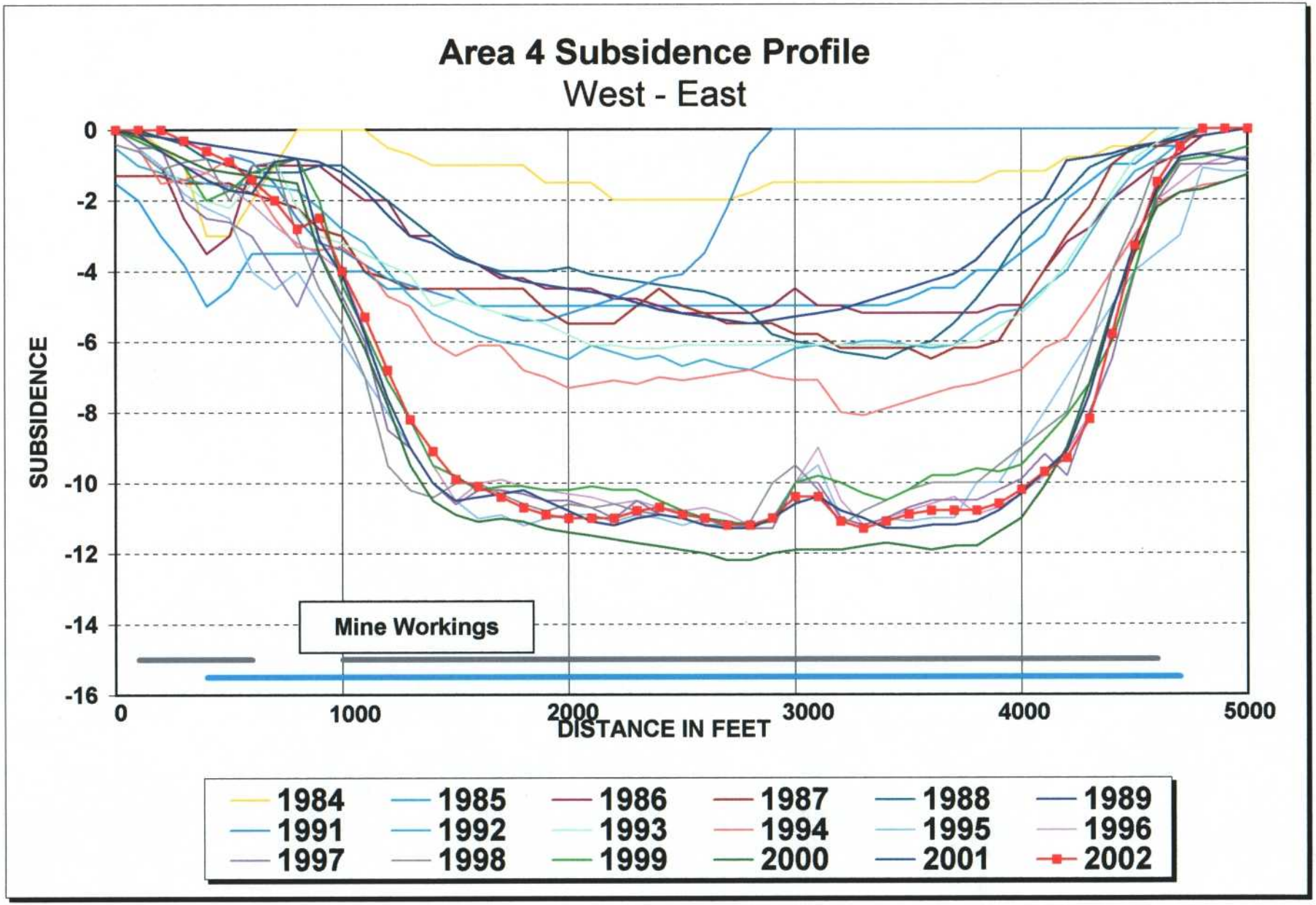

Area 1 Subsidence Profile
West - East
SUBSIDENCE
0
-5
-10
-15
-20
-25
-30
Mine Workings
0
300
600
900
1200
1500
DISTANCE IN FEET
1982
1983
1984
1985
1986
1987
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

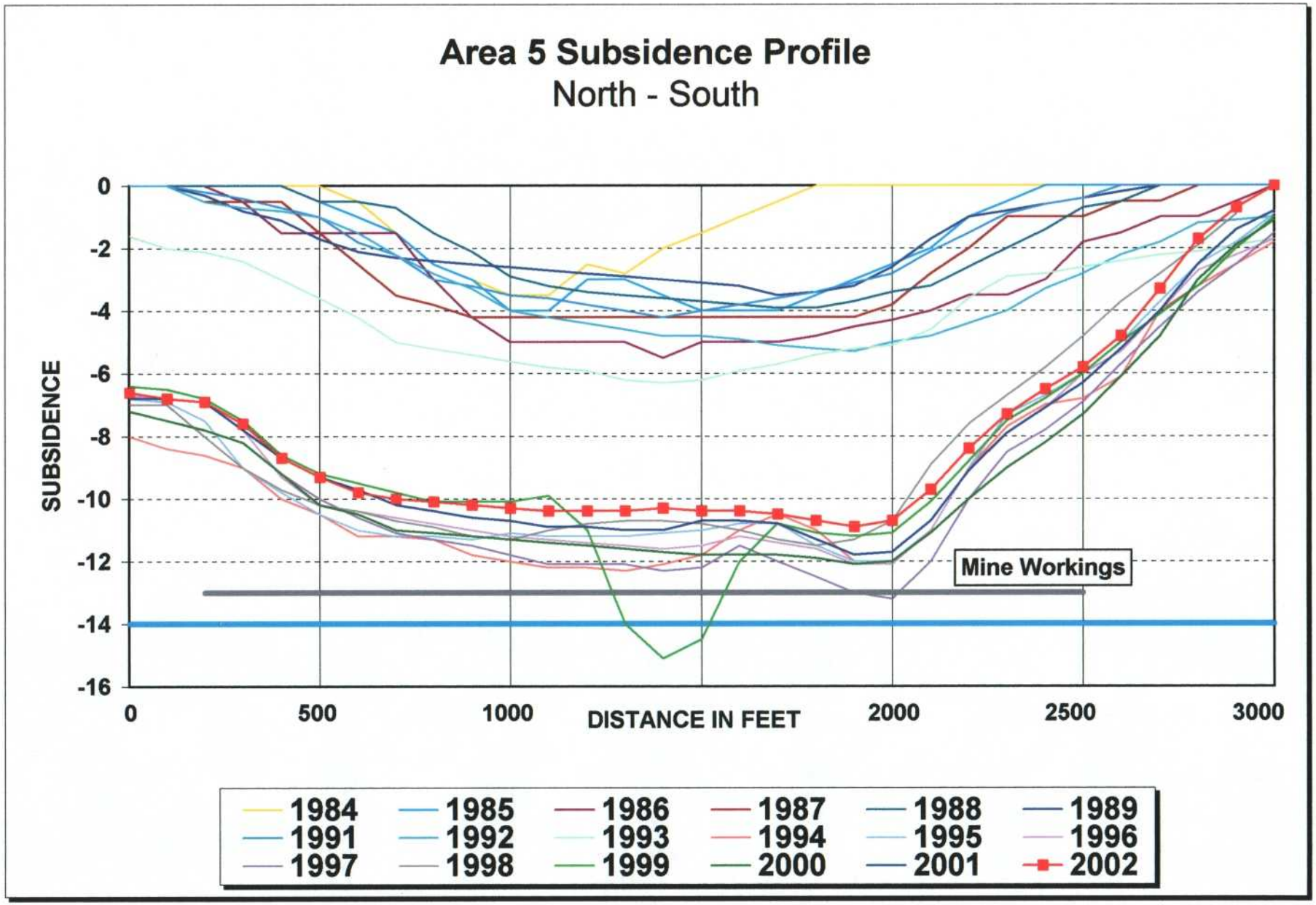

Area 2 Subsidence Profile
North - South
SUBSIDENCE
0
-5
-10
-15
0
1000
2000
3000
4000
5000
6000
7000
DISTANCE IN FEET
Mine Workings
1982
1983
1984
1985
1986
1987
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

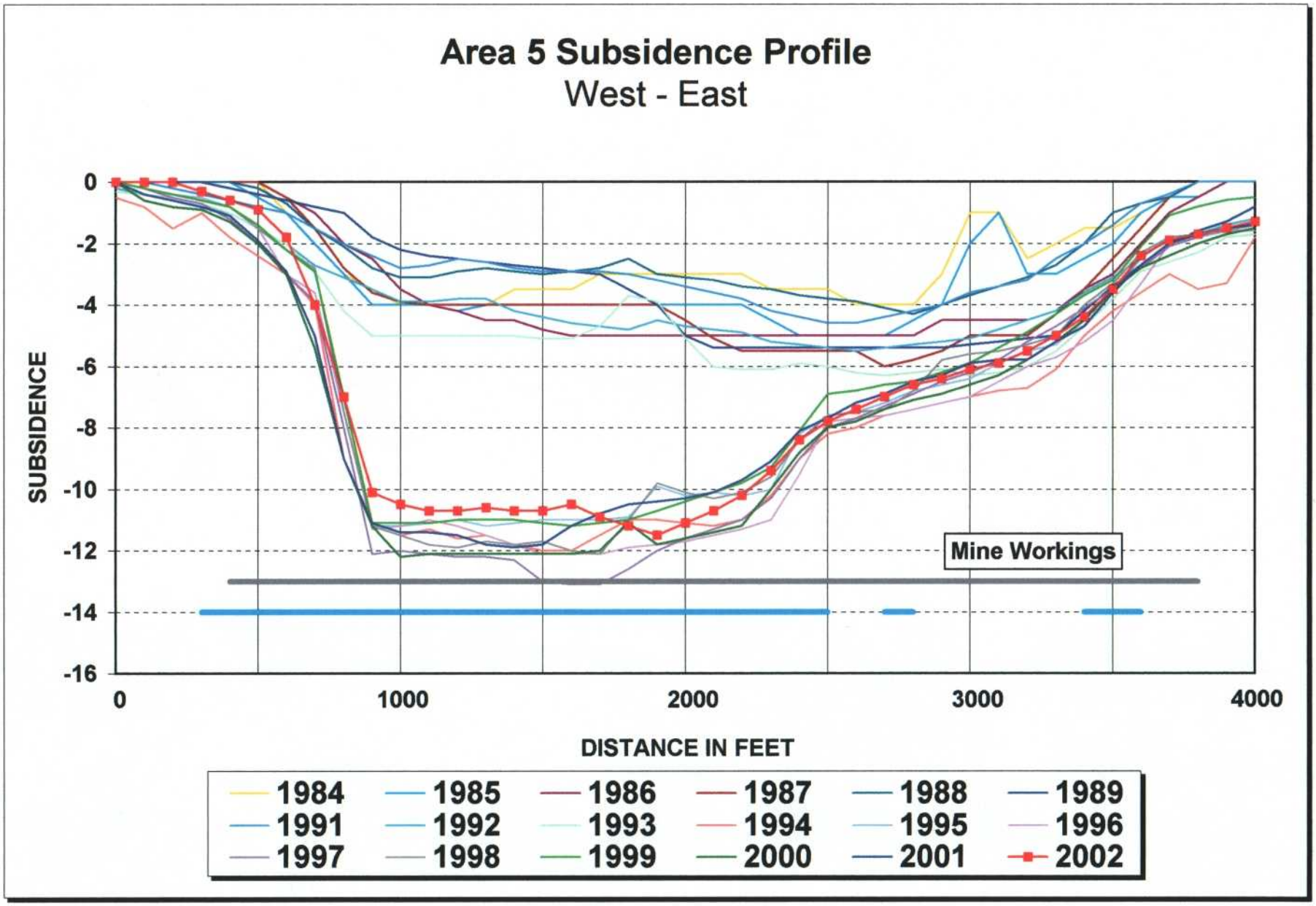

Area 2 Subsidence Profile
West - East
SUBSIDENCE
0
-2
-4
-6
-8
-10
-12
-14
-16
0
1000
2000
3000
4000
DISTANCE IN FEET
Mine Workings
1982
1983
1984
1985
1986
1987
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

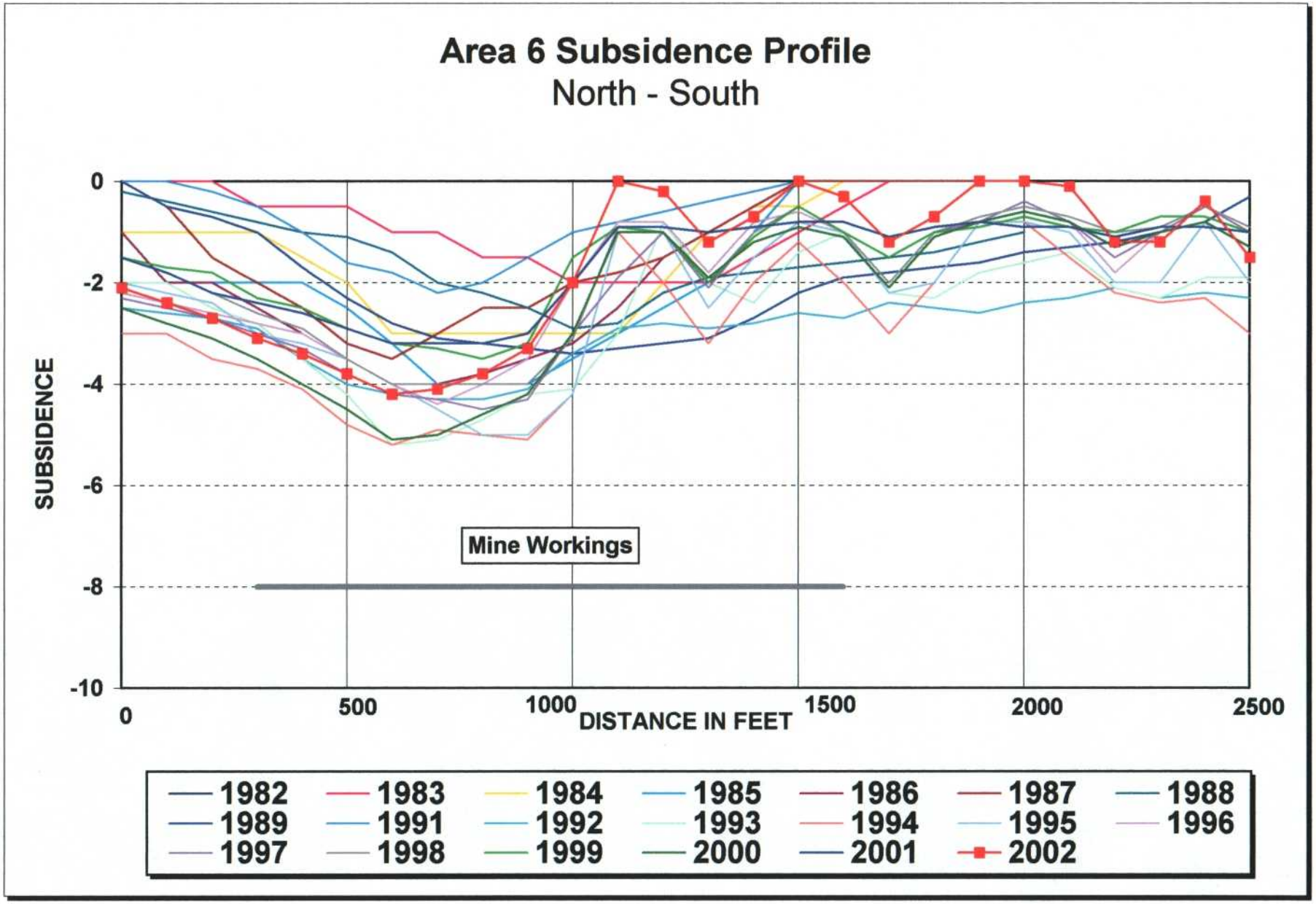

Area 3 Subsidence Profile
North - South
SUBSIDENCE
0
-1
-2
-3
-4
-5
-6
-7
-8
Mine Workings
0
400
800
1200
1600
DISTANCE IN FEET
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

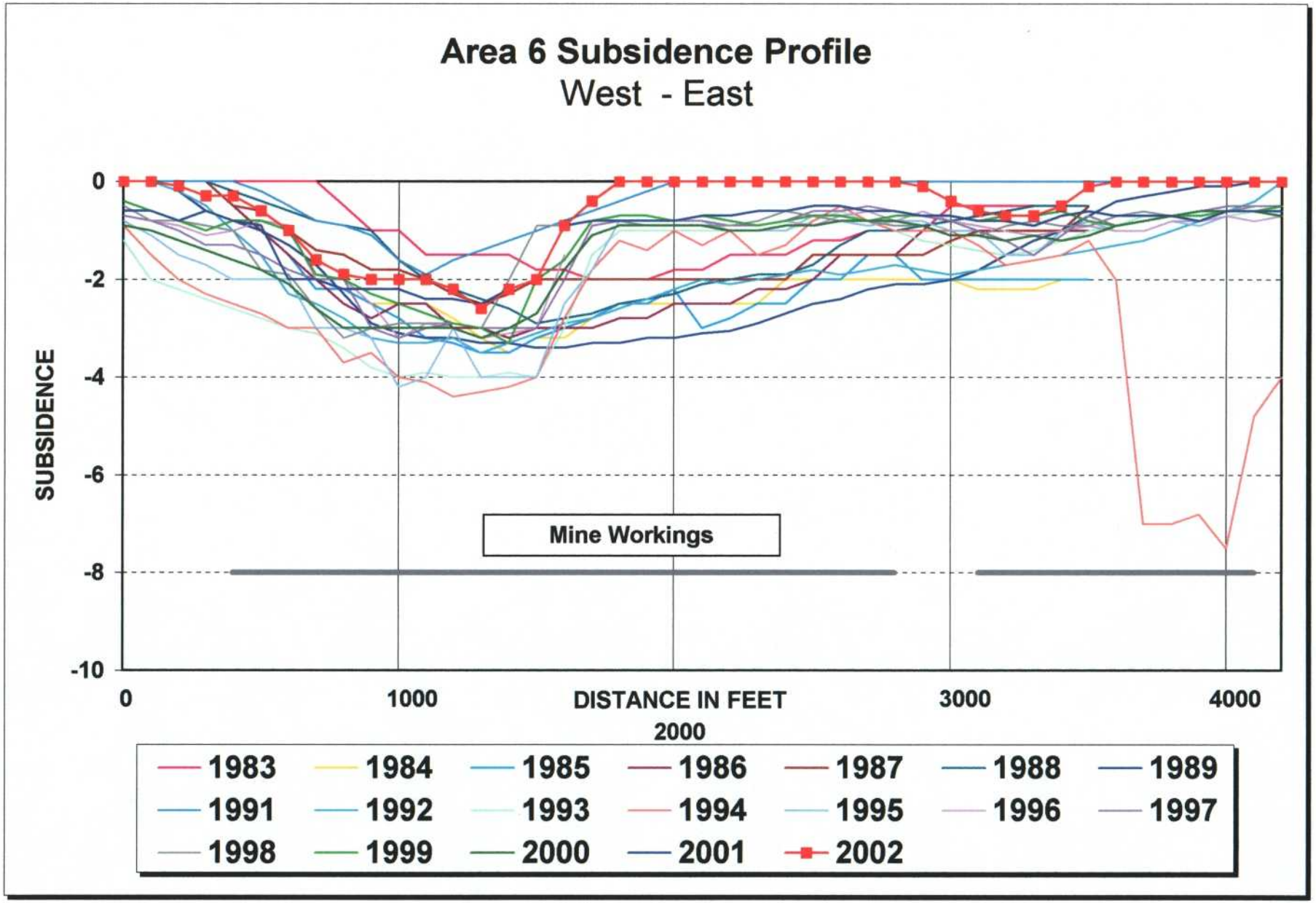

Area 4 Subsidence Profile
North - South
SUBSIDENCE
0
-2
-4
-6
-8
-10
-12
-14
-16
0
2000
4000
6000
8000
10000
DISTANCE IN FEET
Mine Workings
1984
1985
1986
1987
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

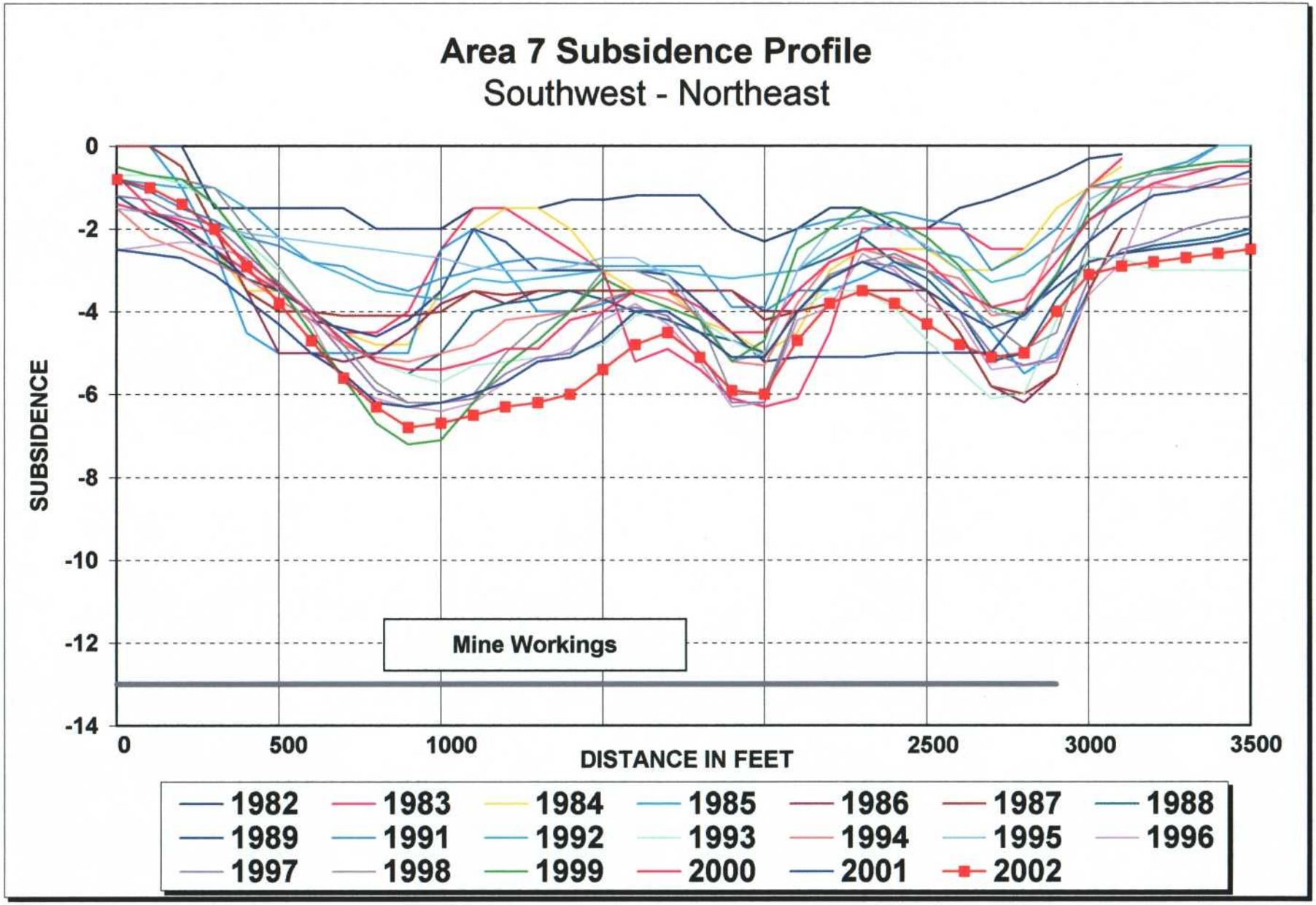

Area 4 Subsidence Profile
West - East
SUBSIDENCE
0
-2
-4
-6
-8
-10
-12
-14
-16
0
1000
2000
3000
4000
5000
DISTANCE IN FEET
Mine Workings
1984
1985
1986
1987
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

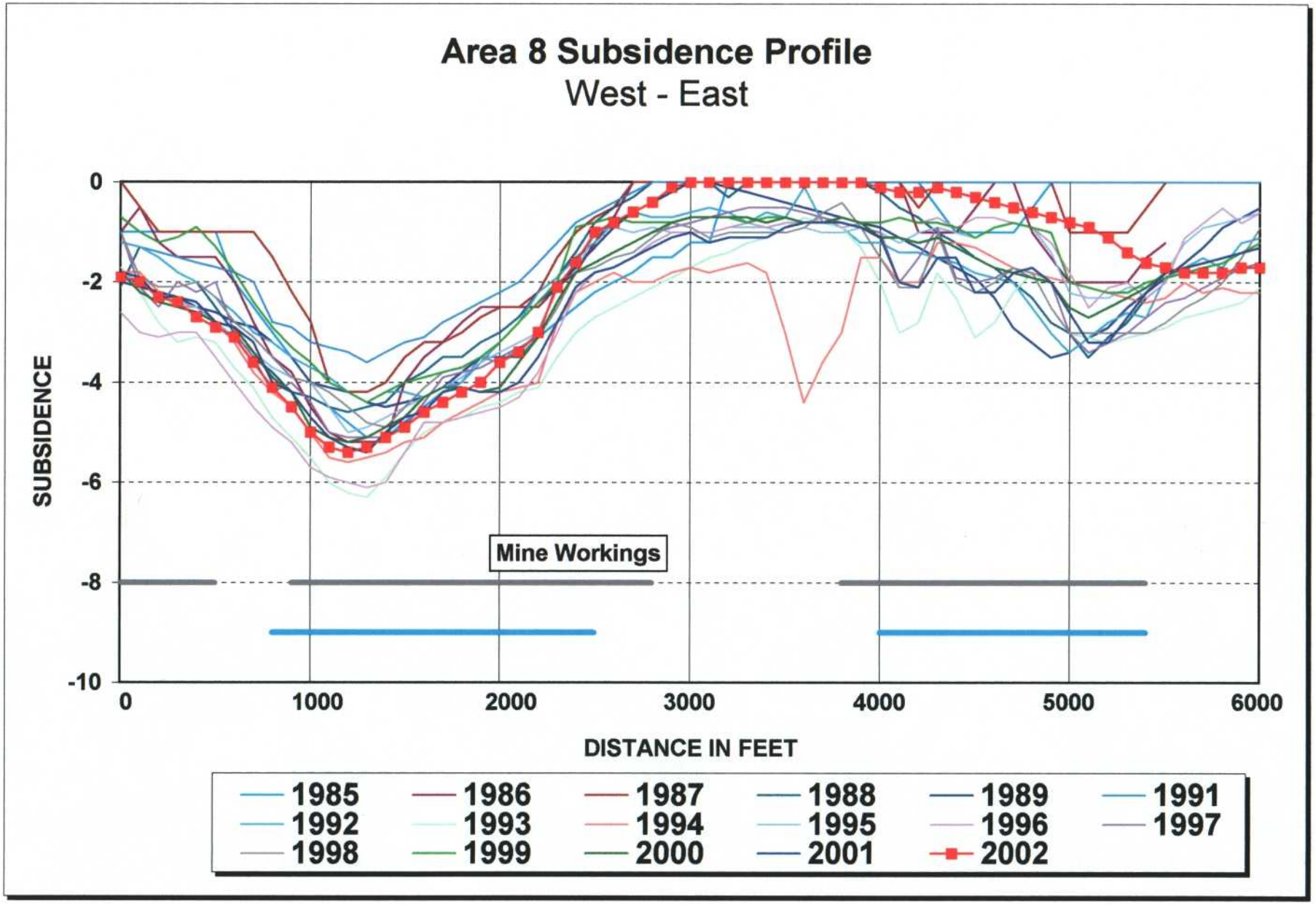

Area 5 Subsidence Profile
North - South
SUBSIDENCE
0
-2
-4
-6
-8
-10
-12
-14
-16
0
500
1000
DISTANCE IN FEET
2000
2500
3000
Mine Workings
1984
1985
1986
1987
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

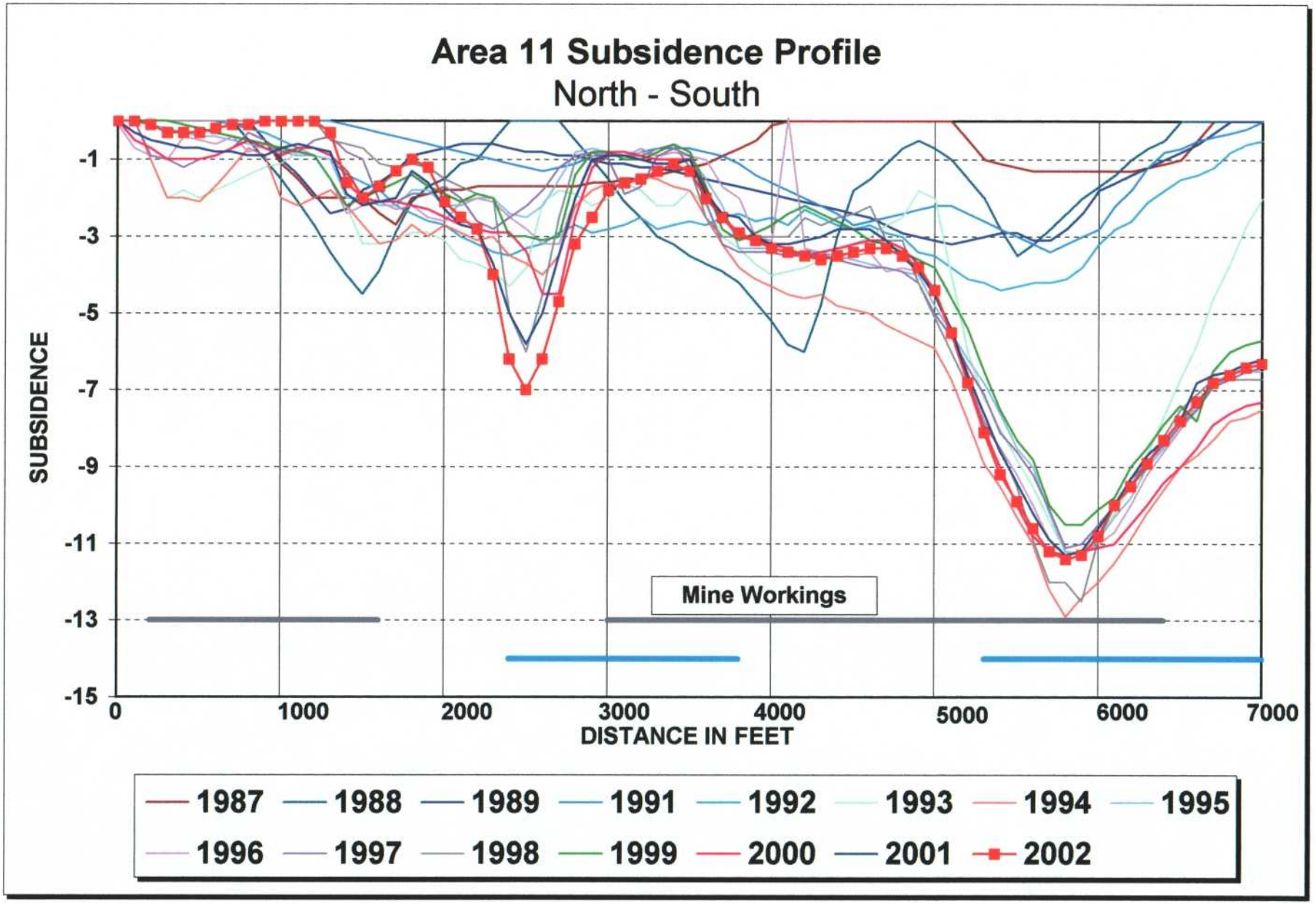

Area 5 Subsidence Profile
West - East
SUBSIDENCE
0
-2
-4
-6
-8
-10
-12
-14
-16
0
1000
2000
3000
4000
DISTANCE IN FEET
Mine Workings
1984
1985
1986
1987
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

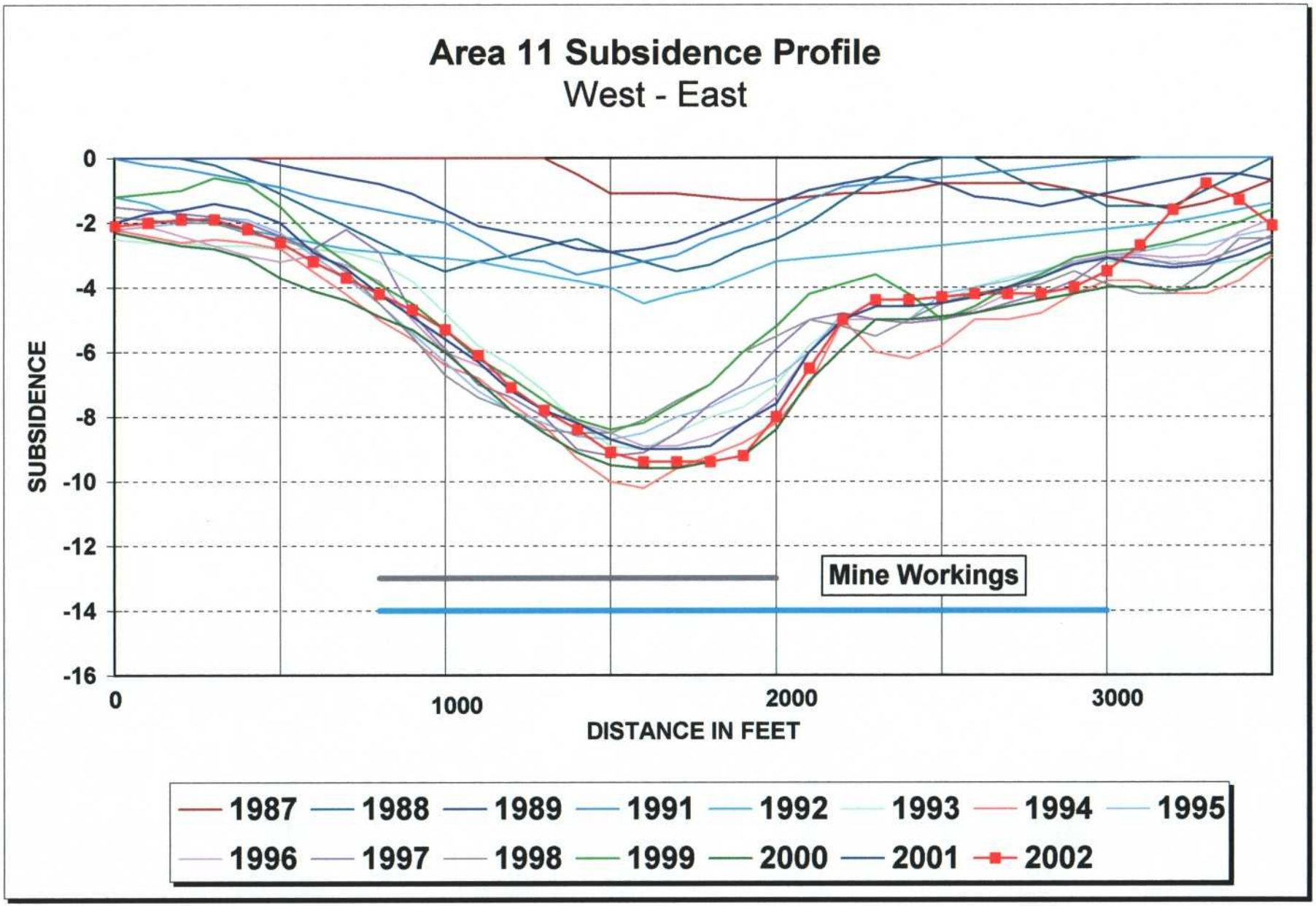

Area 6 Subsidence Profile
North - South
SUBSIDENCE
0
-2
-4
-6
-8
-10
0
500
1000
1500
2000
2500
DISTANCE IN FEET
Mine Workings
1982
1983
1984
1985
1986
1987
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

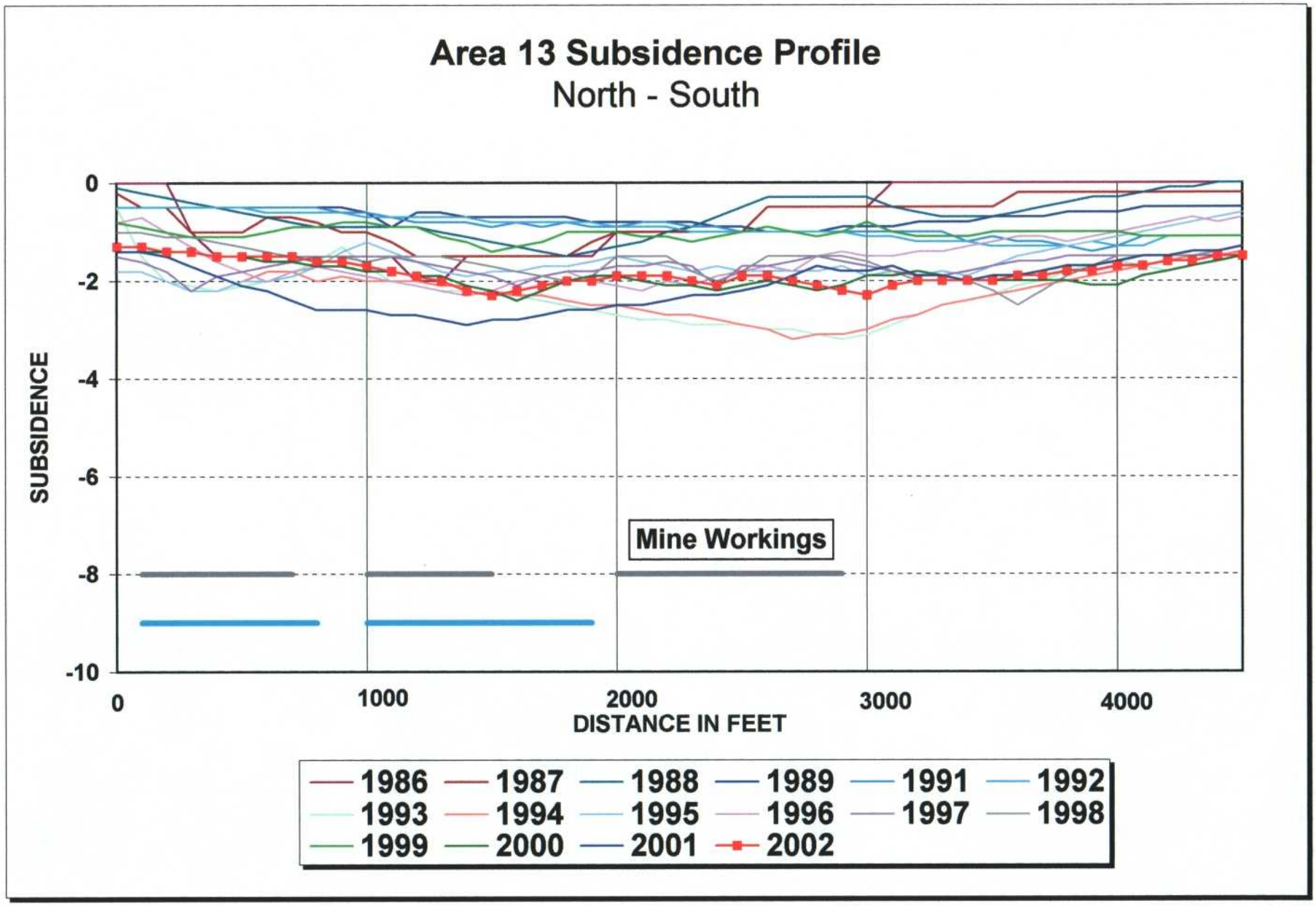

Area 6 Subsidence Profile
West - East
SUBSIDENCE
0
-2
-4
-6
-8
-10
Mine Workings
0
1000
2000
3000
4000
DISTANCE IN FEET
1983
1984
1985
1986
1987
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

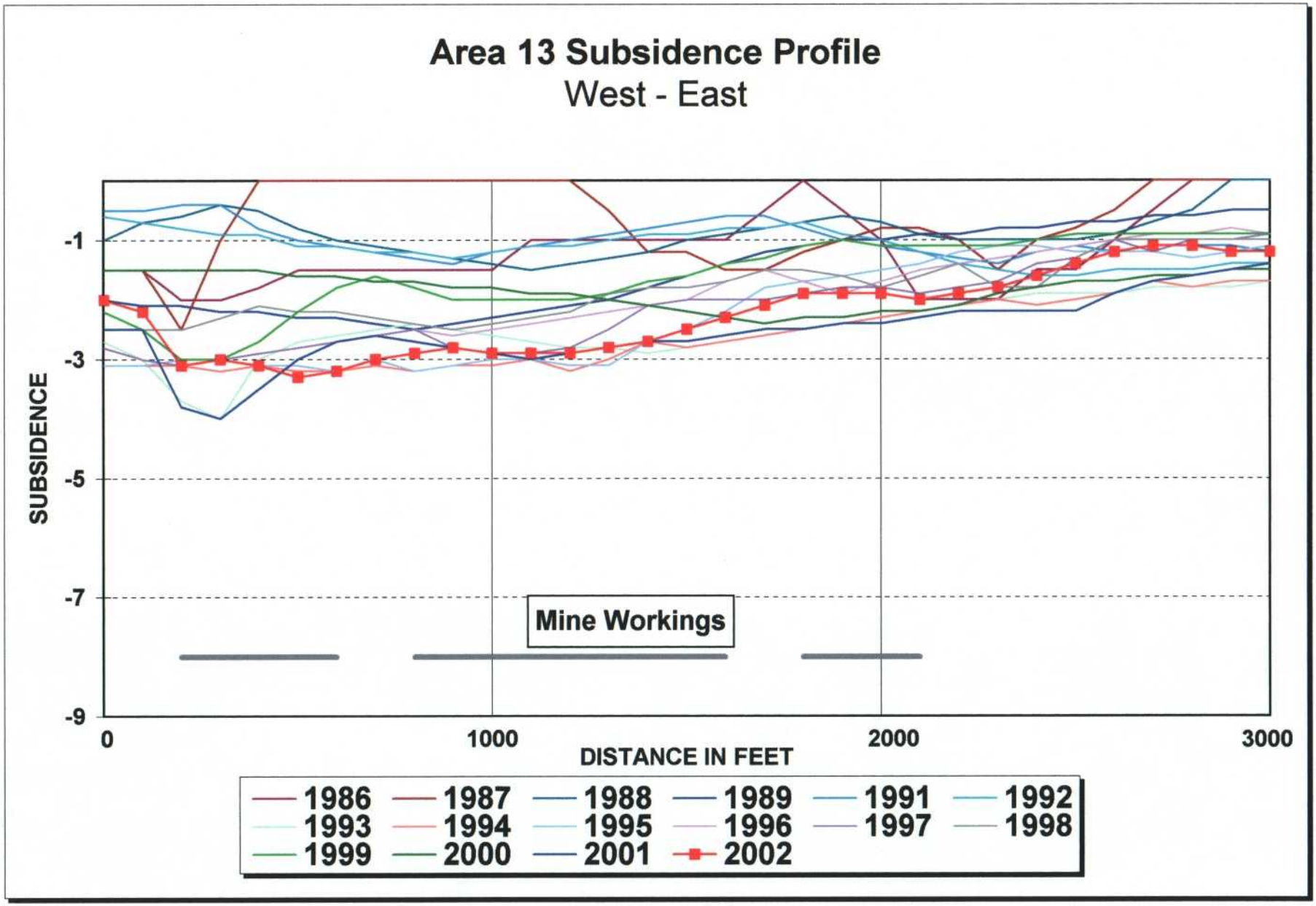

Area 7 Subsidence Profile
Southwest - Northeast
SUBSIDENCE
0
-2
-4
-6
-8
-10
-12
-14
0
500
1000
2500
3000
3500
DISTANCE IN FEET
Mine Workings
1982
1983
1984
1985
1986
1987
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

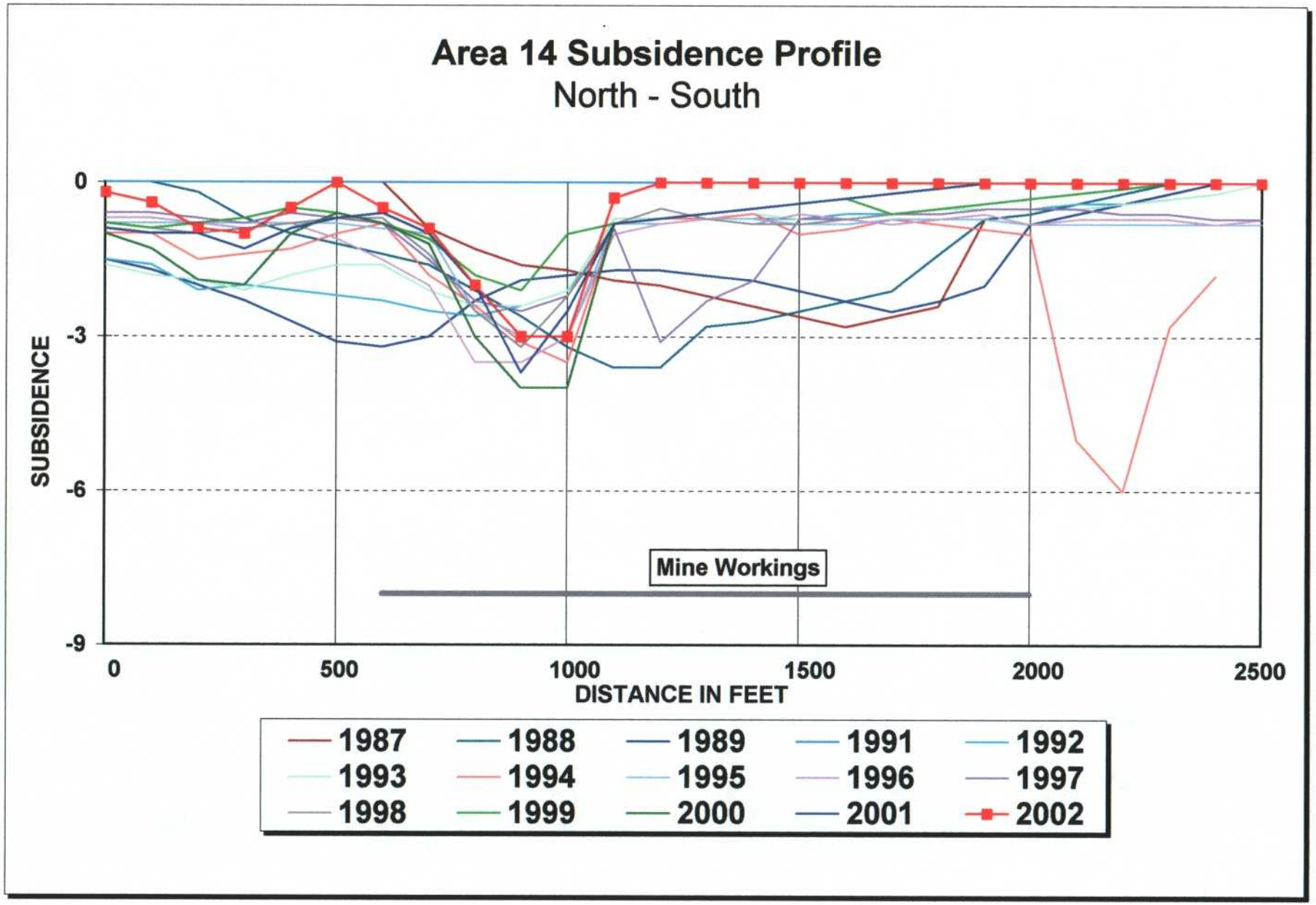

Area 8 Subsidence Profile
West - East
SUBSIDENCE
0
-2
-4
-6
-8
-10
0
1000
2000
3000
4000
5000
6000
DISTANCE IN FEET
Mine Workings
1985
1986
1987
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

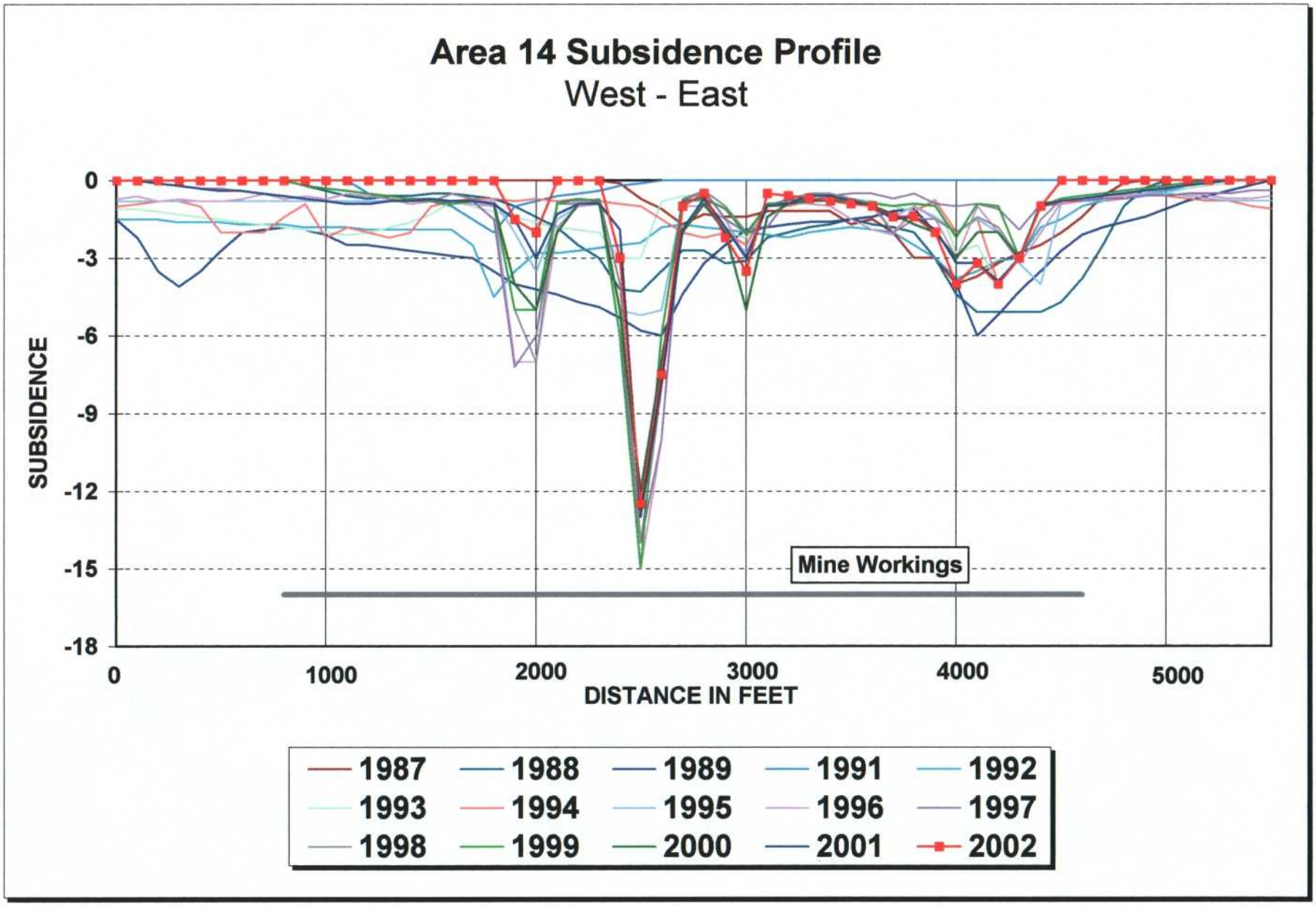

Area 11 Subsidence Profile
North - South
SUBSIDENCE
-1
-3
-5
-7
-9
-11
-13
-15
0
1000
2000
3000
4000
5000
6000
7000
DISTANCE IN FEET
Mine Workings
1987
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

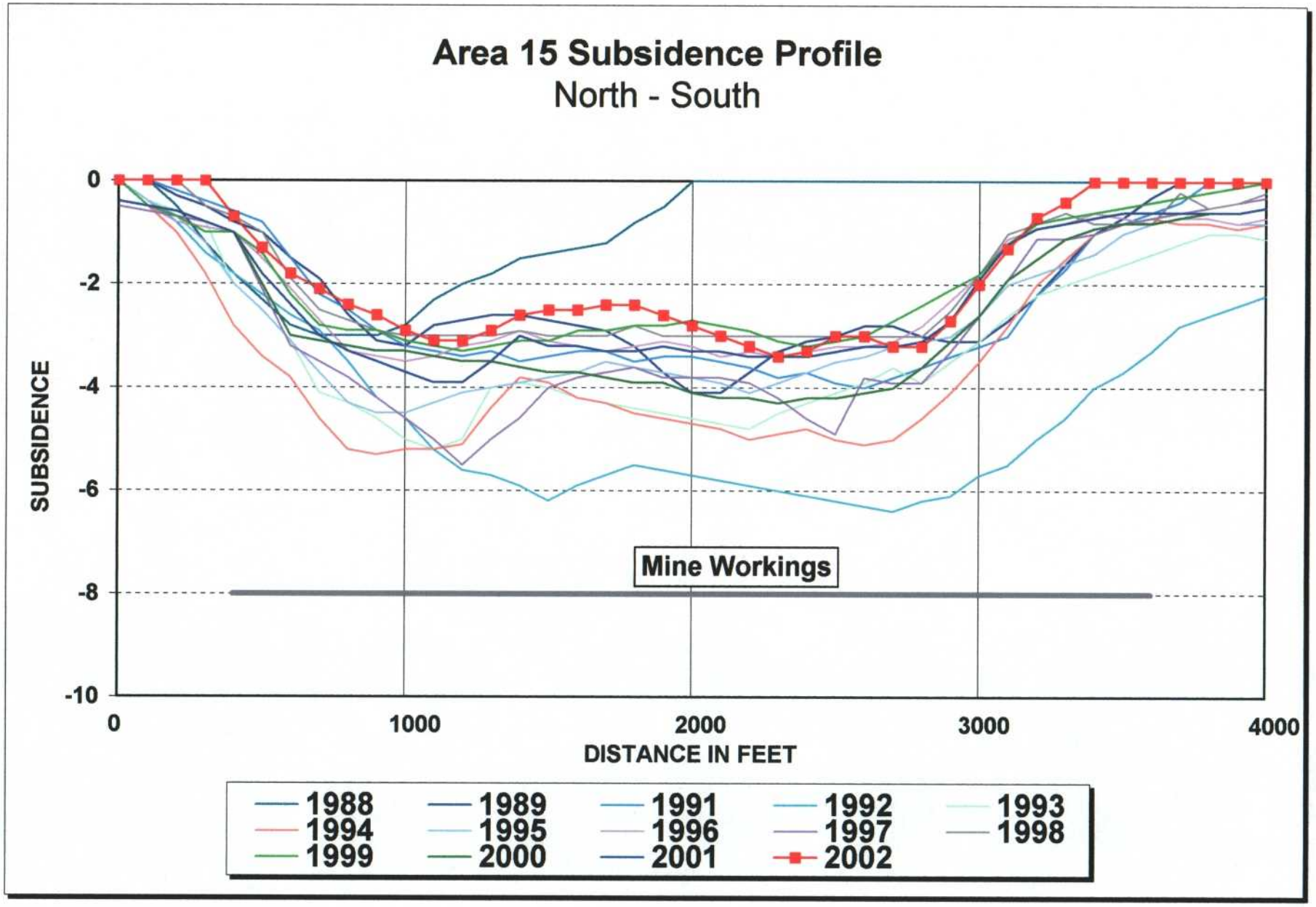

Area 11 Subsidence Profile
West - East
SUBSIDENCE
0
-2
-4
-6
-8
-10
-12
-14
-16
0
1000
2000
3000
DISTANCE IN FEET
Mine Workings
1987
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

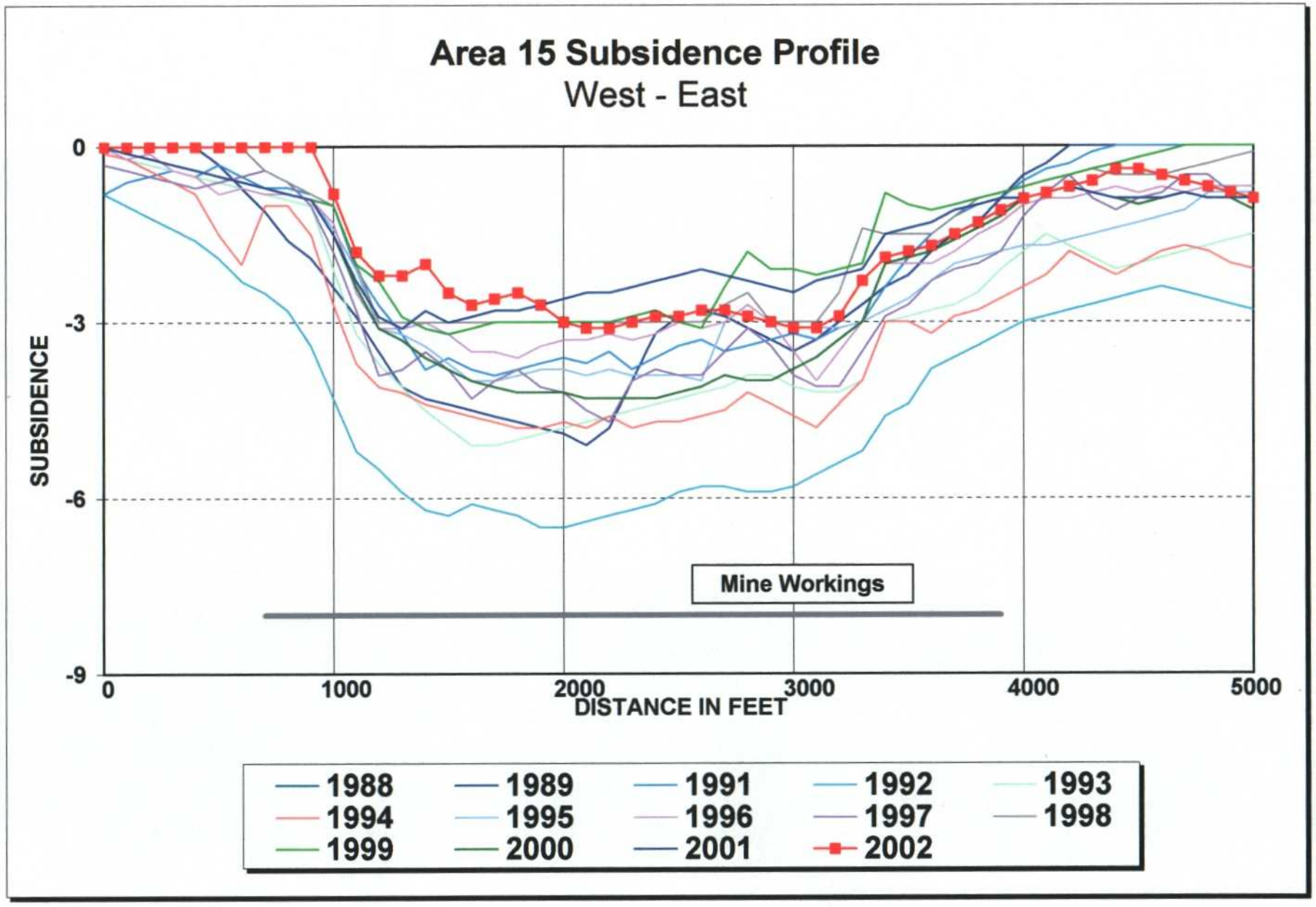

Area 13 Subsidence Profile
North - South
SUBSIDENCE
0
-2
-4
-6
-8
-10
0
1000
2000
3000
4000
DISTANCE IN FEET
Mine Workings
1986
1987
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

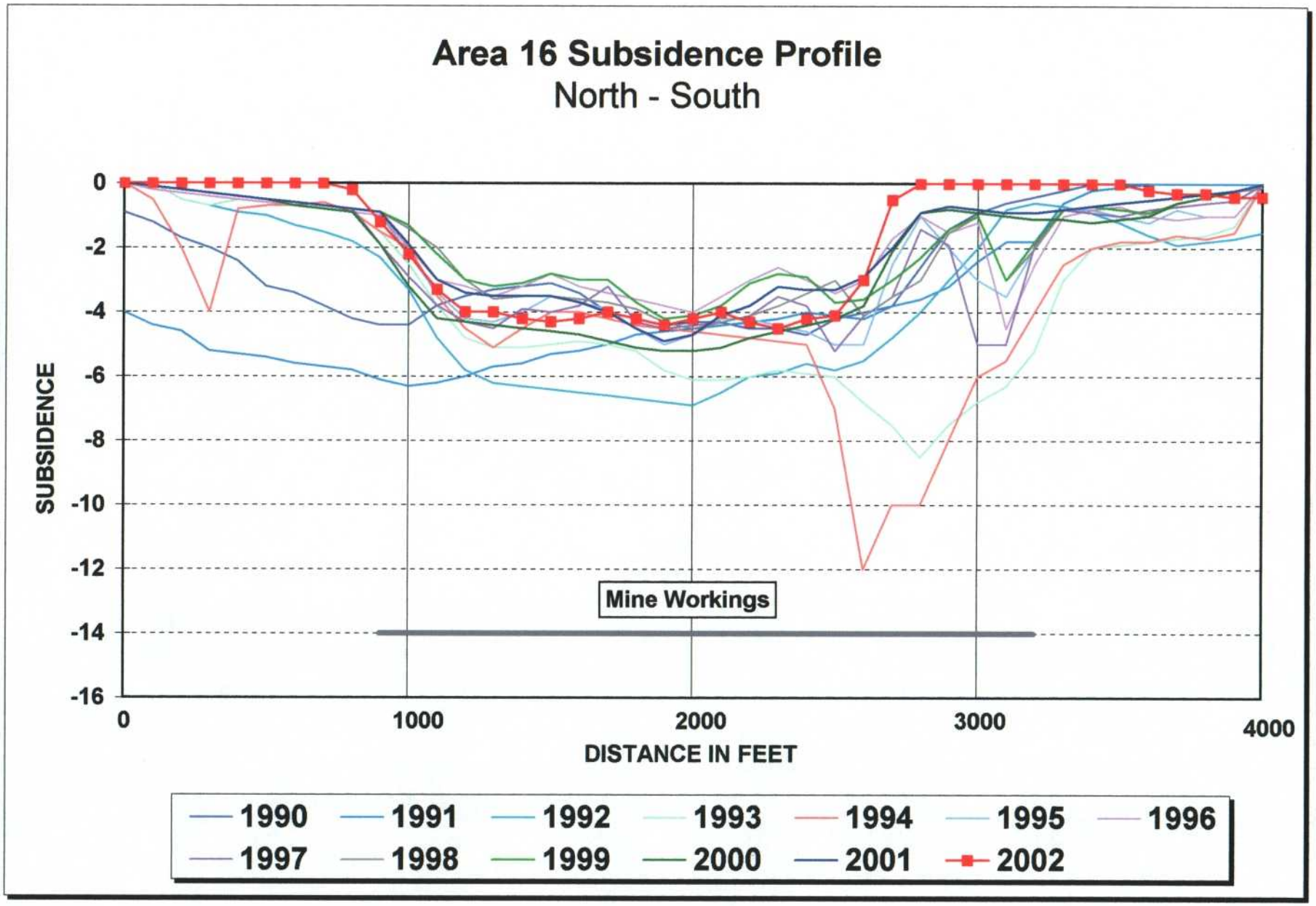

Area 13 Subsidence Profile
West - East
SUBSIDENCE
-1
-3
-5
-7
-9
0
1000
2000
3000
DISTANCE IN FEET
Mine Workings
1986
1987
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

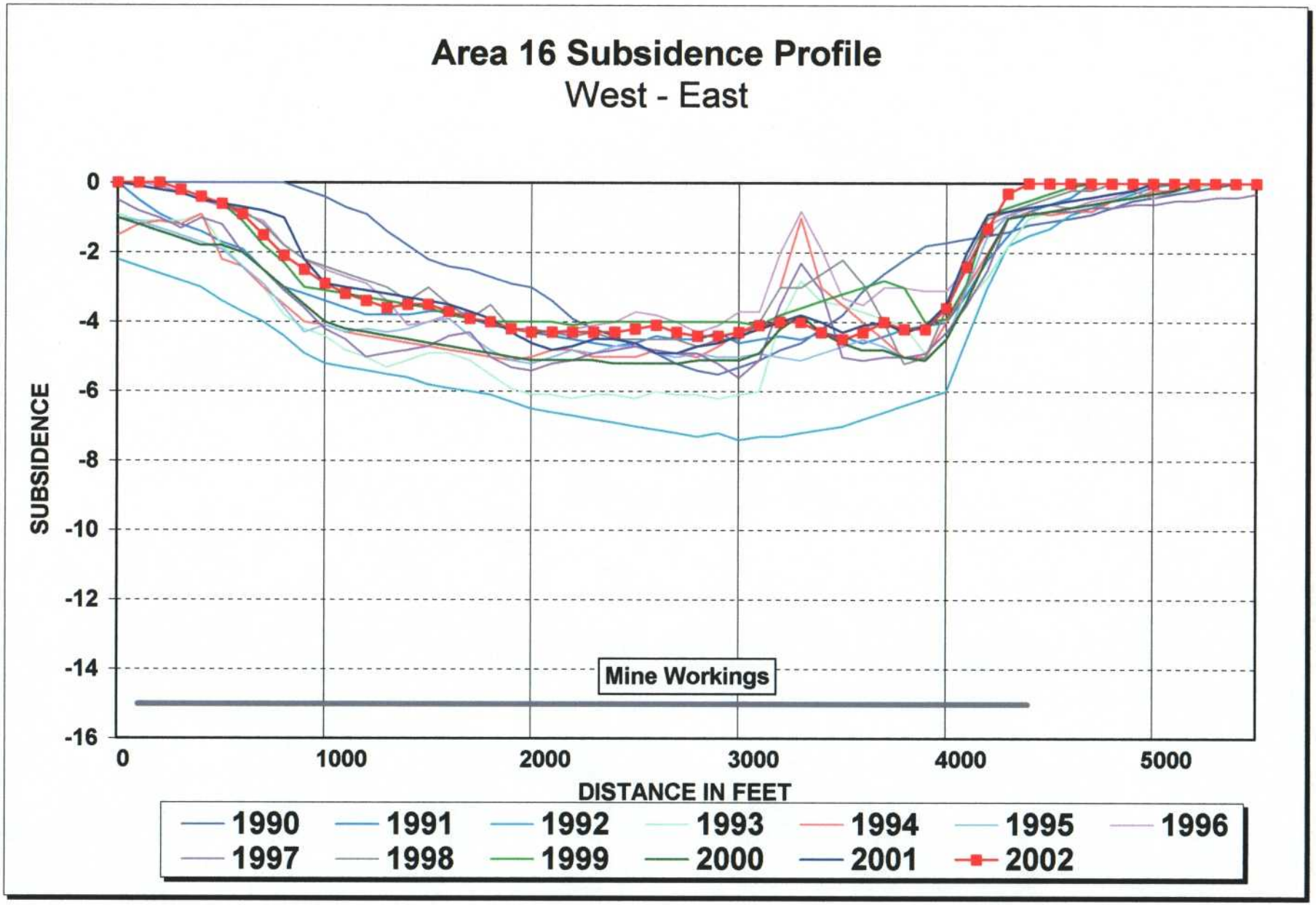

Area 14 Subsidence Profile
North - South
SUBSIDENCE
0
-3
-6
-9
0
500
1000
1500
2000
2500
DISTANCE IN FEET
Mine Workings
1987
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

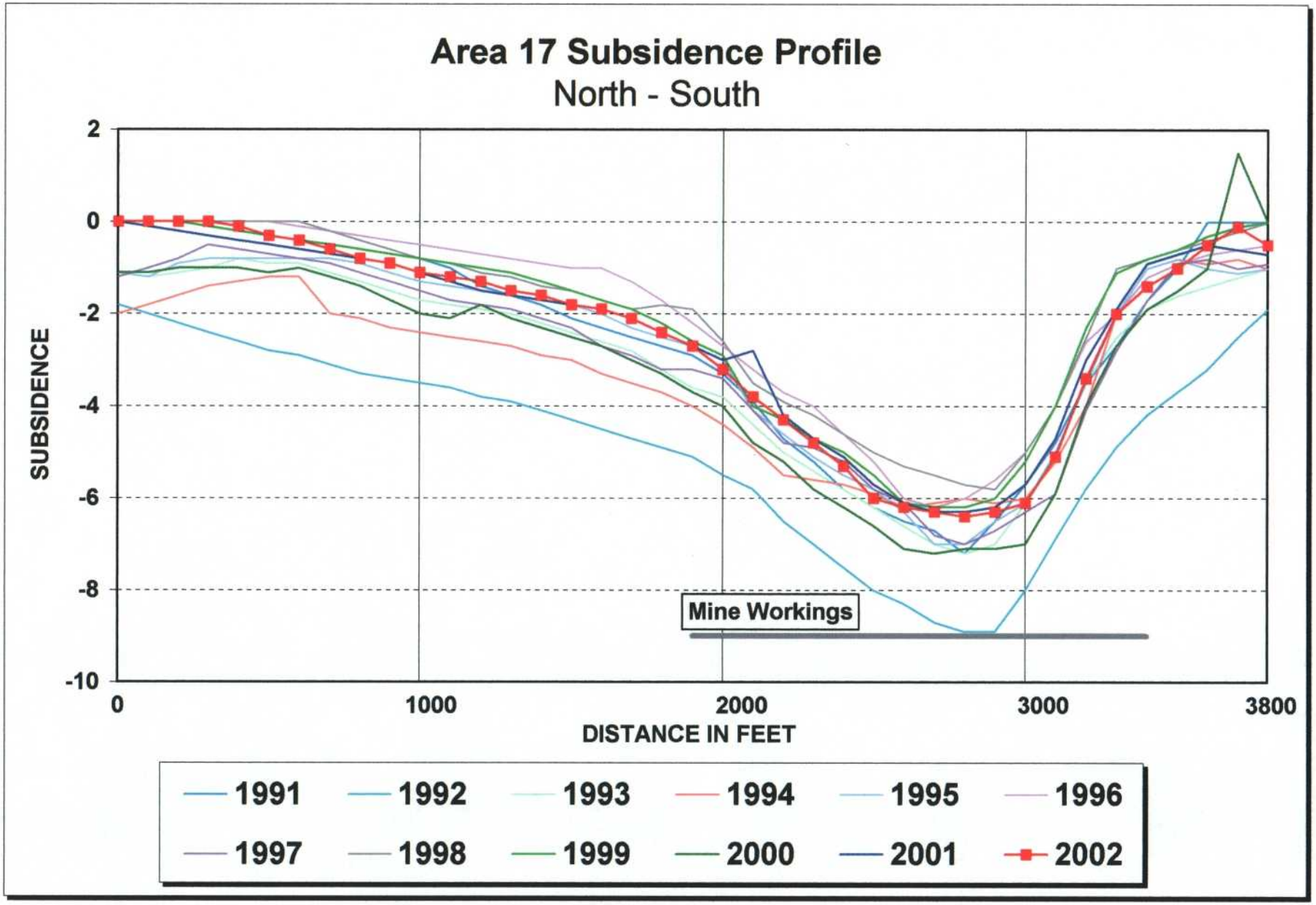

Area 14 Subsidence Profile
West - East
SUBSIDENCE
0
-3
-6
-9
-12
-15
-18
0
1000
2000
3000
4000
5000
DISTANCE IN FEET
Mine Workings
1987
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

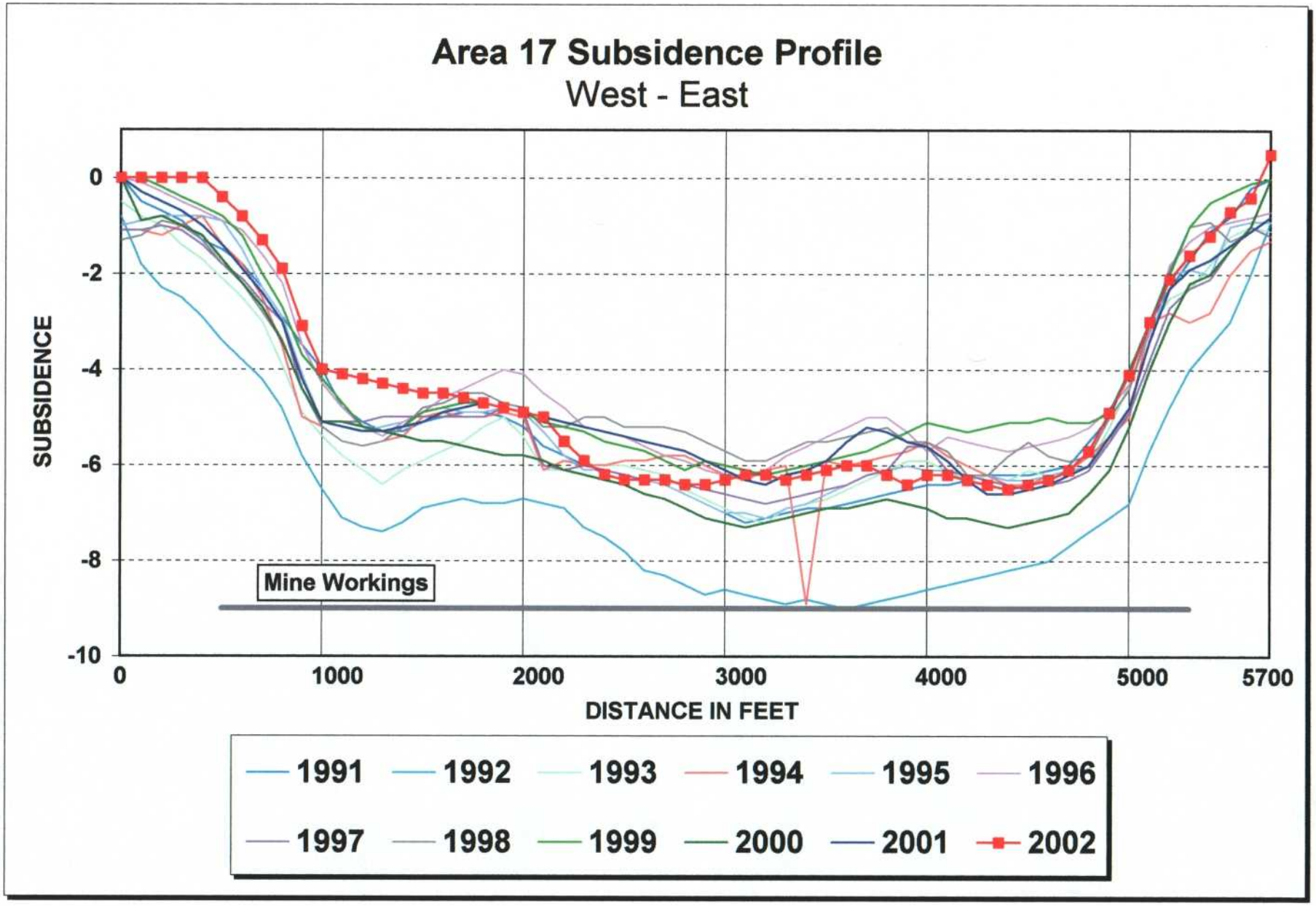

Area 15 Subsidence Profile
North - South
SUBSIDENCE
0
-2
-4
-6
-8
-10
0
1000
2000
3000
4000
DISTANCE IN FEET
Mine Workings
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

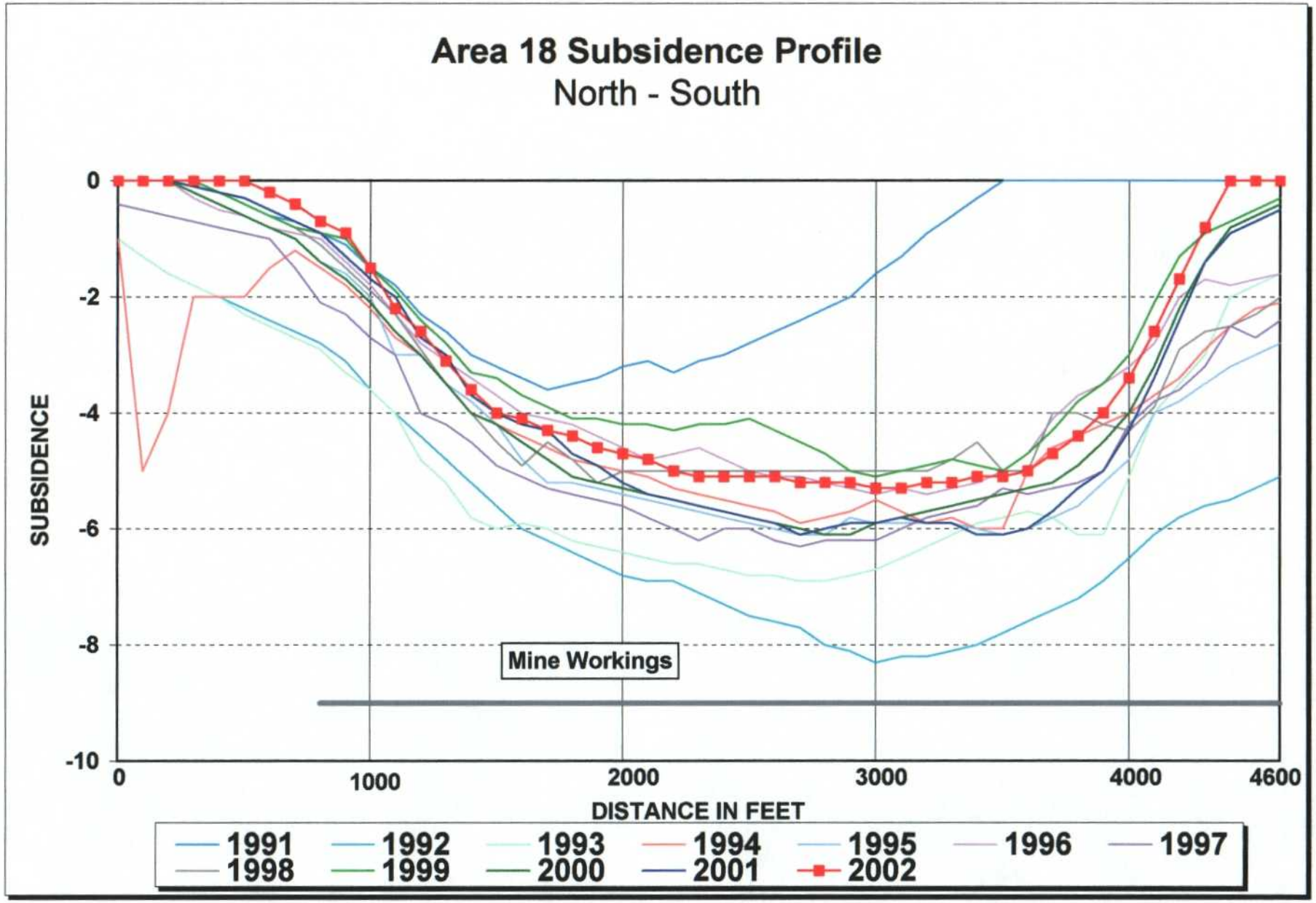

Area 15 Subsidence Profile
West - East
SUBSIDENCE
0
-3
-6
-9
0
1000
2000
3000
4000
5000
DISTANCE IN FEET
Mine Workings
1988
1989
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

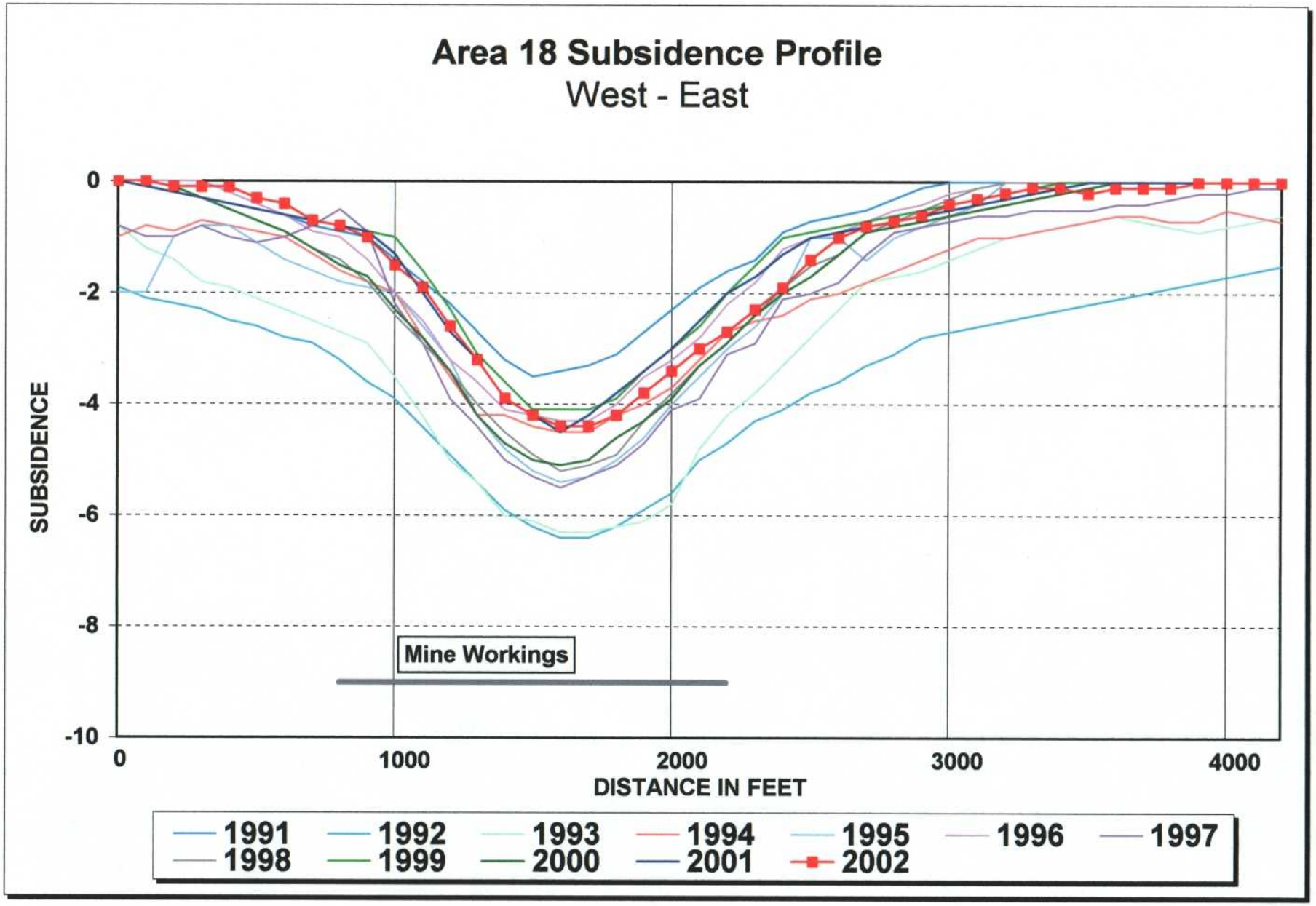

Area 16 Subsidence Profile
North - South
SUBSIDENCE
0
-2
-4
-6
-8
-10
-12
-14
-16
0
1000
2000
3000
4000
DISTANCE IN FEET
Mine Workings
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

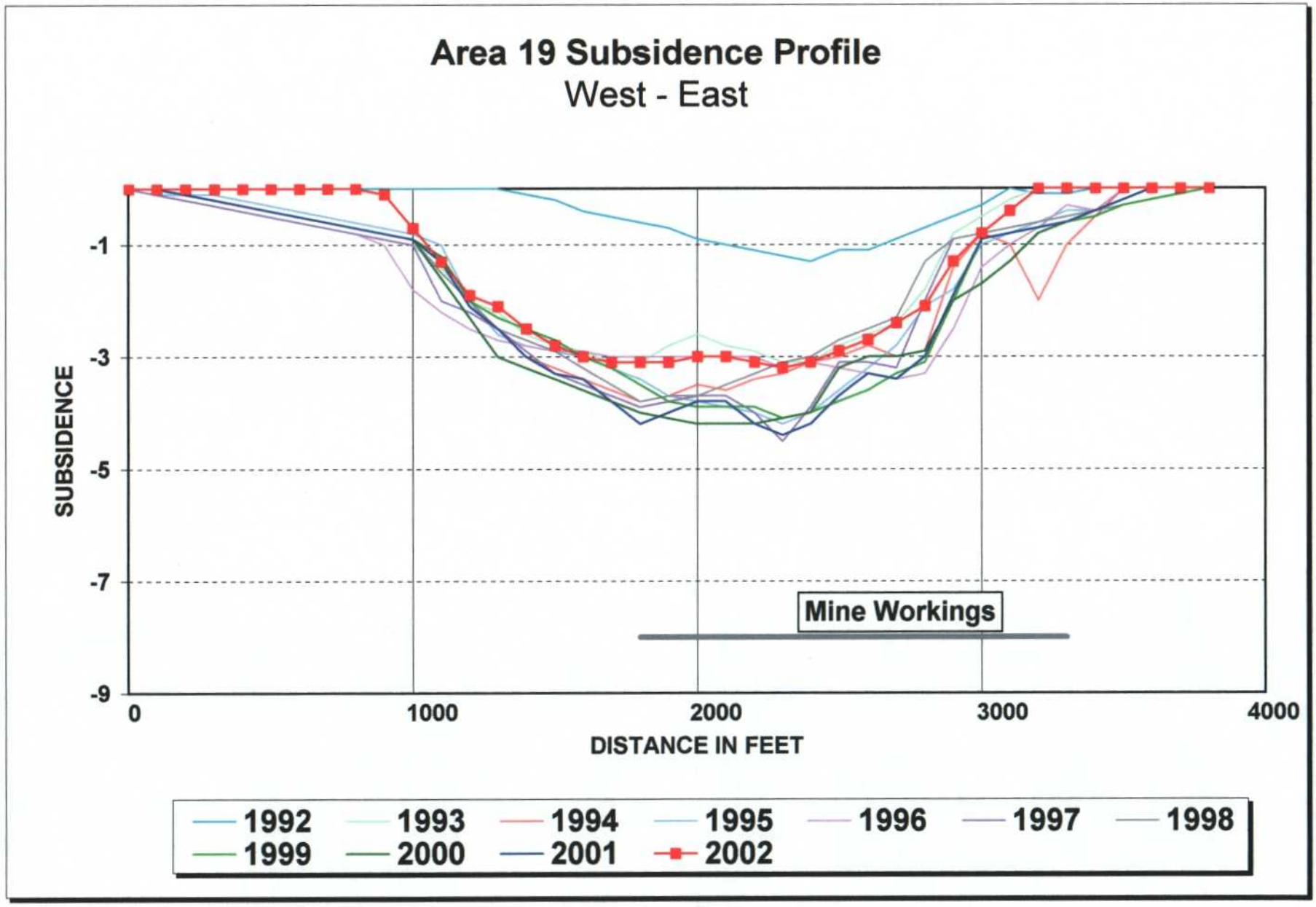

Area 16 Subsidence Profile
West - East
SUBSIDENCE
0
-2
-4
-6
-8
-10
-12
-14
-16
0
1000
2000
3000
4000
5000
DISTANCE IN FEET
Mine Workings
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

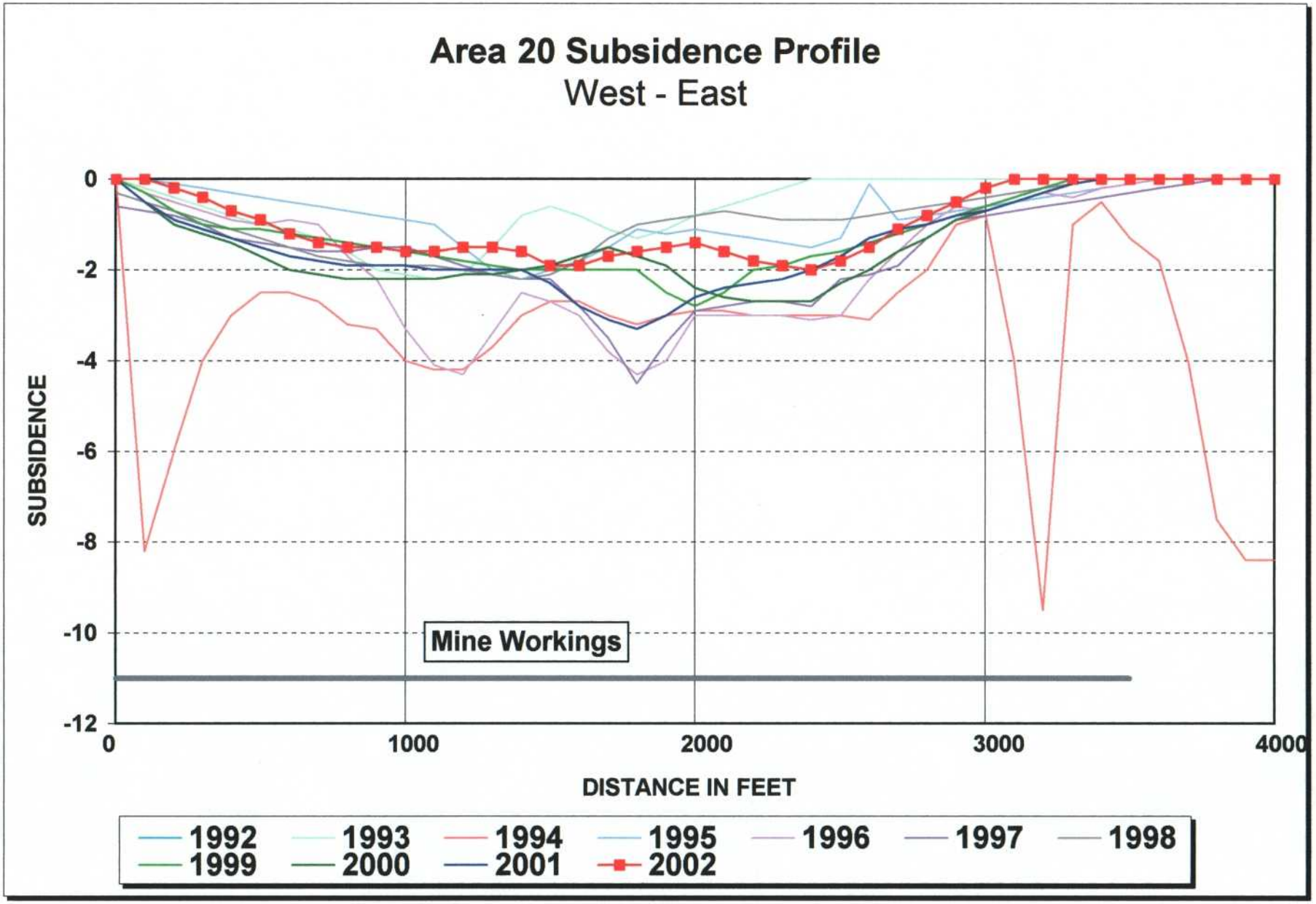

Area 17 Subsidence Profile
North - South
SUBSIDENCE
2
0
-2
-4
-6
-8
-10
0
1000
2000
3000
3800
DISTANCE IN FEET
Mine Workings
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

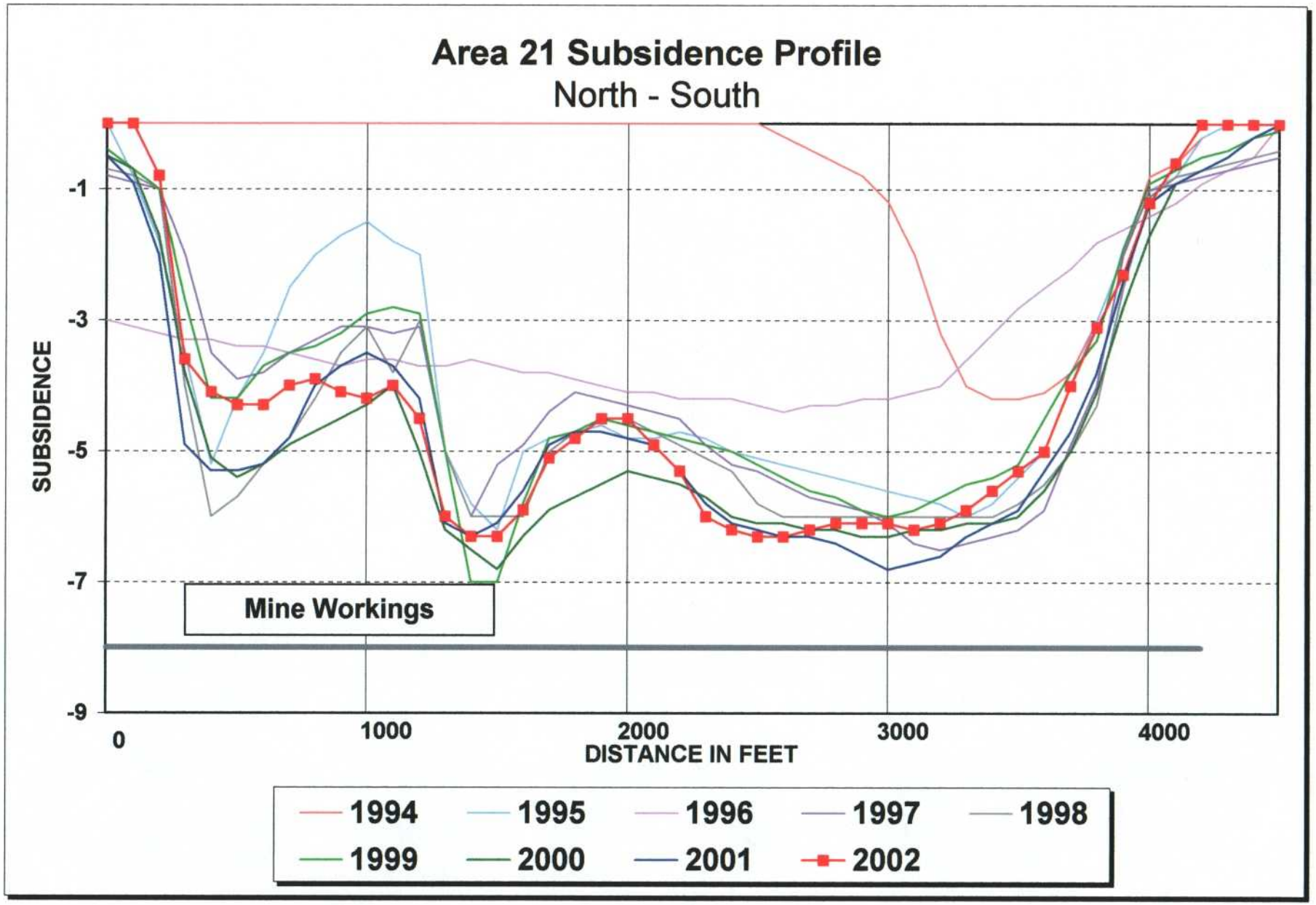

Area 17 Subsidence Profile
West - East
SUBSIDENCE
0
-2
-4
-6
-8
-10
0
1000
2000
3000
4000
5000
5700
DISTANCE IN FEET
Mine Workings
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

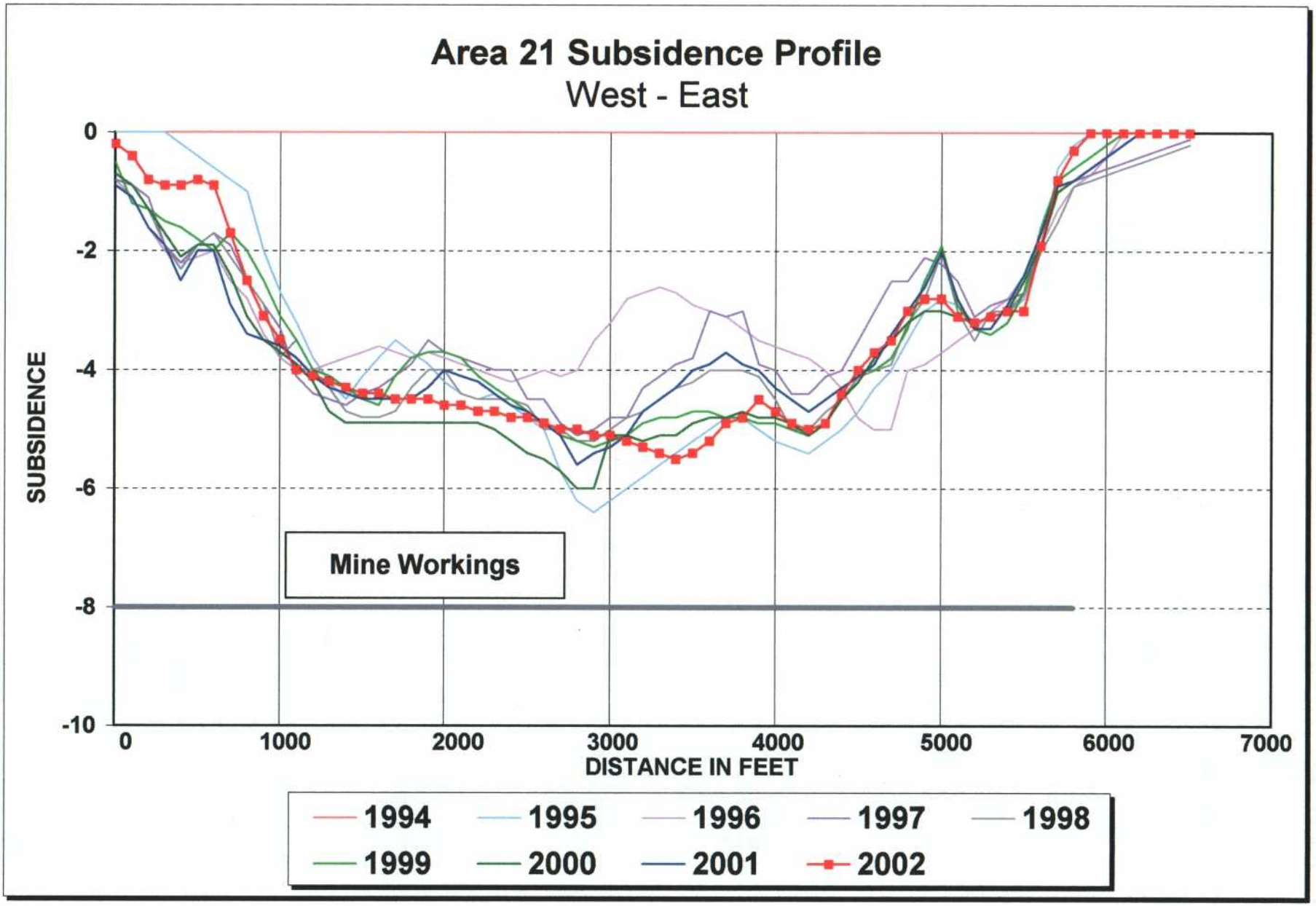

Area 18 Subsidence Profile
North - South
SUBSIDENCE
0
-2
-4
-6
-8
-10
0
1000
2000
3000
4000
4600
DISTANCE IN FEET
Mine Workings
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

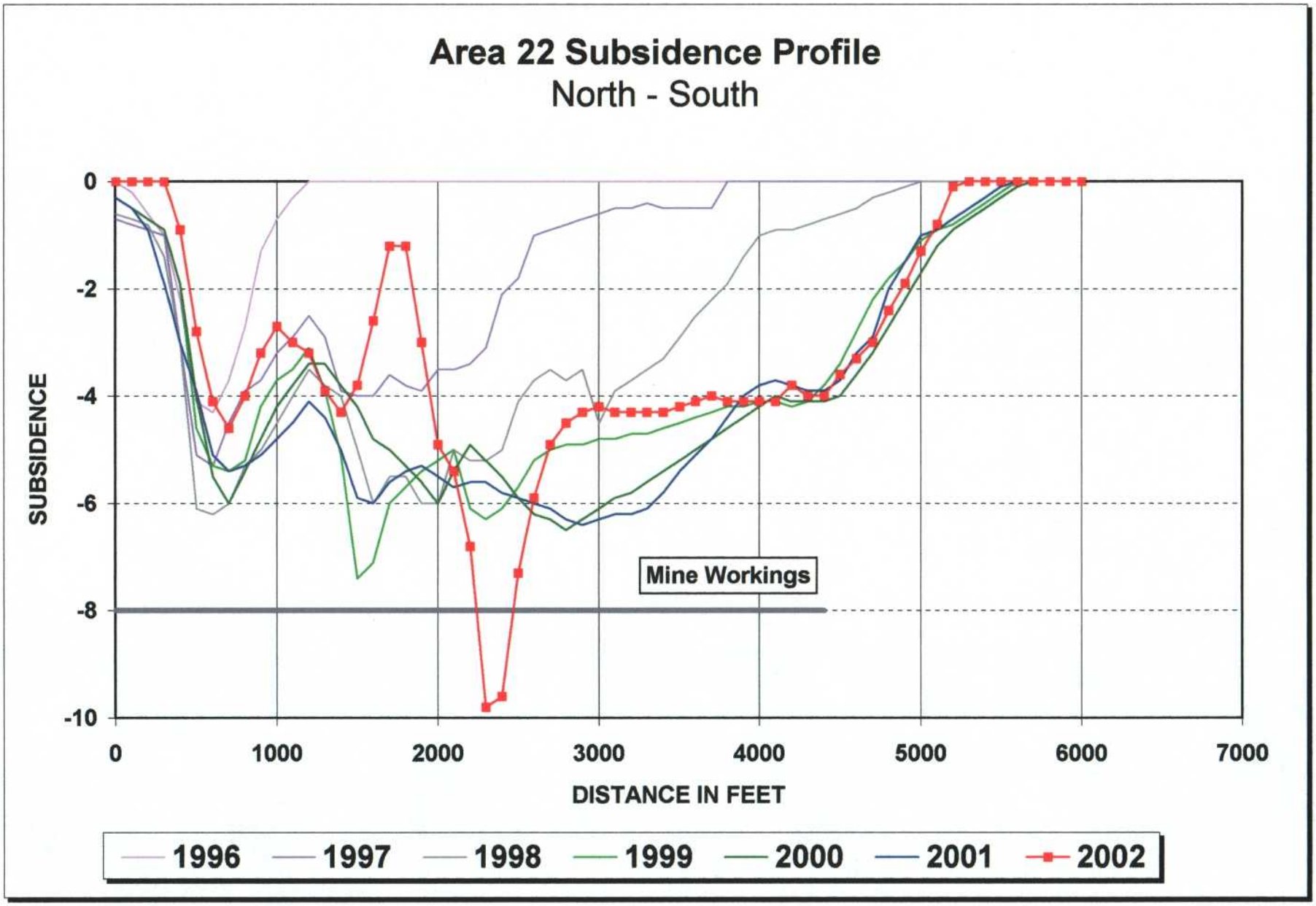

Area 18 Subsidence Profile
West - East
SUBSIDENCE
0
-2
-4
-6
-8
-10
0
1000
2000
3000
4000
DISTANCE IN FEET
Mine Workings
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

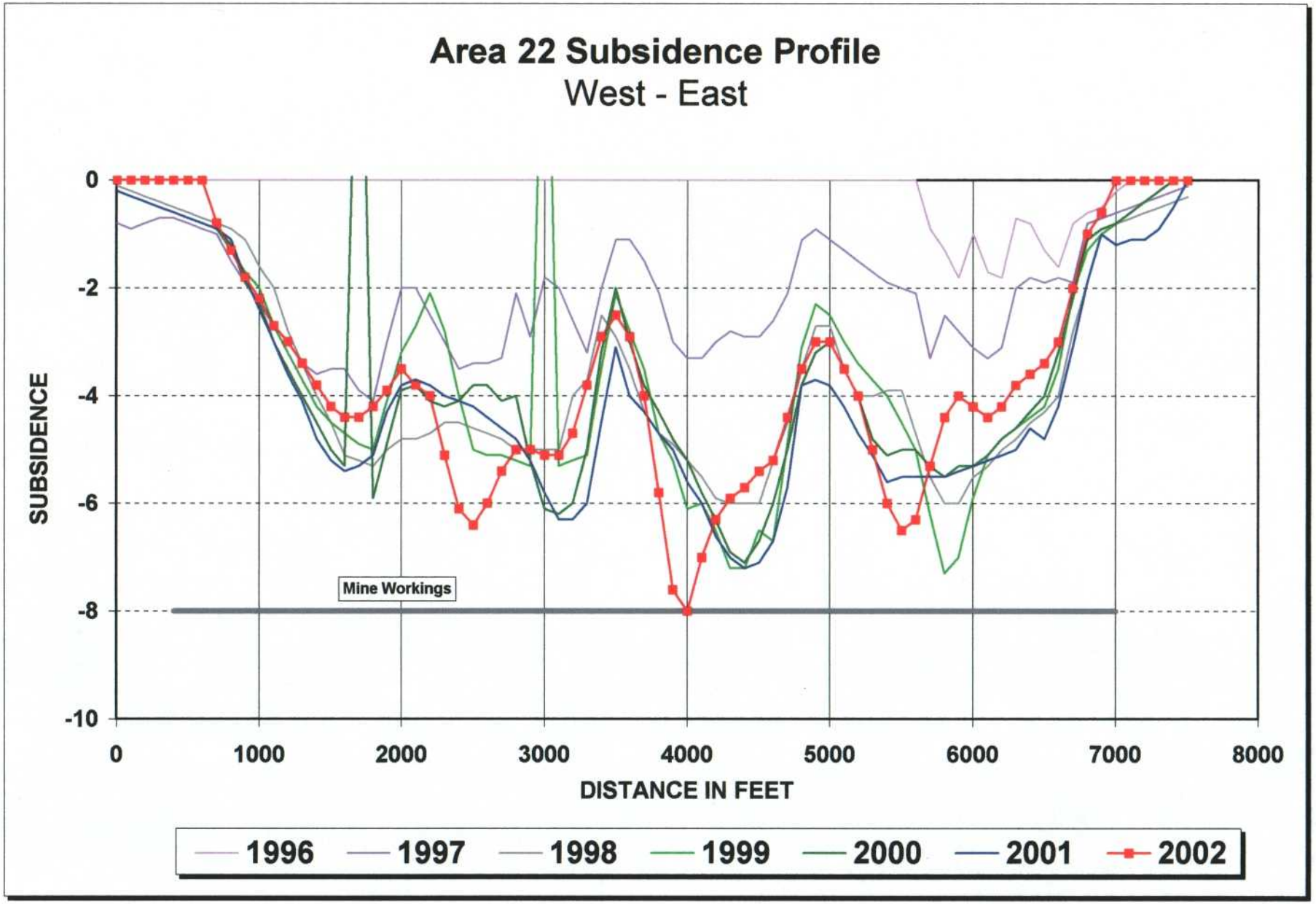

Area 19 Subsidence Profile
West - East
SUBSIDENCE
-1
-3
-5
-7
-9
0
1000
2000
3000
4000
DISTANCE IN FEET
Mine Workings
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

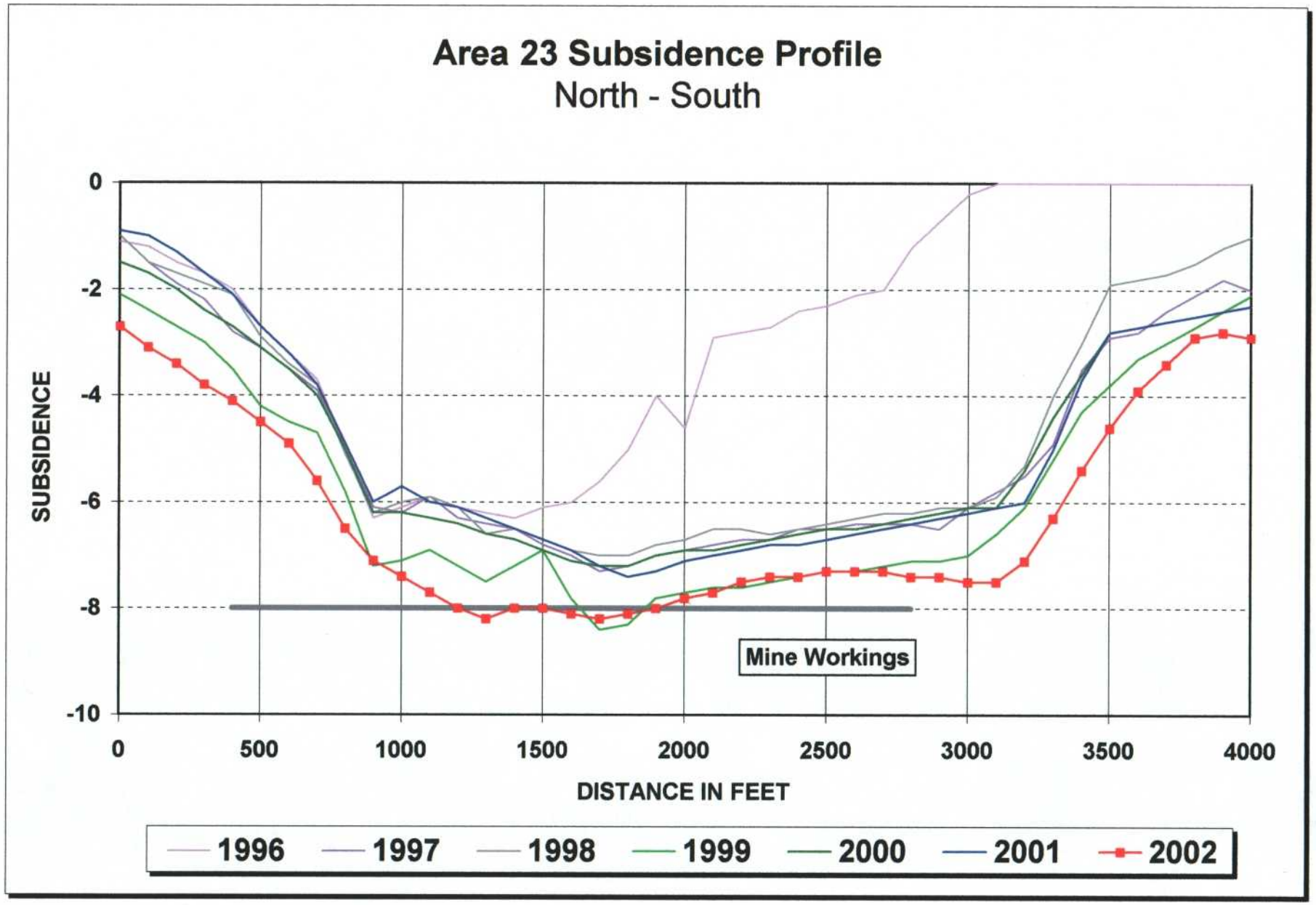

Area 20 Subsidence Profile
West - East
SUBSIDENCE
0
-2
-4
-6
-8
-10
-12
0
1000
2000
3000
4000
DISTANCE IN FEET
Mine Workings
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002

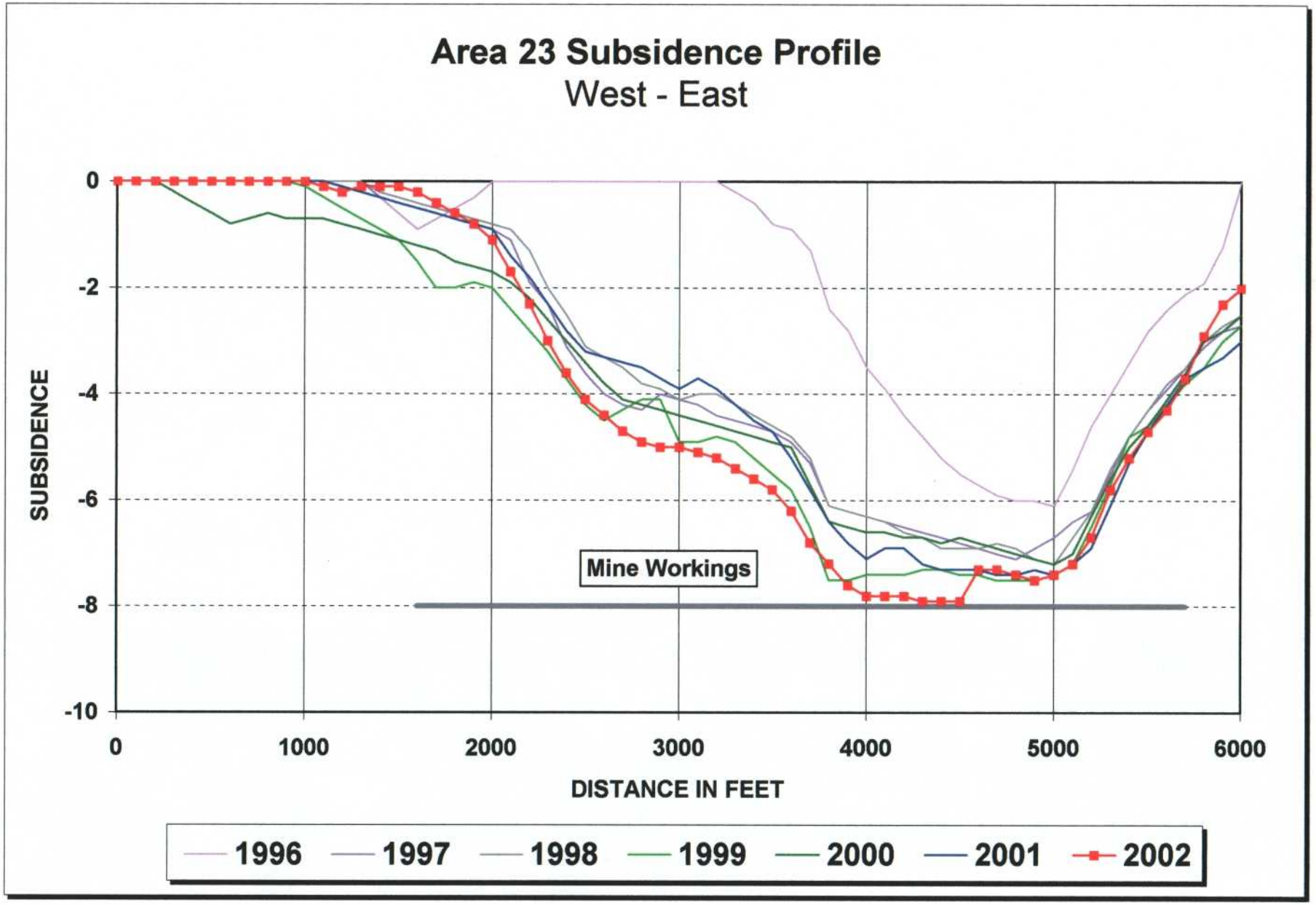

Area 21 Subsidence Profile
North - South
SUBSIDENCE
-1
-3
-5
-7
-9
0
1000
2000
3000
4000
DISTANCE IN FEET
Mine Workings
1994
1995
1996
1997
1998
1999
2000
2001
2002

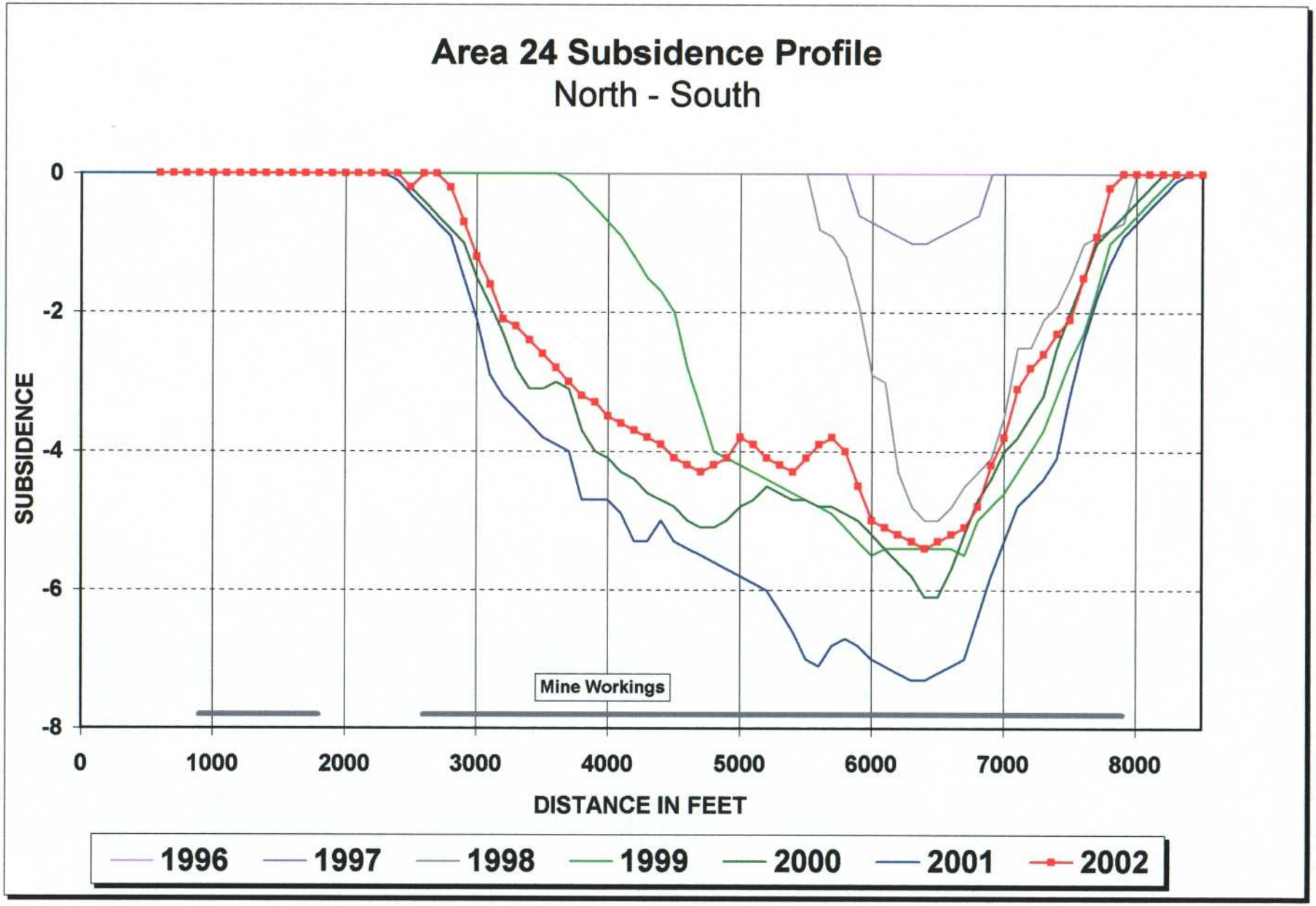

Area 21 Subsidence Profile
West - East
SUBSIDENCE
0
-2
-4
-6
-8
-10
0
1000
2000
3000
4000
5000
6000
7000
DISTANCE IN FEET
Mine Workings
1994
1995
1996
1997
1998
1999
2000
2001
2002

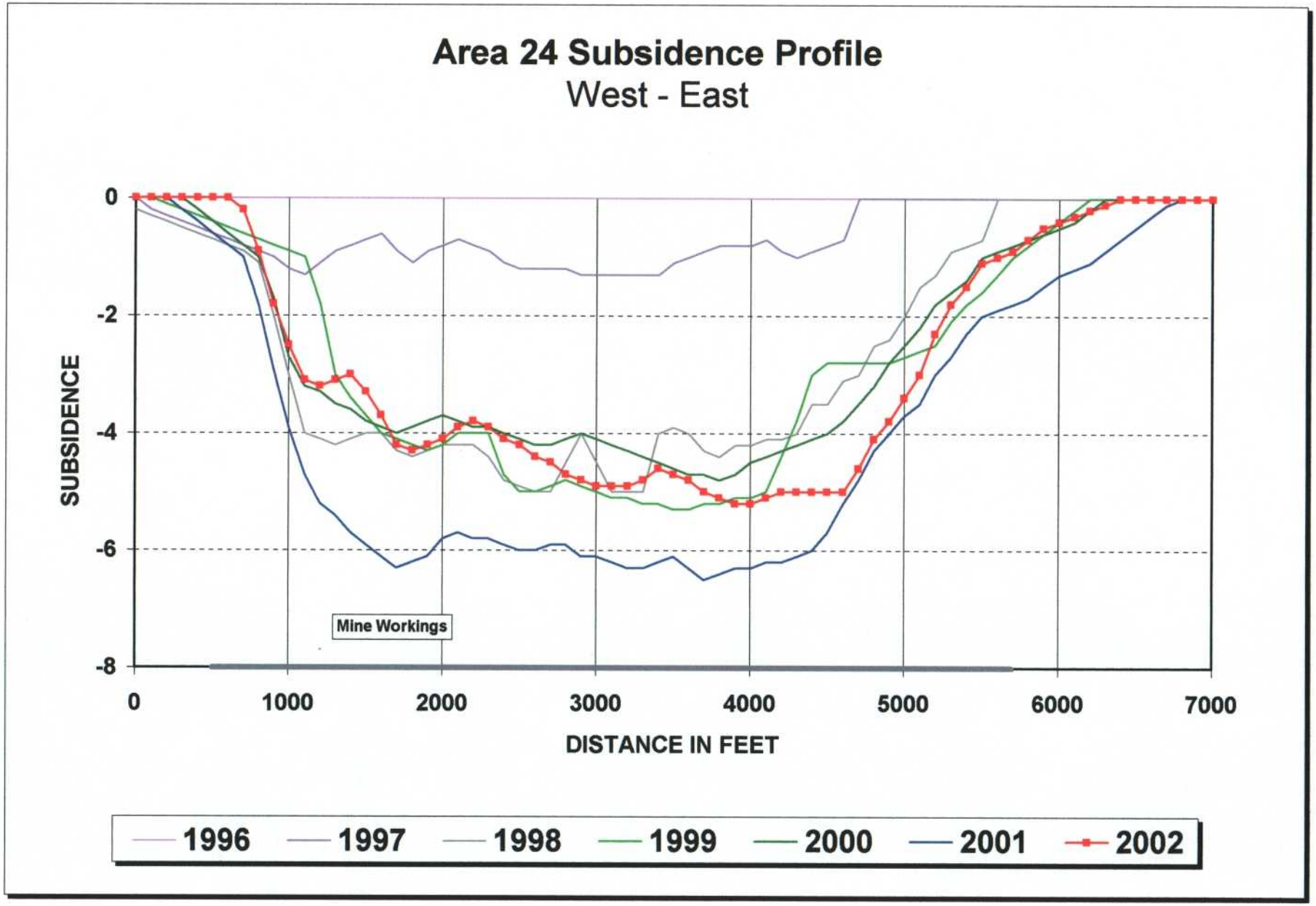

Area 22 Subsidence Profile
North - South
SUBSIDENCE
0
-2
-4
-6
-8
-10
0
1000
2000
3000
4000
5000
6000
7000
DISTANCE IN FEET
Mine Workings
1996
1997
1998
1999
2000
2001
2002

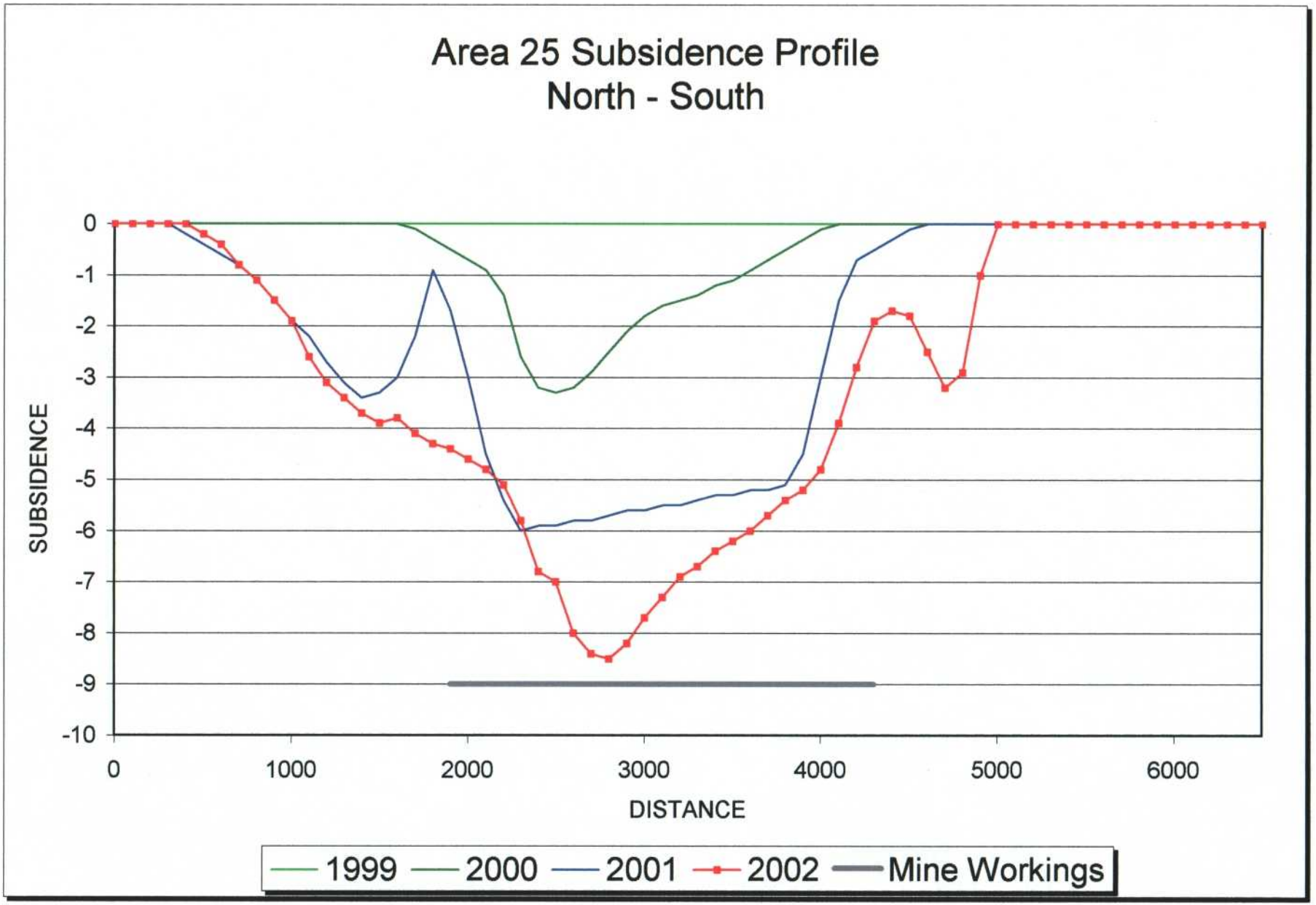

Area 22 Subsidence Profile
West - East
SUBSIDENCE
0
-2
-4
-6
-8
-10
Mine Workings
0
1000
2000
3000
4000
5000
6000
7000
8000
DISTANCE IN FEET
1996
1997
1998
1999
2000
2001
2002

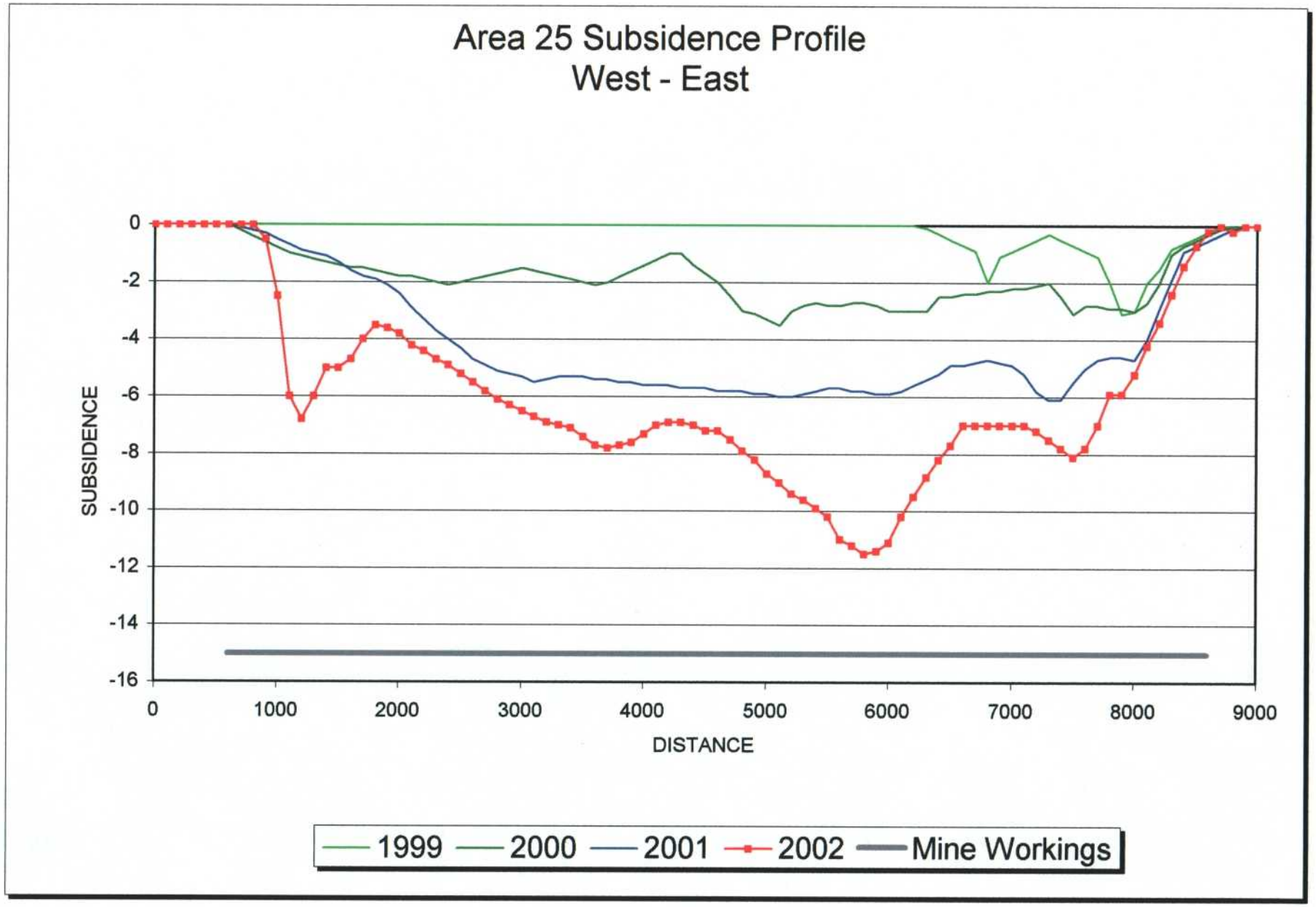

Area 23 Subsidence Profile
North - South
SUBSIDENCE
0
-2
-4
-6
-8
-10
0
500
1000
1500
2000
2500
3000
3500
4000
DISTANCE IN FEET
Mine Workings
1996
1997
1998
1999
2000
2001
2002


Area 23 Subsidence Profile
West - East
SUBSIDENCE
0
-2
-4
-6
-8
-10
0
1000
2000
3000
4000
5000
6000
DISTANCE IN FEET
Mine Workings
1996
1997
1998
1999
2000
2001
2002


Area 24 Subsidence Profile
North - South
SUBSIDENCE
0
-2
-4
-6
-8
0
1000
2000
3000
4000
5000
6000
7000
8000
DISTANCE IN FEET
Mine Workings
1996
1997
1998
1999
2000
2001
2002


Area 24 Subsidence Profile
West - East
SUBSIDENCE
0
-2
-4
-6
-8
0
1000
2000
3000
4000
5000
6000
7000
DISTANCE IN FEET
Mine Workings
1996
1997
1998
1999
2000
2001
2002


Area 25 Subsidence Profile
North - South
SUBSIDENCE
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
0
1000
2000
3000
4000
5000
6000
DISTANCE
1999
2000
2001
2002
Mine Workings


Area 25 Subsidence Profile
West - East
SUBSIDENCE
0
-2
-4
-6
-8
-10
-12
-14
-16
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
DISTANCE
1999
2000
2001
2002
Mine Workings

EAST MOUNTAIN/TRAIL MOUNTAIN 2002

SUBSIDENCE MAP

SPRING MAP WITH SUBSIDENCE AND 5-YEAR

MINE PLAN

RILDA CANYON CLIFF MONITORING PRISMS

RILDA CANYON 5TH NORTH STREAM

CROSSING DATA

RILDA CANYON PRISMS

Prisms 1-3 Installed on February 24, 1999

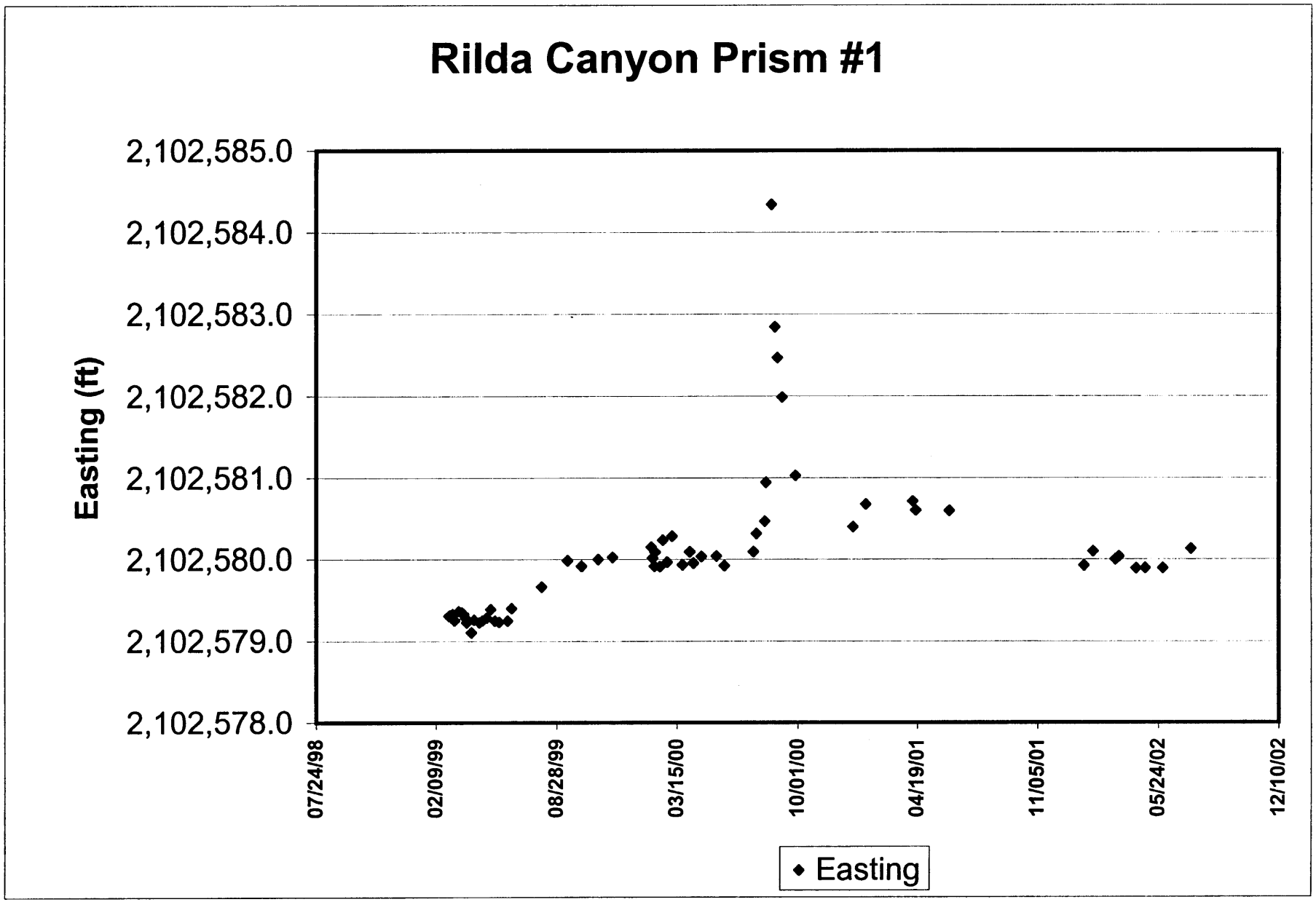
Baseline Data

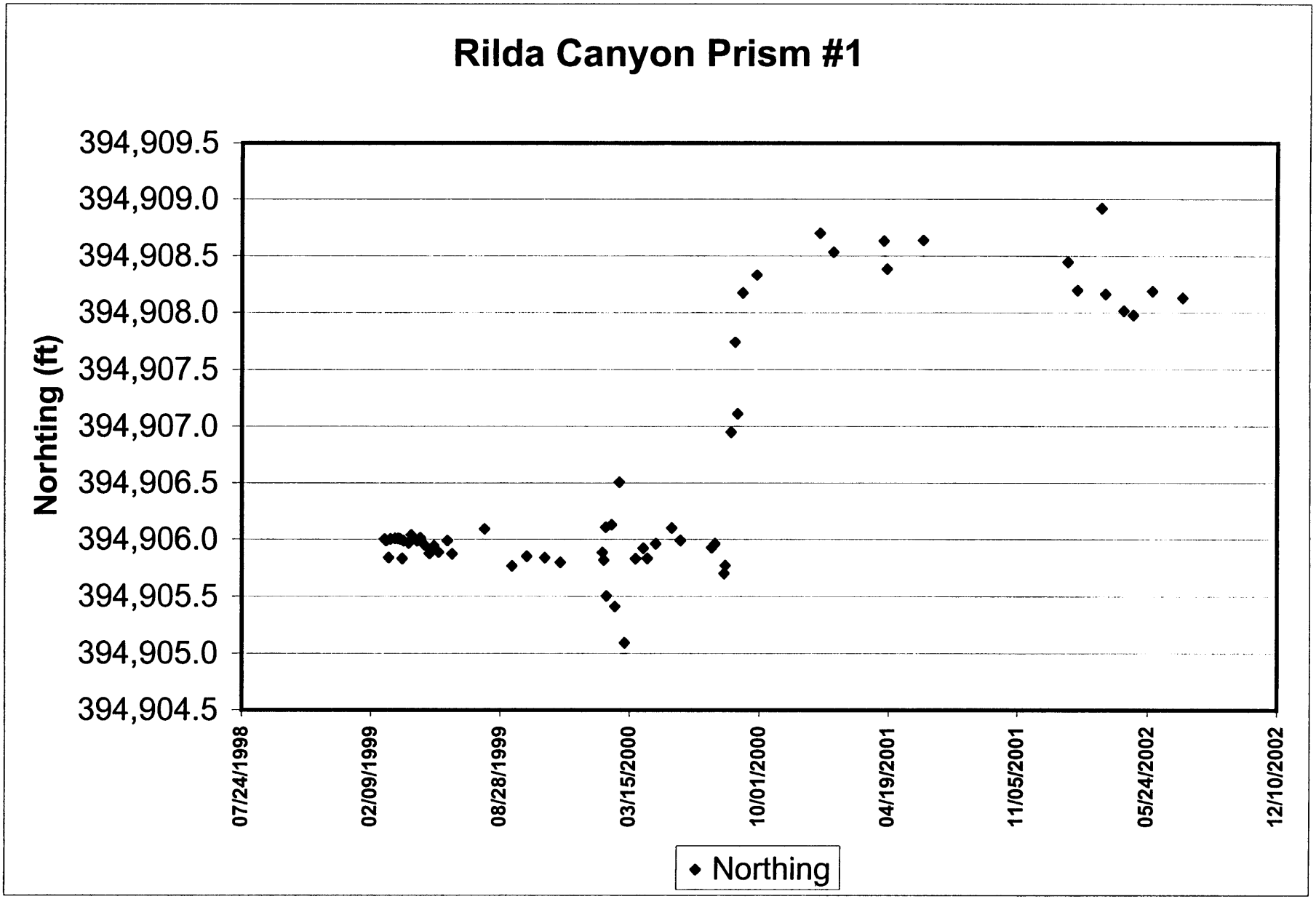
PRISM 1

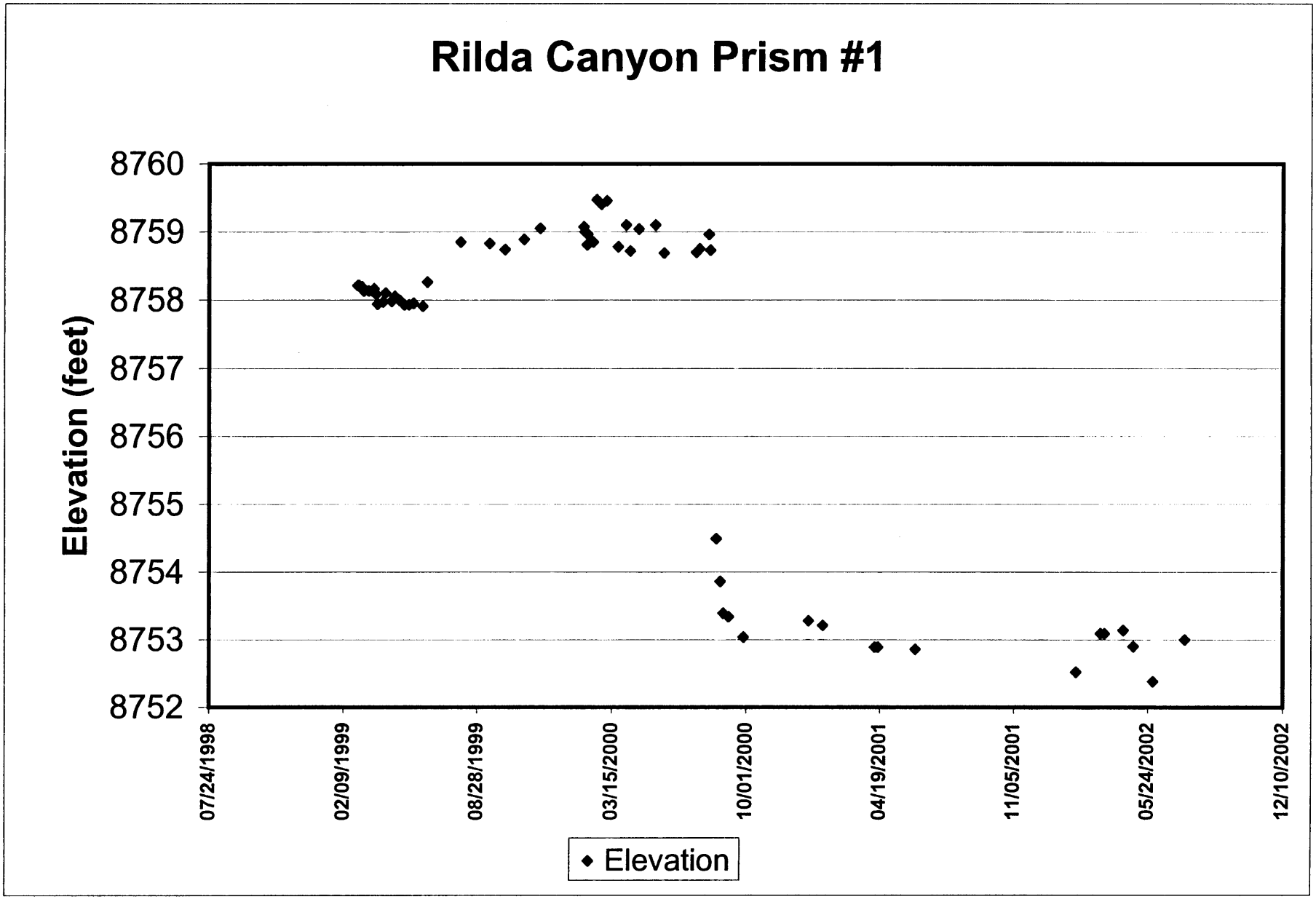
	Northing		Easting		Elevation		
Date	Reading	Variance	Reading	Variance	Reading	Variance	
03/02/1999	394,906.00		2,102,579.31		8758.21		
03/04/1999	394,905.99		2,102,579.32		8758.21		
03/08/1999	394,905.84		2,102,579.33		8758.19		
03/11/1999	394,906.00		2,102,579.25		8758.13		
03/18/1999	394,906.01		2,102,579.37		8758.13		
03/23/1999	394,906.01		2,102,579.35		8758.13		
03/26/1999	394,906.00		2,102,579.33		8758.16		
03/29/1999	394,905.83		2,102,579.28		8758.08		
03/31/1999	394,905.99		2,102,579.23		8757.94		
04/08/1999	394,905.97		2,102,579.11		8757.97		
04/12/1999	394,906.04		2,102,579.26		8758.1		
04/21/1999	394,905.99		2,102,579.23		8757.98		
04/26/1999	394,906.01		2,102,579.25		8758.05		
05/03/1999	394,905.95		2,102,579.28		8757.99		
05/10/1999	394,905.87		2,102,579.39		8757.93		
05/17/1999	394,905.94		2,102,579.25		8757.93		
05/24/1999	394,905.89		2,102,579.23		8757.95		
06/07/1999	394,905.99		2,102,579.25		8757.91		
06/14/1999	394,905.87		2,102,579.40		8758.26		Average Cutoff
08/03/1999	394,906.09	0.13	2,102,579.67	0.38	8758.85	0.78	
09/15/1999	394,905.77	-0.19	2,102,579.99	0.70	8758.83	0.76	
10/08/1999	394,905.85	-0.11	2,102,579.92	0.63	8758.74	0.67	
11/05/1999	394,905.84	-0.12	2,102,580.00	0.72	8758.89	0.82	
11/29/1999	394,905.80	-0.16	2,102,580.03	0.74	8759.05	0.98	
02/02/2000	394,905.88	-0.07	2,102,580.15	0.86	8759.07	1.00	
02/04/2000	394,905.82	-0.14	2,102,580.02	0.73	8759	0.93	
02/07/2000	394,906.11	0.15	2,102,579.92	0.63	8758.81	0.74	
02/08/2000	394,905.50	-0.45	2,102,580.09	0.80	8758.96	0.89	
02/16/2000	394,906.13	0.17	2,102,579.91	0.63	8758.85	0.78	
02/21/2000	394,905.41	-0.55	2,102,580.23	0.95	8759.47	1.40	
02/28/2000	394,906.51	0.55	2,102,579.97	0.68	8759.4	1.33	
03/07/2000	394,905.09	-0.86	2,102,580.29	1.00	8759.45	1.38	
03/24/2000	394,905.83	-0.13	2,102,579.94	0.65	8758.78	0.71	
04/05/2000	394,905.92	-0.03	2,102,580.09	0.81	8759.1	1.03	
04/11/2000	394,905.83	-0.12	2,102,579.96	0.67	8758.72	0.65	
04/24/2000	394,905.96	0.00	2,102,580.04	0.75	8759.04	0.97	
05/19/2000	394,906.10	0.14	2,102,580.04	0.75	8759.1	1.03	
06/01/2000	394,905.99	0.03	2,102,579.92	0.64	8758.69	0.62	
07/19/2000	394,905.93	-0.03	2,102,580.09	0.81	8758.7	0.63	
07/24/2000	394,905.96	0.01	2,102,580.32	1.03	8758.75	0.68	
08/07/2000	394,905.70	-0.26	2,102,580.47	1.18	8758.96	0.89	
08/09/2000	394905.77	-0.19	2,102,580.95	1.66	8758.73	0.66	
08/18/2000	394,906.95	0.99	2,102,584.34	5.05	8754.49	-3.58	MINED UNDER #1 PRISM - Blind Canyon Seam
08/24/2000	394,907.74	1.79	2,102,582.85	3.56	8753.86	-4.21	
08/28/2000	394,907.11	1.15	2,102,582.47	3.19	8753.39	-4.68	
09/05/2000	394,908.17	2.22	2,102,581.99	2.70	8753.34	-4.73	
09/27/2000	394,908.33	2.38	2,102,581.03	1.74	8753.04	-5.03	
01/02/2001	394,908.70	2.75	2,102,580.40	1.11	8753.28	-4.79	
01/23/2001	394,908.53	2.58	2,102,580.68	1.39	8753.21	-4.86	
04/11/2001	394,908.63	2.68	2,102,580.71	1.43	8752.89	-5.18	
04/16/2001	394,908.38	2.43	2,102,580.60	1.32	8752.89	-5.18	
06/11/2001	394,908.64	2.68	2,102,580.60	1.31	8752.86	-5.21	
01/21/2002	394,908.45	2.49	2,102,579.93	0.64			
02/05/2002	394,908.19	2.24	2,102,580.10	0.81	8752.52	-5.55	
03/14/2002	394,908.92	2.96	2,102,580.00	0.71	8753.09	-4.98	
03/20/2002	394,908.16	2.21	2,102,580.04	0.75	8753.09	-4.98	
04/17/2002	394,908.02	2.06	2,102,579.89	0.61	8,753.14	-4.93	
05/02/2002	394,907.98	2.02	2,102,579.89	0.61	8752.9	-5.17	
05/31/2002	394,908.19	2.23	2,102,579.89	0.61	8752.38	-5.69	
07/17/2002	394,908.13	2.17	2,102,580.13	0.84	8753	-5.07	
10/15/2002	394,908.26	2.30	2,102,580.05	0.77	8753.04	-5.03	
01/30/2003	394,908.49	2.54	2,102,579.92	0.63	8752.84	-5.23	

Average Survey Prior To Undermining

Cut off Date	**14-Jun-99**
Northing	**394,905.96**
Easting	**2,102,579.29**
Elevation	**8,758.07**


Rilda Canyon Prism #1
Easting (ft)
2,102,585.0
2,102,584.0
2,102,583.0
2,102,582.0
2,102,581.0
2,102,580.0
2,102,579.0
2,102,578.0
07/24/98
02/09/99
08/28/99
03/15/00
10/01/00
04/19/01
11/05/01
05/24/02
12/10/02
Easting


Rilda Canyon Prism #1
Norhting (ft)
394,909.5
394,909.0
394,908.5
394,908.0
394,907.5
394,907.0
394,906.5
394,906.0
394,905.5
394,905.0
394,904.5
07/24/1998
02/09/1999
08/28/1999
03/15/2000
10/01/2000
04/19/2001
11/05/2001
05/24/2002
12/10/2002
Northing


Rilda Canyon Prism #1
Elevation (feet)
8760
8759
8758
8757
8756
8755
8754
8753
8752
07/24/1998
02/09/1999
08/28/1999
03/15/2000
10/01/2000
04/19/2001
11/05/2001
05/24/2002
12/10/2002
Elevation

RILDA CANYON PRISMS

Prisms 1-3 Installed on February 24, 1999

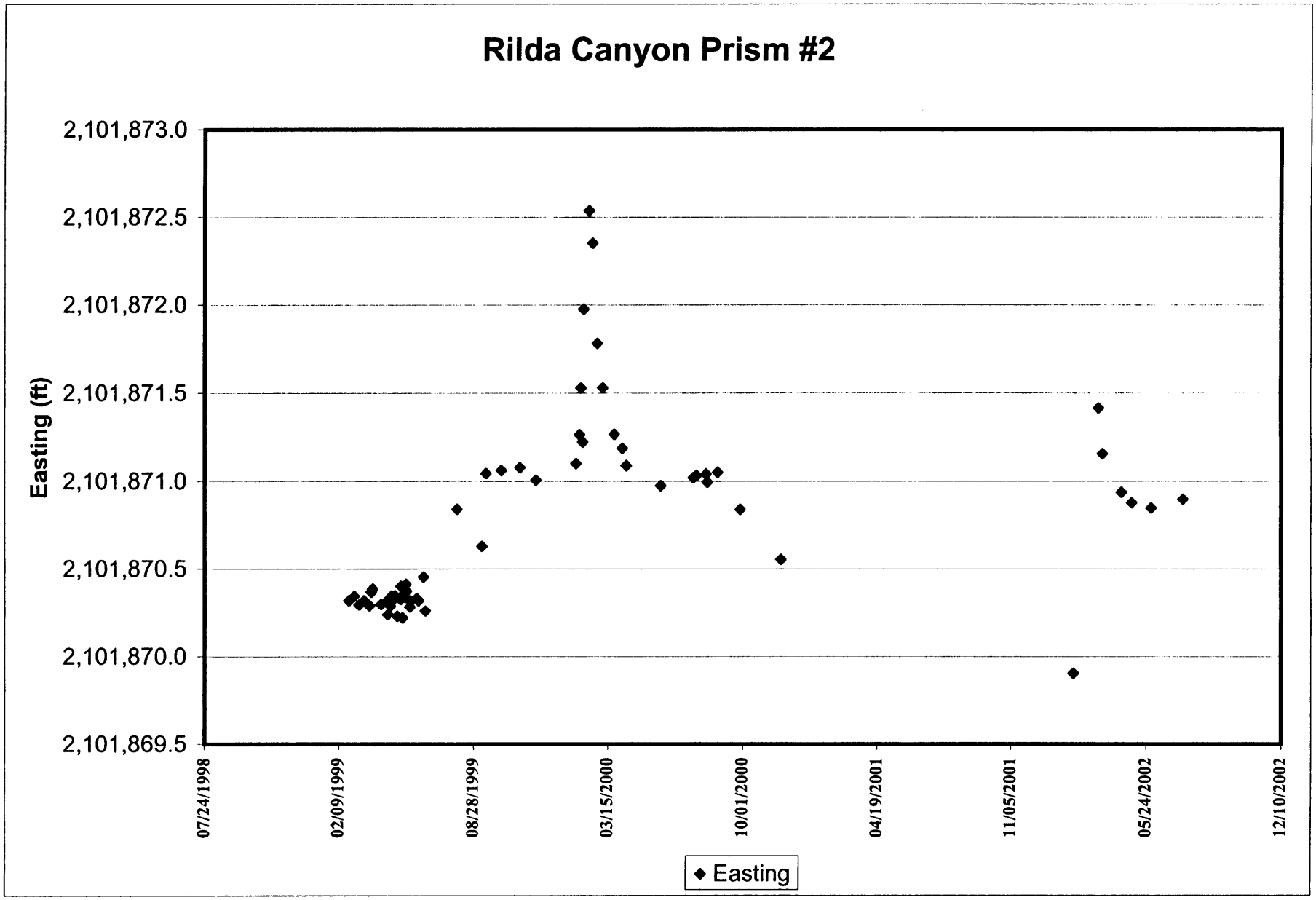
Baseline Data

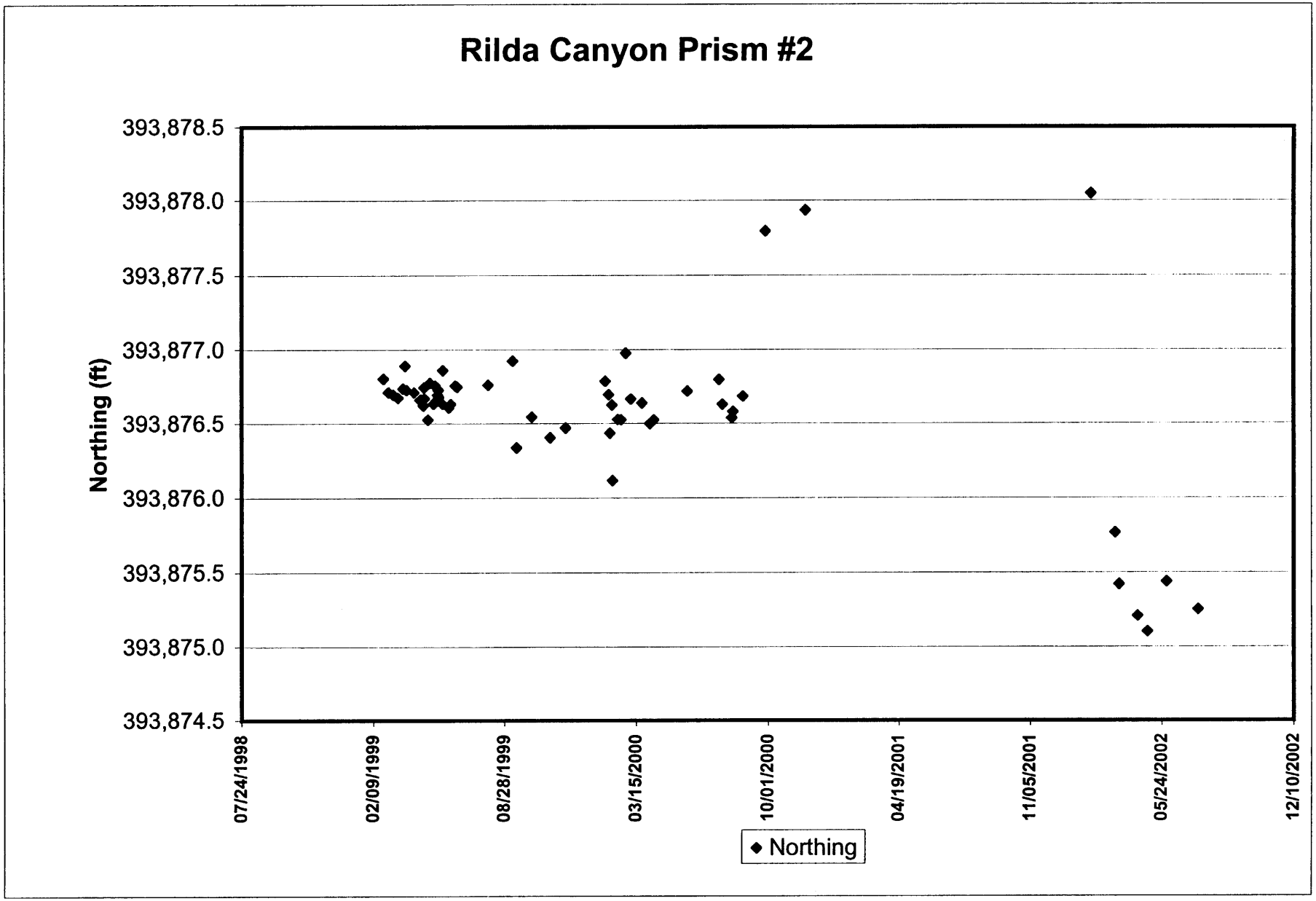
PRISM 2

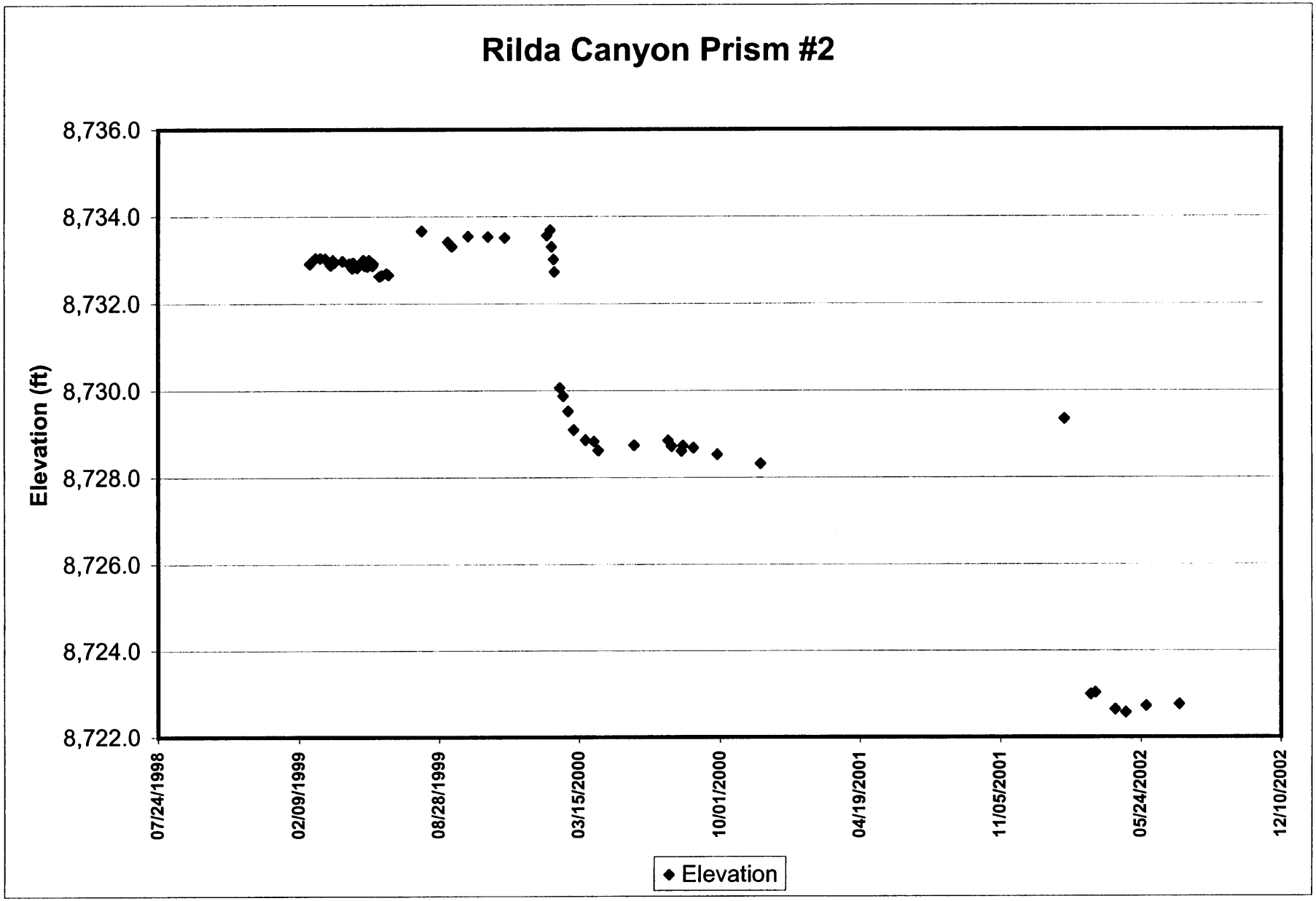
	Northing		Easting		Elevation		
Date	Reading	Variance	Reading	Variance	Reading	Variance	
03/04/1999	393,876.71		2,101,870.34		8733.05		
03/11/1999	393,876.70		2,101,870.29		8733.05		
03/18/1999	393,876.67		2,101,870.32		8733.04		
03/26/1999	393,876.74		2,101,870.29		8732.89		
03/29/1999	393,876.89		2,101,870.37		8733.00		
03/31/1999	393,876.73		2,101,870.39		8732.95		
04/12/1999	393,876.71		2,101,870.30		8732.98		
04/21/1999	393,876.66		2,101,870.32		8732.92		
04/22/1999	393,876.66		2,101,870.24		8732.92		
04/26/1999	393,876.62		2,101,870.29		8732.82		
04/27/1999	393,876.74		2,101,870.31		8732.94		
04/28/1999	393,876.67		2,101,870.35		8,732.93		
05/03/1999	393,876.53		2,101,870.35		8732.83		
05/06/1999	393,876.78		2,101,870.23		8732.90		
05/11/1999	393,876.63		2,101,870.33		8732.99		
05/12/1999	393,876.63		2,101,870.40		8733.00		
05/13/1999	393,876.64		2,101,870.35		8732.96		
05/14/1999	393,876.76		2,101,870.22		8732.87		
05/18/1999	393,876.69		2,101,870.34		8732.86		
05/19/1999	393,876.73		2,101,870.41		8732.92		
05/20/1999	393,876.68		2,101,870.37		8733.00		
02/24/1999	393,876.80		2,101,870.32		8732.92		
05/25/1999	393,876.63		2,101,870.28		8732.88		
05/26/1999	393,876.86		2,101,870.32		8732.92		
06/04/1999	393,876.61		2,101,870.33		8732.63		
06/07/1999	393,876.63		2,101,870.32		8732.65		
06/14/1999	393,876.76		2,101,870.45		8732.70		
06/17/1999	393,876.75		2,101,870.26		8732.66		
08/03/1999	393,876.76		2,101,870.84		8733.67		
09/09/1999	393,876.92		2,101,870.63		8733.42		
09/15/1999	393,876.34		2,101,871.04		8733.32		**Average Cutoff**
10/08/1999	393,876.54	-0.15	2,101,871.06	0.69	8733.55	0.60	
11/05/1999	393,876.41	-0.29	2,101,871.08	0.70	8733.54	0.59	
11/29/1999	393,876.47	-0.23	2,101,871.01	0.63	8733.52	0.57	
01/28/2000	393,876.79	0.09	2,101,871.10	0.73	8733.57	0.62	
02/02/2000	393,876.70	0.00	2,101,871.26	0.89	8733.69	0.74	
02/04/2000	393,876.43	-0.26	2,101,871.53	1.16	8733.31	0.36	**MINED UNDER #2 PRISM - Blind Canyon Sean**
02/07/2000	393,876.62	-0.07	2,101,871.22	0.85	8733.02	0.07	
02/08/2000	393,876.12	-0.58	2,101,871.98	1.60	8732.73	-0.22	
02/16/2000	393,876.53	-0.17	2,101,872.54	2.16	8730.06	-2.89	
02/21/2000	393,876.53	-0.17	2,101,872.35	1.98	8729.87	-3.08	
02/28/2000	393,876.98	0.28	2,101,871.78	1.41	8729.52	-3.43	
03/07/2000	393,876.67	-0.03	2,101,871.53	1.16	8729.09	-3.86	
03/24/2000	393,876.64	-0.06	2,101,871.27	0.89	8728.86	-4.09	
04/05/2000	393,876.50	-0.20	2,101,871.19	0.81	8728.83	-4.12	
04/11/2000	393,876.52	-0.17	2,101,871.09	0.71	8728.62	-4.33	
04/24/2000							**No Distance**
05/19/2000							**No Distance**
06/01/2000	393,876.72	0.02	2,101,870.98	0.60	8728.74	-4.21	
07/19/2000	393,876.80	0.10	2,101,871.02	0.65	8728.85	-4.10	
07/24/2000	393,876.63	-0.07	2,101,871.03	0.66	8728.72	-4.23	
08/07/2000	393,876.54	-0.16	2,101,871.04	0.67	8728.61	-4.34	
08/09/2000	393,876.58	-0.12	2,101,871.00	0.62	8728.73	-4.22	
08/24/2000	393,876.68	-0.01	2,101,871.05	0.68	8728.68	-4.27	
09/27/2000	393,877.80	1.10	2,101,870.84	0.47	8728.53	-4.42	
11/27/2000	393,877.94	1.24	2,101,870.55	0.18	8728.32	-4.63	
							Mirrors Replaced (7/2001)
02/05/2002	393,878.05	1.35	2,101,869.91	-0.47	8729.34	-3.61	**MINED UNDER #2 PRISM - Hiawatha Seam**
03/14/2002	393,875.77	-0.93	2,101,871.42	1.04	8722.99	-9.96	
03/20/2002	393,875.42	-1.28	2,101,871.16	0.78	8723.03	-9.92	
04/17/2002	393,875.21	-1.49	2,101,870.94	0.56	8722.64	-10.31	
05/02/2002	393,875.10	-1.59	2,101,870.88	0.50	8722.57	-10.38	
05/31/2002	393,875.44	-1.26	2,101,870.85	0.47	8722.72	-10.23	
07/17/2002	393,875.25	-1.44	2,101,870.90	0.52	8722.76	-10.19	
10/15/2002	393,875.14	-1.56	2,101,870.63	0.26	8722.6	-10.35	
01/30/2003	393,874.88	-1.82	2,101,870.62	0.24	8722.74	-10.21	

Average Survey Prior To Undermining

Cut off Date	**15-Sep-99**
Northing	**393,876.70**
Easting	**2,101,870.37**
Elevation	**8,732.95**


Rilda Canyon Prism #2
Easting (ft)
2,101,873.0
2,101,872.5
2,101,872.0
2,101,871.5
2,101,871.0
2,101,870.5
2,101,870.0
2,101,869.5
07/24/1998
02/09/1999
08/28/1999
03/15/2000
10/01/2000
04/19/2001
11/05/2001
05/24/2002
12/10/2002
Easting


Rilda Canyon Prism #2
Northing (ft)
393,878.5
393,878.0
393,877.5
393,877.0
393,876.5
393,876.0
393,875.5
393,875.0
393,874.5
07/24/1998
02/09/1999
08/28/1999
03/15/2000
10/01/2000
04/19/2001
11/05/2001
05/24/2002
12/10/2002
Northing


Rilda Canyon Prism #2
Elevation (ft)
8,736.0
8,734.0
8,732.0
8,730.0
8,728.0
8,726.0
8,724.0
8,722.0
07/24/1998
02/09/1999
08/28/1999
03/15/2000
10/01/2000
04/19/2001
11/05/2001
05/24/2002
12/10/2002
Elevation

RILDA CANYON PRISMS

Prisms 1-3 Installed on February 24, 1999

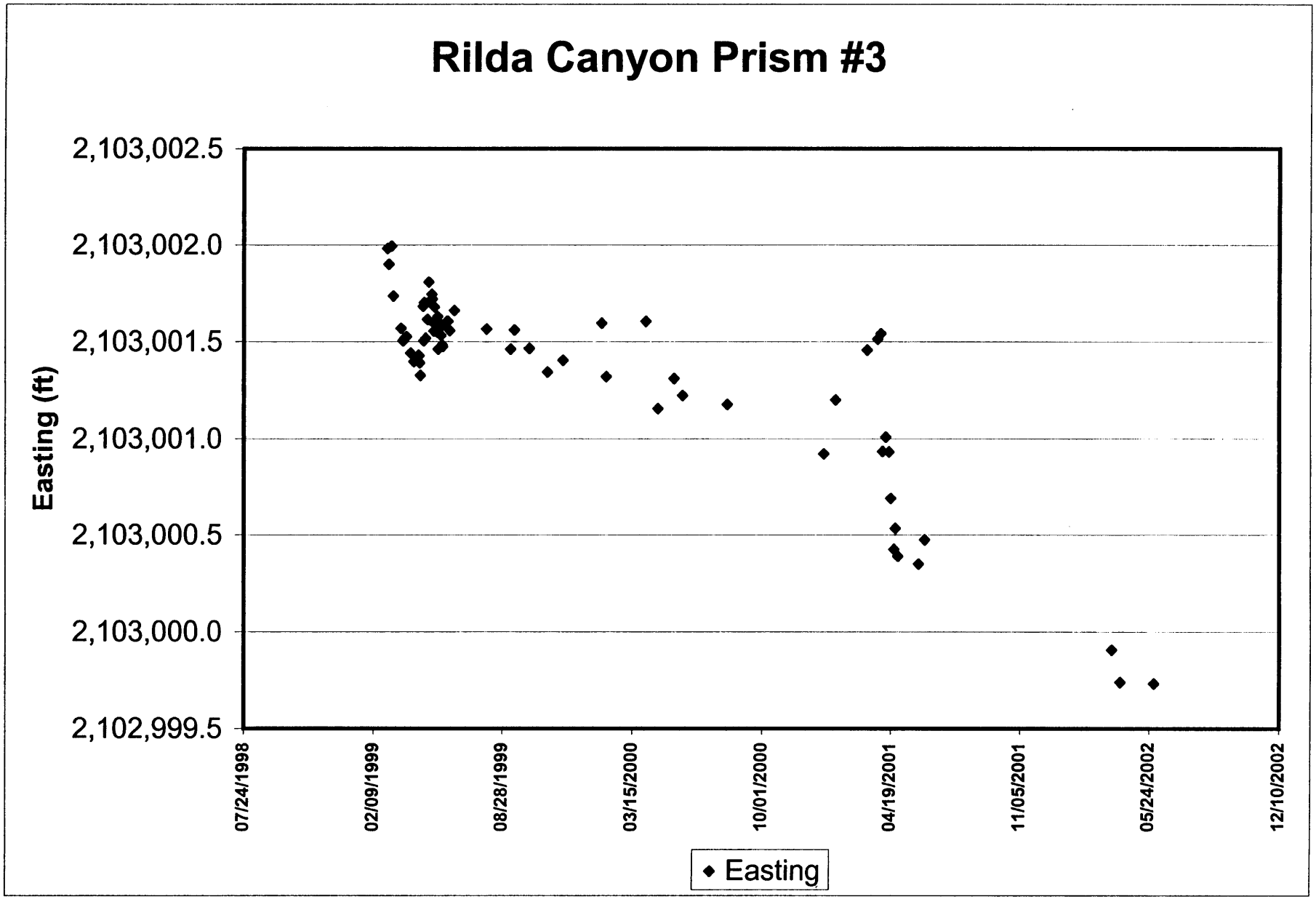
Baseline Data

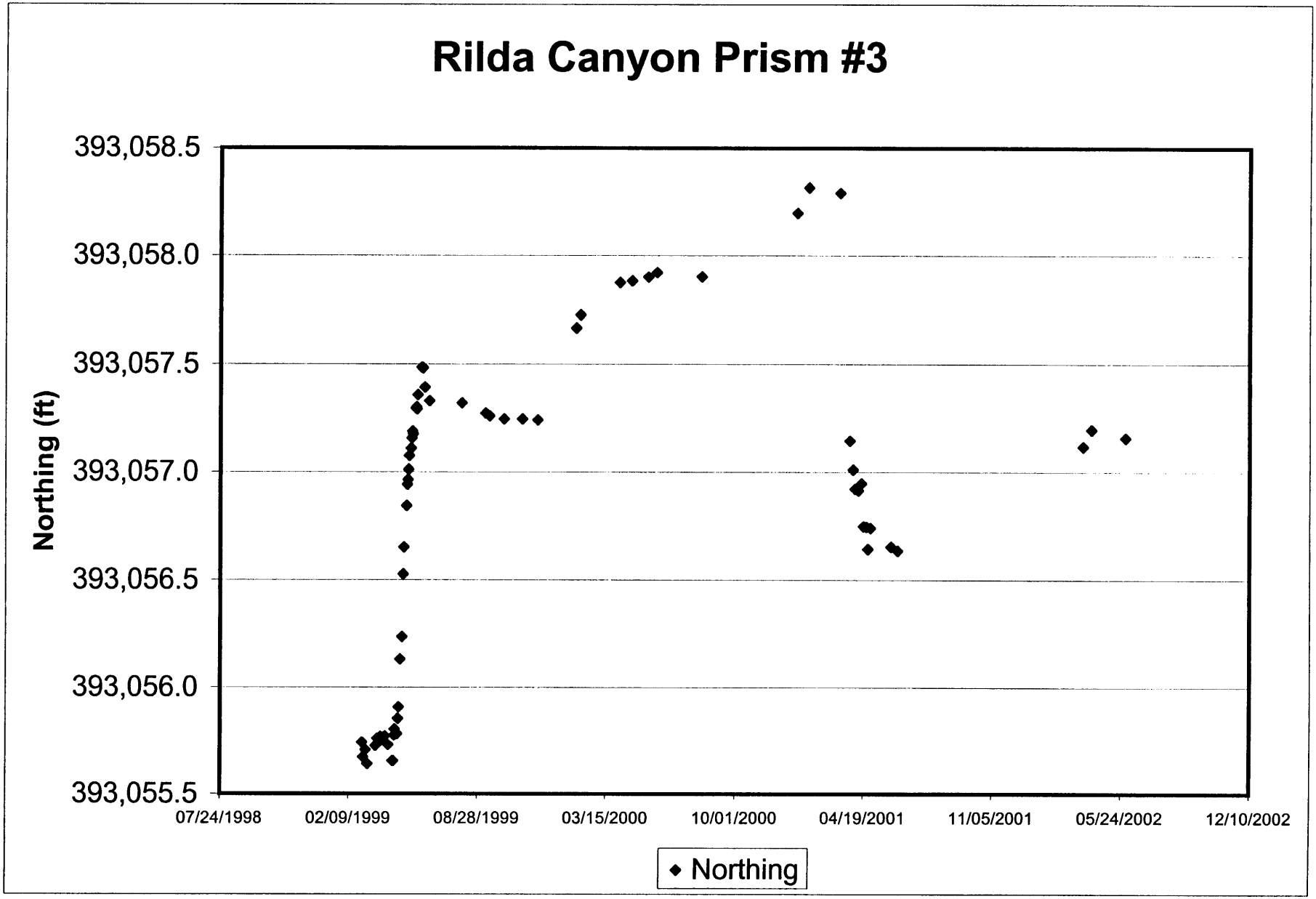
PRISM 3

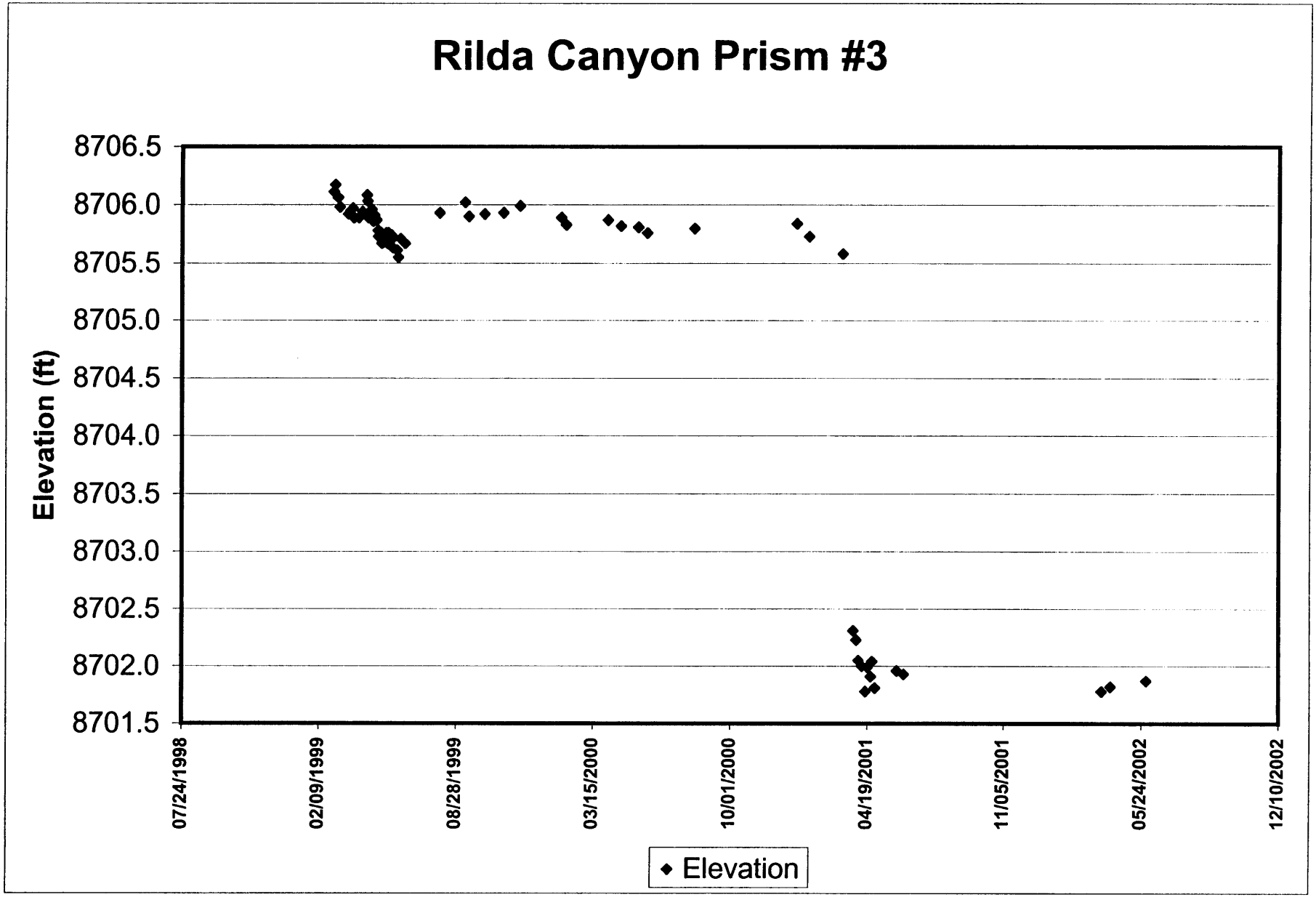
Date	Northing Reading	Northing Variance	Easting Reading	Easting Variance	Elevation Reading	Elevation Variance	
03/02/1999	393,055.74		2,103,001.98		8706.11		
03/04/1999	393,055.67		2,103,001.90		8706.17		
03/08/1999	393,055.71		2,103,001.99		8706.06		
03/11/1999	393,055.64		2,103,001.73		8705.98		
03/23/1999	393,055.73		2,103,001.57		8705.92		
03/26/1999	393,055.76		2,103,001.50		8705.95		
03/29/1999	393,055.74		2,103,001.52		8705.97		
03/31/1999	393,055.77		2,103,001.53		8705.89		Average Cutoff
04/07/1999	393,055.77	0.05	2,103,001.44	-0.28	8705.89	-0.12	
04/12/1999	393,055.73	0.01	2,103,001.40	-0.32	8705.94	-0.07	
04/19/1999	393,055.65	-0.07	2,103,001.43	-0.29	8706.08	0.07	
04/20/1999	393,055.65	-0.07	2,103,001.43	-0.29	8706.03	0.02	
04/21/1999	393,055.78	0.06	2,103,001.39	-0.32	8705.89	-0.12	
04/22/1999	393,055.80	0.08	2,103,001.33	-0.39	8705.89	-0.12	
04/26/1999	393,055.78	0.06	2,103,001.68	-0.03	8705.96	-0.05	
04/27/1999	393,055.85	0.13	2,103,001.50	-0.21	8705.90	-0.11	
04/28/1999	393,055.91	0.19	2,103,001.70	-0.01	8705.86	-0.15	
04/30/1999	393,056.13	0.41	2,103,001.52	-0.20	8705.91	-0.10	
05/03/1999	393,056.24	0.52	2,103,001.61	-0.10	8705.87	-0.14	
05/05/1999	393,056.53	0.81	2,103,001.81	0.09	8705.78	-0.23	
05/06/1999	393,056.65	0.93	2,103,001.71	-0.01	8705.73	-0.28	
05/10/1999	393,056.84	1.12	2,103,001.74	0.03	8705.76	-0.25	
05/11/1999	393,056.94	1.22	2,103,001.72	0.00	8705.67	-0.34	
05/12/1999	393,056.96	1.24	2,103,001.60	-0.12	8705.68	-0.33	
05/13/1999	393,057.01	1.29	2,103,001.55	-0.16	8705.69	-0.32	
05/14/1999	393,057.08	1.36	2,103,001.68	-0.04	8705.68	-0.33	
05/17/1999	393,057.11	1.39	2,103,001.61	-0.10	8705.76	-0.25	
05/18/1999	393,057.16	1.44	2,103,001.55	-0.17	8705.72	-0.29	
05/19/1999	393,057.19	1.47	2,103,001.63	-0.09	8705.67	-0.34	
05/20/1999	393,057.17	1.45	2,103,001.46	-0.25	8705.76	-0.25	
05/24/1999	393,057.29	1.57	2,103,001.53	-0.18	8705.70	-0.31	
05/25/1999	393,057.30	1.58	2,103,001.58	-0.14	8705.74	-0.27	
05/26/1999	393,057.29	1.57	2,103,001.48	-0.23	8705.73	-0.28	
05/27/1999	393,057.36	1.64	2,103,001.47	-0.24	8705.63	-0.38	
06/02/1999	393,057.49	1.77	2,103,001.60	-0.11	8705.61	-0.40	
06/04/1999	393,057.48	1.76	2,103,001.60	-0.11	8705.55	-0.46	
06/07/1999	393,057.39	1.67	2,103,001.56	-0.16	8705.71	-0.30	
06/14/1999	393,057.33	1.61	2,103,001.66	-0.06	8705.67	-0.34	
08/03/1999	393,057.32	1.60	2,103,001.56	-0.15	8705.93	-0.08	
09/09/1999	393,057.27	1.55	2,103,001.46	-0.25	8706.02	0.01	
09/15/1999	393,057.26	1.54	2,103,001.56	-0.16	8705.90	-0.11	
10/08/1999	393,057.24	1.52	2,103,001.46	-0.25	8705.92	-0.09	
11/05/1999	393,057.24	1.52	2,103,001.34	-0.37	8705.93	-0.08	
11/29/1999	393,057.24	1.52	2,103,001.40	-0.31	8705.99	-0.02	
01/28/2000	393,057.66	1.94	2,103,001.59	-0.12	8705.89	-0.12	
02/04/2000	393,057.73	2.01	2,103,001.32	-0.40	8705.83	-0.18	
04/05/2000	393,057.88	2.16	2,103,001.60	-0.11	8705.87	-0.14	
04/24/2000	393,057.88	2.16	2,103,001.16	-0.56	8705.82	-0.19	
05/19/2000	393,057.90	2.18	2,103,001.31	-0.40	8705.81	-0.20	
06/01/2000	393,057.92	2.20	2,103,001.22	-0.49	8705.76	-0.25	
08/09/2000	393,057.90	2.18	2,103,001.18	-0.54	8705.80	-0.21	
01/23/2001	393,058.32	2.60	2,103,001.20	-0.52	8705.73	-0.28	
01/05/2001	393,058.20	2.48	2,103,000.92	-0.79	8705.84	-0.17	
03/13/2001	393,058.29	2.57	2,103,001.46	-0.26	8705.58	-0.43	
03/29/2001	393,057.14	1.42	2,103,001.51	-0.20	8702.31	-3.70	MINED UNDER #3 PRISM - Blind Canyon Seam
04/03/2001	393,057.01	1.29	2,103,001.54	-0.17	8702.23	-3.78	
04/06/2001	393,056.92	1.20	2,103,000.94	-0.78	8702.05	-3.96	
04/11/2001	393,056.91	1.19	2,103,001.01	-0.71	8702.00	-4.01	
04/16/2001	393,056.95	1.23	2,103,000.93	-0.78	8701.78	-4.23	
04/19/2001	393,056.75	1.03	2,103,000.69	-1.02	8701.99	-4.02	
04/24/2001	393,056.75	1.03	2,103,000.43	-1.29	8701.91	-4.10	
04/26/2001	393,056.64	0.92	2,103,000.53	-1.18	8702.04	-3.97	
04/30/2001	393,056.74	1.02	2,103,000.39	-1.33	8701.81	-4.20	
06/01/2001	393,056.65	0.93	2,103,000.35	-1.36	8701.96	-4.05	
06/11/2001	393,056.64	0.92	2,103,000.48	-1.24	8701.93	-4.08	
03/27/2002	393,057.12	1.40	2,102,999.91	-1.81	8701.78	-4.23	
04/09/2002	393,057.20	1.48	2,102,999.74	-1.98	8701.82	-4.19	
05/31/2002	393,057.16	1.44	2,102,999.73	-1.98	8701.87	-4.14	
10/15/2002	393,057.19	1.47	2,102,999.81	-1.90	8701.87	-4.14	
01/30/2003	393,057.07	1.35	2,102,999.74	-1.97	8701.85	-4.16	

Average Survey Prior To Undermining

Cutoff Date	**03/31/1999**
Northing	**393,055.72**
Easting	**2,103,001.72**
Elevation	**8,706.01**


Rilda Canyon Prism #3
Easting (ft)
2,103,002.5
2,103,002.0
2,103,001.5
2,103,001.0
2,103,000.5
2,103,000.0
2,102,999.5
07/24/1998
02/09/1999
08/28/1999
03/15/2000
10/01/2000
04/19/2001
11/05/2001
05/24/2002
12/10/2002
Easting


Rilda Canyon Prism #3
Northing (ft)
393,058.5
393,058.0
393,057.5
393,057.0
393,056.5
393,056.0
393,055.5
07/24/1998
02/09/1999
08/28/1999
03/15/2000
10/01/2000
04/19/2001
11/05/2001
05/24/2002
12/10/2002
Northing


Rilda Canyon Prism #3
Elevation (ft)
8706.5
8706.0
8705.5
8705.0
8704.5
8704.0
8703.5
8703.0
8702.5
8702.0
8701.5
07/24/1998
02/09/1999
08/28/1999
03/15/2000
10/01/2000
04/19/2001
11/05/2001
05/24/2002
12/10/2002
Elevation

RILDA CANYON PRISMS

Prisms 4-6 Installed on JUNE 21, 1999

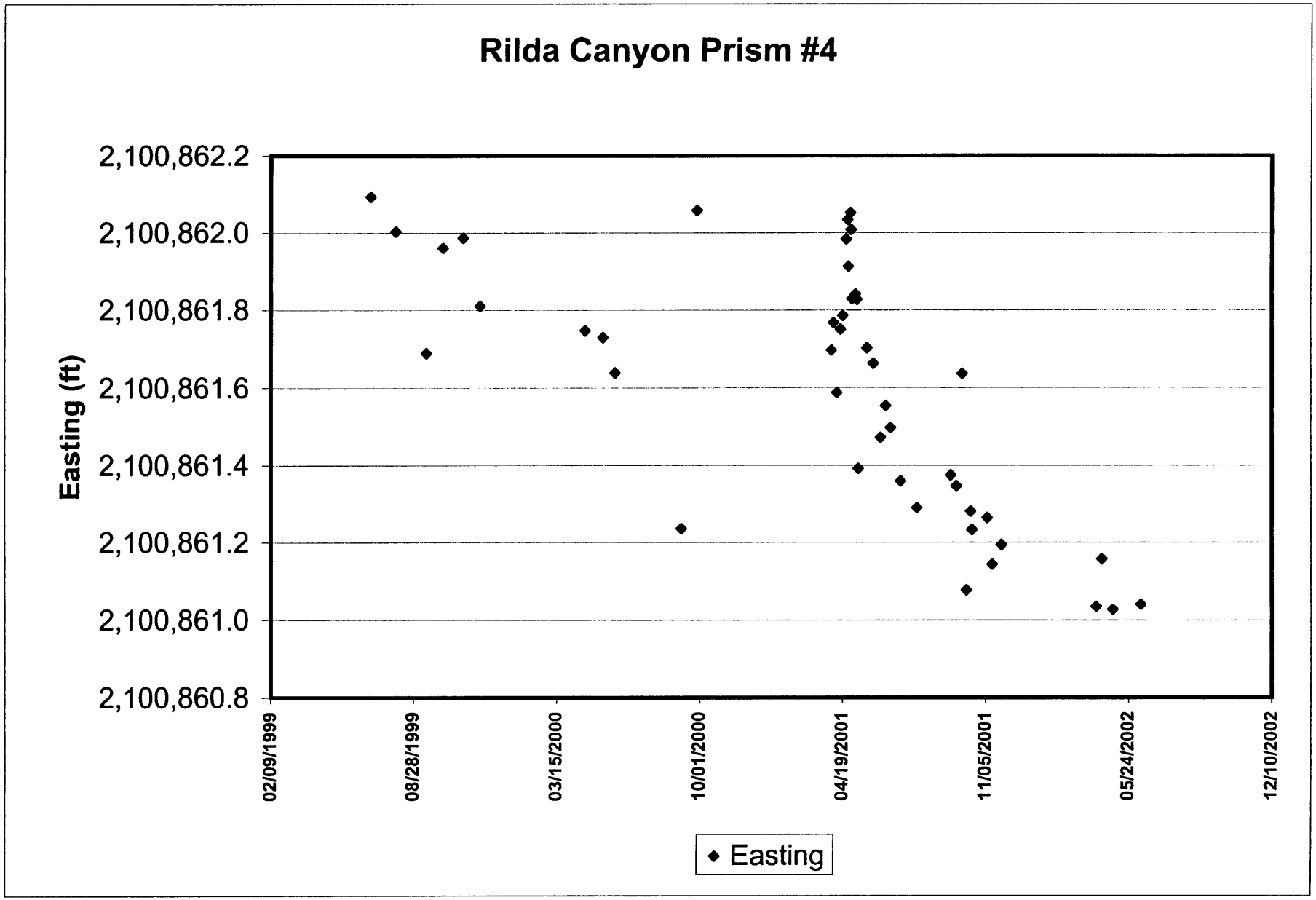
Baseline Data

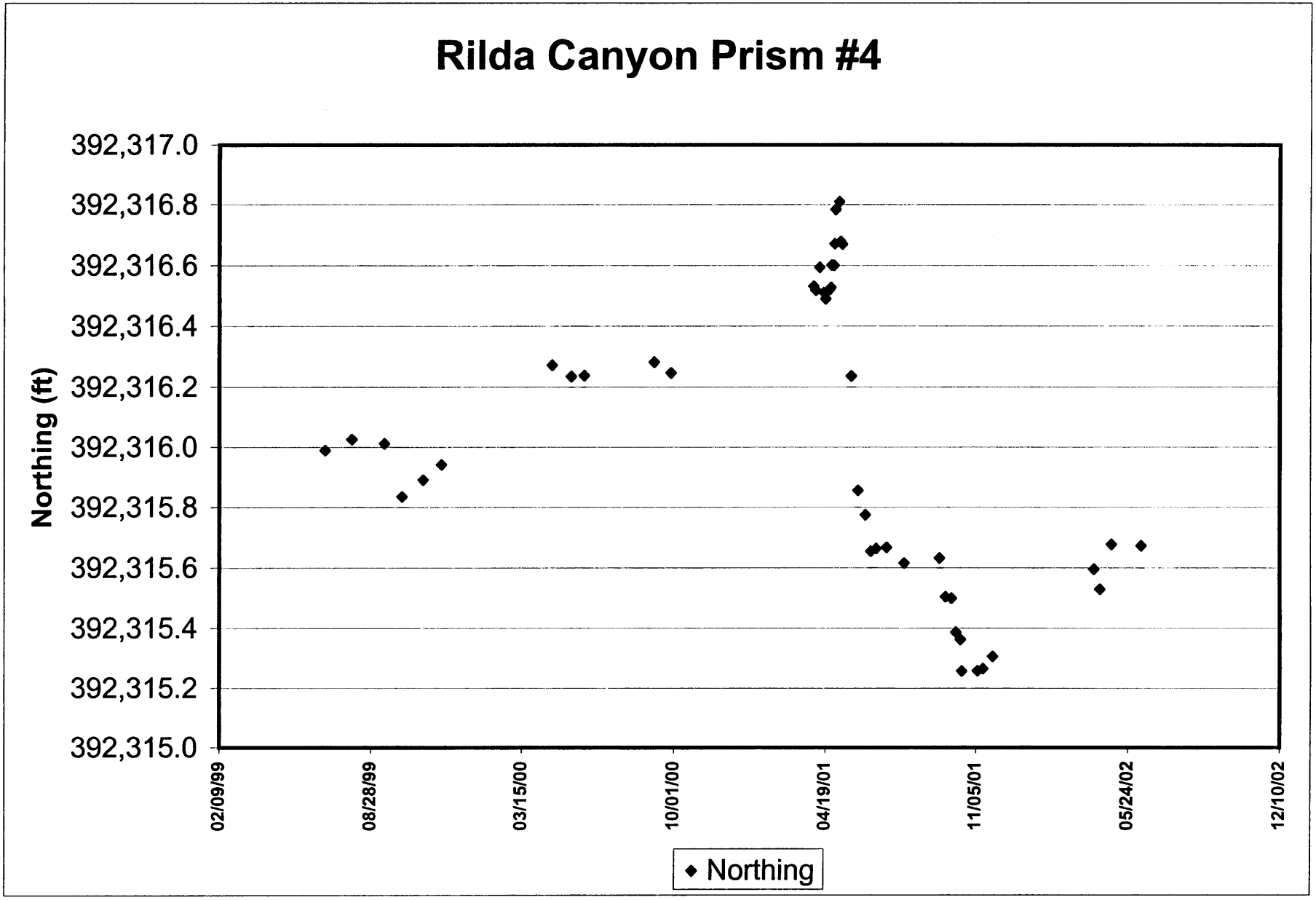
PRISM 4

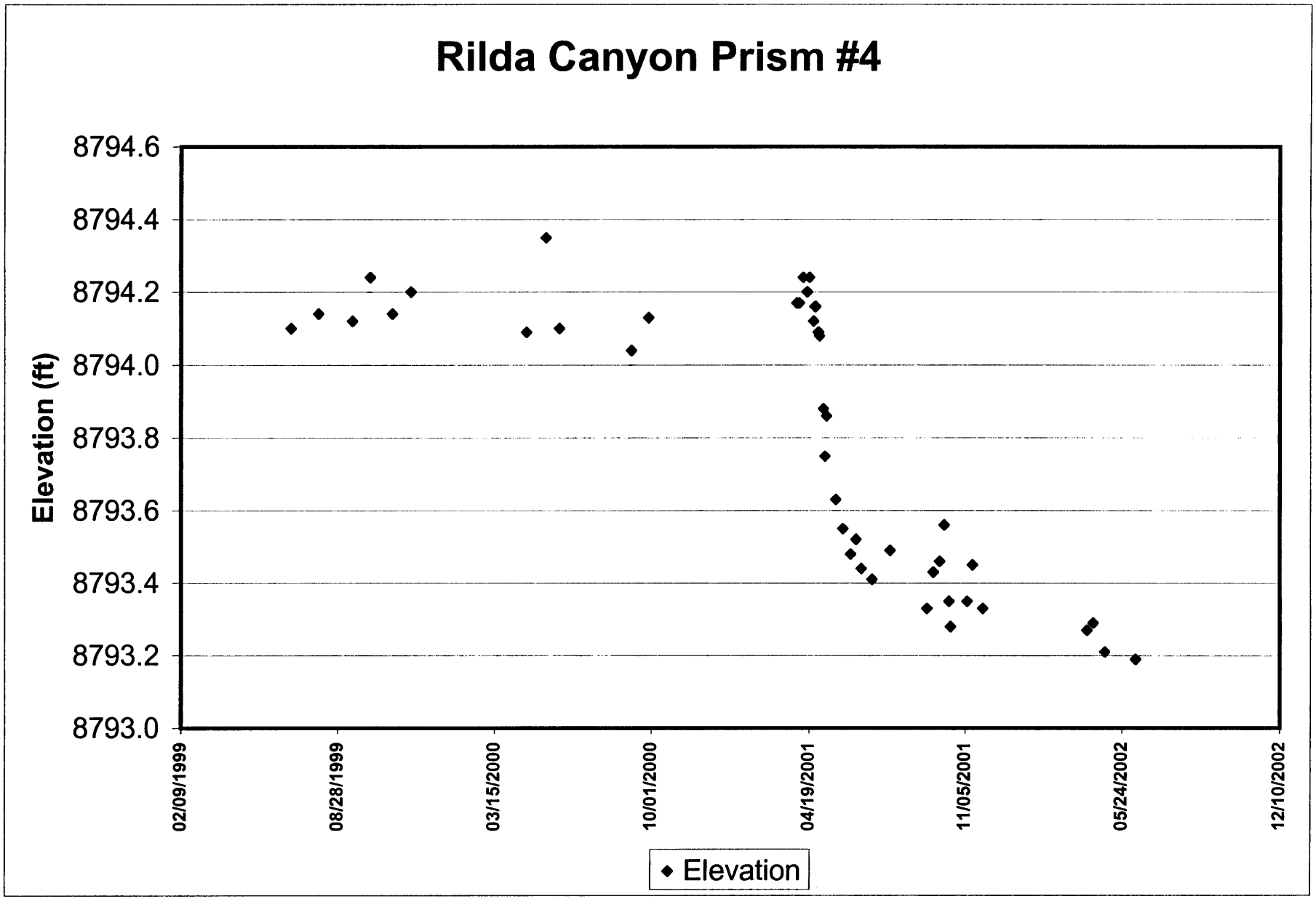
Date	Northing Reading	Northing Variance	Easting Reading	Easting Variance	Elevation Reading	Elevation Variance	
06/29/1999	392,315.99		2,100,862.09		8794.10		
08/03/1999	392,316.03		2,100,862.00		8794.14		
09/15/1999	392,316.01		2,100,861.69		8794.12		
10/08/1999	392,315.84		2,100,861.96		8794.24		
11/05/1999	392,315.89		2,100,861.99		8794.14		
11/29/1999	392,315.94		2,100,861.81		8794.20		
04/24/2000	392,316.27		2,100,861.75		8794.09		
05/19/2000	392,316.24		2,100,861.73		8794.35		
06/05/2000	392,316.24		2,100,861.64		8794.10		
09/05/2000	392,316.28		2,100,861.24		8794.04		
09/27/2000	392,316.25		2,100,862.06		8794.13		
04/03/2001	392,316.53		2,100,861.70		8794.17		Average Cutoff
04/06/2001	392,316.52	0.43	2,100,861.77	-0.04	8794.17	0.02	
04/11/2001	392,316.59	0.51	2,100,861.59	-0.22	8794.24	0.09	
04/16/2001	392,316.51	0.42	2,100,861.75	-0.05	8794.2	0.05	
04/19/2001	392,316.49	0.40	2,100,861.79	-0.02	8794.24	0.09	MINED UNDER #4 PRISM - Blind Canyon Seam
04/24/2001	392,316.52	0.43	2,100,861.98	0.18	8794.12	-0.03	
04/26/2001	392,316.53	0.44	2,100,862.03	0.23	8794.16	0.01	
04/27/2001	392,316.60	0.51	2,100,861.91	0.11	8794.16	0.01	
04/30/2001	392,316.60	0.51	2,100,862.05	0.25	8794.09	-0.06	
05/01/2001	392,316.67	0.58	2,100,862.01	0.20	8794.09	-0.06	
05/02/2001	392,316.78	0.70	2,100,861.83	0.02	8794.08	-0.07	
05/07/2001	392,316.81	0.72	2,100,861.84	0.04	8793.88	-0.27	
05/09/2001	392,316.68	0.59	2,100,861.83	0.02	8793.75	-0.40	
05/11/2001	392,316.67	0.58	2,100,861.39	-0.41	8793.86	-0.29	
05/23/2001	392,316.24	0.15	2,100,861.70	-0.10	8793.63	-0.52	
06/01/2001	392315.86	-0.23	2100861.66	-0.14	8793.55	-0.60	
06/11/2001	392,315.78	-0.31	2,100,861.47	-0.33	8793.48	-0.67	
06/18/2001	392,315.65	-0.43	2,100,861.55	-0.25	8793.52	-0.63	
06/25/2001	392,315.66	-0.42	2,100,861.50	-0.31	8793.44	-0.71	
07/09/2001	392,315.67	-0.42	2,100,861.36	-0.44	8793.41	-0.74	
08/01/2001	392,315.62	-0.47	2,100,861.29	-0.51	8793.49	-0.66	
09/17/2001	392,315.63	-0.46	2,100,861.38	-0.43	8793.33	-0.82	
09/25/2001	392,315.50	-0.58	2,100,861.35	-0.46	8793.43	-0.72	
10/03/2001	392,315.50	-0.59	2,100,861.64	-0.17	8793.46	-0.69	
10/09/2001	392,315.39	-0.70	2,100,861.08	-0.73	8793.56	-0.59	
10/15/2001	392,315.36	-0.72	2,100,861.28	-0.52	8793.35	-0.80	
10/17/2001	392,315.26	-0.83	2,100,861.23	-0.57	8793.28	-0.87	
11/07/2001	392,315.26	-0.83	2,100,861.26	-0.54	8793.35	-0.80	
11/14/2001	392,315.27	-0.82	2,100,861.14	-0.66	8793.45	-0.70	
11/27/2001	392,315.31	-0.78	2,100,861.19	-0.61	8793.33	-0.82	
04/09/2002	392,315.60	-0.49	2,100,861.04	-0.77	8793.27	-0.88	
04/17/2002	392,315.53	-0.56	2,100,861.16	-0.65	8793.29	-0.86	
05/02/2002	392,315.68	-0.41	2,100,861.03	-0.78	8793.21	-0.94	
06/10/2002	392,315.67	-0.42	2,100,861.04	-0.76	8793.19	-0.96	
10/15/2002	392,315.39	-0.70	2,100,860.91	-0.90	8792.91	-1.24	
03/03/2003	392,315.02	-1.07	2,100,861.01	-0.79	8792.76	-1.39	

AVERAGE SURVEY PRIOR TO UNDERMINING

Cutoff Date	**04/03/2001**
Northing	**392,316.09**
Easting	**2,100,861.80**
Elevation	**8794.15**


Rilda Canyon Prism #4
Easting (ft)
2,100,862.2
2,100,862.0
2,100,861.8
2,100,861.6
2,100,861.4
2,100,861.2
2,100,861.0
2,100,860.8
02/09/1999
08/28/1999
03/15/2000
10/01/2000
04/19/2001
11/05/2001
05/24/2002
12/10/2002
Easting


Rilda Canyon Prism #4
Northing (ft)
392,317.0
392,316.8
392,316.6
392,316.4
392,316.2
392,316.0
392,315.8
392,315.6
392,315.4
392,315.2
392,315.0
02/09/99
08/28/99
03/15/00
10/01/00
04/19/01
11/05/01
05/24/02
12/10/02
Northing


Rilda Canyon Prism #4
Elevation (ft)
8794.6
8794.4
8794.2
8794.0
8793.8
8793.6
8793.4
8793.2
8793.0
02/09/1999
08/28/1999
03/15/2000
10/01/2000
04/19/2001
11/05/2001
05/24/2002
12/10/2002
Elevation

RILDA CANYON PRISMS

Prisms 4-6 Installed on JUNE 21, 1999

Baseline Data

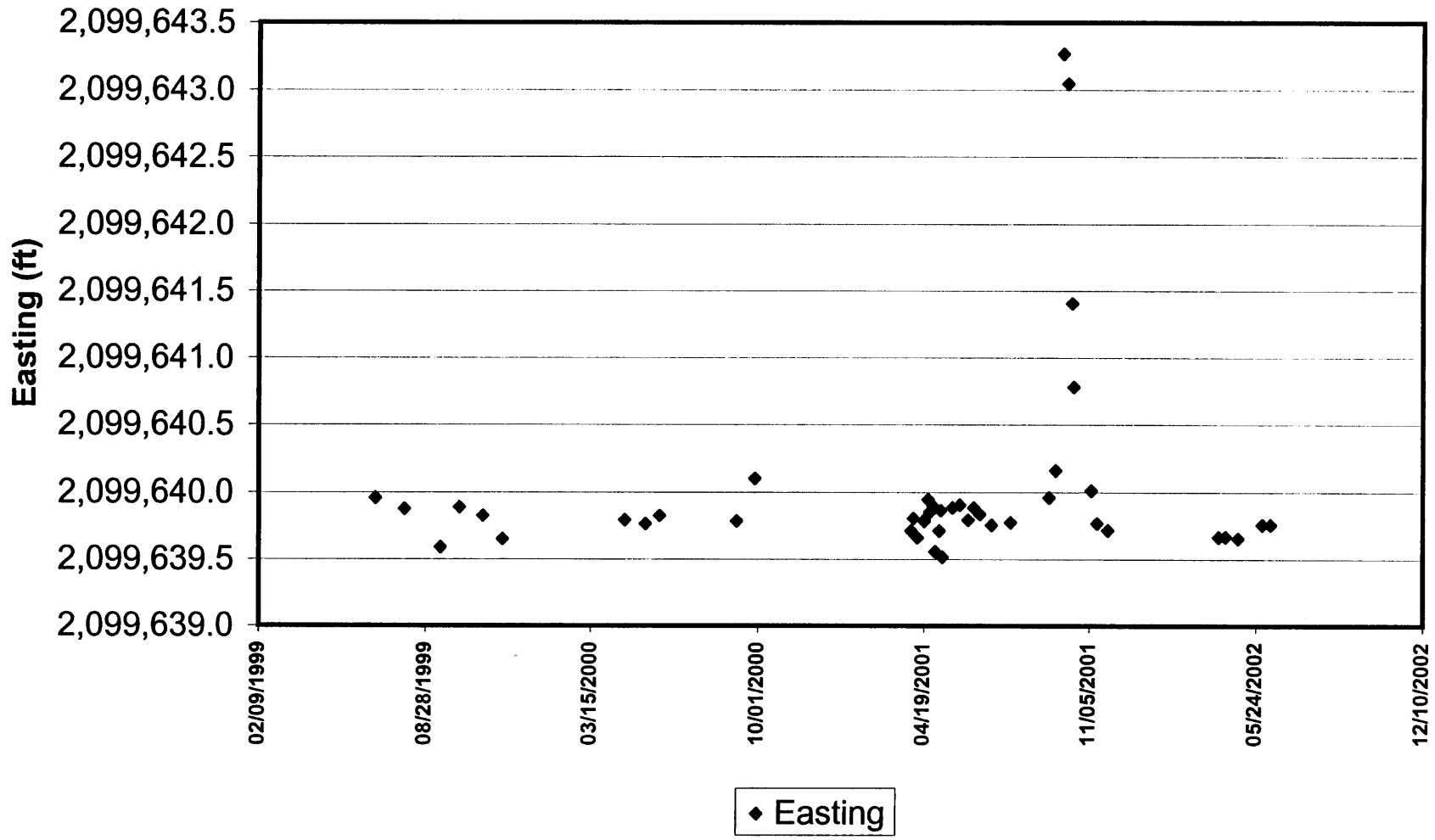
PRISM 5

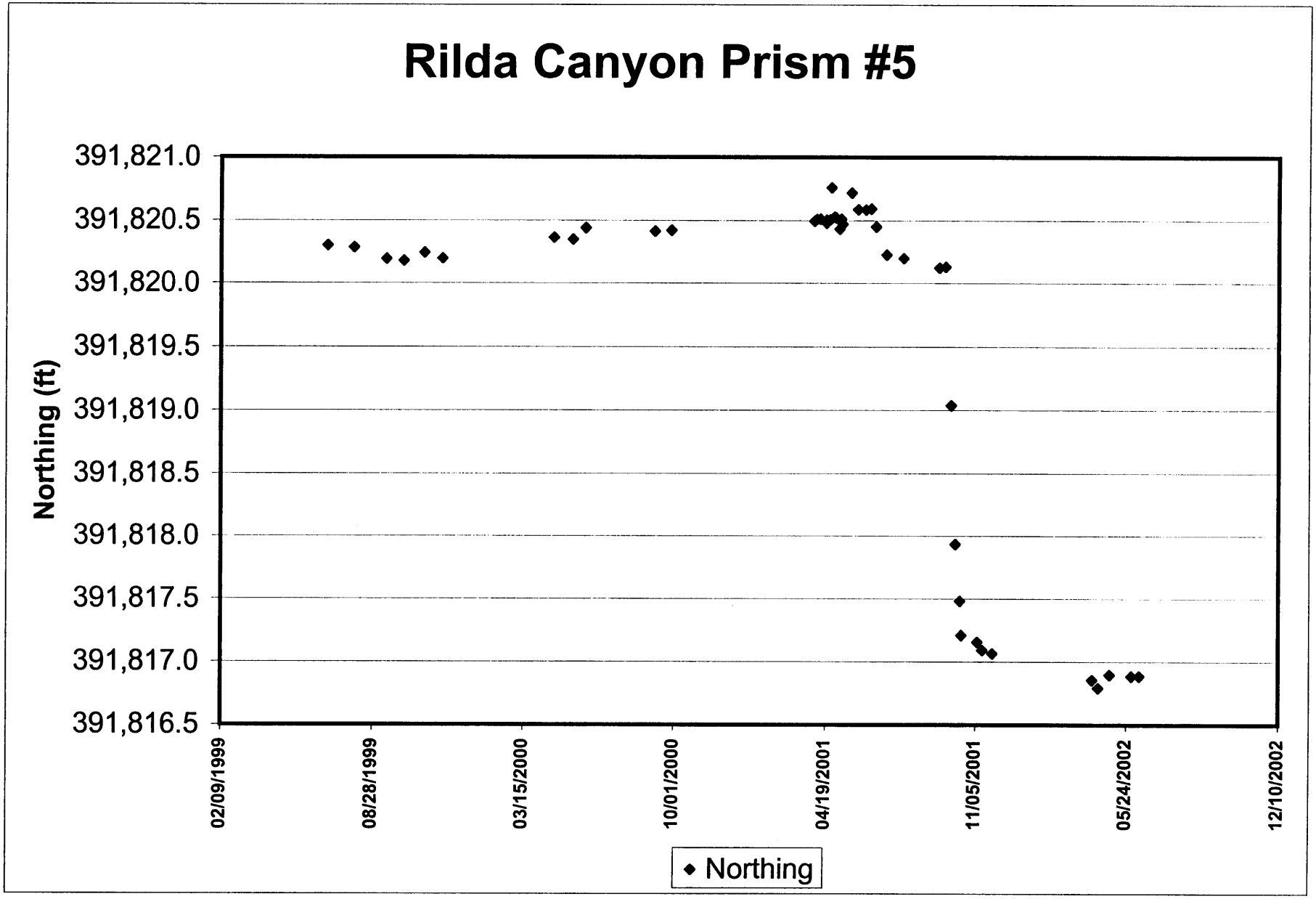
Date	Northing Reading	Northing Variance	Easting Reading	Easting Variance	Elevation Reading	Elevation Variance	
06/29/1999	391,820.30		2,099,639.96		8814.77		
08/03/1999	391,820.29		2,099,639.88		8814.82		
09/15/1999	391,820.20		2,099,639.59		8814.79		
10/08/1999	391,820.18		2,099,639.89		8814.82		
11/05/1999	391,820.24		2,099,639.83		8814.77		
11/29/1999	391,820.20		2,099,639.65		8814.83		
04/24/2000	391,820.36		2,099,639.79		8814.76		
05/19/2000	391,820.35		2,099,639.76		8814.87		
06/05/2000	391,820.44		2,099,639.83		8814.74		
09/05/2000	391,820.41		2,099,639.78		8814.81		
09/27/2000	391,820.42		2,099,640.10		8814.82		
04/03/2001	391,820.49		2,099,639.71		8814.84		
04/06/2001	391,820.51		2,099,639.81		8814.86		
04/11/2001	391,820.51		2,099,639.66		8814.91		
04/19/2001	391,820.48		2,099,639.78		8814.90		
04/19/2001	391,820.50		2,099,639.79		8814.86		
04/24/2001	391,820.51		2,099,639.95		8814.89		
04/26/2001	391,820.76		2,099,639.85		8814.85		
04/30/2001	391,820.53		2,099,639.90		8814.80		
05/02/2001	391,820.52		2,099,639.56		8814.83		
05/07/2001	391,820.43		2,099,639.71		8814.99		
05/09/2001	391,820.51		2,099,639.87		8814.84		
05/11/2001	391,820.47		2,099,639.52		8814.93		
05/23/2001	391,820.72		2,099,639.88		8814.80		
06/01/2001	391,820.59		2,099,639.91		8814.75		
06/11/2001	391,820.58		2,099,639.79		8814.80		
06/18/2001	391,820.59		2,099,639.89		8814.72		
06/25/2001	391820.45		2,099,639.84		8814.78		Average Cutoff
07/09/2001	391,820.23	-0.22	2,099,639.75	-0.05	8814.86	0.03	
08/01/2001	391,820.20	-0.25	2,099,639.78	-0.03	8814.76	-0.07	
09/17/2001	391,820.12	-0.32	2,099,639.96	0.16	8814.86	0.03	
09/25/2001	391,820.13	-0.32	2,099,640.16	0.36	8814.74	-0.09	MINED UNDER #5 PRISM - Blind Canyon Seam
10/03/2001	391,819.04	-1.41	2,099,643.27	3.46	8813.08	-1.75	
10/09/2001	391,817.93	-2.51	2,099,643.05	3.24	8810.45	-4.38	
10/15/2001	391,817.48	-2.97	2,099,641.41	1.60	8808.81	-6.02	
10/17/2001	391,817.21	-3.24	2,099,640.78	0.98	8808.64	-6.19	
11/07/2001	391,817.16	-3.29	2,099,640.01	0.21	8808.11	-6.72	
11/14/2001	391,817.09	-3.36	2,099,639.77	-0.04	8808.14	-6.69	
11/27/2001	391,817.07	-3.38	2,099,639.72	-0.09	8808.06	-6.77	
04/09/2002	391816.856	-3.59	2,099,639.67	-0.14	8807.96	-6.87	
04/17/2002	391,816.79	-3.65	2,099,639.67	-0.14	8808.03	-6.80	
05/02/2002	391,816.90	-3.55	2,099,639.66	-0.15	8807.92	-6.91	
05/31/2002	391,816.89	-3.56	2,099,639.76	-0.05	8807.96	-6.87	
06/10/2002	391,816.89	-3.56	2,099,639.76	-0.05	8807.96	-6.87	
10/15/2002	391,817.06	-3.39	2,099,639.73	-0.08	8807.82	-7.01	
03/03/2003	391,816.81	-3.63	2,099,639.15	-0.65	8807.66	-7.17	

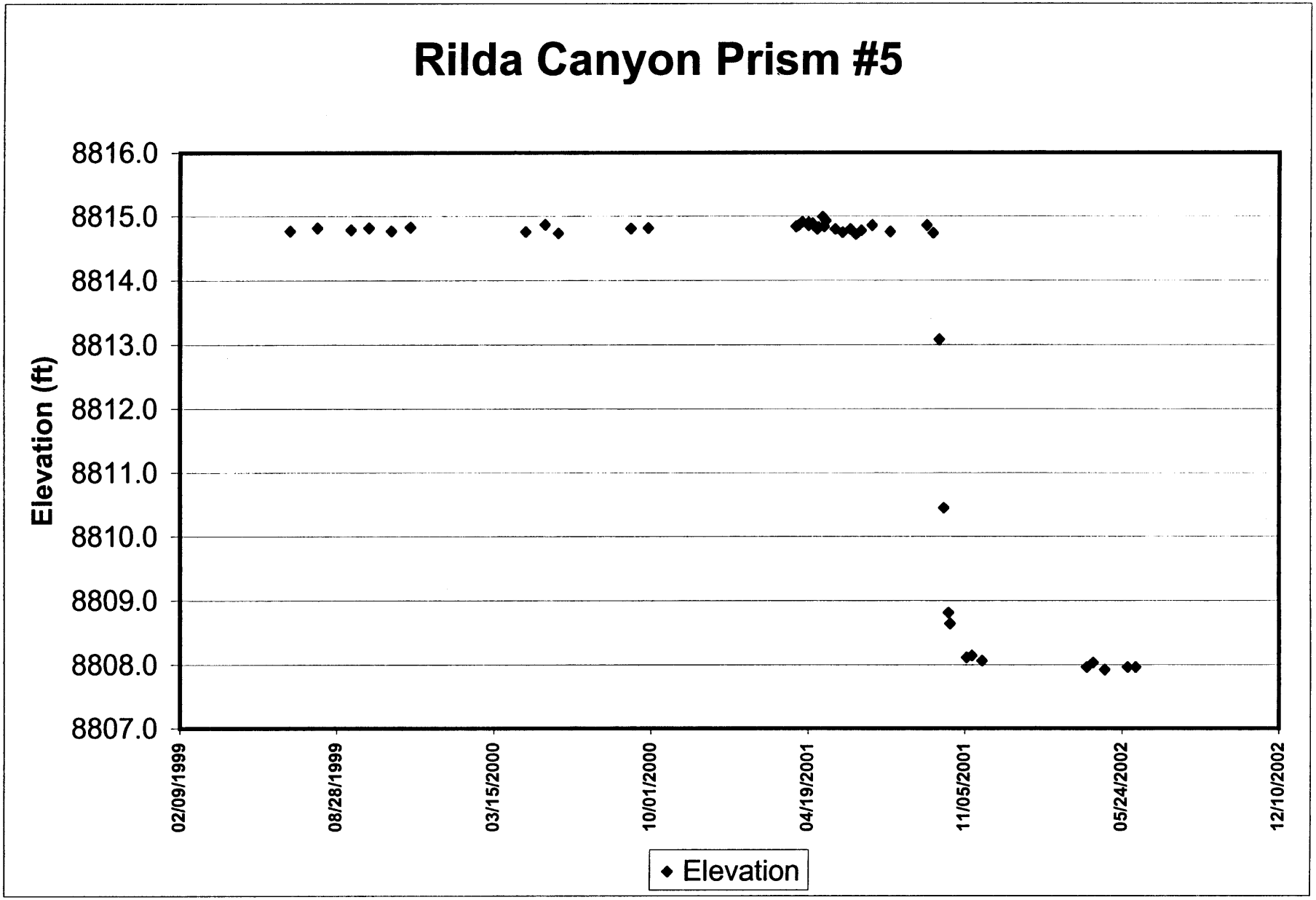
AVERAGE SURVEY PRIOR TO UNDER MINING

Cutoff Date	**06/25/2001**
Northing	**391,820.45**
Easting	**2,099,639.80**
Elevation	**8814.83**

Rilda Canyon Prism #5




Rilda Canyon Prism #5
Northing (ft)
391,821.0
391,820.5
391,820.0
391,819.5
391,819.0
391,818.5
391,818.0
391,817.5
391,817.0
391,816.5
02/09/1999
08/28/1999
03/15/2000
10/01/2000
04/19/2001
11/05/2001
05/24/2002
12/10/2002
Northing


Rilda Canyon Prism #5
Elevation (ft)
8816.0
8815.0
8814.0
8813.0
8812.0
8811.0
8810.0
8809.0
8808.0
8807.0
02/09/1999
08/28/1999
03/15/2000
10/01/2000
04/19/2001
11/05/2001
05/24/2002
12/10/2002
Elevation

RILDA CANYON PRISMS

Prisms 4-6 Installed on JUNE 21, 1999

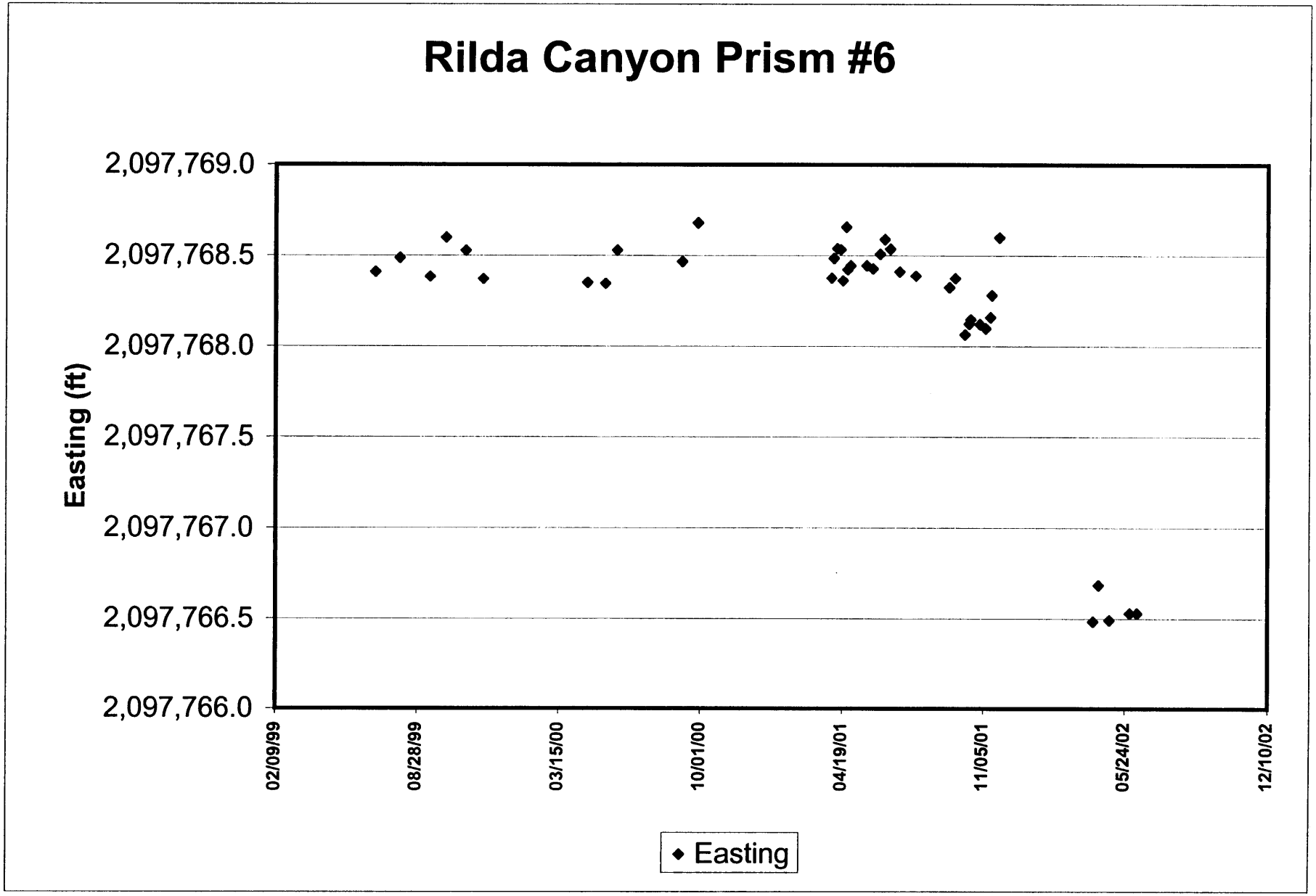
Baseline Data

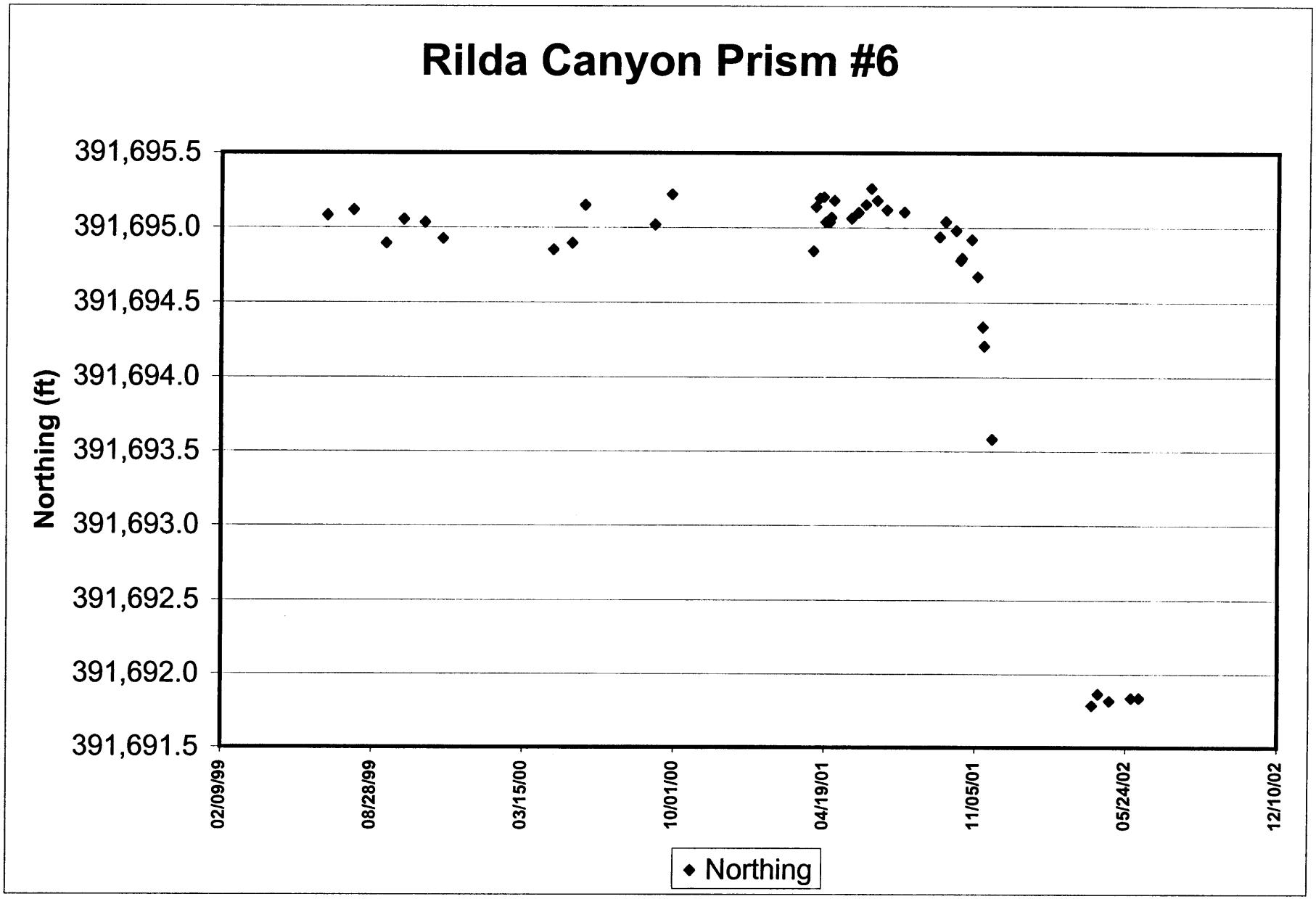
PRISM 6

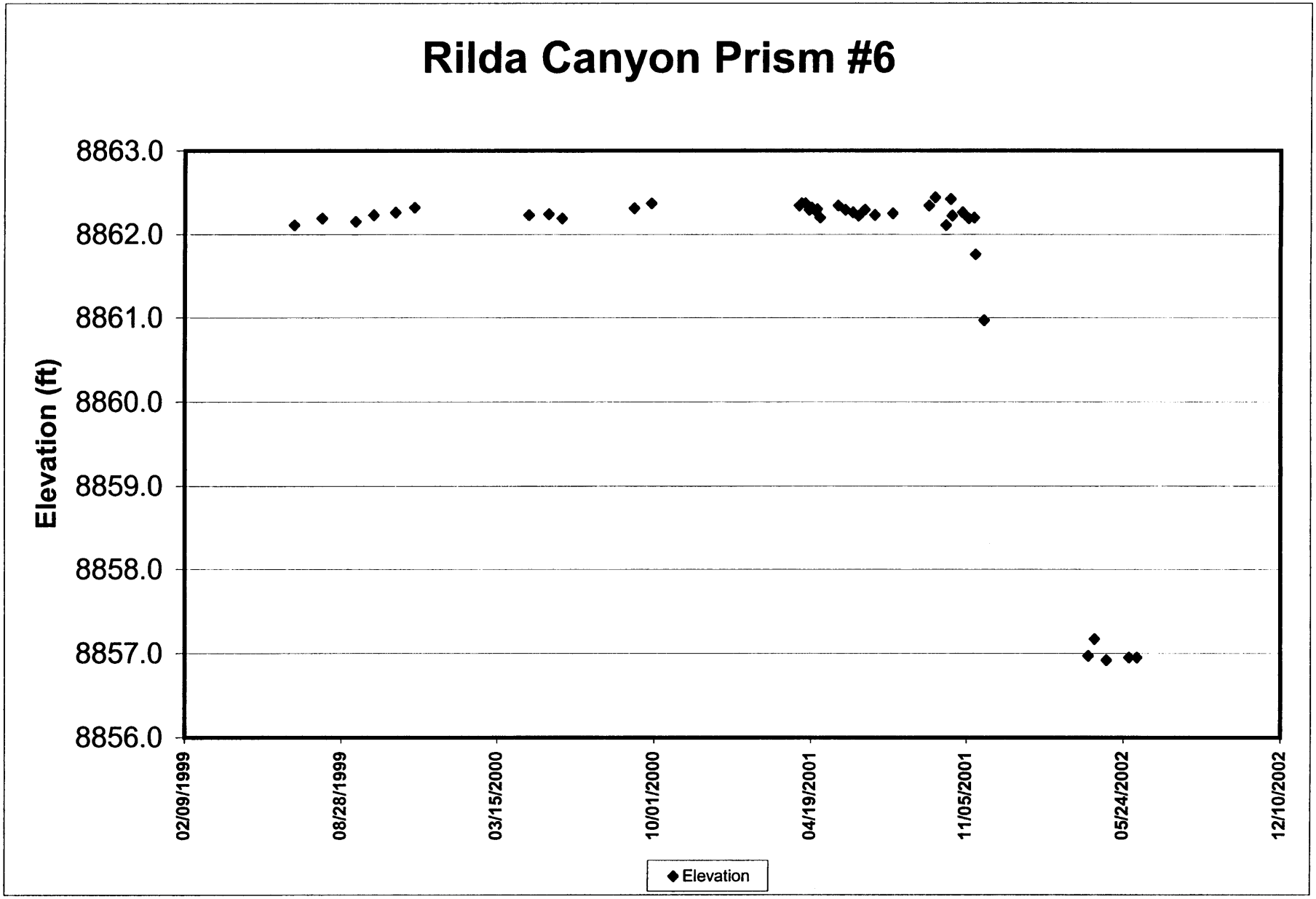
	Northing		Easting		Elevation		
Date	Reading	Variance	Reading	Variance	Reading	Variance	
06/29/1999	391,695.08		2,097,768.41		8862.11		
08/03/1999	391,695.11		2,097,768.49		8862.19		
09/15/1999	391,694.89		2,097,768.38		8862.15		
10/08/1999	391,695.05		2,097,768.60		8862.23		
11/05/1999	391,695.03		2,097,768.53		8862.26		
11/29/1999	391,694.93		2,097,768.37		8862.32		
04/24/2000	391,694.85		2,097,768.35		8862.23		
05/19/2000	391,694.90		2,097,768.35		8862.24		
06/05/2000	391,695.15		2,097,768.53		8862.19		
09/05/2000	391,695.02		2,097,768.47		8862.31		
09/27/2000	391,695.22		2,097,768.68		8862.37		
04/03/2001	391,694.84		2,097,768.38		8862.34		
04/06/2001	391,695.14		2,097,768.49		8862.37		
04/11/2001	391,695.19		2,097,768.54		8862.37		
04/16/2001	391,695.20		2,097,768.53		8862.29		
04/19/2001	391,695.04		2,097,768.36		8862.32		
04/24/2001	391,695.04		2,097,768.66		8862.28		
04/26/2001	391,695.07		2,097,768.42		8862.30		
04/30/2001	391,695.18		2,097,768.45		8862.20		
05/23/2001	391,695.06		2,097,768.45		8862.34		
06/01/2001	391,695.10		2,097,768.43		8862.29		
06/11/2001	391,695.15		2,097,768.51		8862.26		
06/18/2001	391,695.26		2,097,768.59		8862.22		
06/26/2001	391,695.18		2,097,768.54		8862.29		
07/09/2001	391,695.12		2,097,768.41		8862.23		
08/01/2001	391,695.10		2,097,768.39		8862.25		**Average Cutoff**
09/17/2001	391,694.94	-0.13	2,097,768.32	-0.15	8862.34	0.07	
09/25/2001	391,695.04	-0.03	2,097,768.37	-0.10	8862.44	0.17	
10/30/2001	391,694.92	-0.15	2,097,768.12	-0.35	8862.26	-0.01	
10/09/2001	391,694.98	-0.09	2,097,768.06	-0.41	8862.11	-0.16	
10/15/2001	391,694.78	-0.29	2,097,768.12	-0.35	8862.42	0.15	
10/17/2001	391,694.80	-0.28	2,097,768.15	-0.33	8862.22	-0.05	
11/07/2001	391,694.67	-0.40	2,097,768.10	-0.37	8862.19	-0.08	
11/14/2001	391,694.34	-0.73	2,097,768.16	-0.31	8862.20	-0.07	**MINED UNDER #6 PRISM - Blind Canyon Seam**
11/16/2001	391,694.21	-0.86	2,097,768.28	-0.19	8861.76	-0.51	
11/27/2001	391,693.58	-1.49	2,097,768.60	0.13	8860.97	-1.30	
04/09/2002	391,691.79	-3.28	2,097,766.48	-1.99	8856.97	-5.30	
04/17/2002	391,691.87	-3.21	2,097,766.69	-1.79	8857.17	-5.10	
05/02/2002	391,691.82	-3.25	2,097,766.49	-1.98	8856.92	-5.35	
05/31/2002	391,691.84	-3.23	2,097,766.53	-1.94	8856.95	-5.32	
06/10/2002	391,691.84	-3.23	2,097,766.53	-1.94	8856.95	-5.32	
10/15/2002	391,691.78	-3.30	2,097,766.39	-2.09	8856.93	-5.34	
03/03/2003	391,691.48	-3.60	2,097,765.79	-2.68	8856.66	-5.61	

AVERAGE SURVEY PRIOR TO UNDER MINING

Cutoff Date	**08/01/2001**
Northing	**391,695.07**
Easting	**2,097,768.47**
Elevation	**8,862.27**


Rilda Canyon Prism #6
Easting (ft)
2,097,769.0
2,097,768.5
2,097,768.0
2,097,767.5
2,097,767.0
2,097,766.5
2,097,766.0
02/09/99
08/28/99
03/15/00
10/01/00
04/19/01
11/05/01
05/24/02
12/10/02
Easting


Rilda Canyon Prism #6
Northing (ft)
391,695.5
391,695.0
391,694.5
391,694.0
391,693.5
391,693.0
391,692.5
391,692.0
391,691.5
02/09/99
08/28/99
03/15/00
10/01/00
04/19/01
11/05/01
05/24/02
12/10/02
Northing


Rilda Canyon Prism #6
Elevation (ft)
8863.0
8862.0
8861.0
8860.0
8859.0
8858.0
8857.0
8856.0
02/09/1999
08/28/1999
03/15/2000
10/01/2000
04/19/2001
11/05/2001
05/24/2002
12/10/2002
Elevation

			RILDA CANYON SUBSIDENCE MONITORING ABOVE 5TH NORTH									
					STREAM CROSSING / DRILL HOLE AREA							
		RC1			RC2			RC3			RC4	
		Top End									Bottom End	
DATE	N	E	ELEV.	N	E	ELEV.	N	E	ELEV.	N	E	ELEV.
06/25/1998	392182.738	2093512.401	8161.66	392322.121	2092965.037	8208.760	392421.14	2092750.953	8231.12	392536.814	2092275.445	8296.77
08/12/1998	392184.166	2093512.369	8162.87	392322.947	2092965.38	8209.12	392421.687	2092751.055	8231.47	392536.82	2092275.433	8296.21
08/14/1998			8162.34			8209.27			8231.57			8296.22
10/01/1998			8162.33			8209.21			8231.51			8296.19
05/26/1999			8162.30			8209.16			8231.46			8296.18
07/06/1999			8162.47			8209.61			8231.97			8296.00
08/25/1999			8162.35			8209.50			8231.37			8296.18
06/23/2000			8162.35			8208.28			8231.66			8296.11
10/17/2000			8162.15			8209.05			8231.38			8296.16
06/05/2001			8162.38			8209.29			8231.59			8296.18
07/09/2002			8162.27			8209.23			8231.51			8296.22

RAW DATA ON 3.5” DISK