0003

State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt
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March 26, 1998

Wendell Owen
Co-Op Mining Company
P.O. Box 1245
Huntington, Utah 84528

ACT/015/025
#3

Johnny Pappas, Senior Environmental Engineer
Cyprus Plateau Mining Company
847 Northwest Highway 191
Helper, Utah 84526

Re: Response Adequacy from Cyprus Plateau Mining Corporation and Co-Op Mining Corporation Regarding the Birch Spring Monitoring Issues per: Tech Directive 005.

Dear Sirs:

As you are aware, the Division is involved in investigating the observed change in flow at Birch Spring. An analysis of information presented by Co-Op Mining Corporation and Cyprus Plateau Mining Corporation, for the observed change in flow at Birch Spring is attached. The analysis contains recommendations to resolve the outstanding issues.

According to the Division's Tech Directive 005 we are now at step F in our investigation. Step F of the Directive states, "**If no solution or explanation is acceptable, the issue is brought forth to the CRP in-house peer review group and the permittee(s). If an explanation is agreed upon within this group then a memo will be prepared and filed in that mine's water quality file (Folder #7)**". During a meeting held on December 27, 1996 with Co-Op Mining Company and Cyprus Plateau Mining Company, the Division committed to review information submitted and produce an analysis of it. This has been done, however, at this point no explanation for the change in Birch Spring has been agreed upon.

We are now affording you the opportunity to review our analysis. You may wish to provide additional information or clarification to the analysis prior to our moving on to step G in our process. Step G requires the development of an action plan recommended through issuance of a Division Order.

Please contact the Division within 30 days to establish further dialogue on this issue. We appreciate your assistance in this investigation. Please call if you have any questions.

Sincerely,

Daron R. Haddock

Daron R. Haddock
Permit Supervisor

tat
Enclosure
cc: Price Field Office
O:\015025.BCN\BIRCHSLT.WPD

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March 24, 1997

TO: File

THRU: Mary Ann Wright, Associate Director of Mining

FROM: Sharon Falvey, Reclamation Specialist
Ken Wyatt, Reclamation Specialist
Jim Smith, Reclamation Specialist

RE: Response Adequacy from Cyprus Plateau Mining Corporation and Co-Op Mining Corporation Regarding the Birch Spring Monitoring Issues per: Tech Directive 005.

SUMMARY;

Measured flow at Birch Spring, also called Gates Spring, has declined from 33 gpm in February 1990 to 19 gpm in 1997, with a low flow observed in May 1997 at around 16 gpm. This decline in flow followed a series of high-flow ("peak flow") events that may or may not be related to the decline.

Both Co-Op Mining Company (Co-Op), operator of the Bear Canyon Mine, and Cyprus Plateau Mining Corporation (Cyprus), operator of the Star Point Mine, responded to the Division's request for information regarding this decrease in flow at Birch Spring. The letter from Cyprus is dated October, 17, 1997. Cyprus believes the decrease in flow is the result of an earthquake event and potential obstruction of the collection system by silt and vegetative root systems. The letter from Co-Op is dated October 23, 1997. Co-Op does not place faith in the flow data collected prior to 1991, and they indicate the losses in flow after 1991 are likely due to the deterioration of the collection system, as well as climatic effects.

Information in the Cyprus and Co-Op letters, supplemented with information from DOGM's files, does not definitively identify a cause of the decline in flow at Birch Spring. The body of data or evidence is fragmentary and some is of questionable quality. There are aspects of the development and maintenance history of this spring, and the resultant effects on water quantity, that are not entirely understood. There remain many unanswered questions and unproven hypotheses about the ground-water hydrology of the area and what has actually caused reduced flow at Birch Spring. Additional analyses and clarification still are needed from the mine operators and the water users, and there are additional investigations that should be conducted.

- The water users, Cyprus, Co-Op and other interested parties should determine where they are in agreement, and to the extent possible, resolve existing discrepancies or misunderstandings in data or other information. This should be the first step as it may quickly resolve some questions at little expense.

- The water users, Co-Op, Cyprus, and DOGM need to determine the present condition of Birch Spring and fully review the history of its development and maintenance. A joint on-site consultation at Birch Spring by representatives of all parties would be a useful, and probably an essential, part of such an investigation.

- Faults, fractures, and joints need to be investigated, starting with accurate and detailed mapping, because of the probability these are primary flow paths for ground water in the area and because of the possibility these provide a connection between Birch Spring and the sandstone channel that is discharging water inside the Bear Canyon Mine. Orientation, aerial extent, and associated lithologies should be identified.

- Recharge areas and flow paths to Birch Spring need to be identified.

- Further determinations of mean residence time or "age" for ground and surface waters, tracer tests, and modeling of water chemistry evolution should be used to help understand the ground-water hydrology of the area. All water quality data should be reviewed for variations between pre-"peak flow", "peak flow", and post-"peak flow" periods.

BIRCH SPRING DEVELOPMENT HISTORY

Birch Spring was originally developed in the 1970's. According to Co-Op's letter, the collection pipes were covered with pea gravel and had a tendency to silt in. The spring boxes were updated in 1977, and the lines to the spring boxes were re-developed in 1980 (Informal Conferences - permit renewal, cause No. ACT/015/025). Appendix B, in this report, contains a letter from the Utah Department of Health (dated May 25, 1982) approving replacement of the collection line because the perforations had apparently become plugged. This redevelopment work was not done until the fall of 1984, and Appendix B contains an as-built diagram representing the final configuration.

According to the Co-Op letter, water from the Birch Spring collection system was not connected to the water user's system after the 1984 development work, and the flow from the collection system was not as large as expected. In 1986 the collection system was uncovered, but no reason for the less-than-expected flow was identified. The collection system was reburied under impervious material and connected to the water user's system.

In Co-Op's letter Charles Reynolds noted that water is issuing from the area between Huntington Creek and Birch Spring. He felt these flows may be water that was diverted from the Birch Spring collection system through fractures created or opened as a result of using explosives during the 1984 redevelopment of the spring. Although this could account for an initial loss in flow, it probably would not cause a continued decline in flow unless dissolution or erosion were enlarging the channels.

There was an interruption in flow in 1988 and 1989, which has been attributed to a Magnitude 5.3 earthquake that occurred several miles away in the San Rafael Swell on August 14, 1988. The collection box filled with sediment, most likely entering through the buried collection system, and water from Birch Spring was disconnected from the water user's system. For a short time water was observed seeping to the surface above the the buried collection lines. Following this disruption the impervious layer apparently healed or resealed itself and isotopic data currently show very little evidence of connection between the surface and the collection system (Co-Op's letter).

Presently the spring area is well vegetated, which is probably reducing discharge from the spring through plant uptake and transpiration of the water. The overflow pipe at the collection box was recently cleared of roots that were blocking flow; additional root systems may be clogging the collection lines. Silt may also have accumulated in the lines. The water users should clear trees, shrubs, and other large vegetation from the surface over the collection system. The water users should also consider clearing the collection lines through utilizing a rooter or other acceptable method.

All interested parties should jointly visit the spring to document and review the following: 1) the existing condition of the collection system and spring box, 2) maintenance of the collection system and spring box , 3) flow measurement and the seepage that issues between the spring box and Huntington Creek, 4) the design, installation, and re-development history of the spring collection system, and 5) the orientation and areal extent of the fracture systems.

BIRCH SPRING HYDROGEOLOGY

Birch Spring issues from the Star Point Sandstone, west of the Bear Canyon Mine. The source of recharge to the spring is unknown. The spring flows at a relatively steady rate, showing little or no seasonal variation.

Numerous joints and fractures are found in the outcrops surrounding the spring. Water movement across major faults, such as the Blind Canyon fault, does not seem likely based on the information presented to date. However, there is a possibility that secondary faults could be transporting water across the Blind Canyon fault from the saturated sand channel that is exposed in the Bear Canyon Mine to Birch Spring.

There are two fault zones mapped in the region that might provide such a path between the Bear Canyon Mine and Birch Spring. One of these faults is located south of Birch Spring, and if projected along strike it would extend through Birch Spring, cross the Blind Canyon Fault, and intersect the Bear Canyon Mine north of the Blind Canyon Fan Portal (Figure 2 in Appendix C). This fault, where it is mapped, is down-dropped to the west and strikes N17°E. Mining in the Tank Seam has exposed a fault north of the Blind Canyon Fan Portal that strikes N17°E (Figure 1 of Appendix C), is offset 1.5 feet, and is down-dropped to the west. A second projected fault, shown on Figure 3 of Appendix E, lies northwest of the large sandstone channel ("low coal area") that has been exposed by mining of the Blind Canyon Seam in the Bear Canyon Mine.

In the south end of the Bear Canyon Graben, joint and fracture sets are oriented N15°E to N17°E and a second set of minor joints are oriented N60°E (informal conferences - Chris Hansen, Earth Fax Engineering). To the north, within the eastern region of the Star Point mine, fault/joint sets that formed perpendicular to regional extensional stresses are oriented N5°W, N6°E and N14°E. These joint sets are open and ground and surface water migration is common along these fracture systems (Star Point Mine MRP, 1996). No one has identified whether the fault sets near Birch Spring are open or whether they intersect the Bear Canyon Mine. If these fracture zones are open as a result of extensional stress they are very likely carrying ground-water flow to Birch Spring. Detailed mapping of faults, joints, and fractures is needed to fully understand the hydrogeology of the area.

BIRCH SPRING WATER QUANTITY ANALYSES

Recorded water flow data are summarized in Figure 1 in Appendix D. The data show two significant concerns. The first and main issue is the trend of decreasing flow since 1991, and perhaps earlier. Second is the increased flows or "peak flows" observed in August through December 1988, June 1989, and October 1989 through January 1990. The "peak flows" are discussed because of the possibility that they are related to the trend of reduced flow that followed them, although the cause or source for the "peak flows" appears to be separate from the normal flow from Birch Spring.

Based on the information provided by Cyprus in the Star Point Mine MRP, prior to the first "peak flow" the Birch Spring average discharge was 80 gpm. The recorded "peak flow" discharges reached 133, 100 and 230 gpm during August through December 1988; June 1989; and October 1989 through January 1990, respectively. Following the three periods of increased flows, the spring flow declined to 33 gpm in February 1990. Since that time the flow has diminished to about 19 gpm, with a low flow observed in May 1997 at around 16 gpm.

The reliability of flow measurement prior to 1990 is uncertain. Early data collected by Co-Op was obtained through measuring the flow from an overflow pipe and did not include flow traveling through the collection system. Early flow data presented by Cyprus was obtained by Ben Grimes, who is an employee of Cyprus Plateau Mining, through the North Emery Water Users Association (NEWUA) when Mr. Grimes was the NEWUA president. Mr. Grimes obtained these data from an older man who had measured the flows for NEWUA using unknown methods. This older man has since passed away and his records cannot be found. NEWUA has no record of the data that Cyprus attributes to NEWUA, and NEWUA data from this period do not agree with the Cyprus data.

Peak Flow Events

The recorded "peak flow" discharges occurred in August through December 1988; June 1989; and October 1989 through January 1990. The Cyprus data for these events appear to have a logical trailing off from the peak flow. The NEWUA measurement from this period (100 gpm) fits into the trailing end of the 1990 event as defined by the Cyprus data. The 129 gpm measured by Co-Op in October 29 1989 may have been on the rising limb if the 230 gpm measurement was recorded on the 30th of the month.

Three hypotheses have been presented as to the source of the water from the "peak flow" period. The first hypothesis suggests this water may have been released from the bulkheads at Trail Canyon. The second, suggested by Mr. Galen Atwood, former Co-Op mining employee, indicates the water intercepted in the Bear Canyon Mine was pumped out of the Blind Canyon Fan Portal into Dry Canyon and found its way to the Birch Spring collection system. The third hypothesis is that the water originated from the Bear Canyon Mine when water was sumped into the old workings in the southern portion of the permit area and from there somehow reached the spring.

<u>First Hypothesis</u>

The first hypothesis, which suggests the water reaching Birch Spring may have originated from water released from the bulkheads at Trail Canyon, may be supported with the data presented by Cyprus. This data show a correlation between the first event and the earthquake recorded on August 14, 1988. The earthquake epicenter was located in the San Rafael Swell and had a magnitude of 5.3 on the

Richter scale. Water behind bulkheads in the Trail Canyon Mine could have been released during the earthquake. The water would then have had to travel along a fault to reach the spring. An underground connection between the subsided Trail Canyon Mine workings and Birch Spring by way of a fault is speculative. However, it seems unlikely that the two "peak flows" that followed would be related to the earthquake. It also seems unlikely that water released from behind a bulk head would continue to flow at a constant rate for a period of almost three months, assuming the data from the Star Point Mine Plan are representative.

Records from the Department of Water Quality for Trail Canyon City water and Trail Canyon Mine data may show similar water quality characteristics during the peak events in 1988, 1989, and 1990 and should be reviewed in greater detail.

It was indicated that there was a lot of sediment in the Birch Spring collection system at the time of the "peak flows". If the water came from the Trail Canyon Mine one would expect a connection from the mine to the surface to account for the sediment load. The only documented connection is at Subsidence Area #3, reported in October 28, 1996 (Appendix D)[1]. The majority of the damage in this area was on either side of Dry Canyon, but one section of the stream channel, approximately 100 feet long, was dropped 6 to 8 feet. This subsided area appears to be on a mapped fault that passes near Birch Spring (possibly the "Dry Canyon" fault located west of the Blind Canyon fault), but an underground connection between the subsided Trail Canyon Mine workings and Birch Spring by way of this fault is speculative.

According to Chris Rohrer of the UDOGM Abandoned Mine Reclamation Program, the subsidence was recent (within 2 years) when he observed the subsidence in May 1997. If so, it seems unlikely that Subsidence Area #3 in Trail Canyon connected the mine to the surface during the "peak flows".

Second Hypothesis

The second hypothesis, suggested by Mr. Galen Atwood, indicates that water intercepted in the Bear Canyon Mine was pumped from the mine through the Blind Canyon Fan Portal into Dry Canyon. No factual evidence was presented for this hypotheses. It is not likely that the discharge would reach Birch Spring through Dry Canyon unless there was connection through fractures or faults. Subsidence Area #3 is a possible connecting location where water pumped from the fan portal into the surface drainage could flow underground and reach Birch Spring by way of a fault. However, as with the First Hypothesis, an underground connection between the subsided Trail Canyon Mine workings and Birch Spring by way a fault is speculative

[1] The Subsidence Areas discussed in this report are numbered in the sequence in which they were found and documented by DOGM. Subsidence Area #1 and Subsidence Area #3 are described in the body of this report, but Subsidence Area #2 is not because it has no apparent or probable impact on the hydrology of the area. Subsidence Area #2 is in Dry Canyon at the Blind Canyon Fan Portal. Surface damage at Subsidence Area #2 occurred some time between 1986, when portal breakouts were developed, and 1994, when the subsidence was first reported (Appendix D).

Third Hypothesis

The third hypothesis suggests "peak flows" originated at the Bear Canyon Mine when water was sumped into the old workings (Figure 3, Appendix E). Potential flow paths from this sump to Birch Spring could have been opened by subsidence that occurred in Subsidence Area #1 (Mitigation Area #1 on Plate 3-3, Bear Canyon MRP - copy in Appendix D). Pumping of water into the old workings apparently began sometime after mid-1989 and ended in April 1991, when discharge to Bear Creek under a UPDES permit began. There may be direct flow-paths through the rock from the sump to Birch Spring.

Subsidence Area #1 is immediately above Birch Spring, in a small side-drainage of Dry Canyon. This is where Co-Op mined beyond the Bear Canyon Mine permit area boundary in 1985. A large hole in the drainage channel occurred in 1985 during active mining. It had an average depth of 6 feet. At the same time a large fracture formed approximately 100 feet west of the large hole. Ventilation stopping and a barricade were installed in the mine but a seal was not installed, and no surface mitigation was done at that time (memo to file from Peter Hess, March 27, 1995). A smaller diameter hole formed approximately 150 feet southeast of and up-slope of the larger hole. It was approximately 30 feet deep, but it is unknown when it formed. The holes and fractures were observed during a DOGM inspection in the fall of 1994 and are described in Appendix 3-N of the Bear Canyon Mine MRP. NOV N94-46-4-1B was issued December 12, 1994, the subsidence damage in the drainage was mitigated, and the NOV was terminated in 1997.

These subsidence holes and cracks might have provided a path for water to flow from the old workings to the surface drainage. Water would have flowed down the drainage to Birch Spring, some of the water infiltrating into the ground and discharging at Birch Spring.

However, for water to exit to the surface through these subsidence features it would have had to rise a minimum of 40 feet above mine floor in the old workings. The old workings are separated from the active mine by bulkheads that are not watertight and are not built strong enough to contain a reservoir of water with a 40-foot hydraulic head. Water would have flowed around or through the bulkheads and into the mine if that much water had been behind them. According to Co-Op there was no seepage from the bulkheads.

The subsidence holes and fractures might have facilitated the opening of a subsurface flow path between the sump and Birch Spring that would not require any substantial head increase in the old-workings sump.

In October 1990 water was exiting from the cliff face behind the Bear Canyon Mine. During this time Birch Spring water was sediment laden and spring flow increased from 40 to 110. In December of 1990 through January 1991 icicles were noted from the cliffs above Big Bear springs by DOGM personnel and by Mr. Bryce Montgomery, hydrogeologist for the Castle Valley Special Services District. It was believed by Mr. Montgomery that this was the result of Co-Op's discharging water into the abandoned workings at the south end of the Bear Canyon Mine, and during the same period sulfate, TDS, and oil and grease increased in the spring water.

According to Informal Hearing Cause NO. ACT/015/025, DOGM, under Findings of Fact: Relative Findings: #6: "There is evidence that piping may have influenced quantity of flow from outcroppings at or near Big Bear or Birch Spring in the recent past." and #7: "Pumping into the abandoned workings at the south end of the mine, directly north of the existing Bear Canyon Mine may

have influenced the quantity of water seeping from outcrops above Big Bear and Birch Spring."

However, there is no evidence the water flowed directly through the rock from the sump to Birch Spring. The water flowing from the cliffs was at roughly the same elevation and in roughly the same stratigraphic section as the coal seam and the coal mine. Horizontal flow through rocks of the Blackhawk Formation is much easier than vertical flow because of multiple layers of low-permeability clay, siltstone, and sandstone. As in other scenarios, it is most likely that faults or fractures would be needed to provide a path from the sump to Birch Spring.

Long-term Declines in Post - "Peak flows" Flow

It is unclear whether the "peak flows" had an influence on the long term discharge from the spring. The lack of congruity and consistency in the flow data makes such a determination problematic.

Flow at Birch Spring has declined from 33 gpm in February 1990 to about 19 gpm in 1997, with a low flow in May 1997 of 16 gpm. This long decline in flow could be the result of the prolonged drought period that began in 1987 and ended in early 1993. Flow data for Birch Spring were collected by the USGS in 1978 and 1979, a drought period, and flows ranged from a low of 9.3 gpm to a high of 23 gpm.

Birch Spring was originally developed in the 1970's. The spring boxes were updated in 1977, and the lines to the spring boxes were re-developed in 1980. Additional redevelopment work was done in the fall of 1984 and again in 1986.

Presently the area over the spring collection system is well vegetated, which is probably reducing discharge from the spring through plant uptake and transpiration of the water. The overflow pipe at the collection box was recently cleared of roots that were blocking flow; roots may be clogging the collection lines. Silt may also have accumulated in the lines.

Charles Reynolds noted that water is issuing from the area between Huntington Creek and Birch Spring. This may be water that was previously flowing through the Birch Spring collection system. Explosives were used to redevelop the spring in 1986, and new flow paths that bypass the spring collection system could have been created at that time.

Information presented to date does not support the assertion that the decrease in flow from 1990 to the present is the result of mining operations. However, the information it is not adequate to identify the cause of the decline.

BIRCH SPRING WATER DATING AND WATER SOURCE DETERMINATIONS

Water Quality

Data strongly indicating that Birch Spring water and in-mine water from SBC-9 are not the same are presented in the August 12, 1992 PHC in the Bear Canyon Mine MRP. This information shows SBC-9 has a greater concentration of sodium and chloride in comparison to Birch Spring. Bear and Trail Canyon Springs have Stiff diagrams similar to that of Birch Spring (Appendix E, figure 2-2).

However, the water quality used to construct the Stiff diagrams is an average and is therefore assumed to include the "peak flows". Water quality during these flows may not be characteristic and could greatly affect the determination of "average" qualities. It is not clear if water sampled at SBC-9 has historically been sampled as it flows from the channel sandstone or if samples were collected from the nearby sump. Waters collected from the sump and those from the sandstone channel should be clearly identified and analyzed separately.

If water moves from the channel sandstone through fractures to Birch Spring there is a potential for changes in water chemistry. Geochemical reaction modeling should be conducted to determine if it is a likely that the observed chemistry of Birch Spring water could evolve or be derived from the water at the sandstone channel.

$\delta^{34}S$ levels is an isotopic sulfur ratio which has been used to identify sources of sulfate in ground water. However, no data interpretation from this analyses was presented. The Third West Bleeders and SBC- 9 have similar $\delta^{34}S$ levels, while the third west south and Birch Spring are lower. These $\delta^{34}S$ levels become important if geochemical modeling is conducted.

Mean Residence Time

In-mine water dating results are summarized for each site in Table 1 below. Data were obtained from Mayo and Associates (Exhibit 3, informal conference) and were collected on 11/13/96 and 5/15/96. Samples from 5/15/96 were collected during a joint sampling effort between the water users, represented by Peter Nielsen of SECOR, and Co-Op. Some of these data were used by Mayo and Associates in their Exhibit 3. One sample was obtained for Birch Spring from the 1996 version of the Star Point Mine MRP but no sample date was identified.

Data suggest no modern water is contained in Birch Spring or in the sand channel at SBC-9. Data from the 3rd West Bleeders showed some variation between samples collected by SECOR and those obtained by Mayo and Associates. Computed mean residence times were determined for Mayo and Associates using the Pearson, Mooks, and Fontes models. The ages were, from oldest to youngest, 3rd West South, SBC-9, Birch Spring then 3rd West Bleeder. The location of these points can be found in Figure 3, Appendix E.

Although Bear Spring has chemical characteristics similar to Birch Spring, dating indicates modern or "young" water is flowing from Bear Spring. Chemical characteristics of Trail Canyon Spring are also similar to Birch and Bear Springs but water from Trail Canyon Spring was not dated.

A few observations can be made from the water dating. One, the age of the water at SBC-9 (1,400 to 2,100 years mean residence time) and the Birch Spring (1,100 to 1,900 years mean residence time) is similar but slightly younger. Tritium concentrations indicate no modern water is contained in the Birch Spring or SBC-9 waters. Two, water from the 3rd West Bleeders is slightly younger in age (350 to 1,200 years mean residence time), than Birch Spring. If the waters from the 3rd West Bleeder and SBC-9 were mixing and discharging at Birch Spring, a water with a mean residence time lower than SBC-9 would result, perhaps similar to the age of the water from Birch Spring. The standard deviation or confidence interval for these ages should be presented with analysis results. A comparison of water from the 3rd West Bleeders should be provided with the Stiff and Piper analyses.

Table: 1

Water Dating

Source	Date	Company Sampler	Parameter		
			TU	Carbon 14 dating Years Mean Residence Time	$\delta^{34}S$
Birch Spring	5/15/96	Co-Op	0.35		+3.8
		Star Point Mine	0.93		
	5/15/96	Mayo and Associates		1,100 to 1,900	
	Not known	Earth Fax (Bear Canyon Mine Plan Appendix 7-J 4/30/93)	1.12		
SBC-9	11/13/96	Mayo and Associates/ Co-Op	0.36	1,400 to 2,100	+11.3
	5/15/96	SECOR	0.40		+11.4
3rd West Bleeder	11/13/96	Mayo and Associates	0	350 to 1,200	
	5/15/96	SECOR	2.22		+10.8
3rd West South	11/13/96	Mayo and Associates		5,400 to 6,400	
	5/15/96	SECOR	0.0		-0.6

SUMMARY:

Information in the Cyprus and Co-Op letters, supplemented with information from DOGM's files, does not definitively identify a cause of the decline in flow at Birch Spring. The body of data or evidence is fragmentary and some is of questionable quality. There are aspects of the development and maintenance history of this spring, and the resultant effects on water quantity, that are not entirely understood. There remain many unanswered questions and unproven hypotheses about the ground-water hydrology of the area and what has actually caused reduced flow at Birch Spring. Additional analyses and clarification still are needed from the mine operators and the water users, and there are additional investigations that should be conducted.

RECOMMENDATION:

It is recommended that:

1) the water users, Cyprus, Co-Op and other interested parties determine where they agree and to the extent possible resolve existing discrepancies or misunderstandings in data or other information. This should be the first step as it may quickly resolve some problems or questions at little expense.

2) the water users, Co-Op, Cyprus, and DOGM determine the present condition of Birch Spring and fully review the development and maintenance history. A joint on-site consultation at Birch Spring by representatives of all parties would be a useful, and probably essential, part of such an investigation.

3) faults, fractures, and joints be investigated, starting with accurate and detailed mapping because of the probability they are primary flow paths for ground water in the area and because of the possibility they provide a connection between Birch Spring and the sandstone channel that is discharging water inside the Bear Canyon Mine. Orientation, aerial extent, and associated lithologies should be identified.

4) recharge areas and flow paths to Birch Spring be identified.

5) further determinations of mean residence time or "age" for ground and surface waters, tracer tests, and modeling of water chemistry evolution be used to help understand the ground-water hydrology of the area. All water quality data should be reviewed for variations between pre-"peak flow", "peak flow", and post-"peak flow" periods.

cc: Peter Hess, PFO
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Appendix A: Birch Spring Event History

Birch Spring History

1970 Original spring development.

1976 The only observed subsidence associated with the Trail Canyon Mine occurred. (Discussion with Charles Reynolds, meeting at CEU Price, Ut 12/22/97).

1977 Spring boxes were updated (Water Users at informal hearings)

1978-79 USGS measured flow rates between 9 and 23 gpm in 1978 and 1979 (T.W. Danielson, M.D. ReMillard, and R.H. Fuller, U.S.G.S. Open-File Report 81-539). The Palmer Hydrologic Drought Index indicates this was a drought period.

1980 The lines to the spring boxes were upgraded at Birch Spring (informal conference).

1981 Trail Canyon Mine operations ended.

1982 Gates Spring re-development approved by Utah Department of Health in May 25, 1982 letter to NEWUA (Appendix B).

1984 Lines to the Birch Spring were re-developed in the fall (Co-Op letter, October 23, 1997).

Birch Spring average flow was approximately 70 gpm.

1985 Subsidence Area #1. Co-Op mined outside of the south west corner of the permitted mine area (NOV N85-4-26-1). Plate 3-4 of the Bear Canyon Mine MRP (archived version dated April 15, 1987) shows the initial caving or subsidence over the 1st South retreat section. Ventilation stopping and a barricade were installed in the mine but a seal was not installed (memo to file from Peter Hess, March 27, 1995). [Two holes, a large fracture, and several minor fractures developed sometime between 1985 and October 1994, when they were observed by Tom Munson during a DOGM inspection. One hole is roughly 20 feet in diameter and located in the bottom of the drainage. The other hole, approximately 14 feet in diameter, and the large fracture are located up the slope, out of the bottom of the drainage. NOV N94-46-4-1B was issued in December 1994 for failing to mitigate hazards associated with these holes an fractures. Appendix 3-N of the Bear Canyon MRP is the mitigation plan prepared in response to that NOV and Plate 3-3 of the Bear Canyon MRP shows this area as "mitigation area #1".]

Birch Spring average flow was approximately 80 gpm (based on information in the Star Point Mine MRP, 1996).

1986 The Blind Canyon Fan Portal breakout was constructed in Dry Canyon (Bear Canyon Mine MRP Plate 7-1A, dated 12/1/89.)

Birch Spring was re-developed using explosives (Co-Op letter, October 23, 1997).

Large variations in reported flows depending on source of data.

1988 On August 14 a 5.3 magnitude earthquake event occurred with the epicenter in the San

Rafael Swell. Evidence suggests that this earthquake had an affect on the Tie Fork Wells to the north of Bear Canyon Mine (Star Point Mine MRP, 1996).

1989 Co-Op mined up against the Trail Canyon Fault. (Bear Canyon Mine MRP Plate 7-1A, dated 12/1/89.)

According to Mr. Galen Atwood, who worked at the mine, in-mine flows were constant until the summer of 1989 when water was encountered in the northern end of the north main. The mine intercepted 110 gpm (Water Users referenced the Hydrologic evaluations dated March 11, 1991). In 1989 Co-op was accused of discharging water into the Dry Canyon drainage. Mr. Atwood said they discharged out of the fan portal (informal conference, 1996).

On October 17, 1989 a high volume flow (230 gpm) was observed at Birch Spring and high flow continued for approximately three months. Fecal coliform and increases in dissolved solids were observed in the spring. A fault trending north through the bottom of Dry Canyon was believed to be in connection with the discharge from the mine. Several subsidence sink holes in the bottom of Dry Canyon were stated to have been observed (possibly Subsidence Area #3).

1989-91 Sometime between December 1989 and April 1991 a water line was placed in the mine. It was shown on the April 1991 updated map of the workings.

1990 Charles Reynolds testified that early in 1990 water was encountered for the first time at the north end of the mine (informal conference, February 1996).

In October 1990 Birch Spring water was sediment laden, the stream was flowing 120 gpm and water was exiting from the cliffs face. The spring flows at the time increased from 40 to 110 gpm. The base of the collection box at Birch Spring was filled with sand and sediment. The water contained high oil and grease and fecal coliforms. Also during this period an "air vac" was broken by the road department down stream of the spring box. Following customer complaints this problem was stated to be fixed in approximately 2 hours after being broken (informal conferences - Jan Stoyanoff, North Emery Water Users operator/manager for 12 years and overseer of Birch and Rilda Canyon Springs.)

Mr. Atwood testified that the north section of the mine had intercepted a split in the coal seam with lots of water in it. The coal seam dip was toward the working face. Water was pumped out of the Blind Canyon Fan Portal until one day water was running across the road at Birch Spring. The mine water was then pumped into the old workings, after which Co-Op breached the seal of the old workings and pumped water from the workings until they were dry. Mr. Atwood confirmed that icicles were observed around the outcrops in January and February. An MSHA inspector was indicated to have arrived one day and said they needed to seal the workings again and that's when they quit pumping in to the old workings. Following mining of the north section Co-Op sealed the portals and drilled holes at an angle near the East Portal so water would exit the mine. The water was discharged into Bear Creek under their UPDES discharge permit.

1990-91 In December of 1990 through January 1991 icicles were noted from the cliffs above Big Bear springs. It was believed this was the result of the mine discharging water into the abandoned south end of the old workings. Sulfate, TDS, and oil and grease increased in the spring water (informal conferences - Bryce Montgomery, hydrologist for Castle Valley Special Services District who provided 19 years servicing Big Bear spring and conducted

frequent winter month visits.)

1991 The first UPDES-permitted mine discharge was reported by the company in April 1991.

An internal UDOGM memo from Tom Munson to Pam Grubaugh-Littig, dated May 17, 1991, identifies the impacts from the pumping activity.

1992 Mr. Atwood testified that the mine was pumping water from the north section of the mine area when he left Co-Op in 1992.

1993 Cyprus Plateau Mining Corporation began monitoring at Birch Spring. Earlier data were obtained by Mr. Ben Grimes when he was President for the North Emery Water Users. (Letter dated October 17, 1997 from Johnny Pappas, Sr. Environmental Engineer, Cyprus Plateau Mining Corporation).

1994 Subsidence Area #1. Co-Op mined outside of the south west corner of the permitted mine area in 1985. Plate 3-4 (archived version dated April 15, 1987) shows initial caving or subsidence over the 1st South retreat section. Two holes, one large fracture, and several minor fractures developed sometime between 1985 and October 1994, when holes and fractures were observed by Tom Munson during a UDOGM inspection. NOV N94-46-4-1B was issued in December 1994 for failing to mitigate hazards associated with these holes and fractures. (Appendix 3-N of Bear Canyon Mine MRP and memo to file from Peter Hess, March 27, 1995.)

Subsidence Area #2. In October 25, 1994 three places were discovered in the immediate vicinity of the Blind Canyon Fan Portal (E1/4 of NW 1/4, Section 26, T16S, R7E) where collapse or caving created openings from the surface into the mine workings (memo to file from Jess Kelley, February 16, 1995). These are shown on Plate 2-5 of the Bear Canyon MRP.

1996 Birch Spring was flowing at approximately 19 gpm(Water Users Data).

In July the last mining was conducted in the Blind Canyon Seam (Discussion with Charles Reynolds, meeting at Price Field Office, 12/22/97).

Subsidence Area #3. On October 28 DOGM investigated an area of subsidence located approximately 1,000 to 1,500 down the Dry Canyon drainage from the Blind Canyon Fan Portal. This was done in response to a citizen's complaint from Mr. Darrell Leamaster of the Castle Valley Special Services District, The subsidence appears to be caused by collapse of second-mined pillars in the Trail Canyon Mine.

1997 September 7 Pete Hess inspected Subsidence Area #1 and terminated NOV N94-46-4-1B (Division Records).

Appendix B: Birch Spring Development Diagrams

Scott M. Matheson
Governor

James O. Mason, M.D., Dr.P.H.
Executive Director
801-533-6111

DIVISIONS
Community Health Services
Environmental Health
Family Health Services
Health Care Financing

OFFICES
Administrative Services
Community Health Nursing
Management Planning
Medical Examiner
State Health Laboratory

STATE OF UTAH
DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH
150 West North Temple, P.O. Box 2500, Salt Lake City, Utah 84110-2500

Alvin E. Rickers, Director
Room 474 801-533-6121

May 25, 1982
533-4207

Mr. Ben Grimes, President
North Emery Water Users Association
P. O. Box 418
Elmo, Utah 84521

Dear Mr. Grimes:

Re: Gates Spring Redevelopment

We acknowledge receipt of your letter dated May 3, 1982, and its accompanying documentation. From our review of the information submitted we understand you propose to replace the collection line at Gates Spring because you suspect the pipe perforations have become plugged reducing the water collected from the spring.

The materials and method of construction appear to comply with the standards of the "Utah Public Drinking Water Regulations" with one exception. Building paper is not acceptable for separating the gravel backfill from the impervious overburden. We recommend that a non-toxic plastic material approved by the National Sanitation Foundation be considered or a gradation of sand and gravel as shown on Diagram 6-5 in the appendix to the regulations [copy enclosed].

Please notify either the local health department or this office prior to backfilling the excavation in order that the construction can be inspected.

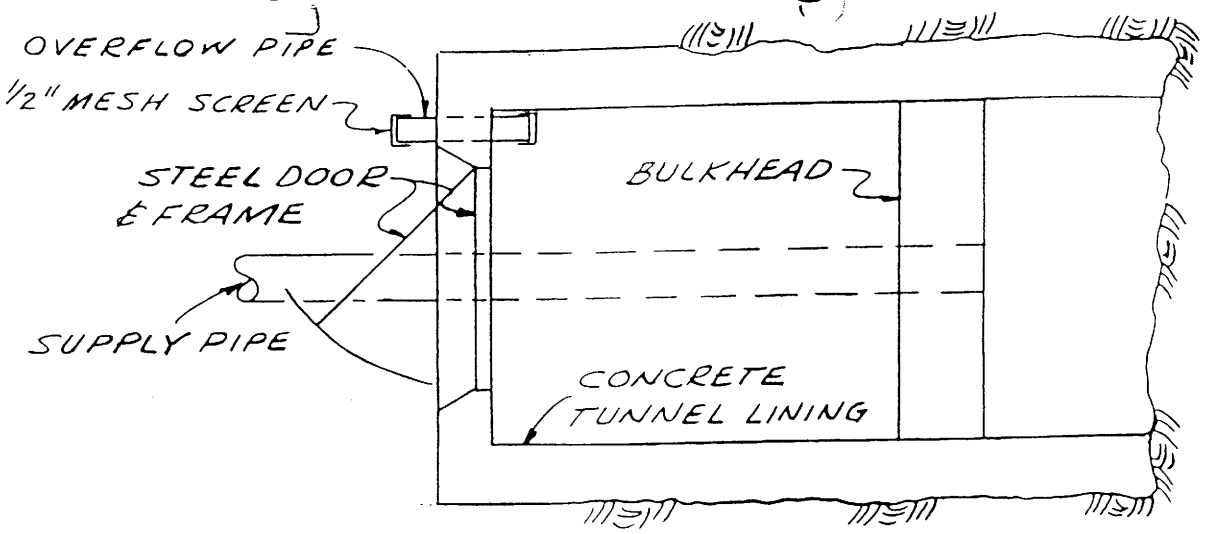
Should you have any questions concerning this correspondence or if we can be of further assitance, please contact this office.

Sincerely,

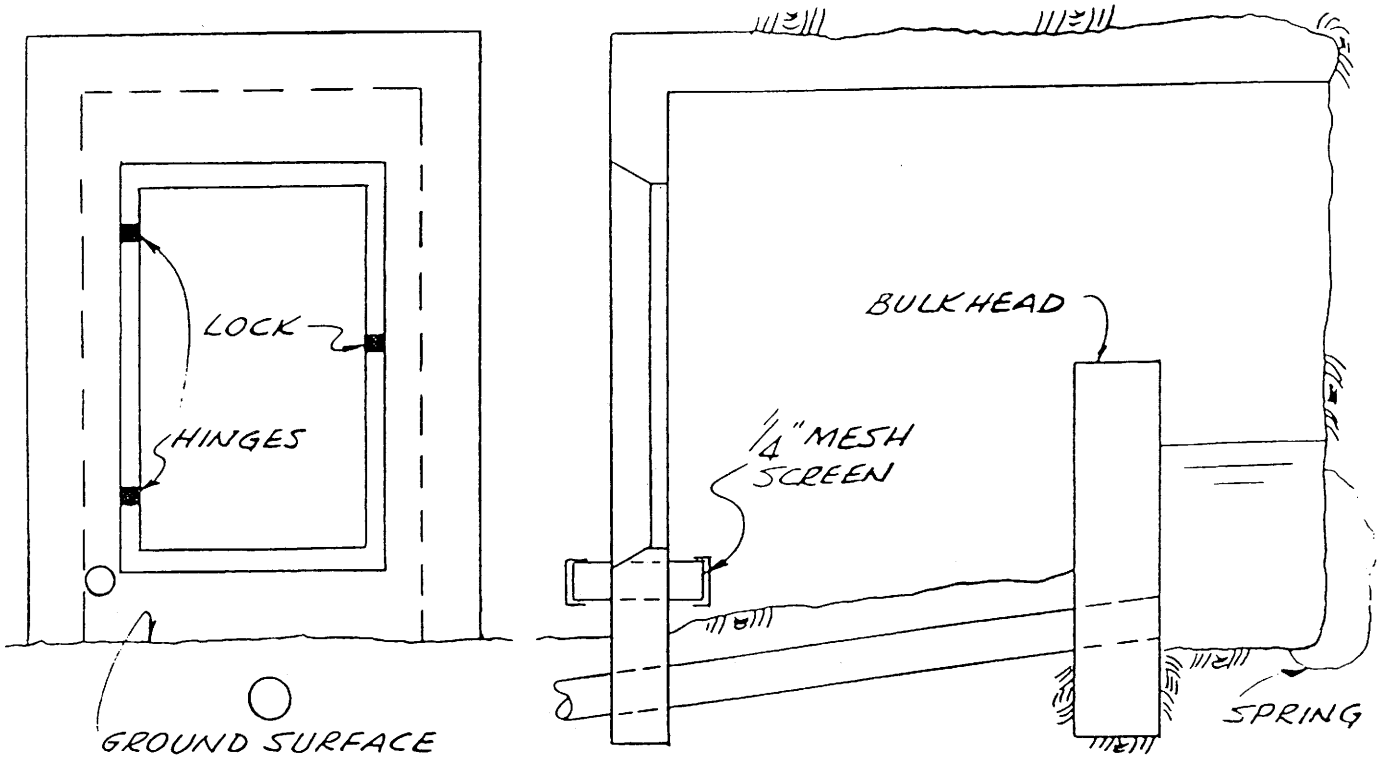
Michael B. Georgeson

Michael B. Georgeson
Chief/Engineering Section
Bureau of Public Water Supplies

LJM:br
Enclosure
cc: Southeastern District Health Department
Bureau of Land Management



PLAN



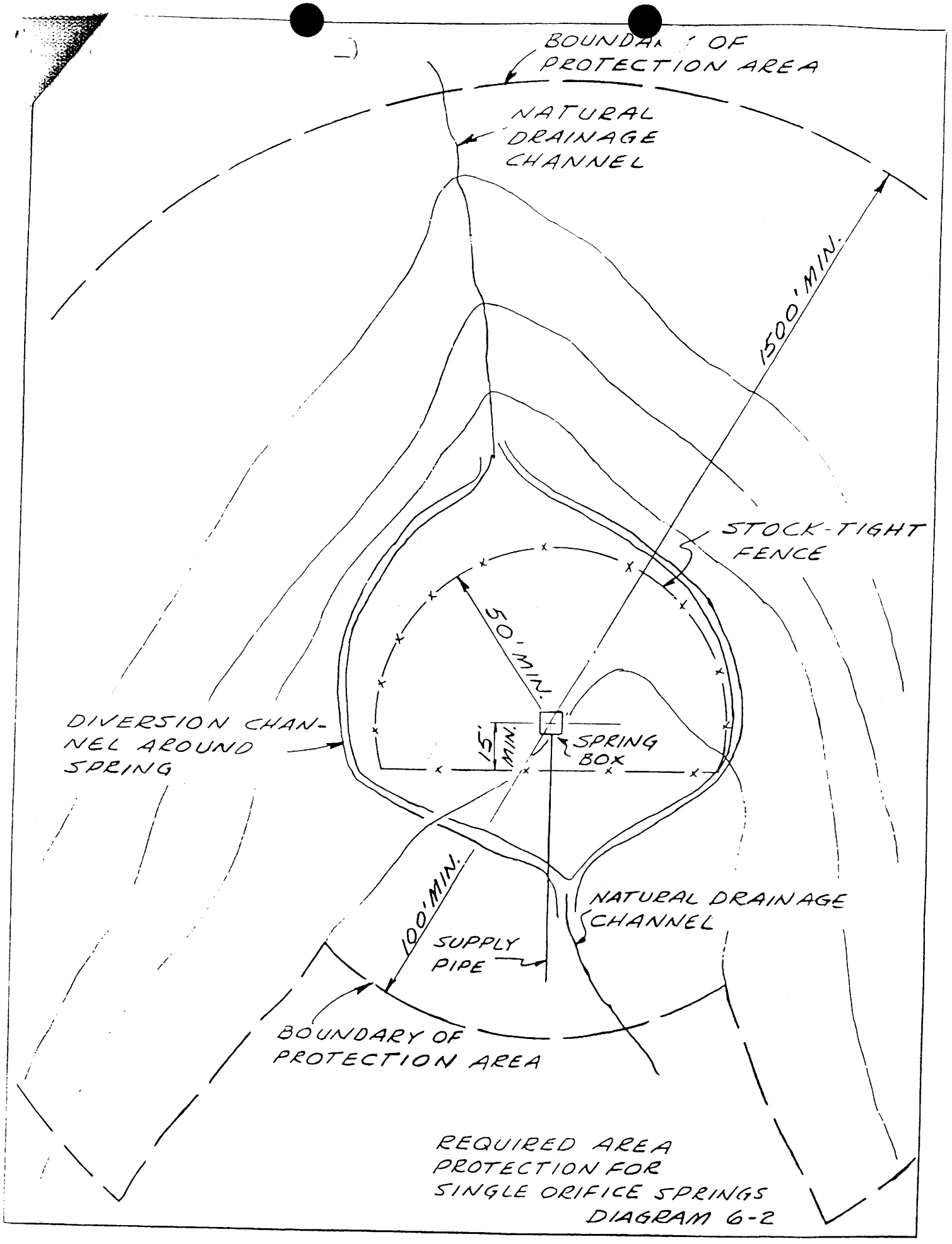
ELEVATION

SECTION

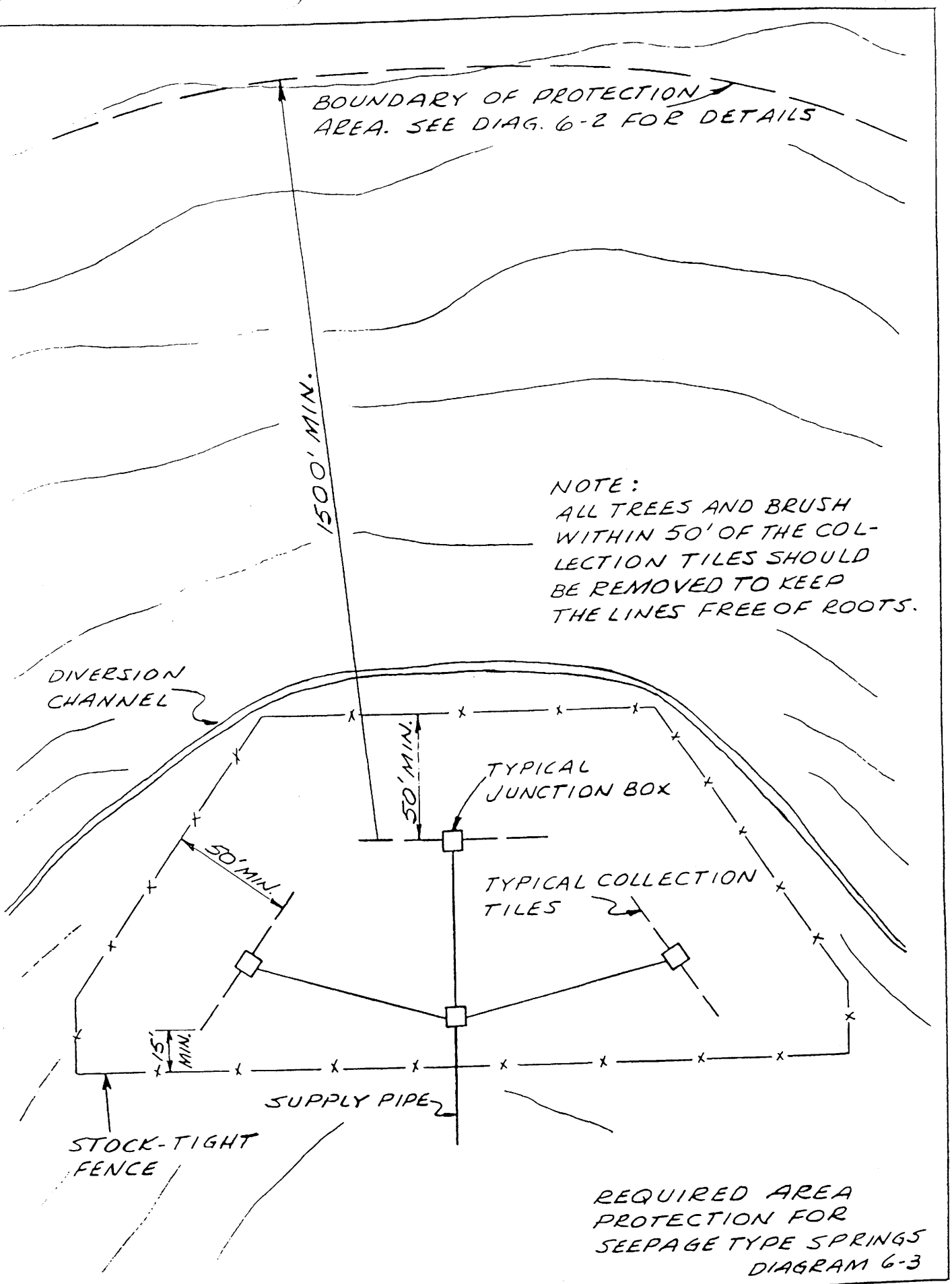
NOTE:
INCLUDE PERMANENT FLOW METERING DEVICE

SUGGESTED DETAILS FOR COLLECTION OF SPRING WATER IN TUNNELS

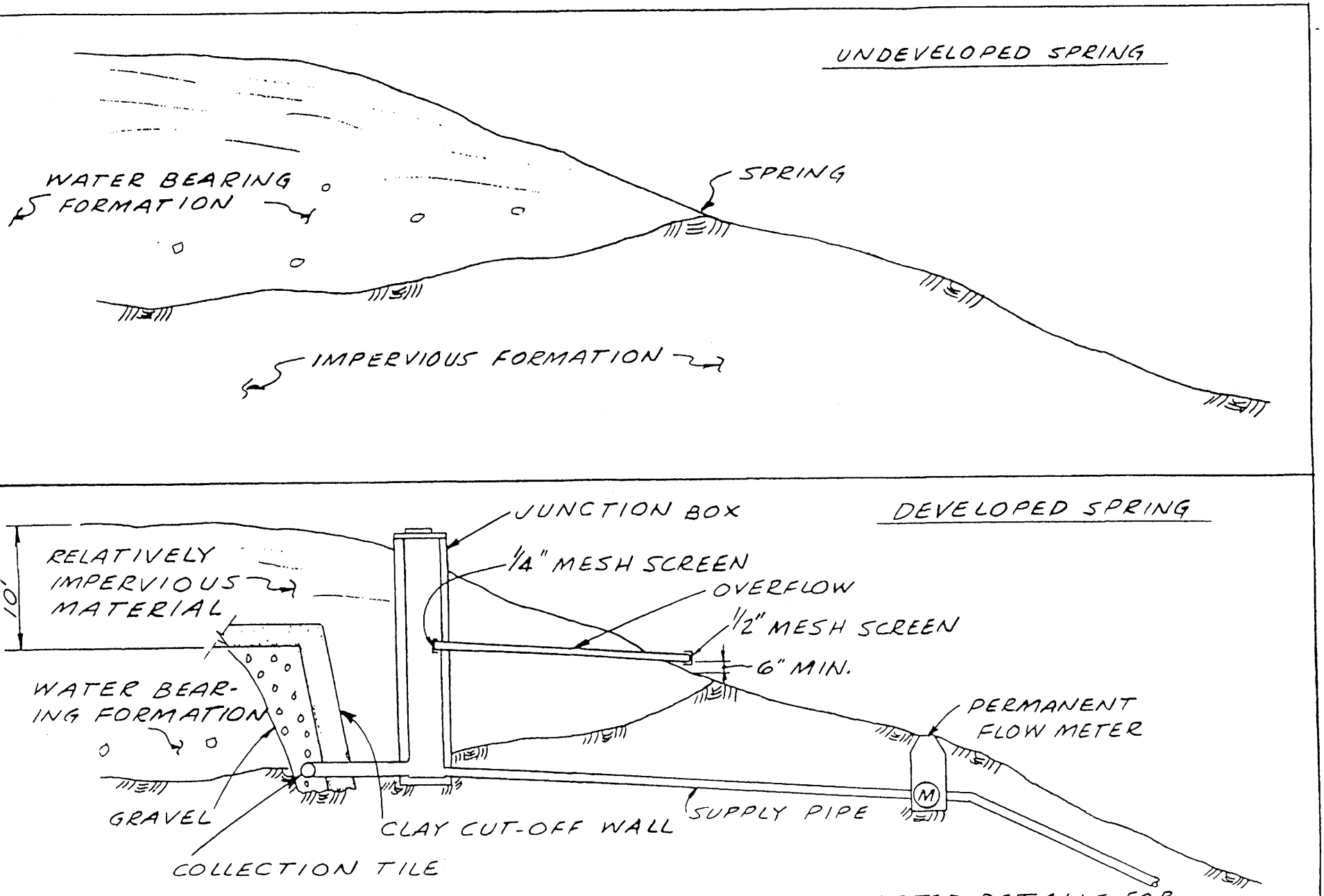
DIAGRAM 6-1



REQUIRED AREA PROTECTION FOR SINGLE ORIFICE SPRINGS
DIAGRAM 6-2

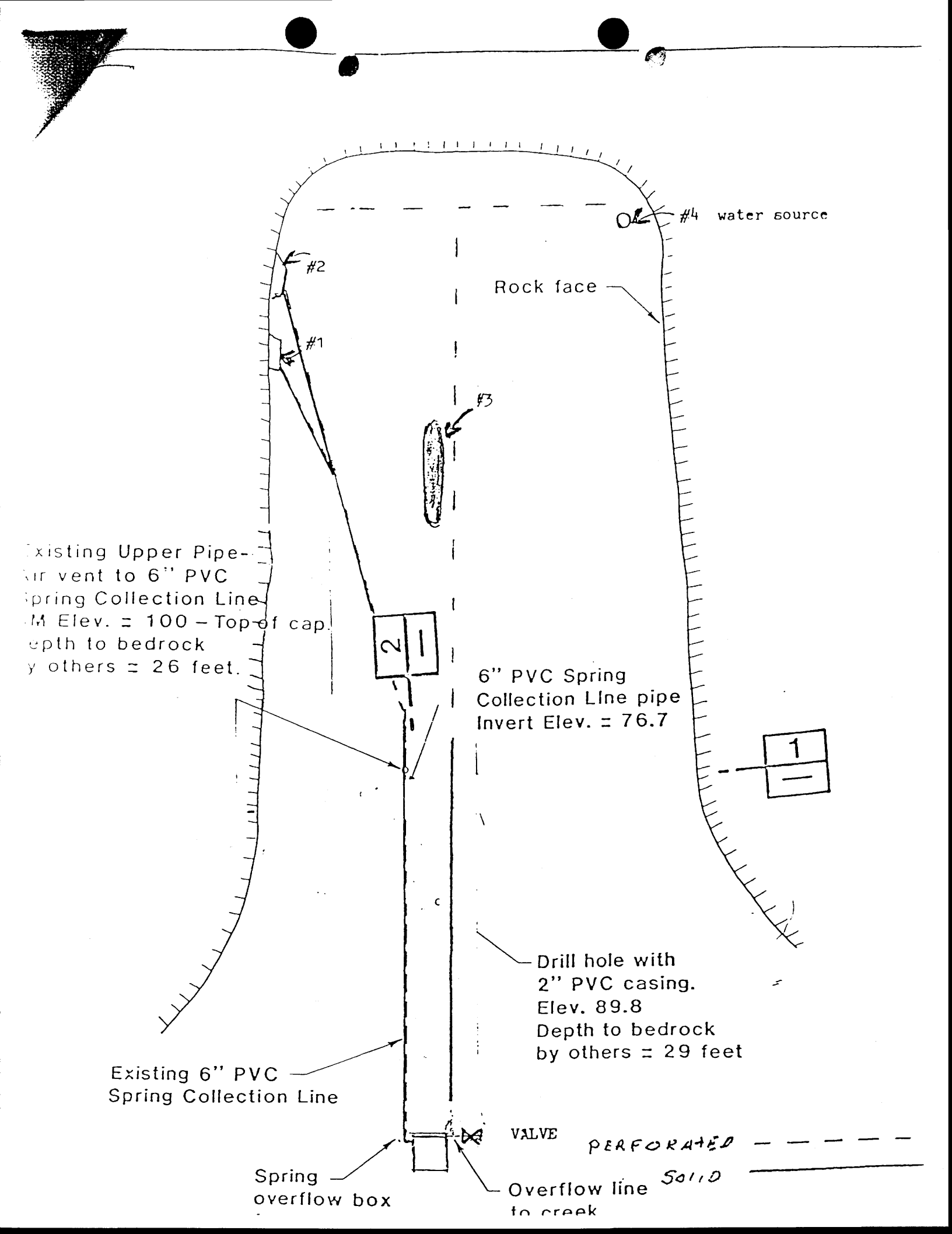


REQUIRED AREA PROTECTION FOR SEEPAGE TYPE SPRINGS
DIAGRAM 6-3



SUGGESTED DETAILS FOR SPRING DEVELOPMENT IN ALLUVIAL FORMATIONS

DIAGRAM 6-4


#4 water source
#2
Rock face
#1
#3
Existing Upper Pipe-
Air vent to 6" PVC
Spring Collection Line
M Elev. = 100 – Top of cap
epth to bedrock
y others = 26 feet.
2
1
6" PVC Spring
Collection Line pipe
Invert Elev. = 76.7
1
Drill hole with
2" PVC casing.
Elev. 89.8
Depth to bedrock
by others = 29 feet
Existing 6" PVC
Spring Collection Line
VALVE
PERFORATED
Solid
Spring
overflow box
Overflow line
to creek

Appendix C: Bear Canyon Mine Faults

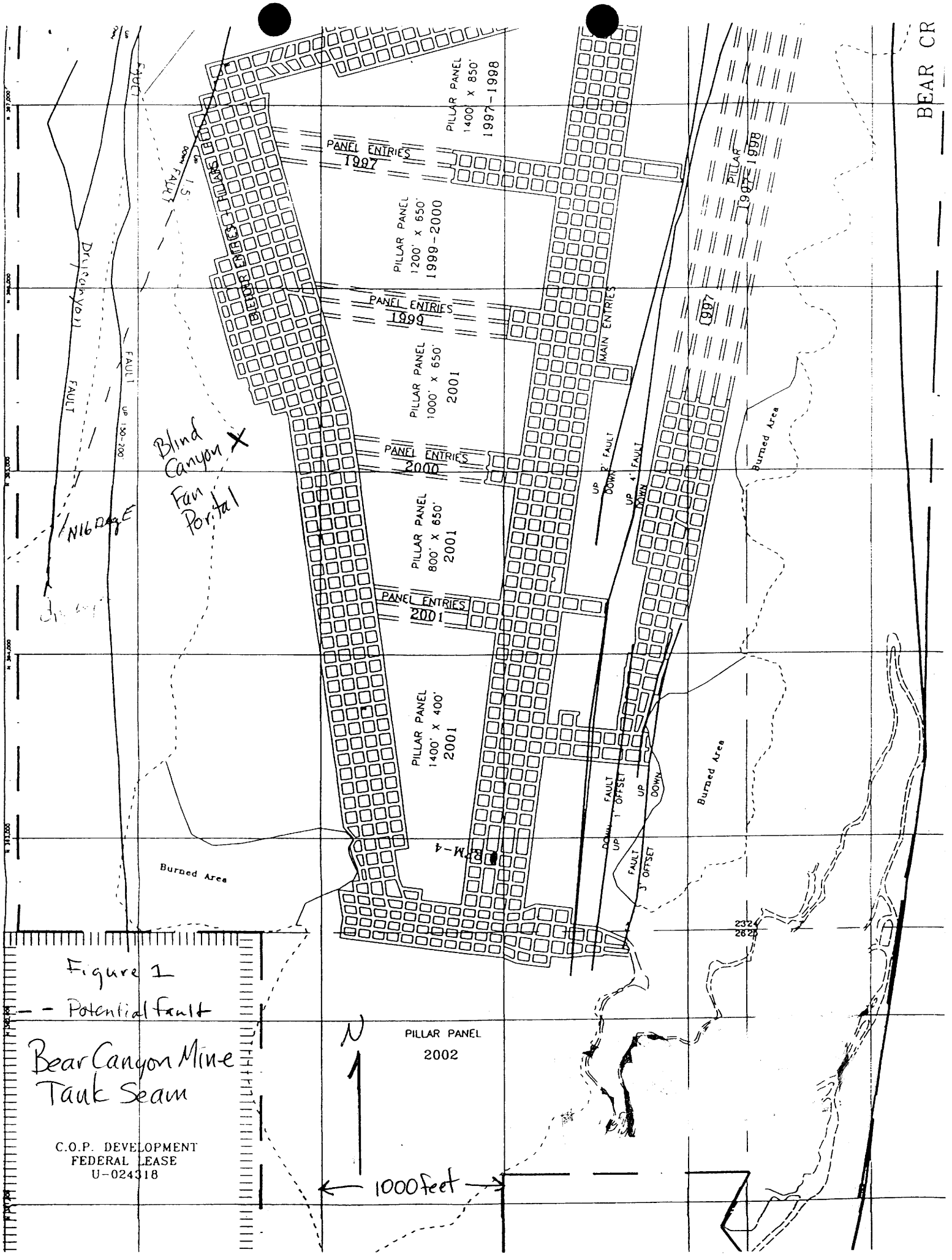


Figure 1

-- Potential Fault

Bear Canyon Mine
Tank Seam

C.O.P. DEVELOPMENT
FEDERAL LEASE
U-024318

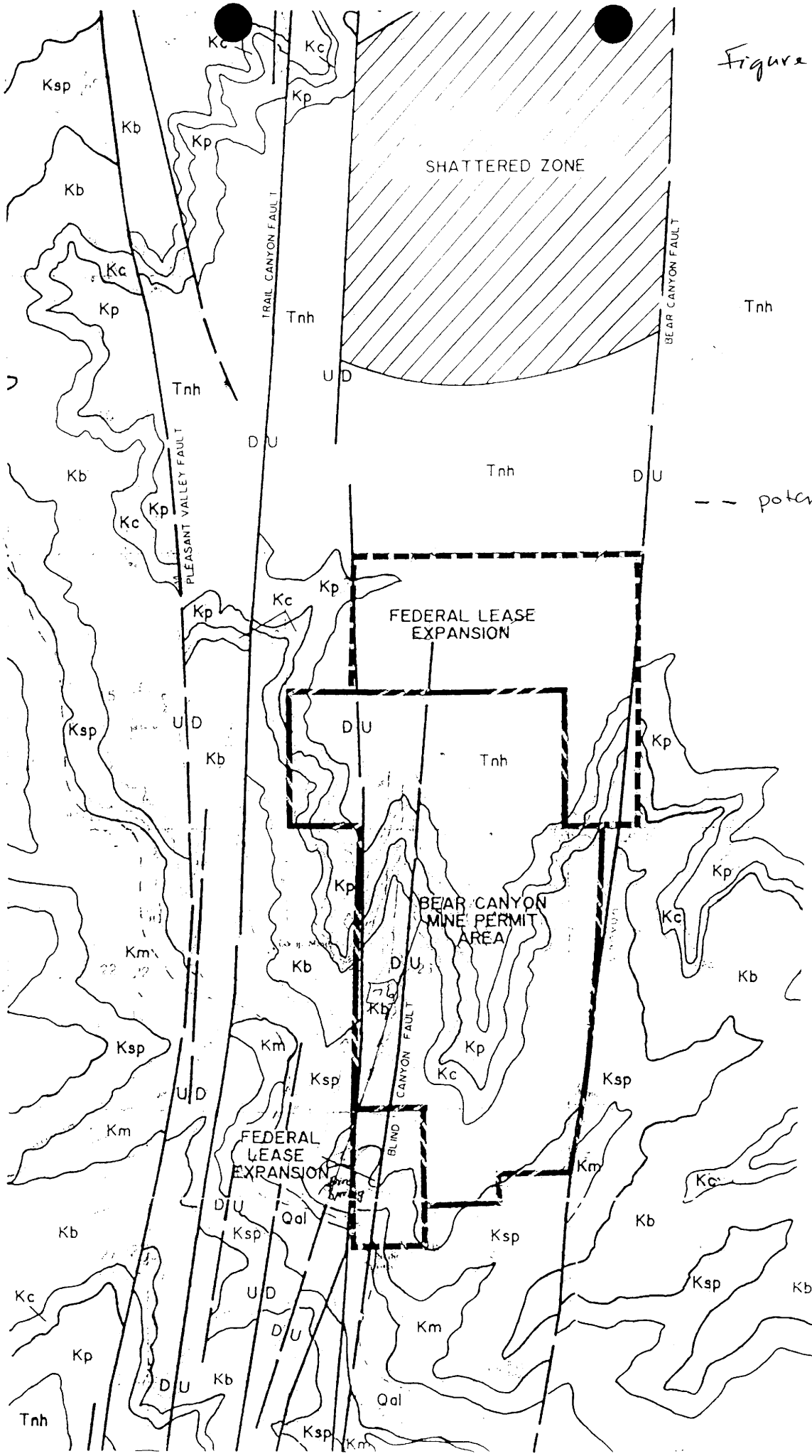


Figure 2
N
1000'
(Approximate)
SHATTERED ZONE
TRAIL CANYON FAULT
BEAR CANYON FAULT
PLEASANT VALLEY FAULT
BLIND CANYON FAULT
FEDERAL LEASE EXPANSION
BEAR CANYON MINE PERMIT AREA
FEDERAL LEASE EXPANSION
-- potential Fault
Ksp
Kb
Kc
Kp
Tnh
Km
Qal
U D
D U

Appendix D: Water Quantity and Subsidence Event Information.

State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt
Governor

Ted Stewart
Executive Director

James W. Carter
Division Director

355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
801-538-5340
801-359-3940 (Fax)
801-538-5319 (TDD)

February 16, 1995

TO: File

FROM: Jess Kelley, Reclamation Engineer JK

RE: Review of Submittal to Correct Errors and Omissions in Descriptions of Blind Canyon Portals, Bear Canyon Mine, Co-Op Mining Company, ACT/015/025-95B, Folder #2, Emery County, Utah

SYNOPSIS

In the Fall of 1994, Peter Hess and Tom Munson of the Division inspected this site with Charles Reynolds of Co-Op. While inspecting the Blind Canyon fan portal, the 3 men discovered 3 places near the fan portal where the settling of the overlying ground into workings close to the coal outcrop had created openings into the mine large enough to allow access.

To mitigate this damage, Peter Hess instructed the permittee to include these 3 areas in the existing disturbed area and make provision for reclaiming them.

In response to Peter Hess's instructions, the permittee submitted this amendment for Division approval on January 19, 1995. The submittal consists of text and a map which have been revised to incorporate the 3 accidental breakouts in the approved plan.

ANALYSIS

In order to mitigate the damage caused by the breakouts, the permittee has included the 3 areas in the disturbed area and has committed to reclaim them by sealing them with a block wall and backfilling them, just like any portal opening. Plate 2-5, which shows the Blind Canyon fan portal, has been modified to show the locations of the breakouts. Since the addition to the approved disturbed area is so small, this action does not constitute a significant revision.

The permittee has also included the reclamation costs associated with the breakouts in the overall reclamation cost estimate. The additional reclamation costs raise the overall estimate from $487,666 to $502,120, in 1999 dollars. Since the present bond is in the amount of only $487,911, the bond will have to be increased to cover the additional cost.

FINDINGS/RECOMMENDATIONS

It is recommended 1) that this amendment be approved and included as part of the approved plan, and 2) that the bond be increased to *at least* $502,120 to cover the additional reclamation costs associated with the breakouts.

CC: Daron Haddock
Pamela Grubaugh-Littig

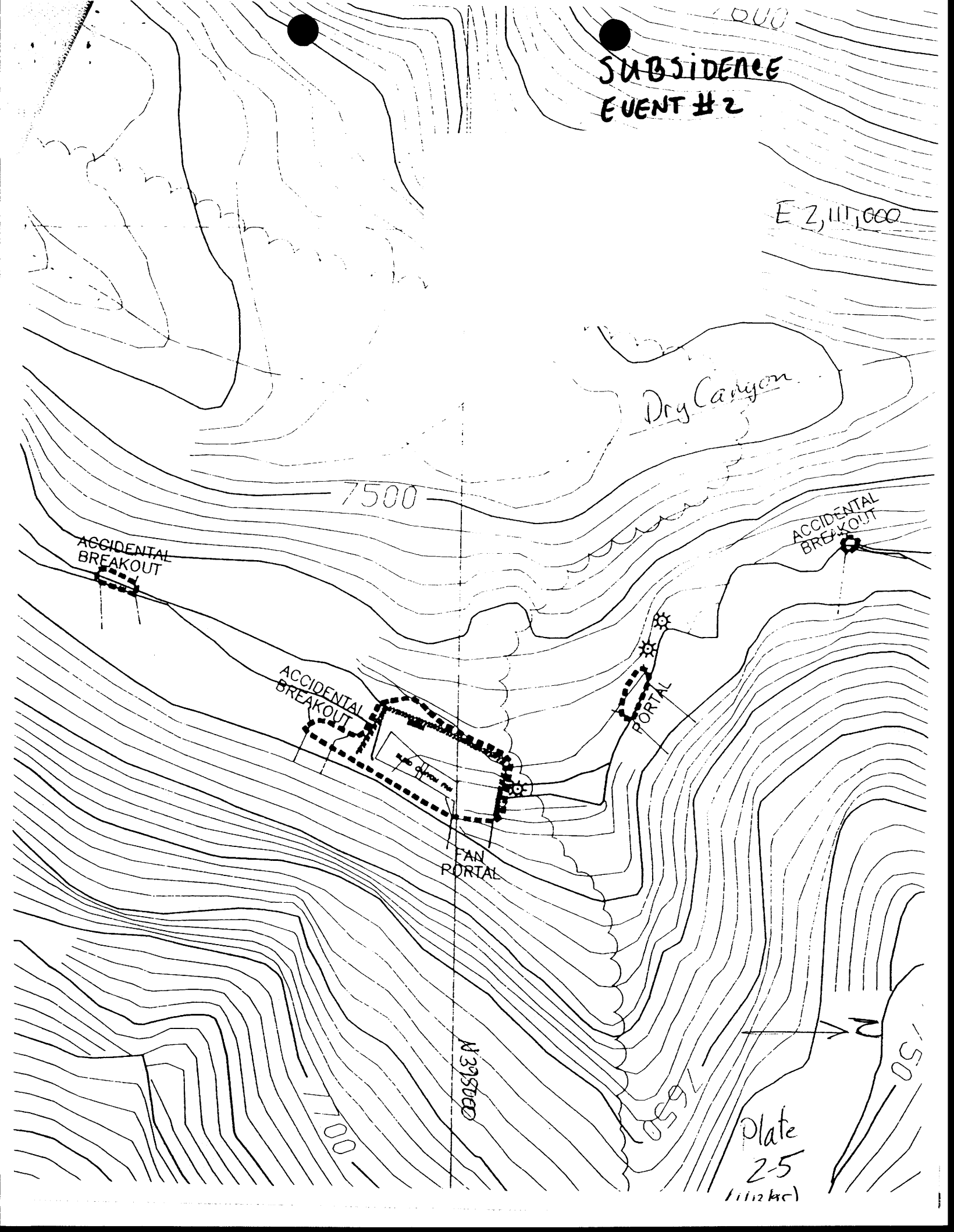
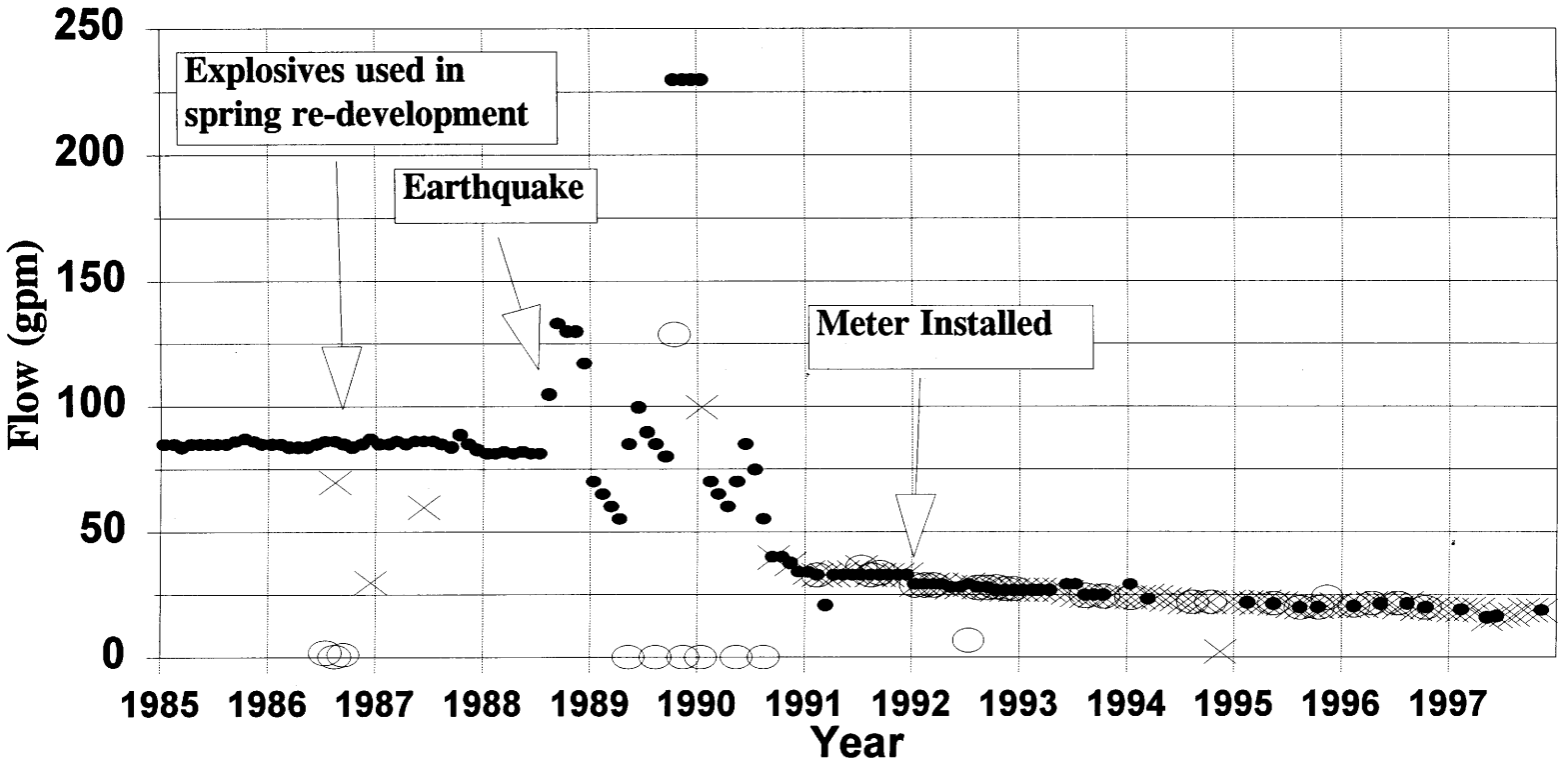

SUBSIDENCE
EVENT #2
E 2,111,000
Dry Canyon
7500
ACCIDENTAL
BREAKOUT
ACCIDENTAL
BREAKOUT
ACCIDENTAL
BREAKOUT
PORTAL
FAN
PORTAL
N 39°E
7700
7650
Plate
2-5

Figure 1

Birch Spring Flow
Combined Data Sources



• Flow From Star Point MRP and NEWUA × Flow Provided by Co-op Ref: NEWUA

○ Flow from Bear Canyon Mine Plan

State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt
Governor

Ted Stewart
Executive Director

James W. Carter
Division Director

355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
801-538-5340
801-359-3940 (Fax)
801-538-5319 (TDD)

March 27, 1995

TO: James W. Carter, Director

FROM: Peter Hess, Engineer PH

RE: Subsidence-New Evidence for Consideration, Re-evaluation of Assessment, NOV N94-46-4-1, Bear Canyon, Co-Op Mining Company, ACT/015/025, Emery County, Utah

#2

As we briefly discussed on March 24, 1995, Mr. Charles Reynolds, Environmental Coordinator, Co-Op Mining Company, has submitted additional evidence which needs to be considered for the finalized assessment of the aforementioned violation, should your determination uphold same.

Plate 3-4, (dated April 15, 1987) which is a map of the underground workings of the Bear Canyon Mine, shows that ventilation **stoppings** were installed out by the initial subsidence hole, which is the hole that was barricaded off in the drainage; this is shown as a cave in the 1st South retreat section. MSHA does not consider stoppings to have the same ventilation effectiveness as mine seals; however, considering the fact that the permittee did barricade off the hole, (which is all 30 CFR, Part 75.1711 requires) and did block entrance to the gob area of the underground works. I believe that the amount of negligence points in the assessment should be reduced. The majority of underground management personnel are not aware of the requirements of SMCRA.

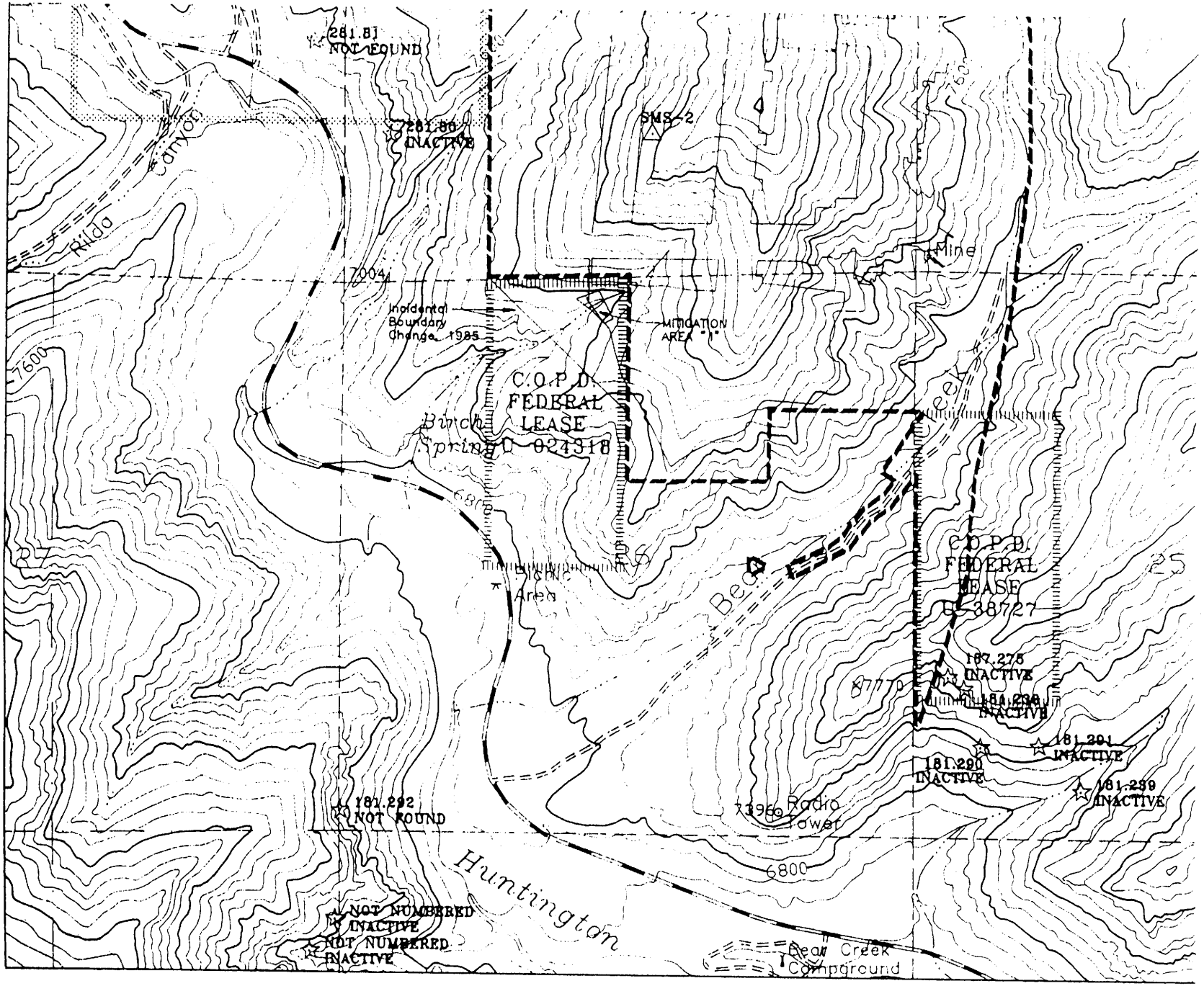
No action was taken to prevent drainage access into the underground works, (R645-301-513.600). Also, it appears that MSHA personnel did not require the permittee to fill in the hole because they felt the barricade was adequate to prevent any problems. It is not known when the other two holes subsided; it is possible that the permittee had no knowledge of them until N94-46-4-1B was issued.

It is my opinion, that although the permittee should have taken it upon himself to fill in the hole, (to go above and beyond the call of duty, so to speak) they did not because no one required them to do so. This is not their fault.

I would like to recommend that, should you uphold the violation, the amount of negligence points be reduced to 10.

Should you have any questions, please call me.

sd
cc: J. Helfrich



From Plate 3-3

Michael O. Leavitt
Governor
Ted Stewart
Executive Director
James W. Carter
Division Director

State of Utah

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING
1594 West North Temple, Suite 1210
P.O. Box 145801
Salt Lake City, Utah 84114-5801
(801) 538-5340
(801) 359-3940 (Fax)

INSPECTION REPORT

Partial: XXX Complete:__ Exploration:__
Inspection Date & Time: 10/28/96 / 8:00a.m.-1:30p.m.
Date of Last Inspection: 8/14/96

Mine Name: Trail Canyon Mine County: Emery Permit Number: **ACT/015/021**
Permittee and/or Operator's Name: Co-Op Mining Company
Business Address: P.O. Box 1245, Huntington, Utah 84528
Type of Mining Activity: Underground XXX Surface__ Prep. Plant__ Other__
Company Official(s): Charles Reynolds, Darrel Leamaster
State Officials(s): Peter Hess Federal Official(s): None
Weather Conditions: Overcast, Snowing
Existing Acreage: Permitted-280 Disturbed-10 Regraded-10 Seeded-10 Bonded-10
Increased/Decreased: Permitted-___ Disturbed-___ Regraded-___ Seeded-___ Bonded-___
Status: _Exploration/___Active/_XXX_Inactive/_Temporary Cessation/_Bond Forfeiture
Reclamation (_Phase I/_Phase II/_Final Bond Release/_Liability_____Year)

REVIEW OF PERMIT, PERFORMANCE STANDARDS & PERMIT CONDITION REQUIREMENTS

Instructions

1. Substantiate the elements on this inspection by checking the appropriate performance standard.
   a. For complete inspections provide narrative justification for any elements not fully inspected unless element is not appropriate to the site, in which case check N/A.
   b. For partial inspections check only the elements evaluated.
2. Document any noncompliance situation by referencing the NOV issued at the appropriate performance standard listed below.
3. Reference any narratives written in conjunction with this inspection at the appropriate performance standard listed below.
4. Provide a brief status report for all pending enforcement actions, permit conditions, Division Orders, and amendments.

		EVALUATED	N/A	COMMENTS	NOV/ENF
1.	PERMITS, CHANGE, TRANSFER, RENEWAL, SALE	☐	☐	☐	☐
2.	SIGNS AND MARKERS	☐	☐	☐	☐
3.	TOPSOIL	☐	☐	☐	☐
4.	HYDROLOGIC BALANCE:				
a.	DIVERSIONS	☐	☐	☐	☐
b.	SEDIMENT PONDS AND IMPOUNDMENTS	☐	☐	☐	☐
c.	OTHER SEDIMENT CONTROL MEASURES	☐	☐	☐	☐
d.	WATER MONITORING	☐	☐	☐	☐
e.	EFFLUENT LIMITATIONS	☐	☐	☐	☐
5.	EXPLOSIVES	☐	☐	☐	☐
6.	DISPOSAL OF EXCESS SPOIL/FILLS/BENCHES	☐	☐	☐	☐
7.	COAL MINE WASTE/REFUSE PILES/IMPOUNDMENTS	☐	☐	☐	☐
8.	NONCOAL WASTE	☐	☐	☐	☐
9.	PROTECTION OF FISH, WILDLIFE AND RELATED ENVIRONMENTAL VALUES	[XX]	☐	[XX]	☐
10.	SLIDES AND OTHER DAMAGE	☐	☐	☐	☐
11.	CONTEMPORANEOUS RECLAMATION	☐	☐	☐	☐
12.	BACKFILLING AND GRADING	☐	☐	☐	☐
13.	REVEGETATION	☐	☐	☐	☐
14.	SUBSIDENCE CONTROL	☐	☐	☐	☐
15.	CESSATION OF OPERATIONS	☐	☐	☐	☐
16.	ROADS:				
a.	CONSTRUCTION/MAINTENANCE/SURFACING	☐	☐	☐	☐
b.	DRAINAGE CONTROLS	☐	☐	☐	☐
17.	OTHER TRANSPORTATION FACILITIES	☐	☐	☐	☐
18.	SUPPORT FACILITIES/UTILITY INSTALLATIONS	☐	☐	☐	☐
19.	AVS CHECK (4th Quarter-April, May, June)_____(date)	☐	☐	☐	☐
20.	AIR QUALITY PERMIT	☐	☐	☐	☐
21.	BONDING & INSURANCE	☐	☐	☐	☐

INSPECTION REPORT
(Continuation sheet)

PERMIT NUMBER: **ACT/015/021**

DATE OF INSPECTION: 10/28/96

(Comments are Numbered to Correspond with Topics Listed Above)

9. PROTECTION OF FISH, WILDLIFE, AND RELATED ENVIRONMENTAL VALUES

Arrangements were made on October 17, 1996 for the Division to respond to a citizen's complaint aired by Mr. Darrell Leamaster, Castle Valley Special Service District, with regard to some mining related surface subsidence. This concern was relayed to Mr. Charles Reynolds, Environmental Coordinator, Co-Op Mining Company and Monday, October 28, 1996 was established as the day the subsidence areas would be visited by the three of us.

The preliminary investigation of the areas indicates that the openings are caused by subsidence due to the second mining of pillars in the Trail Canyon mine (see enclosed mine map) in early 1976. According to Mr. Reynolds, the mined area was sealed off in October of 1976, (i.e., pre-SMCRA).

To access the site, we traveled underground through the Bear Canyon #1 mine to the Blind Canyon fan installation. The surface damage is approximately 1,000 to 1,500 feet down canyon from the fan. As seen from the photos, snow covered the ground, so some of the damage may not be obvious. The majority of the damage is on either side of the drainage, but there is one very large drop right in the drainage. Mr. Leamaster and Mr. Reynolds agreed that this water exits to Huntington Creek at the curve where the cattle guard is located in Huntington Canyon. Neither have ever seen any flow from this area except during a significant thunderstorm event. As the area was mined in 1976, it has probably been about twenty years since the drainage has been affected, hence, it is difficult to say how much hydrological impact has been done.

At the close of the site visit, I told Mr. Leamaster that I was not sure what position the Division would take at this point, but that I would forward all information to DOGM-SLO, including informing Mr. Mark Mesch, Title 4 Supervisor, of the damage. In closing, it appears that the areas are trying to self heal; I do not believe that any of them are a hazard to wildlife or to hunters.

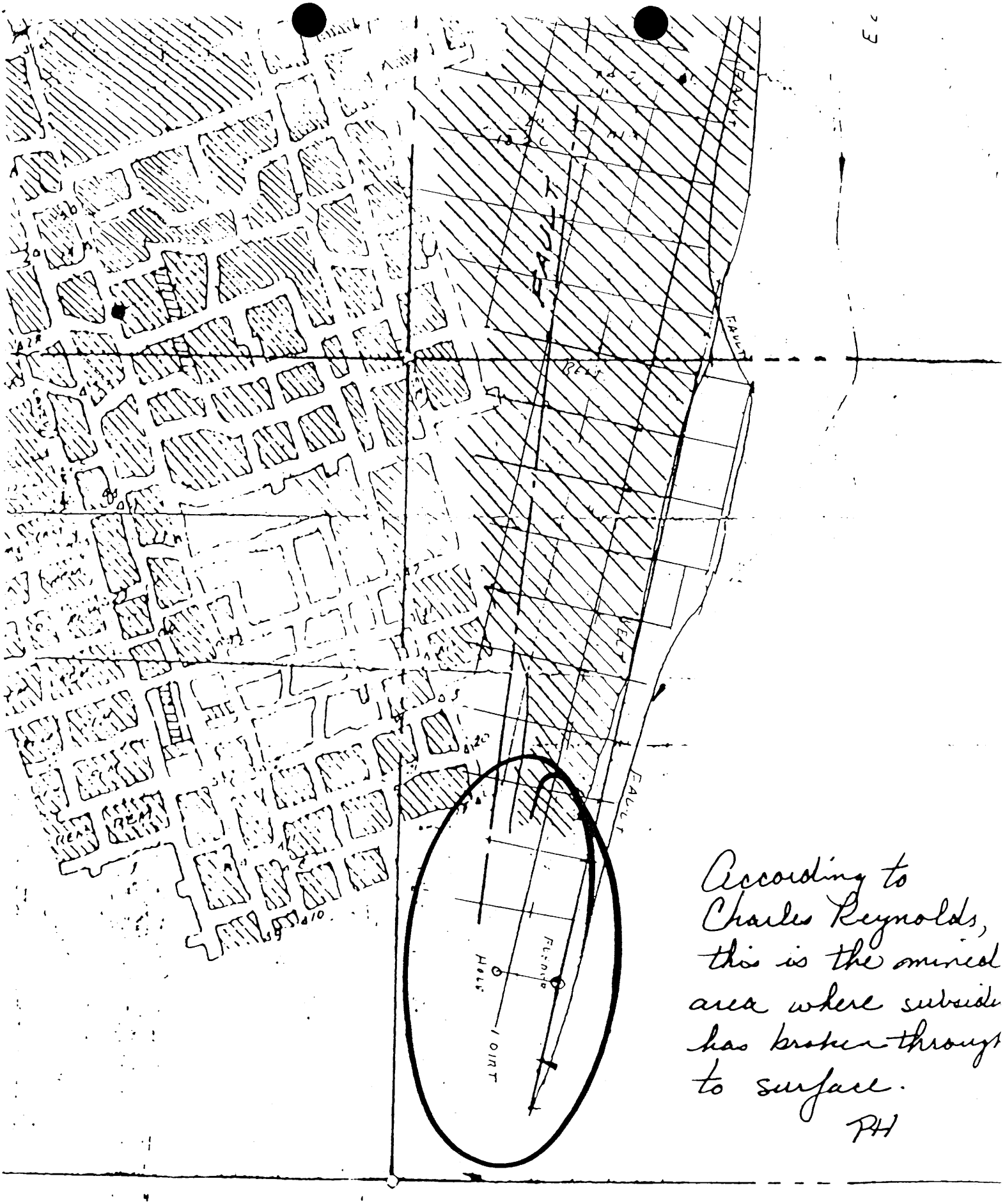
Note: This inspection report does not constitute an affidavit of compliance with the regulatory program of the Division of Oil, Gas, and Mining.

Copy of this Report:

Mailed to: Charles Reynolds (Co-Op), Darrel Leamaster (CVSSD), Marcia Petta (OSM)
Given to: Joe Helfrich, Mark Mesch, Mary Ann Wright, Susan White (DOGM)
Date: November 1, 1996 Filed to: Price Field Office

Inspector's Signature: Peter Hess #46
Peter Hess

SEE: Chris Rohrer's investigations



According to Charles Reynolds, this is the mined area where subsidence has broken through to surface.

PH

STATE OF UTAH
NATURAL RESOURCES
Division of Oil, Gas & Mining

3 Triad Center • Suite 350 • Salt Lake City, UT 84180-1203 • 801-538-5340

notice of violation

NO. N 94-46-4-1B

To the following Permittee or Operator:

Name Co-Op Mining Company

Mine Bear Canyon Mine ☐ Surface ☒ Underground ☐ Other

County Emery State Utah Telephone 801-687-2450

Mailing Address P. O. Box 1245, Huntington, Utah 84528

State Permit No. ACT/015/025

Ownership Category ☐ State ☐ Federal ☒ Fee ☐ Mixed

Date of inspection October 25, 1994, 19 ____

Time of inspection 9:00 ☒ a.m. ☐ p.m. to 1:00 ☐ a.m. ☒ p.m.

Operator Name (other than Permittee) ____

Mailing Address ____

Under authority of the Utah Coal Mining and Reclamation Act, Section 40-10-1 et seq., *Utah Code Annotated*, 1953, the undersigned authorized representative of the Division of Oil, Gas & Mining has conducted an inspection of above mine on above date and has found violation(s) of the act, regulations or required permit condition(s) listed in attachment(s). This notice constitutes a separate Notice of Violation for each violation listed.

You must abate each of these violations within the designated abatement time. You are responsible for doing all work in a safe and workmanlike manner.

The undersigned representative finds that **cessation of mining is** ☐ **is not** ☒ expressly or in practical effect required by this notice. For this purpose, "mining" means extracting coal from the earth or a waste pile, and transporting it within or from the mine site.

This notice shall remain in effect until it expires as provided on reverse side of this form, or is modified, terminated or vacated by written notice of an authorized representative of the director of the Division of Oil, Gas & Mining. Time for abatement may be extended by authorized representative for good cause, if a request is made within a reasonable time before the end of abatement period.

*** Certified Mail Z 254 438 034

Date of ~~service~~/mailing December 12, 1994 Time of ~~#####~~/mailing 3:00 ☐ a.m. ☒ p.m.

Charles Reynolds
Permittee/Operator representative

Environmental Coordinator
Title

Mailed from DOGM Price office
Signature

Peter Hess
Division of Oil, Gas & Mining representative

Engineer II
Title

Peter Hess
Signature

#46
Identification Number

SEE REVERSE SIDE

WHITE-DOGM YELLOW-OPERATOR PINK-OSM GOLDENROD-NOV FILE

DOGM/NOV-1

an equal opportunity employer

Rev. 5/92

NOTICE OF VIOLATION NO. N 94-46-4-1B

Violation No. 1 of 1

Nature of violation

1) Failure to meet the terms and conditions of the approved permit.

2) Failure to prevent access to the mine workings by people, livestock fish and wildlife.

Provisions of act, regulations or permit violated

1) R645-301-560

2) R645-301-551

Portion of operation to which notice applies

Surface subsidence sites in unnamed canyon between Trail Canyon and Bear Canyon. Subsidence is associated with the underground workings of the Bear Canyon Mine.

Remedial action required (including any interim steps)

1) Submit a plan to the Utah Division of Oil, Gas, and Mining for approval to effectively remove the hazards associated with the surface subsidence sites.

2) Upon Division approval, implement said plan.

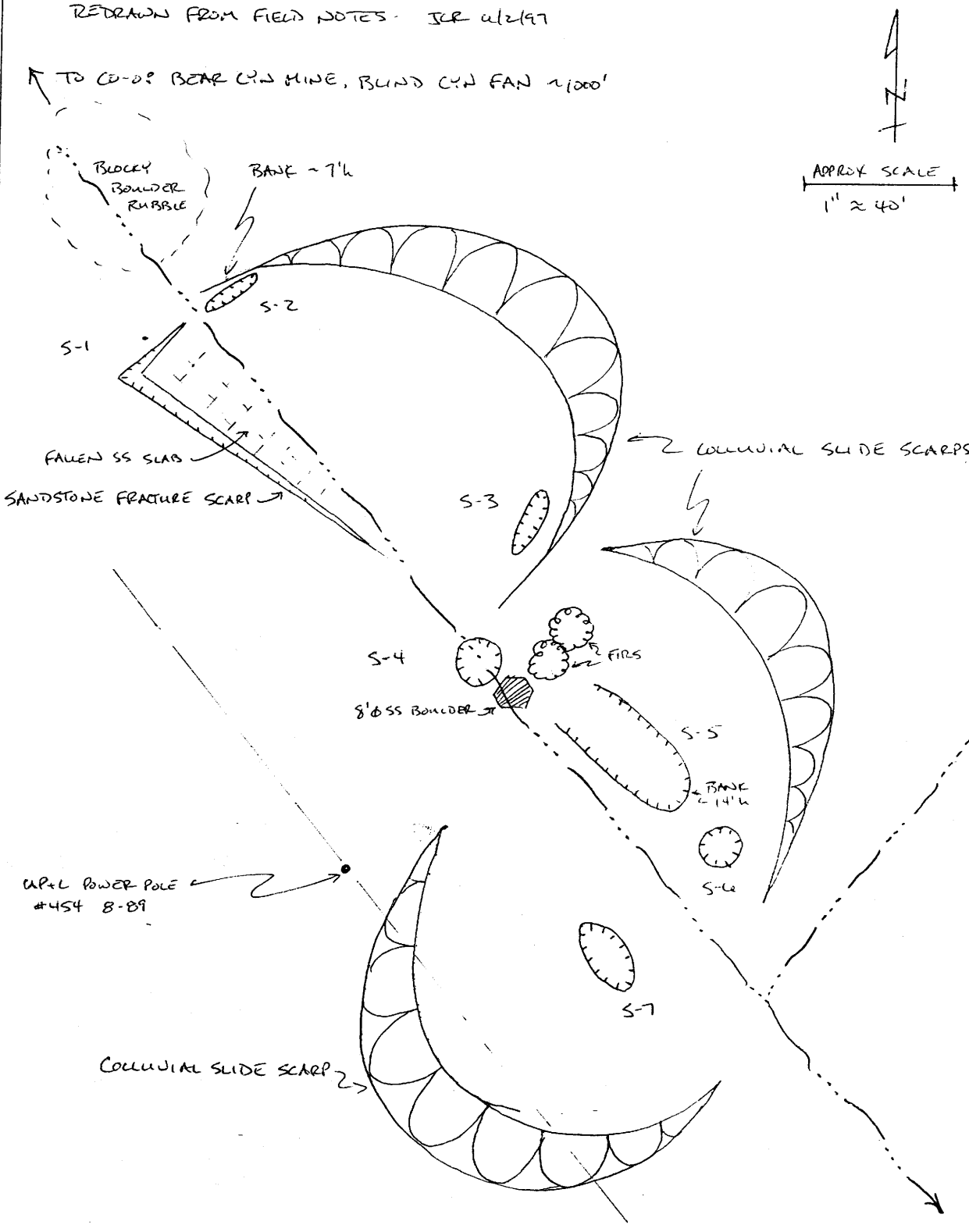
Abatement time (including interim steps)

1) Submit plan no later than December 27, 1994 at 5:00 p.m.

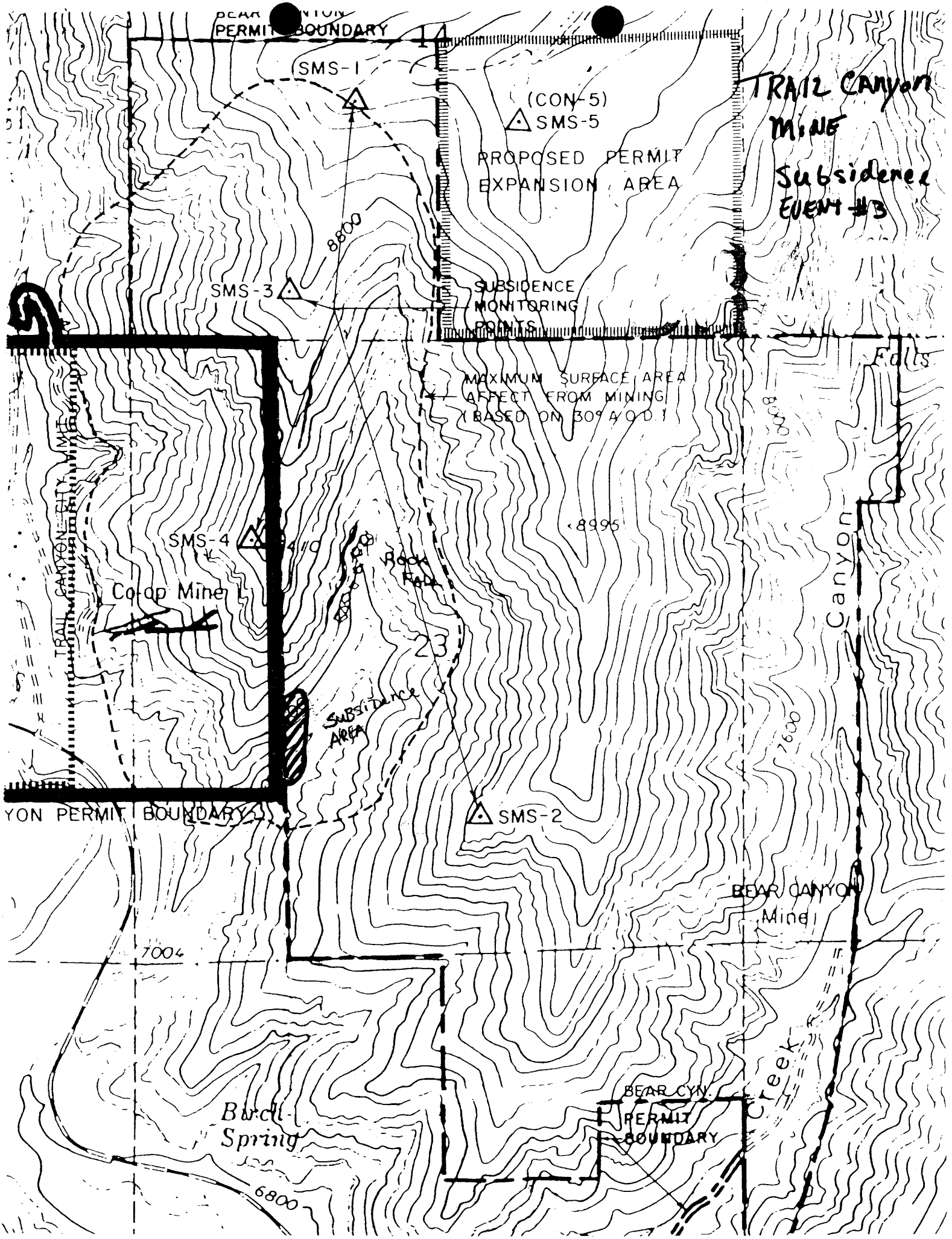
2) ~~Implement approved plan within 30 days of Division approval.~~

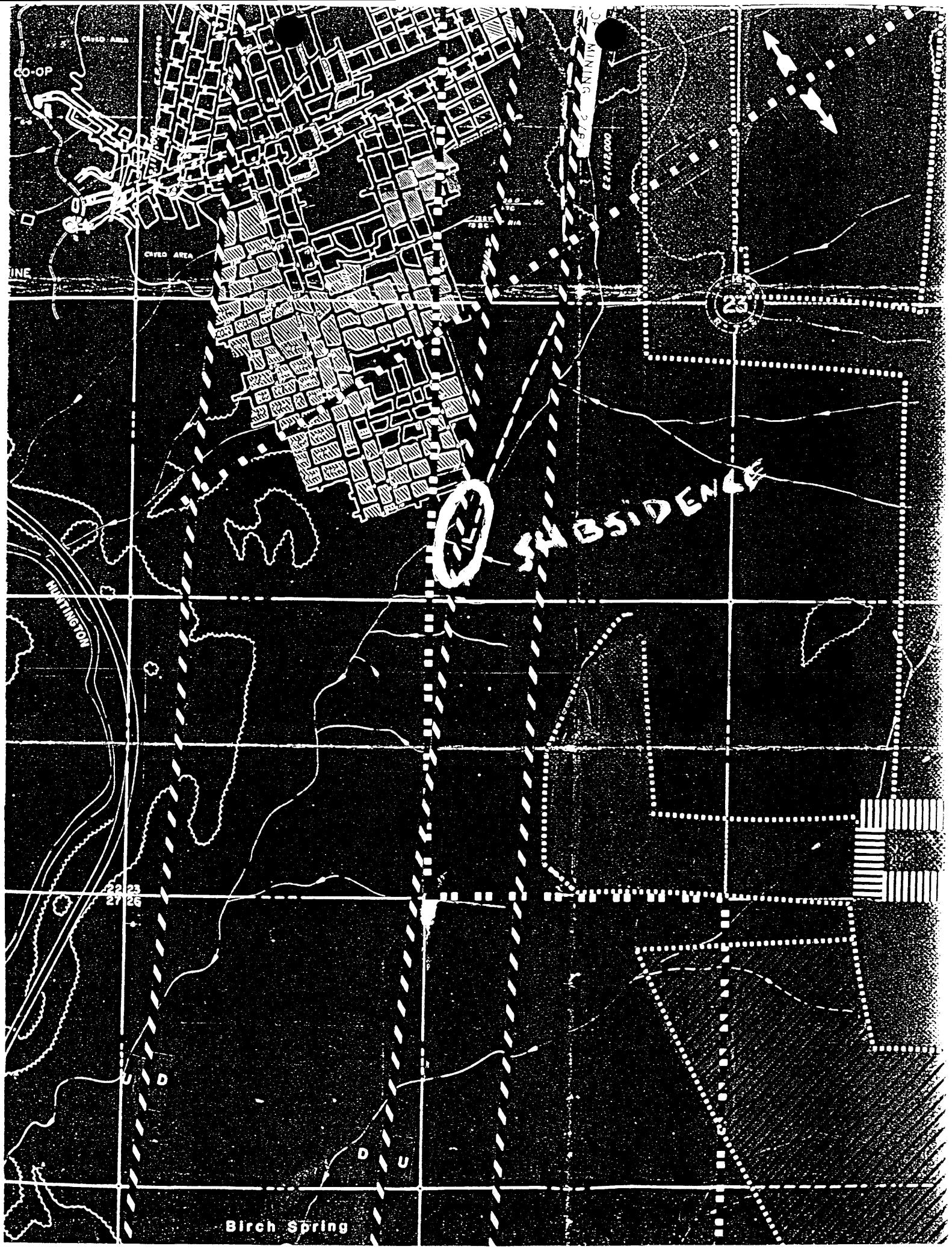
TRAIL CANYON SUBSIDENCE

REDRAWN FROM FIELD NOTES - JCR 4/24/97



STREAM CHANNEL BOTTOM HAS DROPPED 6-8' BETWEEN S-2 AND S-4. CHANNEL ABOVE S-2 AND BELOW S-4 IS AT ORIGINAL ELEVATION.


PERMIT BOUNDARY
SMS-1
(CON-5)
SMS-5
PROPOSED PERMIT
EXPANSION AREA
TRAIL CANYON
MINE
Subsidence
EVENT #3
8800
SMS-3
SUBSIDENCE
MONITORING
POINTS
MAXIMUM SURFACE AREA
AFFECT FROM MINING
(BASED ON 3094001
Falls
8800
TRAIL CANYON CITY
SMS-4
8995
Co-op Mine
Rock
Fall
Canyon
23
SUBSIDENCE
AREA
7600
YON PERMIT BOUNDARY
SMS-2
BEAR CANYON
Mine
7004
Creek
BEAR CYN.
PERMIT
BOUNDARY
Bird
Spring
6800


CO-OP
CHILD AREA
CHILD AREA
MINE
23
SUBSIDENCE
HUNTINGTON
22 23
27 26
D
D
U
Birch Spring

Appendix E: Water Quality Information.

EarthFax

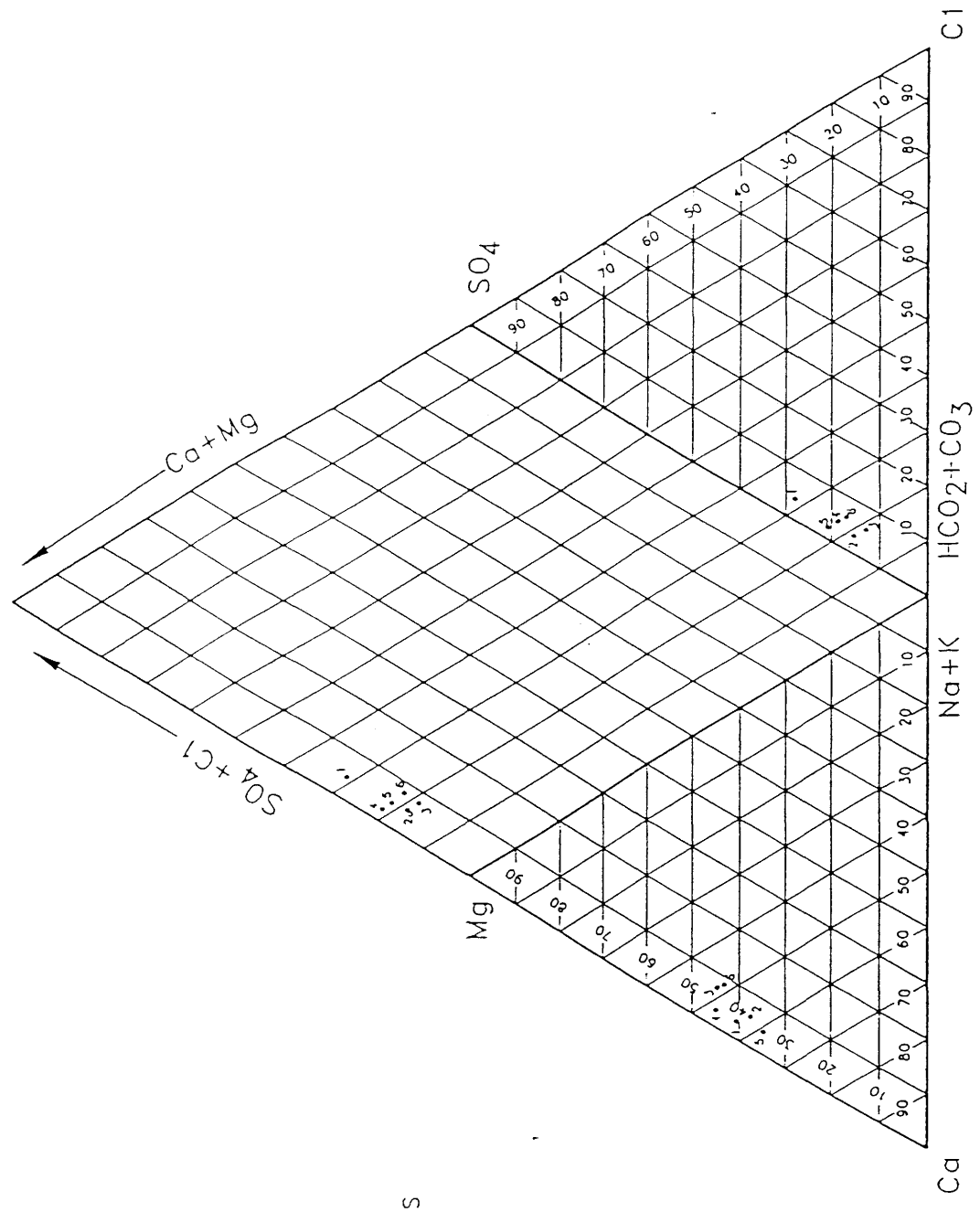


FIGURE 2-1. PIPER DIAGRAM OF AVERAGE GROUNDWATER ANALYTICAL RESULTS

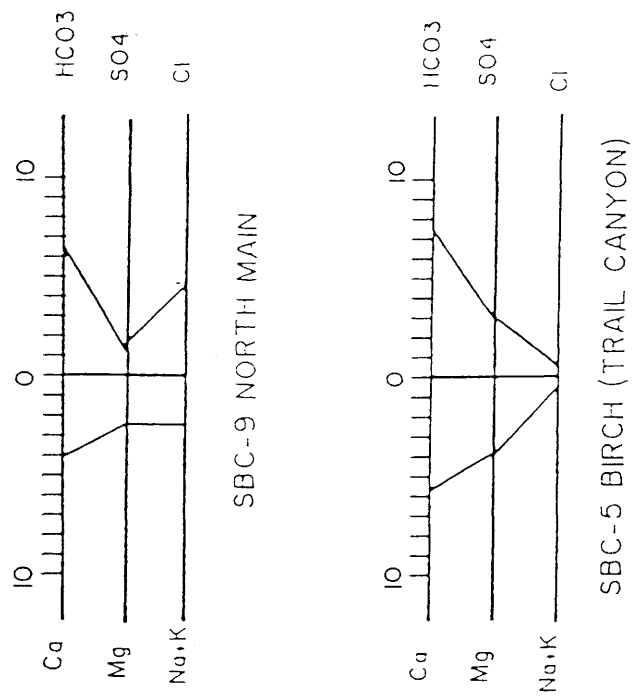
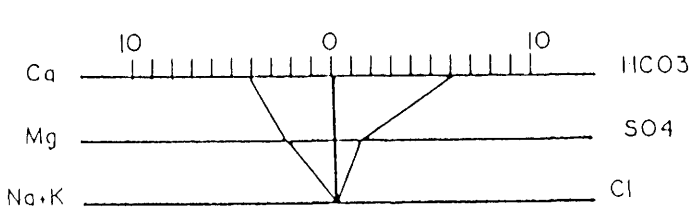
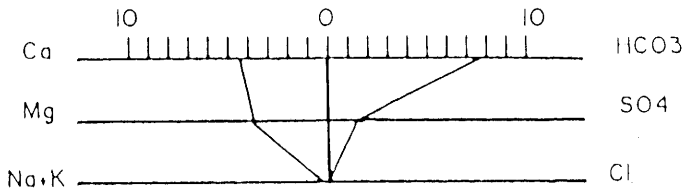


FIGURE 2-2. Stiff Diagrams of Spring Water Analytical Results



CS-I CO-OP SPRING (TRAIL CANYON)



TS-I TRAIL CANYON SPRING

FIGURE 2-2 (continued). Stiff Diagrams of Spring Water Analytical Results

EarthFax

EarthFax

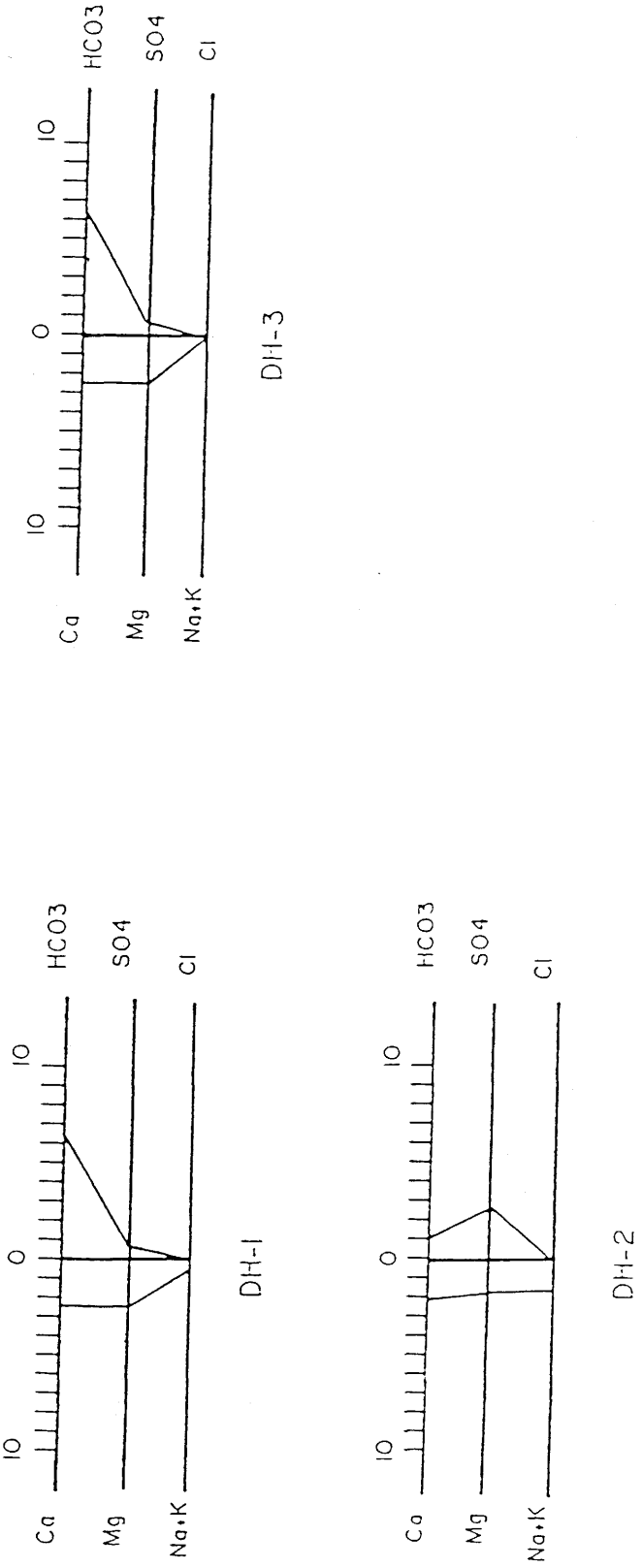


FIGURE 2-3. Stiff Diagrams of In-Mine Monitoring Well Analytical Results