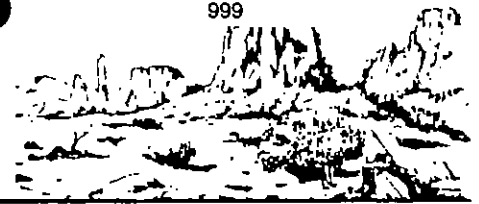


*Mark A. Heifner*

37 E. Colorado Avenue  
Denver, CO 80210  
(303) 722-9067



Environmental Services

• Botanical Studies

• Photography

July 11, 1989

Daniel Hernandez  
Mined Land Reclamation  
215 Centennial Bldg.  
1313 Sherman St.  
Denver, CO 80203

HAND DELIVERED

EXHIBIT # \_\_\_\_\_

RE: Corrective Action Plan for Rock Spillage at Snyder  
Quarry.

Your file NO.: M-77-210

Dear Mr. Hernandez:

Following is a corrective action plan for the damages caused  
by the rock spillage situation at the Snyder Quarry. This  
plan is submitted on behalf of Castle Concrete Company of  
Colorado Springs.

You will note the plan not only contains a plan for  
repairing the damages to the slope, but also some steps to  
be taken to prevent a repeat of this unfortunate accident.  
Therefore, the plan is not only a corrective action plan but  
a preventative action plan.

If you have any questions please do not hesitate to call.

Respectfully,

*Mark A. Heifner*  
Mark A. Heifner

cc: Gordon Morgan, Castle Concrete Company  
G. Scott Briggs, Counsel for Castle Concrete Company

A

## CORRECTIVE ACTION PLAN

### SNYDER QUARRY

#### ROCK SPILLAGE FROM PHASE 1

INTRODUCTION: Near the end of the June hearing on the northwest corner amendment for the Snyder Quarry, mention was made by the public of a possible spillage of rock into the drainage which extends from the quarry area into Williams Canyon. The public mentioned a figure of 4 tons of rock located on Cave of the Winds property which is adjacent to the Castle Concrete Company property.

On June 27, 1989, an investigation was initiated to determine whether any rock had been spilled that far into the canyon. It was known that some spillage had occurred, but until the investigation was conducted it was believed the spillage was virtually all within the mining limit boundary of Phase 1. Any rock located further down the west facing slope below the Phase 1 area had not been noticed. It was quite difficult to believe that much large rock had been spilled. Spillage of rock is costly in lost resource which could be crushed and sold as product. For an employee to take an action which costs the company a significant amount of lost revenue is very serious. Thus even suspecting an employee would spoil a large amount of rock was difficult to believe. However, thinking back to the past, it was recalled that about 1 1/2 to 2 years ago a dozer operator, who is no longer with the company, had been caught pushing rock contrary to directions. After this recollection, it was considered a possibility that he might have pushed some large rocks into the canyon.

INVESTIGATION BY CASTLE CONCRETE: The permit and phase boundaries were located on a blue-line copy of a 1977 aerial photo. These boundaries (particularly the permit boundary) were located in the field and photographs were taken, some of which are included at the end of this report. The permit boundary photo location was atop a cliff to the west of Phase 1 and to the south of the drainage in question (see map).

It became apparent from the permit boundary location that the bottom of the drainage was occupied by a number of very large rocks which appeared to be fairly recent, as judged by their light color. Most of these rocks were outside the permit boundary a distance estimated to be a maximum of about 175 feet. It also appeared that when these rocks rolled down the steep slope below Phase 1 some slope damages

were produced. However, without closer examination of the rocks themselves and the slope it could not be determined whether the rocks were in fact recent or were due to older rock falls from surrounding cliffs.

The next stage of the investigation involved a detailed examination of the drainage from the Phase 1 mining limit boundary to the bottom of Williams Canyon. This was accomplished by climbing down the drainage and photographing the various rocks, examining existing vegetation and vegetation regrowth around the rocks, comparing light colored with dark colored rocks, and noting other points which could provide an approximate date as to when the rocks arrived at their location.

Near the top of the drainage a number of moderate to large rocks were noted just below the mining limit but at least 200 feet inside the permit boundary. These rocks were already known to exist and when Phase 1 nears completion it was planned to remove these rocks and any trees which had died as a result of damage. One very large, old rock (indicated by the dark gray color and the grass growing in cracks) on the side of the hill was noted to have a drill hole in the side of it. However, the dimensions of the hole was too small to have been produced by Castle Concrete. Therefore, it appeared this large rock had fallen to this location during previous mining, probably during the 1930's when excavations occurred above this area. It became clear, as a result of this find, that at least three classes of rocks would be found.

The first class would be boulders which had naturally fallen from cliffs as a result of weathering. The second class of rocks would be those which had originated from the old mining operation. The third class of rocks were those which had more recently fallen into the drainage as a result of mining in Phase 1. These three classes would need to be distinguished in order to classify the rocks in the drainage and determine the extent of the recent spillage, which by this point in the investigation was realized to be likely, to at least some extent.

Further down the drainage, five large rocks which had come from the Phase 1 area were noted. As judged by the color, these rocks were of recent origin and, as shown by small disturbances in the soils above each rock location, it could be determined that they had come from the Phase 1 area. However, as shown by the lack of anything more than minor damage to the soils and hillside vegetation, it became apparent these rocks had been rolling rather slowly. One rock was rolling so slowly it became lodged partially underneath a rock of comparable size which had been there long enough to develop grass in cracks and even a small shrub growing out the top of the rock. All but two of these rocks were noted as being totally within the permit.

boundary and had caused very minor damage to the hillside, damage which was rapidly repairing itself.

Further down the drainage and a distance of 25 to 175 feet beyond the permit boundary (but still on Castle Concrete land) a zone of large boulders was noted. Some of these boulders could be faintly detected on the 1977 aerial photo and therefore were of either natural origin or originated as a result of old mining. However, the main mass of the boulders were of recent origin. One boulder even had a drill hole in it which was of appropriate size to clearly indicate it had come from recent mining. It was estimated that about 100 to 200 tons of rock was located in the bottom of the drainage.

Examination of the slope above the bottom of the drainage showed minor to moderate damage. About 6 to 12 full size trees had been torn from the ground and had subsequently died. However, it was also noted that most of the vegetation on the hillside, unlike the hillsides to the side of the location where the rocks had rolled, was occupied mostly by Gambel Oak and therefore damage was not as severe as it would have been had the rocks rolled through a more forested area.

Growing among the rocks were various shrubs which indicated, by examination of the recent internodes, they had gone through only one growing season since the damage occurred to their structures. The vegetation therefore indicated a probable date of occurrence of sometime prior to April or May 1988 but probably not before about September 1987. There is a slight chance the spillage occurred between September 1986 and May 1987, but growth indications on the plants do not indicate this to be very likely. Furthermore, in 1986 and 1987, mining near the west slope was just beginning and therefore the probability of the spillage occurring then was very low. Furthermore, it was known that the equipment operator which had been caught improperly moving rock had done it sometime between September 1987 and May 1988.

Further down the drainage the zone of large boulders abruptly ends, except for one large rock which rolled down the drainage to a location about 50 feet on to Cave of the Winds property. It is estimated this rock weighs between 5 and 10 tons.

No rocks were detected further down the drainage or in the bottom of Williams Canyon. The canyon was traversed, after obtaining permission from the Cave of the Winds, from the location of the last large rock all the way to the road and no further spillage could be detected. One rather strange tree kill was noted below the cliffs to the west of Phase 1 and at the bottom of a long talus slope. It is not known how this tree was broken off about 5 feet above the ground, but it is

clear that a considerable force caused it. No apparent impact damage could be found on the tree as if a large rock had hit the tree. Furthermore, it was apparent that no rocks from the mining operation came down into this area as no damage to the uphill soils or vegetation could be detected at this time. As further evidence, the last time any mining was done which could have produced this damage was at least two years ago. This tree had been broken by something much more recently than that, as the needles on the tree were still present although brown and dry. Little needle fall had occurred. It therefore appears this tree had been damage by something during the last 6 to 10 months and it is highly unlikely this loss occurred as a result of anything related to the mining operation.

ASSESSMENT OF DAMAGES: It is apparent that a number of rocks were pushed over the side of Phase 1 sometime between 14 to 22 months ago. It does not appear that any rocks were pushed into the canyon more recently than that time period. Some amount of the rock present in the bottom of the drainage originated either from natural rockfall or from mining in the 1930's or earlier.

It is likely that this spillage, which also placed a large amount of rock on the slope immediately below the mining area, occurred as a result of a dozer operator who was fired as a result of an inability to move rock within the quarry according to instructions. The date of this problem with the equipment operator corresponds with the approximate date of the spillage.

DURATION OF SPILLAGE EVENT: It is unlikely, based upon the amount of rock in place, the duration of the event took more than about 1 to 3 days, and it is most likely it occurred over about 1 or 2 days. Vegetation indicators show that all the damage was caused at very nearly the same time. Furthermore, the period during which the equipment operator was working the edge of Phase 1, was detected pushing rock improperly, and was subsequently released from his duties was a matter of just a few days. Therefore, Castle Concrete feels the duration of the event was between 1 and 3 days.

ROCK ON CAVE OF THE WINDS PROPERTY: A letter from Grant Carey, manager of The Cave of the Winds, is provided in this document. This letter indicates that Mr. Carey is aware of the rock on Cave of the Winds property but is not concerned about it as a trespass or danger to his operations. It should be noted that the bottom of the canyon near the Road is heavily posted with signs indicating no hiking, climbing

or trespassing is permitted. Therefore, any person in the canyon who is there without the expressed permission of Cave of the Winds or Castle Concrete is trespassing on private property and could be subject to appropriate penalties.

ROCK IN DRAINAGE: It is felt by Castle Concrete that the presence of the large rocks in the drainage does not cause any significant or measurable adverse effects on the drainage or the hydrology of the area. In fact, it is felt the rock provides an armoring of the drainage bottom to reduce erosion and provide some degree of silt deposition ability. To remove the rock would require the construction of an access road which would cause severe, long term damage to the area which would far exceed that which was caused by the rocks falling to the bottom of the drainage in the first place.

SLOPE DAMAGE: In the opinion of Castle Concrete, the most severe damage to the land caused by this spillage is the damage to the slope between the bottom of the drainage and the top of Phase 1. Many soil gouges were caused by the large rocks bouncing down the hillside. Several trees were also damaged or killed (estimated at 6 to 12). However, because most of the vegetation on the hillside is dominated by Gambel Oak, it is felt that recovery of the shrub component will be quite rapid without any additional efforts to rehabilitate the shrub damage. Gambel Oak is noted for its ability to recover from damages such as this.

However, some potential exists to have local areas of headward erosion develop in the vicinity of the soil gouges (a slight amount is already occurring). These damages need to be corrected and a grass cover developed in these gouges using a rapidly growing, sod forming grass mixture.

CORRECTIVE ACTION: The following corrective actions are proposed.

ROCKS IN DRAINAGE: No specific corrective action is proposed for the rocks in the bottom of the drainage. To remove the rocks would require the construction of an access road either down the drainage or down the slope above the drainage. Such a road would damage the drainage or the slope to a high degree and would require major rehabilitation in its own right. Therefore any seeding or revegetation of the rock areas will be done in conjunction with the slope rehabilitation.

However the large rocks and any damaged trees which are located near the mining limit will be removed as this would not cause severe damage to areas which have not already been affected by nearby mining. This cleanup was planned to be done prior to leaving the Phase 1 area anyway and therefore could be considered as

not actually a corrective action. Pathways created during the removal will be seeded as a normal course of action prior to completing the reclamation of Phase 1.

SLOPE REHABILITATION: The slope above the drainage where the rocks rolled and bounced down the hill has sustained local damage, but generally is in quite good condition. In order to help reduce the erosion potential of this area, the slope will be seeded with a grass mixture as follows. This mixture has been designed to provide excellent and rapid cover on a west facing slope in a rocky soil. The mixture will not be spread generally over the slope, but rather spot seeded in those areas where surface damage occurred.

SEED MIX FOR CORRECTIVE ACTION ON WEST SLOPE OF PHASE 1

SPECIES	lb/acre	seeds/lb	seeds/sqft	acres	lbs. PLS
INTERMEDIATE WHEAT. (SOD)	6	97000	13.36088154	1	6
PUBESCENT WHEAT. (SOD)	6	90000	12.39669421	1	6
STREAMBANK WHEAT. (SOD)	8	160000	29.38475666	1	8
GREEN NEEDLEGRASS (BUNCH)	3	181000	12.46556474	1	3
LITTLE BLUESTEM (BUNCH)	3	225000	15.49586777	1	3
	26	753000	83.10376492		26

(NOTE: SOD MEANS "SOD FORMER"; BUNCH MEANS "BUNCH GRASS")

If necessary, any large gouges in the surface which show a potential for erosion as a result of inappropriate grades will be hand corrected to establish a more normal gradient prior to seeding. Most of the surface gouges are small and will not require any grading work.

Tree planting will be done to rehabilitate the lost tree cover. Although only about 6 to 12 trees were lost to the spillage, a total of 60 trees will be planted. After an estimated 40% to 50% mortality, the number of trees which would be expected to develop to maturity should equal or exceed the number of trees lost as a result of the damage. Trees to be used will be Colorado State Forest Service containerized seedlings. The species to be planted will be Douglas Fir and Ponderosa Pine. These are the same species which currently dominate the area.

Grass seed will also be spread over much of the area near the rocks in the bottom of the drainage to help accelerate the recovery. However, recovery is already occurring rapidly and therefore grass seeding in this area will be light

(about 30% to 50%) of the normal critical area seeding rate. This will provide a seeding of between 20 and 50 live seeds per square foot. The mixture will be the same as that to be used on the slope.

TIMETABLE FOR CORRECTIVE ACTION: Because the slope is west facing, seeding too early could result in a major mortality of grass seed in early winter if significant germination occurred. Therefore, grass seeding will not occur until mid to late October 1989.

Tree planting will not occur until the spring of 1990. Tree planting in this area is usually safely done in mid to late April or very early May.

PREVENTATIVE ACTION: Corrective action takes care of the existing problem, but without preventative action a similar incident could happen again. Therefore, Castle Concrete will take the following actions to reduce the probability of such an event occurring again.

1. Close supervision of dozer operator whenever working near the edge of a mining limit where spillage would create a problem. With such supervision, areas where rocks could be pushed over the side can be identified and special operational adjustments made to avoid the spillage.

2. Possible use of a backhoe to work the edges of a mining limit. With a dozer, there is limited control of rock spillage available. A dozer pushes along the edge and even with the blade shifted to roll material inward like a snowplow, the outer edge of the blade can still spill outward. A backhoe, although it can still have spillage out the sides of the bucket, has better control because it pulls up and away from the slope rather than pushing along the slope. Once the backhoe has pulled material up the slope and into the quarry area, the dozer could be used to push the material to the loading area.

3. Berming below a slope crest where spillage can occur could stop most of any spillage, especially the smaller rocks which tend to not roll very far. The berm, however, would need to be very large to stop a rock weighing several tons. That size of rock would simply need to be handled in such a way as to keep it from going over the side.

4. Cable nets to pull large rocks away from the slope crest. This was recently attempted with good success on the Queen's Canyon Quarry where a large rock was precariously perched on the side of the canyon. The net, after being wrapped



around the rock, was pulled by a dozer. Only one small piece of the rock broke off and rolled a few feet down the slope of the canyon, whereas if the net approach had not been used the rock, estimated at about 2 tons, would have rolled all the way to the bottom of the canyon.

By using various combinations of these methods, as dictated by the existing circumstances, problems such as the one under consideration here should be essentially eliminated.

PHOTOGRAPHIC EVIDENCE AND MAP: Included are several photographs of the area which show where the rocks are present in the bottom drainage, the affected slope, and a few pictures which show individual rocks of interest.

Also included is a copy of a portion of a map of the area which shows the location of various rocks and groups of rocks in relation to Phase 1 and the permit boundary.



Mr. Gordon Morgan  
Castle Concrete  
P.O. Box 2379  
Colorado Springs, CO 80901  
719/598-0215

July 8, 1989

Dear Gordon,

This letter outlines the essence of the meeting in my office on July 5, 1989.

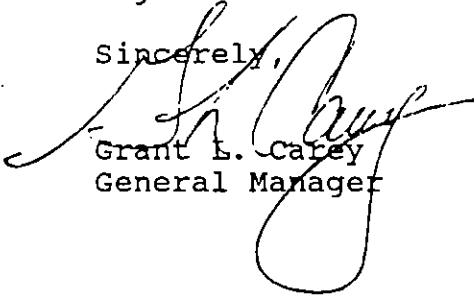
Being required by the Bureau of Mines and Land Reclamation Department, Gordon Morgan and Mark Heffner from Castle Concrete brought to our attention that a large four ton boulder from the Black Canyon Quarry had fallen on to Cave of the Winds property in Williams Canon.

I advised Mr. Morgan I was already aware of the boulder. In addition I assured Mr. Morgan that Cave of the Winds had no objections to the rock being on Cave property.

We reconfirmed our discussion from several years before at which Castle Concrete advised us that there might be some rocks that could become dislodged during the quarrying operation and roll into Williams Canon, possibly onto Cave of the Winds property. However should the boulders become a serious problem to Cave of the Winds, by Cave of the Winds' request, Castle Concrete agreed to remedy the situation in a mutually acceptable manor.

Agreeing that those conditions were still in effect we adjourned our meeting.

Sincerely,

  
Grant L. Carey  
General Manager

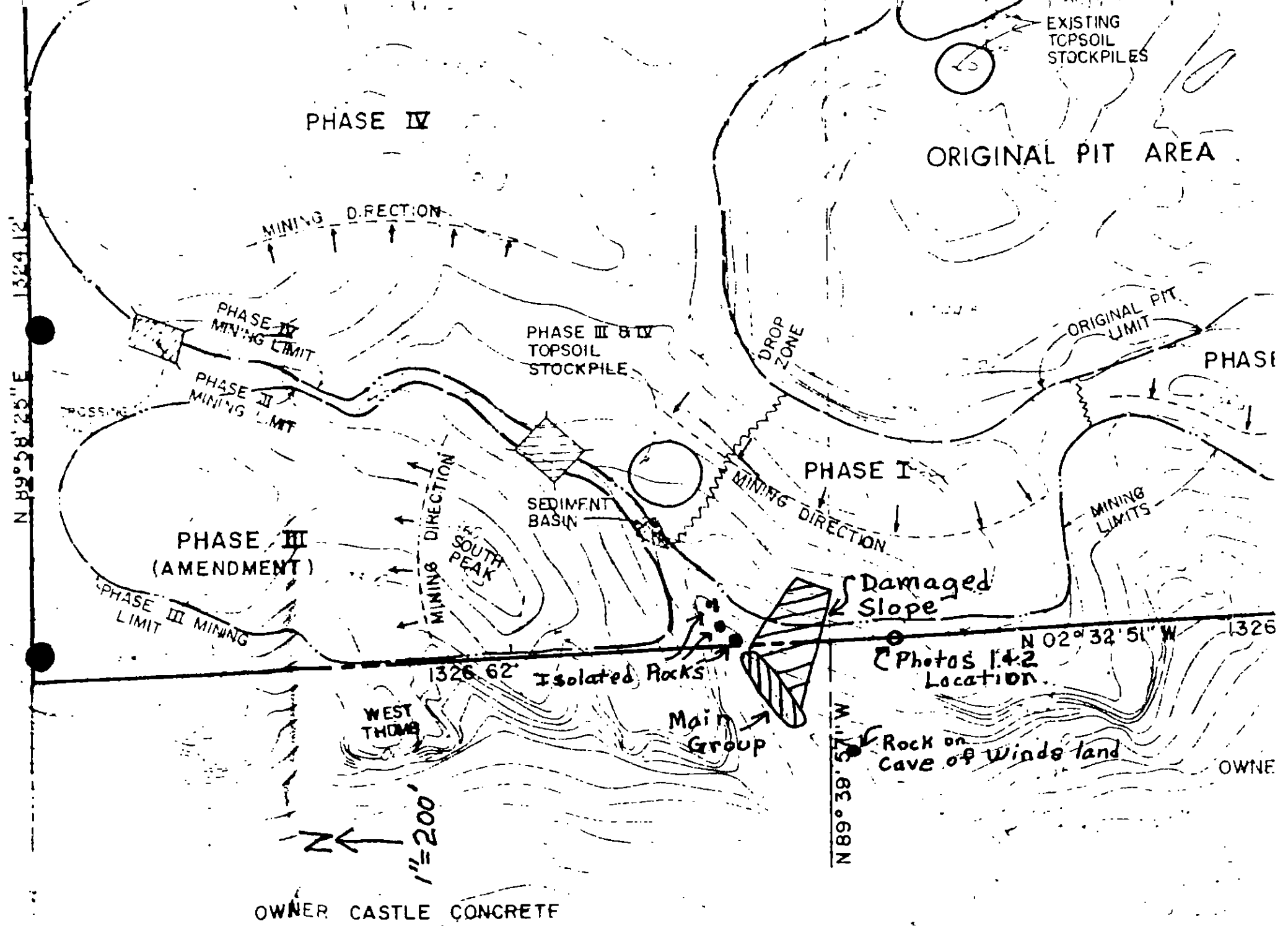




PHOTO 1: A VIEW OF SLOPE AND MAIN BODY  
OF ROCKS IN DRAINAGE BELOW PHASE 1.  
SOLID DARK LINE ALONG RIGHT SIDE  
INDICATES LOCATION OF PERMIT BOUNDARY.  
PERMIT IS TO RIGHT OF BOUNDARY LINE.  
PHOTO LOCATION IS SHOWN ON MAP.

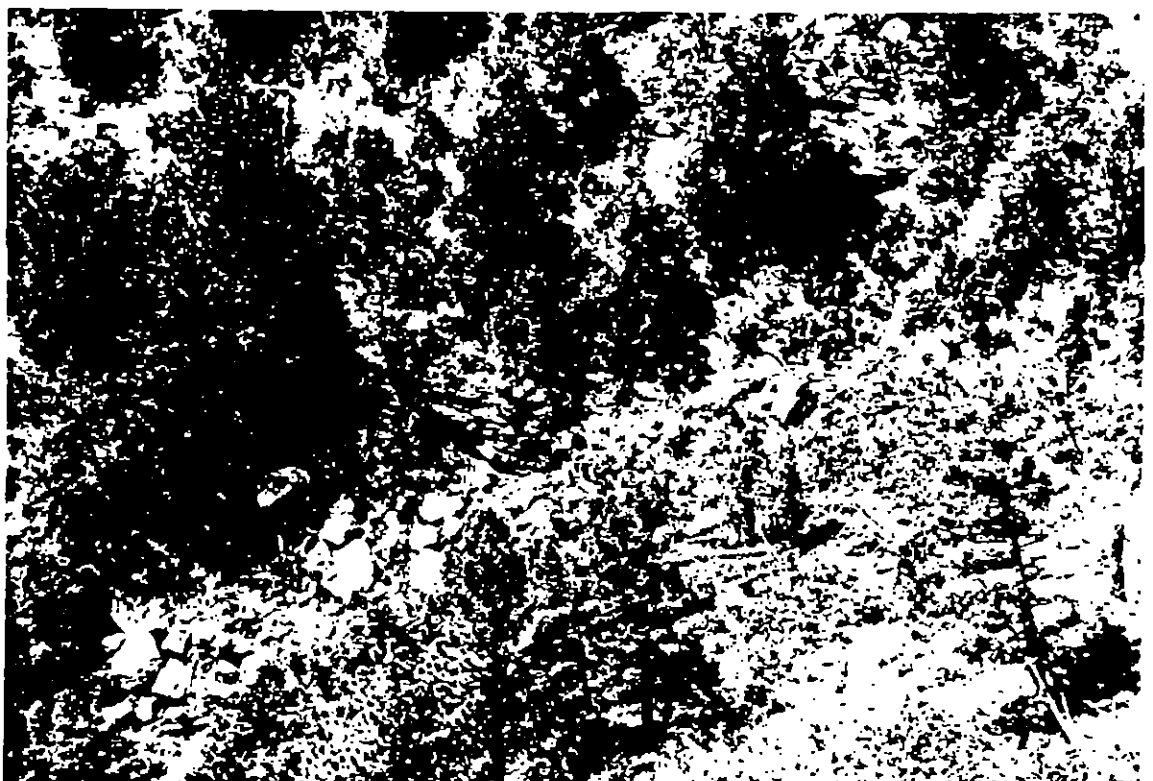


PHOTO 2: VIEW OF MAIN BODY OF ROCKS IN DRAINAGE. TAKEN FROM SAME LOCATION AS PHOTO 1, BUT USING A SHORT TELEPHOTO LENS.



PHOTO 3: VIEW OF SLOPE WHICH WAS  
SLIGHTLY DAMAGED BY ROLLING ROCKS. PHOTO  
LOCATION IS FROM THE BOTTOM OF THE  
DRAINAGE LOOKING UP TOWARD THE EDGE OF  
THE MINING IN PHASE 1.



PHOTO 4: ROCKS LOCATED NEAR PHASE 1 BOUNDARY. OLD 1930'S ROCK IS NOTED. REST OF ROCKS ARE RECENT.



PHOTO 5: ROCK IN DRAINAGE NEAR PERMIT BOUNDARY. RECENT ORIGIN, BUT DAMAGE TO TREE WAS MINIMAL.



PHOTO 6: RECENT ROCK LODGED UNDERNEATH OLD ROCK. NOTE SHRUB GROWING OUT THE TOP OF THE OLD ROCK.



PHOTO 7: VIEW OF MAIN BODY OF ROCKS. NOTE AMOUNT OF VEGETATION GROWING AROUND ROCKS.





PHOTO 8: VIEW OF ROCK ON CAVE OF THE WINDS  
PROPERTY. ROCK ESTIMATED AT 5 TO 10 TONS.