UPDATE TO THE PLAN OF OPERATIONS
ANDRADA QUARRY
Pima County, Arizona

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The following changes have been made to the Revised Plan of Operations prepared by David E. Wahl, Ph.D., R.G., prepared January 24, 2006 and revised April 4, 2006, as follows:

1.) Owner/Operator Information

Ownership of the claims subject to the Plan of Operations and associated private property has been transferred to Andrada Holdings, LLC, an Idaho limited liability company doing business in Arizona as a foreign limited liability company. All interest in the Plan of Operations has been transferred from WR Henderson Arizona Properties, LLC to Andrada Holdings, LLC by assignment.

The registered address for Andrada Holdings is 1252 South, 52 East, Idaho Falls, Idaho, 83401. The Andrada Holdings contact for the Andrada Quarry is Doug Woolsey, 7866 Via Bonita Street, Scottsdale, Arizona, 85258, Telephone (480) 443-4192.

2.) Claims Impacted

The claims identified in the plan as affected by the Plan of Operations are now held by Andrada Holdings with new claim names and serial numbers. The claims referenced in the 2006 Plan of Operations correlate to the new claim numbers as follows:

Former WRH Claim	Andrada Holdings Claim	Serial No.
Gamco 1	Andra-Hold#One	AMC411519
Gamco 2	Andra-Hold#Two	AMC411520
WRH-PRO 1	Andra-Hold#Three	AMC411521
WRH-PRO 2	Andra-Hold#Four	AMC411522
WRH-PRO 3	Andra-Hold#Five	AMC411523

3.) Planned Processing Activity

Excavated material will be processed to 3-inch nominal diameter at the site, consistent with the existing Plan of Operations. The off-site processing plant for further processing of the 3-inch material may be at a variety of as yet to be determined locations, but will be located in southern Arizona or a neighboring state.

4.) Blasting

All blasting will be conducted by an independent contractor. No blasting materials or explosives will be stored on-site during normal operations.

Doug Woolsey

Doug Woolsey, Principal
Andrada Holdings, LLC

3-22-12
Date

REVISED PLAN OF OPERATIONS

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For:

ANDRADA QUARRY
W.R. Henderson Arizona Properties, LLC, Owner/Operator

Lands Involved:

Portions of GAMACO #1, GAMACO #2 and
WRH-PRO-ONE Placer Mining Claims
Located Within NW/4 Section 21, Township 17 South, Range 16 East
Gila and Salt River Prime Meridian
Pima County, Arizona
(~14.2 acres)

Prepared By:

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Consulting Geologist
1756 E. Enrose St.
Mesa, AZ 85203

Submitted To:

U.S. Bureau of Land Management
Tucson Field Office
12661 E. Broadway Blvd.
Tucson, AZ 85748-7208

Submitted By:

Doug Woolsey, General Manager
W.R. Henderson Arizona Properties, LLC
7866 Via Bonita Street
Scottsdale, AZ 85258
(480) 443-4192

1-24-06
Date

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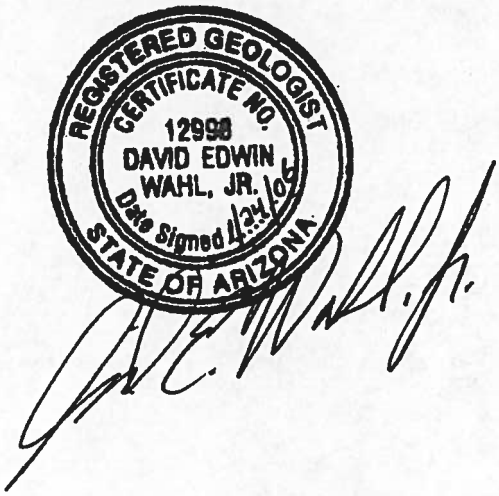
Attachment C: Aquifer Protection Permit Checklist
Attachment D: Corps of Engineers Correspondence
Attachment E: Biological/Botanical Information
Attachment F: Archeological Information
Attachment G: Mine Safety Information
Attachment H: WRH Blasting Plan
Attachment I: Bond Calculation Spreadsheet



EXECUTIVE SUMMARY

Introduction: Renewed quarrying activities are proposed at the currently inactive Andrada marble quarry southeast of Tucson in Pima County, Arizona. Quarrying of marble is proposed on land where the United States administers the mineral estate and the State of Arizona Trust owns the surface estate. Excavated materials will be crushed to 3 inch minus at Andrada quarry and then be transported to a site in **Casa Grande**, Arizona for further crushing and grinding.

Authority for Proposed Operations: This plan of operations is submitted to Bureau of Land Management ("BLM"), United States Department of the Interior pursuant to 43 C.F.R. 3809. A copy of this plan will also be submitted to the Arizona State Land Department ("ASLD") toward fulfillment of their land use requirements under Arizona Administrative Code R12-5-1101.

Owner/Operator: W.R. Henderson Arizona Properties, LLC ("WRH") , 7866 Via Bonita Street, Scottsdale, Arizona 85258. Principal WRH contact is Doug Woolsey (480) 443-4192, and WRH Taxpayer Identification Number is [redacted]

Claims Impacted: Three federal placer mining claims will be affected by operations proposed under this plan of operations. Claims to be impacted are:

Name	Serial Number	Location Date
GAMACO #1	AMC 313138	March 13, 1991
GAMACO #2	AMC 313139	March 13, 1991
WRH-PRO-ONE	AMC 359554	January 9, 2004

Area Encompassed: Previous marble mining operations within the GAMACO #1 and GAMACO #2 claims have disturbed approximately 7.3 acres. An additional ~1 acre has been disturbed by metallic minerals prospecting within GAMACO #1 and #2. Related mining and processing activities for the Andrada quarry have also disturbed approximately 22 acres of private land. Proposed new development within GAMACO #1, GAMACO #2 and WRH-PRO-ONE will impact approximately 14.2 acres. About half of the proposed new development would be within areas of past disturbance. Approximately 6.7 acres of undisturbed land would be impacted by proposed mining activities.

Location: GAMACO #1 and GAMACO #2 and WRH-PRO-ONE claims are located within NW/4 Section 21, Township17 South, Range 16 East, Gila and Salt River Prime Meridian, Pima County, Arizona. These 3 claims, two other adjoining placer mining claims(WRH-PRO-TWO, and WRH-PRO-THREE) and ~140 acres of adjacent fee land comprise property controlled by WRH. The Andrada quarry is located approximately 24 miles southeast of downtown Tucson and lies at the end of South Wentworth Road one mile south of East Sahuarita Road. The last mile of access is via an improved dirt road which occupies a right-of-way through State of Arizona surface estate. Figures 1 and 2 show location and land status of the Andrada quarry.

Personnel: Currently the Andrada quarry is inactive. Upon start up, approximately 5 to 6 on-site workers will be employed. This will include a mine foreman, mining equipment operators and crusher operators.

Permitting: Application has been made or will be made for county, state and federal permits applicable to the project. Quarrying and processing operations will be conducted in a manner reflecting proper stewardship of public lands, natural resources and the environment. No mining will be conducted within areas designated as jurisdictional waters of the United States, and the project is designed to limit storm water runoff. As shown in Figure 3 the Andrada quarry is not located within active channels or in an area designated to be within limits of a 500 year flood event.

Planned Mining Activity: Mining activities will be concentrated on high $CaCO_3$ content layers within the Escabrosa Formation. Figure 4 is an aerial photo and topographic map showing approximate distribution of the preferred Escabrosa unit. Distribution of high $CaCO_3$ content layers within the Escabrosa Formation will dictate specifics of pit development but a series of highwalls and benches trending chiefly west-northwesterly will be created. Excavation will be accomplished chiefly via drilling and blasting using methodologies to limit noise and vibration. Where possible, rock will be excavated without blasting by use of tracked excavators. Overburden will be saved for use in reclamation.

Planned Processing Activity: Broken rock will be loaded and transported down slope from the open cuts to a primary crusher where it will be reduced to a nominal 3 inch minus size. This sized material rock will be trucked to a processing plant in **Casa Grande**, Arizona for further crushing, sorting and grinding.

Surface Disturbance: All reasonable efforts will be taken to minimize surface disturbance during mining and processing operations. The quarrying activity will be conducted in stages. As portions of the quarry are mined out, they will be reclaimed if such reclamation does not impede continuing operations. Maximum surface disturbance of public land associated with proposed mining activities is about 14.2 acres. About half of that area has been previously disturbed.

Reclamation: As constrained by operational parameters, reclamation will proceed concurrently with mining. Overburden material, rejected processed material and inert construction waste may be used in reclamation efforts. Disturbed areas will be reclaimed as approved by BLM under guidelines found in Metropolitan Phoenix Mineral Materials Program Guidelines, 1995, and H-3041-1, Solid Mineral Reclamation Handbook.

Continuing Nature of this Plan: Because this project has not yet been initiated, some operational aspects are not yet fully established and some permitting documents have not been completed. As additional information and documents become available they will be added to this plan, chiefly as attachments. Changes may also have to be made to this plan subsequent to NEPA (National Environmental Policy Act) review by BLM.

Disclaimer: This plan of operations was prepared by David E. Wahl, Jr., Ph.D., R.G. It is based on review of public data, information supplied by WRH, and several visits to the Andrada quarry. Although Wahl may have limited control of operations upon initiation of mining, this plan of operations will guide operations at Andrada until such time as changes are approved by BLM.

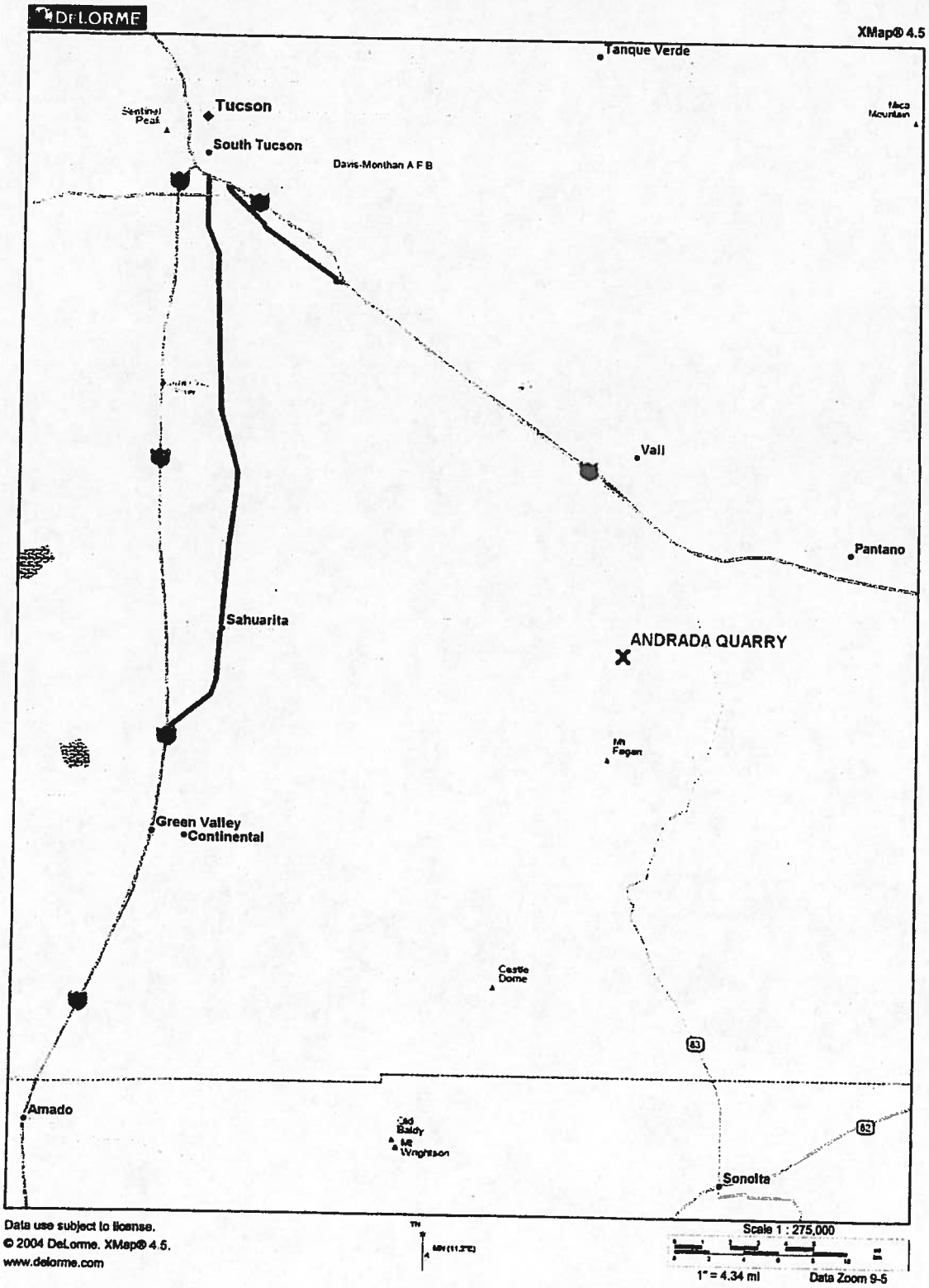


Figure 1: Regional location map (numerical map scale altered in reproduction).

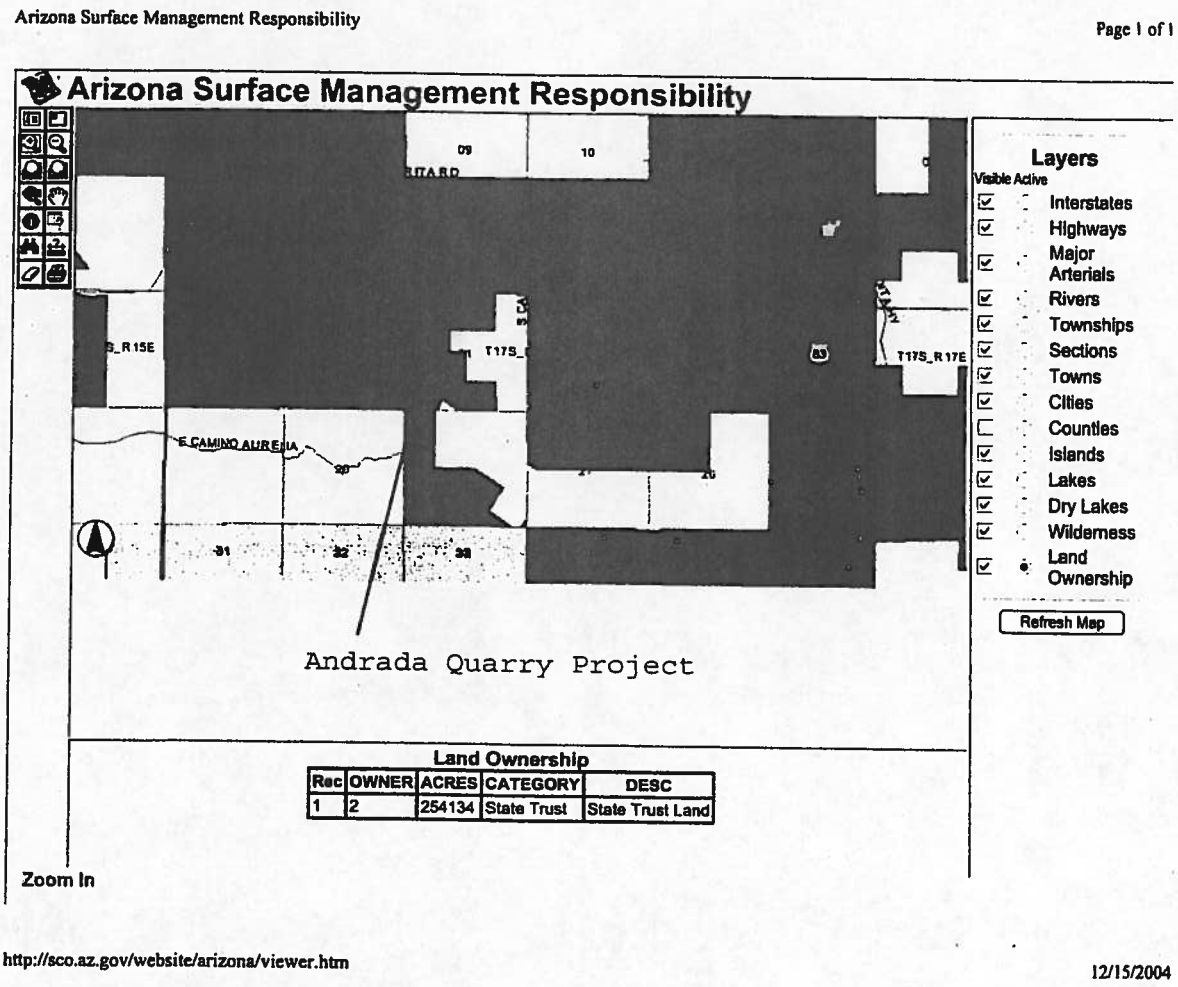


Figure 2: Andrada quarry land status. The total property area shown in darkest blue is approximately 240 acres including ~140 acres of fee land. Five east-west trending federal placer claims on State of Arizona surface comprise the western 1320 foot long portion of the indicated Andrada quarry.

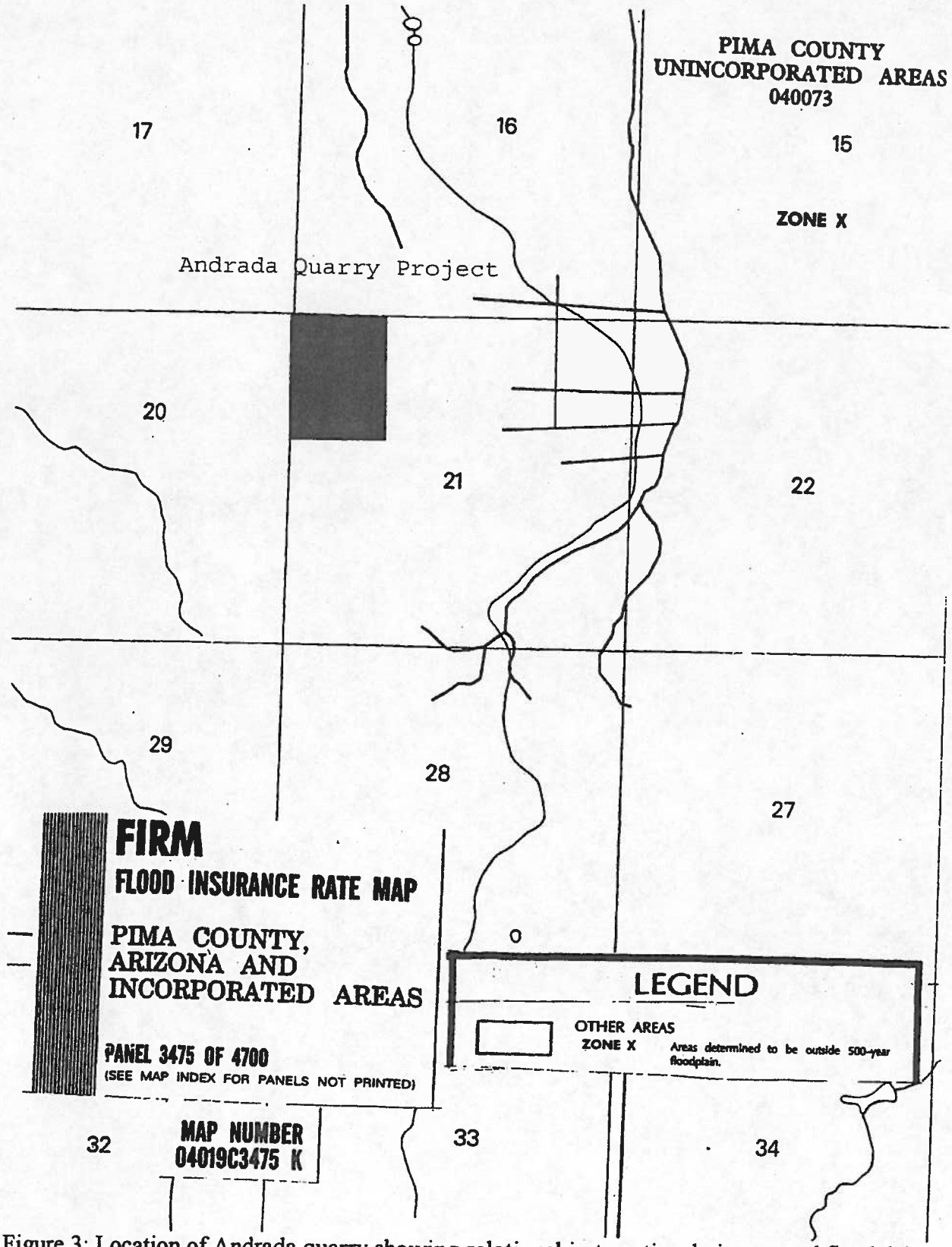
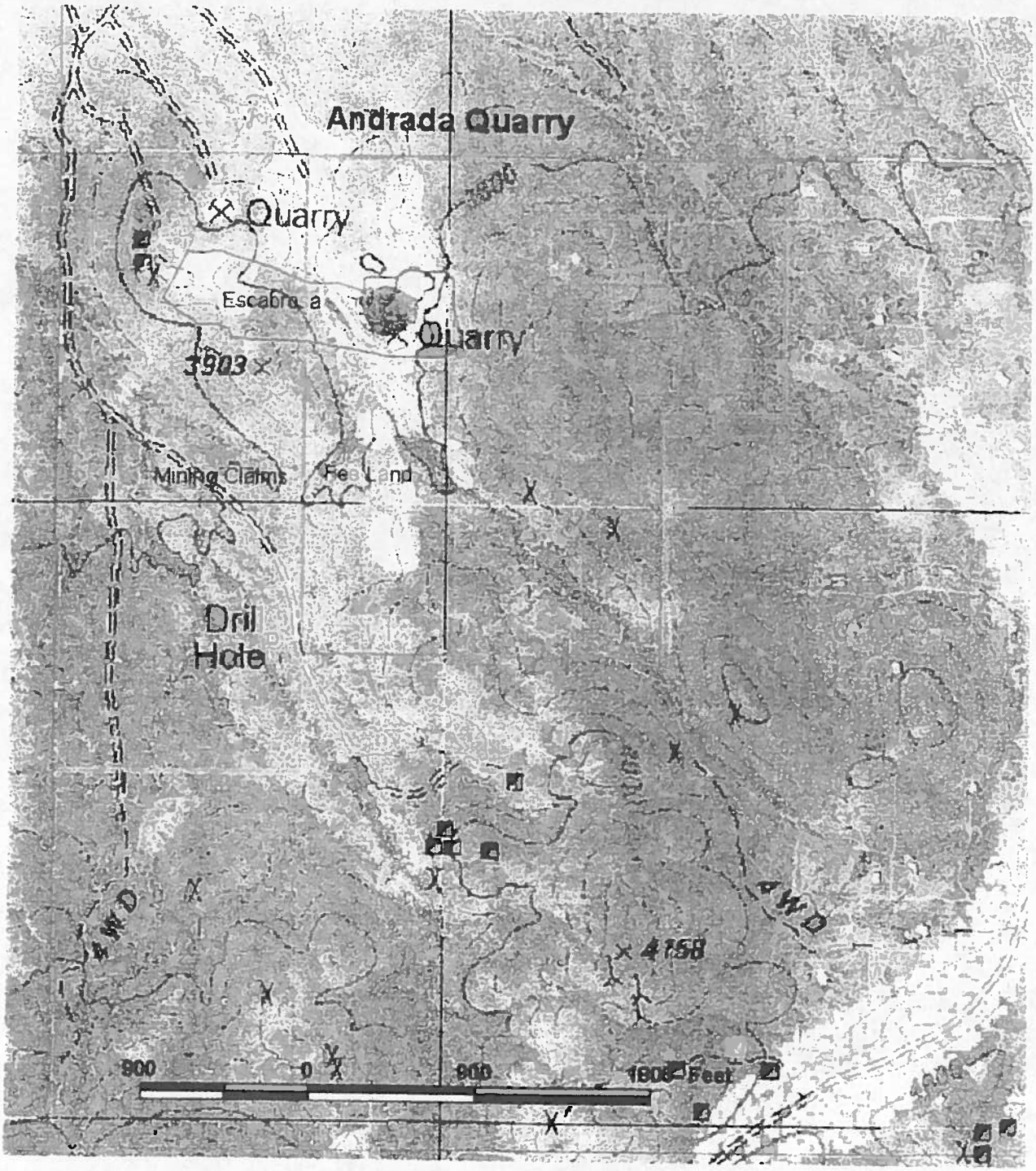


Figure 3: Location of Andrada quarry showing relationship to active drainages and floodplains.



Escabrosa best ls.shp
Private land.shp
5 claims.shp

(contacts transposed from Ferguson and others, 2001)
(AZ Geol. Survey Digital Geol. Map 11)

Figure 4: Aerial photograph and map showing approximate distribution of Escabrosa Formation (dark blue shape) within fee lands (purple shape) and mining claims (green shape). Note that previous mining has concentrated within the outcrop pattern of the Escabrosa Formation.

INTRODUCTION AND PURPOSE OF STUDY

The Andrada quarry has a long history of marble ($CaCO_3$) production. Mr. David Hartley initiated marble production in December, 1960 at a rate of about 100 tons per month. Over the years, Mr. Hartley operated and expanded his operations at the Andrada quarry until he sold the quarry to Georgia Marble Company of Arizona in 1991. Georgia Marble operated the Andrada quarry until 1997 when they ceased operations (Arizona Department of Mines and Mineral Resources and Mine Safety and Health Administration file data). During Georgia Marble's tenure, an on-site processing plant was constructed on fee property and limited marble was mined from the GAMACO #1 and GAMACO #2 claims. Figures 4 through 8 illustrate current aspects of the Andrada quarry.

All mining at the Andrada quarry has concentrated on excavation of low-magnesium, low-silica marble from the Escabrosa Formation. Crushed marble produced in the early 1960s was sold chiefly as decorative rock and as roofing material. As the quarry developed, new markets were established, including use of crushed/ground marble as fillers, pigments, joint compounds and animal feeds. Additional new and expanded markets for crushed and ground marble have developed in the Tucson area since the Andrada quarry closed in 1997. WRH, recognized this situation and purchased the Andrada quarry in May, 2003. This plan of operations is being submitted as one of the requirements necessary to initiate restart of mining operations at Andrada quarry.

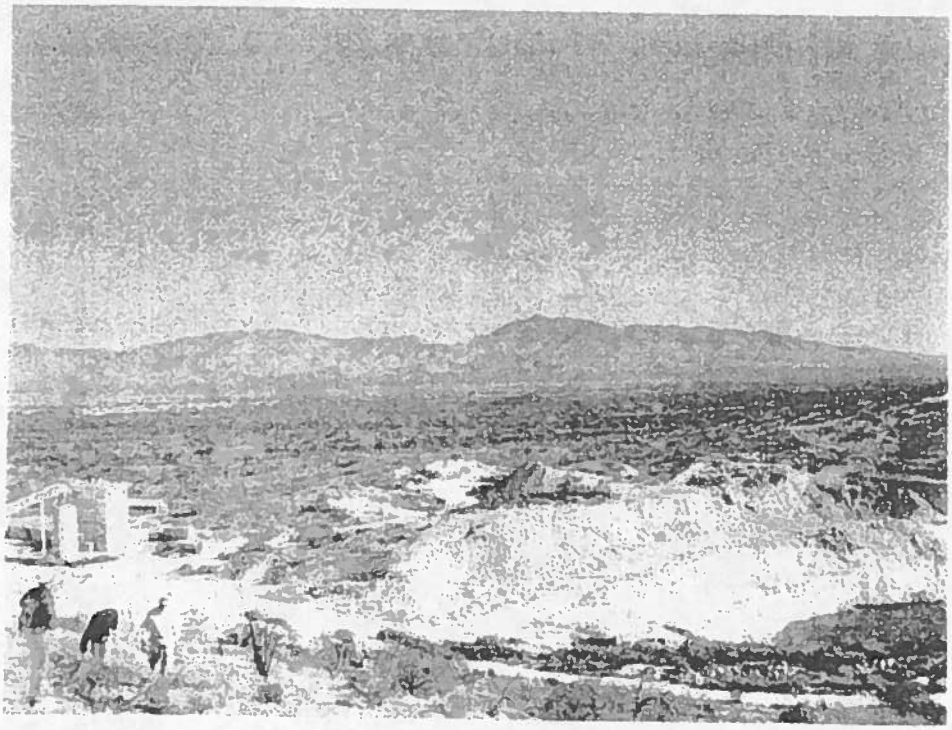


Figure 5: View northeast from public land to existing quarry, waste piles and processing plant on private land.

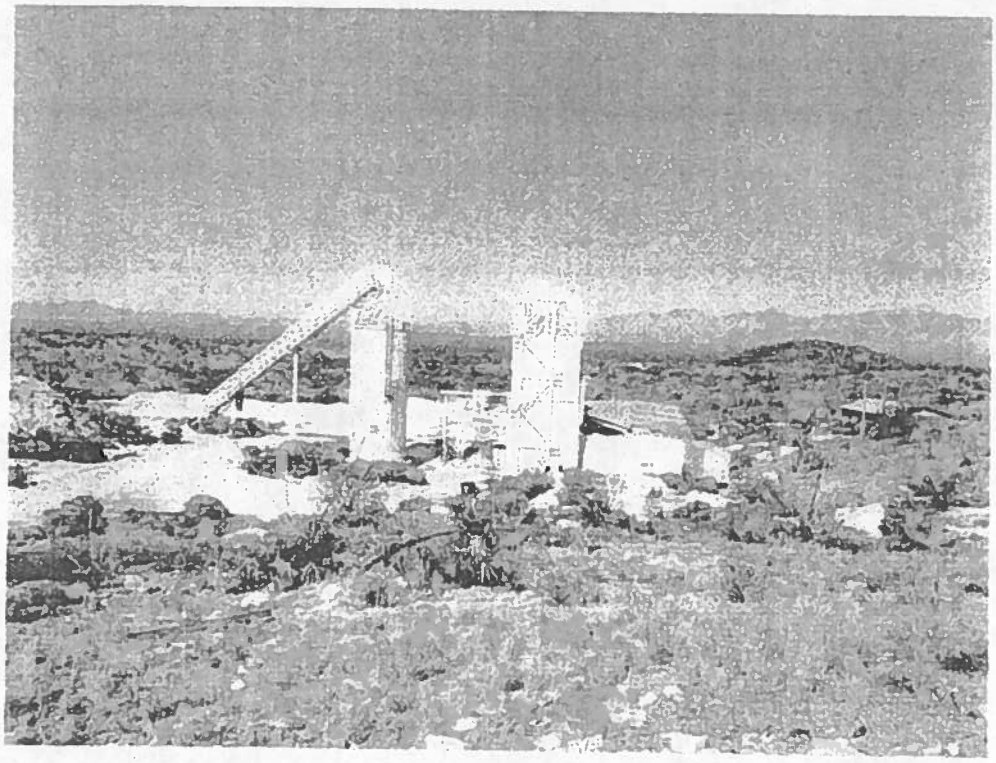


Figure 6: View north to processing plant. Inactive inclined conveyor on left previously conveyed material from the easternmost portion of GAMACO #1 to processing plant.

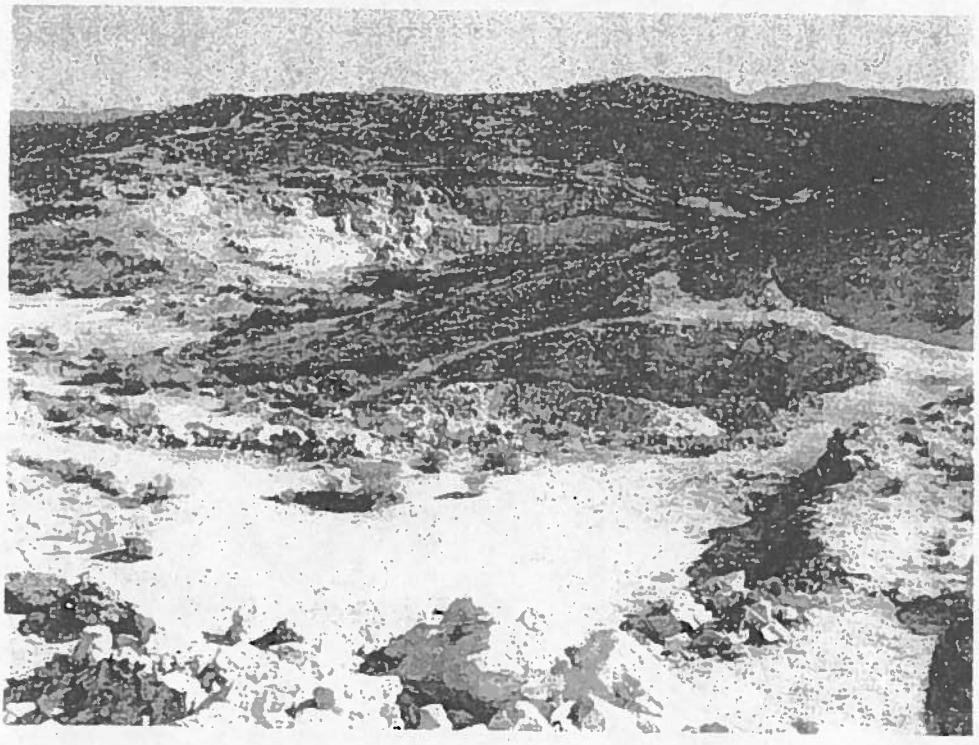


Figure 7: View southeast from small quarry on GAMACO claims to main quarry on private land.

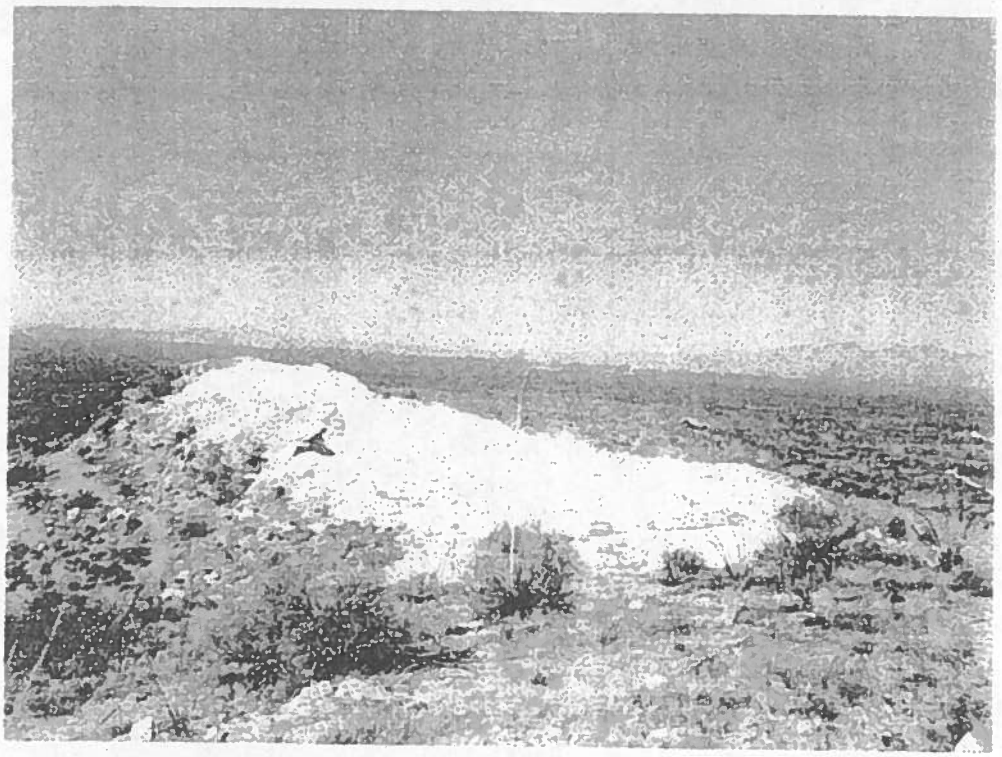


Figure 8: View northwest to small quarry in Escabrosa Formation within GAMACO claims.

GEOLOGICAL SYNOPSIS

The Andrada quarry is located within Arizona's Basin and Range physiographic province in the northern foothills of the Santa Rita Mountains. Although more geologic units are exposed near the quarry, only five rock units are of significance at Andrada quarry. Ferguson and others (2001) describe these units as listed from youngest to oldest as follows:

Corona de Tucson stock (Upper Cretaceous)—Granitoid mapped by Finnell (1971) as unit Kg and referred to as a quartz monzonite by Marvin et al. (1973) who dated the rock at 75.3 Ma + 2.90 (K/Ar, biotite).

Horquilla Formation (Pennsylvanian)—Medium- to thick-bedded gray cherty limestone with interbeds of thin- to medium-bedded silty greenish-gray shale and micritic limestone. Limestone is typically recrystallized, but skeletal and pelletal packstone and grainstone textures preserved locally. Up to 300 meters thick.

Escabrosa Formation (Mississippian)—Massive to thick-bedded and very thick-bedded cherty recrystallized limestone or coarsely crystalline marble. Skeletal and pelletal packstone and grainstone textures preserved locally. Up to 180 meters thick.

Martin Formation (Devonian)—Massive to very thick-bedded, light gray to white, recrystallized, sugary, micritic dolostone. Finnell (1971) reports white quartzite and greenish-gray hornfels and shale units, garnetite and serpentite limestone near contact with the Empire Mountains stock, and a 30cm conglomeratic sandstone at the base. Approximately 60 meters thick.

Abrigo Formation (Cambrian)—A mixed siliciclastic and carbonate unit consisting of interbedded thin- to medium-bedded, greenish-gray calcareous siltstone, silty shale and shale and variable quartz sandy limestone and dolostone. In general, the unit contains more carbonate rocks up section. Approximately 250 meters thick.

The older 4 units (Abrigo through Horquilla Formations; from about 570 to 290 million years old) are sedimentary rocks that were deposited as distinct, sub-horizontal layers chiefly from a shallow marine environment. Limestone, consisting mostly of the mineral calcite ($CaCO_3$), is the dominant rock type within the four sedimentary layers. Other important rock types within the sedimentary package are dolomite, chiefly $Ca,Mg(CaCO_3)_2$, and the sandstone-siltstone-shale continuum which contains significant amounts of quartz (SiO_2) in varying crystal sizes. Of the four sedimentary units, the Escabrosa Formation contains the highest proportion of pure $Ca\ CO_3$.

Subsequent to deposition of the sedimentary rock units as almost flat-lying layers, tectonic forces and intrusion of the Corona de Tucson granitic stock severely tilted the sedimentary layers. Tilting was so intense that the layers were completely overturned such that the younger units now lay below older units and the final strike orientation of the sedimentary sequence is west-northwesterly with a steep north-northeasterly dip. Much of the deformation

probably occurred as the Corona de Tucson granitoid was emplaced about 75 million years ago. Youngest significant structural deformation at Andrada quarry occurred as normal faulting during mid-Tertiary extensional tectonism (~20-25 million years ago).

Intrusion of the Corona de Tucson stock not only tilted the sedimentary rocks but also locally metamorphosed them. Metamorphism (changing of original rock properties) resulted from heat, pressure and limited fluid exchange associated with intrusion of the hot Corona de Tucson granitoid into the cooler sedimentary rocks. The most visual impact of metamorphism was recrystallization of the carbonate (limestone and dolomite) layers. Originally fine-grained calcite and dolomite crystals recrystallized such that individual crystals are now in places clearly visible to the unaided eye. Chemical reactions related to intrusion also produced minor changes in rock chemistry. For example, minor pods of olivine, $(Mg,Fe)_2SiO_4$, have formed in carbonate beds where silica and iron related to the intrusion have combined with Mg in the carbonates. Changes in chemistry and texture of the sedimentary rock units are most pronounced near contacts with the Corona de Tucson intrusive.

More widespread alteration associated with the intrusion is seen in fractures and fault zones which acted as preferentially pathways for hydrothermal fluid migration. Some of the largest fractures have been prospected for copper and precious metals. Evidence of copper mineralization is present at many locations at Andrada quarry as fracture coatings/fillings of copper oxides, copper/iron sulfides and iron oxides related to oxidation of sulfide minerals. The abundant evidence of copper mineralization was reason for past exploratory drilling in the search for buried porphyry copper deposits in the area. Economic copper deposits apparently were not discovered.

As indicated by Ferguson et al.'s (2001) description of rocks at Andrada quarry, there is considerable variation in rock composition within the four major exposed sedimentary units. Santini (1975) in a more detailed study of the same rocks at a nearby location also documented the complex make up of the Abrigo, Martin, Escabrasa and Horquilla Formations. Although purest $CaCO_3$ typically occurs in the Escabrosa Formation, Santini (1975) also reports high concentrations of $CaCO_3$ within lower portions of the Martin Formation in the Empire Mountains. To date, however, high-grade $CaCO_3$ in the Martin Formation has not been documented or exploited at Andrada quarry.

The Escabrosa Formation is the prime rock unit of interest at Andrada quarry. It has been mined previously and potentially minable indicated resources remain within the Escabrosa. Outcrop width of the Escabrosa Formation at Andrada quarry varies from about 300 feet to over 400 feet where it is partially repeated by normal faulting. Average outcrop width is approximately 350 feet. Because the unit dips north-northeast at about 70°, true thickness of the Escabrosa Formation at Andrada quarry is about 330 feet. The unit varies from a gray, fine-grained limestone to a white, coarsely crystalline marble with local chert (fine-grained SiO_2) nodules and stringers. Because chert content appears to increase in the upper (younger) portion of the Escabrosa, purest $CaCO_3$ zones should be present in lower portions of the formation. Impurities such as iron and silica derived from the Corona de Tucson stock also locally impact the Escabrosa Formation. Figures 9 through 16 illustrate various aspects of Andrada quarry geology.

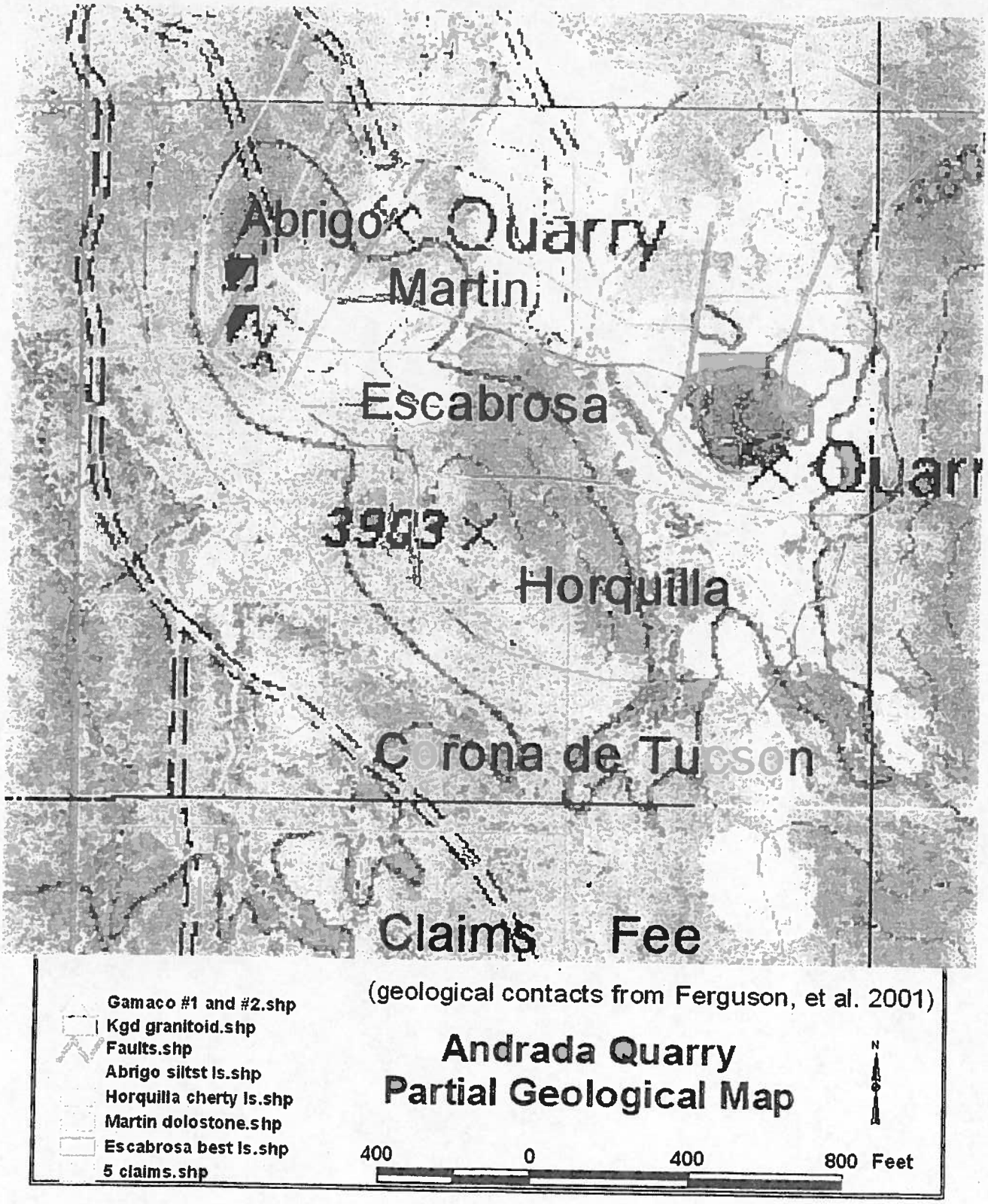


Figure 9: Aerial photo with topography showing distribution of major rock units and faults.

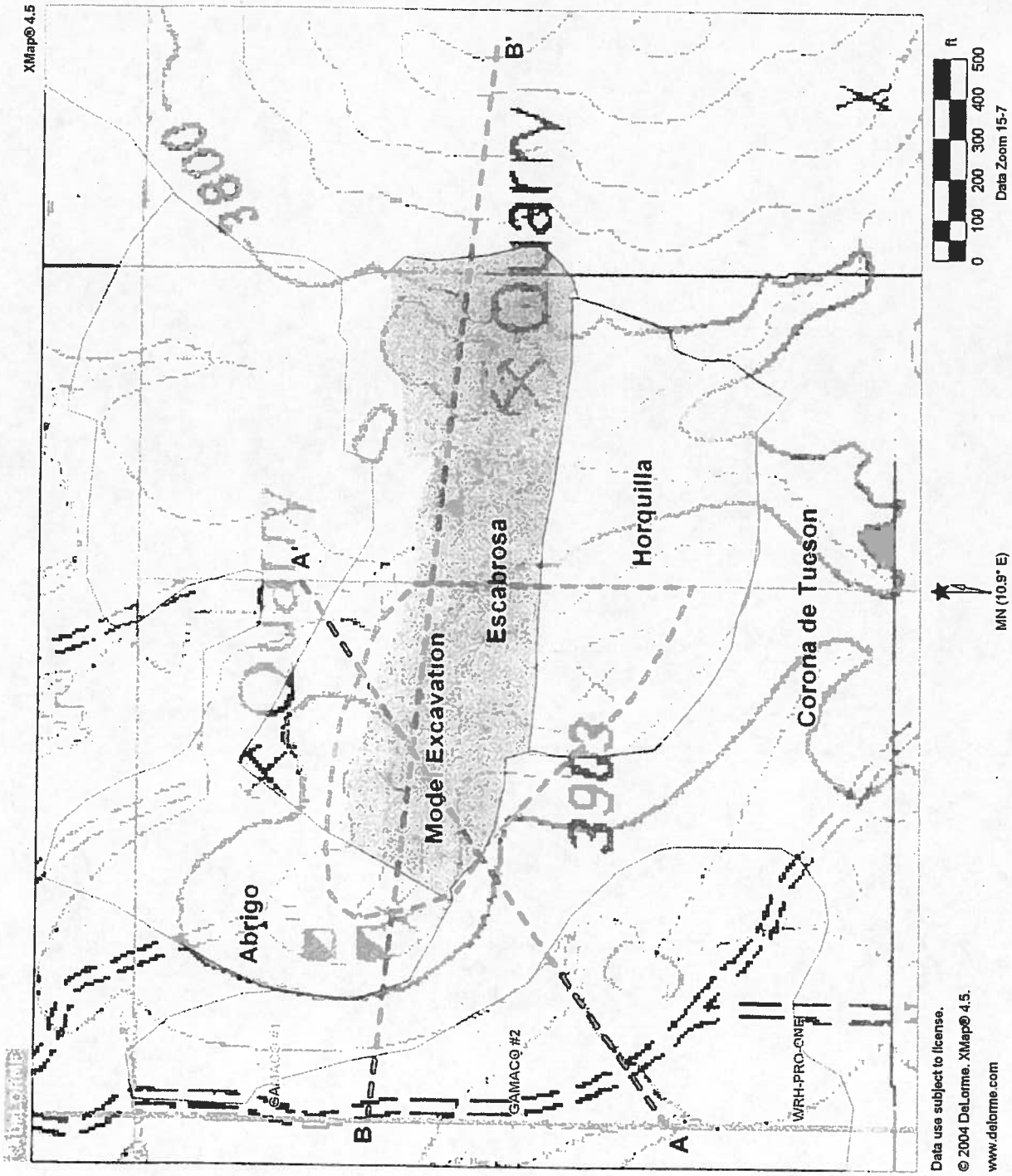


Figure 10: Topographic map showing rock unit distribution, lines of cross section A-A' and B-B', and location of proposed excavation (dashed blue line).

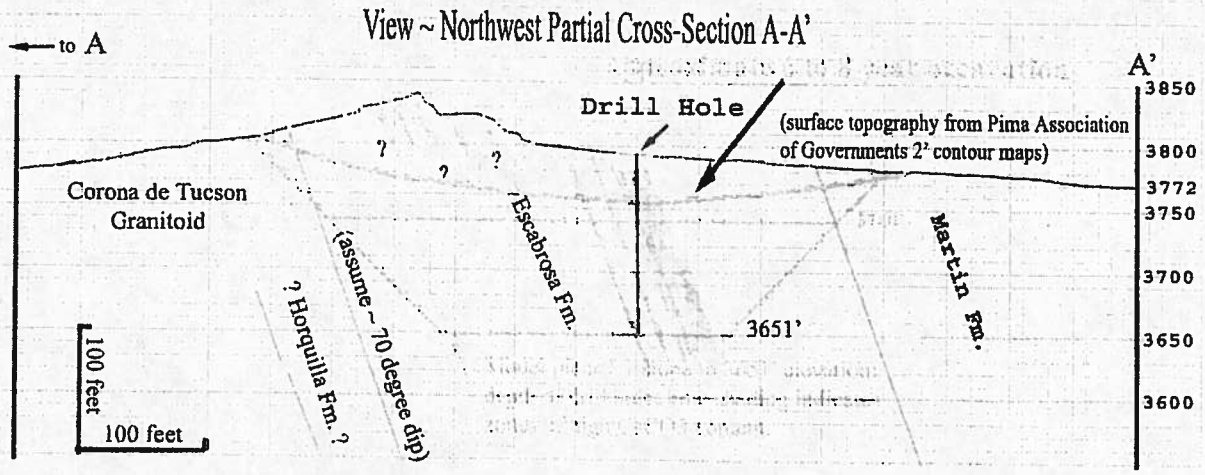


Figure 11: Partial cross section A-A' illustrating geology and 1:1 slope model pit on mining claims. Current plans are to mine only the upper parts of the resource in a 6 to 8 year mine life.

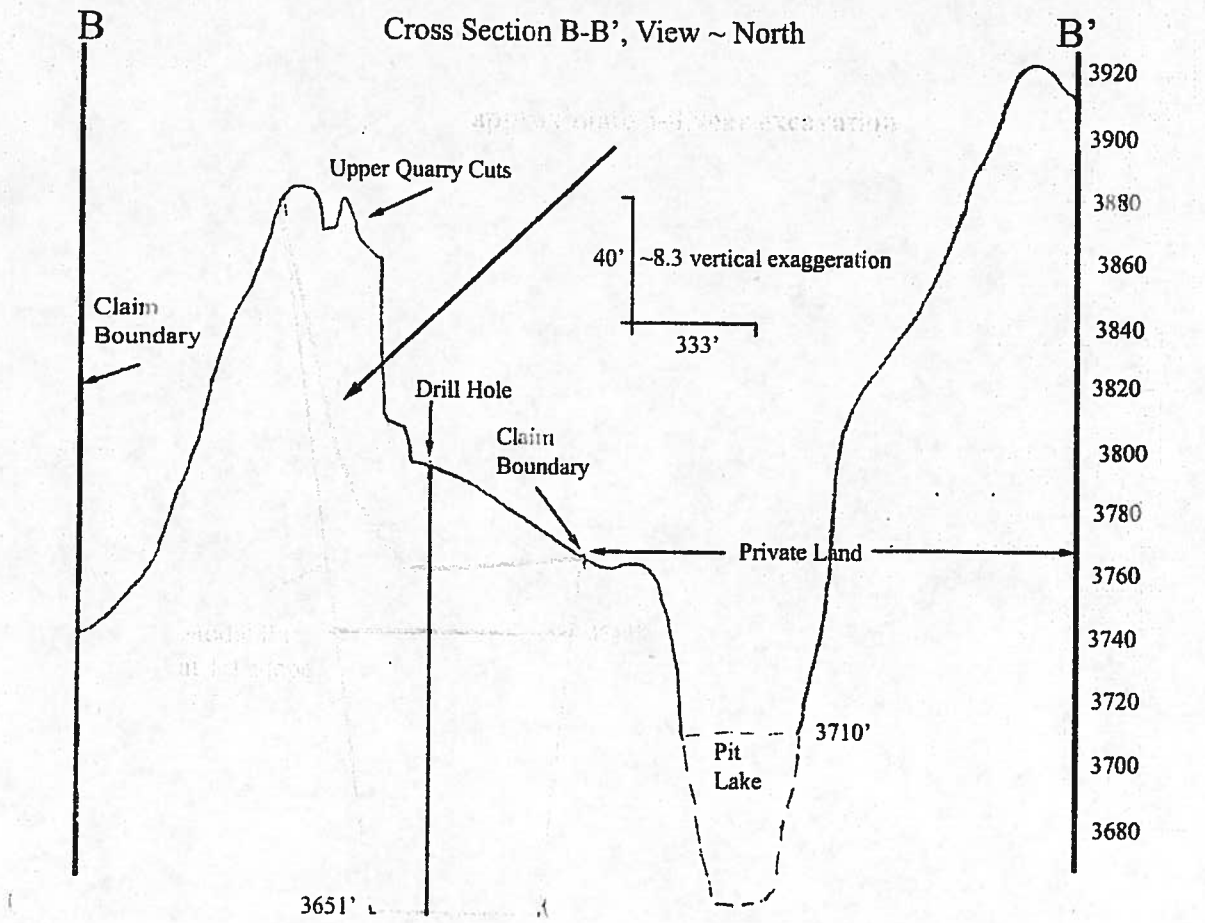


Figure 12 : Cross section B-B' illustrating relation of proposed excavation to existing workings. Note that horizontal and vertical scales are very different than those shown in Figure 11.

Figure 13: View north at existing quarry to Escabrosa Formation (chiefly white, in foreground) with grayer Martin Formation topographically above at skyline. Steep dip of gray layer in Escabrosa can be seen at lower left of photograph.

Figure 14: Coarsely recrystallized limestone/marble at northwest terminus of upper quarry.

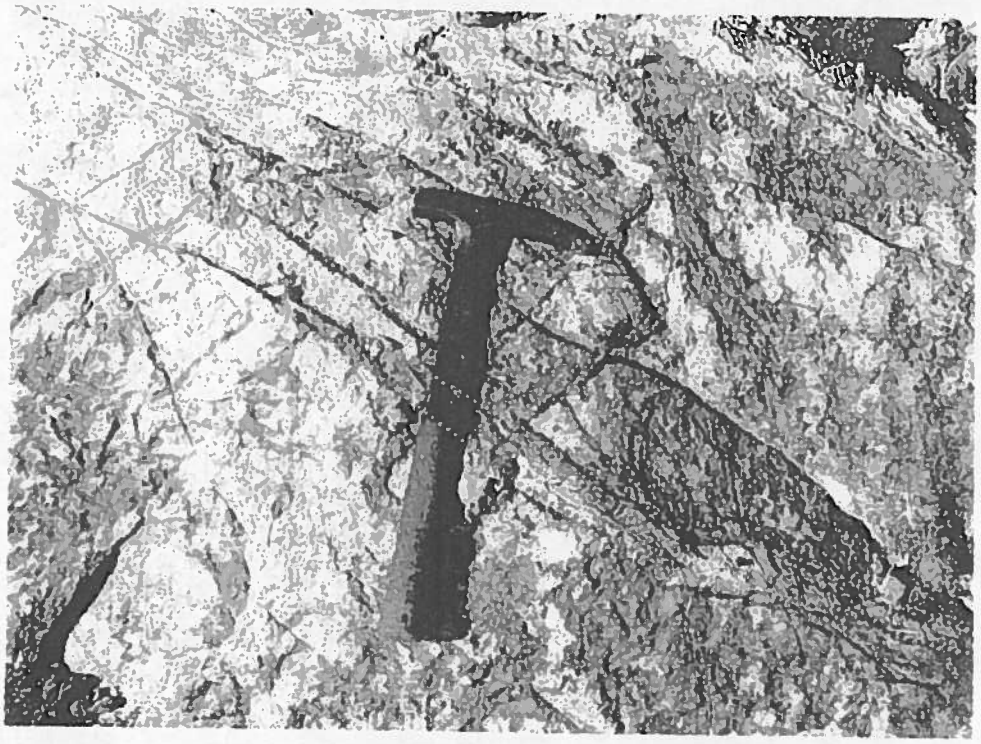


Figure 15: View of chert (SiO_2) nodules and stringers in Horquilla Formation.

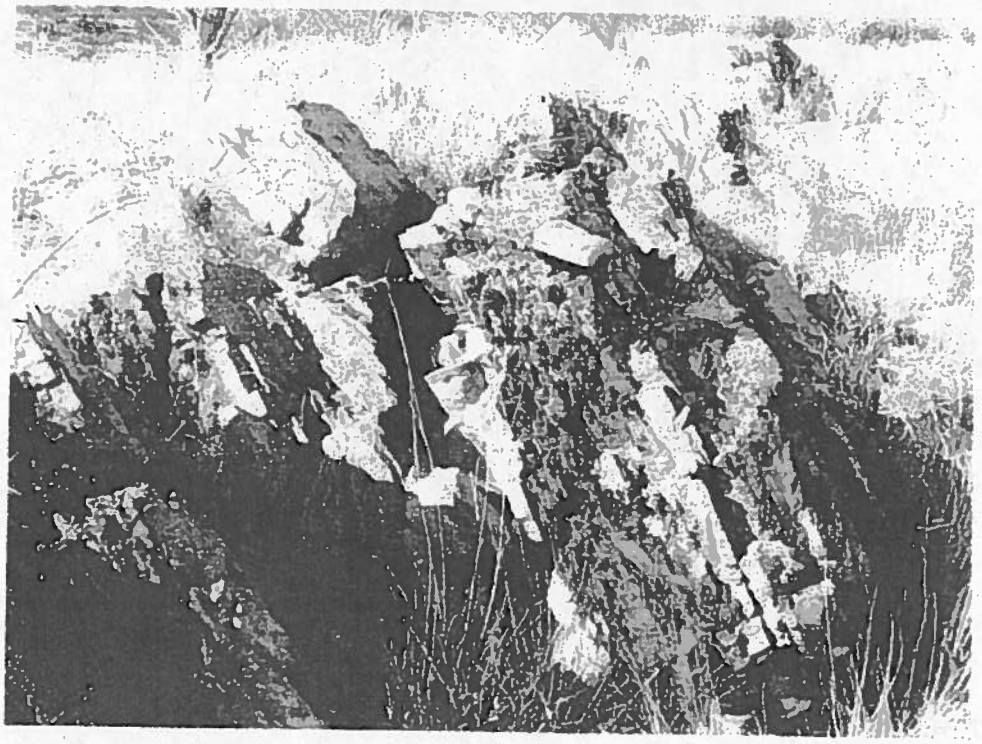


Figure 16: View west-northwest of silica-rich zones in Horquilla Formation illustrating steep north-northeasterly dip of sedimentary rocks.

MINERAL RESOURCES

Past operations at Andrada quarry have produced significant amounts of cement-grade limestone/marble (>90% $CaCO^3$). Recent exploratory drilling by WRH indicates that major portions of the Escabrosa Formation are suitable for use in cement manufacture. Drill intervals up to 60 feet long in the Escabrosa Formation are >95% $CaCO^3$, a content suitable for highest-value applications, such as animal feed, joint compounds, cultured marble, paper filler and high brightness paper filler.

The modeled 1:1 slope pit as shown in Figures 10, 11 and 12 would excavate approximately 2.1 millions tons of Escabrosa Formation rock. A majority of this material would be suited for use in manufacture of cement. Local, but significant zones of >95% $CaCO_3$ are suitable for highest value use. Due to the fact that the vertical drill holes in steeply dipping strata did not adequately test the overall composition of the Escabrosa Formation, it is not possible to realistically estimate percentage of Escabrosa suitable for highest use based on limited drill results.

However, based on past usage, limited drill information and lower specifications required for cement use, it is possible to estimate how much of the model Escabrosa pit material could be used in cement manufacture. Using a 20% loss factor, the 1:1 slope model pit to a depth of 3651 feet is considered to represent an indicated resource of approximately 1.7 million tons of >90% $CaCO_3$ suitable for cement manufacture. The 20% loss estimate includes loss due to impure layers within the Escabrosa and dilution during mining. Most significant losses would be associated with layers containing excessive amounts of SiO^2 (silica, quartz), Fe (iron) and Mg (magnesium). If this material were separated during mining it probably could be used for common variety purposes such as decorative rock or common aggregate.

Although the drill-indicated model pit is modeled to a depth of 3651 feet, the current mining plan addresses excavation only to a depth of 3740 feet, which is the approximate elevation of the access road where it enters the northeast corner of GAMACO #1 mining claim. The indicated resource in a pit to a depth of 3740 feet is approximately 850,000 tons of >90% $CaCO_3$ suitable for cement manufacture.

A definition of indicated resources is given in Figure 17. Note that further studies would be required to upgrade the classification *indicated resources* to that of *proven reserves*. Determination of identified high-grade calcium carbonate resources (>95% Ca CO^3) would require additional drilling and/or channel sampling.

Figure 1 – General Relationship between Exploration Information, Mineral Resources and Mineral Reserves

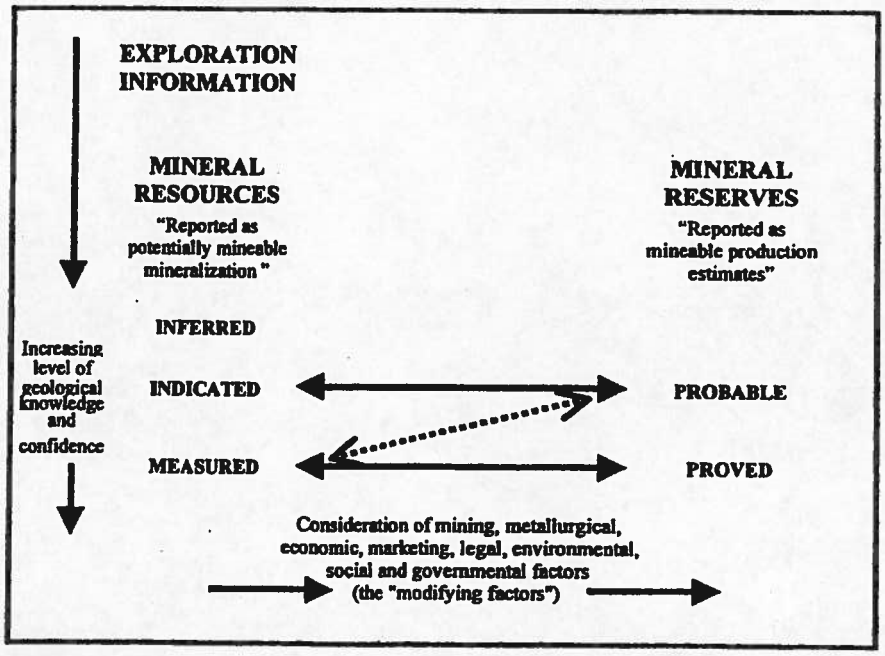


Figure 1 sets out the framework for classifying exploration information, tonnage and grade estimates and contained or recoverable minerals as applicable. This classification reflects different levels of geological confidence and different degrees of technical and economic evaluation. Mineral Resources can be estimated mainly on the basis of geoscientific information with some input from other disciplines. Mineral Reserves, which are a modified sub-set of the Indicated and Measured Mineral Resources, require consideration of those factors affecting extraction, including mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors, and should in most instances be estimated with input from a range of disciplines.

In certain situations, Measured Mineral Resources could convert to Probable Mineral Reserves rather than to Proved Mineral Reserves because of uncertainties associated with modifying factors which are taken into account in the conversion from Mineral Resources to Mineral Reserves. This relationship is shown by the broken arrow in Figure 1. In such situations these modifying factors should be fully explained.

In certain situations, previously reported Mineral Reserves could convert back to Mineral Resources because of new information according to which a Mineral Reserve can no longer be reported. The resulting two-way relationship is shown by the two-headed arrows in Figure 1. The modifying factors which resulted in reclassification of a Mineral Reserve should be fully explained.

Figure 17: Relationship between exploration information, mineral resources and mineral reserves (Figure 1 of SME, 1999).

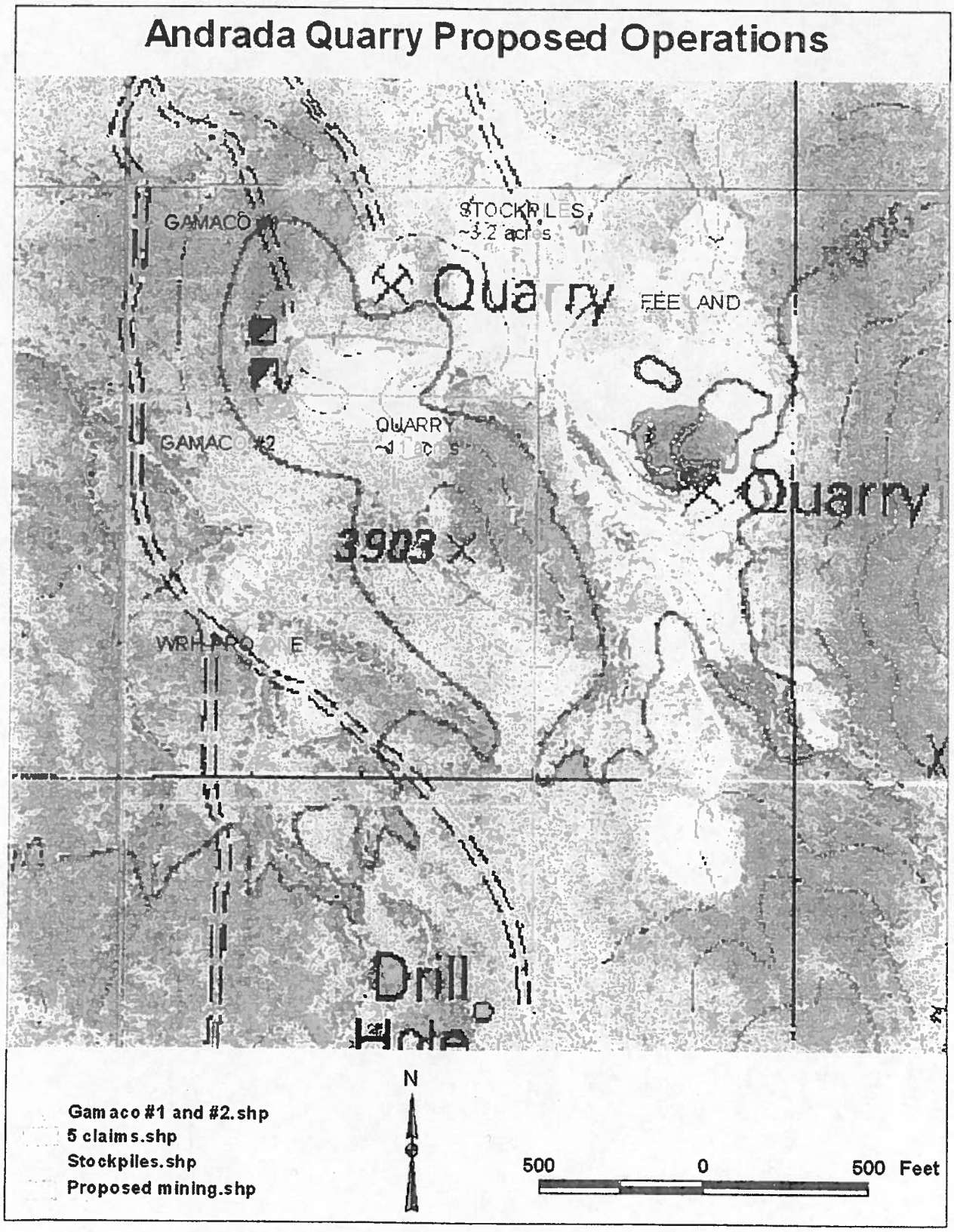


Figure 18: Aerial photograph (taken 4-30-03) illustrating location of mining claims and proposed operations. A primary crusher will be located within the stockpiles area.

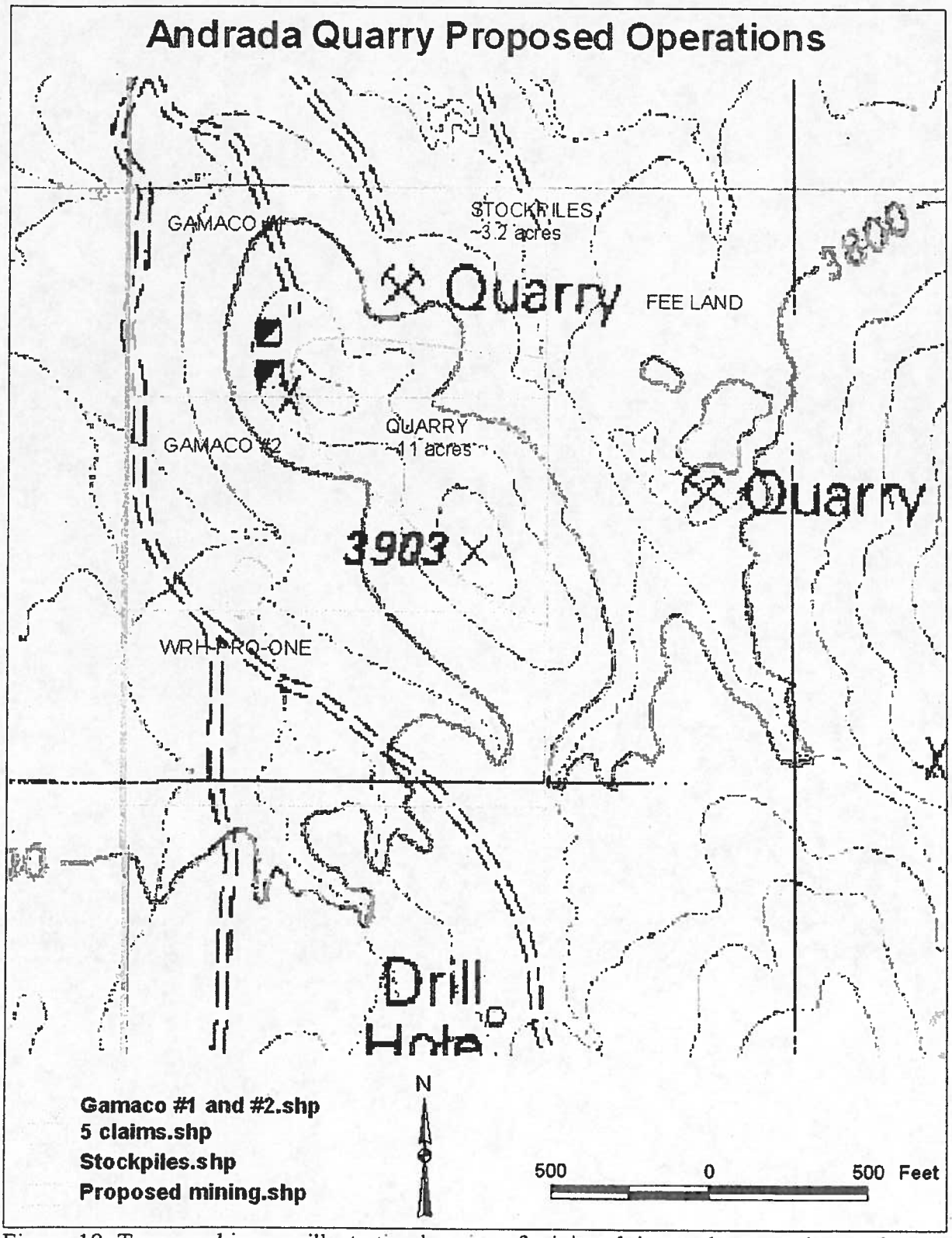


Figure 19: Topographic map illustrating location of mining claims and proposed operations.

MINING AND PROCESSING OPERATIONS

Approximately half of the ~14 acres to be used for mining, stockpiling and crushing activities under this plan have been disturbed by previous mining activities (see Figures 18 & 19). As future mining expands into undisturbed areas, vegetation will be removed according to Arizona Department of Agriculture regulations, and overburden will be stockpiled for reclamation efforts. Once a desirable surface is exposed, marble and related materials will be excavated via ripping with appropriate tracked equipment and blasting. Because distribution of high $CaCO_3$ content layers within the Escabrosa Formation is variable, mining will be conducted selectively in order to maintain acceptable feed to the crusher.

In general, a series of highwalls and benches trending chiefly west-northwesterly to east-southeasterly will be created. Areas too hard to be ripped by tracked excavators will be drilled and blasted by outside contractors. Blasting will be accomplished using methodologies designed to limit noise and vibration. A hydraulic breaker mounted on a tracked excavator may be used to break oversize boulders in the pit and at the crusher grizzly.

Overall pit configuration will reflect local geological conditions of rock orientation and stability. The pit will closely follow the west-northwesterly orientation of the Escabrosa Formation, and the approximately 70° dip of bedding will affect highwall and bench construction. Construction of 30 foot highwalls with 70° faces and 20 foot benches would produce a 1:1 (45°) overall slope. If highwalls were 25 feet high with 70° faces and 25 foot benches, the overall slope would be about 1.34:1 (horizontal to vertical; ~36° slope). Exact highwall to bench ratios will depend on site specific conditions. Maximum height of highwalls would probably be 40 feet. Where steep highwalls are developed, they will be designed and maintained in compliance with federal and state regulations. Arizona Revised Statute (ARS) 27-422 states:

A. *Banks and benches shall be suitably trimmed in a manner consistent with the kind of rock or material, height of banks, and type of equipment being used.*
B. *The operator or a supervisor designated by him shall make a daily inspection of the faces and banks in the working area of any open pit and shall cause all dangerous material to be dislodged or otherwise made safe.*

ARS 27-425 requires: *Those portions or places of open pits which border on inhabited places frequented by the public shall be fenced or otherwise blocked off.*

Federal regulations regarding wall, bank, and slope stability are similar. 30 CFR 56.3130 reads: *Mining methods shall be used that will maintain wall, bank, and slope stability in places where persons work or travel in performing their assigned tasks. When benching is necessary, the width and height shall be based on the type of equipment used for cleaning of benches or for scaling of walls, banks and slopes.*

30 CFR 56.3131 relates to pit or quarry wall perimeter and states: *In places where persons work or travel in performing their assigned tasks, loose or unconsolidated material shall be sloped to the angle of repose or stripped back for at least 10 feet from the top of the pit or*

quarry wall. Other conditions at or near the perimeter of the pit or quarry wall which create a fall-of-material hazard to persons shall be corrected.

Specific highwall heights and slopes are not identified in federal or state regulations. Pit wall slopes and bench widths are dependent on the types of rock involved and the size of equipment working the mine faces. Highwalls developed in coherent rock being worked by large excavators can be higher and steeper than highwalls in loose material being worked by small equipment. An informal, unwritten rule-of-thumb used by the Arizona Mine Inspector allows working highwalls to be 5 feet higher than the reach of largest available equipment if such slopes are stable. Working highwalls at the WRH Andrada quarry will be constructed dependent on site specific conditions and as approved by state and federal mine inspectors. Gates and berms will limit access to the project area, and the public will not be allowed access to operational areas.

Once the desired material is broken loose in the open pit, it will be transported by excavators, front end loaders or dump trucks to a primary crusher and loading facility located within the northeastern part of the GAMACO #1 mining claim. Stockpiles will be established to store run-of-mine and crushed material such that crushing and loading capacities will not be exceeded. Parts of the crushing and loading facility may extend onto adjacent fee land. Only one crushing phase will be conducted at the Andrada site. Mine run material will be crushed to minus 3 inches and then will be trucked to a processing plant in **Casa Grande**, Arizona for further crushing and grinding. No chemicals will be used in the crushing operations and crushing will be accomplished only during daylight hours Water will be routinely sprayed from a water tanker onto roadways and active stockpiles, and water spray bars will be installed on crushing equipment. Roads and process areas within the facility will be periodically graded and bermed to allow for safe travel and to control surface drainage.

It is estimated that approximately twelve 23-ton truck loads of crushed product will be shipped on a daily basis. Invoices for all materials sold will include product weight or volume and a description of the material that allows identification of source.

Yearly production from federal mining claims is estimated to be about 60,000 tons (~250 tons/day x ~240 days/year). Although the proposed quarry on public land contains a cement-grade resource (>90% $CaCO_3$) of ~850, 000 tons to an elevation of 3740 feet, WHR's current plans are to concentrate mining efforts on a lesser amount of higher-grade materials (> 95% $CaCO_3$). Thus, not all cement-grade material will be mined from the proposed quarry. Mining on public land will complement mining and reclamation of adjacent WRH fee land. Because much high-grade calcium carbonate has been previously mined from WRH fee land, only limited amounts of economic resource remain there and main efforts will soon be reclamation such that the private property can be developed for residential use. Mining on public land will augment terminal mining of the WRH private resource. Estimated mine life on the federal mining claims is 6 to 8 years. As indicated on Figures 11 and 12, mining on public land will remove material from higher elevations such that the resulting surface slopes toward grade at the intersection with private land.

ENVIRONMENTAL CONSIDERATIONS

WRH desires to conduct its Andrada quarry operations in an environmentally responsible manner and will address all pertinent issues to insure proper stewardship of public lands and preservation of wildlife and cultural resources. A separate environmental assessment will be completed to further address the following and other issues of environmental concern.

Air Quality: Dust and diesel emissions are the main elements of air quality concern at the Andrada quarry. To limit dust formation during mining and transport of materials at the site, WRH will periodically spray clean water on roadways, process areas and accessible working faces. **Dust suppressants will also be used as required.** Appropriate speed limits will be enforced within the quarry and access road to limit fugitive dust, and spray bars will be installed at several points on crushing equipment to limit dust generation. Only primary coarse crushing will be accomplished at the site. Fine crushing and grinding will occur at a separate, remote location. WRH has obtained Pima County Air Quality Permit #8559 for initial operations (Attachment A). All operations will be conducted to meet air quality standards as regulated by Pima County Department of Environmental Quality.

Storm Water Runoff: Surface water from disturbed surfaces of industrial sites can cause pollution down gradient from areas of disturbance. In the case of active industrial mineral mines in the desert southwest, the most likely form of down-gradient pollution is siltation caused as fine materials washed away from active mine operations are deposited in areas where such deposition is harmful to plants and wildlife. Because much storm water runoff is or will be captured by internal drainages associated with quarries, large amounts of storm water will not flow from the area of mining operations.

Figure 3 illustrates that the Andrada quarry is not located within active drainage channels or floodplains nor is it adjacent to riparian or wetland areas. A Storm Water Pollution Prevention Plan ("SWPPP") has been prepared for the Andrada quarry and WHR has been issued Authorization Number AZMSG-12868 for storm water discharges under conditions imposed by ADEQ's AZPDES Storm Water General-Multi Sector Permit (Attachment B). Storm water controls will include rock mulching, and construction of drainage swales and berms to limit erosion and transport of fine materials while allowing natural flow of storm water.

Ground Water: Because WRH will use only clean water and processes inert materials in its operations, it will not release pollutants into the ground-water table. Therefore the Andrada quarry does not require an Individual Aquifer Protection Permit and will operate under the general permit for sand and gravel operations. A questionnaire checklist prepared by the Arizona Department of Environmental Quality ("ADEQ") to determine eligibility for operation under a general permit has been completed for the facility (Attachment C). Any tank containing hazardous materials that is not double walled would be placed within a facility designed to provide secondary containment in the event of a spill. Major fuel storage would be on adjacent fee land. Because it is planned that crushing equipment will be electric powered, fuel spill exposure on mining claims should be from mobile equipment only. A spill prevention plan will be prepared as required.

Ground water occurs at a shallow depth at Andrada quarry and currently partially fills the inactive quarry on fee land. It is possible that ground water will be encountered during mining operations on public land. Care will be taken to prevent contamination of ground water if encountered. If significant ground water accumulates in an active pit, it may be pumped for use in processing and dust control. Ground water level and quality measurements will be recorded periodically during mine operations at the WRH fee well, the existing pit lake and within the proposed pit if ground water is encountered there. Renewed mining activities will serve to protect ground water resources at Andrada quarry because of increased security measures associated with an active project. Regular supervised activities on WRH private land and claims will help insure that ground water at the Andrada quarry is protected.

Unauthorized Use: In recent years, the inactive Andrada has been subject to excessive unauthorized use and vandalism. Upon renewal of mining operations approximately 5 to 6 employees will be at the site on a regular basis. It is likely that at least one employee will reside on WRH fee land, and appropriate measures will be taken to close Andrada quarry to unauthorized use. Properly managed occupancy and use will improve conditions at the quarry. Managed control should be a benefit to quarry operators, the natural environment and neighbors.

Waters of the United States: Section 404 of the Clean Water Act regulates discharge of dredged or fill material into "waters" of the United States which include lakes, reservoirs, wetlands, perennial and ephemeral streams. The U.S. Army Corps of Engineers ("COE") administers the Section 404 permitting program in Arizona. COE has determined proposed mining within the mining claims does not impact jurisdictional waters of the United States (Attachment D). Material stockpiles on mining claims would occur only in previously disturbed areas whose configurations would not be changed.

Soils: Figure 20 shows that proposed operations on WHR claims would impact soil map unit 42 as defined by the Soil Survey of Pima County, Eastern Part, USDA Natural Resources Conservation Service (Cochran and Richardson, 2003). Soil map unit 42 is the Mabray-Deloro-Rock outcrop complex which is developed on 20 to 65 percent slopes. The unit is 35% Mabray (very cobbly loam), 25% Deloro (extremely channery loam) and 15% Rock outcrop. The Mabray component is developed over limestone and the Deloro component chiefly overlies quartzites. Thus the Mabray and Rock outcrop portions of the map unit dominate near the Andrada quarry. Depth to limestone in the Mabray soil is typically 4 to 20 inches and runoff is very rapid, with attendant moderate to severe hazard for water erosion. Hazard for wind erosion is slight (Cochran and Richardson, 2003).

Mabray soil is classified within the Limestone Hills, 12-16" precipitation zone range site and its potential plant community is mainly gamma grasses, southwestern stipa, range ratany, and peabush. Figure 21 gives a detailed breakdown of Mabray soil characteristic vegetation. This vegetation distribution will be reflected in seed mixture design during reclamation of the WRH claims at Andrada quarry. As documented by Cochran and Richardson (Figure 5, 2003), the Mabray-Deloro-Rock outcrop complex is not considered to be prime farmland. Various other figures in Cochran and Richardson (2003) indicate that the complex is generally not favorable for woodland understory vegetation, recreational development, building site development, sanitary facilities, construction materials and water management.

05-27-06 Addition to Plan of Operations (Water Well Data)

Various residents near the Andrada quarry have complained in the past that mining operations have been detrimental to their ground water supplies. Allegations include loss of aquifer and physical damage to wells by blasting. These concerns apparently stemmed from past operations by Georgia Marble Company on private land much closer to neighbors than operations proposed under the WRH Plan of Operations.

A search of Arizona Department of Water Resources (ADWR) records shows that more than 20 wells are registered in Section 21, T. 17 S., R. 16 E. (the Andrada quarry section). Ground water data shown in the following four maps are taken chiefly from the ADWR Wells 55 CD, a compilation of well data in GIS format. Additional data were compiled from archived well completion reports available on the ADWR website. Figure W1 shows location of these wells and intended use of the wells. Because ADWR locates wells only to 10 acre subdivisions, exact location of wells is not given. Some well location points represent more than one well. Note that the majority of wells are for domestic use. Other wells show "none" as use. Mineral exploration drill holes would be classified as a none use. For example, the none well use indicated near the northwest corner of the section (above "Quarry" on map) represents 8 mineral exploration holes drilled by WRH in 2003.

Figure W2 illustrates water levels for some wells. A "0" notation does not indicate water flowing at the surface, rather a lack of data. Water level in this map represents static water level as reported in well completion reports indicating level of ground water shortly after the well was drilled. Although completion data are not available for all wells, some trends are indicated. Water appears to be encountered at shallowest depth in the northwest portion of Section 21, topography affects water levels, and different aquifers are encountered by different wells. Note that the WRH well sites (including mineral exploration holes) west of the Kolba parcel intersected ground water between 43' and 92' below ground surface. The Kobla well completion report indicates a static water level of 387'. Even accounting for an approximately 100-120' higher elevation, the Kolba well encounters water at a much greater depth than the WRH wells. This suggests that different aquifers are being penetrated. Deepest depth to ground water (800') is reported in the southeast corner of Section 21.

Figure W3 presents drawdown data for 8 wells in Section 21. Drawdown in this figure represents the change in water level after pumping at a steady rate for 4 hours after the well had been drilled and water level had been allowed to stabilize. Note that pumping rates and drawdown differ for the individual wells. The amount of drawdown indicates the capacity of an aquifer at the well site. If a well is pumped at a high rate and the water level doesn't decrease significantly, the well has a high capacity to produce water. If significant drawdown occurs at a low pumping rate, the well has a low capacity to produce water from the depths tested.

Note that two wells in Figure W3 show 0' drawdown; the Georgia Marble well at a pumping rate of 25 gallons per minute (gpm) and the Felzian well at 11 gpm. Other pump-tested wells show moderate to pronounced drawdown. The Georgia Marble and Felzian wells are located along a distinct northwest-trending valley feature that probably represents a highly fractured zone in bedrock. This appears to be the best aquifer in the area. The Singler well near the southeast corner of Section 21 exhibits 665' of drawdown at a pumping rate of 5 gpm. Effectively, this well was pumped dry at a low flow rate. The aquifer represented by this well is probably a poorly developed fractured zone and/or a small porous zone in tilted, consolidated sediments.

Figure W4 is part of the Geological map of the Mount Fagan 7.5' quadrangle, eastern Pima County, Arizona (Arizona Geological Survey DGM-11). Section 21 is chiefly characterized by crystalline igneous rocks (unit Kgd) and layered, coherent sedimentary layers (units Ca, Cb, Dm, PPh, Kw) that are commonly severely rotated. Only limited amounts of relatively young, flat-lying sediments (units QTs, Om, Oy2) are exposed within the section, and thick, laterally continuous aquifers such as found in poorly consolidated alluvial basins are not present.

All producing wells within Section 21 are exempt wells that are mandated to pump less than 35 gpm. The Georgia Marble well, located on WRH fee land contains a 25 gpm pump. ADWR regulations limit production from that well to 10 acre feet per year. Georgia Marble estimated that about 5 acre feet per year would be used for dust control during their operations. A similar amount of water usage is estimated for proposed renewed operations by WRH at Andrada quarry. Because the Andrada Georgia Marble well is located at large distances from other wells, will not draw excess amounts of water and taps a substantial aquifer, it should not have significant impact on other wells in Section 21. Residential wells in Section 21 are much more likely to be impacted by pumping of immediate neighbors, and the limited capacities of their own localized aquifers. Regional effects such as limited recharge during drought conditions will also impact all aquifers in Section 21.

Proposed excavation under the WRH Plan of Operations will not be deeper than the 3740' elevation. Because this is approximately 50 to 100' above ground water level, ground water will not be impacted by mining activities. The WRH blasting plan is designed such that safe vibration limits will be maintained. The limited vibration produced by safe blasting practices and distance to residential wells should preclude any possible physical damage to residential wells in Section 21.

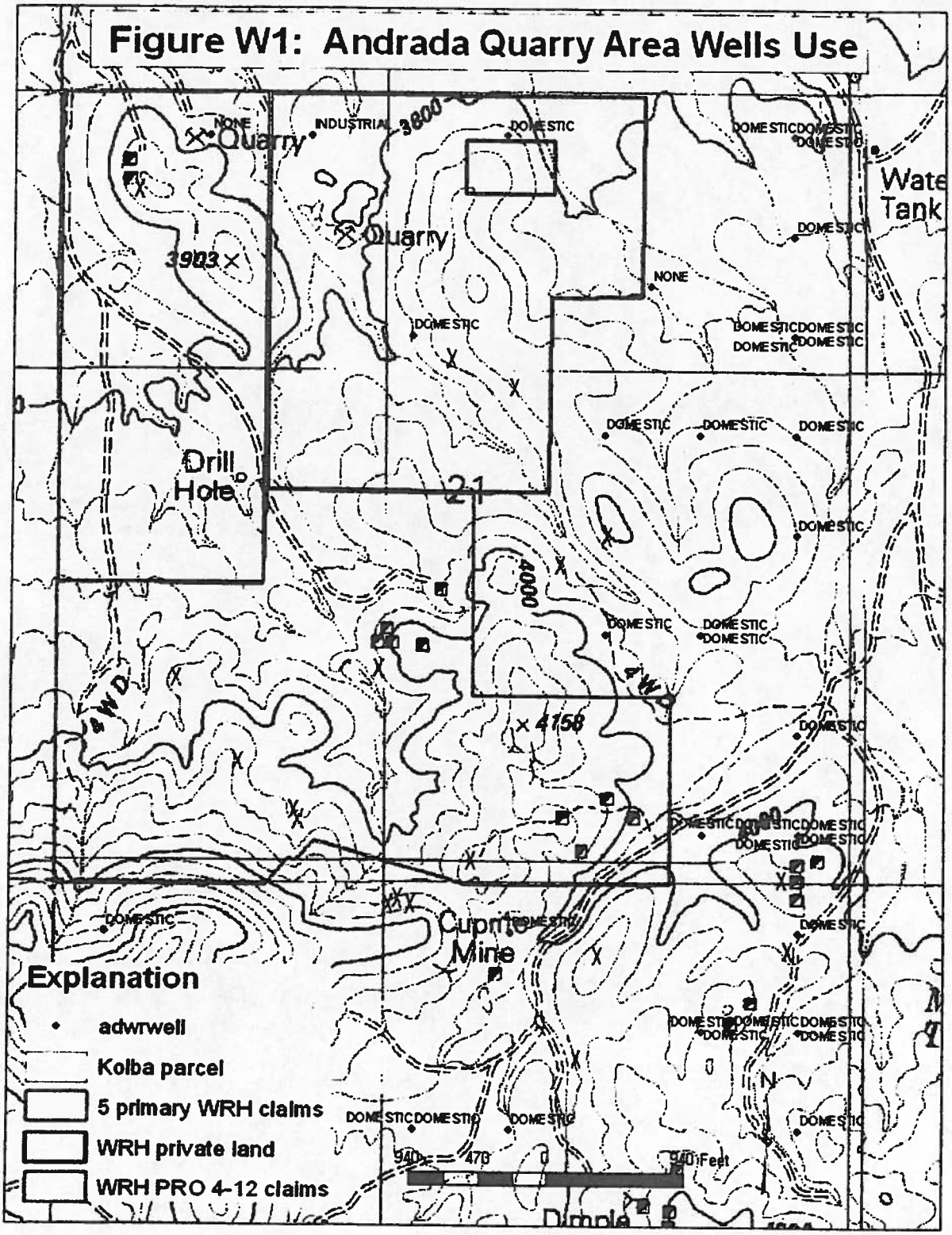


Figure W1: Andrada Quarry Area Wells Use
Quarry
Quarry
Drill Hole
Cuprite Mine
Water Tank
Dimple
3903
3800
4000
4158
21
4WD
DOMESTIC
INDUSTRIAL
NONE
Explanation
adwrwell
Kolba parcel
5 primary WRH claims
WRH private land
WRH PRO 4-12 claims
940 = 470 0 940 Feet

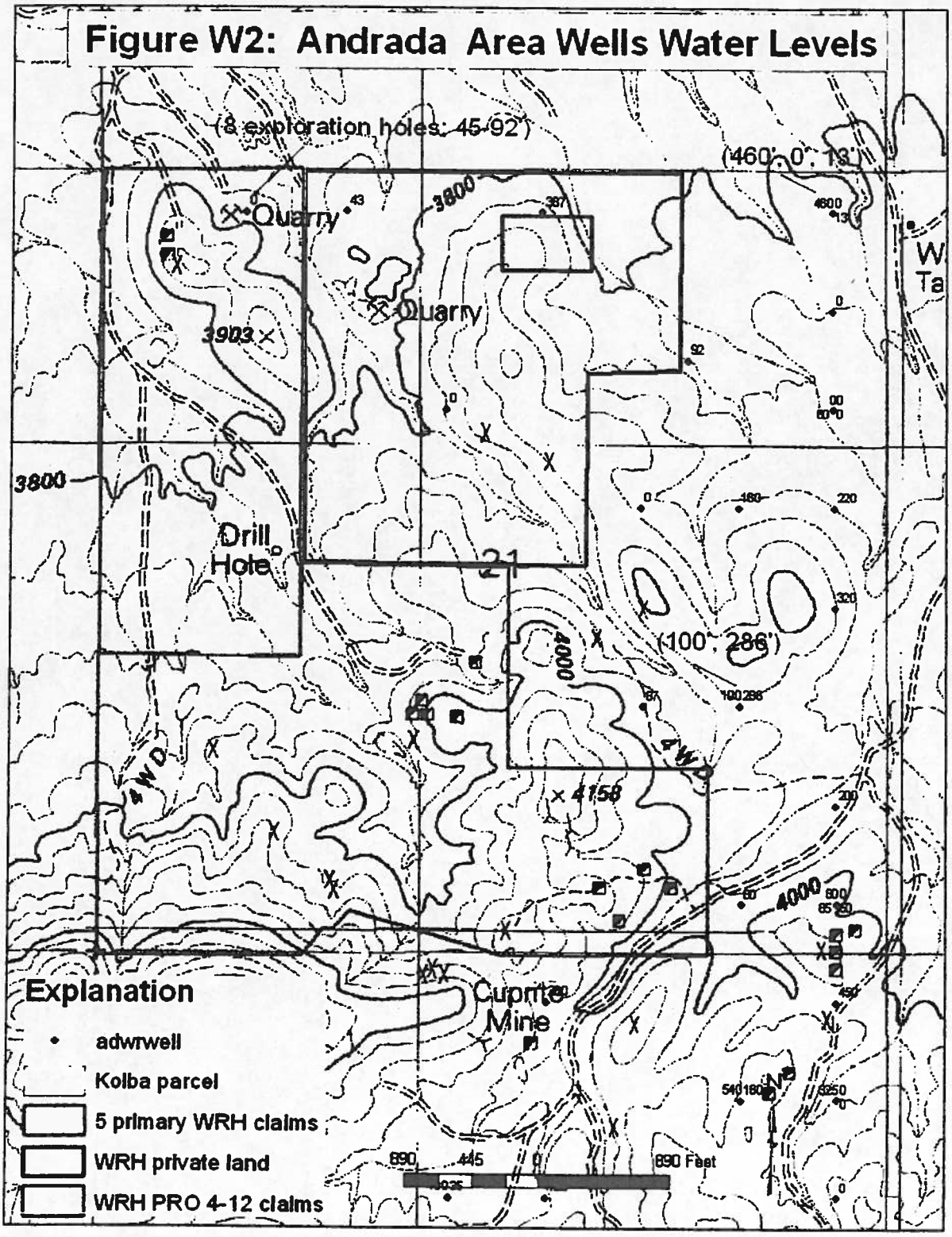


Figure W2: Andrada Area Wells Water Levels
(8 exploration holes: 45-92')
(460', 0', 13')
Quarry
Quarry
3800
3903
3800
Drill Hole
21
(100', 286')
4000
4156
4000
Cuprite Mine
Explanation
adwrwell
Kolba parcel
5 primary WRH claims
WRH private land
WRH PRO 4-12 claims
890
445
0
890 Feet

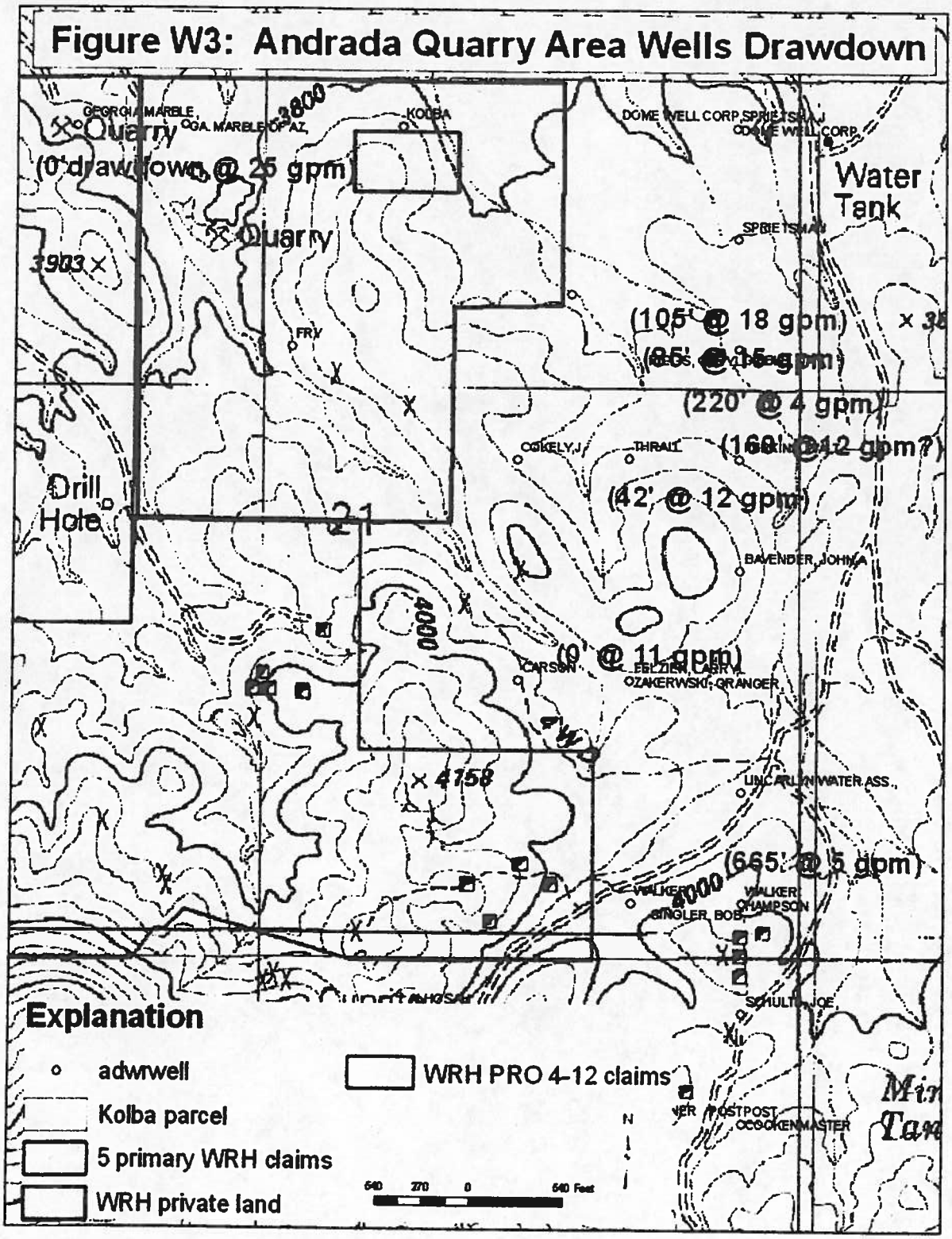


Figure W3: Andrada Quarry Area Wells Drawdown
Quarry
(0' drawdown @ 25 gpm)
Quarry
3903
3800
KOLBA
DOME WELL CORP
Water Tank
SPRIETSMAN
(105' @ 18 gpm)
(220' @ 4 gpm)
(160' @ 12 gpm?)
(42' @ 12 gpm)
FRY
COKELY, J
THRAIL
Drill Hole
21
BAVENDER, JOHN A
4000
(0' @ 11 gpm)
CARSON
OZAKERWSKI, GRANGER
4758
UNCAPLIN WATER ASS.
(665' @ 5 gpm)
WALKER
WALKER CHAMPSON
SINGLER, BOB
SCHULTZ, JOE
Explanation
adwrwell
Kolba parcel
5 primary WRH claims
WRH private land
WRH PRO 4-12 claims
N
640 270 0 640 Feet

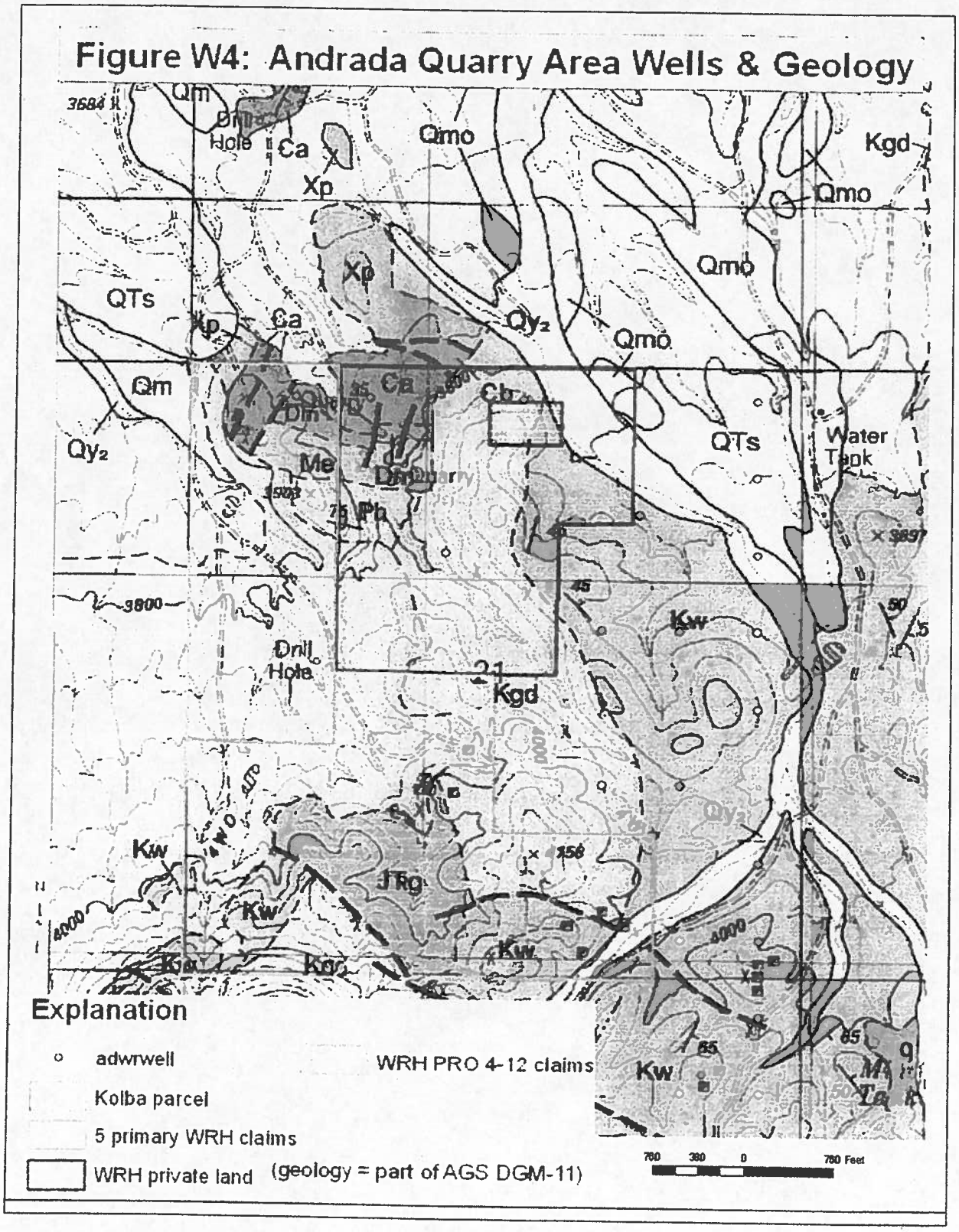


Figure W4: Andrada Quarry Area Wells & Geology
Qm
Drill Hole
Ca
Xp
Qmo
Kgd
QTs
Qy2
Cb
Me
Pb
Water Tank
Kw
JTg
21
Explanation
adwrwell
Kolba parcel
5 primary WRH claims
WRH private land
WRH PRO 4-12 claims
(geology = part of AGS DGM-11)
760 380 0 760 Feet

REGISTERED GEOLOGIST
CERTIFICATE NO.
12998
DAVID EDWIN
WAHL, JR.
Date Signed 5/30/06
STATE OF ARIZONA

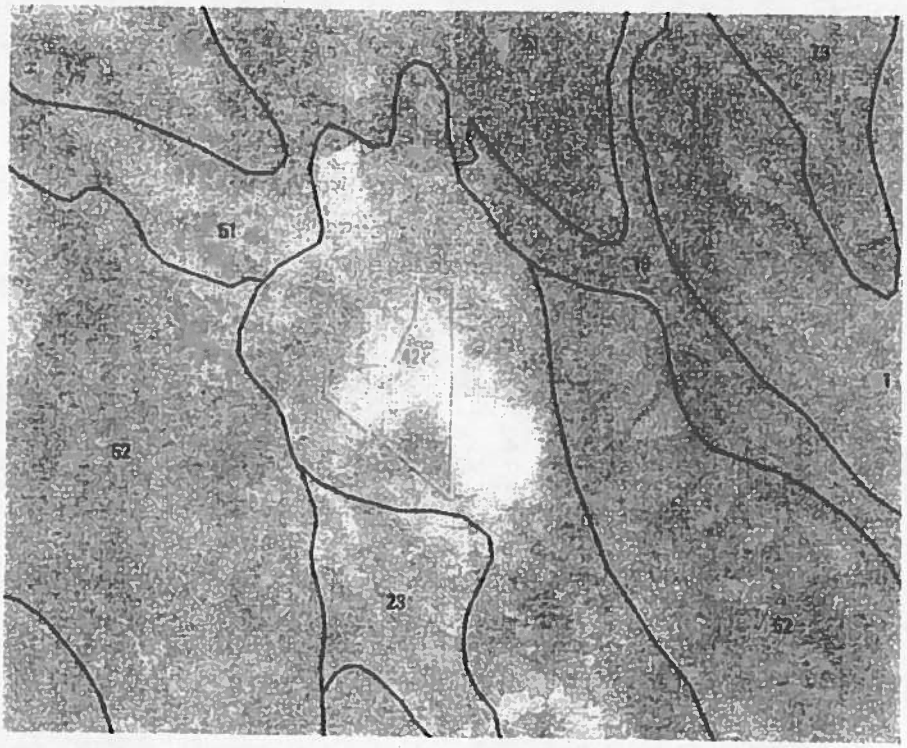


Figure 20: Soil survey showing that proposed Andrada operations would impact map unit 42; Figure is part of Sheet 63 of 90 from Cochran and Richardson (2003).

Table 7.--Rangeland Productivity and Characteristic Plant Communities--Continued

Soil name and map symbol	Range site	Total production: Kind of year	Total production: Dry weight	Characteristic vegetation	Composition
			Lb/acre		Pct
42*:					
Mabray	Limestone Hills, 12-16" P.z.	Favorable	1,100	Sideoats grama	15
		Normal	800	Black grama	10
		Unfavorable	600	Slim tridens	5
				Hall panicum	5
				Blue threeawn	5
				Other perennial grasses	5
				Kidneywood	5
				Range ratany	5
				Peabush	5
				Desert ceanothus	5
				Twinberry	5
				Falsemesquite	5
				Other shrubs	10
				Other perennial forbs	5

Figure 21: Rangeland productivity and characteristic vegetation of the dominant soil type present at Andrada quarry (part of Table 7, Cochran and Richardson, 2003).

Wildlife Resources: A biological evaluation (Attachment E) of the area selected for renewed mining operations was conducted by Phil Jenkins of Southern Arizona Botany. Mr. Jenkins reported that no remarkable grasses or herbaceous plants were observed, but noted the presence of typical, common species in undisturbed areas. Jenkins and an associate concentrated their study on two protected cacti, the Needle-spined Pineapple Cactus and the Pima Pineapple Cactus. Neither was found and Jenkins concluded the proposed quarry area was neither suitable habitat nor within the range of other Listed Protected Plants in Arizona.

http://www.dot.co.pima.az.us/gis/maps/mapguide/mgmap.cfm?path=/cmo/sdcpmaps/sdcp.mwf is the web displaying an interactive map for the Sonoran Desert Conservation Plan. This site indicates that the Andrada quarry area does not lie within special species management zones nor does it impact important riparian zones. In a 1991 survey of plants to be impacted by placement of a crusher on GAMACO #1 mining claim, the Arizona Commission of Agriculture and Horticultural determined that "the plants on the property are of low quality and salvage is not recommended".

Cultural Resources: A cultural resources inventory survey of the proposed project area was completed in June, 2004, by Mary Lou Heuett of Cultural and Environmental Systems, Inc. (Attachment F). Ms. Heuett surveyed 40 acres and identified no sites, either new or previously recorded. She also found no eligible sites, ineligible sites or isolates. Ms. Heuett recommended a finding of no significant effect for the project parcel and proposed activities associated with the parcel.

The Sonoran Desert Conservation Plan web site (op. cit.) places the Andrada quarry in the Archeology Low Sensitivity Zone. Also, an archeological study of the GAMACO #1 and #2 claims conducted in 1992 by David V.M. Stephen of Professional Archeological Services and Technologies ("P.A.S.T.") recommended clearance for the mining project. Archeological clearance was granted by ASLD at that time.

Mine Safety: The WRH Andrada quarry facility will be inspected periodically and will operate under applicable U.S. Mine Safety and Health Administration ("MSHA") and Arizona State Mine Inspector ("ASMI") permits. All employees will receive MSHA-required initial and annual refresher safety training. WRH operations will be conducted in accordance with all applicable MSHA and ASMI safety regulations. Attachment G contains mine safety data from previous operation of the Andrada quarry. Additional mine safety data will be appended within that attachment as they become available.

Blasting: Blasting will periodically be required at the Andrada quarry. All blasting will be conducted by qualified individuals in compliance with applicable federal, state and local regulations. A model blasting plan for the project as prepared by WRH is presented in Attachment H. A single residence (the Kolba residence) lies approximately 1450 feet east of the eastern end of the proposed quarry. Most basting activity would occur between 1500 and 2300 feet from the Kolba residence. Next nearest residences are more than 2900 feet from proposed blasting operations, and most of those more distant residences are topographically shielded from mine operations (see Figure 30).

Blasting will occur only during workdays during daylight working hours such as to minimize impact to neighbors. Input from neighbors will be requested in order to help determine best times for blast events. For example, blasting could be conducted in late afternoon near end of shift if such were favored by neighbors. Noise limiting methodologies will also be used to lessen noise impact to neighbors. Seismic and noise monitoring will be conducted during initial blasting to insure acceptable noise and vibration limits. The quarry will be closed and proper audio warnings given prior to detonations. Neighbors will be notified prior to initiation of quarry operations and prior to blast events.

At least one of the early blast sequences will be done on a demonstration basis such that interested neighbors can view the test detonation sequence from a close but safe distance. Records of blast parameters will be kept on file at the mine office and made available to impacted neighbors upon request. The blasting log will include such information as location, number, depth and diameter of holes, spacing and burden, type of explosives used, type of initiation, powder factor, height of stemming, type of material blasted, weather conditions, exact time of detonations, instrumentation data and/or scaled distance calculations, distance to nearest structure of concern, total amount of explosives per delay, etc. The log will be complete enough such that detailed analysis of blast results can be made should adverse impacts be noted by neighbors. Exact log configuration will be determined by the authorized blaster-in-charge of the excavation project.

Neighbors will be encouraged to record offensive blast impacts. Time of disturbance, weather conditions, wind direction and types of impacts should be noted. Correlation of blast complaint records with blast logs should guide revisions to the blasting plan in order to minimize negative impacts.

Pre-blast surveys are commonly conducted of structures adjacent to a proposed blasting site. Pre-blast surveys typically document condition of interior and exterior conditions of structures near the proposed blast zone. Written and/or videotape records are made showing locations of existing cracks, damage, or other defects, and shall include such information related to possible effects of proposed blasting on the structure. The pre-blast survey typically includes inspection of homes, foundations, driveways, roadbeds, swimming pools, wells and mobile homes within a specified distance from the blast zone (from Town of Windham, New Hampshire blasting ordinance).

Although limited research and conversations with an Arizona State Mine Inspector (Hector Lovemont, personal communication) have revealed that specific pre-blast survey requirements do not exist for Pima County or Arizona, an Internet search has documented that pre-blast surveys are required in many jurisdictions. As shown in Table 1, areas encompassed by pre-blast surveys vary markedly. In addition to stated distances, some jurisdictions require pre-blast survey extents based on local geology and size of anticipated detonations. A representative radius distance from point of blasting for quarries appears to be 2640 feet (1/2 mile). Most jurisdictions that specify pre-blast surveys require that the surveys be conducted by independent inspectors and that survey costs be borne by quarry operators.

Because nearby residents have expressed interest in pre-blast surveys and there is significant ambiguity in pre-blast survey requirements, David E. Wahl, Jr., Consulting Geologist, recommends that WRH, at a minimum, conduct pre-blast surveys on those structures within 2640 feet (½ mile) of proposed blasting operations at Andrada quarry. Wahl also recommends that all structures beyond the ½ mile radius in Section 21, Township 17 South, Range 16 East, which are in direct line of sight of proposed blasting operations be inspected to evaluate air blast impacts of proposed blasting.

Table 1: Pre-Blast Survey Distance Examples

Jurisdiction	Required Radius (feet)	Optional Radius (feet)
Town of Windham, New Hampshire	500	----
Dept. of Transportation, California	328	----
State of Maine (rock quarries)	2000	----
Dept. of Transportation, Ohio	1500	2640 or as required
City of Overland Park, Kansas	500	----
Indiana (re coal mines)	2640	5280 by owner request
Towns within new Brunswick, Canada	1969	----
Town of Blowing Rock, North Carolina	500	----
Lyon County, Kansas	5280	----
Citizens Coal Council	2640 from permit boundary	----
New Mexico (re coal mines)	2640 if requested	----

Vibration and Noise: In addition to blasting, other mine operations including mechanical excavation, crushing and processing can produce significant noise and vibration. Best available practices of noise and vibration reduction will be utilized at the quarry and seismic and noise monitoring will be conducted during initial mine operations. Monitoring stations would be placed on WRH property nearest to affected neighbors. Monitoring may also be conducted at other locations with permission of property owners. It is important to note that proposed operations will not include fine crushing and grinding at Andrada quarry, and that operations will not be conducted on a 24 hour per day basis. Therefore, vibration and noise will be significantly less than that produced by previous operators.

The most significant vibration and noise issues at Andrada quarry will likely be related to blasting. Figure 22 illustrates that explosive energy is released both into the atmosphere and into the subsurface. The air blast explosive component is a compression wave that occurs over a wide frequency range and produces a brief overpressure situation relative to normal atmospheric pressure. Air blast that is audible (above ~20 Hz) is termed noise, and the lower frequency portion of air blast is called concussion. The air blast compression wave travels through the atmosphere in the same manner as does a sound wave and can be affected by atmospheric conditions and terrain characteristics (Atlas Powder Company brochure).

For example, noise/concussion downwind from a blast may be significantly more than noise/concussion upwind from a blast. Temperature inversions can also impact air blast impacts

because compression waves can be refracted back toward land surface. Surface topography will also affect impact of air blast. Pronounced hills, such as the north-trending ridge east of the proposed Andrada quarry can deflect air blast compression waves above outlying areas.

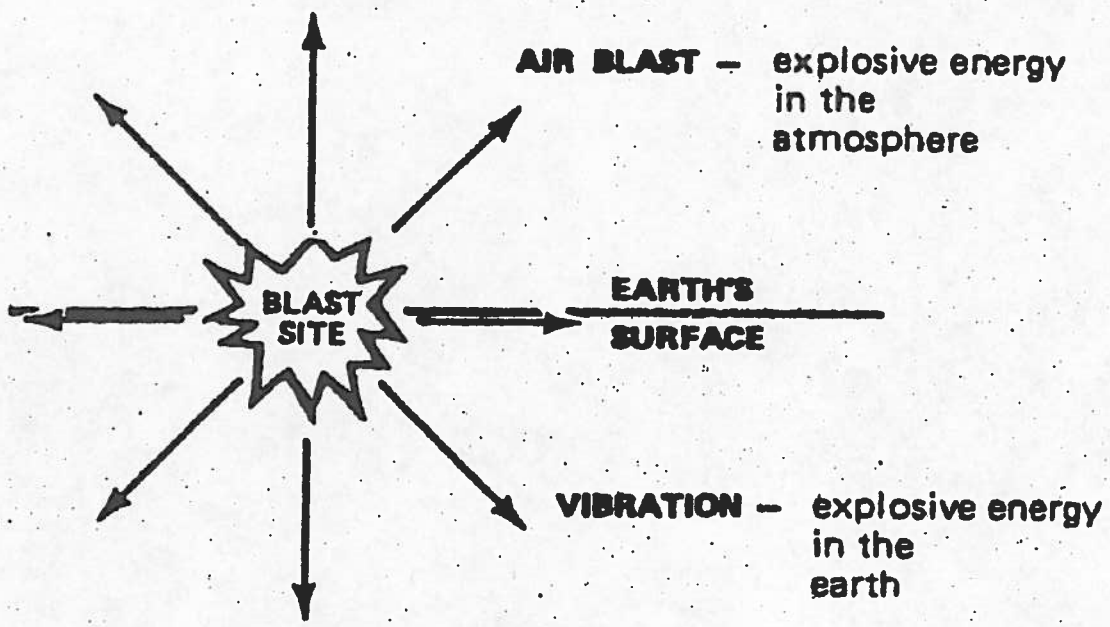


Figure 22: Surface mining blast schematic (from Atlas Powder Company brochure).

Because windows are usually the weakest part of a structure exposed to air blast, they are the most likely to be damaged by concussion. Poorly mounted panes could fall from their frames and improperly pre-stressed panes could break. Extremely high overpressures could crack exterior masonry walls or interior plaster. Structural damage from air blasts is rare, but the rattling of windows by air blast is commonly mistaken for impacts of ground vibration, so control of air blast impact is an important issue (Atlas Powder Company brochure). Figure 23 illustrates possible damage associated with air blast overpressure.

Ground vibration from surface blasting results from propagation of surface and subsurface pressure waves which cause minute movements of particles within the earth's crust as the blast pressure wave moves away from point of origin. Particle movement can be accurately measured by seismographs, and extensive testing by the U.S. Bureau of Mines has established that peak particle velocity is the best criterion for predicting vibration damage to structures. Particle velocities less than 2.0 inches/second show little probability of causing structural damage, while particle velocities greater than 2.0 inches/second are more likely to cause structural damage. If there is at least 8 milliseconds (0.008 seconds) between detonations, the vibration effects of the individual blasts are not cumulative (Siskind, et al., 1980, U.S. Bureau of Mine RI 8507; also U.S. Bureau of Mines Bulletin 656, Blasting Vibrations and Their Effects on Structures).

Figure 24 gives a generalized relationship between blast vibrations and damage. In detail, the amount of damage is dependent on vibration frequency, with more damage likely at low frequencies. Relationship between vibration frequency, particle velocity and damage can be seen in Figure 26.

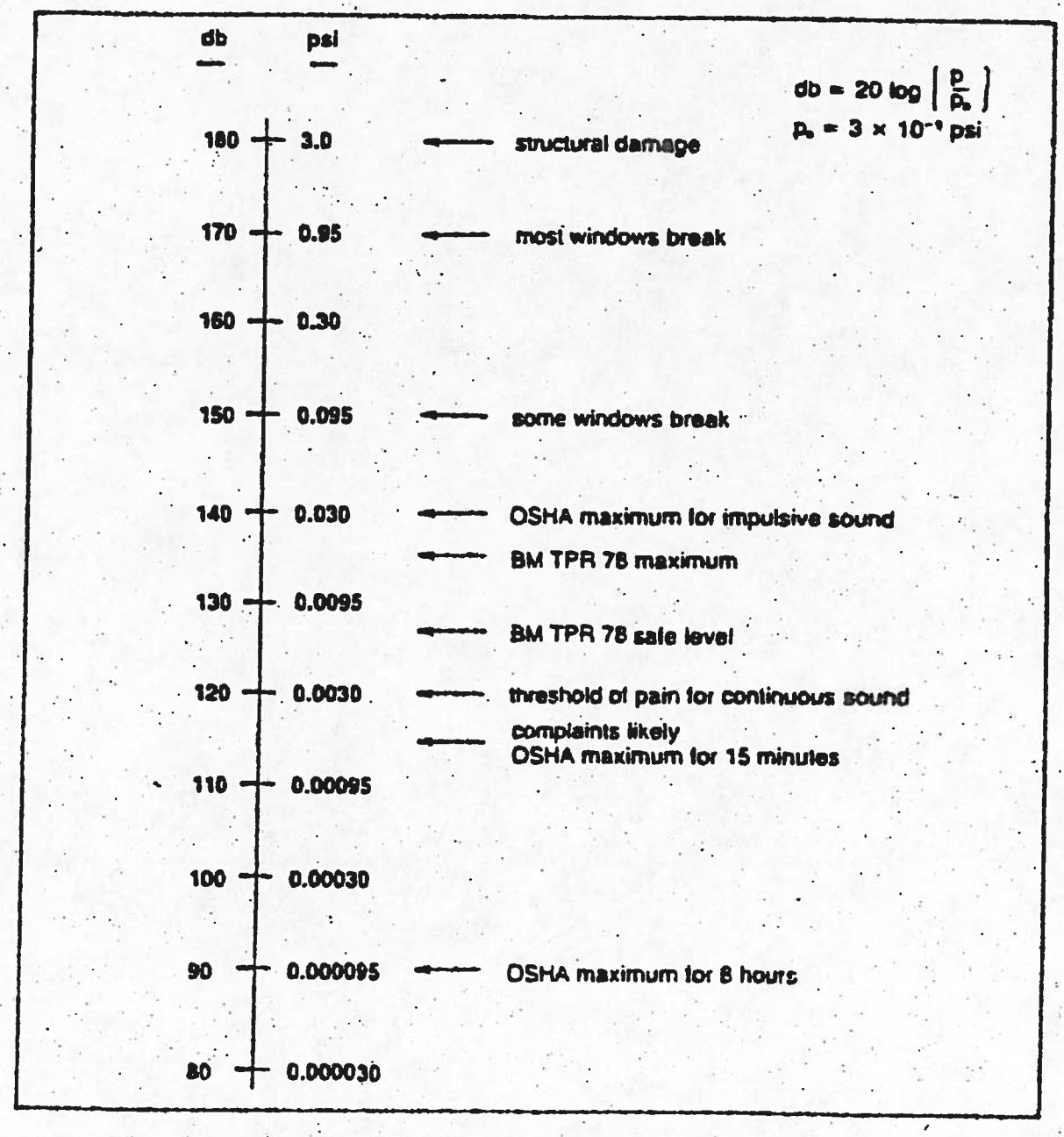


Figure 23: Relationship between damage and overpressure from air blast expressed as decibels (db) and pounds per square inch (psi). A safe level for blast events is typically considered as 128 db, and 138 db is considered a maximum permissible level for both annoyance and structural damage (from Atlas Powder Company brochure).

Peak Particle Velocity inches per second	Nature of Damage
12	Fall of rocks in unlined tunnels
7.6	50% Probability of major plaster damage
5.4	50% Probability of minor plaster damage
2.8-3.3	Threshold of damage from close-in blasting.
2.0	Safe blasting criterion for residential structures recommended by U.S. Bureau of Mines.

Figure 24: Generalized relationship between subsurface vibration as particle velocity and damage (from Atlas Powder Company brochure).

Various studies have been conducted toward determination of amount of explosives that can be detonated safely relative to nearby structures. The most widely accepted rule-of-thumb calculation is the scaled distance relationship. The calculation is based on the fact that the further away from structures, the more explosives can be used safely. Part of a scaled distance table published by the U.S. Bureau of Mines is reproduced in Figure 25. Note that at a distance of 1000 feet from a blast point 400 pounds of explosive per instantaneous blast can be used if the scaled distance is 50 (DS = 50). The maximum charge at DS = 60 is only 278 pounds per delay.

The scaled distance relationship is defined as: $W = \left(\frac{D}{DS}\right)^2$

where W = maximum weight of explosives at distance D from blast point.
DS = the scaled distance factor; typically 50, 60 or 70, with 70 being the most conservative

The nearest structure of concern to proposed blasting at Andrada quarry is the Kolba residence which is ~1450 feet east of the proposed pit limit. Figure 25 lists 544 pounds as the maximum explosive weight per delay for a 1400 feet distance at a scaled distance factor of 60. This is calculated by dividing 1400 by 60 (1400/60 = 23.33), and then, squaring the result (23.33) to yield 544 pounds of explosive per delay as the maximum weight.

At the most conservative scaled distance factor of DS70, a maximum explosive weight at Andrada quarry 1450 feet from the Kolba residence would be 1450/70 squared = 429 pounds per delay. The WRH model blasting plan (Section 9.7 of Attachment H) states that 290 to 460 pounds of explosive will likely be used per delay at Andrada quarry depending on location within the pit. Use of 290 pounds per delay at the east end of the quarry nearest the Kolba residence would be well within the D70 scaled distance factor maximum weight. Blasting at the west end of the proposed quarry would be approximately 2300 feet from the Kolba residence. Maximum weight at DS70 at 2300 feet distance would be 2300/70 squared = 1080 pounds.

Because the scaled distance relationship does not directly address site-specific conditions, use of scaled distance relationships is usually supplemented by test blasting and analysis of seismograph readings. Site-specific observation and analysis will be conducted at Andrada quarry by authorized, experienced personnel to develop a safe, efficient blasting program there.

SCALED DISTANCE TABLE
CONTINUED

DISTANCE	WEIGHT IF DS = 60	WEIGHT IF DS = 50
1000	278	400
1200	400	576
1400	544	784
1600	711	1024
1800	900	1296
2000	1111	1600
2200	1344	1936
2400	1600	2304
2600	1878	2704
2800	2178	3136
3000	2500	3600
3500	3403	4900
4000	4444	6400
4500	5625	8100
5000	6944	10000

D - Distance in feet to nearest structure

W - Maximum Weight of explosives in pounds permitted in 8 ms. delay period.

- Limits apply when no seismograph is used.
U.S. Bureau of Mines recommends Scaled Distance of 50.
OSM recommends Scaled Distance of 60.

Figure 25: Part of scaled distance table for distances of 1000 to 5000 feet from blast (from Siskind et al, 1980; U.S. Bureau of Mines RI 8507).

Because vibration damage is dependent both on velocity of particle motion and frequency of particle motion, proper monitoring of blast impacts requires seismic records such as shown in Figure 26. Note that damage is much more likely at low frequency than at higher frequencies, but also note that most recorded vibrations are in the high frequency range.

The blasts recorded in Figure 26 occurred at the Davidson quarry which is located within 5 miles of the Andrada quarry. As at the Andrada quarry, Escabrosa limestone/marble is the material of interest. Due to similar conditions, the past blasting at Davidson quarry should be a good analogue to proposed blasting at Andrada quarry.

Vibrations shown on the Davidson seismogram represent results of two blast events, one on March 25, 1996 and one on April 8, 1996. The first blast involved detonation of 19 drill holes loaded with ANFO, 36 feet deep and 2 ½ inches in diameter. Total explosive weight detonated at one instant was 200 pounds. The second shot involved 71 ANFO-filled drill holes each 36 feet deep and 2 ½ inches in diameter. Total explosive weight per delay in the second blast was 176 pounds. Because the second blast was for a drop cut with no free face, it was a worst case situation for creation of maximum ground vibration (Bronson and Pryor, 1996).

Two digital seismograph/air blast monitors were placed at distances from 400 to 750 feet from the blast zone during the blast events. The second blast produced the highest vibration and air blast results. Maximum peak particle velocity at 400 feet was 0.791 inches per second and peak air blast was 128 db. At a distance of 600 feet, the second blast produced a maximum peak particle velocity of 0.239 inches per second and peak air blast of 131 db. The higher air blast measurement at the more distant seismograph was probably related to topography that either shielded the closer instrument or concentrated energy at the further instrument. Bronson and Pryor (1996) estimated that air blast would have lessened to below 125 db at a distance of 800 to 1200 feet and that blasting such as in the test blasts would pose no potential for damage to residences near the Davidson quarry.

As shown in the WRH blasting plan (Section 9.7 of Attachment H), maximum peak particle velocity allowed will be 1.92 inches per second. Seismograph monitoring will be conducted for test blasts at Andrada quarry to insure that this limit is not exceeded. As site-specific conditions become known, the qualified blaster-in-charge will be able to more accurately calculate best charge weights and better predict vibration and air blast impacts adjacent to the proposed quarry.

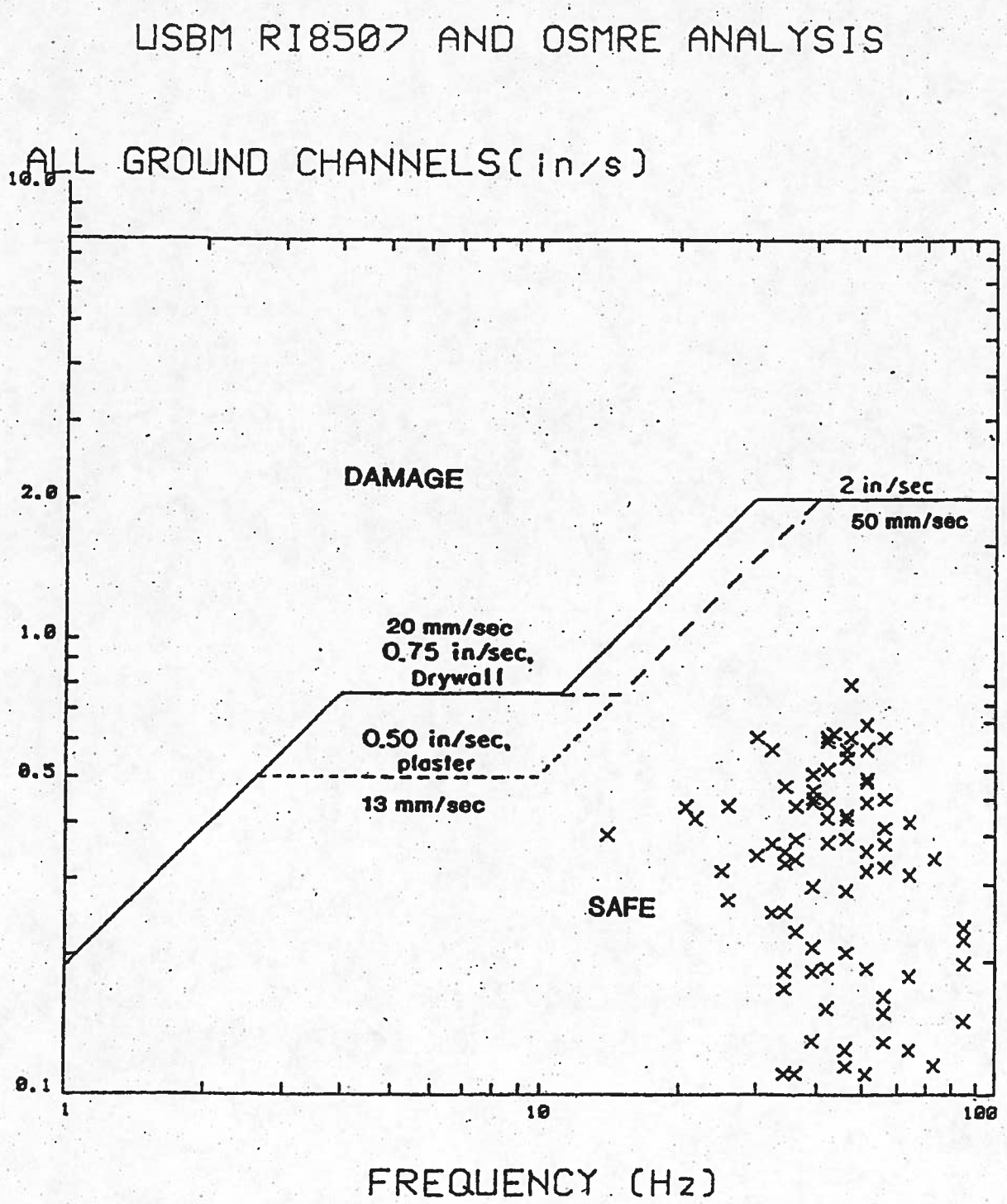


Figure 26: Seismogram from blasts conducted at Davidson quarry March 25 and April 8, 1996. Data points represent impacts recorded on 2 seismographs at distances varying from 400 feet to 750 feet from blast origin. A maximum weight of 200 pounds of ANFO was detonated for each delay (from Bronson and Pryor, 1996).

05-02-06 Addition to Plan of Operations

This mining plan of operations (POO) was submitted April 4, 2006, to Pat Fitch of the Arizona State Mine Inspector's office (ASMI) and Dave Brown of the Mine Safety and Health Administration (MSHA). Both gentlemen reviewed the POO and its associated blasting plan (Attachment H). The consensus was that the blasting plan was adequate under requirements of both agencies, and in fact offered more information and a more far-reaching pre-blast inspection scenario than normally required.

Mr. Fitch and Mr. Brown also offered comments and suggestions relative to planned blasting operations at Andrada quarry. One specific suggestion by Mr. Fitch will be incorporated into our blasting plan (Section 9.3 B). In order to limit noise, noiseless trunk line delays and other best available technology will be used in place of surface delays and det cord.

The intent of blasting at Andrada quarry will be the safe, efficient breaking of rock with a minimum of noise and vibration, with all work being conducted under the supervision of a licensed blasting contractor.

Fire Safety and General Safety: Approved fire extinguishers will be located on all pieces of mobile equipment and in process control rooms. Heavy equipment and water will be available on site to assist in fire fighting. Police and emergency medical services are provided by Pima County under the 911 dispatch system. Cellular telephone service is available at the Andrada quarry for emergency and other communications. WRH employees will be trained in proper emergency response, incident reporting and general health and safety issues as part of their initial and annual refresher MSHA-required training.

Hazardous Materials: Diesel fuel and lubricants will be the major hazardous materials present at the WRH Andrada quarry site. Electric transmission lines present on the site will limit the amount of on-site fuel storage required at the quarry and processing plant. Only minor servicing of mobile equipment will be done at the Andrada quarry. Major equipment repair will be done at off-site locations. Care will be taken so that equipment lubricants, fuels and other industrial liquids do not drip or flow onto natural surfaces. Waste oil, other related fluids, filters, oily rags, etc., will be collected and disposed of properly. Large metal refuse containers will be positioned at the site for collection of hazardous waste materials. Waste materials will be periodically transported to approved sites for disposal.

Hazardous Waste: No hazardous waste will be produced at Andrada quarry. Any waste rock products will consist chiefly of $CaCO_3$, a mineral commonly used because of its buffering properties to mitigate acidic mine waste and other environmental problems.

General Housekeeping: Operational litter will be collected in appropriate containers and removed as required from the site. Portable restroom facilities will be maintained by outside contractors and accumulated human waste will periodically be collected and transported to an approved disposal site. No waste will be buried on site. A previously permitted septic system on fee land may also be utilized.

Product Verification: Various materials will be sold from federal mineral estate at the Andrada quarry. Some of that material may be common variety minerals wherein a royalty is payable to the United States. Any material produced from federal land will be weighed as it leaves the WRH Andrada quarry and records will be kept documenting type of material, date of sale, amount of material and origin of the material.

Zoning: Pima County on-line records (http://www.dot.co.pima.az.us/gis/maps/mapguide/) indicate that the Andrada quarry is located within lands zoned RH (Rural Homestead Zone). Principal use of land zone RH is defined by Pima County as "Low density residential, limited conditional commercial use; agricultural use." The minimum RH lot area is required to be 180,000 square feet (~4.1 acres) and no minimum width is specified. Pima County Code Chapter 18.01.C.1 is a statutory exemption which allows use of parcels greater than 5 acres for mining purposes:

C. Statutory Exemptions.

1. As specified in A.R.S. Section 11-830, the provisions of this code shall not prevent, restrict or otherwise regulate in any district or zone the use or occupation of land or improvements for railroad, mining, metallurgical, grazing or general agricultural

purposes, as defined herein, provided the tract or premises so used is not less than five contiguous commercial acres. (http://www.co.pima.az.us/cob/code/c.83.htm#)

Adjacent Land Use: Land use north and west of the quarry is chiefly low density grazing on State of Arizona surface estate. Limited residential development is present east and south of the quarry. Relationship of the Andrada quarry to other regional use can be seen in Figure 22 (1999 satellite image). General land status of the region has been presented as Figure 2 earlier in this plan. Configuration of private parcels east of WRH fee land is shown in Figure 23. The nearest residence to quarry operations (the Kim and Melvin Kolba five acre parcel) occurs as an island within WRH private land. The next nearest residences are significantly further away from proposed quarry operations. Although it is likely that residential development will increase east and southeast of WRH fee land in the near future, other adjacent lands will not soon be developed because of their public status.

Land use in the Andrada quarry area has been a combination of grazing, marble mining and limited residential development since the 1960s. Renewed operations will not significantly change that long-established land use pattern. WRH strives to be a good neighbor and intends to work toward making the Andrada quarry a positive part of the local community. The planned scope of operations is designed not to overwhelm the local community, and reclamation and restoration at mine closure are intended to improve the property over its current state.

Visual Impact: Previous operations at the Andrada quarry have impacted ~30 acres including almost 21 acres within private land. Proposed new operations on public land would impact approximately 7 acres. This additional disturbance would not markedly change overall visual impact of the Andrada quarry. As illustrated on Figures 27 through 34, the most pronounced visual impact of new operations would be to a small number of neighbors east and southeast of the quarry. Distribution of nearest neighbors can be seen in Figure 28. Most near neighbors east of the quarry are visually shielded from proposed and past operations by a pronounced north-trending ridge. Note that "quarry" outlines shown in Figures 30, 31, 33 and 34 represent a drill-indicated resource block modeled at a 1:1 slope. The current mine plan seeks to excavate a much lesser amount of material as illustrated in Figures 11 and 12.

Although renewed mining would impact a small amount of previously undisturbed land, new operations would also improve some current visual impacts at Andrada quarry. Proposed operations would result in removal of derelict structures and inoperative equipment remaining from past operations. Visual issues associated with ongoing vandalism and other unauthorized use would also be eliminated. The ultimate visual impact of mining would be reclamation of both the private property and public land at end of mine life. Reclamation of the Andrada quarry would be compatible with adjacent land use and beneficial to immediate neighbors. Ultimate conversion of WRH private land at Andrada quarry to residential use would be especially beneficial to adjacent neighbors.

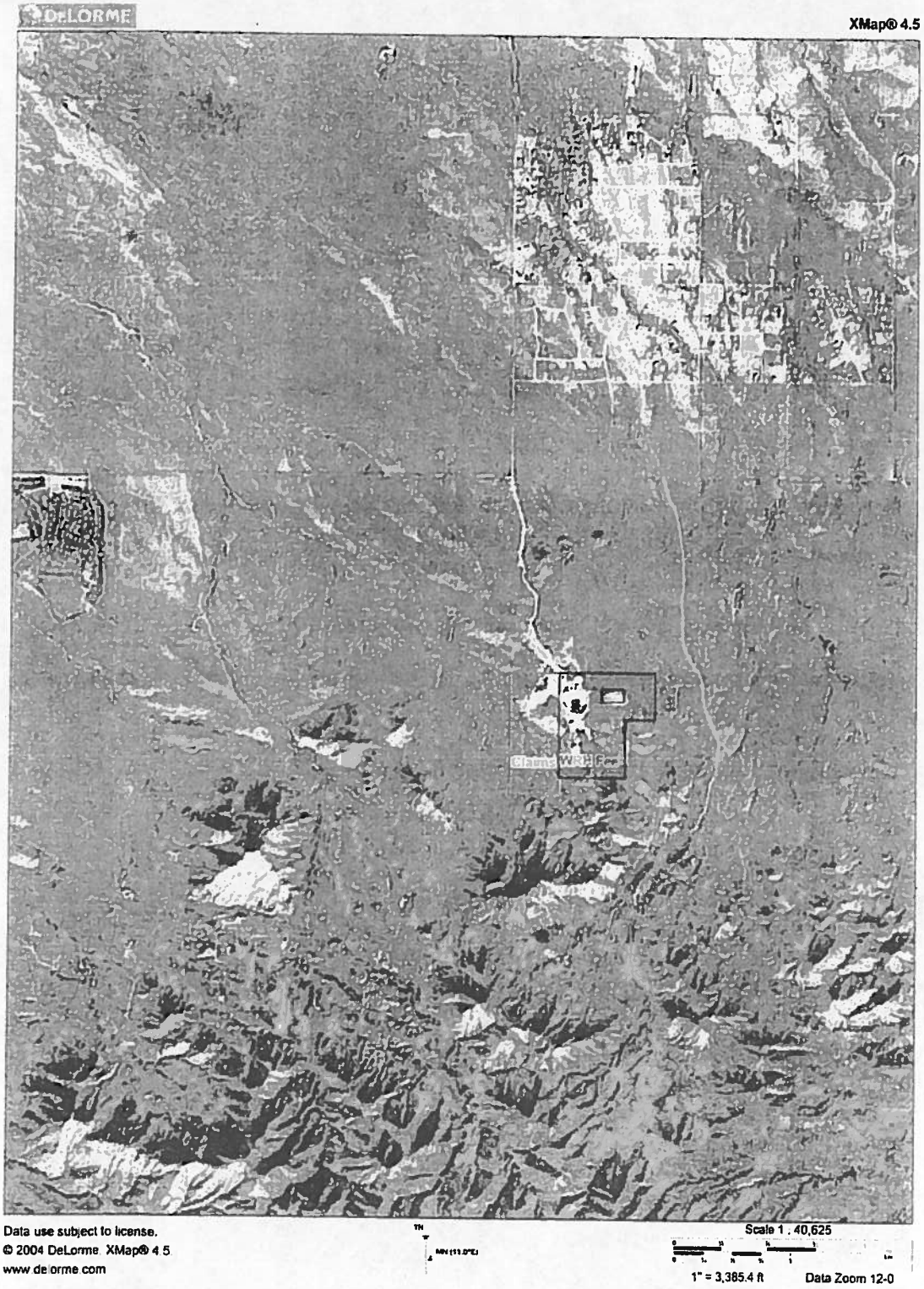


Figure 27: Satellite image generated in late1999 showing location of Andrada quarry. Corona de Tucson is the golf course development approximate 2.5 miles west-northwest of the quarry.

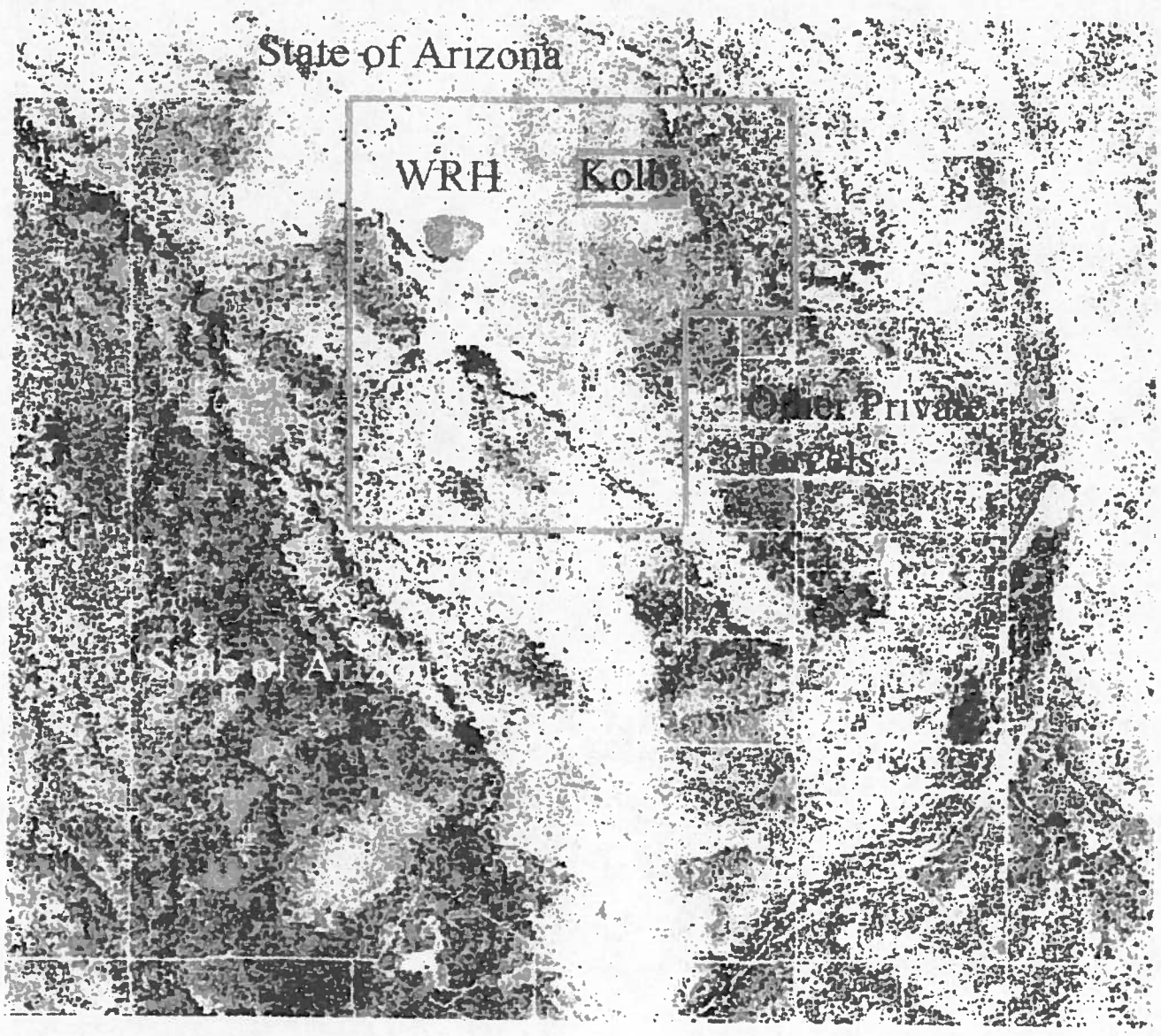


Figure 28: Distribution of land parcels adjacent to Andrada quarry (from Pima Association of Governments website http://www.pagnet.org/rdc/). Land to north and west of WRH fee land is State of Arizona surface with minerals owned by the United States. Numerous small private parcels are located east and southeast of WRH private land. The Kolba 5 acre parcel lies within the WRH holdings.

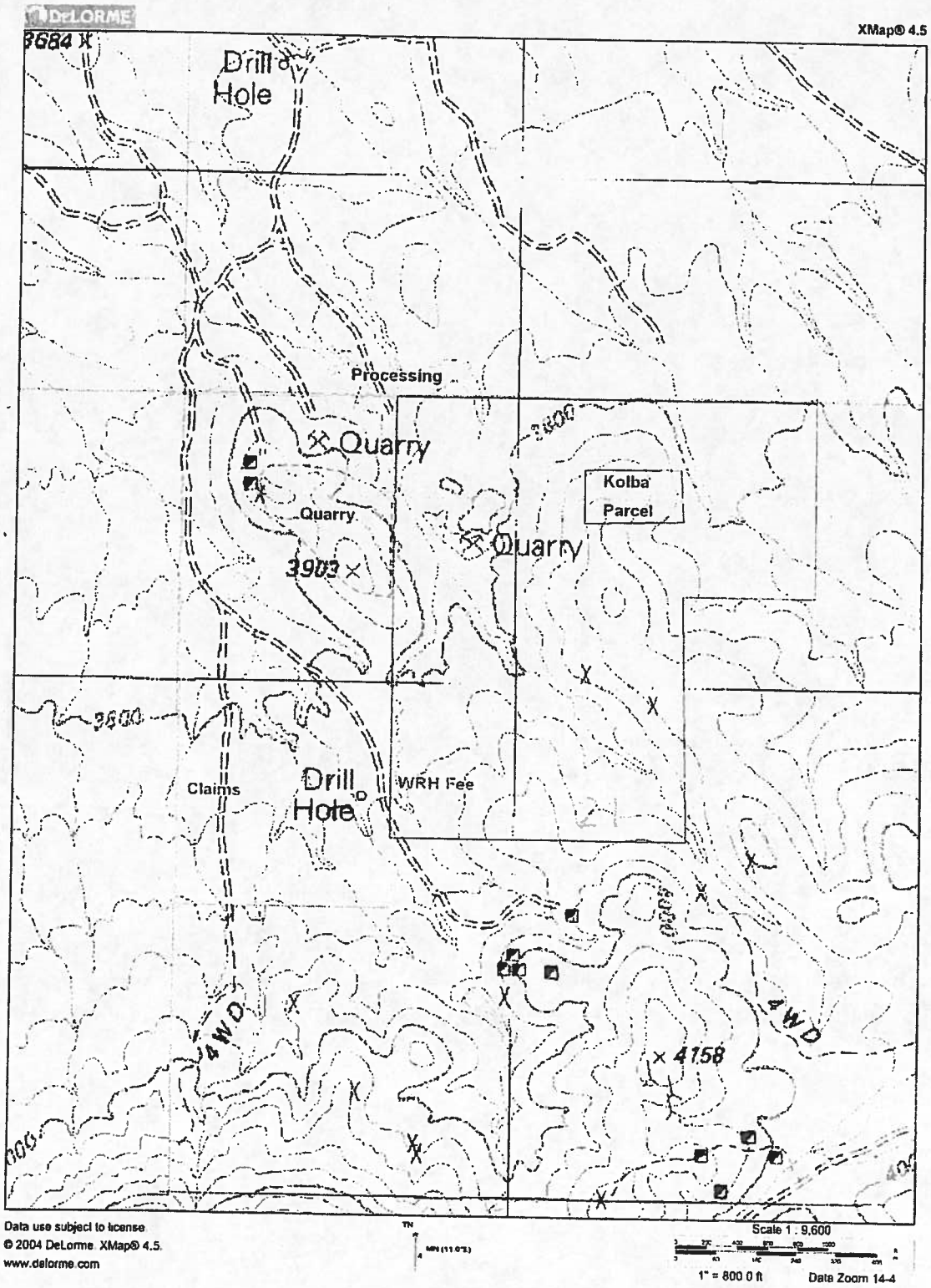


Figure 29: Map illustrating line of sight profiles 1 - 2 and 3 - 4. Numerical map scale altered in reproduction .

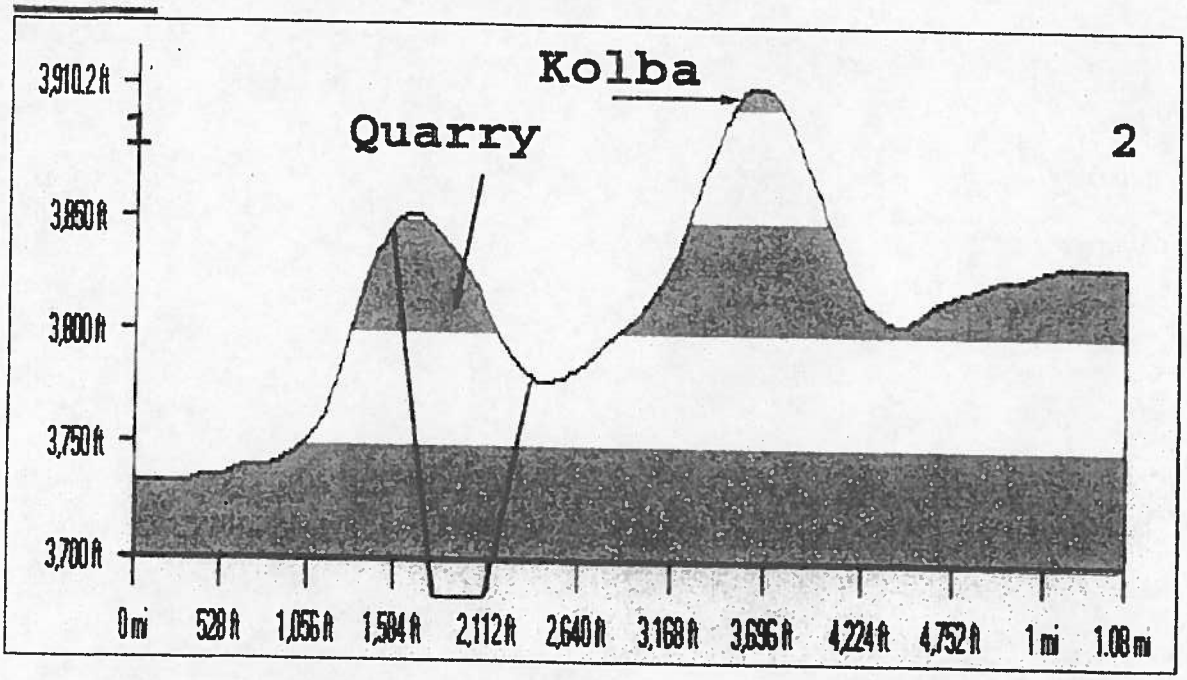


Figure 30: Profile 1 – 2 illustrating that the Kolba parcel, which lies as an island within WRH fee land, has a direct view into the proposed new quarry. The distinct north-trending ridge upon which the Kolba parcel is located blocks view of the quarry from other neighbors to the east.

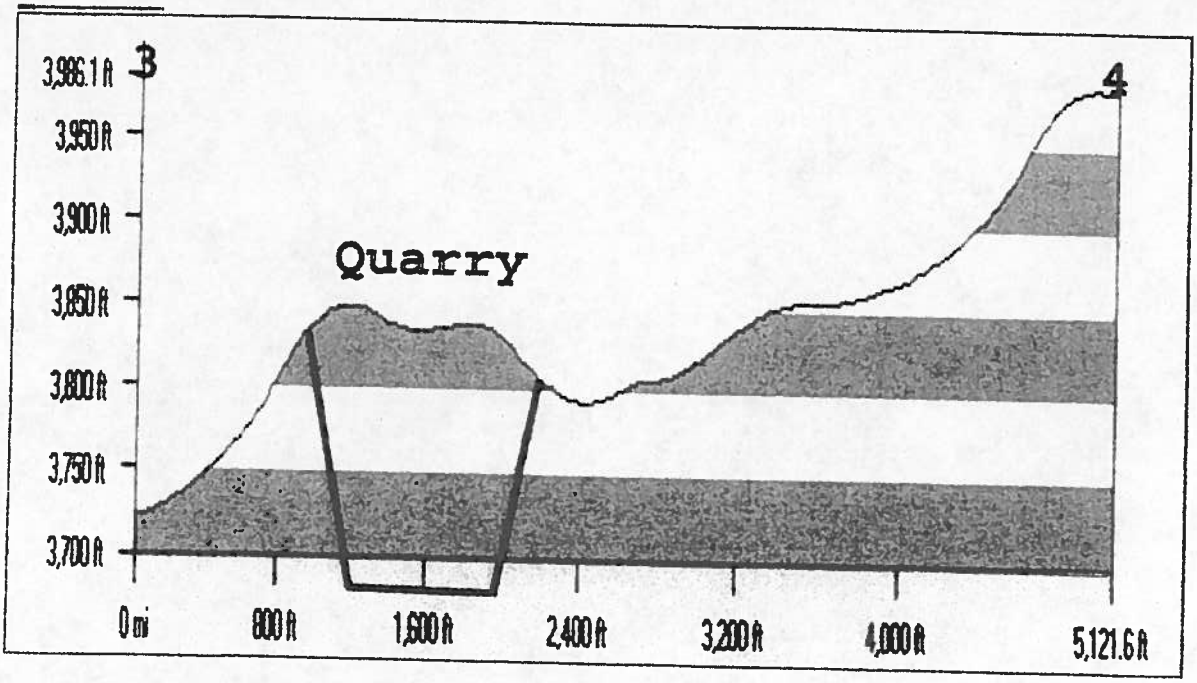


Figure 31: Profile 3 - 4 illustrating that neighbors to the southeast could have a mainly unobstructed view into the proposed quarry. Nearest private land in that direction is approximately ½ mile. Currently no residences are constructed immediately adjacent to WRH fee land southeast of the proposed quarry.

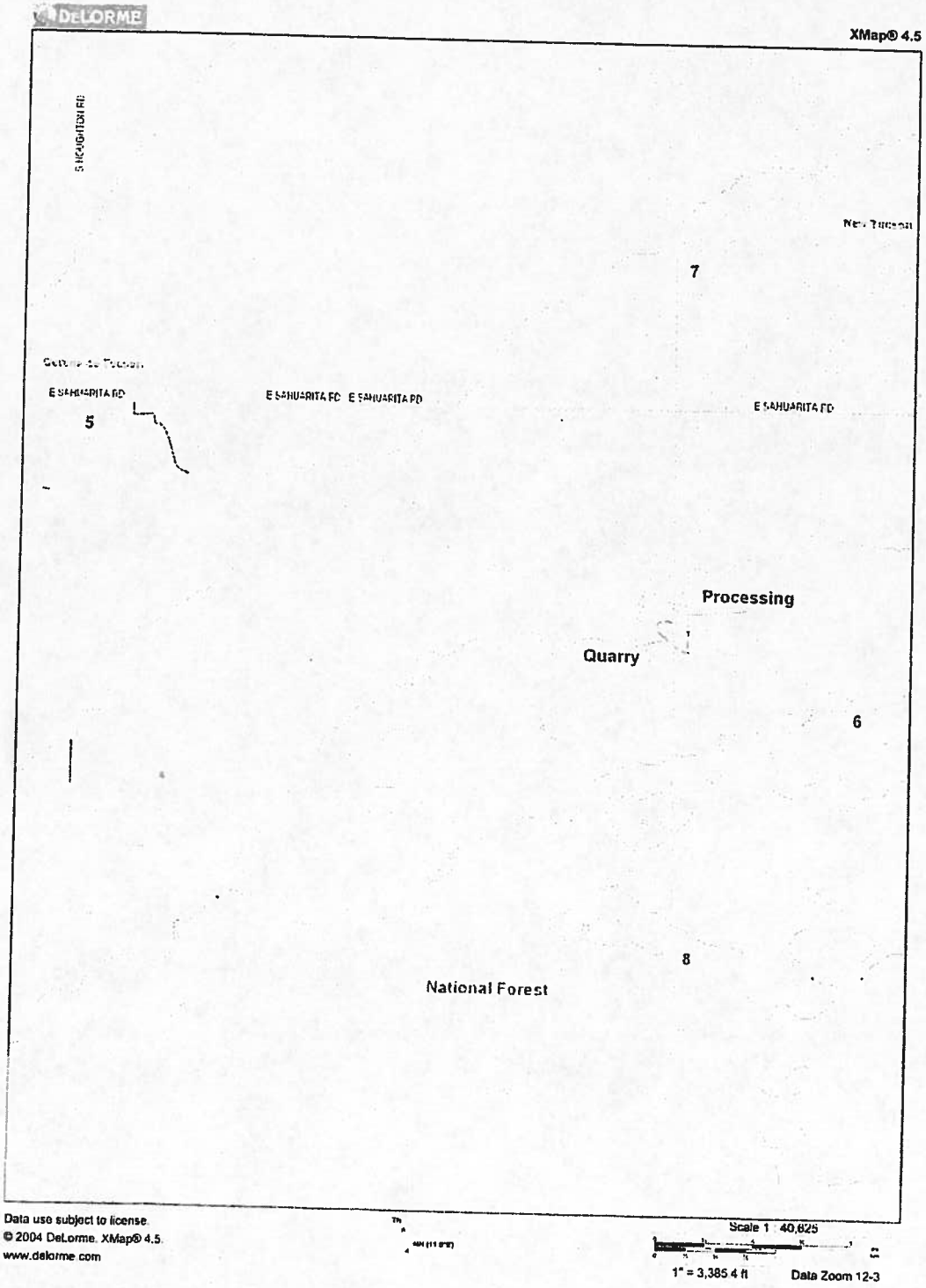


Figure 32: Map showing location of light of sight profiles on a more regional scale relative to proposed operations at Andrada quarry. Numerical map scale altered in reproduction.

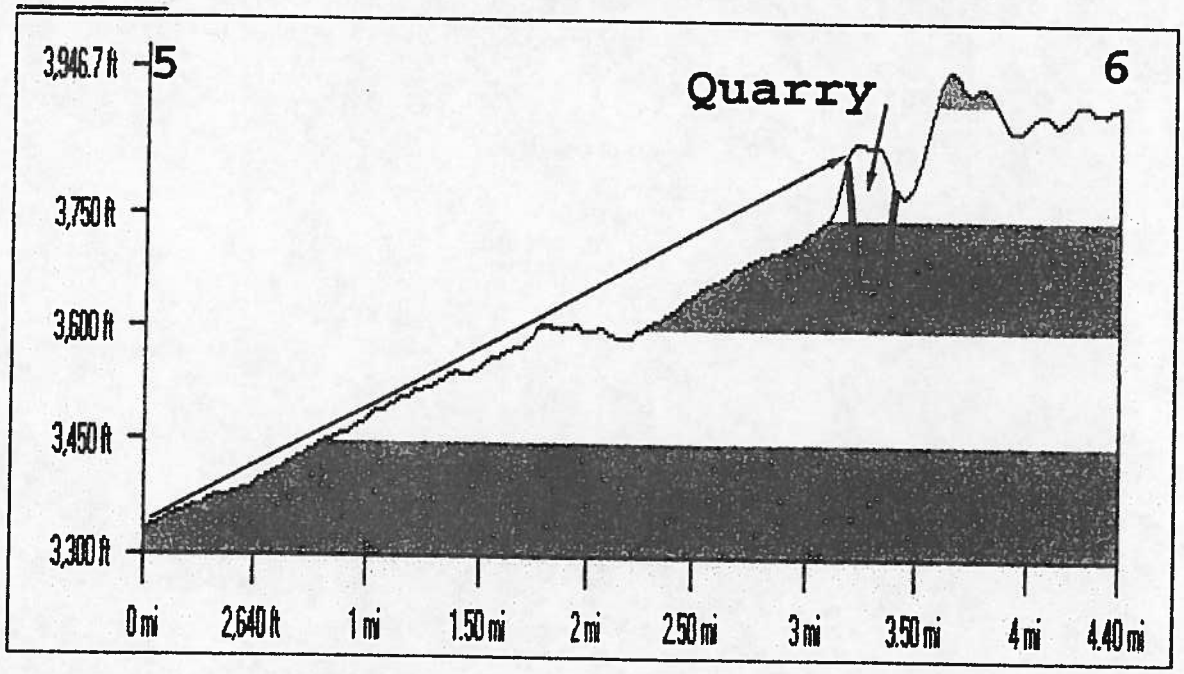


Figure 33: Profile illustrating that initial quarry operations may be visible from some Corona de Tucson locations. As the quarry progresses, an un-mined rim at the northwest margin of the quarry will shield operations from view. Local hills may also totally obstruct the quarry from view in many parts of Corona de Tucson. Because nearest Corona de Tucson residences are more than 2 miles distant, visual impact would be slight even if the quarry were visible.

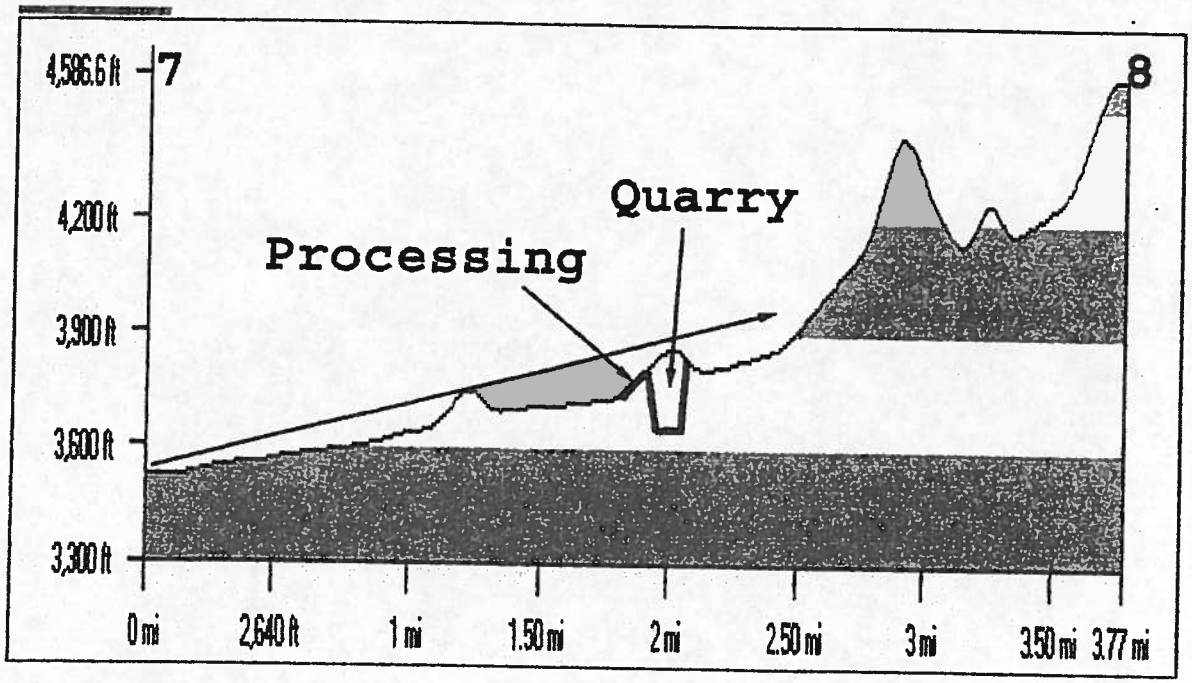


Figure 34: Profile illustrating view south from area of new residential development north of East Sahuarita Road. Low hills typically block view of the quarry area and nearest residential development is more than a mile away.

RECLAMATION WITH LIMITED BACKFILLING

Reclamation at the WRH Andrada quarry will proceed concurrently with mining wherever possible and shall be conducted in accordance with reclamation guidelines as found in the Metropolitan Phoenix Mineral Materials Program Guidelines, 1995 (BLM, 1995) and H-3041-1, Solid Mineral Reclamation Handbook (BLM, 1992). As valuable material is mined out, those areas not to be affected by future quarrying operations will be reclaimed. Although it will be impossible to restore the land surface to its exact original configuration, it should be possible to reclaim the disturbed surface such that it closely matches the natural surface expression of adjacent undisturbed land. At closure, most pit walls will be reduced to a safe slope by such mechanisms as illustrated in Figure 35.

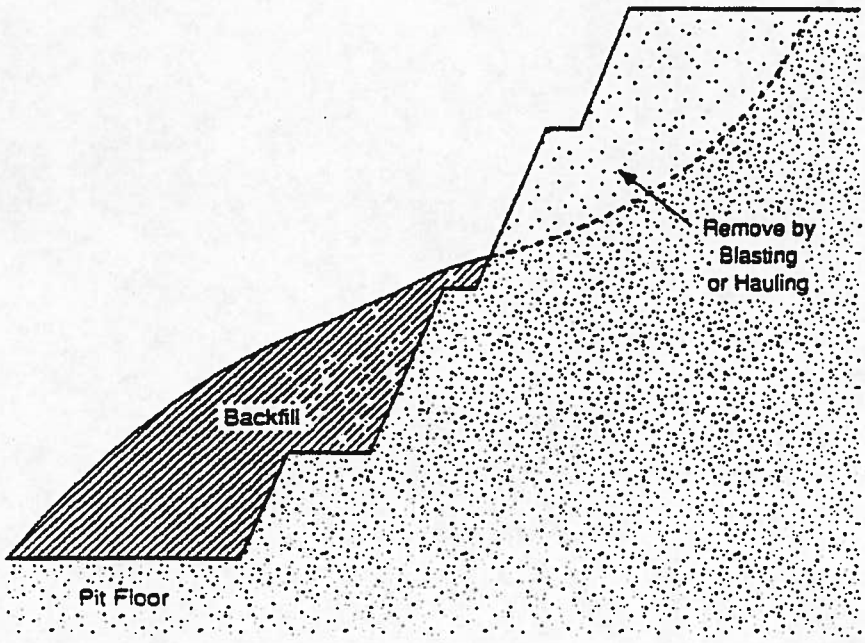


Figure 35: Highwall reclamation schematic (Figure XI-6 of BLM, 1992)

Where feasible, upper portions of pit highwalls will be ripped from above and pushed into the pit. Where necessary, stockpiled overburden and processing waste will also be placed against the highwall. Any loose highwall or fill material will be compacted to a safe, stable slope significantly less than the angle of repose for unconsolidated materials. Final pit slopes are anticipated to be 2.5:1 or less for most areas. Where highwalls can not be collapsed from above, those portions of the highwall remaining above backfill will be scaled from within the partially refilled pit or otherwise made safe and stable. Any remaining steep pit wall slopes will resemble steep cliffs of natural rock units as exposed on nearby undisturbed hills.

If it is determined that artificial seeding of reclaimed areas would be cost efficient, a seed mixture approved by BLM will be applied. The seed mixture would likely attempt to duplicate the area's natural vegetation as listed in Figure 21. All reclaimed surfaces will be graded in such a manner as to limit soil erosion and to allow for reestablishment of appropriate drainage patterns. Upon final mine closure, all equipment will be removed from federal land. Because no

permanent structures or foundations will have been constructed, this should not be a difficult task. Because WRH is the owner of immediately adjacent private land, it is certainly in the best interest of WRH to do an exemplary job in restoration of public land.

RECLAMATION WITH IMPORTED BACKFILL
(Preferred Alternative)

The preferred reclamation method on private land at Andrada quarry will be reduction of highwalls as required and backfilling of pits with inert construction materials. The pit backfill will be compacted to engineering standards applicable for intended future use. Once a suitable surface with proper grading has been established, it will be covered with a mulch consisting of ground construction materials such as plaster board and concrete, biowaste and an appropriate seed mixture. Test areas will be established to determine which mulch mixtures are best suited to local conditions. Because reclamation of private land will begin before reclamation of public land, best practices developed on private land could then be applied to reclamation of the public surface.

RECLAMATION BOND

BLM requires that a reclamation bond be posted proportional to amount of surface disturbance. Attachment I is a bond calculation estimate for surface disturbance at the WRH Andrada quarry. Main components of that reclamation estimate include an 11 acre pit and a 3.2 acre processing area. Also included are several trenches and drill pads. Based on those parameters as shown on the attached spreadsheet, a reclamation bond in the amount of $23,593 has been calculated.

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Attachment A

Pima County Air Quality

DEVELOPMENT SERVICES DEPARTMENT

201 N. STONE AVENUE, 1ST FLOOR TUCSON, AZ 85701
PHONE: 740-6520 FAX: 798-1836

RECEIPT

PIMA COUNTY, ARIZONA

****

ACTIVITY P06DS01743 **FEES RECEIPT# 06C17803**

SITE ADDRESS:

DATE: 08/28/2006 **TIME: 08:43 AM**
COMP TYPE: DS-RECPT **TYPE:**

DESCRIPTION OF WORK: AQ #9334

APPLICANT: DOUG WOOLSEY **Receipt By: GE**

****

NOTATION:

PAID BY:

	Type	Method	Description	Amount
Payment	Check	6164		3,123.90

TOTAL: 3,123.90

FEES PAID:

DESCRIPTION	CURRENT PMTS
PDEQ ACTIVITY PERMITS	3,123.90

TOTAL: 3,123.90

ACCOUNT#:
TYPE OF ACCOUNT:
ENDING BALANCE: $ **Reference # (if applicable):**

DEVELOPMENT SERVICES DEPARTMENT

201 N. STONE AVENUE, 1ST FLOOR TUCSON, AZ 85701
PHONE: 740-6508 FAX: 798-1836

RECEIPT

PIMA COUNTY, ARIZONA

****

ACTIVITY P04DS01125 **FEES RECEIPT# 04C08337**

SITE ADDRESS:

DATE: 04/28/2004 **TIME: 11:53 AM**
COMP TYPE: DS-RECPT **TYPE:**

DESCRIPTION OF WORK: AQ #8559

APPLICANT: WOOLSEY DOUG **Receipt By: RLC**

****

NOTATION:

PAID BY:

	Type	Method	Description	Amount
Payment	Credit C	VCREDI	XXXX-XXXX-XXXX-5109	653.59
Payment	Cash		.41	

TOTAL: 654.00

FEES PAID:

DESCRIPTION	CURRENT PMTS
PDEQ ACTIVITY PERMITS	654.00

TOTAL: 654.00

ACCOUNT#:
TYPE OF ACCOUNT:
ENDING BALANCE: $

Reference # (if applicable): 0001

PIMA COUNTY DEPARTMENT OF ENVIRONMENTAL QUALITY

150 WEST CONGRESS STREET • TUCSON, ARIZONA 85701-1317
PHONE (520) 740-3340 • FAX (520) 882-7209

NUMBER 8559

ISSUED TO WR HENDERSON AZ PROPERTIES
SITE 16101 S WENTWORTH RD
TUCSON

(STRIPPING/EARTHMOVING)
(TRENCHING)(ROAD CONSTRUCTION)

CONDITIONS:

. COMPLIANCE WITH ALL APPLICABLE PROVISIONS OF THE RULES AND REGULATIONS OF THE PIMA COUNTY DEPARTMENT OF ENVIRONMENTAL QUALITY.
. ADDITIONAL TERMS PER THE FOLLOWING CONDITIONS:

EFFECTIVE DATES
FROM 05/15/04 TO 05/14/05
5/15/04 5/14/05

(BLASTING)

WR HENDERSON AZ PROPERTIES
7866 VIA BONITA
SCOTTSDALE AZ 85258

Randi Crawford 4/26/
AUTHORIZED REPRESENTATIVE
PIMA COUNTY DEPARTMENT OF ENVIRONMENTAL QUALITY
DATE

04-28-2004

INVOICE
PIMA COUNTY DEPARTMENT OF ENVIRONMENTAL QUALITY

INVOICE DATE 4-28-04

EFFECTIVE DATES
FROM 05/15/04 TO 05/14/05

WR HENDERSON AZ PROPERTIES, PHONE (520) 740-3340
16101 S WENTWORTH RD

8559

ITEM NO.	DESCRIPTION	TOTAL CAPACITY	UNITS	TOTAL	SCHEDULE
030	TRENCHING (FT)	500	01	75.00	B
05	ROAD CONSTRUCTION (FT)	1000	01	50.00	C
0	BLASTING (DAYS)	3	01	28.59	E

30 DAYS

AVOID LATE CHARGES PAY BY

RETURN YELLOW COPY OF THIS INVOICE WITH CHECK MADE PAYABLE TO:

PAY T AMOU 653.59

WR HENDERSON AZ PROPERTIES
7866 VIA BONITA
SCOTTSDALE AZ 85258

PIMA COUNTY DEPARTMENT OF ENVIRONMENTAL QUALITY
150 WEST CONGRESS STREET
TUCSON, AZ 85701-1317

PERMIT # 8559

AREA _____
(For PDEQ Use Only)

AIR QUALITY ACTIVITY PERMIT APPLICATION

PIMA COUNTY DEPARTMENT OF ENVIRONMENTAL QUALITY
130 WEST CONGRESS STREET, TUCSON, ARIZONA 85701
TELEPHONE: (520) 740-3340 FAX: (520) 882-7709

1. APPLICANT'S NAME: WR HENDERSON ARIZONA PROPERTIES DATE: 4-27-04
2. MAILING ADDRESS AND TELEPHONE NUMBER OF THE APPLICANT:
   7866 VIA BONITA (STREET ADDRESS) SCOTTSDALE (CITY) AZ (STATE) 85258 (ZIP) 480 241 0304 (TELEPHONE)
3. SITE CONTRACTOR (IF DIFFERENT THAN ABOVE): NAME: SAME
   ADDRESS: _____
4. LOCATION OF PERMIT SITE: 16101 S WENTWORTH RD. PIMA CO.
   TOWNSHIP: 17S RANGE: 16E SECTION: 21
   SITE CONTACT PERSON: DOUG WOOLSEY TELEPHONE: 520 440 4155
5. TYPE OF ACTIVITY (CHECK AND INCLUDE THE INFORMATION FOR ALL THAT APPLY):
   - ✓ LANDSTRIPPING/EARTHMOVING — 10 ACRES
   - ~~300 LINEAR FT~~ TRENCHING OR BANK PROTECTION — 500 LINEAR FEET
   - 3 ✓ BLASTING — 3 DAYS
   - ~~1000 FT~~ ROAD CONSTRUCTION — 1000 LINEAR FEET
6. ESTIMATED START DATE: 5-15-04 ESTIMATED COMPLETION DATE: 5-15-05 14 (W)
7. MEASURES TO BE USED TO CONTROL DUST DURING THE ACTIVITY:
   4000 GAL WATER TRUCK & MISTERS 10,000 GAL WATER TANK
8. WHAT IS THE INTENDED USE OF THE SITE AFTER THE ACTIVITY:
   MINING SITE
9. This certifies that I am familiar with those rules and regulations of the Pima County Department of Environmental Quality which apply to this activity and that I accept full responsibility for complying with all applicable requirements of those rules and regulations as well as any permit conditions specified by the Control Officer for this permit.

   Doug Jolam (SIGNATURE) MANAGER (TITLE) 4-27-04 (DATE)

Note: If this permit is to be paid from a pre-paid account, please enter your Account Number here: _____.

Attachment B

Storm Water Permit

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Janet Napolitano
Governor

1110 W. Washington Street - Phoenix, Arizona 85007
(602) 771-2300 - www.adeq.state.az.us

Steve Owens
Director

January 5, 2005

Owner/Operator:
DOUG WOOLSEY
W R HENDERSON AZ PROPERTIES
7866 VIA BONITA STREET
SCOTTSDALE, AZ 85258

Facility Information
ANDRADA QUARRY
SOUTH END OF S WENTWORTH ROAD
VAIL, AZ 85641
Lat: 315650 Long:1104305

Authorization Number: AZMSG-12868

Dear Applicant:

Your Notice of Intent (NOI) has been processed by Arizona Department of Environmental Quality (ADEQ). This facility is authorized to discharge stormwater associated with industrial activities under the terms and conditions imposed by ADEQ's **AZPDES STORMWATER GENERAL-MULTI SECTOR PERMIT.**

Please be aware this document is not your permit but is your authorization to discharge within the requirements of the permit. Implementation of a Stormwater Pollution Prevention Plan (SWPPP) tailored to your specific site is one of these requirements. You must demonstrate compliance with all terms and conditions of the SWPPP as well as the Multi Sector General Permit to maintain coverage and avoid possible penalties.

Please keep this document for your records and use this authorization number for any correspondance. Use this authorization number when you complete the Notice of Termination (NOT) to cease participation in this program.

To obtain a copy of the AZPDES Multi Sector General Permit to which you are now held accountable, you may access ADEQ's web site at www.adeq.state.az.us/environ/water/permits/stormwater.html.

If you have any questions regarding this letter and attachment(s), please contact Shirley Conard at (602) 771-4632. If you have other general inquiries concerning the stormwater program, please contact Karyn Moldenhauer at (602) 771-4449.

Attachment C

Aquifer Protection Permit Checklist

Facility Information

Date: 1/25/05

Facility Contact/Phone #: (480) 241-0304

Facility Name: ANDRADA QUARRY

Facility Address: SOUTH END OF S. WENTWORTH RD VAIL, AZ 85641

Location of Activity (brief description): LAT: 315650 LONG: 1104305 NW/4 SECTION 21, TOWNSHIP 17 SOUTH, RANGE 16 EAST

Definitions

1. **"Inert Material"** means broken concrete. asphaltic pavement. manufactured asbestos-containing products. brick. rock. gravel. sand and soil. Inert material also includes material that when subjected a water leach test that is designed to approximate natural infiltrating waters will not leach substances in concentrations that exceed numeric aquifer water quality standards...including overburden and wall rock that is not acid generating, taking into consideration acid neutralization potential. and that has not and will not be subject to mine leaching operations. (ARS 49-201.18)

2. **"Discharge"** means the direct or indirect addition of any pollutant to the waters of the state from a facility. For purposed of the aquifer protection permit program prescribed by article 3 of this chapter. discharge means the addition of a pollutant from a facility directly to an aquifer or to the land surface or the vadose zone in such a manner that there is a reasonable probability that the pollutant will reach an aquifer. (ARS 49.201.11)

3. **"Hazardous substance"** means:

(a) Any substance designated pursuant to sections 31 1(b)(2)(A) and 307(a) of the clean water act.

(b) Any element. compound. mixture. solution or substance designated pursuant to section 102 of CERCLA.

(c) Any hazardous waste having the characteristics identified under or listed pursuant to section 49-922.

(d) Any hazardous air pollutant listed under section 112 of the federal clean air act (42 United States Code section 7412).

(e) Any imminently hazardous chemical substance or mixture with respect to which the administrator has taken action pursuant to section 7 of the federal toxic substances control act (15 United States Code section 2606).

(f) Any substance which the director. by rule. either designates as a hazardous substance following the designation of the substance by the administrator under the authority described in subdivisions (a) through (e) of this paragraph or designates as a hazardous substance on the basis of a determination that such substance represents an imminent and substantial endangerment to public health. (ARS 49-201.17)

Questionnaire Checklist

Regulatory Reference	Regulatory Language	Facility Process	NO	YES
A.A.C. R18-9-129.A	A General Permit is issued for the discharge of wash water from sand and gravel operations, and placer mining operations, if only physical processes employed and no hazardous substances, other than those naturally existing in the sand and gravel or the placer material, have been added or exposed during the processing or removal of the sand and gravel.	1. My operations will utilize only physical processes when discharging wash water from sand and gravel operations.	___	✓
		2. My operations will utilize only physical processes when discharging wash water from placer mining operations.	___	✓
		3. My operations will use wash water free of any hazardous substances.	___	✓
A.A.C. R18-9-129.G	A General Permit is issued for disposal of material that contains only uncontaminated soil, cement, bricks, or other similar inert material.	4. My operations will dispose of only uncontaminated soil, cement, bricks, or other similar inert materials.	___	✓
A.R.S. 49-250.B.5	Mining overburden returned to the excavation site including any common material which has been excavated and removed from the excavation site and has not been subjected to any chemical or Leaching agent or process of any kind is exempt from the APP requirement.	5. When returning mining overburden to the excavation site, my operations will only include common materials which have not been subjected to any chemical or leaching agent.	___	✓
		6. My operations will not be subjected to any chemical process of any kind.	___	✓
A.R.S. 49-250-B-20	Storage, treatment, or disposal or inert material is exempt from the APP requirement.	7. All material that my operation stores, treats, or disposes of will be inter.	___	✓

Attachment 2

Regulatory Reference	Regulatory Language	Facility Process	NO	YES
A.R.S. 49-250-B.21	Structures designed and constructed not to discharge, which are built on an impermeable barrier that can be visually inspected for leakage, are exempt from the APP requirement.	8. If any chemical or chemical process is associated with my operations, whether added or pre-existing, then these activities will be conducted on structures designed and constructed not to discharge, which are built on an impermeable barrier that can be visually inspected for leakage.	___	✓
A.R.S. 49-250-B.22	Pipelines and tanks designed, constructed, operated, and regularly maintained so as not to discharge are exempt from the APP requirement.	9. All pipelines and tanks which are used at any point within my operations are designed, constructed, operated, and regularly maintained so as not to discharge.	___	✓

Lee Woolsey, certify that the answers to the above information are true and correct.

Larry Woolsey
(Signature)

1-25-05
(Date)

Attachment D

Corps of Engineers Correspondence

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
TUCSON PROJECT OFFICE
5205 EAST COMANCHE STREET
TUCSON, ARIZONA 85707

REPLY TO

Office of the Chief
Regulatory Branch

October 18, 2004

Mr. Robert Peeples, P.E.
Legacy Environmental Services
19432 N. 50th Avenue
Glendale, Arizona 85308

File Number: 2005-00072-MB

Dear Mr. Peeples:

Reference is made to your letter received October 4, 2004 on behalf of W.R. Henderson Arizona Properties, LLC in which you inquired as to whether or not a Section 404 permit is required from the U.S. Army Corps of Engineers to conduct mining activities resulting in no discharge of dredged or fill material into waters of the U.S. at the Andrada Mine, east of Houghton Road, bisected by Sahuarita Road (Section 21, T17S, R16E), Vail, Pima County, Arizona.

Based on the information furnished in your letter (referenced above), we have determined that your proposed project is not subject to our jurisdiction under Section 404 of the Clean Water Act. Since there are no waters of the United States within the aforementioned proposed project area as shown on the attached aerial photograph, no Section 404 permit is required from our office.

The receipt of your letter is appreciated. If you have questions, please contact me at (520) 584-1684.

Sincerely,

Marjorie E. Blaine

Marjorie E. Blaine
Senior Project Manager
Arizona Section, Regulatory Branch

SECTION 404 JURISDICTIONAL DELINEATION
U.S. Army Corps of Engineers, Los Angeles District
Application No. 2005 - 00072 - MB

-----Boundary of area surveyed for jurisdictional waters of the United States

-----Ordinary High Water Mark

-----Waters of the United States

-----Wetlands (If legend is blank no wetlands occur with survey area.)

N Site Visit(Y/N) Date: 18 Oct 04
1"=100' Scale Nov 10, 2000 Date of Photograph
Maryone Blacne Corps Project Manager
Sheet 1 of 1

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: W.R. Henderson Arizona Properties	File Number: 2005-00072-MB	Date: October 18, 2004

Attached is:		See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
	PERMIT DENIAL	C
X	APPROVED JURISDICTIONAL DETERMINATION	D
	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://usace.army.mil/inet/functions/cw/cecwo/reg or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the DISTRICT engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the DISTRICT engineer. Your objections must be received by the DISTRICT engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the DISTRICT engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the DISTRICT engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the DIVISION (not district) engineer (address on reverse). This form must be received by the DIVISION (not district) engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the DIVISION (not district) engineer (address on reverse) engineer. This form must be received by the DIVISION (not district) engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the DIVISION (not district) engineer (address on reverse) engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL OF PROFFERED PERMIT, PERMIT DENIAL, OR APPROVED JD TO DIVISION

ENGINEER or SUBMITTAL OF OBJECTIONS TO AN INITIAL PROFFERED PERMIT or NEW INFORMATION FOR APPEAL OF APPROVED JURISDICTIONAL DETERMINATION TO DISTRICT ENGINEER

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact: DISTRICT ENGINEER Los Angeles District, Corps of Engineers Attn: Chief, Regulatory Branch PO Box 532711 Los Angeles, CA 90053 (213-452-3425)	If you only have questions regarding the appeal process you may also contact: DIVISION ENGINEER Army Engineer Division, South Pacific, CESPD-CM-O Attn: Doug Pomeroy Administrative Appeal Review Officer 333 Market Street San Francisco, CA 94015 (415-977-8035)

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

Signature of appellant or agent	Date:	Telephone number:

Attachment E

Biological/Botanical Information

PHIL JENKINS
SOUTHERN ARIZONA BOTANY

10 June 2004

W. R. Henderson Arizona Properties, LLC
7866 Via Bonita
Scottsdale, AZ 85258

Greetings:

At the request of Doug Woolsey another botanist and I conducted a survey of the vegetation of about 25 acres of land adjacent to the west side of the Gamaco mines in the North ½ of Section 21 of Township 17 South, Range 16 E of the Gila and Salt Baseline/Meridian in Pima County, Arizona. The roughly semicircle boundary of the area to be surveyed were described to me by Mr. Woolsey, who also gave me 3 maps and papers describing the location the site.

The area surveyed was a low hill with a small dry drainage (arroyo), to the west, running Northwest and well outside of the survey limits. The two of us walked a grid pattern back and forth across the area such that entire area was covered. The vegetation was sparse and growing plant and standing dead plant parts were easily seen. The vegetation type was Semidesert Grassland (Brown and Lowe 1977). Scattered Ocotillo (*Fouquieria splendens*), Velvet Mesquite (*Prosopis velutina*), and Mariola (*Parthenium incanum*) are the largest, or most numerous, plants present.

Other woody plants, in smaller numbers are;

Catclaw (*Acacia greggii*)
Desert Hackberry (*Celtis reticulata*)
Graythorn (*Ziziphus obtusifolia*)
Yerba de Pasmo (*Baccharis pteronioides*)
Desert Broom (*Baccharis sarothroides*)
Bricklebush (*Brickellia californica*)
Condalia (*Condalia warnockii*)
Foothill PaloVerde (*Parkinsonia microphylla*)
Range Ratany (*Krameria erecta*)
Creosote Bush (*Larrea tridentada*) began to occur on the western edge.

Agavaceae (The Agave Family):

Parry Agave (*Agave parryi*) several plants

Sotol *(Dasylirion wheeleri)* a few plants

Cactaceae (The Cactus Family):

Fish Hook Barrel (*Ferocactus wislizenii*); one small plant in poor condition
Prickly Pear (*Opuntia phaeacantha*); rare.
Nipple Cactus (*Mammillaria* sp.); two remains of dead plants were seen.

No remarkable grasses or herbaceous plants were seen, but typical, common species were present in undisturbed areas. The presence in abundances of the fern *Astrolepis cochisensis* , the subshrub *Tiquilia canescens*, and of *Parthenium incanum* indicated the high quantity of limestone and calciferous rock. Soil, as such, was scarce among the rock.

Given the geographic area, we concentrated our search on two protected (Both Federal and State) cacti, both found within ten miles of the site. One, the Needle-spined Pineapple Cactus (*Echinomastus erectocentrus* var. *erectocentrus*) prefers limestone soils, but only of an alluvial (finer) texture. It is found on the southern pediment of the Rincon Mountains to the Northeast, and sometimes will be found in fine-textured soils south of I-10. The Pima Pineapple Cactus (*Corypthantha scheeri* var. *robustispina*) also grows in alluvial lowlands with sandy and rocky loam, on slopes less than 10%. It is found from the area of the Santa Rita Experimental Range west to the Baboquivari Moutains' pediment. The rocky habitat of the survey are was not such that either plant could likely grow there, but these and any other plants of interest were carefully searched for. It was determined that this is neither suitable habitat nor within the range of the other Listed Protected Plants in Arizona.
None were found, and evidence indicated none would be, even at another time of year when other sensitive plants would be visible (for example, *Amoreuxia gonzalezii,* another plant of this vegetation type, would have left some evidence of its presence, although it would not appear vegetatively until late summer. No evidence was found).

Just a note; during our visit we saw two Rock Wrens (*Salpinctes obsoletus*), a Road Runner (*Geococcyx californianus*), one Whiptail Lizard (*Cnemidophorus* sp.), and the nests of two Woodrats (*Neotoma* sp.). It was curious that the Woodrat nests contained no cacti.

If a list of forbs and herbaceous plants is needed, I will supply it. I believed it superfluous as any vegetation of possible interest is mentioned. Some are mentioned in accompanying photos. The survey took three hours and travel was about 90 miles.

Six photographs are included, numbered, with explanations written on the back Some parts of the photos are outside the are of the survey.

The reference was
Brown, David E., Charles H. Lowe and Charles P. Pase. [1977] 1978. *Biotic Communities of the Southwest.* U.S.D.A. Forest Service. Rocky Mountain Forest and

Range Experimental Station, Ft. Collins, CO .

Please ask if there are any questions at the addresses listed below (email, postal, phone or FAX).

If my Curriculum Vitae is needed, it will be supplied upon request

Sincerely,

Philip D. Jenkins

Curatorial Specialist Senior
Herbarium, Shantz 113
Box 210038
The University of Arizona
Tucson, AZ 85745
520-621-7243
Fax 520-621-7186
pjenkins@u.arizona.edu

State Land Appl.
23-99638

Survey Number_____

Arizona Commission of Agriculture and Horticulture

416 WEST CONGRESS, ROOM 106 • TUCSON, ARIZONA 85701 • (602) 628-6310

November 8, 1991

Mr. Mike Rice
Arizona State Land Department
Title and Contracts Section
1616 West Adams
Phoenix, Arizona 85007

Re: Spcl Land Use Appl 23-99638, SJV & Assoc, to place an ore crusher.

Dear Mr. Rice,

An inspection of the above referenced project/application has determined the following:

[ ] **The plants or a portion of the plants on the property are accessable and are of average or better quality, and we recommend salvage.**

[XXX] **The plants on the property are of low quality and salvage is not recommended.**

[ ] **The terrain is too rough to make plant salvage possible.**

[ ] **There are no protected native plants.**

VARIETY AND NUMBER OF PLANTS

SAGUARO Under 3'	3-6	6-10	Over 10'	Additional Inaces. Saguaro	? Sal. Saguaro	BARREL	OCO-TILLO	HEDGE-HOG	CHOLLA	PRICKLY-PEAR
------	------	------	------	------	------	------	8	------	6	20

PALO VERDE	IRON-WOOD	MESQUITE	ADDITIONAL MISCELANEOUS REGULATED PLANTS					
			AGAVE	YUCCA				
2	------	4	4	12	------	------	------	------

Jim Maender

Jim Maender
District Inspector
628-6310/
Fax Number 798-3924

Note: Survey Wed. Oct. 16, '91

Attachment F

Archeological Information

In accord with standard Bureau of Land Management procedures for the handling and disposition of archeological data, this section has been removed.

Please contact the Tucson Field Office for more information.

Attachment G

Mine Safety Information

U.S. Department of Labor
Mine Safety and Health Administration
Protecting Miners' Safety and Health Since 1978

www.msha.gov

Search MSHA | Advanced Options | H

Find It! in DOL | Compliance Assistance | En Espa

DATA RETRIEVAL SYSTEM

As Developed by PEIR

Mine Overview

Mine ID:	**0201201**
Operator:	**Georgia Marble Company**
Mine Name:	**GEORGIA MARBLE COMPANY**
Controlling Company:	**Imerys Group**
Ownership Date:	3/25/1991
Mine Status:	Abandoned
Status Date:	9/3/1998
Mined Material:	Crushed, Broken Marble
Type of Mine:	Surface
Location:	Pima County, AZ
State:	AZ
ress of Record:	, SAHUARITA , AZ 85629

Please note that the information provided by the Data Retrieval System is based on data gathered from various MSHA syster As there may be a lag time in data being entered into those systems, there will also be a lag in the reflection of that data on th DRS.

Injuries

Year	Fatal Operator Injuries	NFDL Operator Injuries	Fatal Contractor Injuries	NFDL Contractor Injuries	Operator Hours Worked*	Operator Fatal Incidence Rate**	Operator NFDL Incidence Rate**	Mine Type National Fatal Incidence Rate**	Mine Type National NFDL Incidence Rate**
1995	0	1	0	0	32,352	0.000	6.18	0.020	3.31
1996	0	0	0	0	27,350	0.000	0.00	0.027	3.10
1997	0	2	0	0	25,432	0.000	15.73	0.021	3.08
1998	0	0	0	0	0	n/a	n/a	0.018	2.97
1999	0	0	0	0	0	n/a	n/a	0.015	2.93
2000	0	0	0	0	0	n/a	n/a	0.020	3.10
2001	0	0	0	0	0	n/a	n/a	0.005	2.83
2002	0	0	0	0	0	n/a	n/a	0.022	2.69
2003	0	0	0	0	0	n/a	n/a	0.010	2.65
2004	0	0	0	0	0	n/a	n/a	0.011	2.82
2005	0	0	0	0	0				

* Hours worked and accidents & injuries now include office hours or accidents (subunit 99).

** The Incident Rates for the current year are not being provided. Since the calculation for this rate is based on both accidents, which are reported as they occur, and hours (which, by regulation, are reported on a quarterly basis) the numbers for the current year are skewed.

Citations and Orders

Please Note: Georgia Marble Company has been the operator since 3/25/1991

Year	104(a)	Proposed Penalties ($)	Current/Final Penalties ($)	Amount Paid To Date ($)
1995	9	450.00	450.00	450.00
1996	10	1,353.00	1,353.00	1,353.00
1997	11	5,210.00	5,210.00	5,210.00
1998	0	0.00	0.00	0.00
1999	0	0.00	0.00	0.00
2000	0	0.00	0.00	0.00
2001	0	0.00	0.00	0.00
2002	0	0.00	0.00	0.00
2003	0	0.00	0.00	0.00
2004	0	0.00	0.00	0.00
2005	0	0.00	0.00	0.00

Mine Safety and Health Administration (MSHA)
1100 Wilson Boulevard, 21st Floor
Arlington, VA 22209-3939

Phone: (202) 693-940
Fax-on-demand: (202) 693-940
Technical (web) questions: Webmaster@msha.go
Contact U

U.S. Department of Labor
Mine Safety and Health Administration
Protecting Miners' Safety and Health Since 1978

www.msha.gov

Search MSHA Go Advanced Options | H

Find It! in DOL | Compliance Assistance | En Esp

DATA RETRIEVAL SYSTEM

As Developed by PEIR

Mine Quarterly Production Information

Mine ID:	**0201201**
Operator:	**Georgia Marble Company**
Mine Name:	**GEORGIA MARBLE COMPANY**
Controlling Company:	**Imerys Group**
Ownership Date:	3/25/1991
Mine Status:	Abandoned
Status Date:	9/3/1998
Mined Material:	Crushed, Broken Marble
Type of Mine:	Surface
Location:	Pima County, AZ
State:	AZ
dress of Record:	, SAHUARITA , AZ 85629

Please note that the information provided by the Data Retrieval System is based on data gathered from various MSHA syster As there may be a lag time in data being entered into those systems, there will also be a lag in the reflection of that data on tl DRS.

MSHA Mine Quarterly Reported Production Information

Mine ID: 0201201 Operator: Georgia Marble Company

Prod. Year	Prod. Qtr.	Subunit Cd	Subunit	Annual Hrs.	Avg. Emp. Cr
1998	1	03	Strip, Quarry, Open Pit	0	
1998	2	03	Strip, Quarry, Open Pit	0	
1998	3	03	Strip, Quarry, Open Pit	0	
			Totals . . .	**0**	
1997	1	03	Strip, Quarry, Open Pit	2160	
1997	1	30	Mill Operation/Preparation Plant	4832	
1997	1	99	Office Workers at Mine Site	1153	
1997	2	03	Strip, Quarry, Open Pit	2389	
1997	2	30	Mill Operation/Preparation Plant	4750	
1997	2	99	Office Workers at Mine Site	1800	
1997	3	03	Strip, Quarry, Open Pit	3024	

1997	3	30	Mill Operation/Preparation Plant	3795	
1997	3	99	Office Workers at Mine Site	1519	
1997	4	30	Mill Operation/Preparation Plant	10	
			Totals . . .	**25432**	
1996	1	03	Strip, Quarry, Open Pit	5325	
1996	1	99	Office Workers at Mine Site	1600	
1996	2	03	Strip, Quarry, Open Pit	2492	
1996	2	30	Mill Operation/Preparation Plant	3129	
1996	2	99	Office Workers at Mine Site	1651	
1996	3	03	Strip, Quarry, Open Pit	2082	
1996	3	30	Mill Operation/Preparation Plant	3384	
1996	3	99	Office Workers at Mine Site	1665	
1996	4	03	Strip, Quarry, Open Pit	1438	
1996	4	30	Mill Operation/Preparation Plant	3481	
1996	4	99	Office Workers at Mine Site	1103	
			Totals . . .	**27350**	
1995	1	03	Strip, Quarry, Open Pit	1836	
1995	1	30	Mill Operation/Preparation Plant	4790	
1995	1	99	Office Workers at Mine Site	1480	
1995	2	03	Strip, Quarry, Open Pit	2134	
1995	2	30	Mill Operation/Preparation Plant	5115	
1995	2	99	Office Workers at Mine Site	1561	
1995	3	03	Strip, Quarry, Open Pit	2174	
1995	3	30	Mill Operation/Preparation Plant	4178	
1995	3	99	Office Workers at Mine Site	1579	
1995	4	03	Strip, Quarry, Open Pit	5926	
1995	4	99	Office Workers at Mine Site	1579	
			Totals . . .	**32352**	
1994	1	03	Strip, Quarry, Open Pit	1451	
1994	1	30	Mill Operation/Preparation Plant	4380	
1994	1	99	Office Workers at Mine Site	1565	
1994	2	03	Strip, Quarry, Open Pit	1289	
1994	2	30	Mill Operation/Preparation Plant	5510	
1994	2	99	Office Workers at Mine Site	1418	
1994	3	03	Strip, Quarry, Open Pit	692	
1994	3	30	Mill Operation/Preparation Plant	5627	
1994	3	99	Office Workers at Mine Site	1614	
1994	4	03	Strip, Quarry, Open Pit	1913	
1994	4	30	Mill Operation/Preparation Plant	4255	
1994		99	Office Workers at Mine Site	1636	

			Totals . . .	**31350**	
1993	1	03	Strip, Quarry, Open Pit	1740	
1993	1	30	Mill Operation/Preparation Plant	3739	
1993	1	99	Office Workers at Mine Site	1672	
1993	2	03	Strip, Quarry, Open Pit	1580	
1993	2	30	Mill Operation/Preparation Plant	4136	
1993	2	99	Office Workers at Mine Site	2087	
1993	3	03	Strip, Quarry, Open Pit	1876	
1993	3	30	Mill Operation/Preparation Plant	4207	
1993	3	99	Office Workers at Mine Site	1798	
1993	4	03	Strip, Quarry, Open Pit	1909	
1993	4	30	Mill Operation/Preparation Plant	3059	
1993	4	99	Office Workers at Mine Site	2978	
			Totals . . .	**30781**	
1992	1	03	Strip, Quarry, Open Pit	1815	
1992	2	03	Strip, Quarry, Open Pit	3158	
1992	3	03	Strip, Quarry, Open Pit	647	
1992	3	30	Mill Operation/Preparation Plant	820	
1992	3	99	Office Workers at Mine Site	854	
1992	4	30	Mill Operation/Preparation Plant	5718	
1992	4	99	Office Workers at Mine Site	1560	
			Totals . . .	**14572**	
1991	2	03	Strip, Quarry, Open Pit	613	
1991	3	03	Strip, Quarry, Open Pit	783	
1991	4	03	Strip, Quarry, Open Pit	846	
			Totals . . .	**2242**	
1990	1	03	Strip, Quarry, Open Pit	2248	
1990	2	03	Strip, Quarry, Open Pit	2558	
1990	3	03	Strip, Quarry, Open Pit	2308	
			Totals . . .	**7114**	
1989	1	03	Strip, Quarry, Open Pit	1944	
1989	2	03	Strip, Quarry, Open Pit	2302	
1989	3	03	Strip, Quarry, Open Pit	1431	
1989	4	03	Strip, Quarry, Open Pit	2209	
			Totals . . .	**7886**	
1988	1	03	Strip, Quarry, Open Pit	1855	
1988	1	99	Office Workers at Mine Site	735	
1988	2	03	Strip, Quarry, Open Pit	2077	
1988	3	03	Strip, Quarry, Open Pit	2066	
1988	4	03	Strip, Quarry, Open Pit	2028	

			Totals . . .	**8761**	
1987	1	03	Strip, Quarry, Open Pit	1420	
1987	2	03	Strip, Quarry, Open Pit	2027	
1987	3	03	Strip, Quarry, Open Pit	2165	
1987	4	03	Strip, Quarry, Open Pit	1705	
1987	4	99	Office Workers at Mine Site	604	
			Totals . . .	**7921**	
1986	1	03	Strip, Quarry, Open Pit	1728	
1986	2	03	Strip, Quarry, Open Pit	1620	
1986	3	03	Strip, Quarry, Open Pit	1650	
1986	4	03	Strip, Quarry, Open Pit	1710	
			Totals . . .	**6708**	
1985	1	03	Strip, Quarry, Open Pit	1512	
1985	2	03	Strip, Quarry, Open Pit	2120	
1985	3	03	Strip, Quarry, Open Pit	1680	
1985	4	03	Strip, Quarry, Open Pit	960	
			Totals . . .	**6272**	
1984	1	03	Strip, Quarry, Open Pit	2540	
1984	2	03	Strip, Quarry, Open Pit	1090	
1984	3	03	Strip, Quarry, Open Pit	2500	
1984	4	03	Strip, Quarry, Open Pit	2140	
			Totals . . .	**8270**	
1983	1	03	Strip, Quarry, Open Pit	2050	
1983	2	03	Strip, Quarry, Open Pit	2030	
1983	3	03	Strip, Quarry, Open Pit	2010	
1983	4	03	Strip, Quarry, Open Pit	2030	
			Totals . . .	**8120**	

* Average number of employees reported by the operator for the applicable quarter, subunit and year beginning in 1990.

Attachment H

WRH Blasting Plan

ANDRADA QUARRY BLASTING PLA N

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1.0 PURPOSE

This demolition plan is in support of the necessary drilling and blasting at the Andrada Quarry Site for the fracturing of rock for processing.

See Plan of Operations for location (especially Figures 18 and 19).

2.0 REFERENCES

a. EXPLOSIVES TRAINING MANUAL COPYRIGHT 1975 BY JOHN C. FRIEND.
b. ISEE 17TH EDITION BLASTERS HANDBOOK
c. ATLAS BLASTING DATA SHEET
d. DUPONT BLASTERS HANDBOOK
e. FEDERAL REGISTER 1926, 900 and 1910.109

3.0 RESPONSIBILITIES

Mine Safety Personnel will be responsible for proper communications with Operating Personnel.

4.0 PROCEDURE FOR DELIVERY AND PROCUREMENT OF EXPLOSIVES

The explosives vendor will notify the Mine Safety Personnel, at least twenty-four (24) hours in advance of expected delivery time and make arrangements for the Mine Safety Personnel to: Meet the explosive hauling vehicle; Inspect vehicle for compliance with transportation regulations; Escort vehicle to designated storage magazines.

5.0 TRANSPORTATION OF EXPLOSIVES

Federal Regulations (49 CFR) will govern.

6.0 GENERAL HANDLING OF EXPLOSIVES

7.0 STORAGE OF EXPLOSIVES

Separate magazines located on adjacent WRH deeded property shall be provided for explosives and detonators. Explosives shall be stored within the table of distances published in BATF 27 CFR

8.0 DESCRIPTION OF DEMOLITION AREA

8.1 Andrada Quarry Site

8.2 ADJACENT SENSITIVE STRUCTURES AND FACILITIES

A. The closest sensitive structure that is not owned by the Andrada mining company is located approximately 1450 linear feet to 2300 linear feet from the blasting site depending on the location in the pit. This structure is a modular single family dwelling.

The sensitivity problem for these structures have been objectively considered and resolved in accordance with New Jersey Reg. No. 13. Refer to Items 9.4 thru 9.8 of blasting plan.

9.0 MINE BLASTING PLAN

9.1 GENERAL OBJECTIVE

Current project is to fracture Marble deposit for processing. The area where the blasting is to be performed is shown in Attachment A. The exact elevation that the rock will be fractured will be field determined.

9.2 ROCK TYPE AND CHARACTERISTICS

The type of rock indigenous to this area is Marble. The characteristics of marble are as follows:

Specific gravity = 2.1 to 2.9

Density = 155 lbs. /cu. ft., 12.8 cu. ft./ton, 2.09 ton/cu. yd.

9.3 CHARACTERIZATION OF EXPLOSIVES INTENDED FOR USE

A. The type of explosive intended for use is Ammonium Nitrate Fuel Oil, a nitro carbo nitrate blasting agent (ANFO at a strength of .90), using a 75% power primer (one (1) inch x 6 inch booster per hole).

B. **The initiating system will be non electric blasting caps, shock cord and noiseless trunk line delays.**

9.4 DRILLING PATTERN

The drilling pattern for production shots is described as follows: The following pattern is a typical only, actual shot patterns may differ but all shots will be calculated using this method.

A. Pattern will be a square.
B. Burden distance = 5 feet.
C. Spacing distance = 5 feet.
D. Hole depth = 15 to 25 feet.
E. Hole size = 3-inch diameter minimum.

9.5 CHARGE CALCULATION, LOADING DENSITY (TYPICAL)

A. Calculation of a charge for a free face:

Given:

Burden distance = 5 feet
Spacing distance = 5 feet
Depth = 10 feet
Powder factor = 1.94 lbs. per cubic yard

Calculation:

(1) Vol of rock displaced per hole shot
V (vol. Of rock) #B = (Burden distance)
S = (Spacing)
D = (Depth)
V = (vol. Of rock) = (5 feet) (5 feet) (10 feet)
= 250 cubic feet
= 9.25 cubic yards
Powder factor = 1.94 lbs. per 27 cubic feet = 1.94 lbs.
Explosives/hole = 1.94 x 9.25
(10 ft. depth) = 17.96 lbs. per hole
(25 ft. depth) = 44.89 lbs. per hole

Testing will be done for proper burden and spacing distance, and proper hole diameter, with powder factors varying (.75 lbs./cubic yard) to (1.75 lbs./cubic yard).

9.6 SHOT LAYOUT AND DELAY PERIODS

To be determined using New Jersey Regs.

9.7 GROUND SHOCK AND VIBRATION

Ground motion: One (1) standard will be used for peak particle velocity at critical receptors. Receptors such as buildings, walls and other structures will be limited to 1.92 in/sec as specified in the New Jersey Code.

The vector sum of the transverse, longitudinal, and vertical peak particle velocities will be used in determining ground motion.

The vector sum of the transverse, vertical, and longitudinal particle velocities appear to correlate the best with the distance–charge scaling factor:

$$\frac{D}{W^{.5}}$$

Where D = distance in feet and W = charge in pounds. The particle velocity scaling law for single charges in single hole is:

$$Vs = 92.69 \left(\frac{D}{W^{.5}}\right)^{-1.11}$$

Where Vs = vector sum particle velocity, in inches per second.

9.8 1/5 of a pound per foot or approximately 290 lbs. to 460 lbs. per delay depending on the blasting location in the pit.

9.9 BLASTING FORMAT

1. Preparation of the blasting area

   a. The blasting area is that area surrounding the excavation site in which personnel could be injured or equipment damaged by blast or fragmentation. This will be defined as a 500-foot radius around the excavation area. The blasting foreman will notify the Mine Safety Personnel prior to blasting for coordination with Operating Contractor Personnel.

   b. Entry of personnel or vehicles to the blast area will be limited to those individuals that are necessary during the blasting period.

   c. A vehicle horn will be the blasting warning system. This system

must be checked and verified ready for operation. Three 5-second sound blasts of the horn will be the firing signal.

d. The explosives, HE ANFO and EBC's will be stored in accordance with BATF 27 CFR

e. The explosives transport vehicle must be readied to comply fully with 49 CFR transportation requirements.

f. The drilling cuts in the bedrock must be checked for depth, location, and size, and must be air blown to eliminate fines, and sealed until loaded.

g. A drilling log must be kept recording all drilling operations.

h. All required blasting equipment should be accounted for and tested for reliability.

A list is as follows:

1. Blasting machine
2. Lightning Detector
3. Blasting galvanometer
4. 500 ft. firing lines: REO compatible
5. Wooden tamping rod
6. Sand/clay stemming
7. Cap crimpers or dynamite punch
8. Tape
9. Log book

2. Priming

a. The 60% or 75% gelatin power primer, ANFO and EBC's will be delivered to the blast site.

b. Priming and loading will be supervised by the blasting foreman. Qualified personnel will prime and load the cartridges. Standard electric cap priming techniques will be used in making up the primer cartridges.

The priming sequence is as follows:

1. Making up primer cartridges
2. Load holes and tamp
3. Add stemming

4. Tie in circuit using loop ties
5. Cover site with 3-feet overburden (if required)

c. The EBC's will be minimum of #6 and will be checked for conductivity. Leg wire shunts will be maintained until they are wired in series and connected into the main firing line. Western union pigtail splices or loop splices will be used for all electrical connections. Connections will be taped, if necessary, to eliminate ground faults.

d. The blasting machine will be in the possession of the blasting foreman.

3. Loading and Stemming

a, The primer cartridge will be bottom loaded in the drilling holes as they are made up.

b. Wet holes will not be primed.

c. All charges will be loaded and stemmed in series before leg wires are tied into circuit.

4. Connecting Blasting Circuits

a. Lay out leading wire, maintain shunts.

b. Remove EBC leg wire shunts, connect in series, check with blast galvanometer.

c. Tie in EBC leg wires to lead line.

d. Lead line will be connected to the blasting machine during the firing sequence. (See 5.g.)

e. Personnel evacuation to 500 feet to safe firing area.

5. Firing

a. A conductivity check of the main firing line will be made and the shunt replaced.

b. An accounting of all personnel will be made.

c. Sufficient controls will be implemented to control access to blast

area.

d. Adequate cover will be insured for all personnel.

e. The warning horn will be sounded for three 5-second periods as the positive warning signal.

f. The blasting machine, CD sequential type, will be tested before being connected into the lead line.

g. The firing line will be deshunted and the blasting machine connected.

h. The charges will be fired.

I. Investigate throw and log distance in the explosives log.

6. Return to the Blast Area

a. Only the powder man will be allowed to initially re-enter the blast area. The main firing line will be shunted and the blasting machine carried.

b. Re-entry will be allowed only when smoke, fumes and dust have cleared.

c. Each detonated or misfired charge must be accounted for.

d. Burning holes (evidenced by smoke or irregularity) must not be approached until at least an hour after the smoke has subsided.

e. A vocal "all clear" signal shall be given after the powder man has checked the area and found it free of all explosive hazards.

7. Emergency Action for Misfires

a. Should a blasting misfire occur, Mine Safety Personnel shall be notified before taking corrective action.

b. Mine Safety Personnel or its designated representative shall investigate and approve the method(s) to be used to fire or remove the unfired charge.

c. Do not attempt to investigate a misfire too soon. For non-electric and electric primed charges an hour wait is required. If it becomes dark, the area will be secured until the following morning.

d. Burning holes should not be approached for at least an hour after the burning has subsided. Fumes from burning dynamite are very toxic and the burning may result in an explosion called a "hang fire".

e. There are not specific instructions for handling all misfires. Each situation must be judged upon its own safety conditions. Under most conditions the safest way to dispose of a misfire is to shoot it.

f. If EBC's are involved in the misfire, disconnect the leading wires from the source of power before returning to the blast area. If the leg wire of the misfired priming cartridge is accessible, test the cap with the blasting galvanometer and if it shows a circuit, reconnect cap leg and lead wires and fire it in the usual manner.

g. Sequential timer safety interlocks are sometimes caused by ripping and tearing rock which may produce broken wires in subsequent series. These will be handled by:

1. Find the broken series with the use of a blasting galvanometer.

2. Test all caps in the remaining series.

3. Reconnect and fire the remaining series in accordance with the outline in 9.9.4 and 9.9.5 of blasting plan.

h. Explosives shall not be extracted from any hole that has once been charged or has misfired unless it is impossible to detonate the unexploded charge by insertion of a fresh additional primer.

I. EBC shots that fail the second time, non-accessible EGC leg wire situations, and holes that contain only 12-15 inches of stemming, shooting with a fresh primer will be tried.

j. If the procedure as stated in (h) fails or is impractical, stemming may be removed by means of a wooden spoon or jet of water if the misfired charge is water resistant, or a stiff rubber hose and compressed air. The distance from the top of the misfired charge to the collar of the hole should be known from the loading data. With the aid of the wooden tamping rod one can determine hole access to within 12 inches of the misfired charge. When sufficient stemming has been removed, the stemming left in the hole should be moistened and a new high velocity primer inserted and fired. A

careful search shall be made for unexploded material in the debris of the second charge.

k. When stemming entry is not possible, the missed holes may be opened by benching.

l. Missed hole may be handled by drilling a new hole no nearer than two feet from the misfired charge. It is preferable to place the second hole so that both holes lie in a plane parallel to the face or so that the second one is in front of rather than behind the missed hole in order to prevent throwing unexploded dynamite into the broken rock from the blast. This is a hazardous procedure and should be used only as a last resort.

m. For large diameter holes or sprung holes, it is neither safe nor practicable to drill another hole near them to blast out the charge. This is due to the fact that drill holes drift to a surprising degree in certain types of ground, and to some degree in concrete.

n. Partially detonated charges in a borehole should be handled in the same manner as those involving the entire charge.

o. Unexploded dynamite spread about an area or lying in a "muck" pile should be collected, placed in a storage magazine or secured and disposed of in a manner approved by the manufacturer. Mine Safety Personnel will be notified of the details prior to implementation.

p. Workers re-entering the blasting area should be briefed on the hazards and visual qualities of unexploded dynamites or detonating caps. A suspicious "find" by anyone should be immediately reported to the blasting supervisor.

q. An investigation of a misfire will usually disclose the cause of the trouble, such as improperly made primers, defective or deteriorated explosives, the use of non-water resistant explosives in wet work, improper loading practices, injuries to leg wires, detonator-explosive disengagement, failure to light the fuse or connect electrical hookup, improper power source, cutoffs, direct priming, improperly trimmed fuses, improper use of delays, or improper blasting design.

9.10 ADMINISTRATION REQUIREMENTS

This procedure must be approved by Mine Safety Personnel, Mine Manager, and the Blasting Foreman

9.11 BILL OF MATERIALS

60% or 75% Gelatin Power Primer
ANFO
Electric Blasting Caps ranging in delay from 75 to 500 ms.

Quantities to be delivered and stored on site in storage magazines will be on an as needed basis.

BLASTER-IN-CHARGE (POWDER MAN) QUALIFICATIONS

KIM K. CAMPBELL
ST. ANTHONY, IDAHO

GENERAL INFORMATION

DATE OF BIRTH:	September 12, 1952
MARITAL STATUS:	Single
YEARS OF BLASTING EXPERIENCE:	32 Years

EDUCATION

South Fremont High School
St. Anthony, Idaho
Graduate 1974

Storage, Handling, and Use of Explosives
University of Arizona
January 1976

Government Contract Law
Brigham Young University
January 1977

Surface Blasting
Dupont
January 1981

Sequential Blasting and Seismic Control
Don Harris & Associates
January 1982

Numerous blasting refresher courses

PROFESSIONAL ORGANIZATIONS

Member of the Society of Explosives Engineers

BLASTER-IN-CHARGE (POWDER MAN) QUALIFICATIONS

KIM K. CAMPBELL
ST. ANTHONY, IDAHO

COMPLETED PROJECTS

RWMC Firewater Line	- for - Superior Fire Protection
Scofield Mine	- for - S & W Construction
Union Pacific Railroad	- for - Tiger Asphalt
Idaho Falls Trenching	- for - Hood Construction
Intermountain Gas	- for - Rex Excavating
RWMC Pit #17	- for - Hunter Saucerman
Island Park Utilities	- for - Profit Brothers
Quartzite Quarry	- for - Valley Rock Products
Scofield Skyline Mine	- for - S & W Construction
Northwest Pipeline Co.	- for - Sabco
Alcohol Processing Plant	- for - Rick - Adams
Hurricane Sewer Trench	- for - George Johansen Construction
Hurricane Municipal	- for - Johansen & Sons Construction
Martin Marietta Cement	- for - S & W Construction
Big Cottonwood Conduit	- for - Western Utility Contractors
Wendover Water & Sewer	- for - Whitaker Construction
Salt Lake Mine Shaft	- for - Wright Bros. Engineering
Jim's Casino Blasting	- for - Culp Construction
Pegram Blasting	- for - Bannock Paving Co., Inc.
Tar Sands	- for - Wasatch Tar Sands, Inc.
Northpoint Blasting	- for - Derrick Development Co.
St. Anthony Substation	- for - Utah Power & Light Co.
Wendover Blasting	- for - Culp Construction
RWMC FY-84 Blasting	- for - M-K Company, Inc.
Sage Junction Blasting	- for - Burggraf Construction
RWMC Swepp Building Blasting	- for - Goodwin Construction
Great Western Canal Blasting	- for - Hunziker Companies
Promintory Point Blasting	- for - R.O. Peterson Company
Mesa Falls Blasting	- for - Arrow Head Sand, Inc.
North Sugar to St. Anthony	- for - Bannock Paving Co., Inc.
Bear Lake Sewage Lagoons	- for - Whitaker Construction
Powder Mountain Utilities	- for - Whitaker Construction
Archer Quarry Blasting	- for - Flood Control Dist. #1
Mountain Fuel Project	- for - South East Pipeline
Security Helicopter Facility	- for - C & H Construction, Inc.
Oroville Power Plant	- for - Brown & Root, Inc.