El Paso County

Master Plan for Mineral Extraction

February 8, 1996

MASTER PLAN FOR MINERAL EXTRACTION

El Paso County, Colorado

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Definitions

The following terms are specifically defined for use in this document:

AGGREGATE: Materials including all commercial grade sands, gravels, rock products and crushed rock generally used in the construction industry.

ALLUVIUM: A general term for clay, silt, sand and gravel or similar unconsolidated detrital materials, deposited during recent geological times by streams.

BOARD: El Paso County Board of Commissioners

COLLUVIUM: A general term applied to any loose, unconsolidated mix of soil material and/or rock fragments deposited by slow continuous downslope creep.

COMMERCIAL MINERAL DEPOSIT: A natural mineral deposit of limestone used for construction purposes, coal, sand, gravel, and quarry aggregate, for which extraction by an extractor is or will be commercially feasible and regarding which it can be demonstrated by geologic, mineralogic or other scientific data that such deposit has significant economic or strategic value to the area, state, or nation (C.R.S. 34-1-302).

COMMITTEE: El Paso County Mineral Master Plan Advisory Committee.

CONCURRENT RECLAMATION: Reclamation activities which are initiated coincident with completed interim phases of a mining operation.

COUNTY: El Paso County, Colorado: Normally defined as the entire County for data analysis purposes and the unincorporated County only for legal jurisdiction of this Plan.

H.B. 1529: Colorado House Bill No. 1529 "Concerning Commercial Mineral Deposits, and Providing for the Preservation of Access to, Regulation of Extraction of, and Reclamation of Land Used for Mining of, Such Deposits", 1973. Also known as the "Preservation Act".

EL PASO COUNTY LAND DEVELOPMENT CODE: As periodically amended, the document which contains the combined zoning, subdivision and solid waste regulations of El Paso County; specifically including Section 35.13, "Development Requirements for Mineral and Natural Resource Extraction Operations".

EMPIRE STUDY: The publication entitled, Report of an Aggregate Resource Evaluation For El Paso County, Colorado and accompanying maps, prepared for El Paso County by Empire Laboratories in 1991. The original maps have been revised for inclusion in this Plan.

ENHANCED RECLAMATION: Supplemental reclamation activities including but not limited to additional plantings, additional grading, rock staining and rock sculpting in excess of minimum State reclamation requirements.

EOLIAN: Sand and salt deposited by wind

LIGNITE COAL: A brownish-black coal which is intermediate in rank between peat and subituminous coal, containing 6,000 or more BTU/pound.

GRAVEL: Naturally occurring unconsolidated or poorly consolidated rock particles that pass through a sieve with 3-inch (76.2 millimeters) square openings and are retained on No. 4-mesh (4.75-millimeter square openings) U.S. standard sieve.

MINING OPERATION: The development or extraction of a mineral from its natural occurrences on affected land. The term includes, but is not limited to, open mining and surface operation and disposal of refuse from underground and in situ mining. The term includes the following operations on affected lands: Transportation; concentrating; milling; evaporation; and other processing.

MINERAL EXTRACTION ACTIVITIES: Activities related to mining as defined above.

MINERAL PROCESSING ACTIVITIES: Larger scale activities related to the storage, sorting, screening, washing, drying, crushing, leaching and batching of mineral resources which may occur in association with mining or on a separate site. This definition encompasses asphalt batch plants and cement and asphalt manufacture.

MINERAL RESERVES: Assumed commercial mineral deposits contained within sites permitted through the Colorado Mined Land Reclamation Board (MLRB) and having local government land use approval (if applicable) for extraction.

MINERAL RESOURCES: Potential commercial mineral deposits as depicted on (reference to maps) as further limited to account for development and institutional constraints which might reasonably be anticipated to preclude extraction.

MINERAL RESOURCE MAPS: The maps, adopted as Appendix H to this document, depicting areas of potential commercial mineral deposits.

PLAN: The Master Plan for Mineral Extraction- El Paso County

QUARRY: A mineral extraction operation in which drilling and/or blasting are required in order to access or remove the desired materials.

SAND: Naturally occurring unconsolidated or poorly consolidated rock particles that pass through a No. 4-mesh (4.75 millimeter) U.S. standard sieve and are retained on a No. 200-mesh (75-micrometers) U.S. standard sieve.

SUB-BITUMINOUS COAL: A black coal, intermediate in rank between lignite and bituminous coal.

VISUAL LANDFORM STANDARD: A measure of the degree to which an ongoing or completed mining operation visually blends in with or complements the surrounding landscape.

I. INTRODUCTION

A. Executive Summary

This Plan updates and supersedes the *1975 El Paso County Master Plan for the Extraction of Commercial Mineral Deposits* as amended in 1978 and 1982 and has two primary purposes. The first purpose is to facilitate continued compliance with the mineral resource protection mandates outlined in the "Preservation of Commercial Mineral Deposits Act" of 1973. The second is to provide guidance to the Planning Commission and Board of County Commissioners in evaluating land use proposals involving new or expanded mining and mineral resource processing operations. This Plan addresses all materials contemplated in the Preservation Act. However, mineral aggregate materials (sand, gravel and crushed stone) are afforded the most attention because these commodities dominate the mining activity in this County.

The Plan begins with a brief history of mining in El Paso County and then provides overviews of geology, resources, existing operations and the current regulatory framework. The first major element of the Plan is an analysis of current and projected resource demand. Demand is specifically evaluated with respect to current permitted capacity and more generally compared with future potential areas of supply. These potential future resource areas are delineated on Potential Resource Maps which are derived from a 1991 aggregate resource study commissioned by the County (Empire Study). Planning information has been overlain on these resource maps in order to evaluate the degree to which particular areas may be constrained from future mining activities. In this analysis, particular attention is paid to those higher value commodities (hard-rock quarry aggregate, mesa gravels and silica sands) which have limited distribution. The Potential Resource Maps, Planning Overlay Maps and descriptive text are intended to be used in combination with the policies in this Plan to achieve the above-stated purposes.

Some of the principal findings of this Plan are as follows:

- The "bulk to value" ratio for construction aggregate materials is high. This ratio increases with lower grade commodities, such as road base gravels. Proximity and to the ultimate point of use is therefore essential to determining the potential commercial importance of a particular identified mineral deposit.

- Over the past several decades, the trend in El Paso County has been toward consolidation of mineral extraction activities into a smaller number of larger operations. There are currently about forty (40) active State-permitted mining sites in the County.

- State-permitted sources of crushed stone quarry aggregate in the County are limited to three (3) operations in two (2) separate ownerships. In combination, these have a projected capacity of possibly twelve (12) to twenty (20) years based upon current rates of consumption. Within approximately ten (10) years, in the absence of approved new operations or expan-

sions, the County may be left with as few as one (1) permitted source of crushed stone quarry aggregate.

- Options available to address this projected shortage of permitted hard rock quarry aggregate include substitution from other (non-quarry) sources in the County, importation from sources outside of the County or the permitting of new or expanded operations within the County.

- Substitution for crushed hard-rock quarry aggregate typically involves the crushing of larger-diameter gravel deposits. This process can result in a product with an acceptable proportion of angular or fractured faces, but the proportion of waste material produced and resultant cost may be unacceptably high.

- The primary external source for crushed rock aggregate would be Fremont County. Their permitted capacity appears to be sufficient to serve the needs of El Paso County for a substantial period of time. However, there are increased hauling costs associated with bringing material in from this great a distance. Additionally, there are traffic safety concerns associated with a large number of trucks utilizing State Highway 115. There may also be a concern with long-term reliability associated with dependence on material from outside of the County.

- The spatial distribution of high quality quarry aggregate deposits in El Paso County is very limited. Various institutional and planning constraints combine to further limit the practical availability of these resources.

- El Paso County appears to have in excess of fifty (50) years of gravel capacity currently permitted. Most of these operations are associated with mesa gravel deposits which are located in a band generally paralleling Interstate 25. Development activities and other institutional constraints combine to significantly limit the practical sites for additional gravel extraction.

- There may be in excess of eighty (80) years' supply of higher quality construction sand currently permitted. However, much of this capacity is associated with a single facility. Areas of potential future supply are very extensive.

- High value rounded silica sands occur in a limited number of deposits in the vicinity of northern Colorado Springs. Many of these deposits have been either mined out or have become unavailable as a result of urban development. Current permitted capacity for this export commodity should be sufficient to meet about 10 to 15 years of demand.

- Sub-bituminous coal beds outcrop in a band which stretches across much of the center of the County. Although these shallow deposits were extensively mined in the past, any additional extraction is not considered economically feasible at this time.

- There is also a zone of lower quality lignite coal beds associated with the Denver Formation in the northern part of the County. It does not appear likely that these deposits will become financially recoverable.

- There is a long history of refractory clay mining in El Paso County. Clay mining continues sporadically today at four (4) permitted facilities in the Calhan area. These have a large combined capacity.

B. Effect

Upon adoption by the El Paso County Board of County Commissioners, the effect of this document is to amend and supersede the El Paso County Master Plan for the Extraction of Commercial Mineral Deposits (1975). That document was most recently amended in 1982.

C. Purposes, Scope and Intent

The purposes of this Plan are as follows:

1. **To address the mineral resource protection mandates outlined in the Preservation of Commercial Mineral Deposits Act of 1973 (the "Preservation Act").**

   This legislation directed all counties with a 1970 population of sixty-five thousand (65,000) or more residents to prepare a plan for the preservation of its commercial mineral deposits. The "Act" specifically stipulated:

   > "After adoption of a master plan for extraction for an area under its jurisdiction, no board of county commissioners, governing body of any city and county, city, or town, or other governmental authority which has control over zoning shall, by zoning, rezoning, granting a variance, or other official action or inaction, permit the use of any area containing a commercial mineral deposit in a manner which would interfere with the present and future extraction of such a deposit by an extractor."

2. **Provide guidance for the Planning Commission and Board of County Commissioners in evaluating land use proposals which involve mining and/or mineral processing activities.**

   In particular, Section 35.13 of the El Paso County Land Development Code outlines standards to be applied in the consideration of mineral extraction as a Use Permitted by Special Review (Special Use). The information, maps and policies contained within the Plan are intended to serve as an important aid in review and analysis of future mining applications.

3. **Provide guidance to the County with respect to the need for any amendments or additions to local regulations.**

   Although no major changes to the County's existing regulations are contemplated by this document, a few specific regulatory changes can be anticipated. These will include updated references to this Master Plan element.

4. **Generally address topics, processes and issues where the County may become involved, but not through a direct regulatory action.**

   The intention here is to provide guidance in areas which will or may include:

   - County input on Colorado Mined Land Reclamation Board (MLRB) reclamation permit applications in cases where the

County's regulatory involvement may be limited.

- County comments on mining proposals in areas outside of its direct jurisdiction (i.e. municipalities or adjoining counties).
- County comments on, and/or involvement in modifications to mining operations which are considered to be legal nonconforming uses.
- Active or passive participation in "extra-regulatory" initiatives including enhanced reclamation and voluntary mitigation programs.

5. Serve as a general reference source which describes the role of mining in El Paso County.

D. Legal Authority

The El Paso County Board of Commissioners has the authority and responsibility to make and adopt a Master Plan for Mineral Extraction-El Paso County. According to Sections 30-28-106 through 108 of the Colorado Revised Statutes (C.R.S.), the County Planning Commission has responsibility for the drafting and adoption of elements of the County Master Plan. The Planning Commission shall by Section 30-28-109 certify <this element of> the plan to the Board of County Commissioners. Pursuant to C.R.S. 34-1-303 through 305, the County Planning Commission is specifically required to conduct a study of commercial mineral deposits located within its jurisdiction and develop a master plan for the extraction of such deposits. Unlike other Master Plan elements which must only be certified to the Board of County Commissioners, this master plan for mineral extraction must be formally adopted by the Board.

This document addresses all of the commodities included in the "Preservation Act" to the degree that these are known to occur in El Paso County. Aggregate resources are afforded the most attention because these represent the most extensive and actively used resources. Oil and gas resources are not addressed, as these are not contemplated in the Act.

E. Background

El Paso County responded to the 1973 Preservation Act by contracting with Dr. John Lewis of the Colorado College to undertake a study of commercial mineral deposits and prepare a plan. The resulting *Master Plan for the Extraction of Commercial Mineral Deposits* and its accompanying maps were adopted by the Board of County Commissioners in the summer of 1975. Although this document included some siting and performance-related policies, it was geared primarily toward meeting the resource preservation mandates of the 1973 Act.

The 1975 plan was amended in 1982 to make it clear that the appurtenant maps depicted only "potential" commercial mineral deposits subject to a case-by-case Board determination. The 1982 Update specifically addressed the fact that the original resource maps had identified the entire eastern part of the County as having a sand supply of heterogeneous quality. This supply was determined to be well in excess of any reasonably projected demand. The map was therefore revised to only depict certain valley-fill and flood-plain sand deposits in the eastern County. Also included in this revision was the

suggestion to periodically update the plan as additional geological information became available.

On March 8, 1990 the Board of County Commissioners adopted a new section of the El Paso County Land Development Code (35.13) which provides additional procedures and standards for the review of mineral and natural resource extraction use applications.

Also in March of 1990 the services of Empire Laboratories Inc. of Fort Collins, Colorado were engaged for the purposes of evaluating existing and potential aggregate sites in the El Paso County. Although this study was authorized in anticipation of a program to update the County's *Master Plan for the Extraction of Commercial Mineral Deposits*, the contract was not structured in a manner which would allow this objective to be entirely achieved.

Empire reviewed available literature including existing plans, performed some field reconnaissance and drilled a total of eighty-two (82) borings. A majority of these borings were concentrated in the Midway area, along Interstate 25 near the Pueblo County line. Empire also produced a set of Aggregate Resource Maps using the 1975 resource maps as their primary source. These 1991 maps were limited to aggregate resources and they are of a significantly larger scale than the 1975 maps. Some areas were excluded from the mapping based on generalized planning assumptions. For example, the Fort Carson Military Reservation and the Air Force Academy were not mapped, and decomposed granite deposits were only mapped in selected areas. The basis for these decisions was not fully documented.

In April of 1991 the El Paso County Planning Department staff prepared a process outline for review and modification of the Empire Study and its integration into an overall Master Plan update. This outline was presented to the El Paso County Planning Commission and Board of County Commissioners. A comprehensive analysis of mineral supply and demand parameters was proposed as part of the project scope. Also included would be a thorough and documented analysis of the planning factors which might influence the future availability of identified resources.

On May 21, 1991, the Empire study was accepted by the El Paso County Planning Commission, but no formal action was taken. The consensus of the Commission was the study had not been fully reviewed, and that it was not structured in a way which would allow direct incorporation as an amendment to the El Paso County Master Plan.

F. County Planning Process

Given the complexity of this subject, its sometimes controversial nature and constraints on staff availability, a decision was made to prepare an essentially complete draft plan prior to initiating a comprehensive public input process.

The original *Master Plan for the Extraction of Commercial Mineral Deposits* (1975/1982) was evaluated along with a variety of other publications and files. Staff used the Empire Study maps as a basis for the required evaluation of potential commercial mineral deposits. The

resource information from these maps was digitally transferred into the County's computer-generated base map. Active permitted mining sites were added to these maps for illustrative purposes. Some modifications were made to the Empire maps to correct drafting errors and to address comments from Dr. Hal Prostka.

Colorado Mined Land Reclamation Board (MLRB) permit files were then researched in order to estimate the current available supply of various mineral types. The demand for each mineral commodity was analyzed through a review of available records and interviews with major public sector aggregate purchasers. Careful consideration was given to the issue of aggregate specifications. A limited analysis of the economic implications of local mining was also prepared.

The digitized resource maps were then overlain with a variety of graphic planning information including subdivision and visual resource overlays. This exercise had a variety of purposes but its primary objectives were twofold. One was to provide a sense for the relative availability of current unpermitted resources. The other was to establish a very general framework within which to begin an analysis of the relative impact of a proposed mining operation compared to other potential sites. Based upon the foregoing analysis, critical issues were then derived and preliminary draft policies were prepared. All of the above information was then integrated into a partial draft of this document.

In June of 1993, the Board of County Commissioners authorized the formation a Mineral Master Plan Advisory Committee (Resolution No. 93-191, General- 79-A). Following advertisement and notices to targeted organizations the Board established this Committee on July 19, 1993. The Committee consisted of thirteen (13) regular members representing a variety of industry, neighborhood, at-large and public sector constituencies. Additionally, six (6) non-voting liaison members were appointed. The Committee worked actively during the second half of 1993 reviewing draft materials, touring sites and facilities and evaluating aggregate resource demand and permitted supply. During the first half of 1994 the Committee went on inactive status while Planning Department staff prepared computerized planning overlay maps.

The Committee reconvened in the Fall of 1994 to consider statistical input from the planning overlay process. There was another period of inactivity in early 1995 during which the Planning Department worked on other projects.

In the Fall of 1995 the Committee reconvened again to review an updated draft of the Plan document.

II. INVENTORY AND ANALYSIS

A. Brief History of Mining in El Paso County

Although very few if any precious metals have been mined within its boundaries El Paso County has a rich mining history. It is not coincidental that a pick and shovel were made a part of the seal of the County when it was established in 1861.

Gold mining played a key indirect role in the County's early history and development. In 1859 the rumored discovery of gold in this region precipitated a major "gold rush." Wagons were painted with the now-famous "Pikes Peak or Bust" slogan. While these reports turned out to be largely overblown, major discoveries did occur a few decades later in Cripple Creek. Beginning in the early 1890s Colorado Springs and its surrounding communities served as primary support bases for the Teller County gold fields. The population of Colorado Springs more than tripled between 1890 and 1900. During the late 1800's and early 1900s Cripple Creek was producing more gold than any other single area in the world. In 1896 Spencer Penrose institutionalized this economic link with the gold fields by constructing the Golden Cycle ore processing mill near Colorado Springs and effectively monopolizing ore reduction.

Beginning with the Franceville Mine in 1882, the Colorado Springs Coal Fields began to be extensively mined. Coal from these underground mines provided fuel for a variety of users including the Colorado City gold reduction mill. Production peaked during the period from 1900 to 1920. Altogether, upwards of 100 mines produced at least 15,000,000 tons of coal up until the last operation (an open pit mine near Franceville) was closed in 1965.

At one time or another, many hundreds, if not thousands of mostly smaller aggregate mines and borrow pits have been operated within the County. The vast majority of these have since been closed or abandoned. Most of the larger currently operating aggregate mines and quarries have a history which dates back a few decades or more. The result is that almost all of these major operations predate current zoning regulations and therefore have nonconforming use status.

Over the past several decades, the most dominant image of mining in El Paso County has been associated with three larger limestone aggregate quarries. Active mining operations have recently ceased at the Queens Canyon Quarry. This facility is located near the Mountain Shadows development. Queens Canyon was opened by Castle Concrete Company in the 1950s. The property is no longer being mined and reclamation is now being completed.

Operations at what is now known as the Snyder (a.k.a. Snider, Black Canyon) Quarry, located north of Manitou Springs, were apparently initiated by the Black brothers in 1881. After several decades of inactivity this mine was reopened in the late 1960s. The quarry was acquired by Continental Materials Inc. through its local subsidiary, Castle Concrete, shortly thereafter.

Workings at the site of the Pikeview Quarry, located just south of the Air Force Academy, were initiated in the early 1900s. A full-scale quarry was established by Peter Kiewit and Sons during the 1950s when much of the material from this quarry was used in the construction of the Air Force Academy. At that time this operation was called the Lennox Breed Quarry. Castle Concrete also acquired this facility in the early 1970s.

"Enhanced" reclamation plans for Queens, Pikeview and Snyder have recently been developed through a locally appointed advisory committee. Enhanced reclamation is now being carried out under the auspices of the Colorado Mountain Reclamation Foundation, a local nonprofit organization.

The other active hardrock quarry operation which has played an important role in the recent mining history of El Paso County is the "Menzer Quarry". This "granite" quarry is located in the far southwest corner of the County near the Fremont County line. What is actually mined is a combination of fine grained granite and accompanying metamorphic rocks. In 1986, a proposal to expand this operation onto adjoining property was denied by the County Commissioners.

The "Avenger" mining claims, located on the northeast side of Ute Pass on the El Paso/ Teller County border, have figured prominently in the mining history of the County even though major mining has never taken place on this site. The story began in 1966 when a group of 25 mining claims were located for limestone on National Forest Service land in this vicinity. In 1987, after two decades of litigation, 6 of the original 25 claims were ruled to be valid. The Avenger claims were subsequently patented in May of 1992, with one effect being that, as private property these parcels are now clearly subject to full local government land use jurisdiction.

The locations of well over 100 abandoned sand and gravel pits have been identified in inventory maps prepared for El Paso County. There were certainly many other unmapped mining locations. Gravel was removed extensively from the mesa deposits along Monument Creek in conjunction with the urbanization of Colorado Springs. Until fairly recently, the County had lease arrangements with several dozen small pits in the more rural areas. Over the past several decades, the trend in sand and gravel has been toward consolidation of operations. The reasons for this include urbanization, higher product standards and reclamation requirements. Only about forty (40) active permitted sand and gravel operations remain today.

B. Overview of Geology, Resources and Operations.

1. Geology

The resource geology of the County is dominated by the contact between the Front Range and the Great Plains Physiographic Provinces (Empire Laboratories, 1991). The Front Range is a major upthrust mountain belt characterized by large areas of Precambrian igneous and metamorphic rocks. This crystalline Precambrian basement complex was originally

formed at great depth and was once covered by thick sedimentary strata. These units were most recently uplifted during the Late Cretaceous mountain building period (65 to 100 million years ago). Extensive weathering and erosion have left the present day topography. Precambrian rocks such as the billion year old Pikes Peak Granite now predominate at higher elevations. The remaining overlying sedimentary strata are often tilted at high angles where the Precambrian units have been thrust up and over them along the Front Range. The Garden of the Gods area, west of Colorado Springs provides a spectacular manifestation of this phenomenon. A simplified stratigraphic column is included as Figure 1. Map 1 generally depicts the primary surficial geologic features of El Paso County.

The current physiography of the Front Range in El Paso County is impacted by a number of secondary movements in addition to the predominant Rampart Range Fault. The most dominant of these is the Ute Pass Fault. In addition to creating this area's major gateway to the west, movement along this fault has resulted in a major horizontal displacement of certain strata. One noteworthy example is the Lower Ordovician Manitou Limestone which is extensively mined as a source of crushed rock aggregate. This important unit now outcrops discontinuously along an arc extending from the southwest corner of the Air Force Academy (Pikeview Quarry) to Cedar Heights (Snyder Quarry). The Manitou Limestone outcrops again in association with the Avenger claims at the boundary of El Paso and Teller Counties northeast of U.S. Highway 24. Manitou limestone also outcrops less extensively in a few areas south of Pikes Peak.

While the Front Range was being upthrust and eroded, deposition was occurring in areas to the east. During the Late Cretaceous and Tertiary Periods, up to several thousand feet of material were deposited into Denver Basin which extends roughly from Fort Collins to Colorado Springs. Subsequent erosion and uplift have resulted in the present physiography of this Basin.

Many of the unconsolidated and variously well-sorted sand and gravel resources found east of the Front Range were deposited in much more recent geologic history. Some of the more important sand and gravel deposits result from flowing water (alluvial) and wind (eolian) deposition associated with fairly recent episodes of glaciation. Streams flowing out of the mountains carried larger gravels, whereas streams flowing in the eastern part of the County carried mainly sands. It is important to understand present drainage patterns are not entirely consistent with those which may have deposited these aggregates. For example, it appears that the south flowing Monument and Fountain Creek drainages resulted from the "capture" of more gradual streams which originally flowed east from the Front Range.

Some of the more important sand resources in the County are the result of wind rather than water deposition. For example, the high quality silica sands found in the Briargate/Northgate area occur in dune formations created during the late Tertiary period and the Pleistocene epoch.

2. Summary of Resources

a. Introduction

Many of the potential commercial mineral deposits in El Paso County are depicted on the Potential Mineral Resource Map (Map 1) which is included as an appendix to this document. The scope, limitations and recommended use of this map are discussed later in this Plan.

b. Crushed or Decomposed Rock Aggregate

Due to its high angularity and potential for uniform quality, crushed rock has been the material of choice for many construction applications. Historically, much of this aggregate has come from the three (3) large Manitou limestone quarries located in the foothills west of Colorado Springs. The extent of these limestone outcrops is delineated on the Resource Map. Options for future limestone quarries are very limited due to limited occurrences combined with high visual exposure.

In addition to the well-known Limestones, there are also areas of fine-grained granites and grandiorites in the Foothills. Although generally not considered to be as valuable as the limestone (which can be used for concrete production), these deposits have some viability for high specification crushed rock aggregate.

Pikes Peak Granite occurs extensively in western El Paso County. This coarse-grained granite is suitable for some base course and asphalt applications. Less weathered granite deposits tend to produce higher quality aggregate.

c. Unconsolidated Aggregate

There are a variety of alluvial fan, upland, floodplain, stream terrace, valley-fill and wind-blown sand and gravel deposits associated with the Fountain Creek Drainage (Colorado Geological Survey, 1974). Generally, potentially available high quality gravel deposits represent a fairly limited resource, while construction grade sand resources are extensive.

The upland deposits located closer to the mountains contain large amounts of silt, clay and boulders and are typically not good sources of high quality sand and gravel. Upland mesa deposits generally improve in quality with distance away from the mountains. Mesa gravel deposits often need to be

screened and/or crushed in order to meet construction specifications.

Extensive mesa gravel deposits lie along the flanks of the mountains from north of the Air Force Academy to south of the Pueblo County line extending eastward to Fountain Creek. These gravels which consist mainly of fragments of granitic rock, vary in thickness from 25-50 feet near the mountains to less than 10 feet, five to six miles to the east (Empire, 1991).

More recent (late Pleistocene) gravel terrace deposits extend along the east bank of Monument Creek north of Fountain Creek. However, the majority of these resources have either been removed or (more likely) built over.

Several high quality alluvial sand deposits lie east of Monument and Fountain Creeks. Sand deposits suitable for many construction-grade applications occur along stream beds and associated terraces across large areas of the eastern part of the County.

Large sand dune deposits cover areas between Cottonwood and Pine Creeks and the area between Colorado Springs and Security near the mouth of Sand Creek. Included among these are the high quality "silica sands" found in the Northgate/ Briargate areas. Northeast of Colorado Springs near the headwaters of Sand Creek, alluvial fan upland, valley fill and floodplain deposits of coarse sand from the Dawson Arkose highland are found. Eolian and alluvial sand deposits exist throughout the eastern portion of the County.

d. Coal

The highest quality and historically most significant coal resources in El Paso County are the subituminous coal beds found in association with the Laramie Formation. These deposits outcrop or occur near the surface along an arc extending from the Rockrimmon area through Cragmoor (University of Colorado at Colorado Springs-UCCS), then through Cimarron Hills and into Franceville (see resource maps). The beds range up to about ten (10) feet in thickness (Speltz, 1976). Many of these beds were mined out during the early 1900's.

In addition to the better known coal resources of the Laramie Formation, there is also a zone of lignite beds associated with the Denver Formation in northeastern El Paso County. These lower grade coal resources are apparently more discontinuous than the coals in the Laramie Formation beds. Their approximate extent is also delineated on the resource maps.

In terms of quantity, the Denver Basin coal beds account for a majority of all of the coal resources in the State of Colorado (Speltz, 1976). Mining of these resources is currently not feasible due to their discontinuous distribution and low quality. If the extraction of these materials ever becomes economically reasonable, the technology employed would almost certainly involve some strip mining potentially with a rail-haul component.

e. Other

The refractory clay deposits shown on the Potential Resource Maps include the "Paint Mines" just south of Calhan. This, and a few other depicted deposits are associated with the Dawson formation in the Denver Basin. Also shown on the resource maps are potential clay deposits associated with the Dakota sandstone and the Laramie Formation along the Front Range. These include potential deposits in the southwest corner of Fort Carson.

There are some isolated decorative quartz deposits found in large veins associated with the granite and the metamorphic rocks related to it. Limited amounts of gem or specimen-quality minerals; including topaz, fluorite, amazonite, smoky quartz and beryl are also found in association with the Pikes Peak Granite. These minerals are too rare to be considered of commercial importance.

Finally, many areas not highlighted on the resource maps contain material of sufficient quality for local borrow, backfill and road base applications.

3. Summary of Current Operations

Historically, mining of some type has occurred on at least several hundred individual sites within El Paso County. Many, but certainly not all of these operations are located on inventory maps available at the Planning Department. Currently, there are approximately fifty (50) relatively significant legal mining sites currently permitted in the County. These are identified on the mineral resource and planning overlay maps. There are also several additional mineral processing operations such as concrete and asphalt plants which are not associated with permitted mining operations. Some of these are also shown on the resource maps.

The dominant mining operations in El Paso County include the two active Front Range limestone quarries, the Menzer "granite" quarry and several sand and gravel pits located south of Colorado Springs along Interstate 25. Mining in the northern part of the County is generally confined to smaller operations. Lower grade road base materials are extracted from a number of pits in the eastern part of the County.

4. Adjoining County Plans and Regulations

Of the counties which adjoin El Paso County, only **Pueblo County** met the 65,000 population threshold established in the 1973 Preservation Act (H.B. 1529). Pueblo County prepared a plan and adopted it in mapped form. Basically, they determined that they only had aggregate resources associated with floodplain deposits. There are a number of sand and gravel pits operating in Pueblo County.

Douglas County did not originally fall under H.B. 1529, but they have subsequently addressed the Preservation Plan through a recent amendment to their general Master Plan. This "Master Plan for Mineral Extraction - Douglas County" was adopted on July 9, 1990 following a nine-month moratorium on mineral extraction permits.

Douglas County has a variety of floodplain mesa and cemented gravel deposits including some which adjoin El Paso County. Because of its location near the headwaters of stream basins, Douglas County is generally lacking in large cobble deposits. Douglas County also has some limited limestone deposits as well as significant outcrops of rhyolite. Rhyolite is a fine grained igneous rock suitable for a number of purposes, but not for producing concrete. As in El Paso County, Douglas County also has extensive deposits of coarse grained igneous rocks including Pikes Peak Granite. Permitted mining sites are currently limited to a number of small sand, gravel and specialty products pits. Douglas County has no large hard-rock quarries and imports much of its coarse aggregate from other counties.

In Douglas County, mining is allowed as a conditional use only in a limited number of zone districts. Developers typically need to utilize a planned unit development approach if they desire to integrate mining with site preparation activities.

There are several large active mesa sand and gravel mining operations in **Fremont County**. A number of these supply asphalt and concrete to producers in El Paso County. Fremont County also has one (1) large active coal mine. The permitted hard rock quarry sites in Fremont County are not currently active. Mining is addressed only to a limited extent in the County's general master plan. It emphasizes the importance of preserving the Highway 115 and 67 scenic corridors. Mining is allowed as a conditional use in the Agricultural Forestry, Agricultural Farming and Ranching, Agricultural living zone districts. In combination, these districts overlay a majority of the land in the County.

Although **Teller County** has a tradition of subsurface hard rock gold mining, current mining activity is dominated by surface gold mining and cyanide heap leaching operations in the vicinity of Cripple Creek and Victor. Approximately a dozen smaller sand and gravel pits are also operated for local consumption.

These include two (2) pits used by the City of Colorado Springs in conjunction with maintenance of the Pikes Peak Toll Road. There are also approximately four (4) permitted peat mining sites in Teller County. However, application of Federal wetlands regulations may effectively preclude peat mining in the future. Some of this peat material is shipped to El Paso County for processing into soil mixes.

Mining is allowed as a conditional use in Teller County's agricultural zones. The Teller County Master Plan addresses mining quite extensively. Visibility issues are not addressed extensively in the Master Plan at this time, but Teller County is in the process of developing a County-wide scenic overlay system which will be available for use in evaluating proposed new and expanded mining operations. Teller County has also been considering development of long-range reclamation requirements which would be in addition to those of the State.

Jefferson County does not adjoin El Paso County but is important because it is a regionally significant source of mineral aggregates and because of its activities in the area of mining regulation. There have been several controversial mining-related issues in Jefferson County. In 1977 the County adopted a Mineral Policy Plan which included a variety of detailed policy statements along with a numerical weighting criteria with which to evaluate mining requests. Several subsequent regulations have been promulgated, but the 1977 plan has not been updated in its entirety.

The counties which adjoin eastern El Paso County are not believed to have extensive high-grade commercial mineral deposits.

5. Other El Paso County Master Plan Elements

   a. Introduction

      The El Paso County Master Plan consists of approximately fifty (50) separate elements, all of which amend the County-wide Master Plan document. Currently, this overall County Master Plan is the 1990 Land Use Plan which was completed in 1970. The 1990 Plan is in the process of being amended and replaced by a County-wide Policy Plan. This new overall document will reference applicable, specific elements of the Master Plan, including this Mineral Master Plan document.

      The following advisory elements of the County Master Plan are most pertinent to this Mining Plan:

      - Wildlife Habitats and Descriptors
      - Major Transportation Corridors
      - Small Area Plans

The wildlife element is potentially important because special consideration may need to be given to areas designated as having potentially high wildlife constraints.

The Major Corridors element may be important in that it will be important that proposed new or expanded mining operations will need to be designed in such a way that the functional integrity of these corridors is preserved. Additionally, designated future corridors will need to be considered in visual impact analyses.

Small Area Plans respond to the unique features and circumstances in specific sub-areas of the County and recommend more detailed land use guidance. Several of these Small Area Plans address the issue of mining at some level. Although this Mineral Master Plan will take precedence with respect to implementation of the Preservation Act, it is the intent of this Plan to recognize the pertinent land use policies in Small Area Plans within a County-wide planning context. Separate Small Area Plans are discussed below:

b. Small Area Plans

Small Area Plans are available for review at the Planning Department. These documents are briefly summarized below with an emphasis on any advisory aspects which may be relevant to mining.

Black Forest Plan (1987) - This document addresses the primarily forested rural-residential area directly north of Colorado Springs using a concept map/ planning unit approach. Much of this planning area is proposed to remain as a rural-residential area. This document specifically recognizes the mining and mineral processing uses along the Vollmer Road corridor, but recommends that these areas not be expanded.

The Black Forest Plan also includes an "Industrial and Extractive" policy section with several related policies.

Falcon/ Peyton Plan (1993) - This Small Area Plan also utilizes a concept map/ planning unit approach. This planning area is located northeast of Colorado Springs. The Plan also includes an Industrial/ Extractive policy section. These emphasize compatibility issues and impact mitigation.

Highway 94 Plan (1985) - This planning document for the area surrounding Falcon Air Force Base relies on a very generalized overall concept plan. Mining is not discussed as a discrete topic.

Ellicott Valley Comprehensive Plan (1989) - The Ellicott Valley Plan addresses a primarily rural

section of the east-central County. It utilizes a policy-only approach and emphasizes economic development values. A policy section on Agriculture, Mineral Extraction and Special Uses contains some generalized guidance pertaining to mining.

South Central Plan (1983) - This document addresses the sparsely populated south-central part of the County. Although it contains a limited amount of language which specifically pertains to mining, this Plan makes it clear the residents of this area do not want to absorb a disproportionate share of locally unwanted land uses.

Southwestern Highway 115 Comprehensive Plan (1990) - This planning document addresses the area of the County south of Colorado Springs and west of Highway 115. Of all the Small Area Plans, the Highway 115 Plan places the highest emphasis on mining issues. One of its five (5) main topic areas addresses resource extraction. The Plan recognizes the high quality mineral deposits in this sub-area but strongly advocates against new or expanded mining operations unless they meet very exacting standards related to transportation and environmental impact.

Ute Pass Comprehensive Plan (1982) - The Plan for the Ute Pass area utilizes a specific land use map approach. It places a high value on protecting the natural environment and visual character. This Plan includes limited direct discussion of mining other than a description of the existing mining operations along Highway 24.

The primary policy guidance in this Plan is directed toward visual impact mitigation.

Tri-Lakes Plan (1983) - The Tri-Lakes Plan utilizes a concept map approach. It contains limited specific discussion of mining, but emphasizes policies related to visual impacts and general preservation of the natural environment.

C. Regulatory Framework

1. Federal

a. Mining Law of 1872

Prospecting, mining and patenting activities related to federal lands are still largely governed by the United States Mining Law of 1872. However, it is important to be aware that this law applies only to federally owned properties. There is fairly limited federal legal jurisdiction over mining activities related to private property.

The 1872 law established that a mining claim on the public domain did not become private property until a mineral was discovered and "perfected". The law further provided a mechanism for

eventually obtaining title to or "patenting" the land associated with the claim. A few major amendments to this Act have occurred since 1872. These changes include the Mineral Leasing Act of 1920 which made certain nonmetalliferous minerals exclusively leasable and not open to acquisition by claim staking, and the Minerals Act of 1947 which defined a group of salable minerals. Later, the Multiple Mineral Use Act of 1954 provided for multiple mineral development of the same tracts of public lands, and the Multiple Surface Use Mining Act of 1955 withdrew "common varieties" from mineral entry. Finally, a section of the Federal Land Policy and Management Act of 1976 redefined claim recording procedures and provided for abandonment of the claims if these procedures are not followed. The 1872 Act has been under consideration for major reform for many years, and it may be substantially amended in the near future.

2. State

   a. Preservation Act

      The threshold State statute governing the planning and regulation of mining operations by counties is the 1973 Preservation of Commercial Mineral Deposits Act (Whittier, 1993). This Act applies to counties having a population of 65,000 or more, and requires such counties to develop a master plan for the extraction of commercial mineral deposits with the aid of maps developed by the Colorado Geological Survey identifying and locating such commercial deposits. In developing this Master Plan, the following factors are to be considered:

      1) Any system adopted by the Colorado Geological Survey grading commercial mineral deposits according to such factors as magnitude of the deposit and time of availability for and feasibility of extraction of a deposit;

      2) The potential for effective multiple-sequential use which would result in the optimum benefit to the landowner, neighboring residents, and the community as a whole;

      3) The development or preservation of land to enhance development of physically attractive surroundings compatible with the surrounding area;

      4) The quality of life of the residents in and around areas which contain commercial mineral deposits;

      5) Other master plans of the county;

      6) Maximization of extraction of commercial mineral deposits;

7) The ability to reclaim an area pursuant to the provisions of article 32 of Title 34, C.R.S.; and

8) The ability to reclaim an area owned by any county, city and county, city, town, or other governmental authority consistent with such proposed use.

The Preservation Act further requires that after adoption of a master plan for the extraction of commercial mineral deposits, no board of county commissioners shall, by zoning, rezoning, granting a variance, or other official action or inaction, permit the use of any area containing a commercial mineral deposit in a manner which would interfere with the present or future extraction of such deposit by an extractor.

In light of the above, it is clear that the Preservation Act provides the Board with very broad discretion in determining what is a commercial mineral deposit, but then strictly limits the Board's land use authority upon determination that a deposit is commercial in nature for the purposes of this Act. For example, based upon geological studies and a thorough planning analysis, a County is free to determine that an ostensibly very valuable mineral deposit is not a commercial resource for the purposes of this Plan based upon a variety of factors. These factors might include the existence of adequate permitted supplies or other deposits which might be extracted with less adverse impact to County residents.

b. Colorado Mined Land Reclamation Act

The Colorado Mined Land Reclamation Act of 1976 as amended establishes reclamation requirements which are applicable to most recently active mines within the State, largely independent of when the mine was originally established. The Act provides for financial warranties to guarantee reclamation performance. Permit applications are processed and reviewed by the Colorado Division of Minerals and Geology (known until recently as the Mined Land Reclamation Division). The Division processes the applications for the Colorado Mined Land Reclamation Board (MLRB). The MLRB is responsible for formal action in all but limited administrative determination cases.

The "Reclamation Act" specifically pre-empts any other political subdivision within the State from requiring reclamation standards different than those stipulated in the Act.

Counties are also specifically pre-empted from requiring their own financial warranties related to reclamation.

The Reclamation Act is articulated through the "Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board". These rules and regulations were originally promulgated in 1977, and have been amended on several subsequent occasions. There are a variety of permit types depending upon the nature, and scale of the proposed operation. Notice to affected county governments is required during the application review process.

As presently authorized, the State reclamation review and approval process ensures that the reclamation plan is feasible, enforceable, and is in compliance with the requirements of the Colorado Mined Land Reclamation Act. The authority of the Mined Land Reclamation Board in the areas of visual and off-site transportation impacts is limited.

Although local government is pre-empted from becoming directly involved in reclamation planning, counties may be in a position to indirectly influence the nature of reclamation planning through their zoning authority (see below).

3. County

   a. Zoning and Subdivision Authority

      Through State enabling legislation, counties are authorized to adopt and enforce zoning and subdivision regulations pertaining to their unincorporated territory. Zoning is a "police power" which is predicated upon a need to protect a community's health, safety and welfare. Where they are not otherwise pre-empted, counties have jurisdiction over any locational and operational aspects of mining and mineral processing which might be reasonably related to their authorized zoning powers.

      The part of unincorporated El Paso County which adjoins the City of Colorado Springs was first zoned in 1942. In later years, the zoned area was generally extended to include all of western El Paso County. However, mining was allowed as a principally permitted land use in agricultural and forest zones until 1970 when approvals of location became a requirement. Therefore, no local approvals were necessary. The result is that most major mining operations in unincorporated El Paso County predate the need for special zoning review and approval and, therefore, exist as legal nonconforming uses. Mining is now allowed in all zone districts as a Use Permitted by Special Review. Section

35.13 of the El Paso County Land Development Code provides additional procedures related to County review and processing of mining applications. Appendix B describes the evolution of El Paso County mining regulations in more detail.

b. Local Permitting Process

New or expanded mining operations in the unincorporated County require approval as a Use Subject to Special Review (Special Use). This process is outlined in the El Paso County Land Development Code. General standards and requirements for Special Uses are outlined in Section 35.8 of the Code. More specific standards and requirements are included in Section 35.13, "Development Requirements for Mineral and Natural Resource Extraction Operations." This local review and approval process can occur before, concurrent with or following the State permitting process. The local process includes requirements for analysis of certain impacts which may not be fully addressed in the State review. These include visual and traffic impacts. Section 35.13 also includes a more streamlined process directed toward accommodating small-scale operations of limited duration.

There are exceptions to the above-described requirements for local approval of mining operations. Local approval is not required for unzoned areas. Currently, about 800 square miles in the eastern County are unzoned. Although Federal properties including military installations are zoned in most cases, the County does not exercise most land use authority (including regulation of mining) in these areas.

4. Municipalities

Municipalities have the authority to regulate mining operations within their corporate limits. The City of Colorado Springs Zoning Ordinance defines several different types of mining operations. All are allowed subject to conditional use approval in the A (Agricultural) zone district, subject to specific standards. Only temporary surface and underground activities are allowed in other non-residential zones, subject to the same standards. No mining is allowed in residential zones.

Until 1988, the City of Fountain had a zone district which exclusively allowed mining. Currently mining is allowed as a conditional use in the City's I-2 (Industrial) and RA (Agricultural) districts. Fountain has no mining-specific review criteria. Broderick and Gibbons operates a sand and gravel mine within City limits, and also has rights to substantial permitted reserves on the Fountain Colony property.

Manitou Springs has no current mining operations. Mining is allowed as a conditional use in all zone districts subject to adopted general standards. A

grading permit might also be required in conjunction with any mining approval.

The Town of Monument currently has no mining operations within its corporate limits. Their zoning ordinance does not directly address mining. If mining were to be proposed it would likely necessitate a regulatory interpretation and/or revision.

D. Elements of Resource Demand

1. Introduction

An understanding of the demand for primary mineral products and their critical specifications is an essential prelude to the development of a viable mineral master plan. The following sections summarize the demand side of the mineral products industry in El Paso County.

On a quantitative basis, local mineral resource demand is primarily comprised of aggregates (using the broad definition of this term). Most of the aggregates used in El Paso County are committed to public infrastructure construction or maintenance. In most years, road, bridge and drainage projects account for the greatest demand. Periodically, one-time projects (such as the recently completed new Colorado Springs Municipal Airport) may account for a large share of annual resource use.

Nationally, according to the U.S. Bureau Mines, an average of about 3.4 tons of construction sand and gravel are used annually per person. About 4.6 tons of crushed stone are consumed per capita. In the State of Colorado, the ratios are reversed, with per capita annual consumption of construction sand and gravel at 7.57 tons and use of crushed stone at 2.31 tons. In either case, an overall per capita aggregate demand of between 8 and 10 tons appears to be a reasonable "rule of thumb".

Historical data for the Denver metropolitan area (Jefferson County, 1987) indicate that their consumption rate for aggregates averaged between 8.5 and 10.0 tons per person per year. It is important to understand that this figure encompasses all uses of aggregate from all sources by both the private and public sectors. State-wide, as reported by the U.S. Bureau of Mines, the three leading end uses of aggregates were:

Road base and/or cover	28%
Concrete aggregate	25%
Asphaltic Concrete (Asphalt)	12%

In order to obtain a sense for aggregate supply, demand and use in El Paso County, a survey of major producers and users was coordinated through the Mineral Master Plan Advisory Committee. Although responses were incomplete, the survey did provide some insight into local aggregate demand.

Table 1 below provides a *very general* estimated accounting of aggregate use in El Paso County based primarily on the results of this survey:

Table 1

General Accounting of Aggregate Use in El Paso County

Use	Tons/Year	General Source
Asphalt Production	700,000	60% Sand and Gravel Pits; 40% Quarries
Concrete Production	1,200,000	Sand and Gravel Pits; Some Quarry Aggregate
Road Base/ Road Gravel pits	650,000	Sand and Gravel Pits; 50% taken from County
Pikes Peak Highway	30,000	Teller County Pits
Utility Uses	100,000	Primarily Utilities Pits
Anti-Skid Material Operations (Road Sand)	50,000	Quarries or Sand
Silica Sands	250,000	Silica Sand Pits
Other and grade/ Not Accounted For*	1,000,000	Various, Mostly lower- Deposits
Total	3,980,000	

Source: Survey of El Paso County Aggregate producers, late 1993, augmented with other data and estimates by the Planning Department

* Includes a factor for producers not reporting, borrow operations, rip-rap, landscaping, military and other specialty uses.

Table 1 would indicate that concrete and asphalt combine for a larger share of total County aggregate use than would be expected based on State-wide averages. This difference could be attributable to the higher-than-average comparative rules of growth and levels of urbanization in this County.

Total local aggregate demand for El Paso County is estimated at 4,000,000 tons per year. This calculates out to about 8.6 tons per person per year based upon 1995 County population. For illustrative purposes, this equates to mining about 1.8 square miles of

land one foot deep per year. Projected future annual demand is summarized in Table 2 below. Yearly per capita consumption can be expected to fluctuate substantially depending upon growth rates in the community and the status of public works programs.

TABLE 2

Projected Annual Aggregate Demand
El Paso County

Year	Population	Tons	Tons/ Capita
1990	397,014	3,375,000	8.5
1995	463,356	3,940,000	8.5
2000	491,633	4,180,000	8.5
2005	526,838	4,480,000	8.5
2010	560,645	4,770,000	8.5
2015	596,965	5,070,000	8.5
2020	634,687	5,390,000	8.5

-1990 population taken from U.S. Census, other years are Pikes Peak Area Council of Governments (Pikes Peak Area Council of Governments) 1995 "base scenario" forecasts; forecasts are subject to future modification; annual per capita consumption assumed to remain constant at 8.5 tons.

2. Resource Allocation by Product Type

a. Introduction

Table 3 presents a summary of the primary mineral products used in El Paso County along with their usual "parent" source material. A few of the most critical minimum material specifications are also included. Specific product types are discussed in the following paragraphs.

TABLE 3

Summary of Parent Materials and Specifications for Primary Mineral Products El Paso County

Mineral Use	Parent Materials	Critical Specifications
Coal	bituminous coal	Carbon content (BTU rating) Low sulfur, low residual ash
Concrete	crushed limestone, or crushed fine-grained granite, or crushed and washed mesa gravels; and sand	Cement content, hard aggregate with no more than 15% angular or flattish fragments, low % of fines, short delivery time to site,
Asphalt	crushed limestone, or crushed coarse or fine-grained granite, or crushed or uncrushed mesa gravels	Petroleum content, angularity and graduation of aggregate stability and temperature at delivery
Chip Seal	3/8" minus crushed rock chips and petroleum emulsion	Hardness of gravel chips
Base Course	all of the above except coal	
Structural Fill	all of the above; floodplain sands and gravels; "pit" gravels	
"Anti-Skid" Material	crushed and/or washed rock or gravel	L.A. Abrasion of 35+, size and low % fines
Pipe Bedding	all of the above except coal	
Sand Blasting, Hydro-fracking, Well Packing, etc.	silica sands	Sands containing 90% or more silica, round shape, very hard, various mesh sizes 4-140
Rip-Rap	mostly limestone and granite	
Clay	clay deposits	Chemical composition, low percent impurities, color

- adapted from Empire, 1991; information is generalized.

b. Concrete

Based upon state-wide figures, the per capita annual consumption of ready mixed concrete is about 1.28 cubic yards per year. The figures included in Table 1 reflect about 30% higher concrete aggregate use in El Paso County, compared to the State average. This may be attributable to higher-than-average construction activity. Year-to-year consumption varies depending upon the construction economy and the status of special projects.

In El Paso County the majority of concrete is purchased by private-sector users except at times when major public projects (such as the new Airport) are underway.

c. Asphalt

The figure included in Table 1 calculates out to a requirement for about 1.5 tons of asphalt required per person per year in El Paso County. About 80% of the materials used to produce this asphalt come from virgin sources. Paving or paving overlay projects (roads and parking areas) account for essentially all asphalt use in this community. Ultimately, the majority of all asphalt consumed is used on public roadways. However, much of the total production is delivered to private contractors. On an average annual basis, about 60% of all asphalt is used for overlay projects and 40% is used for new construction. This ratio can be expected to increase as the community matures and if the rate of development moderates.

Demand for asphalt is seasonal because it is best laid down when temperatures are well above freezing. The County's "paving season" lasts about eight or nine months, but activity is most pronounced during the late Spring, Summer and early Fall when temperatures are most moderate.

d. Road Gravel

Due to a combination of increasing development, higher traffic counts, air-quality concerns, and more stringent development standards, the ratio of paved to gravel roads in the County is always increasing. However, at this time approximately 1,200 miles, or about 40%, of all the publicly maintained roads in the County are gravel roads. Another approximately 250 miles are "chip and seal" roads. The vast majority of this unpaved mileage is in the unincorporated County system. Based upon County Department of Transportation statistics, it is estimated that per capita consumption of gravel for unpaved and chip and seal road maintenance is 0.75 tons per year.

e. Road Base

Regardless of whether a road is ultimately paved it requires a gravel base. Standards for road bases vary, but as a rule of thumb, a six (6) inch compacted gravel base is required. This translates into the need for about 3,000 tons of gravel for each lane mile of new roadway. If 120 additional lane miles were constructed in the County each year, this would require about 0.75 tons of gravel per capita.

f. Anti-Skid Material

Until recently, State and local road crews primarily used sand or other unspecified fine materials to enhance traction on winter snow and ice. The need to meet new State air quality-related road sanding regulations has resulted in an increased specification for "anti-skid materials. The requirements for angularity, hardness and cleanliness dictate that these materials are prepared from materials which are both crushed and washed. Limestone may be used, but it is difficult for the hardness criteria to be met with this material. Producers are sometimes able to meet the anti-skid materials standard by reworking materials screened out during the preparation of other aggregate products.

g. Coal

The City of Colorado Springs Utilities is essentially the only user of coal in El Paso County. Its two major generating plants are coal fired. All coal is brought in by rail from mines on the Western Slope of Colorado. Altogether, the City burns between 1.1 and 1.3 million tons of coal per year. This equates to about 12,000 rail cars. The City pays between $13.00 and $30.00 per ton at the mine mouth. The higher figure is a locked-in contract price and the lower figure represents the current spot market price. Colorado Springs has purchased its own unit train consisting of 105 rail cars, not including spare cars.

The more critical specifications for coal include BTU rating (related to carbon content), low sulfur (related to pollution control), residual ash content and percent moisture (related to ash disposal). As noted in Chapter II. B.3, locally available Denver Basin lignite and subituminous coal has very low BTU ratings and would have a much higher residual ash content. Additionally, most local deposits are covered by too much overburden to make extraction economically feasible.

h. Clay

Essentially all of the clay mined in El Paso County is shipped to brick-making

plants in either Pueblo or the Denver metropolitan area. Important specifications include the type of clay (related to chemical composition) amount of impurities (such as sand) and color. Currently, on the order of 25,000 - 50,000 tons of clay are shipped out of the County annually. Periodically, there are local requirements for use of clay materials in various construction applications. These include construction of clay liners in landfills and water impoundments. In the case of landfills, the required clay is ordinarily taken from within the project site.

i. Silica Sand

"Silica sands" are a unique mineral resource in El Paso County in that the majority of the product is shipped out of state. These deposits are very limited in location and extent. It is postulated that deposition was a result of these particles being rolled along by the wind after other sands were blown farther downwind. This product has a variety of specialty uses including; water/wastewater filtration, hydro-fracturing (related to oil and gas well production), sand blasting, glass production and golf course construction. These sands are ordinarily washed, dried and screened to various specifications. The finished material is either bagged or bulk loaded into rail cars for shipment to a variety of users. Presently, the most marketable silica sand product is that falling within the #6-#9 mesh range (6-9 openings per inch. Roundness (sphericity) and very high quartz content are the desirable attributes which define Silica Sands. Combined processing (washing and screening) produces on the order of 25% "waste". Much of this waste material can be put to some kind of use (e.g. baseball infields, nonstructural fill)

j. Rip-Rap

Rip-rap is defined as material ranging in size from small cobbles through large boulders. The primary uses of rip-rap rock in El Paso County are for drainage channel improvements and general landscaping purposes. Within El Paso County the limestone quarries provide the major source of rip-rap materials.

3. Specifications

Some of the more important aggregate materials specifications are included in Table 3 above. These include:

a. Size

Size characteristics are often a key parameter in defining mineral aggregate products, both as they naturally occur and after processing. An aggregate size chart is included in Appendix C. Sizes are usually defined in terms of a screen mesh or a simple diameter measure-

ment. Often, a material is graded with respect to size according to a percent purity standard. For example, a specified proportion of the sample must pass through a larger mesh screen and be retained by a smaller mesh screen. Aggregate might be described as being "minus 1/2" meaning that it has passed though a 1/2 inch screen. Shipment and storage may have an adverse impact on a product which had initially met size specifications.

b. Hardness

Hardness is typically evaluated through an L.A. (Los Angeles) abrasion test. This test consists of placing the coarse materials in a tumbler with steel balls, rotating it for a specified time period and then measuring the amount of degradation.

Hardness is important in a number of applications. "Anti-skid" materials need to be hard in order to maintain their traction characteristics and to limit the production of dust. Relative hardness is also indirectly related to the maintenance of other commodity specifications. For example, after handling, a softer product may no longer meet the specification for maximum percent of fines.

c. Angularity

A high degree of angularity is often required in the specifications for aggregate mixes. This increases the surface area for adhesion. Angularity is typically measured in terms of "percent fractured faces". Since many concrete and some asphalt contracts call for aggregate with 100% fractured faces, all sources except crushed hard rock quarries are effectively precluded.

Conversely, lack of angularity, or roundness is a desired and measured attribute for silica sands. This allows the sands to readily transmit liquids, while at the same time providing maximum surface area for processes such as filtration.

d. Percent of Fines

Excess fine materials are considered as contaminants in many aggregate applications. One common method for assessing the presence of fines is to determine what percent of a sample passes through a "200" mesh screen (two hundred openings per square inch). Materials may need to be differentially screened and/or washed in order to meet an established standard for percent of fines. Prepared material (especially crushed limestone) may need to be carefully handled in order to continue to meet this standard.

e. Others

Chemical composition is often a specification. For example, high quality sands must have a minimum silica

content. Resistance to acid solubility is sometimes measured for silica sands. This may be important if these sands are to be used as a treatment media. Higher chemical reactivity is an undesirable attribute for concrete aggregate because this requires the addition of an increased amount of cement to the mix.

4. Process Operations

a. Introduction

With certain notable exceptions, raw mineral resources normally require some level of initial processing in order to be suitable for their ultimate use as mineral products. Some of these operations are ordinarily conducted at the mining site, while others are typically performed at other locations. Some of the more commonly practiced mineral processing operations are discussed in the following paragraphs. The basic processes for making concrete and asphalt are also described.

b. Blasting

Blasting is routinely required in the removal of well consolidated materials such as limestone and granite. Decomposed granite can sometimes be mined without the need for blasting. Blasting is generally performed by drilling a series of holes in advance of the mining face, charging the holes, and then firing the charges in rapid sequence. Blasting is done fairly continuously ordinarily between once every few days to once per month in active mining operations, and produces some dust, noise and vibration impacts. The vibrations from blasting are sometimes implicated in cases related to changing groundwater hydrology. In most cases, the loosened material is then moved to a crusher located on the mine site.

c. Crushing

Crushing is almost always necessary in conjunction with mining of consolidated rock for use as quarry aggregate. Crushing is sometimes also used to upgrade unconsolidated materials such as gravels in order to meet size and angularity requirements. Often this process is initially performed at the mine site for economic reasons and because the waste material is often needed as backfill. Secondary crushing may occur away from the mine site in association with final processing (asphalt production etc.).

Crushing operations vary depending upon the commodity being mined, the desired product and the scale of the operation. Systems typically employ a raised hopper which feeds into a jaw crusher. The jaw crusher reduces larger boulders to cobble sized materials. This material is then sent on via conveyer

belts to a cone crusher which produces the gravel-sized material needed for finished aggregate. Screening is an integral step in the crushing process.

Crushing machines produce significant local noise impacts and require limited amounts of water used in dust abatement spray arms. Although configurations vary, a crushing apparatus may be twenty or thirty feet tall. The process of crushing can produce substantial amounts of dust, although ancillary loading and screening activities often produce relatively larger amounts. Light pollution and glare may be significant during periods of peak market demand if the facilities are permitted to operate during non-daylight hours.

d. Screening

Screening is an integral part of the crushing operation in that fine materials need to be removed and larger materials need to be captured and re-circulated for additional crushing. However, screening may be employed without crushing in cases where the parent material consists of unconsolidated gravels or sands. A typical "two-deck" screen consists of an upper larger mesh screen which prevents entry of over-sized particles and a lower smaller mesh screen through which finer waste materials pass. The resultant captured material is then characterized by upper and lower diameter limits which correspond to the mesh sizes in the screens. A "three-deck" screen functions in the same general manner, but is capable of producing two finished product sizes concurrently. Water spray arms may be employed to reduce dust production.

An average of about 20% of the parent material processed in crushing/ screening operations ends up being screened out as fines. Much of this material is useful only as backfill material. Some of this screened out "breeze" material can be used either in asphalt production or as "anti-skid" material if it is subsequently washed.

Screening equipment has largely the same potential planning impacts as crushing apparatus.

e. Washing

Aggregate products are often washed in order to remove very fine materials which adhere even to screened material and which act as contaminants. For example, most sands are washed prior to concrete production and anti-skid materials are often washed in order to meet air quality standards. Wash plants may be set up at the mine site or in association with a separate processing facility or concrete or asphalt plant.

Wash plants may be fairly simple operations or may be very complex depending upon such factors as available water supply and production requirements. Sands or gravels are ordinarily augured through some sort of wash tank. The dirty water is then cycled into a pond or a tank where the sediment settles out with the help of recyclable floculants and coagulants. Clean water is then recirculated back through the washing system. The resulting sediments are either scooped out or piped to backfill areas. These materials may be used in some construction applications.

Washing operations necessarily involve considerable quantities of water. However, consumptive water use may be substantially reduced through re-use. Visibility, noise and lighting impacts of washing may be comparable to crushing and screening.

f. Drying

Finer aggregate materials have substantial moisture retention capabilities when they are stored in larger stockpiles. These materials may need to be artificially dried prior to shipment, spreading or processing to make concrete and asphalt. Some processing operations utilize large, natural gas fired rotating drum dryers. Other than energy consumption, the impacts of drying equipment are relatively limited when compared with other associated processes and operations.

g. Stockpiling

Stockpiling of materials is often a significant component associated with mineral extraction and processing uses. Operators often keep a variety of pre-processed, processed and post-processing materials on hand to meet fluctuating demand for products of varying specifications. Top soil, overburden and low-quality or waste materials may also end up in stockpiles. Depending upon the situation, visual impacts, blowing materials, drainage and erosion concerns and safety may be important planning issues related to stockpile management.

h. Concrete Production

Compared to the initial processing functions outlined above, concrete manufacture is more of a secondary processing function. The constituent materials for concrete vary somewhat depending upon the specific application. Generally, one cubic yard (3,855 pounds) of concrete is manufactured according to the following mix of primary ingredients:

- 34.5 gallons of water
- 1,660 pounds of coarse angular aggregate (3/4 inch max. diameter)
- 1,460 pounds of coarse washed sand (passing through a #4 mesh screen)

- 400 pounds of Portland cement
- 70 pounds of sulfur resistant fly ash

The process of producing concrete is often highly automated. This allows for batches to be tailored to meet the client's individual needs. The individual constituents are metered, mixed and then augured into a lined rotating drum. After mixing for a few minutes, the drum is emptied into a truck waiting below. Final mixing occurs in the rotating drum of the delivery truck. Concrete may be augmented through the addition of colors or strengthening fibers. Additional strength may also be achieved by increasing the cement content of the mix. The aggregate and sand are ordinarily locally produced in El Paso County, however, some aggregate is currently being brought in from Fremont County. The Portland cement is imported from a cement kiln in Fremont County as is some of the fly ash. Other fly ash comes from Pueblo County. Fly ash may be available from the Martin Drake power plant. However, this ash currently is not being used. Aggregate standards for concrete tend to be more rigorous than those for asphalt products. However, it is the cost of cement and fly ash which has the largest proportional impact on the price of the final product.

Round particles in the aggregate are desirable because they improve the workability of the concrete as it is being poured. If angular or flattish fragments exceed about 15% of the volume, workability can only be maintained by increasing the amount of sand and water, thus reducing strength, or by adding more cement, thus increasing the cost of the concrete.

Concrete binds and hardens as a result of the crystallization of hydrous calcium aluminum silicates which takes place in the presence of water. The timing of concrete delivery is therefore an especially important consideration because a ready mix batch must be poured within 90 minutes or less. The timing between deliveries is also critical to maintain a good bonding within the structure being poured.

The potential impacts of concrete plants include those of dust, noise and truck traffic. There may also be water quality impacts related to the need to periodically wash concrete trucks and production equipment.

i. Asphalt Production

Asphalt making would also be considered a secondary mineral processing function. Technically, the word "asphalt" refers to the heavy oil which is mixed with aggregates to produce the

"asphaltic concrete" paving material we commonly refer to as asphalt. Although the mixes and specifications vary somewhat, a typical ton, (2,000 pounds) of hot mix asphalt might be prepared according to the following formula:

- 13 gallons of oil
- 400 pounds of recycled asphalt (RAP)
- 700 pounds of +1/2" coarse material
- 900 pounds of -1/2" fine material

This type of asphalt is intended for immediate use after loading at the plant. Normally it must be applied within three hours of loading to maintain a temperature of approximately 280 degrees. "Cold-mix" asphalt is prepared with an oil additive which inhibits hardening as the material cools. Cold mix asphalt is normally used in limited patching applications.

Asphalt is produced in either permanent of semi-mobile plants. A number of materials substitutions and variations are possible. Recycled asphalt is an important ingredient in mixes today. Twenty percent (20%) is normally the upper limit for allowable recycled asphalt content. In addition to providing an important disposal option for used asphalt, recycling incrementally reduces the need for petroleum in the production process. In most cases, the aggregate material must be crushed to maintain the required angularity. Angularity is important because the cubicle materials need to interlock to provide strength. The cubicle materials move or flow less when placed under stress. Fine materials can be provided from a variety of sources including screened and washed crusher fines.

While petroleum represents only about 6% of the volume of raw materials used in asphalt, it accounts for roughly 50% of the materials cost, and is therefore very significant financially.

The specifications for State, County and City bids vary enough to typically require separate production runs. Some of the more important specifications include "asphalt content", gradation, temperature and stability. Asphalt content refers to the amount of petroleum used, gradation refers to the physical size ranges of the aggregate used, and stability is a measure of the ability of the asphalt to withstand breakage. Stability is largely determined by a combination of the first three factors along with the relative angularity of the aggregate materials. To produce high quality asphalt, most of the constituent aggregate materials need to be crushed and screened, but not necessarily washed. The asphalt (petroleum) content in recycled asphalt (RAP) is ordinarily about 4% so it must be augmented.

Materials are heated by a burner for the purpose of drying and maintaining production temperatures. Asphalt oil, maintained at a temperature of about 300 degrees Fahrenheit, is introduced at this point. Finished asphalt is ordinarily transferred into one or more storage silos which are used to load the trucks. A cubic yard of prepared asphalt weighs roughly 2,800 pounds.

Mobile asphalt plants are sometimes used for large one-time construction or overlay projects. This allows for reduced transport costs in the event that at least some of the raw aggregate products are available in the vicinity of the plant.

The potential impacts of asphalt production are "heavy industrial" in nature. They include the visibility of the plant and associated stockpiles, some noise and dust, as well as fire danger, and traffic. The plant's storage silos and conveyer systems may be in excess of fifty (50) feet in height. The stockpile area for a large plant may need to encompass several acres in order to accommodate the half dozen or more feed materials which need to be kept on hand. Fire is a concern because large quantities of oil must be stored on site, and the asphalt itself is potentially volatile. Substantial amounts of natural gas, propane, or oil used in the production process, may exacerbate this potential hazard.

A large asphalt batch plant may generate up to 200 external two-way truck trips per day not including employee and internal trips. Trucks may be lined up inside or outside of the facility if there is a delay in asphalt loading.

j. Heap Leaching

The term "heap leaching" describes a process whereby either new ore or previously worked mine tailings are treated with a weak cyanide solution in order to free precious metals, allowing for their recovery. There are a number of heap leaching gold recovery operations occurring in the vicinity of Cripple Creek in Teller County. Currently, there are no active heap leach operations in El Paso County. However, there have been periodic proposals to reprocess the large stockpiles of mine tailings which were deposited on the Gold Hill Mesa in the early 1900's during the operation of the Golden Cycle Mill. On-site leaching has been considered in some plans, while others involve removal of the tailings to a remote site. Gold Hill Mesa is located within the City Limits of Colorado Springs, but a remote processing site may be located within an unincorporated area.

If heap leach processing is to occur on a remote site, the Colorado Division of Minerals and Geology normally requires a reclamation permit which addresses both the materials recovery and processing locations. In the case of a "custom site" which receives ores from several locations, a State Health Department permit may be required in lieu of a reclamation permit.

Heap leaching operations are somewhat unique in that acute ground and/or water quality impacts may occur due to faulty design or operator error. Additionally, cyanide may become an airborne toxic if it is entrained along with blowing dust.

k. Summary

The following table (Table 4) presents some of the more important planning issues which will likely be related to primary mineral processing functions.

TABLE 4
Planning Issues Related to
Primary Mineral Processing Activities

Processing Activity	Planning Issues*
Blasting	noise, vibration, dust, safety, groundwater disturbance
Crushing	visibility, noise, dust
Screening	dust, water use/re-use, visibility, noise
Washing	water use/re-use, visibility, drainage and erosion control
Drying	utility availability, fuel storage
Stockpiling	visibility, blowing materials, drainage and erosion control
Concrete	visibility, noise, dust, water availability and quality, truck traffic
Asphalt	visibility, water quality, noise, fire danger, dust, truck traffic
Heap Leaching	water quality, visibility, traffic, dust, drainage and erosion control

*Light pollution/glare may be a factor in all cases if the activity is to be carried out during non-daylight hours. Facilities requirements and transportation impacts are variable but generally correspond with the number of employees.

5. Resource Allocation by End Use

   a. Road and Bridge Construction

      Table 5 below describes the aggregate requirements for "typical" sections of new roadway construction. Using a rule of thumb that 120 new lane miles are added to the County-wide system each year, approximately 600,000 tons of aggregate are needed for this purpose annually. By comparison, aggregate required for new bridges is less significant.

TABLE 5

AGGREGATE DEMAND FOR TYPICAL CONSTRUCTION APPLICATIONS

Use	Unit	Tons Required
Gravel Road[1] (Two-lane section)	1 mile	6,000
Paved Road[2] (Two-lane section)	1 mile	10,000
Curb, Gutter and Sidewalk[3]	1 mile	2,000
Drainage Bank Protection[4]	1 mile	23,800
Residential Dwelling Unit[5]	1 home	150

Sources: El Paso County Department of Transportation and Planning Department estimates, 1995; residential dwelling unit information provided through Colorado Rock Products Association.

b. Road and Bridge Maintenance

As previously described in this document, the total aggregate demand for road maintenance purposes is very significant. Most of this demand is attributable to re-graveling of roads or asphalt overlays. Altogether, roughly 800,000 tons of aggregate materials are used for road maintenance purposes each year.

c. Building Construction

Concrete production accounts for the majority of

[1] Assumes 30-foot wide mat with six inches of compacted gravel.
[2] Assumes 28-foot wide mat with six inches of compacted gravel and a four-inch asphalt overlay.
[3] Assumes standard specifications for curb, gutter and sidewalk constructed on both sides of a roadway.
[4] Assumes five-foot high rip-rap bank protection wall with a five-foot buried toe, one side of channel only; and bedding gravel for a maintenance road.
[5] Assumes 2,000 square foot single-family house; on-site improvements only.

aggregate demand in the building industry. As an example, a "typical" 2,500 square foot house requires about ninety (90) cubic yards of concrete, equating to a demand for one hundred fifty-two (152) tons of aggregate.

d. Airport Construction and Maintenance

Airport construction and other related activities can have a very substantial impact on aggregate demand during periods when these activities are taking place. Runways and aprons, in particular, require tremendous quantities of high-quality concrete and gravel base course.

e. Drainage Facilities

With today's shift toward more naturalistic forms of drainage facilities, the material of choice for larger bank protection projects is rip rap. A typical mile of bank protected with rip rap on one side would consume approximately 18,300 tons of rip rap. Gravel is required for drainage channel maintenance roads. Concrete is also required for such applications as culverts and drop structures.

6. Governmental Procurement

a. Introduction

Although most of the materials mined in El Paso County are not sold directly to governmental entities, a majority of the finished products ultimately end up in public sector projects. There is a continuum of governmental participation in mineral and mineral product use involving many, if not all of the following basic scenarios:

- Raw products obtained from a government-owned pit (e.g. Utilities Dept. gravel pit)
- Direct purchase of raw product at the mine site (e.g. pit gravel)
- Contract delivery of raw product to a designated site (e.g. anti-skid material)
- Purchase of mineral-based product for direct use (asphalt patch mix)
- Contract purchase of mineral-based product (e.g. contract asphalt overlay)
- Private contract to install public facilities (e.g. public roads constructed by a developer in satisfaction of a subdivision improvements agreement)

Table 6 below summarizes El Paso County's purchases of aggregate products over the five (5) year period from 1988-1992

TABLE 6
El Paso County's Procurement of Mineral Products
(annual averages)

Commodity	Amount/Value/Unit Price
Pit Gravel	192,198.40 cy $99,943.17 $0.52/ cy
Graded Aggregate #7	10,870.93 tons $123,276.33 $11.34/ ton
Graded Aggregate #8	7,877.13 tons $84,994.28 $10.79/ ton
Rip-Rap	2,030.12 tons $17,296.63 $8.52/ ton
Anti-skid Material	7,130.31 tons $36,721.11 $5.15/ ton
Asphalt (plant mix)	25,893.36 tons $395,909.51 $15.29/ton
Asphalt (contract overlay)	50 - 75,000 tons

Notes: 1) El Paso County numbers are all 5-year averages(1988-92)
2) cy = cubic yard

Source: El Paso County Department of Transportation, Fall 1993

b. Federal

The United States government funds a substantial proportion of major highway construction and airport projects through the Highway User's and Aviation Trust Funds. However, the actual projects are carried out by state and local agencies in almost all cases. Federal agencies do influence specifications to the degree that they require projects to be built for a designated life span. Nationally accepted AASHTO (American Association of State Highway and Transportation Officials) standards are used in the case of highway projects.

c. State

The Colorado Department of Transportation (CDOT) has jurisdiction over about 230 miles of roadways within El Paso County. This State system includes Interstate 25 as well as many of the other major roadways in the County. Most of the aggregate and aggregate-related materials used to construct and maintain this State system are used by private contractors who bid on specific projects. The State directly purchases on the order of 10,000 tons of aggregate per year, much of this as asphalt.

d. County

The El Paso County Department of Transportation is responsible for the maintenance of approximately 1,850 miles of roadways, about 40% of which have paved or chip and seal surfaces. On a year-for-year basis the County constructs a limited amount of new road mileage. Most new roads are constructed by developers and then deeded to the County for maintenance.

Each year the County directly uses about 350,000 tons of aggregate products, most of which go to the re-graveling of roads. Additionally, the County administers an annual asphalt overlay contract averaging about 75,000 tons. Altogether, the County directly or indirectly purchases about 1.0 tons of aggregate per person per year.

e. Municipal

Colorado Springs accounts for the vast majority of municipal aggregate purchases in the County. The City maintains about 1,265 miles of paved roadways. Altogether Colorado Springs buys about 200,000 tons of material per year, 75% of which is used for asphalt. Combined aggregate use by all municipalities probably equates to about 0.5 tons per capita.

f. Other

Colorado Springs Utilities, which is a separate enterprise under the jurisdiction of

Colorado Springs City Council, operates its own gravel pit and utilizes possibly 100,000 tons of gravel annually for its purposes. Use can be expected to increase during those years when major utility infrastructure is being constructed.

Specific use statistics are not available from area military installations, but it is estimated that this demand is substantial, especially during period of high maintenance or construction activity.

7. Private Sector Procurement

   a. Road Construction

      As has been described in Chapter II. D. of this document in a typical year the majority of new road construction in the County is undertaken by the private sector. Once constructed, most roads are deeded over to a governmental entity for maintenance. Representatives of the aggregate industry estimate that about 50% of all asphalt demand is attributable to private road or parking area construction projects. The curbs, gutters and sidewalks associated with a typical subdivision road require a considerable amount of concrete. This calculates out to about 1,200 cubic yards per mile, requiring about 2,000 tons of aggregate.

   b. Building Construction

      Industry representatives estimate that at least 75% of all concrete used in a typical year is purchased for use by the public sector. Much of this concrete goes into building construction and associated uses such as driveways, curb and gutter and sidewalks.

8. Inter-County Transfers

   As described in previous sections of this Plan, most of the mineral resources extracted or consumed within El Paso County never cross County boundaries. However, there are several current and potential future exceptions to this generalization, some of which are listed in Table 7 below:

Table 7

Inter-County Transfers of Mineral Resources

Commodity	Transfer
Silica Sands	- El Paso County to world-wide users
Clays	- El Paso County to Pueblo and Denver area brick plants
Gravel	- Teller County to Pikes Peak Highway - Arkansas River to El Paso County asphalt plants - El Paso County pit to Elbert County
Peat	- Teller County to El Paso County soil mix providers
Cement	- Fremont County to El Paso County concrete plants
Gold Ore	- Teller County to El Paso County landscape rock suppliers
Asphalt	- El Paso County asphalt plants to Teller and Douglas County construction projects
Coal	- Western Slope of Colorado to power plants in El Paso County

Source: El Paso County Planning Department, 1995

Note: EPC = El Paso County

As product demands along the Front Range increase and sources of supply become more limited, it is possible that inter-County transfers could also increase. Much of the potential for inter-County transfer will be tied to the relative availability of rail haul and the cost of diesel fuel for hauling by truck.

E. Elements of Resource Supply

1. Permitted Capacity

a. Permitted Operations

An integral part of assessing the "supply side" of the mining picture in El Paso County involves determining the quantity and quality of resources currently under State permit. Although certain additional factors and constraints apply in a minority of cases, possession of a valid State reclamation permit ordinarily implies a right to mine. Because State permits are required as a precursor to almost any type of mineral extraction, a survey of all active state permitted sites provides a reasonable method for estimating the current supply of available minerals.

As of August 1995, the Colorado Division of Minerals and Geology files included a total of 130 permits for El Paso County. Most of these are depicted on Map 1. As indicated in Table 8 below, less than half of this total falls within the "active" category. Terminated permits ordinarily involve sites which have been closed and reclaimed to the satisfaction of the State.

TABLE 8

State Reclamation Permits
Categorized by Status
El Paso County

Status	Number
Active	47
Terminated	69
Withdrawn	6
Awaiting Warranty	3
Incomplete	1
Application in Process	2
Other	2
Total	130

Source: El Paso County Planning Department and Division of Minerals and Geology County Reports, 1995

Of these approximately 50 "active" sites, eight (8) have recently been closed by the El Paso County Department of Transportation This figure additionally includes three (3) completed or limited borrow operations, a closed coal strip mine, a closed State Highway Department gravel pit, and the inactive Chipita Ranch and Summit Pits. If all of these sites are eliminated the total number of "Potentially Viable Permitted Sites" is reduced to approximately 41. These remaining permits are categorized according to resource type in Table 9 below.

TABLE 9

Potentially Active Mining Permits Categorized by Commodity Mined

Commodity Mined	Number
Sand or Sand and Gravel	30
Silica Sand	4
Clay	3
Limestone	2
Granite	1
Shale	1
Total	41

*One additional silica sand operation is under temporary closure

Source: El Paso County Planning Department and Division of Minerals and Geology County Reports

Of the 30 sand or sand and gravel operations, nine (9) are permitted to El Paso County and one (1) to Elbert County. The other twenty (20) or so are privately operated. Approximately twelve (12) of these active, potentially viable operations have some form of zoning approval by El Paso County. The others are legal nonconforming uses or are located in unzoned areas.

During the process of review of this Plan it was pointed out that the costs of applying for and maintaining a State reclamation permit makes it difficult for a potential small operator to establish a mining operation in advance of when it will be needed. This may lead to future conflicts with property owners in the area.

b. Permitted Capacity By Commodity

El Paso County Planning Department staff have attempted to estimate the approximate amount of mineral resources which remain available in permitted sites. Maps 1 - 3 depict the location of these operations. They are differentiated from inactive sites by a "pick and shovel" symbol. Where possible, capacity figures were taken directly from operators statements and reports. However, the most common methodology involved review of the MLRD files and calculation of an approximate figure by estimating remaining permitted

acreage and an average depth modified to include a waste factor. General ratios of 2.2 tons per cubic yard for consolidated materials and 1.5 tons per cubic yard for alluvial materials were used. Documentation for calculations is available in the El Paso County Planning Department. Altogether, about 5,500 total acres in El Paso County are under some type of State reclamation permit. However, it is noteworthy that over 25% of this average is accounted for by two clay mines. Another 30% of total permitted acreage is devoted to the County's three most-extensive sand and gravel operations.

1) Sand

Many of the sand extraction operations in El Paso County are categorized under the more generalized commodity designation of "sand and gravel", with some operations actually producing quantities of both products.

County staff identified approximately twelve (12) permitted sites which appear to produce sand (other than silica sand) exclusively. Altogether, approximately 38,000,000 tons of sand are available in these sand-only operations. This represents possibly an 80-year supply. It is notable that one pit (Daniels Sand, located on South Academy Boulevard) accounts for roughly 75% of this capacity.

In reality, there is quite a bit of additional permitted sand capacity associated with combined sand and gravel operations (see below). The largest of these permitted reserves are located along Interstate 25 between the City of Fountain and the Pueblo County line.

2) Gravel

Approximately seven (7) gravel-only mining permits were identified in the County's inventory. Together these account for approximately 39,000,000 tons of permitted reserves. This equates roughly to over fifty (50) years' demand for general purpose gravel, noting that the hard-rock quarries and combined sand and gravel operations have the effect of increasing this capacity. The gravel capacity picture becomes a great deal more complex when the issue of specifications is introduced. No single operation dominates this category of permitted reserves.

3) Sand and Gravel

It is difficult to distinguish the proportion of sand and/or gravel produced

by some of the pits in El Paso County. Therefore, a total of about seventeen (17) permitted facilities were categorized as producing a combination of "sand and gravel." Altogether, these facilities account for roughly 75,000,000 tons of reserves. Much of this material is of undetermined quality. It needs to be emphasized that, in most cases, this material does not meet the standards necessary for concrete or asphalt aggregate. This category of operations includes many of the "pit gravel" sites leased by the County Department of Transportation in the eastern County.

4) Silica Sand

Chapter II. D. I. of this Plan describes the unique importance of silica sands as a valuable mineral export. As noted in Table 6 above, there are only three (3) active operating silica sand mines in El Paso County. These are located in the Briargate and Northgate areas, and they are operated by a single company on leased properties. Both pits adjoin areas which are undergoing substantial urban density development. At least three (3) other silica sand pits have been closed due to a combination of depleted supplies and development in the Briargate area. Another site is under temporary closure, and its future is in question due to projected development. An additional mine, operated by another company is listed as awaiting warranty. That company reportedly went out of business.

Total permitted silica sand reserves are estimated by industry representatives to be three (3) to four (4) million tons. Based on an assumed annual production of 250,000 tons, this supply could last for twelve (12) to sixteen (16) years. However, it needs to be emphasized that each of the three active permitted sites is potentially impacted by adjacent development. Permitted operations may be constrained by local government conditions and/or lease limitations. Development pressure and limited resource distribution will be combined to limit the potential for new sites to be opened.

5) Clay

There are a total of three (3) State-permitted clay mines in El Paso County. All are located in the vicinity of Calhan, Colorado, on property which is currently unzoned. One of these operations is

associated with the historic "paint mines" south of Calhan. Another is a recently approved three hundred twenty (320) acre site. The third operation is very small and was used to provide material to line the Sun-set Village wastewater plant lagoons. Altogether, about one thousand seven hundred (1,700) acres are under permit, with possibly half that acreage available for mining. Total permitted reserves are likely to be in excess of three million (3,000,000) tons. With annual consumption in the area of fifty thousand (50,000) tons, the life of these reserves would be roughly fifty (50) years.

As with silica sands, essentially all of this material is exported out of El Paso County. Total truck trip generation is estimated at an average of five (5) to ten (10) per day. Urban development pressure is not likely to adversely impact this re-source, but it should be noted that this deposit of refractory clay is essen-tially unique in El Paso County.

6) Limestone

With the closing of the Queen's Canyon Quarry in 1990, El Paso County is left with two operating limestone quarries. These are the Pikeview Quarry- south of the Air Force Academy, and the Snyder Quarry located west of the Garden of the Gods. Together these account for a reserve of approximately thirteen million (13,000,000) tons. This permitted reserve is the equivalent of ten (10) to fifteen (15) years' supply of high quality concrete aggregate. However, it is important to understand that these operations currently supply a broader range of categories within the gravel market. There are some options for sub-stitutability from others sources. On occasion these quarries also export their product beyond the limits of El Paso County.

7) Granite

The County has only one (1) permitted hard rock "granite" quarry. This is located west of State Highway 115 near the Fremont County line. The material mined is "granodiorite". It is suitable for concrete aggregate after being blasted and crushed. According to statements by the operator, as of late 1993 approximately two million (2,000,000) tons of material remain in the permitted area with another fourteen million (14,000,000) tons available in the adjoining leased-but-not-permitted

area). In 1986, the previous operator petitioned for expansion of the permit area. This Use Permitted by Special Review was denied by the Board of County Commissioners in response to residents concerns related to traffic safety and environmental quality.

Subsequently, a petition for an approximately 60 acre granodiorite quarry was received in association with the Louisiana State University Camp property located to the north on Highway 115. If approved, this operation would have allowed for the extraction of approximately 38,000,000 tons of material. However the application met with stiff opposition and was never carried forward to the Board of County Commissioners.

8) Other

There is one (1) coal strip mine technically under permit in the County. However, this operation near Franceville south of State Highway 94 is under a plan for reclamation only and has not produced coal since 1981.

There is also one (1) small decorative quartz mine permitted in an area west of the Town of Palmer Lake.

9) Conclusion

Table 10 below provides a general estimate of remaining permitted capacity of mineral resources by commodity type. In some cases, the figures provided are the result of very rough calculations, but they do present a sense for relative amounts of permitted supply. It becomes readily apparent that the "quarry aggregate" and "silica sand" categories have the least remaining permitted capacities. As will be described later in this document, potential new sources for these resources are very limited.

TABLE 10

Permitted Reserves by Commodity Type

Commodity	Permitted Capacity (tons)	Supply in Years
Quarry Aggregate	15,000,000	12-20
Sand	30 - 40,000,000	80+
Gravel	30-40,000,000	50+
Sand and Gravel*	75,000,000	40+
Silica Sands	3 - 4,000,000	12-16
Refractory Clay	3,000,000+	50+
Coal	0	N/A
Quartz	200,000**	N/A

* material not specified; gravel is the commodity usually mined; quality highly variable; most does not meet concrete or asphalt aggregate standards.

** very rough estimate

Source: El Paso County Planning Department 1995 estimates using a combination of Colorado Division of Minerals and Geology permit information and operators' statements.

By comparison, the Aggregate Analysis for the Denver Metropolitan Area (Jefferson County Planning Department, 1987) estimated that study area to have approximately 340,000,000 tons of permitted aggregate reserves. This equated to about 18 years of available reserves.

2. Potential Additional Capacity

   a. Introduction

      Potential additional capacity could be most broadly defined as the amount of unpermitted reserves of a given mineral resource which may be theoretically available anywhere in El Paso County. However, actual available capacity, besides not being entirely known, is limited by a variety of constraints which are discussed in some detail in Chapter III of this Plan. In the following Section the relative physical availability of potential additional capacity is discussed according to category.

   b. Quarry Aggregate

      Within El Paso County, potential new sources of quarry aggregate are extremely limited. These are limited to areas of limestone outcroppings, as well as certain fine-grain granites and metamorphic associated rocks. The Empire Study identified less than 6,000 acres of these deposits County-wide. As is discussed in Chapter III, much of this acreage has limited availability for mining.

c. Higher-Quality Gravel

According to the Empire Study, there were approximately 60,000 acres of potential gravel deposits in El Paso County at one time. These are depicted as "mesa gravel" and "stream terrace deposits" on Map 1. However, not all of these areas contain deposits of commercial quantity. Much of this property has been developed or is encumbered by various planning constraints.

d. Sand

The Empire Study (Map 1) depicts almost 300,000 acres of eolian (windblown) deposits as well as other areas where construction-grade sand may be available in commercial quantities. While not all of these areas contain sand which meets required specifications, it is clear that overall potential reserves of sand are extensive.

e. Lower-Quality Gravels

The Empire maps depict over 500,000 acres of "upland deposits" as well as other areas where lower-quality gravel deposits may be found. Overall, it is clear that there is no shortage of lower-quality gravel in the County, especially in the Eastern County. However, as specifications are increased, these sources can be expected to have limited applications.

f. Silica Sands

The Empire Study does not delineate deposits of "silica sands." These are extremely limited in geographic location and extent, occurring only in the general vicinity of Briargate. Potential future availability can be measured on a deposit-by-deposit basis.

g. Clay

Areas of potential clay deposits have been transferred onto the Mineral Resource Maps (see Map 1) from the original 1975 Mineral Master Plan. Areas are limited to a band along the Front Range and sites in the vicinity of Calhan. Altogether 5,351 acres are shown in this category. These areas are not entirely inclusive of potential clay deposits in the County, and commercial quantities may not be available in all areas which are shown.

h. Coal

Approximately 99,811 acres of potential coal deposits are shown on Map 1. However, many of these deposits are mined out or otherwise unavailable. In any case, as of the time of preparation of this Plan, it is understood that it is not commercially feasible to mine any of the coal deposits in El Paso County at this time.

3. External Sources

   a. Introduction

      Areas outside the boundaries of El Paso County currently supply some of the mineral and mineral products used in this region. In order to prepare a viable mineral master plan for this county, both existing and potential future outside sources need to be evaluated. Potential external supplies are very generally summarized in the following discussion.

      The viability of external mineral sources is a function of several interrelated factors including local availability, substitutability, the relative value of the commodity and the comparative degree to which the outside jurisdictions regulate mining. The following is a fairly qualitative summary of the status of surrounding jurisdictions as present and potential future sources of external supply:

   b. Surrounding Counties

      Currently Fremont and Pueblo Counties are the only sources which regularly supply users in El Paso County with significant quantities of aggregate materials. A number of sand and gravel pits in Fremont County are used to supply materials for concrete and asphalt plants in the Colorado Springs area. In addition to concerns with transportation costs and traffic safety issues along State Highway 115, there is a long-term concern that Fremont County may "balk" at being a primary aggregate source for El Paso County. However, based upon discussion with the Planning staff of Fremont County, it would not appear that there will be an impending shortage of permitted aggregate supply in Fremont County.

      Pueblo County has a substantial number of permitted sand and gravel operations, many of which are associated with the Arkansas River and its major tributaries. The primary trade-off with respect to this potential external supply is the cost of delivery. Many of the permitted pits in Pueblo County are only operated when there is an active project in the immediate vicinity. Apparently waste slag from the C.F. & I. Steel Mill is usable for some aggregate applications.

      Opportunities for aggregate substitution from the west, north and east would appear to be quite a bit more limited. Douglas County has the potential resources but very few permitted sites. The planning and political climate there are not conducive to additional approvals. Jefferson County, farther to the north, has a number of permitted quarry sites but these are located at least forty (40) miles from the nearest large Colorado Springs markets. Jefferson County already serves a

substantial share of the Denver metropolitan area market.

Teller County has limited high quality aggregate supplies, so it is unlikely they can be relied upon as a major external source. The City of Colorado Springs does maintain the Pikes Peak Highway with materials obtained from pits located in Teller County. Conversely, El Paso County supplies Teller County with much of their needed high quality aggregate.

Counties to the east have limited potential for aggregate supplies due to a combination of distance and poor quality resources.

F. Economic Impacts and Considerations

1. Cost of Production

Construction sand and gravel, crushed stone and, to a lesser degree, concrete and asphaltic concrete are high volume, low-value commodities. Nationally, the constant dollar unit (f.o.b.) values for the most common grades of sands and gravels have remained relatively stable. Increased real costs of labor, energy, equipment and environmental compliance have been offset through increased use of automation and more efficient equipment. In the future, constant dollar prices are expected to rise because of decreased deposit quality and more stringent environmental and land use regulations.

In 1991, the National average unit price for construction sand and gravel was $3.60 per ton f.o.b. (at the mine site). For Colorado, the 1991 figure was $3.47. For crushed stone the comparable 1991 values were $4.70 per ton for the U.S. and $4.88 for Colorado.

As noted under Transportation below, accessibility is a major key to the real price of these commodities.

2. Employment

Statewide, Colorado's mining employment, which included oil and gas production, totaled 19,500 in 1991. El Paso County's share of this employment is quite low, primarily because essentially no metals and coal mining or oil and gas production takes place within this County.

Since 1940, direct employment in the El Paso County mining industry has remained at fairly low levels, generally accounting for 100-200 jobs (refer to Figure 2). In 1991 the Colorado Department of Labor and Employment listed 119 persons working at 13 establishments with a total direct payroll of $3,622,000. By applying multipliers of 1.75 for employment and 1.65 for payroll, the total direct and indirect 1991 impacts calculate out to 208 jobs and $5,976,000 in total payroll. These figures roughly equate to 0.1 percent of the total El Paso County economy. It should be noted that in all probability the above numbers somewhat understate the local employment

impact of mining. Some workers who are engaged to some degree in mining, are reported to the State in other employment categories. For example, the independent truckers who haul from many of the mineral extraction sites in the County are not included in this accounting. Also, mining jobs have traditionally paid higher than average wages in this region.

If all workers associated with mining and mineral processing (e.g. asphalt and concrete production) were accounted for, it is likely that total County mining-related employment would be in excess of 500 persons. However, the majority of these individuals would probably continue to be employed within the County even if most of the raw mineral products were imported.

3. Other Economic Impacts

   a. Property Taxes

      As of late 1992, nineteen (19) of the tax parcels in El Paso County were directly assessed for mineral-related uses. These properties include many, but not all of the major active extraction operations in the County. Altogether these 6,618 acres, have an assessed value of $823,810 along with their associated real property improvements. This represents about 0.2 percent of the property in the County and 0.04 percent of all real property valuation.

      The 1992 valuation for severed mineral interests totaled $417,060 for 1182 parcels covering 201,793 acres. These severed mineral rights include those for oil and gas. Severed rights are associated with about 15% of the land in the County, but less than one (1) percent of the parcels. Ordinarily, such property is assessed at a standard $2.00 per mineral acre. The mineral rights associated with the remaining acreage in the County are not severed and are therefore not given a separate valuation.

      The 1991 County assessment also included $1,688,000 in assessed value for all natural resources-related personal property. What portion of this relates to mining is unknown. Altogether, mining-related real and personal property accounts for on the order of 0.1% of the County tax base.

   b. Sales and Use Taxes

      Sales tax revenues derived from raw mineral product sales in El Paso County are significant, but relatively unimportant when compared to other economic considerations. Mineral producers are only required to pay sales taxes on materials sold to private accounts, and then only when the product is delivered to an end user within the taxing jurisdiction. An analysis of 1991 and 1992 sales tax records for

several of the larger mineral extraction and mineral processing firms in the County indicates that these companies contributed roughly $100,000.00 - 150,000.00 in sales taxes to the County each year. Secondary products such as concrete and asphalt appear to account for at least 80% of this revenue. It is arguable that these processing functions would continue to exist (and pay taxes) even if some raw product had to be imported from outside the County.

c. Leases and Royalties

Mineral royalty and lease income has not been determined, and may be locally significant in El Paso County. However, the Countywide impact of leases and royalties is likely to be insignificant. This is because most of the major operators in El Paso County maintain fee simple ownership of their mining sites.

d. Indirect Impacts

Although it is sometimes difficult to establish appropriate limits, it is clear that local mining has associated secondary economic impacts in addition to traditional employment multipliers. For example, to varying degrees, local processing, and to some degree, local shipping, would not occur in the absence of local supplies. One example is the almost $300,000 annually spent on natural gas for silica sand drying. Lease and royalty income are other examples for which comprehensive figures are not available.

Mineral product haulers certainly account for a substantial amount of taxes related to vehicle use and ownership. However, it is logical to presume that most of these revenues are counterbalanced by the costs of maintaining the roads used by these vehicles.

4. Transportation Costs

Arguably, the more important economic aspect of mining in El Paso County is the degree to which locally available resources reduce the cost of construction and maintenance. Aggregate is a generally high bulk, low value commodity. A rule of thumb for larger distances is that it costs 7.5 cents per ton to transport raw mineral products one additional mile by truck.

A sense for the importance of incremental transportation costs can be derived from Table 11 below. It illustrates the approximate distance-related variations in delivered costs for a number of sample commodities.

TABLE 11

Variations in Final Delivered Cost Per Ton Related to Hauling Distance

Commodity	Undelivered Cost	10 Mile Cost	25 Mile Cost	100 Mile Cost
Pit Gravel	$ 0.35	$ 1.10	$ 2.23	$ 7.85
Concrete Sand				
#7 Aggregate	$ 11.34	$ 12.09	$13.22	$18.84
Asphalt	$ 15.29	$ 16.04	$17.16	N/A
Concrete	$ 25.00	$ 26.00	$27.50	N/A

Notes: 7.5 cents per ton per mile and truck hauling assumed in all cases except for concrete which was assumed at 10.0 cents per mile; 100-mile costs are not provided for concrete and asphalt because these commodities can not be delivered over this distance.

Source: El Paso County Planning Dept.

As would be expected, transportation-related costs have the largest relative impact on the lowest value commodities. For example, in the case of a one way trip distance of 25 miles, the proportional impact of over the road hauling costs varies between 10% and 85% of the total delivered costs for the commodities described above. It should be noted that Table 11 probably under-represents the distance-related costs of delivering concrete and asphalt because of the reduced capacity of these trucks. Because labor and fuel costs are two of the key components of overall transportation costs, increased traffic congestion places upward pressure on per mile costs. Congestion also reduces the effective range from asphalt and concrete plant sites, especially during peak traffic hours.

A presumed future reduction in the number of aggregate sources in El Paso County will likely result in an increase in average hauling distances along with a corresponding increase in hauling costs. However, these increased hauling costs may account for only a minority of future price increases. Other factors related to environmental regulation and/or lack of competition, may contribute a larger proportion.

Rail haul may be an economically viable option, once distances reach a certain threshold. For example, in the

case of the new Denver Airport high quality crushed granite aggregate was brought in by rail from Wyoming in lieu of truck haul from more local sources. As a rough rule of thumb, aggregate can be hauled by rail at about 2.5 cents per ton/ mile versus 10 - 12 cents for hauling by truck. However, there are relatively few existing or potential future mine sites which are situated immediately adjacent to rail lines. Additionally, most final delivery points for aggregates do not have rail access. Cost estimating for most rail haul alternatives would need to account for a truck haul segment on both ends. Although no specific figures are available, it would appear that rail haul would be a limited and expensive option for the hauling of common variety aggregates.

Finally, it should be emphasized that a shift to non-local aggregate suppliers is not likely to have that large an impact on total material usage. Demand for aggregate is fairly inelastic. Combined traffic impacts to the County would almost certainly be greater in the event that outside aggregate resources were to be used in any large quantity.

G. Institutional Constraints

1. Incorporated, Developed and Platted Property

a. Introduction

An understanding of the extent of incorporated, developed and platted property is an essential component in the preparation and application of a viable mineral master plan. The reasons for this are jurisdictional, practical and regulatory. To begin with, any properties which are located within municipal limits (either now or as a result of future annexations) effectively fall outside of the legal purview of this document. Secondly, most already developed properties will be unsuitable for mining. Finally, many platted but yet undeveloped areas will also be unsuitable for mining. Due to their already platted status, these parcels are also effectively exempt from one of the major stipulations of the 1973 "Preservation Act."

That stipulation is essentially that a Board of County Commissioners shall not take a land use action which would interfere with the present or future extraction of a commercial mineral deposit.

b. Incorporated Areas

Approximately 9.5% of the area within El Paso County is now located within one of its eight (8) municipalities. With 182.2 square miles within its city limits, the City of Colorado Springs accounts for almost 90% of this incorporated territory. Municipal limits are depicted on the Map 2 which is an appendix to this document.

Traditionally, most mineral extraction and many mineral processing activities in El Paso County have occurred

in unincorporated areas. Of the approximately forty (40) reasonably active permitted sites in El Paso County, it appears that only three (3) silica sand mining operations and one (1) major gravel mine are located within city limits. Additionally, there are several materials stockpile areas within City limits. Many of these are associated with asphalt and concrete plants. Typically, cities and towns will annex only those areas with existing or planned urban density development. Existing mining operations are almost never annexed, and it would be especially difficult to permit a new mining operation within city limits. For these reasons it is appropriate to make a general planning assumption that opportunities to establish new mining operations within city limits will be fairly limited. Conversely, it is not unreasonable to expect new mineral processing operations to locate within municipal areas which are zoned for heavy industrial purposes. This is especially true for those municipal areas in which concrete and asphalt plants are already located.

c. Developed Areas

Only about fifty (50) percent of all of the municipal property in El Paso County is currently developed. Obviously, the opportunities for mining in currently developed areas are extremely limited. In addition to incorporated areas there are substantial unincorporated areas which are developed, and therefore not reasonably available for mining. Altogether, about 115,000 persons or 25% of the County population resides in unincorporated areas. Most of the non-military proportion of these residents live in either sub-urban or rural-residential developments. Because of the lower average densities involved, unincorporated areas account for more developed property than is found in municipal areas. For the purposes of this analysis, it was decided that the inventory of platted property (described below) would be a reasonable substitute for an inventory of unincorporated developed property. The major exceptions to this approach are the Rancho Colorado subdivisions along south Interstate 25 and selected parcels in the 35-acre category. These are also discussed below.

d. Platted Property

Part of the planning overlay process for this Plan involved an inventory of platted unincorporated property. Platting status is an important factor because it provides a strong (but not 100% conclusive) indication of the parcels' lack of availability for mining. Altogether, the County Planning Department identified a total of one hundred twenty-one (121) square miles of platted unincorporated properties. These areas are depicted on Map 2. This

survey is fairly complete, but it should be understood that its accuracy cannot be 100% guaranteed. It should also be understood that platted status does not fully preclude a parcel from being mined.

In some cases, parcels within larger lot subdivisions might be mined for local construction purposes. There are also areas such as Rancho Colorado (located west of Interstate 25 near the Pueblo County line) where properties were previously platted, but where no viable development has occurred. In El Paso County there are also a growing number of 35 and 40-acre tracted but not subdivided developments. While the opportunities for mining on these properties is diminished, staff concluded that it was not appropriate to entirely exclude these larger properties as potential mining areas.

2. Military Lands

The major military properties within El Paso County are Fort Carson, the Air Force Academy and Falcon Air Base. Potential aggregate resources for Fort Carson and the Air Force Academy were not mapped as part of the Empire study. The 1975 Resource Maps depict substantial gravel and some clay deposits within Fort Carson, but no areas of potential hard-rock quarry aggregate. A small area of potential clay deposits was also depicted within the Air Force Academy.

Because El Paso County does not exercise zoning authority within military installations, it is unlikely that there would be any formal local review of mining operations within these facilities.

Within the part of Fort Carson located within El Paso County there are no substantial ongoing mining operations, and none are anticipated. Small borrow pits are utilized on a project-specific basis. These are ordinarily kept below one (1) acre in area in order to limit the need for fugitive dust permits. Mineral rights within Fort Carson are administered by the Bureau of Land Management (BLM).

Because Fort Carson has not been targeted for either closure or major force reduction in the latest 1995 Defense Department Base Realignment and Closure (BRAC) process, its short- and medium-term future as a military installation appears secure. However, there is still some possibility that the facility could be closed or substantially downsized in the more distant future. In that event, extensive gravel and other mineral resources could become available for commercial extraction.

Within the Air Force Academy, there is one (1) former clay mining site which was under State permit. Sources at the Academy indicate that no major mining activities are occurring at this time and none are contemplated for the future. One or more mobile asphalt batch plants have been periodically located on the Academy, primarily for

the purpose of serving internal paving needs.

It is also noteworthy that the Forest Service properties which provide the visual backdrop for the Air Force Academy were withdrawn from availability for mineral entry during the late 1950s.

In conclusion, it is reasonable to assume for planning purposes that any mineral resources within military installations should not be considered as being potentially available for commercial extraction.

3. Federal Withdrawals

Map 2 includes a layer which delineates United States Forest Service properties for which the rights to prospect for and claim "common variety" minerals have been withdrawn. The "common variety" mineral category includes use of materials for aggregate purposes. A total of 79.8 square miles, or 3.7% of all El Paso County Forest Service properties, are depicted as withdrawn. This area includes a substantial majority of the visible Front Range Mountain backdrop.

4. Other Institutional Constraints to Mining

In addition to those categories of land uses identified above, there are certain other land tenure situations which practically or legally reduce the likelihood that a given property will be available for future mining. Some, but not all, of these categories are depicted on the planning overlay maps. These include various categories of public ownership and parcels which may be encumbered by conservation easements.

Major City and County park properties are not all depicted on the overlay maps but are assumed to be unavailable for mining. In total, these unincorporated park properties account for about five (5) square miles. Also considered as not available for mining is the Nature Conservancy's 1,600-acre Aiken Canyon property located on southwest Highway 115. Property on the north and south slopes of Pikes Peak, owned or leased by the City of Colorado Springs for water supply purposes, is also depicted on Map 2. Mining is not technically precluded on these properties, but Colorado Springs Utilities staff indicate the likelihood of any private entity being allowed to mine or any major public mining would be remote. The primary purpose of the City is to protect these properties for water supply purposes.

H. Traffic Impacts

1. Trip Generation

It is estimated that the mining and mineral processing industries in El Paso County combine to account for about 567,000 one way truck trips and eight and one-half (8.5) million vehicle miles traveled (VMT) each year. This estimate was based upon the following assumptions:

- 805 tons annual per capita aggregate consumption
- 425,000 1993 estimated County population
- 25.5 net tons per truck
- 30-mile average pre-processing two-way haul distance
- 30-mile average post-processing two-way haul distance

Non aggregate hauling, internal trips and non-truck traffic were not considered in the above accounting.

By way of comparison, Pikes Peak Area Council of Governments (PPACG) estimates that there are a total of three (3) billion vehicle miles traveled in the Pikes Peak transportation planning area each year. Mining and mineral processing-related truck trips would therefore account for only about 1 in 4,000 total vehicle miles traveled in the region. However, many of these mining-related trips tend to be concentrated in a few areas.

2. Pavement Damage

Heavy vehicles including mining trucks are known to account for a disproportionately high share of pavement damage compared to their share of the vehicle mix. Organizations such as the American Association of State Highway and Transportation Officials (AASHTO) and the Colorado Department of Transportation (CDOT) have attempted to quantify this relative impact by attributing a "unit damage" to various types of vehicles. This figure corresponds to the flexion damage caused to a standardized asphalt surface. Accordingly, a truck axle carrying an 18,000 pound legal load is attributed a "unit damage" factor of 1.0 while the factor for a typical passenger automobile is about 0.0008. The result is that one heavily loaded truck may produce the road damage equivalent of approximately 1,000 average passenger cars. Because the damage factor for overloaded trucks increases almost exponentially, the relative damage from a 21,000 pound axle is calculated at three times that of a legal 18,000 pound axle.

3. Congestion

It is intuitively obvious that, because of its size and relative lack of acceleration, a larger truck tends to take up more roadway capacity than an average passenger vehicle. Transportation professionals tend to express this as an equivalence which ranges from about 1.5 cars per truck when both vehicles are at highway speeds through 7 cars per truck in congested areas with steep grades where there is also a need for the truck to accelerate.

4. Loss of Load

Damage to vehicles from sand or gravel which escapes from haul trucks has been a fairly consistent complaint from motorists. As a result the City of Colorado Springs has adopted an ordinance which requires sand and gravel trucks to be covered while within City Limits. Within unincorporated areas, a more nebulous statute prohibits the "loss of load" from all vehicles but does not specifically

require tarps. Most city, county and state trucks are now equipped with motorized tarping systems. Loss of load is most often the result of materials either blowing from trucks or falling from their exposed surfaces. Anecdotal evidence suggests that more vehicle damage is caused by material falling off of the trucks than is caused by material being blown from them. New mining operations in El Paso County are routinely conditioned to require sweeping of truck rails and covering of all loads where material gradation is such that part of the load may escape from the vehicle.

5. Accidents

   The Planning Department was unable to uncover any statistics which would be used to reasonably evaluate the contributions of mining related traffic to motor vehicle accidents.

6. Environmental Impacts

   Due to a combination of remoteness and the periodic realignments, the roadway systems which provide immediate access to mining sites are often unpaved. This provides a potential for substantial dust and/or erosional impacts

   Operators are ordinarily required to include internal access roads within their State reclamation permit boundaries and also to address these roads within their Fugitive Dust Emissions Permits. Water-borne sediments must be managed within all permit areas.

7. Conclusion

   In conclusion, it can be stated that mining-related traffic does not contribute significantly to overall regional traffic congestion and safety concerns. However, site- and corridor-specific concerns related to safety, road damage, noise and loss-of-load can be very significant.

I. Visual Impacts

1. Introduction

   The potential visual impacts associated with mining and mineral processing activities are of paramount concern to local government. There are two primary reasons for this. First, the potential visual impacts of these operations may be very significant in terms of land alteration and/or visual contrast. The duration of these impacts may be quite long. Secondly, the State, through the Mined Land Reclamation Act, may consider visual impacts along with other reclamation concerns. Thus, local government has a role to play, in coordination with the Division of Minerals and Geology, the mining industry and interested citizens' groups.

   This section provides some background on the visual impact issue in El Paso County, the current regulatory structure, a brief discussion of some of the practical aspects of visual analysis, alternative approaches to assessing and mitigating visual impacts, potential quantitative impacts to identified reserves, and a recommended approach to this issue.

The recommended approach is to rely heavily upon site-specific analyses of individual applications while also encouraging the development and use of additional and more refined regional visual inventory, analysis and management resources. Of particular importance will be use of the County-wide Geographic Information System (G.I.S.).

2. Components of Visual Impact

A variety of factors contribute to the degree of visual impact which may be associated with a mining operation. Some of these are discussed in general terms below.

a. Line of Sight/ Area of Impact

In a visual analysis the essential determination is whether there is a direct line of sight between the affected parcel and areas, corridors or observation points around it. This determination is directly influenced by topography and more indirectly by factors such as the location of roads and population centers. Some properties have very limited line-of-sight exposure while others have very broad areas of visual influence.

Related to the geographic area of impact is an assessment of the number of people who either reside in or travel through that area. For those who may pass through an area of visual impact, the duration of their exposure is an important element.

b. Contrast

Contrast is essentially the degree of deviation between the visual character of an area and that which surrounds it. If a mining operation alters the form, color, line or texture of the landscape from that which surrounds it, the tendency is to draw attention to the operation. In a natural setting, contrast is often considered a positive landscape element. However, when attention is drawn toward a mining or mineral processing operation because of its contrast, the reaction is ordinarily negative partly because attention is drawn to an alteration of the natural condition.

c. Aspect and Distance

All other things being equal, the higher the angle of a feature above the viewer's horizon, the greater its visual impact will be. There is an obvious correlation between aspect and distance. In visual analysis, landscapes are often divided into distance zone sections such as foreground, middle ground and background. Foreground might be defined as the areas within one-fourth mile of the observer with middle ground being those areas between one-fourth and three miles distant. Background areas could be defined as all areas three or more miles distant. It is important to understand that a given visual impact

does not necessarily decrease correspondingly with distance. Rather, distance affects the relative importance of certain factors, especially those which contribute to contrast.

d. Duration and Timing

The duration and timing of a given visual impact may have a lot to do with its relative acceptability. Visual impacts from mining often have long periods of exposure, but these can vary. It may be possible to orient or phase an operation or otherwise provide mitigation such that most of the impacts which would be of visual concern are limited to a narrow window of time. A short-term or temporary operation may be more acceptable in advance of or in conjunction with development as compared with later periods. One of the concerns with the duration or timing aspects of mining and mineral processing is that some of these are market driven. Actual phasing may be tied to when a market develops for a given amount of material. Conversely, property in the area of visual impact may develop at a faster or slower rate than what was projected. Timing of reclamation activities clearly also has an impact on overall visual impact.

e. Mining-Related Activities

In some cases, the most visually significant aspects of a mining operation may actually be related activities such as stockpiling and equipment use and storage.

f. Degree of Permanent Landform Alteration

While it is somewhat of a "stretch" to consider ultimate landform alteration as a separate factor in "visual" analysis, there can be an innate concern with these changes which is somewhat independent from whether they can be seen, by whom and for how long. The idea is that the unseen impact of removing a ridge within a generally pristine and unique geological area may be considered quite profound. Conversely, the removal and export of a few feet of overburden in association with urban development of a very visible property might be considered to be less consequential in an ultimate visual sense.

3. Types of Visual Analyses

a. Regional Approaches

A regional "viewshed" approach to visual impact analysis and management can be very powerful because this considers impacts within the context of the larger landscape area. Ordinarily, a "viewshed" for an analysis area is defined as being inclusive of all properties which can be seen from any other point within the area. Viewsheds are normally bounded by major

topographic divides. In the broadest example a "Front Range Viewshed" for El Paso County would be defined as all property located east of the Front Range ridgeline. Alternatively, a more specific Ute Pass viewshed would be defined as all properties which could be seen from any other point within Ute Pass.

When this approach is used, the landscape is typically divided into "units" based upon pattern elements such as form, lines, color and texture. These elements may then be combined with orientation toward and distance from key population centers or transportation corridors. Additional factors can be overlaid to come up with a composite potential visual impact map for a larger area.

An advantage of a viewshed or regional approach to visual impact is that it may have value as a more objective measure of relative impact. For example, a mining operation proposed for a previously designated low-potential impact area should be at a relative advantage compared with a site proposed in a designated high-impact area. A disadvantage of using regional visual assessment methods is that they may not fully account for the site-specific aspects of a proposed project or changes in road and development patterns. Minor modifications in site location and/or mining plans may have significant impacts on the overall extent of visual impact. A regional approach may not be fully sensitive to these distinctions.

b. Project Specific or Line-of-Sight Approaches

Site-specific visual approaches have limited applicability until one or more potential mining sites have been identified. The site itself becomes the point of visual focus rather than a larger viewshed or regional visual unit. Determinations are then made as to how much adjoining property will be potentially affected and to what degree. An advantage of this approach is that it can be customized to address the concerns associated with a particular site. It can also be sensitive enough to distinguish among the relative impacts of minor locational, operational and timing modifications. A potential disadvantage of this approach is that it may lack context. It may at least somewhat fail to answer the question whether one site does or does not compare favorably with all other available options.

4. Technological Options for Visual Analyses

a. Introduction

The choice of technological approach(es) used in visual analysis can be extremely important.

Available techniques vary from very simple map and photographic analysis to sophisticated digital modeling and photo-simulation. Each method or technology has its strengths and weaknesses associated with cost and effectiveness.

b. Mapping Techniques

A thorough analysis using only topographic maps can go a long way toward assessing potential visual impact. Total affected areas can be calculated for various project scenarios. Profiles can be developed from these maps can be used to demonstrate the angle of view, distance and amount of exposure from specified view points. One disadvantage of the conventional mapping approach is that, at least for the untrained observer, it may be of limited help in visualizing what the impact might be in the three-dimensional real world.

c. Digital Mapping Techniques

Digital mapping technology can be used to create three-dimensional models of the "before and after" views of a mining or mineral processing operation. These models have the potential advantage of allowing people to visualize impacts in a more user-friendly three-dimensional context. Sophisticated systems allow for fairly easy adjustment to depict modifications in mining plans or view points and perspectives. A disadvantage of this approach is that it may be quite costly and/or be too "rough" to fully capture relative impacts as seen by the naked eye.

d. Photography and Photo-Simulation

Photographs have the advantage of being able to very closely replicate what we see with the naked eye. Photographs can be re-touched to approximate the extent of and contrast associated with a given mining plan or scenario. One potential disadvantage of photo simulation is that the choice of film type or lens focal length can be used to either under or over emphasize the degree of actual impact from a given point of perspective. When photos are retouched or otherwise enhanced to simulate future conditions, the choice of exact color and technique is important.

e. Field Trips

In some cases there is no complete substitute for going out in the field, standing at carefully selected points assessing whether or to what extent a proposed mining operation might be seen and how it might look. It may be helpful to combine this approach with those listed above.

f. Combined Techniques

Given the relative strengths and weaknesses of the visual analysis techniques discussed above, it becomes apparent that the most appropriate approach to a complex, controversial or long-term mining proposal might be to combine two or more of the techniques listed above. For example, photos can be digitized to allow them to be more fully integrated with digital terrain modeling. Site visits can be utilized to verify that other techniques appear to be capturing a real world perspective. Table 9 attempts to summarize some of the comparative advantages and disadvantages of various visual assessment techniques.

TABLE 12

COMPARISON OF VARIOUS VISUAL ASSESSMENT TECHNIQUES

Technique	Cost	Potential Advantages	Potential Disadvantages
Conventional Mapping	Low if contours are available	Provides quantitative assessment of areas of impact	May be difficult for untrained person to visualize
Profiles	Relatively low depending on resources and sophistication	Add another (vertical) dimension	Limited to fixed points; does not fully combine dimensions
Digital Terrain Modeling	Moderate to high depending on resources and sophistication	Allows views in three dimensions; can model future conditions over a variety of time periods	May be too rough to fully model real world; can be manipulated
Photos and Photo Simulation	Low to high depending upon sophistication	Can be excellent user-friendly replication	May not fully capture effects of contrast
Field Trips	Low to moderate	Captures best sense of existing conditions; may be effective for verification	Harder to capture future conditions; Limited permanent record

5. Existing and Potential Future Visual Assessment Inventories and Tools

   a. Introduction

      While El Paso County does not currently have a County-wide visual analysis or inventory of significant visual features, there are a variety of resources which currently exist or may become available in the future. These are discussed below.

   b. County-Wide Geographic Information System (G.I.S.)

      El Paso County's evolving G.I.S. will have a number of important applications to visual assessment. Once an area of visual impact is identified, this could be overlaid on the County's G.I.S. to extract a wealth of related data. This could include detailed demographic data based upon the latest available census.

      Additionally, the County has Digital Elevation Model (DEM) topographic information available typically at the 20-foot contour interval. This data can be manipulated to determine rough areas of visual impact.

      However, it is important to note that the County G.I.S. may not be fully available to applicants or consultants. Applicants may need to be charged for in-house analysis on a time and materials basis.

   c. Small Area Plans

      Several of the County's Small Area Plans (S.A.P.s) include sections on visual resources or analyses. These documents can and ordinarily should be referred to when they are applicable.

      The Ute Pass Plan (1982) includes a comprehensive and detailed visual resource section which breaks this area down into landscape units.

      The Tri-Lakes Plan (1983) includes visual resource policies, but no comprehensive visual analysis.

      The Highway 115 (Southwestern) Plan (1990) includes a comprehensive visual analysis which combines several approaches.

      Both the Black Forest (1987) and Falcon/ Peyton (1993) Plans include generalized visual analysis which break these planning areas into visual units and describe these.

      The South Central Plan (1988) includes a policy section on minimization of visual exposure.

      The Highway 94 (1985) and Ellicott Valley (1988) Plans include visual policies, but no comprehensive analyses.

d. Colorado Springs Inventory of Significant Natural Features

In 1990 the City of Colorado Springs engaged a consultant to prepare a comprehensive inventory of significant natural features for the area within the Colorado Springs urban and potentially urbanizing areas. This study is based upon the Federal Government's Visual Resource Management System. This method uses landscape character and sensitivity classifications to produce a graphic prioritization of visual resources areas. This data is presented as overlays on U.S.G.S. maps of the study area.

e. Mountain Backdrop Study

Through an intergovernmental agreement among five counties (El Paso, Douglas, Jefferson, Boulder and Larimer) a consultant has been hired with the purpose of focusing attention on the Front Range Backdrop. A major emphasis of this effort will be a visual analysis component. It is anticipated that this resource will be very helpful in providing a context for evaluating future mining proposals within this backdrop area.

6. Existing regulations

Section 35.13 of the El Paso County Land Development Code contains a requirement for a visual impact report. This report must include but not be limited to a description and depiction of the visual impact area, consideration of temporal aspects and a discussion of mitigation measures which will be taken.

The intent of this requirement is to allow reasonable latitude based upon the circumstances associated with each unique proposal. For example, a short-term borrow operation associated with site preparation might require only the most perfunctory level of visual analysis. Conversely, a long-term quarry operation proposed for a generally pristine natural area will require a very high level of analysis.

7. Potential Impact of Visibility Standards on Available Mineral Reserves

A County-wide inventory of visually significant areas is not currently available. Therefore, at this time it is not possible to reasonably calculate the potential impact that exclusion of visually sensitive areas might have on the overall availability of mineral resources in the County. However, as an example of the way this impact might be calculated, the Planning Department excluded a buffer strip extending five hundred feet (500') from all State highways and/or expressway corridors in the County. As can be seen on Table 10, these theoretical impacts on mineral reserves range from being very significant for commodities such as limestone to insignificant for other commodities.

TABLE 13

POTENTIAL EFFECT OF VISUAL BUFFER ZONES ON IDENTIFIED MINERAL RESERVES

Mineral Commodity	Total Acres After Other Exclusions	Total Acres After Visual Exclusion	% Change
Limestone	523	346	-30.4
Granite	85,808	84,811	-1.2
Mesa Gravel	8,568	8,138	-5.0
Fine-grained Granite	2,461	2,460	0
Upland Deposits	507,667	495,332	-2.4
Stream Terrace Deposits	15,814	13,263	-16.1
Floodplain Deposits	114,019	111,457	-2.2
Alluvial Fan Deposits	0	0	0
Eolian Deposits	143,057	141,683	-1.0
Clay			

By comparison, the Aggregate Analysis for the Denver Metropolitan Area (Jefferson County Planning Department, 1987) estimated that study area to have approximately 340,000,000 tons of permitted aggregate reserves. This equated to about 18 years of available reserves.

8. Visual Impact Mitigation Options

   a. Introduction

      By their nature, all mining operations will have some visual impacts. However, there are a variety of techniques which can be employed to reduce these. Some of these mitigation strategies are discussed below.

   b. Siting

      The preeminent initial decision in visual impact mitigation is one of project siting. Some sites are highly exposed visually, while others have extremely limited visual impact areas. Sometimes a minor adjustment in site and/or mining area boundaries will have a substantial impact upon visual exposure.

   c. Phasing and Timing

      Project phasing decisions may have a very significant influence on aggregate visual impact. It may be possible to "shield" most adjoining property from maximum visual impact throughout most of the life of an operation through appropriate phasing. Adjustments to the

overall timing of a project may also serve to reduce visual impacts. A mining operation which is initiated and completed well in advance of development may be more palatable. Alternatively, if mining is more or less concurrent with development site preparations concerns with visual impacts might also be reduced.

d. Buffering/ Screening

Natural (preferable) or constructed buffers may be employed to reduce visual impacts. In some cases, it may be possible to incorporate revegetated topsoil stockpiles into a buffering/ screening system. Vegetation may also be employed to enhance the effectiveness of buffering and screening.

e. Concurrent Reclamation

By limiting the maximum amount of disturbed and/or high contrast areas concurrent reclamation can go a long way toward minimizing adverse visual impacts. Although the Mined Land Reclamation Board (MLRB) has ultimate authority over reclamation issues, concurrency requirements could be built into the locally approved mining operation plan so long as such requirements do not conflict with MLRB authority.

f. Enhanced Reclamation

Visual impacts may be reduced by employing reclamation techniques which are in addition to those required by the State. These techniques will be variable depending upon site characteristics but may include rock staining, additional planting of trees, shrubs or wildflowers and/or additional grading to add texture to the reclaimed site.

9. Conclusion and Recommended Approach

a. Visual Impact Assessment

The recommended approach of this Plan toward visual impact analysis has several components:

1) Fit the type and level of analysis to the unique circumstances associated with each proposal.

2) Maximize the effective use of regional visual analyses and methods which are or will be available.

3) Continue to upgrade the County's Geographic Information System (G.I.S.) to enhance its value as a regional visual assessment tool.

b. Visual Impact Mitigation

The recommended approach of this Plan toward visual

Definitions

The following terms are specifically defined for use in this document:

AGGREGATE: Materials including all commercial grade sands, gravels, rock products and crushed rock generally used in the construction industry.

ALLUVIUM: A general term for clay, silt, sand and gravel or similar unconsolidated detrital materials, deposited during recent geological times by streams.

BOARD: El Paso County Board of Commissioners

COLLUVIUM: A general term applied to any loose, unconsolidated mix of soil material and/or rock fragments deposited by slow continuous downslope creep.

COMMERCIAL MINERAL DEPOSIT: A natural mineral deposit of limestone used for construction purposes, coal, sand, gravel, and quarry aggregate, for which extraction by an extractor is or will be commercially feasible and regarding which it can be demonstrated by geologic, mineralogic or other scientific data that such deposit has significant economic or strategic value to the area, state, or nation (C.R.S. 34-1-302).

COMMITTEE: El Paso County Mineral Master Plan Advisory Committee.

CONCURRENT RECLAMATION: Reclamation activities which are initiated coincident with completed interim phases of a mining operation.

COUNTY: El Paso County, Colorado: Normally defined as the entire County for data analysis purposes and the unincorporated County only for legal jurisdiction of this Plan.

H.B. 1529: Colorado House Bill No. 1529 "Concerning Commercial Mineral Deposits, and Providing for the Preservation of Access to, Regulation of Extraction of, and Reclamation of Land Used for Mining of, Such Deposits", 1973. Also known as the "Preservation Act".

EL PASO COUNTY LAND DEVELOPMENT CODE: As periodically amended, the document which contains the combined zoning, subdivision and solid waste regulations of El Paso County; specifically including Section 35.13, "Development Requirements for Mineral and Natural Resource Extraction Operations".

EMPIRE STUDY: The publication entitled, Report of an Aggregate Resource Evaluation For El Paso County, Colorado and accompanying maps, prepared for El Paso County by Empire Laboratories in 1991. The original maps have been revised for inclusion in this Plan.

ENHANCED RECLAMATION: Supplemental reclamation activities including but not limited to additional plantings, additional grading, rock staining and rock sculpting in excess of minimum State reclamation requirements.

EOLIAN: Sand and salt deposited by wind

LIGNITE COAL: A brownish-black coal which is intermediate in rank between peat and subituminous coal, containing 6,000 or more BTU/pound.

GRAVEL: Naturally occurring unconsolidated or poorly consolidated rock particles that pass through a sieve with 3-inch (76.2 millimeters) square openings and are retained on No. 4-mesh (4.75-millimeter square openings) U.S. standard sieve.

MINING OPERATION: The development or extraction of a mineral from its natural occurrences on affected land. The term includes, but is not limited to, open mining and surface operation and disposal of refuse from underground and in situ mining. The term includes the following operations on affected lands: Transportation; concentrating; milling; evaporation; and other processing.

MINERAL EXTRACTION ACTIVITIES: Activities related to mining as defined above.

MINERAL PROCESSING ACTIVITIES: Larger scale activities related to the storage, sorting, screening, washing, drying, crushing, leaching and batching of mineral resources which may occur in association with mining or on a separate site. This definition encompasses asphalt batch plants and cement and asphalt manufacture.

MINERAL RESERVES: Assumed commercial mineral deposits contained within sites permitted through the Colorado Mined Land Reclamation Board (MLRB) and having local government land use approval (if applicable) for extraction.

MINERAL RESOURCES: Potential commercial mineral deposits as depicted on (reference to maps) as further limited to account for development and institutional constraints which might reasonably be anticipated to preclude extraction.

MINERAL RESOURCE MAPS: The maps, adopted as Appendix H to this document, depicting areas of potential commercial mineral deposits.

PLAN: The Master Plan for Mineral Extraction- El Paso County

QUARRY: A mineral extraction operation in which drilling and/or blasting are required in order to access or remove the desired materials.

SAND: Naturally occurring unconsolidated or poorly consolidated rock particles that pass through a No. 4-mesh (4.75 millimeter) U.S. standard sieve and are retained on a No. 200-mesh (75-micrometers) U.S. standard sieve.

SUB-BITUMINOUS COAL: A black coal, intermediate in rank between lignite and bituminous coal.

VISUAL LANDFORM STANDARD: A measure of the degree to which an ongoing or completed mining operation visually blends in with or complements the surrounding landscape.

I. INTRODUCTION

A. Executive Summary

This Plan updates and supersedes the *1975 El Paso County Master Plan for the Extraction of Commercial Mineral Deposits* as amended in 1978 and 1982 and has two primary purposes. The first purpose is to facilitate continued compliance with the mineral resource protection mandates outlined in the "Preservation of Commercial Mineral Deposits Act" of 1973. The second is to provide guidance to the Planning Commission and Board of County Commissioners in evaluating land use proposals involving new or expanded mining and mineral resource processing operations. This Plan addresses all materials contemplated in the Preservation Act. However, mineral aggregate materials (sand, gravel and crushed stone) are afforded the most attention because these commodities dominate the mining activity in this County.

The Plan begins with a brief history of mining in El Paso County and then provides overviews of geology, resources, existing operations and the current regulatory framework. The first major element of the Plan is an analysis of current and projected resource demand. Demand is specifically evaluated with respect to current permitted capacity and more generally compared with future potential areas of supply. These potential future resource areas are delineated on Potential Resource Maps which are derived from a 1991 aggregate resource study commissioned by the County (Empire Study). Planning information has been overlain on these resource maps in order to evaluate the degree to which particular areas may be constrained from future mining activities. In this analysis, particular attention is paid to those higher value commodities (hard-rock quarry aggregate, mesa gravels and silica sands) which have limited distribution. The Potential Resource Maps, Planning Overlay Maps and descriptive text are intended to be used in combination with the policies in this Plan to achieve the above-stated purposes.

Some of the principal findings of this Plan are as follows:

- The "bulk to value" ratio for construction aggregate materials is high. This ratio increases with lower grade commodities, such as road base gravels. Proximity and to the ultimate point of use is therefore essential to determining the potential commercial importance of a particular identified mineral deposit.

- Over the past several decades, the trend in El Paso County has been toward consolidation of mineral extraction activities into a smaller number of larger operations. There are currently about forty (40) active State-permitted mining sites in the County.

- State-permitted sources of crushed stone quarry aggregate in the County are limited to three (3) operations in two (2) separate ownerships. In combination, these have a projected capacity of possibly twelve (12) to twenty (20) years based upon current rates of consumption. Within approximately ten (10) years, in the absence of approved new operations or expansions, the County may be left with as few as one (1) permitted source of crushed stone quarry aggregate.

- Options available to address this projected shortage of permitted hard rock quarry aggregate include substitution from other (non-quarry) sources in the County, importation from sources outside of the County or the permitting of new or expanded operations within the County.

- Substitution for crushed hard-rock quarry aggregate typically involves the crushing of larger-diameter gravel deposits. This process can result in a product with an acceptable proportion of angular or fractured faces, but the proportion of waste material produced and resultant cost may be unacceptably high.

- The primary external source for crushed rock aggregate would be Fremont County. Their permitted capacity appears to be sufficient to serve the needs of El Paso County for a substantial period of time. However, there are increased hauling costs associated with bringing material in from this great a distance. Additionally, there are traffic safety concerns associated with a large number of trucks utilizing State Highway 115. There may also be a concern with long-term reliability associated with dependence on material from outside of the County.

- The spatial distribution of high quality quarry aggregate deposits in El Paso County is very limited. Various institutional and planning constraints combine to further limit the practical availability of these resources.

- El Paso County appears to have in excess of fifty (50) years of gravel capacity currently permitted. Most of these operations are associated with mesa gravel deposits which are located in a band generally paralleling Interstate 25. Development activities and other institutional constraints combine to significantly limit the practical sites for additional gravel extraction.

- There may be in excess of eighty (80) years' supply of higher quality construction sand currently permitted. However, much of this capacity is associated with a single facility. Areas of potential future supply are very extensive.

- High value rounded silica sands occur in a limited number of deposits in the vicinity of northern Colorado Springs. Many of these deposits have been either mined out or have become unavailable as a result of urban development. Current permitted capacity for this export commodity should be sufficient to meet about 10 to 15 years of demand.

- Sub-bituminous coal beds outcrop in a band which stretches across much of the center of the County. Although these shallow deposits were extensively mined in the past, any additional extraction is not considered economically feasible at this time.

- There is also a zone of lower quality lignite coal beds associated with the Denver Formation in the northern part of the County. It does not appear likely that these deposits will become financially recoverable.

- There is a long history of refractory clay mining in El Paso County. Clay mining continues sporadically today at four (4) permitted facilities in the Calhan area. These have a large combined capacity.

B. Effect

Upon adoption by the El Paso County Board of County Commissioners, the effect of this document is to amend and supersede the El Paso County Master Plan for the Extraction of Commercial Mineral Deposits (1975). That document was most recently amended in 1982.

C. Purposes, Scope and Intent

The purposes of this Plan are as follows:

1. **To address the mineral resource protection mandates outlined in the Preservation of Commercial Mineral Deposits Act of 1973 (the "Preservation Act").**

   This legislation directed all counties with a 1970 population of sixty-five thousand (65,000) or more residents to prepare a plan for the preservation of its commercial mineral deposits. The "Act" specifically stipulated:

   > "After adoption of a master plan for extraction for an area under its jurisdiction, no board of county commissioners, governing body of any city and county, city, or town, or other governmental authority which has control over zoning shall, by zoning, rezoning, granting a variance, or other official action or inaction, permit the use of any area containing a commercial mineral deposit in a manner which would interfere with the present and future extraction of such a deposit by an extractor."

2. **Provide guidance for the Planning Commission and Board of County Commissioners in evaluating land use proposals which involve mining and/or mineral processing activities.**

   In particular, Section 35.13 of the El Paso County Land Development Code outlines standards to be applied in the consideration of mineral extraction as a Use Permitted by Special Review (Special Use). The information, maps and policies contained within the Plan are intended to serve as an important aid in review and analysis of future mining applications.

3. **Provide guidance to the County with respect to the need for any amendments or additions to local regulations.**

   Although no major changes to the County's existing regulations are contemplated by this document, a few specific regulatory changes can be anticipated. These will include updated references to this Master Plan element.

4. **Generally address topics, processes and issues where the County may become involved, but not through a direct regulatory action.**

   The intention here is to provide guidance in areas which will or may include:

   - County input on Colorado Mined Land Reclamation Board (MLRB) reclamation permit applications in cases where the County's regulatory involvement may be limited.

- County comments on mining proposals in areas outside of its direct jurisdiction (i.e. municipalities or adjoining counties).

- County comments on, and/or involvement in modifications to mining operations which are considered to be legal nonconforming uses.

- Active or passive participation in "extra-regulatory" initiatives including enhanced reclamation and voluntary mitigation programs.

5. Serve as a general reference source which describes the role of mining in El Paso County.

D. Legal Authority

The El Paso County Board of Commissioners has the authority and responsibility to make and adopt a Master Plan for Mineral Extraction-El Paso County. According to Sections 30-28-106 through 108 of the Colorado Revised Statutes (C.R.S.), the County Planning Commission has responsibility for the drafting and adoption of elements of the County Master Plan. The Planning Commission shall by Section 30-28-109 certify <this element of> the plan to the Board of County Commissioners. Pursuant to C.R.S. 34-1-303 through 305, the County Planning Commission is specifically required to conduct a study of commercial mineral deposits located within its jurisdiction and develop a master plan for the extraction of such deposits. Unlike other Master Plan elements which must only be certified to the Board of County Commissioners, this master plan for mineral extraction must be formally adopted by the Board.

This document addresses all of the commodities included in the "Preservation Act" to the degree that these are known to occur in El Paso County. Aggregate resources are afforded the most attention because these represent the most extensive and actively used resources. Oil and gas resources are not addressed, as these are not contemplated in the Act.

E. Background

El Paso County responded to the 1973 Preservation Act by contracting with Dr. John Lewis of the Colorado College to undertake a study of commercial mineral deposits and prepare a plan. The resulting *Master Plan for the Extraction of Commercial Mineral Deposits* and its accompanying maps were adopted by the Board of County Commissioners in the summer of 1975. Although this document included some siting and performance-related policies, it was geared primarily toward meeting the resource preservation mandates of the 1973 Act.

The 1975 plan was amended in 1982 to make it clear that the appurtenant maps depicted only "potential" commercial mineral deposits subject to a case-by-case Board determination. The 1982 Update specifically addressed the fact that the original resource maps had identified the entire eastern part of the County as having a sand supply of heterogeneous quality. This supply was determined to be well in excess of any reasonably projected demand. The map was therefore revised to only depict certain valley-fill and flood-plain sand deposits in the eastern County. Also included in this revision was the suggestion to periodically update the plan as additional geological information became available.

On March 8, 1990 the Board of County Commissioners adopted a new section of the El Paso County Land Development Code (35.13) which provides additional procedures and standards for the review of mineral and natural resource extraction use applications.

Also in March of 1990 the services of Empire Laboratories Inc. of Fort Collins, Colorado were engaged for the purposes of evaluating existing and potential aggregate sites in the El Paso County. Although this study was authorized in anticipation of a program to update the County's *Master Plan for the Extraction of Commercial Mineral Deposits*, the contract was not structured in a manner which would allow this objective to be entirely achieved.

Empire reviewed available literature including existing plans, performed some field reconnaissance and drilled a total of eighty-two (82) borings. A majority of these borings were concentrated in the Midway area, along Interstate 25 near the Pueblo County line. Empire also produced a set of Aggregate Resource Maps using the 1975 resource maps as their primary source. These 1991 maps were limited to aggregate resources and they are of a significantly larger scale than the 1975 maps. Some areas were excluded from the mapping based on generalized planning assumptions. For example, the Fort Carson Military Reservation and the Air Force Academy were not mapped, and decomposed granite deposits were only mapped in selected areas. The basis for these decisions was not fully documented.

In April of 1991 the El Paso County Planning Department staff prepared a process outline for review and modification of the Empire Study and its integration into an overall Master Plan update. This outline was presented to the El Paso County Planning Commission and Board of County Commissioners. A comprehensive analysis of mineral supply and demand parameters was proposed as part of the project scope. Also included would be a thorough and documented analysis of the planning factors which might influence the future availability of identified resources.

On May 21, 1991, the Empire study was accepted by the El Paso County Planning Commission, but no formal action was taken. The consensus of the Commission was the study had not been fully reviewed, and that it was not structured in a way which would allow direct incorporation as an amendment to the El Paso County Master Plan.

F. County Planning Process

Given the complexity of this subject, its sometimes controversial nature and constraints on staff availability, a decision was made to prepare an essentially complete draft plan prior to initiating a comprehensive public input process.

The original *Master Plan for the Extraction of Commercial Mineral Deposits* (1975/1982) was evaluated along with a variety of other publications and files. Staff used the Empire Study maps as a basis for the required evaluation of potential commercial mineral deposits. The resource information from these maps was digitally transferred into the County's computer-generated

base map. Active permitted mining sites were added to these maps for illustrative purposes. Some modifications were made to the Empire maps to correct drafting errors and to address comments from Dr. Hal Prostka.

Colorado Mined Land Reclamation Board (MLRB) permit files were then researched in order to estimate the current available supply of various mineral types. The demand for each mineral commodity was analyzed through a review of available records and interviews with major public sector aggregate purchasers. Careful consideration was given to the issue of aggregate specifications. A limited analysis of the economic implications of local mining was also prepared.

The digitized resource maps were then overlain with a variety of graphic planning information including subdivision and visual resource overlays. This exercise had a variety of purposes but its primary objectives were twofold. One was to provide a sense for the relative availability of current unpermitted resources. The other was to establish a very general framework within which to begin an analysis of the relative impact of a proposed mining operation compared to other potential sites. Based upon the foregoing analysis, critical issues were then derived and preliminary draft policies were prepared. All of the above information was then integrated into a partial draft of this document.

In June of 1993, the Board of County Commissioners authorized the formation a Mineral Master Plan Advisory Committee (Resolution No. 93-191, General- 79-A). Following advertisement and notices to targeted organizations the Board established this Committee on July 19, 1993. The Committee consisted of thirteen (13) regular members representing a variety of industry, neighborhood, at-large and public sector constituencies. Additionally, six (6) non-voting liaison members were appointed. The Committee worked actively during the second half of 1993 reviewing draft materials, touring sites and facilities and evaluating aggregate resource demand and permitted supply. During the first half of 1994 the Committee went on inactive status while Planning Department staff prepared computerized planning overlay maps.

The Committee reconvened in the Fall of 1994 to consider statistical input from the planning overlay process. There was another period of inactivity in early 1995 during which the Planning Department worked on other projects.

In the Fall of 1995 the Committee reconvened again to review an updated draft of the Plan document.

II. INVENTORY AND ANALYSIS

A. Brief History of Mining in El Paso County

Although very few if any precious metals have been mined within its boundaries El Paso County has a rich mining history. It is not coincidental that a pick and shovel were made a part of the seal of the County when it was established in 1861.

Gold mining played a key indirect role in the County's early history and development. In 1859 the rumored discovery of gold in this region precipitated a major “gold rush.” Wagons were painted with the now-famous “Pikes Peak or Bust” slogan. While these reports turned out to be largely overblown, major discoveries did occur a few decades later in Cripple Creek. Beginning in the early 1890s Colorado Springs and its surrounding communities served as primary support bases for the Teller County gold fields. The population of Colorado Springs more than tripled between 1890 and 1900. During the late 1800's and early 1900s Cripple Creek was producing more gold than any other single area in the world. In 1896 Spencer Penrose institutionalized this economic link with the gold fields by constructing the Golden Cycle ore processing mill near Colorado Springs and effectively monopolizing ore reduction.

Beginning with the Franceville Mine in 1882, the Colorado Springs Coal Fields began to be extensively mined. Coal from these underground mines provided fuel for a variety of users including the Colorado City gold reduction mill. Production peaked during the period from 1900 to 1920. Altogether, upwards of 100 mines produced at least 15,000,000 tons of coal up until the last operation (an open pit mine near Franceville) was closed in 1965.

At one time or another, many hundreds, if not thousands of mostly smaller aggregate mines and borrow pits have been operated within the County. The vast majority of these have since been closed or abandoned. Most of the larger currently operating aggregate mines and quarries have a history which dates back a few decades or more. The result is that almost all of these major operations predate current zoning regulations and therefore have nonconforming use status.

Over the past several decades, the most dominant image of mining in El Paso County has been associated with three larger limestone aggregate quarries. Active mining operations have recently ceased at the Queens Canyon Quarry. This facility is located near the Mountain Shadows development. Queens Canyon was opened by Castle Concrete Company in the 1950s. The property is no longer being mined and reclamation is now being completed.

Operations at what is now known as the Snyder (a.k.a. Snider, Black Canyon) Quarry, located north of Manitou Springs, were apparently initiated by the Black brothers in 1881. After several decades of inactivity this mine was reopened in the late 1960s. The quarry was acquired by Continental Materials Inc. through its local subsidiary, Castle Concrete, shortly thereafter.

Workings at the site of the Pikeview Quarry, located just south of the Air Force Academy, were initiated in the early 1900s. A full-scale quarry was established by Peter Kiewit and Sons during the 1950s when much of the material from this quarry was used in the construction of the Air Force Academy. At that time this operation was called the Lennox Breed Quarry. Castle Concrete also acquired this facility in the early 1970s.

"Enhanced" reclamation plans for Queens, Pikeview and Snyder have recently been developed through a locally appointed advisory committee. Enhanced reclamation is now being carried out under the auspices of the Colorado Mountain Reclamation Foundation, a local nonprofit organization.

The other active hardrock quarry operation which has played an important role in the recent mining history of El Paso County is the "Menzer Quarry". This "granite" quarry is located in the far southwest corner of the County near the Fremont County line. What is actually mined is a combination of fine grained granite and accompanying metamorphic rocks. In 1986, a proposal to expand this operation onto adjoining property was denied by the County Commissioners.

The "Avenger" mining claims, located on the northeast side of Ute Pass on the El Paso/ Teller County border, have figured prominently in the mining history of the County even though major mining has never taken place on this site. The story began in 1966 when a group of 25 mining claims were located for limestone on National Forest Service land in this vicinity. In 1987, after two decades of litigation, 6 of the original 25 claims were ruled to be valid. The Avenger claims were subsequently patented in May of 1992, with one effect being that, as private property these parcels are now clearly subject to full local government land use jurisdiction.

The locations of well over 100 abandoned sand and gravel pits have been identified in inventory maps prepared for El Paso County. There were certainly many other unmapped mining locations. Gravel was removed extensively from the mesa deposits along Monument Creek in conjunction with the urbanization of Colorado Springs. Until fairly recently, the County had lease arrangements with several dozen small pits in the more rural areas. Over the past several decades, the trend in sand and gravel has been toward consolidation of operations. The reasons for this include urbanization, higher product standards and reclamation requirements. Only about forty (40) active permitted sand and gravel operations remain today.

B. Overview of Geology, Resources and Operations.

1. Geology

The resource geology of the County is dominated by the contact between the Front Range and the Great Plains Physiographic Provinces (Empire Laboratories, 1991). The Front Range is a major upthrust mountain belt characterized by large areas of Precambrian igneous and metamorphic rocks. This crystalline Precambrian basement complex was originally

formed at great depth and was once covered by thick sedimentary strata. These units were most recently uplifted during the Late Cretaceous mountain building period (65 to 100 million years ago). Extensive weathering and erosion have left the present day topography. Precambrian rocks such as the billion year old Pikes Peak Granite now predominate at higher elevations. The remaining overlying sedimentary strata are often tilted at high angles where the Precambrian units have been thrust up and over them along the Front Range. The Garden of the Gods area, west of Colorado Springs provides a spectacular manifestation of this phenomenon. A simplified stratigraphic column is included as Figure 1. Map 1 generally depicts the primary surficial geologic features of El Paso County.

The current physiography of the Front Range in El Paso County is impacted by a number of secondary movements in addition to the predominant Rampart Range Fault. The most dominant of these is the Ute Pass Fault. In addition to creating this area's major gateway to the west, movement along this fault has resulted in a major horizontal displacement of certain strata. One noteworthy example is the Lower Ordovician Manitou Limestone which is extensively mined as a source of crushed rock aggregate. This important unit now outcrops discontinuously along an arc extending from the southwest corner of the Air Force Academy (Pikeview Quarry) to Cedar Heights (Snyder Quarry). The Manitou Limestone outcrops again in association with the Avenger claims at the boundary of El Paso and Teller Counties northeast of U.S. Highway 24. Manitou limestone also outcrops less extensively in a few areas south of Pikes Peak.

While the Front Range was being upthrust and eroded, deposition was occurring in areas to the east. During the Late Cretaceous and Tertiary Periods, up to several thousand feet of material were deposited into Denver Basin which extends roughly from Fort Collins to Colorado Springs. Subsequent erosion and uplift have resulted in the present physiography of this Basin.

Many of the unconsolidated and variously well-sorted sand and gravel resources found east of the Front Range were deposited in much more recent geologic history. Some of the more important sand and gravel deposits result from flowing water (alluvial) and wind (eolian) deposition associated with fairly recent episodes of glaciation. Streams flowing out of the mountains carried larger gravels, whereas streams flowing in the eastern part of the County carried mainly sands. It is important to understand present drainage patterns are not entirely consistent with those which may have deposited these aggregates. For example, it appears that the south flowing Monument and Fountain Creek drainages resulted from the "capture" of more gradual streams which originally flowed east from the Front Range.

Some of the more important sand resources in the County are the result of wind rather than water deposition. For example, the high quality silica sands found in the Briargate/Northgate area occur in dune formations created during the late Tertiary period and the Pleistocene epoch.

2. Summary of Resources

   a. Introduction

      Many of the potential commercial mineral deposits in El Paso County are depicted on the Potential Mineral Resource Map (Map 1) which is included as an appendix to this document. The scope, limitations and recommended use of this map are discussed later in this Plan.

   b. Crushed or Decomposed Rock Aggregate

      Due to its high angularity and potential for uniform quality, crushed rock has been the material of choice for many construction applications. Historically, much of this aggregate has come from the three (3) large Manitou limestone quarries located in the foothills west of Colorado Springs. The extent of these limestone outcrops is delineated on the Resource Map. Options for future limestone quarries are very limited due to limited occurrences combined with high visual exposure.

      In addition to the well-known Limestones, there are also areas of fine-grained granites and grandiorites in the Foothills. Although generally not considered to be as valuable as the limestone (which can be used for concrete production), these deposits have some viability for high specification crushed rock aggregate.

      Pikes Peak Granite occurs extensively in western El Paso County. This coarse-grained granite is suitable for some base course and asphalt applications. Less weathered granite deposits tend to produce higher quality aggregate.

   c. Unconsolidated Aggregate

      There are a variety of alluvial fan, upland, floodplain, stream terrace, valley-fill and wind-blown sand and gravel deposits associated with the Fountain Creek Drainage (Colorado Geological Survey, 1974). Generally, potentially available high quality gravel deposits represent a fairly limited resource, while construction grade sand resources are extensive.

      The upland deposits located closer to the mountains contain large amounts of silt, clay and boulders and are typically not good sources of high quality sand and gravel. Upland mesa deposits generally improve in quality with distance away from the mountains. Mesa gravel deposits often need to be screened and/or crushed in

order to meet construction specifications.

Extensive mesa gravel deposits lie along the flanks of the mountains from north of the Air Force Academy to south of the Pueblo County line extending eastward to Fountain Creek. These gravels which consist mainly of fragments of granitic rock, vary in thickness from 25-50 feet near the mountains to less than 10 feet, five to six miles to the east (Empire, 1991).

More recent (late Pleistocene) gravel terrace deposits extend along the east bank of Monument Creek north of Fountain Creek. However, the majority of these resources have either been removed or (more likely) built over.

Several high quality alluvial sand deposits lie east of Monument and Fountain Creeks. Sand deposits suitable for many construction-grade applications occur along stream beds and associated terraces across large areas of the eastern part of the County.

Large sand dune deposits cover areas between Cottonwood and Pine Creeks and the area between Colorado Springs and Security near the mouth of Sand Creek. Included among these are the high quality "silica sands" found in the Northgate/ Briargate areas. Northeast of

Colorado Springs near the headwaters of Sand Creek, alluvial fan upland, valley fill and floodplain deposits of coarse sand from the Dawson Arkose highland are found. Eolian and alluvial sand deposits exist throughout the eastern portion of the County.

d. Coal

The highest quality and historically most significant coal resources in El Paso County are the subituminous coal beds found in association with the Laramie Formation. These deposits outcrop or occur near the surface along an arc extending from the Rockrimmon area through Cragmoor (University of Colorado at Colorado Springs-UCCS), then through Cimarron Hills and into Franceville (see resource maps). The beds range up to about ten (10) feet in thickness (Speltz, 1976). Many of these beds were mined out during the early 1900's.

In addition to the better known coal resources of the Laramie Formation, there is also a zone of lignite beds associated with the Denver Formation in northeastern El Paso County. These lower grade coal resources are apparently more discontinuous than the coals in the Laramie Formation beds. Their approximate extent is also delineated on the resource maps.

In terms of quantity, the Denver Basin coal beds account for a majority of all of

the coal resources in the State of Colorado (Speltz, 1976). Mining of these resources is currently not feasible due to their discontinuous distribution and low quality. If the extraction of these materials ever becomes economically reasonable, the technology employed would almost certainly involve some strip mining potentially with a rail-haul component.

e. Other

The refractory clay deposits shown on the Potential Resource Maps include the "Paint Mines" just south of Calhan. This, and a few other depicted deposits are associated with the Dawson formation in the Denver Basin. Also shown on the resource maps are potential clay deposits associated with the Dakota sandstone and the Laramie Formation along the Front Range. These include potential deposits in the southwest corner of Fort Carson.

There are some isolated decorative quartz deposits found in large veins associated with the granite and the metamorphic rocks related to it. Limited amounts of gem or specimen-quality minerals; including topaz, fluorite, amazonite, smoky quartz and beryl are also found in association with the Pikes Peak Granite. These minerals are too rare to be considered of commercial importance.

Finally, many areas not highlighted on the resource maps contain material of sufficient quality for local borrow, backfill and road base applications.

3. Summary of Current Operations

Historically, mining of some type has occurred on at least several hundred individual sites within El Paso County. Many, but certainly not all of these operations are located on inventory maps available at the Planning Department. Currently, there are approximately fifty (50) relatively significant legal mining sites currently permitted in the County. These are identified on the mineral resource and planning overlay maps. There are also several additional mineral processing operations such as concrete and asphalt plants which are not associated with permitted mining operations. Some of these are also shown on the resource maps.

The dominant mining operations in El Paso County include the two active Front Range limestone quarries, the Menzer “granite” quarry and several sand and gravel pits located south of Colorado Springs along Interstate 25. Mining in the northern part of the County is generally confined to smaller operations. Lower grade road base materials are extracted from a number of pits in the eastern part of the County.

4. Adjoining County Plans and Regulations

Of the counties which adjoin El Paso County, only **Pueblo**

County met the 65,000 population threshold established in the 1973 Preservation Act (H.B. 1529). Pueblo County prepared a plan and adopted it in mapped form. Basically, they determined that they only had aggregate resources associated with floodplain deposits. There are a number of sand and gravel pits operating in Pueblo County.

Douglas County did not originally fall under H.B. 1529, but they have subsequently addressed the Preservation Plan through a recent amendment to their general Master Plan. This "Master Plan for Mineral Extraction - Douglas County" was adopted on July 9, 1990 following a nine-month moratorium on mineral extraction permits.

Douglas County has a variety of floodplain mesa and cemented gravel deposits including some which adjoin El Paso County. Because of its location near the headwaters of stream basins, Douglas County is generally lacking in large cobble deposits. Douglas County also has some limited limestone deposits as well as significant outcrops of rhyolite. Rhyolite is a fine grained igneous rock suitable for a number of purposes, but not for producing concrete. As in El Paso County, Douglas County also has extensive deposits of coarse grained igneous rocks including Pikes Peak Granite. Permitted mining sites are cur

rently limited to a number of small sand, gravel and specialty products pits. Douglas County has no large hard-rock quarries and imports much of its coarse aggregate from other counties.

In Douglas County, mining is allowed as a conditional use only in a limited number of zone districts. Developers typically need to utilize a planned unit development approach if they desire to integrate mining with site preparation activities.

There are several large active mesa sand and gravel mining operations in **Fremont County**. A number of these supply asphalt and concrete to producers in El Paso County. Fremont County also has one (1) large active coal mine. The permitted hard rock quarry sites in Fremont County are not currently active. Mining is addressed only to a limited extent in the County's general master plan. It emphasizes the importance of preserving the Highway 115 and 67 scenic corridors. Mining is allowed as a conditional use in the Agricultural Forestry, Agricultural Farming and Ranching, Agricultural living zone districts. In combination, these districts overlay a majority of the land in the County.

Although **Teller County** has a tradition of subsurface hard rock gold mining, current mining activity is dominated by surface gold mining and cyanide heap leaching operations in the vicinity of Cripple Creek and Victor. Approximately a dozen smaller sand and gravel pits are also operated for local consumption.

These include two (2) pits used by the City of Colorado Springs in conjunction with maintenance of the Pikes Peak Toll Road. There are also approximately four (4) permitted peat mining sites in Teller County. However,

application of Federal wetlands regulations may effectively preclude peat mining in the future. Some of this peat material is shipped to El Paso County for processing into soil mixes.

Mining is allowed as a conditional use in Teller County's agricultural zones. The Teller County Master Plan addresses mining quite extensively. Visibility issues are not addressed extensively in the Master Plan at this time, but Teller County is in the process of developing a County-wide scenic overlay system which will be available for use in evaluating proposed new and expanded mining operations. Teller County has also been considering development of long-range reclamation requirements which would be in addition to those of the State.

Jefferson County does not adjoin El Paso County but is important because it is a regionally significant source of mineral aggregates and because of its activities in the area of mining regulation. There have been several controversial mining-related issues in Jefferson County. In 1977 the County adopted a Mineral Policy Plan which included a variety of detailed policy statements along with a numerical weighting criteria with which to evaluate mining requests. Several

subsequent regulations have been promulgated, but the 1977 plan has not been updated in its entirety.

The counties which adjoin eastern El Paso County are not believed to have extensive high-grade commercial mineral deposits.

5. Other El Paso County Master Plan Elements

   a. Introduction

      The El Paso County Master Plan consists of approximately fifty (50) separate elements, all of which amend the County-wide Master Plan document. Currently, this overall County Master Plan is the 1990 Land Use Plan which was completed in 1970. The 1990 Plan is in the process of being amended and replaced by a County-wide Policy Plan. This new overall document will reference applicable, specific elements of the Master Plan, including this Mineral Master Plan document.

      The following advisory elements of the County Master Plan are most pertinent to this Mining Plan:

      - Wildlife Habitats and Descriptors
      - Major Transportation Corridors
      - Small Area Plans

      The wildlife element is potentially important because special consideration may need to be given to areas designated as having potentially high wildlife constraints.

      The Major Corridors element may be important in that it will be important that pro-

posed new or expanded mining operations will need to be designed in such a way that the functional integrity of these corridors is preserved. Additionally, designated future corridors will need to be considered in visual impact analyses.

Small Area Plans respond to the unique features and circumstances in specific sub-areas of the County and recommend more detailed land use guidance. Several of these Small Area Plans address the issue of mining at some level. Although this Mineral Master Plan will take precedence with respect to implementation of the Preservation Act, it is the intent of this Plan to recognize the pertinent land use policies in Small Area Plans within a County-wide planning context. Separate Small Area Plans are discussed below:

b. Small Area Plans

Small Area Plans are available for review at the Planning Department. These documents are briefly summarized below with an emphasis on any advisory

aspects which may be relevant to mining.

Black Forest Plan (1987) - This document addresses the primarily forested rural-residential area directly north of Colorado Springs using a concept map/ planning unit approach. Much of this planning area is proposed to remain as a rural-residential area. This document specifically recognizes the mining and mineral processing uses along the Vollmer Road corridor, but recommends that these areas not be expanded.

The Black Forest Plan also includes an “Industrial and Extractive” policy section with several related policies.

Falcon/ Peyton Plan (1993) - This Small Area Plan also utilizes a concept map/ planning unit approach. This planning area is located northeast of Colorado Springs. The Plan also includes an Industrial/ Extractive policy section. These emphasize compatibility issues and impact mitigation.

Highway 94 Plan (1985) - This planning document for the area surrounding Falcon Air Force Base relies on a very generalized overall concept plan. Mining is not discussed as a discrete topic.

Ellicott Valley Comprehensive Plan (1989) - The Ellicott Valley Plan addresses a primarily rural

section of the east-central County. It utilizes a policy-only approach and emphasizes economic development values. A policy section on Agriculture, Mineral Extraction and Special Uses contains some generalized guidance pertaining to mining.

South Central Plan (1983) - This document addresses the sparsely populated south-central part of the County. Although it contains a limited amount of language which specifically pertains to mining, this Plan makes it clear the residents of this area do not want to absorb a disproportionate share of locally unwanted land uses.

Southwestern Highway 115 Comprehensive Plan (1990) - This planning document addresses the area of the County south of Colorado Springs and west of Highway 115. Of all the Small Area Plans, the Highway 115 Plan places the highest emphasis on mining issues. One of its five (5) main topic areas addresses resource extraction. The Plan recognizes the high quality mineral deposits in this sub-area but strongly advocates against new or expanded mining operations unless they meet very exacting standards related to transportation and environmental impact.

Ute Pass Comprehensive Plan (1982) - The Plan for the Ute Pass area utilizes a specific land use map

approach. It places a high value on protecting the natural environment and visual character. This Plan includes limited direct discussion of mining other than a description of the existing mining operations along Highway 24.

The primary policy guidance in this Plan is directed toward visual impact mitigation.

Tri-Lakes Plan (1983) - The Tri-Lakes Plan utilizes a concept map approach. It contains limited specific discussion of mining, but emphasizes policies related to visual impacts and general preservation of the natural environment.

C. Regulatory Framework

1. Federal

a. Mining Law of 1872

Prospecting, mining and patenting activities related to federal lands are still largely governed by the United States Mining Law of 1872. However, it is important to be aware that this law applies only to federally owned properties. There is fairly limited federal legal jurisdiction over mining activities related to private property.

The 1872 law established that a mining claim on the public domain did not become private property until a mineral was discovered and "perfected". The law further provided a mechanism for

eventually obtaining title to or “patenting” the land associated with the claim. A few major amendments to this Act have occurred since 1872. These changes include the Mineral Leasing Act of 1920 which made certain nonmetalliferous minerals exclusively leasable and not

open to acquisition by claim staking, and the Minerals Act of 1947 which defined a group of salable minerals. Later, the Multiple Mineral Use Act of 1954 provided for multiple mineral development of the same tracts of public lands, and the Multiple Surface Use Mining Act of 1955 withdrew "common varieties" from mineral entry. Finally, a section of the Federal Land Policy and Management Act of 1976 redefined claim recording procedures and provided for abandonment of the claims if these procedures are not followed. The 1872 Act has been under consideration for major reform for many years, and it may be substantially amended in the near future.

2. State

   a. Preservation Act

      The threshold State statute governing the planning and regulation of mining operations by counties is the 1973 Preservation of Commercial Mineral Deposits Act (Whittier, 1993). This Act applies to counties having a population of 65,000 or more, and requires such counties to develop a master plan for the extraction of commercial mineral deposits with the aid of maps developed by the Colorado Geological Survey identifying and locating such commercial deposits. In developing this Master Plan, the following factors are to be considered:

      1) Any system adopted by the Colorado Geological Survey grading commercial mineral deposits according to such factors as magnitude of the deposit and time of availability for and feasibility of extraction of a deposit;

      2) The potential for effective multiple-sequential use which would result in the optimum benefit to the landowner, neighboring residents, and the community as a whole;

      3) The development or preservation of land to enhance development of physically attractive surroundings compatible with the surrounding area;

      4) The quality of life of the residents in and around areas which contain commercial mineral deposits;

      5) Other master plans of the county;

      6) Maximization of extraction of commercial mineral deposits;

      7) The ability to reclaim an area pursuant to the provisions of article 32 of Title 34, C.R.S.; and

      8) The ability to reclaim an area owned by any county, city and county, city, town, or other governmental authority

consistent with such proposed use.

The Preservation Act further requires that after adoption of a master plan for the extraction of commercial mineral deposits, no board of county commissioners shall, by zoning, rezoning, granting a variance, or other official action or inaction, permit the use of any area containing a commercial mineral deposit in a manner which would interfere with the present or future extraction of such deposit by an extractor.

In light of the above, it is clear that the Preservation Act provides the Board with very broad discretion in determining what is a commercial mineral deposit, but then strictly limits the Board's land use authority upon determination that a deposit is commercial in nature for the purposes of this Act. For example, based upon geological studies and a thorough planning analysis, a County is free to determine that an ostensibly

very valuable mineral deposit is not a commercial resource for the purposes of this Plan based upon a variety of factors. These factors might include the existence of adequate permitted supplies or other deposits which might be extracted with less adverse impact to County residents.

b. Colorado Mined Land Reclamation Act

The Colorado Mined Land Reclamation Act of 1976 as amended establishes reclamation requirements which are applicable to most recently active mines within the State, largely independent of when the mine was originally established. The Act provides for financial warranties to guarantee reclamation performance. Permit applications are processed and reviewed by the Colorado Division of Minerals and Geology (known until recently as the Mined Land Reclamation Division). The Division processes the applications for the Colorado Mined Land Reclamation Board (MLRB). The MLRB is responsible for formal action in all but limited administrative determination cases.

The "Reclamation Act" specifically pre-empts any other political subdivision within the State from requiring reclamation standards different than those stipulated in the Act.

Counties are also specifically pre-empted from requiring their own financial warranties related to reclamation.

The Reclamation Act is articulated through the "Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board".

These rules and regulations were originally promulgated in 1977, and have been amended on several subsequent occasions. There are a variety of permit types depending upon the nature, and scale of the proposed operation. Notice to affected county governments is required during the application review process.

As presently authorized, the State reclamation review and approval process ensures that the reclamation plan is feasible, enforceable, and is in compliance with the requirements of the Colorado Mined Land Reclamation Act. The authority of the Mined Land Reclamation Board in the areas of visual and off-site transportation impacts is limited.

Although local government is pre-empted from becoming directly involved in reclamation planning, counties may be in a position to indirectly influence the nature of reclamation planning through their zoning authority (see below).

3. County

   a. Zoning and Subdivision Authority

      Through State enabling legislation, counties are authorized to adopt and enforce zoning and subdivision regulations pertaining to their unincorporated territory. Zoning is a "police power" which is predicated upon a need to protect a community's health, safety and welfare. Where they are not otherwise pre-empted, counties have jurisdiction over any locational and operational aspects of mining and mineral processing which might be reasonably related to their authorized zoning powers.

      The part of unincorporated El Paso County which adjoins the City of Colorado Springs was first zoned in 1942. In later years, the zoned area was generally extended to include all of western El Paso County. However, mining was allowed as a principally permitted land use in agricultural and forest zones until 1970 when approvals of location became a requirement. Therefore, no local approvals were necessary. The result is that most major mining operations in unincorporated El Paso County predate the need for special zoning review and approval and, therefore, exist as legal nonconforming uses. Mining is now allowed in all zone districts as a Use Permitted by Special Review. Section 35.13 of the El Paso County Land Development Code provides additional procedures related to County review and processing of mining applications. Appendix B describes the evolution of El Paso County mining regulations in more detail.

   b. Local Permitting Process

New or expanded mining operations in the unincorporated County require approval as a Use Subject to Special Review (Special Use). This process is outlined in the El Paso County Land Development Code. General standards and requirements for Special Uses are outlined in Section 35.8 of the Code. More specific standards and requirements are included in Section 35.13, "Development Requirements for Mineral and Natural Resource Extraction Operations." This local review and approval process can occur before, concurrent with or following the State permitting process. The local process includes requirements for analysis of certain impacts which may not be fully addressed in the State review. These include visual and traffic impacts. Section 35.13 also includes a more streamlined process directed toward accommodating small-scale operations of limited duration.

There are exceptions to the above-described requirements for local approval of mining operations. Local

approval is not required for unzoned areas. Currently, about 800 square miles in the eastern County are unzoned. Although Federal properties including military installations are zoned in most cases, the County does not exercise most land use authority (including regulation of mining) in these areas.

4. Municipalities

Municipalities have the authority to regulate mining operations within their corporate limits. The City of Colorado Springs Zoning Ordinance defines several different types of mining operations. All are allowed subject to conditional use approval in the A (Agricultural) zone district, subject to specific standards. Only temporary surface and underground activities are allowed in other non-residential zones, subject to the same standards. No mining is allowed in residential zones.

Until 1988, the City of Fountain had a zone district which exclusively allowed mining. Currently mining is allowed as a conditional use in the City's I-2 (Industrial) and RA (Agricultural) districts. Fountain has no mining-specific review criteria. Broderick and Gibbons operates a sand and gravel mine within City limits, and also has rights to substantial permitted reserves on the Fountain Colony property.

Manitou Springs has no current mining operations. Mining is allowed as a conditional use in all zone districts subject to adopted general standards. A

grading permit might also be required in conjunction with any mining approval.

The Town of Monument currently has no mining operations within its corporate limits. Their zoning ordinance does not directly address mining. If mining were to be proposed it would likely necessitate a regulatory interpretation and/or revision.

D. Elements of Resource Demand

1. Introduction

An understanding of the demand for primary mineral products and their critical specifications is an essential prelude to the development of a viable mineral master plan. The following sections summarize the demand side of the mineral products industry in El Paso County.

On a quantitative basis, local mineral resource demand is primarily comprised of aggregates (using the broad definition of this term). Most of the aggregates used in El Paso County are committed to public infrastructure construction or maintenance. In most years, road, bridge and drainage projects account for the greatest demand. Periodically, one-time projects (such as the recently completed new Colorado Springs Municipal Airport) may account for a large share of annual resource use.

Nationally, according to the U.S. Bureau Mines, an average of about 3.4 tons of construction sand and gravel are used annually per person. About 4.6 tons of crushed stone are consumed per capita. In the State of Colorado, the ratios are reversed, with per capita annual consumption of construction sand and gravel at 7.57 tons and use of crushed stone at 2.31 tons. In either case, an overall per capita aggregate demand of between 8 and 10 tons appears to be a reasonable "rule of thumb".

Historical data for the Denver metropolitan area (Jefferson County, 1987) indicate that their consumption rate for aggregates averaged between 8.5 and 10.0 tons per person per year. It is important to understand that this figure encompasses all uses of aggregate from all sources by both the private and public sectors. State-wide, as reported by the U.S. Bureau of Mines, the three leading end uses of aggregates were:

Road base and/or cover	28%
Concrete aggregate	25%
Asphaltic Concrete (Asphalt)	12%

In order to obtain a sense for aggregate supply, demand and use in El Paso County, a survey of major producers and users was coordinated through the Mineral Master Plan Advisory Committee. Although responses were incomplete, the survey did provide some insight into local aggregate demand.

Table 1 below provides a *very general* estimated accounting of aggregate use in El Paso County based primarily on the results of this survey:

Table 1

General Accounting of Aggregate Use in El Paso County

Use	Tons/Year	General Source

Asphalt Production	700,000	60% Sand and Gravel Pits; 40% Quarries
Concrete Production	1,200,000	Sand and Gravel Pits; Some Quarry Aggregate
Road Base/ Road Gravel pits	650,000	Sand and Gravel Pits; 50% taken from County
Pikes Peak Highway	30,000	Teller County Pits
Utility Uses	100,000	Primarily Utilities Pits
Anti-Skid Material Operations (Road Sand)	50,000	Quarries or Sand
Silica Sands	250,000	Silica Sand Pits
Other and grade/ Not Accounted For*	1,000,000	Various, Mostly lower- Deposits
Total	3,980,000	

Source: Survey of El Paso County Aggregate producers, late 1993, augmented with other data and estimates by the Planning Department

* Includes a factor for producers not reporting, borrow operations, rip-rap, landscaping, military and other specialty uses.

Table 1 would indicate that concrete and asphalt combine for a larger share of total County aggregate use than would be expected based on State-wide averages. This difference could be attributable to the higher-than-average comparative rules of growth and levels of urbanization in this County.

Total local aggregate demand for El Paso County is estimated at 4,000,000 tons per year. This calculates out to about 8.6 tons per person per year based upon 1995 County population. For illustrative purposes, this equates to mining about 1.8 square miles of

land one foot deep per year. Projected future annual demand is summarized in Table 2 below. Yearly per capita consumption can be expected to fluctuate substantially depending upon growth rates in the community and the status of public works programs.

TABLE 2

Projected Annual Aggregate Demand
El Paso County

Year	Population	Tons	Tons/ Capita
1990	397,014	3,375,000	8.5
1995	463,356	3,940,000	8.5
2000	491,633	4,180,000	8.5
2005	526,838	4,480,000	8.5
2010	560,645	4,770,000	8.5
2015	596,965	5,070,000	8.5
2020	634,687	5,390,000	8.5

-1990 population taken from U.S. Census, other years are Pikes Peak Area Council of Governments (Pikes Peak Area Council of Governments) 1995 “base scenario” forecasts; forecasts are subject to future modification; annual per capita consumption assumed to remain constant at 8.5 tons.

2. Resource Allocation by Product Type

a. Introduction

Table 3 presents a summary of the primary mineral products used in El Paso County along with their usual "parent" source material. A few of the most critical minimum material specifications are also included. Specific product types are discussed in the following paragraphs.

TABLE 3

Summary of Parent Materials and Specifications for Primary Mineral Products El Paso County

Mineral Use	Parent Materials	Critical Specifications
Coal	bituminous coal	Carbon content (BTU rating) Low sulfur, low residual ash
Concrete	crushed limestone, or crushed fine-grained granite, or crushed and washed mesa gravels; and sand	Cement content, hard aggregate with no more than 15% angular or flattish fragments, low % of fines, short delivery time to site,
Asphalt	crushed limestone, or crushed coarse or fine-grained granite, or crushed or uncrushed mesa gravels	Petroleum content, angularity and graduation of aggregate stability and temperature at delivery
Chip Seal	3/8” minus crushed rock chips and petroleum emulsion	Hardness of gravel chips
Base Course	all of the above except coal	
Structural Fill	all of the above; floodplain sands and gravels; “pit” gravels	
“Anti-Skid” Material	crushed and/or washed rock or gravel	L.A. Abrasion of 35+, size and low % fines
Pipe Bedding	all of the above except coal	
Sand Blasting, Hydro-fracking, Well Packing, etc.	silica sands	Sands containing 90% or more silica, round shape, very hard, various mesh sizes 4-140
Rip-Rap	mostly limestone and granite	
Clay	clay deposits	Chemical composition, low percent impurities, color

- adapted from Empire, 1991; information is generalized.

b. Concrete

Based upon state-wide figures, the per capita annual consumption of ready mixed concrete is about 1.28 cubic yards per year. The figures included in Table 1 reflect about 30% higher concrete aggregate use in El Paso County, compared to the State average. This may be attributable to higher-than-average construction activity. Year-to-year consumption varies depending upon the construction economy and the status of special projects.

In El Paso County the majority of concrete is purchased by private-sector users except at times when major public projects (such as the new Airport) are underway.

c. Asphalt

The figure included in Table 1 calculates out to a requirement for about 1.5 tons of asphalt required per person per year in El Paso County. About 80% of the materials used to produce this asphalt come from virgin sources. Paving or paving overlay projects (roads and parking areas) account for essentially all asphalt use in this community. Ultimately, the majority of all asphalt consumed is used on public roadways. However, much of the total production is delivered to private contractors. On an average annual basis, about 60% of all asphalt is used for overlay projects and 40% is used for new construction. This ratio can be expected to increase as the community matures and if the rate of development moderates.

Demand for asphalt is seasonal because it is best laid down when temperatures are well above freezing. The County's "paving season" lasts about eight or nine months, but activity is most pronounced during the late Spring, Summer and early Fall when temperatures are most moderate.

d. Road Gravel

Due to a combination of increasing development, higher traffic counts, air-quality concerns, and more stringent development standards, the ratio of paved to gravel roads in the County is always increasing. However, at this time approximately 1,200 miles, or about 40%, of all the publicly maintained roads in the County are gravel roads. Another approximately 250 miles are "chip and seal" roads. The vast majority of this unpaved mileage is in the unincorporated County system. Based upon County Department of Transportation statistics, it is estimated that per capita consumption of gravel for unpaved and chip and seal road maintenance is 0.75 tons per year.

e. Road Base

Regardless of whether a road is ultimately paved it requires a gravel base. Standards for road bases vary, but as a rule of thumb, a six (6) inch compacted gravel base is required. This translates into the need for about 3,000 tons of gravel for each lane mile of new roadway. If 120 additional lane miles were constructed in the County each year, this would require about 0.75 tons of gravel per capita.

f. Anti-Skid Material

Until recently, State and local road crews primarily used sand or other unspecified fine materials to enhance traction on winter snow and ice. The need to meet new State air quality-related road sanding regulations has resulted in an increased specification for "anti-skid materials. The requirements for angularity, hardness and cleanliness dictate that these materials are prepared from materials which are both crushed and washed. Limestone may be used, but it is difficult for the hardness criteria to be met with this material. Producers are sometimes able to meet the anti-skid materials standard by reworking materials screened out during the preparation of other aggregate products.

g. Coal

The City of Colorado Springs Utilities is essentially the only user of coal in El Paso County. Its two major generating plants are coal fired. All coal is brought in by rail from mines on the Western Slope of Colorado. Altogether, the City burns between 1.1 and 1.3 million tons of coal per year. This equates to about 12,000 rail cars. The City pays between $13.00 and $30.00 per ton at the mine mouth. The higher figure is a locked-in contract price and the lower figure represents the current spot market price. Colorado Springs has purchased its own unit train consisting of 105 rail cars, not including spare cars.

The more critical specifications for coal include BTU rating (related to carbon content), low sulfur (related to pollution control), residual ash content and percent moisture (related to ash disposal). As noted in Chapter II. B.3, locally available Denver Basin lignite and subituminous coal has very low BTU ratings and would have a much higher residual ash content. Additionally, most local deposits are covered by too much overburden to make extraction economically feasible.

h. Clay

Essentially all of the clay mined in El Paso County is shipped to brick-making plants in either Pueblo or the Denver metropolitan area.

Important specifications include the type of clay (related to chemical composition) amount of impurities (such as sand) and color. Currently, on the order of 25,000 - 50,000 tons of clay are shipped out of the County annually. Periodically, there are local requirements for use of clay materials in various construction applications. These include construction of clay liners in landfills and water impoundments. In the case of landfills, the required clay is ordinarily taken from within the project site.

i. Silica Sand

"Silica sands" are a unique mineral resource in El Paso County in that the majority of the product is shipped out of state. These deposits are very limited in location and extent. It is postulated that deposition was a result of these particles being rolled along by the wind after other sands were blown farther downwind. This product has a variety of specialty uses including; water/wastewater filtration, hydro-fracturing (related to oil and gas well production), sand blasting, glass production and golf course construction. These sands are ordinarily washed, dried and screened to various specifications. The finished material is either bagged or bulk loaded into rail cars for shipment to a variety of users. Presently,

the most marketable silica sand product is that falling within the #6-#9 mesh range (6-9 openings per inch. Roundness (sphericity) and very high quartz content are the desirable attributes which define Silica Sands. Combined processing (washing and screening) produces on the order of 25% "waste". Much of this waste material can be put to some kind of use (e.g. baseball infields, nonstructural fill)

j. Rip-Rap

Rip-rap is defined as material ranging in size from small cobbles through large boulders. The primary uses of rip-rap rock in El Paso County are for drainage channel improvements and general landscaping purposes. Within El Paso County the limestone quarries provide the major source of rip-rap materials.

3. Specifications

Some of the more important aggregate materials specifications are included in Table 3 above. These include:

a. Size

Size characteristics are often a key parameter in defining mineral aggregate products, both as they naturally occur and after processing. An aggregate size chart is included in Appendix C. Sizes are usually defined in terms of a screen mesh or a simple diameter measure

ment. Often, a material is graded with respect to size according to a percent purity

standard. For example, a specified proportion of the sample must pass through a larger mesh screen and be retained by a smaller mesh screen. Aggregate might be described as being "minus 1/2" meaning that it has passed though a 1/2 inch screen. Shipment and storage may have an adverse impact on a product which had initially met size specifications.

b. Hardness

Hardness is typically evaluated through an L.A. (Los Angeles) abrasion test. This test consists of placing the coarse materials in a tumbler with steel balls, rotating it for a specified time period and then measuring the amount of degradation.

Hardness is important in a number of applications. "Anti-skid" materials need to be hard in order to maintain their traction characteristics and to limit the production of dust. Relative hardness is also indirectly related to the maintenance of other commodity specifications. For example, after handling, a softer product may no longer meet the specification for maximum percent of fines.

c. Angularity

A high degree of angularity is often required in the specifications for aggregate mixes.

This increases the surface area for adhesion. Angularity is typically measured in terms of "percent fractured faces". Since many concrete and some asphalt contracts call for aggregate with 100% fractured faces, all sources except crushed hard rock quarries are effectively precluded.

Conversely, lack of angularity, or roundness is a desired and measured attribute for silica sands. This allows the sands to readily transmit liquids, while at the same time providing maximum surface area for processes such as filtration.

d. Percent of Fines

Excess fine materials are considered as contaminants in many aggregate applications. One common method for assessing the presence of fines is to determine what percent of a sample passes through a "200" mesh screen (two hundred openings per square inch). Materials may need to be differentially screened and/or washed in order to meet an established standard for percent of fines. Prepared material (especially crushed limestone) may need to be carefully handled in order to continue to meet this standard.

e. Others

Chemical composition is often a specification. For example, high quality sands must have a minimum silica content. Resistance to acid solubility is sometimes measured for silica sands. This may be important if

these sands are to be used as a treatment media. Higher chemical reactivity is an undesirable attribute for concrete aggregate because this requires the addition of an increased amount of cement to the mix.

4. Process Operations

a. Introduction

With certain notable exceptions, raw mineral resources normally require some level of initial processing in order to be suitable for their ultimate use as mineral products. Some of these operations are ordinarily conducted at the mining site, while others are typically performed at other locations. Some of the more commonly practiced mineral processing operations are discussed in the following paragraphs. The basic processes for making concrete and asphalt are also described.

b. Blasting

Blasting is routinely required in the removal of well consolidated materials such as limestone and granite. Decomposed granite can sometimes be mined without the need for blasting. Blasting is generally performed by drilling a series of holes in advance of the mining face, charging the holes, and then firing the charges in rapid sequence. Blasting is done fairly continuously ordinarily between once every few days to once per month in active mining operations, and produces some dust, noise and vibration impacts. The vibrations from blasting are sometimes implicated in cases related to changing groundwater hydrology. In most cases, the loosened material is then moved to a crusher located on the mine site.

c. Crushing

Crushing is almost always necessary in conjunction with mining of consolidated rock for use as quarry aggregate. Crushing is sometimes also used to upgrade unconsolidated materials such as gravels in order to meet size and angularity requirements. Often this process is initially performed at the mine site for economic reasons and because the waste material is often needed as backfill. Secondary crushing may occur away from the mine site in association with final processing (asphalt production etc.).

Crushing operations vary depending upon the commodity being mined, the desired product and the scale of the operation. Systems typically employ a raised hopper which feeds into a jaw crusher. The jaw crusher reduces larger boulders to cobble sized materials. This material is then sent on via conveyer belts to a cone crusher which produces the gravel-sized material needed for finished aggregate. Screening is an

integral step in the crushing process.

Crushing machines produce significant local noise impacts and require limited amounts of water used in dust abatement spray arms. Although configurations vary, a crushing apparatus may be twenty or thirty feet tall. The process of crushing can produce substantial amounts of dust, although ancillary loading and screening activities often produce relatively larger amounts. Light pollution and glare may be significant during periods of peak market demand if the facilities are permitted to operate during non-daylight hours.

d. Screening

Screening is an integral part of the crushing operation in that fine materials need to be removed and larger materials need to be captured and re-circulated for additional crushing. However, screening may be employed without crushing in cases where the parent material consists of unconsolidated gravels or sands. A typical "two-deck" screen consists of an upper larger mesh screen which prevents entry of over-sized particles and a lower smaller mesh screen through which finer waste materials pass. The resultant captured material is then charac

terized by upper and lower diameter limits which correspond to the mesh sizes in the screens. A "three-deck" screen functions in the same general manner, but is capable of producing two finished product sizes concurrently. Water spray arms may be employed to reduce dust production.

An average of about 20% of the parent material processed in crushing/ screening operations ends up being screened out as fines. Much of this material is useful only as backfill material. Some of this screened out "breeze" material can be used either in asphalt production or as "anti-skid" material if it is subsequently washed.

Screening equipment has largely the same potential planning impacts as crushing apparatus.

e. Washing

Aggregate products are often washed in order to remove very fine materials which adhere even to screened material and which act as contaminants. For example, most sands are washed prior to concrete production and anti-skid materials are often washed in order to meet air quality standards. Wash plants may be set up at the mine site or in association with a separate processing facility or concrete or asphalt plant.

Wash plants may be fairly simple operations or may be very complex depending upon such factors as available water supply and production requirements.

Sands or gravels are ordinarily augured through some sort of wash tank. The dirty water is then cycled into a pond or a tank where the sediment settles out with the help of recyclable floculants and coagulants. Clean water is then recirculated back through the washing system. The resulting sediments are either scooped out or piped to backfill areas. These materials may be used in some construction applications.

Washing operations necessarily involve considerable quantities of water. However, consumptive water use may be substantially reduced through re-use. Visibility, noise and lighting impacts of washing may be comparable to crushing and screening.

f. Drying

Finer aggregate materials have substantial moisture retention capabilities when they are stored in larger stockpiles. These materials may need to be artificially dried prior to shipment, spreading or processing to make concrete and asphalt. Some processing operations utilize large, natural gas fired rotating drum dryers. Other than energy consumption, the impacts of drying equipment are relatively limited when compared with other associated processes and operations.

g. Stockpiling

Stockpiling of materials is often a significant component associated with mineral extraction and processing uses. Operators often keep a variety of pre-processed, processed and post-processing materials on hand to meet fluctuating demand for products of varying specifications. Top soil, overburden and low-quality or waste materials may also end up in stockpiles. Depending upon the situation, visual impacts, blowing materials, drainage and erosion concerns and safety may be important planning issues related to stockpile management.

h. Concrete Production

Compared to the initial processing functions outlined above, concrete manufacture is more of a secondary processing function. The constituent materials for concrete vary somewhat depending upon the specific application. Generally, one cubic yard (3,855 pounds) of concrete is manufactured according to the following mix of primary ingredients:

- 34.5 gallons of water
- 1,660 pounds of coarse angular aggregate (3/4 inch max. diameter)
- 1,460 pounds of coarse washed sand (passing through a #4 mesh screen)
- 400 pounds of Portland cement
- 70 pounds of sulfur resistant fly ash

The process of producing concrete is often highly automated. This allows for batches to be tailored to

meet the client's individual needs. The individual constituents are metered, mixed and then augured into a lined rotating drum. After mixing for a few minutes, the drum is emptied into a truck waiting below. Final mixing occurs in the rotating drum of the delivery truck. Concrete may be augmented through the addition of colors or strengthening fibers. Additional strength may also be achieved by increasing the cement content of the mix. The aggregate and sand are ordinarily locally produced in El Paso County, however, some aggregate is currently being brought in from Fremont County. The Portland cement is imported from a cement kiln in Fremont County as is some of the fly ash. Other fly ash comes from Pueblo County. Fly ash may be available from the Martin Drake power plant. However, this ash currently is not being used. Aggregate standards for concrete tend to be more rigorous than those for asphalt products. However, it is the cost of cement and fly ash which has the largest proportional impact on the price of the final product.

Round particles in the aggregate are desirable because they improve the workability of the concrete as it is being poured. If angular or flattish fragments exceed about 15% of the volume, workability can only be maintained by increasing the amount of sand and water, thus reducing strength, or by adding more cement, thus increasing the cost of the concrete.

Concrete binds and hardens as a result of the crystallization of hydrous calcium aluminum silicates which takes place in the presence of water. The timing of concrete delivery is therefore an especially important consideration because a ready mix batch must be poured within 90 minutes or less. The timing between deliveries is also critical to maintain a good bonding within the structure being poured.

The potential impacts of concrete plants include those of dust, noise and truck traffic. There may also be water quality impacts related to the need to periodically wash concrete trucks and production equipment.

i. Asphalt Production

Asphalt making would also be considered a secondary mineral processing function. Technically, the word "asphalt" refers to the heavy oil which is mixed with aggregates to produce the

"asphaltic concrete" paving material we commonly refer to as asphalt. Although the mixes and specifications vary somewhat, a typical ton, (2,000 pounds) of hot mix asphalt might be prepared according to the following formula:

- 13 gallons of oil

- 400 pounds of recycled asphalt (RAP)
- 700 pounds of +1/2” coarse material
- 900 pounds of -1/2” fine material

This type of asphalt is intended for immediate use after loading at the plant. Normally it must be applied within three hours of loading to maintain a temperature of approximately 280 degrees. "Cold-mix" asphalt is prepared with an oil additive which inhibits hardening as the material cools. Cold mix asphalt is normally used in limited patching applications.

Asphalt is produced in either permanent of semi-mobile plants. A number of materials substitutions and variations are possible. Recycled asphalt is an important ingredient in mixes today. Twenty percent (20%) is normally the upper limit for allowable recycled asphalt content. In addition to providing an important disposal option for used asphalt, recycling incrementally reduces the need for petroleum in the production process. In most cases, the aggregate material must be crushed to maintain the required angularity. Angularity is important because the cubicle materials need to interlock to provide strength. The cubicle materials move or flow less when placed under stress. Fine materials can be provided from a variety of sources including screened and washed crusher fines.

While petroleum represents only about 6% of the volume of raw materials used in asphalt, it accounts for roughly 50% of the materials cost, and is therefore very significant financially.

The specifications for State, County and City bids vary enough to typically require separate production runs. Some of the more important specifications include "asphalt content", gradation, temperature and stability. Asphalt content refers to the amount of petroleum used, gradation refers to the physical size ranges of the aggregate used, and stability is a measure of the ability of the asphalt to withstand breakage. Stability is largely determined by a combination of the first three factors along with the relative angularity of the aggregate materials. To produce high quality asphalt, most of the constituent aggregate materials need to be crushed and screened, but not necessarily washed. The asphalt (petroleum) content in recycled asphalt (RAP) is ordinarily about 4% so it must be augmented.

Materials are heated by a burner for the purpose of drying and maintaining production temperatures. Asphalt oil, maintained at a temperature of about 300 degrees Fahrenheit, is introduced at this point. Finished asphalt is ordinarily transferred into one or more storage silos which are used to load the trucks. A cubic

yard of prepared asphalt weighs roughly 2,800 pounds.

Mobile asphalt plants are sometimes used for large one-time construction or overlay projects. This allows for reduced transport costs in the event that at least some of the raw aggregate products are available in the vicinity of the plant.

The potential impacts of asphalt production are "heavy industrial" in nature. They include the visibility of the plant and associated stockpiles, some noise and dust, as well as fire danger, and traffic. The plant's storage silos and conveyer systems may be in excess of fifty (50) feet in height. The stockpile area for a large plant may need to encompass several acres in order to accommodate the half dozen or more feed materials which need to be kept on hand. Fire is a concern because large quantities of oil must be stored on site, and the asphalt itself is potentially volatile. Substantial amounts of natural gas, propane, or oil used in the

production process, may exacerbate this potential hazard.

A large asphalt batch plant may generate up to 200 external two-way truck trips per day not including employee and internal trips. Trucks may be lined up inside or outside of the facility if there is a delay in asphalt loading.

j. Heap Leaching

The term "heap leaching" describes a process whereby either new ore or previously worked mine tailings are treated with a weak cyanide solution in order to free precious metals, allowing for their recovery. There are a number of heap leaching gold recovery operations occurring in the vicinity of Cripple Creek in Teller County. Currently, there are no active heap leach operations in El Paso County. However, there have been periodic proposals to reprocess the large stockpiles of mine tailings which were deposited on the Gold Hill Mesa in the early 1900's during the operation of the Golden Cycle Mill. On-site leaching has been considered in some plans, while others involve removal of the tailings to a remote site. Gold Hill Mesa is located within the City Limits of Colorado Springs, but a remote processing site may be located within an unincorporated area.

If heap leach processing is to occur on a remote site, the Colorado Division of Minerals and Geology normally requires a reclamation permit which addresses both the materials recovery and processing locations. In the case of a "custom site" which receives ores from several locations, a State Health Department permit may be

required in lieu of a reclamation permit.

Heap leaching operations are somewhat unique in that acute ground and/or water quality impacts may occur due to faulty design or operator error. Additionally, cyanide may become an airborne toxic if it is entrained along with blowing dust.

k. Summary

The following table (Table 4) presents some of the more important planning issues which will likely be related to primary mineral processing functions.

TABLE 4
Planning Issues Related to
Primary Mineral Processing Activities

Processing Activity	Planning Issues*
Blasting	noise, vibration, dust, safety, groundwater disturbance
Crushing	visibility, noise, dust
Screening	dust, water use/re-use, visibility, noise
Washing	water use/re-use, visibility, drainage and erosion control
Drying	utility availability, fuel storage
Stockpiling	visibility, blowing materials, drainage and erosion control
Concrete	visibility, noise, dust, water availability and quality, truck traffic
Asphalt	visibility, water quality, noise, fire danger, dust, truck traffic
Heap Leaching	water quality, visibility, traffic, dust, drainage and erosion control

*Light pollution/glare may be a factor in all cases if the activity is to be carried out during non-daylight hours. Facilities requirements and transportation impacts are variable but generally correspond with the number of employees.

5. Resource Allocation by End Use

   a. Road and Bridge Construction

      Table 5 below describes the aggregate requirements for "typical" sections of new roadway construction. Using a rule of thumb that 120 new lane miles are added to the County-wide system each year, approximately 600,000 tons of aggregate are needed for this purpose annually. By comparison, aggregate required for new bridges is less significant.

TABLE 5

AGGREGATE DEMAND FOR TYPICAL CONSTRUCTION APPLICATIONS

Use	Unit	Tons Required
Gravel Road[1] (Two-lane section)	1 mile	6,000
Paved Road[2] (Two-lane section)	1 mile	10,000
Curb, Gutter and Sidewalk[3]	1 mile	2,000
Drainage Bank Protection[4]	1 mile	23,800
Residential Dwelling Unit[5]	1 home	150

Sources: El Paso County Department of Transportation and Planning Department estimates, 1995; residential dwelling unit information provided through Colorado Rock Products Association.

b. Road and Bridge Maintenance

As previously described in this document, the total aggregate demand for road maintenance purposes is very significant. Most of this demand is attributable to re-graveling of roads or asphalt overlays. Altogether, roughly 800,000 tons of aggregate materials are used for road maintenance purposes each year.

c. Building Construction

Concrete production accounts for the majority of

[1] Assumes 30-foot wide mat with six inches of compacted gravel.
[2] Assumes 28-foot wide mat with six inches of compacted gravel and a four-inch asphalt overlay.
[3] Assumes standard specifications for curb, gutter and sidewalk constructed on both sides of a roadway.
[4] Assumes five-foot high rip-rap bank protection wall with a five-foot buried toe, one side of channel only; and bedding gravel for a maintenance road.
[5] Assumes 2,000 square foot single-family house; on-site improvements only.

aggregate demand in the building industry. As an example, a "typical" 2,500 square foot house requires about ninety (90) cubic yards of concrete, equating to a demand for one hundred fifty-two (152) tons of aggregate.

d. Airport Construction and Maintenance

Airport construction and other related activities can have a very substantial impact on aggregate demand during periods when these activities are taking place. Runways and aprons, in particular, require tremendous quantities of high-quality concrete and gravel base course.

e. Drainage Facilities

With today's shift toward more naturalistic forms of drainage facilities, the material of choice for larger bank protection projects is rip rap. A typical mile of bank protected with rip rap on one side would consume approximately 18,300 tons of rip rap. Gravel is required for drainage channel maintenance roads. Concrete is also required for such applications as culverts and drop structures.

6. Governmental Procurement

a. Introduction

Although most of the materials mined in El Paso County are not sold directly to governmental entities, a majority of the finished products ultimately end up in public sector projects. There is a continuum of governmental participation in mineral and mineral product use involving many, if not all of the following basic scenarios:

- Raw products obtained from a government-owned pit (e.g. Utilities Dept. gravel pit)
- Direct purchase of raw product at the mine site (e.g. pit gravel)
- Contract delivery of raw product to a designated site (e.g. anti-skid material)
- Purchase of mineral-based product for direct use (asphalt patch mix)
- Contract purchase of mineral-based product (e.g. contract asphalt overlay)
- Private contract to install public facilities (e.g. public roads constructed by a developer in satisfaction of a subdivision improvements agreement)

Table 6 below summarizes El Paso County's purchases of aggregate products over the five (5) year period from 1988-1992

TABLE 6
El Paso County's Procurement of Mineral Products
(annual averages)

Commodity	Amount/Value/Unit Price
Pit Gravel	192,198.40 cy $99,943.17 $0.52/ cy
Graded Aggregate #7	10,870.93 tons $123,276.33 $11.34/ ton
Graded Aggregate #8	7,877.13 tons $84,994.28 $10.79/ ton
Rip-Rap	2,030.12 tons $17,296.63 $8.52/ ton
Anti-skid Material	7,130.31 tons $36,721.11 $5.15/ ton
Asphalt (plant mix)	25,893.36 tons $395,909.51 $15.29/ton
Asphalt (contract overlay)	50 - 75,000 tons

Notes: 1) El Paso County numbers are all 5-year averages(1988-92)
2) cy = cubic yard

Source: El Paso County Department of Transportation, Fall 1993

b. Federal

The United States government funds a substantial proportion of major highway construction and airport projects through the Highway User's and Aviation Trust Funds. However, the actual projects are carried out by state and local agencies in almost all cases. Federal agencies do influence specifications to the degree that they require projects to be built for a designated life span. Nationally accepted AASHTO (American Association of State Highway and Transportation Officials) standards are used in the case of highway projects.

c. State

The Colorado Department of Transportation (CDOT) has jurisdiction over about 230 miles of roadways within El Paso County. This State system includes Interstate 25 as well as many of the other major roadways in the County. Most of the aggregate and aggregate-related materials used to construct and maintain this State system are used by private contractors who bid on specific projects. The State directly purchases on the order of 10,000 tons of aggregate per year, much of this as asphalt.

d. County

The El Paso County Department of Transportation is responsible for the maintenance of approximately 1,850 miles of roadways, about 40% of which have paved or chip and seal surfaces. On a year-for-year basis the County constructs a limited amount of new road mileage. Most new roads are constructed by developers and then deeded to the County for maintenance.

Each year the County directly uses about 350,000 tons of aggregate products, most of which go to the re-graveling of roads. Additionally, the County administers an annual asphalt overlay contract averaging about 75,000 tons. Altogether, the County directly or indirectly purchases about 1.0 tons of aggregate per person per year.

e. Municipal

Colorado Springs accounts for the vast majority of municipal aggregate purchases in the County. The City maintains about 1,265 miles of paved roadways. Altogether Colorado Springs buys about 200,000 tons of material per year, 75% of which is used for asphalt. Combined aggregate use by all municipalities probably equates to about 0.5 tons per capita.

f. Other

Colorado Springs Utilities, which is a separate enterprise under the jurisdiction of

Colorado Springs City Council, operates its own gravel pit and utilizes possibly 100,000 tons of gravel annually for its purposes. Use can be expected to increase during those years when major utility infrastructure is being constructed.

Specific use statistics are not available from area military installations, but it is estimated that this demand is substantial, especially during period of high maintenance or construction activity.

7. Private Sector Procurement

   a. Road Construction

      As has been described in Chapter II. D. of this document in a typical year the majority of new road construction in the County is undertaken by the private sector. Once constructed, most roads are deeded over to a governmental entity for maintenance. Representatives of the aggregate industry estimate that about 50% of all asphalt demand is attributable to private road or parking area construction projects. The curbs, gutters and sidewalks associated with a typical subdivision road require a considerable amount of concrete. This calculates out to about 1,200 cubic yards per mile, requiring about 2,000 tons of aggregate.

   b. Building Construction

      Industry representatives estimate that at least 75% of all concrete used in a typical year is purchased for use by the public sector. Much of this concrete goes into building construction and associated uses such as driveways, curb and gutter and sidewalks.

8. Inter-County Transfers

   As described in previous sections of this Plan, most of the mineral resources extracted or consumed within El Paso County never cross County boundaries. However, there are several current and potential future exceptions to this generalization, some of which are listed in Table 7 below:

Table 7

Inter-County Transfers of Mineral Resources

Commodity	Transfer
Silica Sands	- El Paso County to world-wide users
Clays	- El Paso County to Pueblo and Denver area brick plants
Gravel	- Teller County to Pikes Peak Highway - Arkansas River to El Paso County asphalt plants - El Paso County pit to Elbert County
Peat	- Teller County to El Paso County soil mix providers
Cement	- Fremont County to El Paso County concrete plants
Gold Ore	- Teller County to El Paso County landscape rock suppliers
Asphalt	- El Paso County asphalt plants to Teller and Douglas County construction projects
Coal	- Western Slope of Colorado to power plants in El Paso County

Source: El Paso County Planning Department, 1995

Note: EPC = El Paso County

As product demands along the Front Range increase and sources of supply become more limited, it is possible that inter-County transfers could also increase. Much of the potential for inter-County transfer will be tied to the relative availability of rail haul and the cost of diesel fuel for hauling by truck.

E. Elements of Resource Supply

1. Permitted Capacity

a. Permitted Operations

An integral part of assessing the "supply side" of the mining picture in El Paso County involves determining the quantity and quality of resources currently under State permit. Although certain additional factors and constraints apply in a minority of cases, possession of a valid State reclamation permit ordinarily implies a right to mine. Because State permits are required as a precursor to almost any type of mineral extraction, a survey of all active state permitted sites provides a reasonable method for estimating the current supply of available minerals.

As of August 1995, the Colorado Division of Minerals and Geology files included a total of 130 permits for El Paso County. Most of these are depicted on Map 1. As indicated in Table 8 below, less than half of this total falls within the "active" category. Terminated permits ordinarily involve sites which have been closed and reclaimed to the satisfaction of the State.

TABLE 8

State Reclamation Permits
Categorized by Status
El Paso County

Status	Number
Active	47
Terminated	69
Withdrawn	6
Awaiting Warranty	3
Incomplete	1
Application in Process	2
Other	2
Total	130

Source: El Paso County Planning Department and Division of Minerals and Geology County Reports, 1995

Of these approximately 50 "active" sites, eight (8) have recently been closed by the El Paso County Department of Transportation This figure additionally includes three (3) completed or limited borrow operations, a closed coal strip mine, a closed State Highway Department gravel pit, and the inactive Chipita Ranch and Summit Pits. If all of these sites are eliminated the total number of "Potentially Viable Permitted Sites" is reduced to approximately 41. These remaining permits are categorized according to resource type in Table 9 below.

TABLE 9

Potentially Active Mining Permits Categorized by Commodity Mined

Commodity Mined	Number
Sand or Sand and Gravel	30
Silica Sand	4
Clay	3
Limestone	2
Granite	1
Shale	1
Total	41

*One additional silica sand operation is under temporary closure

Source: El Paso County Planning Department and Division of Minerals and Geology County Reports

Of the 30 sand or sand and gravel operations, nine (9) are permitted to El Paso County and one (1) to Elbert County. The other twenty (20) or so are privately operated. Approximately twelve (12) of these active, potentially viable operations have some form of zoning approval by El Paso County. The others are legal nonconforming uses or are located in unzoned areas.

During the process of review of this Plan it was pointed out that the costs of applying for and maintaining a State reclamation permit makes it difficult for a potential small operator to establish a mining operation in advance of when it will be needed. This may lead to future conflicts with property owners in the area.

b. Permitted Capacity By Commodity

El Paso County Planning Department staff have attempted to estimate the approximate amount of mineral resources which remain available in permitted sites. Maps 1 - 3 depict the location of these operations. They are differentiated from inactive sites by a “pick and shovel” symbol. Where possible, capacity figures were taken directly from operators statements and reports. However, the most common methodology involved review of the MLRD files and calculation of an approximate figure by estimating remaining permitted

acreage and an average depth modified to include a waste factor. General ratios of 2.2 tons per cubic yard for consolidated materials and 1.5 tons per cubic yard for alluvial materials were used. Documentation for calculations is available in the El Paso County Planning Department. Altogether, about 5,500 total acres in El Paso County are under some type of State reclamation permit. However, it is noteworthy that over 25% of this average is accounted for by two clay mines. Another 30% of total permitted acreage is devoted to the County's three most-extensive sand and gravel operations.

1) Sand

Many of the sand extraction operations in El Paso County are categorized under the more generalized commodity designation of "sand and gravel", with some operations actually producing quantities of both products.

County staff identified approximately twelve (12) permitted sites which appear to produce sand (other than silica sand) exclusively. Altogether, approximately 38,000,000 tons of sand are available in these sand-only operations. This represents possibly an 80-year supply. It is notable that one pit (Daniels Sand, located on South Academy Boulevard) accounts for roughly 75% of this capacity.

In reality, there is quite a bit of additional permitted sand capacity associated with combined sand and gravel operations (see below). The largest of these permitted reserves are located along Interstate 25 between the City of Fountain and the Pueblo County line.

2) Gravel

Approximately seven (7) gravel-only mining permits were identified in the County's inventory. Together these account for approximately 39,000,000 tons of permitted reserves. This equates roughly to over fifty (50) years' demand for general purpose gravel, noting that the hard-rock quarries and combined sand and gravel operations have the effect of increasing this capacity. The gravel capacity picture becomes a great deal more complex when the issue of specifications is introduced. No single operation dominates this category of permitted reserves.

3) Sand and Gravel

It is difficult to distinguish the proportion of sand and/or gravel produced

by some of the pits in El Paso County. Therefore, a total of about seventeen (17) permitted facilities were categorized as producing a combination of "sand and gravel." Altogether, these facilities account for roughly 75,000,000 tons of reserves. Much of this material is of undetermined quality. It needs to be emphasized that, in most cases, this material does not meet the standards necessary for concrete or asphalt aggregate. This category of operations includes many of the "pit gravel" sites leased by the County Department of Transportation in the eastern County.

4) Silica Sand

Chapter II. D. I. of this Plan describes the unique importance of silica sands as a valuable mineral export. As noted in Table 6 above, there are only three (3) active operating silica sand mines in El Paso County. These are located in the Briargate and Northgate areas, and they are operated by a single company on leased properties. Both pits adjoin areas which are undergoing substantial urban density development. At least three (3) other silica sand pits have been closed due to a combination of depleted supplies and development in the Briargate area. Another site is under temporary closure, and its future is in question due to projected development. An additional mine, operated by another company is listed as awaiting warranty. That company reportedly went out of business.

Total permitted silica sand reserves are estimated by industry representatives to be three (3) to four (4) million tons. Based on an assumed annual production of 250,000 tons, this supply could last for twelve (12) to sixteen (16) years. However, it needs to be emphasized that each of the three active permitted sites is potentially impacted by adjacent development. Permitted operations may be constrained by local government conditions and/or lease limitations. Development pressure and limited resource distribution will be combined to limit the potential for new sites to be opened.

5) Clay

There are a total of three (3) State-permitted clay mines in El Paso County. All are located in the vicinity of Calhan, Colorado, on property which is currently unzoned. One of these operations is

associated with the historic “paint mines” south of Calhan. Another is a recently approved three hundred twenty (320) acre site. The third operation is very small and was used to provide material to line the Sun-set Village wastewater plant lagoons. Altogether, about one thousand seven hundred (1,700) acres are under permit, with possibly half that acreage available for mining. Total permitted reserves are likely to be in excess of three million (3,000,000) tons. With annual consumption in the area of fifty thousand (50,000) tons, the life of these reserves would be roughly fifty (50) years.

As with silica sands, essentially all of this material is exported out of El Paso County. Total truck trip generation is estimated at an average of five (5) to ten (10) per day. Urban development pressure is not likely to adversely impact this re-source, but it should be noted that this deposit of refractory clay is essen-tially unique in El Paso County.

6) Limestone

With the closing of the Queen's Canyon Quarry in 1990, El Paso County is left with two operating limestone quarries. These are the Pikeview Quarry- south of the Air Force Academy, and the Snyder Quarry located west of the Garden of the Gods. Together these account for a reserve of approximately thirteen million (13,000,000) tons. This permitted reserve is the equivalent of ten (10) to fifteen (15) years’ supply of high quality concrete aggregate. However, it is important to understand that these operations currently supply a broader range of categories within the gravel market. There are some options for sub-stitutability from others sources. On occasion these quarries also export their product beyond the limits of El Paso County.

7) Granite

The County has only one (1) permitted hard rock "granite" quarry. This is located west of State Highway 115 near the Fremont County line. The material mined is "granodiorite". It is suitable for concrete aggregate after being blasted and crushed. According to statements by the operator, as of late 1993 approximately two million (2,000,000) tons of material remain in the permitted area with another fourteen million (14,000,000) tons available in the adjoining leased-but-not-permitted

area). In 1986, the previous operator petitioned for expansion of the permit area. This Use Permitted by Special Review was denied by the Board of County Commissioners in response to residents concerns related to traffic safety and environmental quality.

Subsequently, a petition for an approximately 60 acre granodiorite quarry was received in association with the Louisiana State University Camp property located to the north on Highway 115. If approved, this operation would have allowed for the extraction of approximately 38,000,000 tons of material. However the application met with stiff opposition and was never carried forward to the Board of County Commissioners.

8) Other

There is one (1) coal strip mine technically under permit in the County. However, this operation near Franceville south of State Highway 94 is under a plan for reclamation only and has not produced coal since 1981.

There is also one (1) small decorative quartz mine permitted in an area west of the Town of Palmer Lake.

9) Conclusion

Table 10 below provides a general estimate of remaining permitted capacity of mineral resources by commodity type. In some cases, the figures provided are the result of very rough calculations, but they do present a sense for relative amounts of permitted supply. It becomes readily apparent that the “quarry aggregate” and “silica sand” categories have the least remaining permitted capacities. As will be described later in this document, potential new sources for these resources are very limited.

TABLE 10

Permitted Reserves by Commodity Type

Commodity	Permitted Capacity (tons)	Supply in Years
Quarry Aggregate	15,000,000	12-20
Sand	30 - 40,000,000	80+
Gravel	30-40,000,000	50+
Sand and Gravel*	75,000,000	40+
Silica Sands	3 - 4,000,000	12-16
Refractory Clay	3,000,000+	50+
Coal	0	N/A
Quartz	200,000**	N/A

* material not specified; gravel is the commodity usually mined; quality highly variable; most does not meet concrete or asphalt aggregate standards.
** very rough estimate

Source: El Paso County Planning Department 1995 estimates using a combination of Colorado Division of Minerals and Geology permit information and operators' statements.

By comparison, the Aggregate Analysis for the Denver Metropolitan Area (Jefferson County Planning Department, 1987) estimated that study area to have approximately 340,000,000 tons of permitted aggregate reserves. This equated to about 18 years of available reserves.

2. Potential Additional Capacity

   a. Introduction

      Potential additional capacity could be most broadly defined as the amount of unpermitted reserves of a given mineral resource which may be theoretically available anywhere in El Paso County. However, actual available capacity, besides not being entirely known, is limited by a variety of constraints which are discussed in some detail in Chapter III of this Plan. In the following Section the relative physical availability of potential additional capacity is discussed according to category.

   b. Quarry Aggregate

      Within El Paso County, potential new sources of quarry aggregate are extremely limited. These are limited to areas of limestone outcroppings, as well as certain fine-grain granites and metamorphic associated rocks. The Empire Study identified less than 6,000 acres of these deposits County-wide. As is discussed in Chapter III, much of this acreage has limited availability for mining.

c. Higher-Quality Gravel

According to the Empire Study, there were approximately 60,000 acres of potential gravel deposits in El Paso County at one time. These are depicted as “mesa gravel” and “stream terrace deposits” on Map 1. However, not all of these areas contain deposits of commercial quantity. Much of this property has been developed or is encumbered by various planning constraints.

d. Sand

The Empire Study (Map 1) depicts almost 300,000 acres of eolian (windblown) deposits as well as other areas where construction-grade sand may be available in commercial quantities. While not all of these areas contain sand which meets required specifications, it is clear that overall potential reserves of sand are extensive.

e. Lower-Quality Gravels

The Empire maps depict over 500,000 acres of “upland deposits” as well as other areas where lower-quality gravel deposits may be found. Overall, it is clear that there is no shortage of lower-quality gravel in the County, especially in the Eastern County. However, as specifications are increased, these sources can be expected to have limited applications.

f. Silica Sands

The Empire Study does not delineate deposits of “silica sands.” These are extremely limited in geographic location and extent, occurring only in the general vicinity of Briargate. Potential future availability can be measured on a deposit-by-deposit basis.

g. Clay

Areas of potential clay deposits have been transferred onto the Mineral Resource Maps (see Map 1) from the original 1975 Mineral Master Plan. Areas are limited to a band along the Front Range and sites in the vicinity of Calhan. Altogether 5,351 acres are shown in this category. These areas are not entirely inclusive of potential clay deposits in the County, and commercial quantities may not be available in all areas which are shown.

h. Coal

Approximately 99,811 acres of potential coal deposits are shown on Map 1. However, many of these deposits are mined out or otherwise unavailable. In any case, as of the time of preparation of this Plan, it is understood that it is not commercially feasible to mine any of the coal deposits in El Paso County at this time.

3. External Sources

   a. Introduction

      Areas outside the boundaries of El Paso County currently supply some of the mineral and mineral products used in this region. In order to prepare a viable mineral master plan for this county, both existing and potential future outside sources need to be evaluated. Potential external supplies are very generally summarized in the following discussion.

      The viability of external mineral sources is a function of several interrelated factors including local availability, substitutability, the relative value of the commodity and the comparative degree to which the outside jurisdictions regulate mining. The following is a fairly qualitative summary of the status of surrounding jurisdictions as present and potential future sources of external supply:

   b. Surrounding Counties

      Currently Fremont and Pueblo Counties are the only sources which regularly supply users in El Paso County with significant quantities of aggregate materials. A number of sand and gravel pits in Fremont County are used to supply materials for concrete and asphalt plants in the Colorado Springs area. In addition to concerns with transportation costs and traffic safety issues along State Highway 115, there is a long-term concern that Fremont County may "balk" at being a primary aggregate source for El Paso County. However, based upon discussion with the Planning staff of Fremont County, it would not appear that there will be an impending shortage of permitted aggregate supply in Fremont County.

      Pueblo County has a substantial number of permitted sand and gravel operations, many of which are associated with the Arkansas River and its major tributaries. The primary trade-off with respect to this potential external supply is the cost of delivery. Many of the permitted pits in Pueblo County are only operated when there is an active project in the immediate vicinity. Apparently waste slag from the C.F. & I. Steel Mill is usable for some aggregate applications.

      Opportunities for aggregate substitution from the west, north and east would appear to be quite a bit more limited. Douglas County has the potential resources but very few permitted sites. The planning and political climate there are not conducive to additional approvals. Jefferson County, farther to the north, has a number of permitted quarry sites but these are located at least forty (40) miles from the nearest large Colorado Springs markets. Jefferson County already serves a

substantial share of the Denver metropolitan area market.

Teller County has limited high quality aggregate supplies, so it is unlikely they can be relied upon as a major external source. The City of Colorado Springs does maintain the Pikes Peak Highway with materials obtained from pits located in Teller County. Conversely, El Paso County supplies Teller County with much of their needed high quality aggregate.

Counties to the east have limited potential for aggregate supplies due to a combination of distance and poor quality resources.

F. Economic Impacts and Considerations

1. Cost of Production

Construction sand and gravel, crushed stone and, to a lesser degree, concrete and asphaltic concrete are high volume, low-value commodities. Nationally, the constant dollar unit (f.o.b.) values for the most common grades of sands and gravels have remained relatively stable. Increased real costs of labor, energy, equipment and environmental compliance have been offset through increased use of automation and more efficient equipment. In the future, constant dollar prices are expected to rise because of decreased deposit quality and more stringent environmental and land use regulations.

In 1991, the National average unit price for construction sand and gravel was $3.60 per ton f.o.b. (at the mine site). For Colorado, the 1991 figure was $3.47. For crushed stone the comparable 1991 values were $4.70 per ton for the U.S. and $4.88 for Colorado.

As noted under Transportation below, accessibility is a major key to the real price of these commodities.

2. Employment

Statewide, Colorado's mining employment, which included oil and gas production, totaled 19,500 in 1991. El Paso County's share of this employment is quite low, primarily because essentially no metals and coal mining or oil and gas production takes place within this County.

Since 1940, direct employment in the El Paso County mining industry has remained at fairly low levels, generally accounting for 100-200 jobs (refer to Figure 2). In 1991 the Colorado Department of Labor and Employment listed 119 persons working at 13 establishments with a total direct payroll of $3,622,000. By applying multipliers of 1.75 for employment and 1.65 for payroll, the total direct and indirect 1991 impacts calculate out to 208 jobs and $5,976,000 in total payroll. These figures roughly equate to 0.1 percent of the total El Paso County economy. It should be noted that in all probability the above numbers somewhat understate the local employment

impact of mining. Some workers who are engaged to some degree in mining, are reported to the State in other employment categories. For example, the independent truckers who haul from many of the mineral extraction sites in the County are not included in this accounting. Also, mining jobs have traditionally paid higher than average wages in this region.

If all workers associated with mining and mineral processing (e.g. asphalt and concrete production) were accounted for, it is likely that total County mining-related employment would be in excess of 500 persons. However, the majority of these individuals would probably continue to be employed within the County even if most of the raw mineral products were imported.

3. Other Economic Impacts

   a. Property Taxes

      As of late 1992, nineteen (19) of the tax parcels in El Paso County were directly assessed for mineral-related uses. These properties include many, but not all of the major active extraction operations in the County. Altogether these 6,618 acres, have an assessed value of $823,810 along with their associated real property improvements. This represents about 0.2 percent of the property in the County and 0.04 percent of all real property valuation.

      The 1992 valuation for severed mineral interests totaled $417,060 for 1182 parcels covering 201,793 acres. These severed mineral rights include those for oil and gas. Severed rights are associated with about 15% of the land in the County, but less than one (1) percent of the parcels. Ordinarily, such property is assessed at a standard $2.00 per mineral acre. The mineral rights associated with the remaining acreage in the County are not severed and are therefore not given a separate valuation.

      The 1991 County assessment also included $1,688,000 in assessed value for all natural resources-related personal property. What portion of this relates to mining is unknown. Altogether, mining-related real and personal property accounts for on the order of 0.1% of the County tax base.

   b. Sales and Use Taxes

      Sales tax revenues derived from raw mineral product sales in El Paso County are significant, but relatively unimportant when compared to other economic considerations. Mineral producers are only required to pay sales taxes on materials sold to private accounts, and then only when the product is delivered to an end user within the taxing jurisdiction. An analysis of 1991 and 1992 sales tax records for

several of the larger mineral extraction and mineral processing firms in the County indicates that these companies contributed roughly $100,000.00 - 150,000.00 in sales taxes to the County each year. Secondary products such as concrete and asphalt appear to account for at least 80% of this revenue. It is arguable that these processing functions would continue to exist (and pay taxes) even if some raw product had to be imported from outside the County.

c. Leases and Royalties

Mineral royalty and lease income has not been determined, and may be locally significant in El Paso County. However, the Countywide impact of leases and royalties is likely to be insignificant. This is because most of the major operators in El Paso County maintain fee simple ownership of their mining sites.

d. Indirect Impacts

Although it is sometimes difficult to establish appropriate limits, it is clear that local mining has associated secondary economic impacts in addition to traditional employment multipliers. For example, to varying degrees, local processing, and to some degree, local shipping, would not occur in the absence of local supplies. One example is the almost $300,000 annually spent on natural gas for silica sand drying. Lease and royalty income are other examples for which comprehensive figures are not available.

Mineral product haulers certainly account for a substantial amount of taxes related to vehicle use and ownership. However, it is logical to presume that most of these revenues are counterbalanced by the costs of maintaining the roads used by these vehicles.

4. Transportation Costs

Arguably, the more important economic aspect of mining in El Paso County is the degree to which locally available resources reduce the cost of construction and maintenance. Aggregate is a generally high bulk, low value commodity. A rule of thumb for larger distances is that it costs 7.5 cents per ton to transport raw mineral products one additional mile by truck.

A sense for the importance of incremental transportation costs can be derived from Table 11 below. It illustrates the approximate distance-related variations in delivered costs for a number of sample commodities.

TABLE 11

Variations in Final Delivered Cost Per Ton Related to Hauling Distance

Commodity	Undelivered Cost	10 Mile Cost	25 Mile Cost	100 Mile Cost
Pit Gravel	$ 0.35	$ 1.10	$ 2.23	$ 7.85
Concrete Sand				
#7 Aggregate	$ 11.34	$ 12.09	$13.22	$18.84
Asphalt	$ 15.29	$ 16.04	$17.16	N/A
Concrete	$ 25.00	$ 26.00	$27.50	N/A

Notes: 7.5 cents per ton per mile and truck hauling assumed in all cases except for concrete which was assumed at 10.0 cents per mile; 100-mile costs are not provided for concrete and asphalt because these commodities can not be delivered over this distance.

Source: El Paso County Planning Dept.

As would be expected, transportation-related costs have the largest relative impact on the lowest value commodities. For example, in the case of a one way trip distance of 25 miles, the proportional impact of over the road hauling costs varies between 10% and 85% of the total delivered costs for the commodities described above. It should be noted that Table 11 probably under-represents the distance-related costs of delivering concrete and asphalt because of the reduced capacity of these trucks. Because labor and fuel costs are two of the key components of overall transportation costs, increased traffic congestion places upward pressure on per mile costs. Congestion also reduces the effective range from asphalt and concrete plant sites, especially during peak traffic hours.

A presumed future reduction in the number of aggregate sources in El Paso County will likely result in an increase in average hauling distances along with a corresponding increase in hauling costs. However, these increased hauling costs may account for only a minority of future price increases. Other factors related to environmental regulation and/or lack of competition, may contribute a larger proportion.

Rail haul may be an economically viable option, once distances reach a certain threshold. For example, in the

case of the new Denver Airport high quality crushed granite aggregate was brought in by rail from Wyoming in lieu of truck haul from more local sources. As a rough rule of thumb, aggregate can be hauled by rail at about 2.5 cents per ton/ mile versus 10 - 12 cents for hauling by truck. However, there are relatively few existing or potential future mine sites which are situated immediately adjacent to rail lines. Additionally, most final delivery points for aggregates do not have rail access. Cost estimating for most rail haul alternatives would need to account for a truck haul segment on both ends. Although no specific figures are available, it would appear that rail haul would be a limited and expensive option for the hauling of common variety aggregates.

Finally, it should be emphasized that a shift to non-local aggregate suppliers is not likely to have that large an impact on total material usage. Demand for aggregate is fairly inelastic. Combined traffic impacts to the County would almost certainly be greater in the event that outside aggregate resources were to be used in any large quantity.

G. Institutional Constraints

1. Incorporated, Developed and Platted Property

a. Introduction

An understanding of the extent of incorporated, developed and platted property is an essential component in the preparation and application of a viable mineral master plan. The reasons for this are jurisdictional, practical and regulatory. To begin with, any properties which are located within municipal limits (either now or as a result of future annexations) effectively fall outside of the legal purview of this document. Secondly, most already developed properties will be unsuitable for mining. Finally, many platted but yet undeveloped areas will also be unsuitable for mining. Due to their already platted status, these parcels are also effectively exempt from one of the major stipulations of the 1973 “Preservation Act.”

That stipulation is essentially that a Board of County Commissioners shall not take a land use action which would interfere with the present or future extraction of a commercial mineral deposit.

b. Incorporated Areas

Approximately 9.5% of the area within El Paso County is now located within one of its eight (8) municipalities. With 182.2 square miles within its city limits, the City of Colorado Springs accounts for almost 90% of this incorporated territory. Municipal limits are depicted on the Map 2 which is an appendix to this document.

Traditionally, most mineral extraction and many mineral processing activities in El Paso County have occurred

in unincorporated areas. Of the approximately forty (40) reasonably active permitted sites in El Paso County, it appears that only three (3) silica sand mining operations and one (1) major gravel mine are located within city limits. Additionally, there are several materials stockpile areas within City limits. Many of these are associated with asphalt and concrete plants. Typically, cities and towns will annex only those areas with existing or planned urban density development. Existing mining operations are almost never annexed, and it would be especially difficult to permit a new mining operation within city limits. For these reasons it is appropriate to make a general planning assumption that opportunities to establish new mining operations within city limits will be fairly limited. Conversely, it is not unreasonable to expect new mineral processing operations to locate within municipal areas which are zoned for heavy industrial purposes. This is especially true for those municipal areas in which concrete and asphalt plants are already located.

c. Developed Areas

Only about fifty (50) percent of all of the municipal property in El Paso County is currently developed. Obviously, the opportunities for mining in currently developed areas are extremely limited. In addition to incorporated areas there are substantial unincorporated areas which are developed, and therefore not reasonably available for mining. Altogether, about 115,000 persons or 25% of the County population resides in unincorporated areas. Most of the non-military proportion of these residents live in either suburban or rural-residential developments. Because of the lower average densities involved, unincorporated areas account for more developed property than is found in municipal areas. For the purposes of this analysis, it was decided that the inventory of platted property (described below) would be a reasonable substitute for an inventory of unincorporated developed property. The major exceptions to this approach are the Rancho Colorado subdivisions along south Interstate 25 and selected parcels in the 35-acre category. These are also discussed below.

d. Platted Property

Part of the planning overlay process for this Plan involved an inventory of platted unincorporated property. Platting status is an important factor because it provides a strong (but not 100% conclusive) indication of the parcels' lack of availability for mining. Altogether, the County Planning Department identified a total of one hundred twenty-one (121) square miles of platted unincorporated properties. These areas are depicted on Map 2. This

survey is fairly complete, but it should be understood that its accuracy cannot be 100% guaranteed. It should also be understood that platted status does not fully preclude a parcel from being mined.

In some cases, parcels within larger lot subdivisions might be mined for local construction purposes. There are also areas such as Rancho Colorado (located west of Interstate 25 near the Pueblo County line) where properties were previously platted, but where no viable development has occurred. In El Paso County there are also a growing number of 35 and 40-acre tracted but not subdivided developments. While the opportunities for mining on these properties is diminished, staff concluded that it was not appropriate to entirely exclude these larger properties as potential mining areas.

2. Military Lands

The major military properties within El Paso County are Fort Carson, the Air Force Academy and Falcon Air Base. Potential aggregate resources for Fort Carson and the Air Force Academy were not mapped as part of the Empire study. The 1975 Resource Maps depict substantial gravel and some clay deposits within Fort Carson, but no areas of potential hard-rock quarry aggregate. A small area of potential clay deposits was also depicted within the Air Force Academy.

Because El Paso County does not exercise zoning authority within military installations, it is unlikely that there would be any formal local review of mining operations within these facilities.

Within the part of Fort Carson located within El Paso County there are no substantial ongoing mining operations, and none are anticipated. Small borrow pits are utilized on a project-specific basis. These are ordinarily kept below one (1) acre in area in order to limit the need for fugitive dust permits. Mineral rights within Fort Carson are administered by the Bureau of Land Management (BLM).

Because Fort Carson has not been targeted for either closure or major force reduction in the latest 1995 Defense Department Base Realignment and Closure (BRAC) process, its short- and medium-term future as a military installation appears secure. However, there is still some possibility that the facility could be closed or substantially downsized in the more distant future. In that event, extensive gravel and other mineral resources could become available for commercial extraction.

Within the Air Force Academy, there is one (1) former clay mining site which was under State permit. Sources at the Academy indicate that no major mining activities are occurring at this time and none are contemplated for the future. One or more mobile asphalt batch plants have been periodically located on the Academy, primarily for

the purpose of serving internal paving needs.

It is also noteworthy that the Forest Service properties which provide the visual backdrop for the Air Force Academy were withdrawn from availability for mineral entry during the late 1950s.

In conclusion, it is reasonable to assume for planning purposes that any mineral resources within military installations should not be considered as being potentially available for commercial extraction.

3. Federal Withdrawals

Map 2 includes a layer which delineates United States Forest Service properties for which the rights to prospect for and claim "common variety" minerals have been withdrawn. The "common variety" mineral category includes use of materials for aggregate purposes. A total of 79.8 square miles, or 3.7% of all El Paso County Forest Service properties, are depicted as withdrawn. This area includes a substantial majority of the visible Front Range Mountain backdrop.

4. Other Institutional Constraints to Mining

In addition to those categories of land uses identified above, there are certain other land tenure situations which practically or legally reduce the likelihood that a given property will be available for future mining. Some, but not all, of these categories are depicted on the planning overlay maps.

These include various categories of public ownership and parcels which may be encumbered by conservation easements.

Major City and County park properties are not all depicted on the overlay maps but are assumed to be unavailable for mining. In total, these unincorporated park properties account for about five (5) square miles. Also considered as not available for mining is the Nature Conservancy's 1,600-acre Aiken Canyon property located on southwest Highway 115. Property on the north and south slopes of Pikes Peak, owned or leased by the City of Colorado Springs for water supply purposes, is also depicted on Map 2. Mining is not technically precluded on these properties, but Colorado Springs Utilities staff indicate the likelihood of any private entity being allowed to mine or any major public mining would be remote. The primary purpose of the City is to protect these properties for water supply purposes.

H. Traffic Impacts

1. Trip Generation

It is estimated that the mining and mineral processing industries in El Paso County combine to account for about 567,000 one way truck trips and eight and one-half (8.5) million vehicle miles traveled (VMT) each year. This estimate was based upon the following assumptions:

- 805 tons annual per capita aggregate consumption

- 425,000 1993 estimated County population
- 25.5 net tons per truck
- 30-mile average pre-processing two-way haul distance
- 30-mile average post-processing two-way haul distance

Non aggregate hauling, internal trips and non-truck traffic were not considered in the above accounting.

By way of comparison, Pikes Peak Area Council of Governments (PPACG) estimates that there are a total of three (3) billion vehicle miles traveled in the Pikes Peak transportation planning area each year. Mining and mineral processing-related truck trips would therefore account for only about 1 in 4,000 total vehicle miles traveled in the region. However, many of these mining-related trips tend to be concentrated in a few areas.

2. Pavement Damage

Heavy vehicles including mining trucks are known to account for a disproportionately high share of pavement damage compared to their share of the vehicle mix. Organizations such as the American Association of State Highway and Transportation Officials (AASHTO) and the Colorado Department of Transportation (CDOT) have attempted to quantify this relative impact by attributing a "unit damage" to various types of vehicles. This figure corresponds to the flexion damage caused to a standardized asphalt surface. Accordingly, a truck axle carrying

an 18,000 pound legal load is attributed a "unit damage" factor of 1.0 while the factor for a typical passenger automobile is about 0.0008. The result is that one heavily loaded truck may produce the road damage equivalent of approximately 1,000 average passenger cars. Because the damage factor for overloaded trucks increases almost exponentially, the relative damage from a 21,000 pound axle is calculated at three times that of a legal 18,000 pound axle.

3. Congestion

It is intuitively obvious that, because of its size and relative lack of acceleration, a larger truck tends to take up more roadway capacity than an average passenger vehicle. Transportation professionals tend to express this as an equivalence which ranges from about 1.5 cars per truck when both vehicles are at highway speeds through 7 cars per truck in congested areas with steep grades where there is also a need for the truck to accelerate.

4. Loss of Load

Damage to vehicles from sand or gravel which escapes from haul trucks has been a fairly consistent complaint from motorists. As a result the City of Colorado Springs has adopted an ordinance which requires sand and gravel trucks to be covered while within City Limits. Within unincorporated areas, a more nebulous statute prohibits the “loss of load” from all vehicles but does not specifically

require tarps. Most city, county and state trucks are now equipped with motorized tarping

systems. Loss of load is most often the result of materials either blowing from trucks or falling from their exposed surfaces. Anecdotal evidence suggests that more vehicle damage is caused by material falling off of the trucks than is caused by material being blown from them. New mining operations in El Paso County are routinely conditioned to require sweeping of truck rails and covering of all loads where material gradation is such that part of the load may escape from the vehicle.

5. Accidents

   The Planning Department was unable to uncover any statistics which would be used to reasonably evaluate the contributions of mining related traffic to motor vehicle accidents.

6. Environmental Impacts

   Due to a combination of remoteness and the periodic realignments, the roadway systems which provide immediate access to mining sites are often unpaved. This provides a potential for substantial dust and/or erosional impacts

   Operators are ordinarily required to include internal access roads within their State reclamation permit boundaries and also to address these roads within their Fugitive Dust Emissions Permits. Water-borne sediments must be managed within all permit areas.

7. Conclusion

   In conclusion, it can be stated that mining-related traffic does not contribute significantly to overall regional traffic congestion and safety concerns. However, site- and corridor-specific concerns related to safety, road damage, noise and loss-of-load can be very significant.

I. Visual Impacts

1. Introduction

   The potential visual impacts associated with mining and mineral processing activities are of paramount concern to local government. There are two primary reasons for this. First, the potential visual impacts of these operations may be very significant in terms of land alteration and/or visual contrast. The duration of these impacts may be quite long. Secondly, the State, through the Mined Land Reclamation Act, may consider visual impacts along with other reclamation concerns. Thus, local government has a role to play, in coordination with the Division of Minerals and Geology, the mining industry and interested citizens' groups.

   This section provides some background on the visual impact issue in El Paso County, the current regulatory structure, a brief discussion of some of the practical aspects of visual analysis, alternative approaches to assessing and mitigating visual impacts, potential quantitative impacts to identified reserves, and a recommended approach to this issue.

   The recommended approach is to rely heavily upon site-specific

analyses of individual applications while also encouraging the development and use of additional and more refined regional visual inventory, analysis and management resources. Of particular importance will be use of the County-wide Geographic Information System (G.I.S.).

2. Components of Visual Impact

   A variety of factors contribute to the degree of visual impact which may be associated with a mining operation. Some of these are discussed in general terms below.

   a. Line of Sight/ Area of Impact

      In a visual analysis the essential determination is whether there is a direct line of sight between the affected parcel and areas, corridors or observation points around it. This determination is directly influenced by topography and more indirectly by factors such as the location of roads and population centers. Some properties have very limited line-of-sight exposure while others have very broad areas of visual influence.

      Related to the geographic area of impact is an assessment of the number of people who either reside in or travel through that area. For those who may pass through an area of visual impact, the duration of their exposure is an important element.

   b. Contrast

      Contrast is essentially the degree of deviation between the visual character of an area and that which surrounds it. If a mining operation alters the form, color, line or texture of the landscape from that which surrounds it, the tendency is to draw attention to the operation. In a natural setting, contrast is often considered a positive landscape element. However, when attention is drawn toward a mining or mineral processing operation because of its contrast, the reaction is ordinarily negative partly because attention is drawn to an alteration of the natural condition.

   c. Aspect and Distance

      All other things being equal, the higher the angle of a feature above the viewer's horizon, the greater its visual impact will be. There is an obvious correlation between aspect and distance. In visual analysis, landscapes are often divided into distance zone sections such as foreground, middle ground and background. Foreground might be defined as the areas within one-fourth mile of the observer with middle ground being those areas between one-fourth and three miles distant. Background areas could be defined as all areas three or more miles distant. It is important to understand that a given visual impact

      does not necessarily decrease correspondingly with distance. Rather, distance affects the relative importance of certain factors,

especially those which contribute to contrast.

d. Duration and Timing

The duration and timing of a given visual impact may have a lot to do with its relative acceptability. Visual impacts from mining often have long periods of exposure, but these can vary. It may be possible to orient or phase an operation or otherwise provide mitigation such that most of the impacts which would be of visual concern are limited to a narrow window of time. A short-term or temporary operation may be more acceptable in advance of or in conjunction with development as compared with later periods. One of the concerns with the duration or timing aspects of mining and mineral processing is that some of these are market driven. Actual phasing may be tied to when a market develops for a given amount of material. Conversely, property in the area of visual impact may develop at a faster or slower rate than what was projected. Timing of reclamation activities clearly also has an impact on overall visual impact.

e. Mining-Related Activities

In some cases, the most visually significant aspects of

a mining operation may actually be related activities such as stockpiling and equipment use and storage.

f. Degree of Permanent Landform Alteration

While it is somewhat of a "stretch" to consider ultimate landform alteration as a separate factor in "visual" analysis, there can be an innate concern with these changes which is somewhat independent from whether they can be seen, by whom and for how long. The idea is that the unseen impact of removing a ridge within a generally pristine and unique geological area may be considered quite profound. Conversely, the removal and export of a few feet of overburden in association with urban development of a very visible property might be considered to be less consequential in an ultimate visual sense.

3. Types of Visual Analyses

a. Regional Approaches

A regional "viewshed" approach to visual impact analysis and management can be very powerful because this considers impacts within the context of the larger landscape area. Ordinarily, a "viewshed" for an analysis area is defined as being inclusive of all properties which can be seen from any other point within the area. Viewsheds are normally bounded by major

topographic divides. In the broadest example a "Front Range Viewshed" for El Paso County would be defined as all property located east of

the Front Range ridgeline. Alternatively, a more specific Ute Pass viewshed would be defined as all properties which could be seen from any other point within Ute Pass.

When this approach is used, the landscape is typically divided into "units" based upon pattern elements such as form, lines, color and texture. These elements may then be combined with orientation toward and distance from key population centers or transportation corridors. Additional factors can be overlaid to come up with a composite potential visual impact map for a larger area.

An advantage of a viewshed or regional approach to visual impact is that it may have value as a more objective measure of relative impact. For example, a mining operation proposed for a previously designated low-potential impact area should be at a relative advantage compared with a site proposed in a designated high-impact area. A disadvantage of using regional visual assessment methods is that they may not fully account for the site-specific aspects of a proposed project or changes in road and development patterns. Minor modifications in site location and/or mining plans may have significant impacts on the overall extent of visual impact. A regional approach may not be fully sensitive to these distinctions.

b. Project Specific or Line-of-Sight Approaches

Site-specific visual approaches have limited applicability until one or more potential mining sites have been identified. The site itself becomes the point of visual focus rather than a larger viewshed or regional visual unit. Determinations are then made as to how much adjoining property will be potentially affected and to what degree. An advantage of this approach is that it can be customized to address the concerns associated with a particular site. It can also be sensitive enough to distinguish among the relative impacts of minor locational, operational and timing modifications. A potential disadvantage of this approach is that it may lack context. It may at least somewhat fail to answer the question whether one site does or does not compare favorably with all other available options.

4. Technological Options for Visual Analyses

a. Introduction

The choice of technological approach(es) used in visual analysis can be extremely important.

Available techniques vary from very simple map and photographic analysis to sophisticated digital modeling and photo-simulation. Each method or technology has its

strengths and weaknesses associated with cost and effectiveness.

b. Mapping Techniques

A thorough analysis using only topographic maps can go a long way toward assessing potential visual impact. Total affected areas can be calculated for various project scenarios. Profiles can be developed from these maps can be used to demonstrate the angle of view, distance and amount of exposure from specified view points. One disadvantage of the conventional mapping approach is that, at least for the untrained observer, it may be of limited help in visualizing what the impact might be in the three-dimensional real world.

c. Digital Mapping Techniques

Digital mapping technology can be used to create three-dimensional models of the "before and after" views of a mining or mineral processing operation. These models have the potential advantage of allowing people to visualize impacts in a more user-friendly three-dimensional context. Sophisticated systems allow for fairly easy adjustment to depict modifications in mining plans or view points and perspectives.

A disadvantage of this approach is that it may be quite costly and/or be too "rough" to fully capture relative impacts as seen by the naked eye.

d. Photography and Photo-Simulation

Photographs have the advantage of being able to very closely replicate what we see with the naked eye. Photographs can be re-touched to approximate the extent of and contrast associated with a given mining plan or scenario. One potential disadvantage of photo simulation is that the choice of film type or lens focal length can be used to either under or over emphasize the degree of actual impact from a given point of perspective. When photos are retouched or otherwise enhanced to simulate future conditions, the choice of exact color and technique is important.

e. Field Trips

In some cases there is no complete substitute for going out in the field, standing at carefully selected points assessing whether or to what extent a proposed mining operation might be seen and how it might look. It may be helpful to combine this approach with those listed above.

f. Combined Techniques

Given the relative strengths and weaknesses of the visual analysis techniques discussed above, it becomes apparent that the most

appropriate approach to a complex, controversial or long-term mining proposal might be to combine two or more of the techniques listed above. For example, photos can be digitized to allow them to be more fully integrated with digital terrain modeling. Site visits can be utilized to verify that other techniques appear to be capturing a real world perspective. Table 9 attempts to summarize some of the comparative advantages and disadvantages of various visual assessment techniques.

TABLE 12

COMPARISON OF VARIOUS VISUAL ASSESSMENT TECHNIQUES

Technique	Cost	Potential Advantages	Potential Disadvantages
Conventional Mapping	Low if contours are available	Provides quantitative assessment of areas of impact	May be difficult for untrained person to visualize
Profiles	Relatively low depending on resources and sophistication	Add another (vertical) dimension	Limited to fixed points; does not fully combine dimensions
Digital Terrain Modeling	Moderate to high depending on resources and sophistication	Allows views in three dimensions; can model future conditions over a variety of time periods	May be too rough to fully model real world; can be manipulated
Photos and Photo Simulation	Low to high depending upon sophistication	Can be excellent user-friendly replication	May not fully capture effects of contrast
Field Trips	Low to moderate	Captures best sense of existing conditions; may be effective for verification	Harder to capture future conditions; Limited permanent record

5. Existing and Potential Future Visual Assessment Inventories and Tools

   a. Introduction

      While El Paso County does not currently have a County-wide visual analysis or inventory of significant visual features, there are a variety of resources which currently exist or may become available in the future. These are discussed below.

   b. County-Wide Geographic Information System (G.I.S.)

      El Paso County's evolving G.I.S. will have a number of important applications to visual assessment. Once an area of visual impact is identified, this could be overlaid on the County's G.I.S. to extract a wealth of related data. This could include detailed demographic data based upon the latest available census.

      Additionally, the County has Digital Elevation Model (DEM) topographic information available typically at the 20-foot contour interval. This data can be manipulated to determine rough areas of visual impact.

      However, it is important to note that the County G.I.S. may not be fully available to applicants or consultants. Applicants may need to be charged for in-house analysis on a time and materials basis.

   c. Small Area Plans

      Several of the County's Small Area Plans (S.A.P.s) include sections on visual resources or analyses. These documents can and ordinarily should be referred to when they are applicable.

      The Ute Pass Plan (1982) includes a comprehensive and detailed visual resource section which breaks this area down into landscape units.

      The Tri-Lakes Plan (1983) includes visual resource policies, but no comprehensive visual analysis.

      The Highway 115 (Southwestern) Plan (1990) includes a comprehensive visual analysis which combines several approaches.

      Both the Black Forest (1987) and Falcon/ Peyton (1993) Plans include generalized visual analysis which break these planning areas into visual units and describe these.

      The South Central Plan (1988) includes a policy section on minimization of visual exposure.

      The Highway 94 (1985) and Ellicott Valley (1988) Plans include visual policies, but no comprehensive analyses.

d. Colorado Springs Inventory of Significant Natural Features

In 1990 the City of Colorado Springs engaged a consultant to prepare a comprehensive inventory of significant natural features for the area within the Colorado Springs urban and potentially urbanizing areas. This study is based upon the Federal Government's Visual Resource Management System. This method uses landscape character and sensitivity classifications to produce a graphic prioritization of visual resources areas. This data is presented as overlays on U.S.G.S. maps of the study area.

e. Mountain Backdrop Study

Through an intergovernmental agreement among five counties (El Paso, Douglas, Jefferson, Boulder and Larimer) a consultant has been hired with the purpose of focusing attention on the Front Range Backdrop. A major emphasis of this effort will be a visual analysis component. It is anticipated that this resource will be very helpful in providing a context for evaluating future mining proposals within this backdrop area.

6. Existing regulations

Section 35.13 of the El Paso County Land Development Code contains a requirement for a visual impact report. This report must include but not be limited to a description and depiction of the visual impact area, consideration of temporal aspects and a discussion of mitigation measures which will be taken.

The intent of this requirement is to allow reasonable latitude based upon the circumstances associated with each unique proposal. For example, a short-term borrow operation associated with site preparation might require only the most perfunctory level of visual analysis. Conversely, a long-term quarry operation proposed for a generally pristine natural area will require a very high level of analysis.

7. Potential Impact of Visibility Standards on Available Mineral Reserves

A County-wide inventory of visually significant areas is not currently available. Therefore, at this time it is not possible to reasonably calculate the potential impact that exclusion of visually sensitive areas might have on the overall availability of mineral resources in the County. However, as an example of the way this impact might be calculated, the Planning Department excluded a buffer strip extending five hundred feet (500') from all State highways and/or expressway corridors in the County. As can be seen on Table 10, these theoretical impacts on mineral reserves range from being very significant for commodities such as limestone to insignificant for other commodities.

TABLE 13

POTENTIAL EFFECT OF VISUAL BUFFER ZONES ON IDENTIFIED MINERAL RESERVES

Mineral Commodity	Total Acres After Other Exclusions	Total Acres After Visual Exclusion	% Change
Limestone	523	346	-30.4
Granite	85,808	84,811	-1.2
Mesa Gravel	8,568	8,138	-5.0
Fine-grained Granite	2,461	2,460	0
Upland Deposits	507,667	495,332	-2.4
Stream Terrace Deposits	15,814	13,263	-16.1
Floodplain Deposits	114,019	111,457	-2.2
Alluvial Fan Deposits	0	0	0
Eolian Deposits	143,057	141,683	-1.0
Clay			

By comparison, the Aggregate Analysis for the Denver Metropolitan Area (Jefferson County Planning Department, 1987) estimated that study area to have approximately 340,000,000 tons of permitted aggregate reserves. This equated to about 18 years of available reserves.

8. Visual Impact Mitigation Options

   a. Introduction

      By their nature, all mining operations will have some visual impacts. However, there are a variety of techniques which can be employed to reduce these. Some of these mitigation strategies are discussed below.

   b. Siting

      The preeminent initial decision in visual impact mitigation is one of project siting. Some sites are highly exposed visually, while others have extremely limited visual impact areas. Sometimes a minor adjustment in site and/or mining area boundaries will have a substantial impact upon visual exposure.

   c. Phasing and Timing

      Project phasing decisions may have a very significant influence on aggregate visual impact. It may be possible to "shield" most adjoining property from maximum visual impact throughout most of the life of an operation through appropriate phasing. Adjustments to the overall timing of a project may also serve to reduce visual impacts. A mining operation which is initiated

and completed well in advance of development may be more palatable. Alternatively, if mining is more or less concurrent with development site preparations concerns with visual impacts might also be reduced.

d. Buffering/ Screening

Natural (preferable) or constructed buffers may be employed to reduce visual impacts. In some cases, it may be possible to incorporate revegetated topsoil stockpiles into a buffering/ screening system. Vegetation may also be employed to enhance the effectiveness of buffering and screening.

e. Concurrent Reclamation

By limiting the maximum amount of disturbed and/or high contrast areas concurrent reclamation can go a long way toward minimizing adverse visual impacts. Although the Mined Land Reclamation Board (MLRB) has ultimate authority over reclamation issues, concurrency requirements could be built into the locally approved mining operation plan so long as such requirements do not conflict with MLRB authority.

f. Enhanced Reclamation

Visual impacts may be reduced by employing reclamation techniques which are in addition to those required by the State. These techniques will be variable depending upon site characteristics but may include rock staining, additional planting of trees, shrubs or wildflowers and/or additional grading to add texture to the reclaimed site.

9. Conclusion and Recommended Approach

a. Visual Impact Assessment

The recommended approach of this Plan toward visual impact analysis has several components:

1) Fit the type and level of analysis to the unique circumstances associated with each proposal.

2) Maximize the effective use of regional visual analyses and methods which are or will be available.

3) Continue to upgrade the County's Geographic Information System (G.I.S.) to enhance its value as a regional visual assessment tool.

b. Visual Impact Mitigation

The recommended approach of this Plan toward visual impact mitigation is as follows:

1) Consider the ability and willingness of an operator to agree to binding visual mitigation conditions.

2) Encourage concurrent and enhanced reclamation techniques where this can serve to effectively reduce visual impacts.

J. Other Environmental Concerns

1. Dust

Dust generation can be a major impact of mining and mineral processing activities, especially during dry periods. Dust is generated from the blasting, materials handling, crushing and screening functions as well as from haul roads.

Opportunities for mitigation of dust from blasting are limited. However, water trucks and spray arms may be employed to greatly reduce dust emissions from processing activities such as crushing and screening. Calcium chloride or water can be applied to pit floors and haul roads to abate dust.

All mining operators are required to obtain a Fugitive Dust Permit from the Colorado Department of Health. The El Paso County Department of Health & Environment contracts with the State to perform inspections associated with these permits. Their first inspection typically involves verification of information on the initial State permit prior to final State approval.

Associated with the State Dust Permit is a control plan which specifies dust mitigation practices that must be employed. Inspections occur on both a regularly scheduled and a complaint basis.

2. Noise and Vibration

Noise impacts associated with mining and mineral processing activities can be very significant if not properly mitigated. Blasting noise is not that consequential since this activity occurs infrequently. More often it will be heavy equipment, trucks and crushing and screening operations which will contribute most to noise impacts. These impacts may be reduced through careful siting decisions, construction of berms, and by limiting operations or the times they occur. Vibration is an impact which is most pronounced during blasting. Since blasting only occurs in association with a few mining operations in the County, it should be evaluated on a case-by-case basis.

3. Water Quality and Quantity

Although mineral processing activities such as wash plants and slurry lines may account for substantial consumptive water use, it is evaporative loss from surface impoundments which most often presents a water quantity issue. Operations which expose groundwater ordinarily must augment any evaporative loss. A well permit from the State Engineer's Office is ordinarily required if the mining activity results in surface exposure of groundwater. In some cases, the operator will need to continue augmentation of evaporative

water in perpetuity. The net effect of these regulations is that the process of mining in saturated areas (such as in stream corridors) may be both complicated and expensive.

Sediments which leave either the mine site or access roads may present a water-quality problem. There are State reclamation standards pertaining to grading and hydrology. However, drainage and erosion control may also be a local concern, especially related to off-site impacts.

There have also been claims that mining activities such as blasting may have the impact of altering local groundwater hydrology. These situations may be difficult to evaluate in areas of more complicated geology.

4. Lights

During periods of peak production and processing mining operations may be continued during late evening or early morning hours. This activity often necessitates the use of high intensity lights. These lights may cause an inconvenience to either neighboring or distant property owners. Since the State does not ordinarily regulate hours of operation, it would be up to the County to potentially regulate lighting through the local review process.

5. Noxious Weeds

The State of Colorado has designated certain plants, including leafy spurge and certain thistles as noxious weeds, which must be eradicated by the property owner. Noxious weeds often occur in association with mining sites due to the disturbance of natural vegetation and the importation of topsoil.

III. THE PLAN

A. Introduction

The operative elements of this Plan consist of a Mineral Resource Map with planning overlays, along with a series of goals, policies and recommended actions. It is intended for these elements to be used in combination with the information in Chapter II of this Plan and other referenced materials in the evaluation of land use and mining applications. The Resource Map (Map 1) and Planning Overlays (Maps 2 and 3) have been prepared in digital computer format to maximize their effectiveness for planning. Smaller-scale versions are included as a separate appendix to this report (Appendix H). Larger-scale copies are available to the El Paso County Planning Department.

B. Mineral Resources Map

1. Description

The Mineral Resources Map (Map 1) depicts a combination of potential mineral resource information for the County. The primary source for this was the 1991 *Empire Aggregate Resources Study*. Original mapping was completed on 1:24,000 U.S.G.S. mylars and is available at the El Paso County Planning Department. Only minor modifications have been made to correct for obvious errors and to allow for edge matching. It is noteworthy that aggregate information for Fort Carson and the Air Force Academy was not provided in the Empire Study. It is suggested that this information be obtained and integrated within the Resource Map in the future.

Also delineated on Map 1 are areas of potential coal and clay deposits digitized directly from the County's original 1975 mining plan.

Finally, Map 1 includes the locations of all State-permitted mining operations in the County. These are indicated by an identification number. Active operations are depicted with a pick and shovel symbol. These "active" operations are summarized in Appendix A.

2. Scope and Limitations

The potential mineral resource information on Map 1 is only as good as its original sources. Within each category it is understood that quality may differ significantly. For example, isolated higher-quality mineral deposits may exist within an area categorized as including materials of lower quality. A review of the locations of the 130 or so State-permitted mining sites in the County bears this out. Most geographically correspond with the deposits shown on the Resources Map. However, there are limited notable exceptions. For example, the existing Menzer Quarry located west of Highway 115 in southwestern El Paso County is shown as being located in an area of Pikes Peak Granite. In actuality, this operation is located within an exposure of finer grained granite and metamorphic rocks.

3. Recommendations for Use

   It is recommended that Map 1 be used in combination with Maps 2 and 3 as a first step in allowing the Board of County Commissioners to make a determination as to whether a mineral deposit of commercial quality may exist on a given property for purposes of implementing the Preservation Act. If indications are that such a deposit may exist, and options for substitute sources are reasonably limited, a site-specific evaluation should be undertaken.

   It is also recommended that Map 1 be used in the evaluation of proposed mining activities. The Map should be used as one tool in assessing the reasonable availability of alternatives to a given proposed mining application. If extensive, potentially extractable exposures of a mineral deposit are indicated, the applicant can be asked to demonstrate that the proposed site will either have nominal impacts or is otherwise preferable. Alternatively, if the Resources Map indicates that other options for mining a given mineral commodity are very limited, the burden will be more on the community to demonstrate why mining should not be allowed on a site for which it is proposed.

C. Planning Overlay Maps

   1. Description

      The Planning Overlay Maps (Maps 2 and 3) consist of Map 1 overlaid with various planning information, the majority of which shows categories which combine to reduce the potential availability of areas for mining. These “institutional constraints” categories are discussed in Chapter II. G. of this Plan. They include municipal installations, military facilities, platted unincorporated areas and Federal mineral withdrawals. Altogether these categories account for almost 27% of the land in the entire County (refer to Table 12).

      Additionally, **as a planning example only**, a 1,000-foot highway buffer is depicted along selected major roadways.

Table 12
Relative Land Use Impact of Institutional Factors

Category	Acres	% of Total
Total County	1,318,760	100.0
Military	108,061	7.8
Municipalities	134,218	9.7
Platted and/or Developed (Unincorporated)	77,618	5.6
Federal Withdrawals	51,074	3.7
Total Institutional Factors	370,944	26.8

Source: El Paso County Planning Department; October 1995; Total County area is a general estimate; all other figures computed from County G.I.S.

Table 13 provides calculations of the relative spatial impact of the various planning exclusions. It becomes evident that potentially valuable limestone and mesa gravel deposits have been constrained in potential availability by planning factors. Other resources, such as floodplain, upland and eolian deposits, have not been as highly impacted and are more extensive in the first place

Table 15

Effect of Exclusions on Various Potential Mineral Resources

Category	Acreage before Exclusion	Acreage after Exclusion	% Remaining	Acreage after Excluding Visual Buffer	% Remaining
Floodplain Deposit	131,381	114,091	86.8%	111,457	87.2%
Valley Fill	42,198	28,168	66.8%	26,519	62.8%
Stream Terrace Deposit	36,409	15,841	43.5%	13,263	36.4%
Mesa Gravels	23,177	8,568	37.0%	8,138	35.1%
Upland Deposits	561,689	507,667	90.4%	495,332	88.2%
Alluvial Fan Deposits	139	0	0.0%	0	0.0%
Eolian Deposits	162,861	143,057	87.8%	141,683	87.0%
Granite	139,881	85,808	61.3%	84,811	60.6%
Fine-grained Granite	2,935	2,461	83.9%	2,460	83.8%
Decomposed Granite	3,994	0	0.0%	438	11.0%
Limestone	2,774	523	18.9%	364	13.1%
Conglomerate	12,880	10,531	81.8%	10,531	81.8%
Coal					
Clay					

Source: El Paso County Planning Department Geographic Information System 1995

2. Scope and Limitations

   The planning overlay data is generally current and fairly complete. However, in addition to the need to correct errors as they are discovered, it is understood that these overlays cannot be static. Land use jurisdiction and conditions are constantly changing. More importantly, these categories are neither complete nor black and white. Many areas which are not delineated are reasonably available for mining for a variety of reasons. Conversely, some areas shown as being unavailable, could be used for mining under some scenarios.

3. Recommendations for Use

   It is recommended that this system of planning overlays be used as an aid in the evaluation of both general land use and mining proposals. As new planning information becomes available, it should be integrated within this overlay system.

4. Findings with respect to the Preservation Act

   It is specifically recommended that the Board of County Commissioners should make applicable findings with respect to whether extraction of a “commercial mineral deposit” will be interfered with pursuant to the Preservation Act on a case-by-case basis. In making such findings the Board should make comprehensive use of the information contained or referenced in this Plan and also make use of appropriate technical information provided by the applicant and others.

D. Goals, Policies and Recommended Actions

   1. Introduction

      The following goals, polices and recommended actions are intended to address the Critical Planning Issues presented above. They are derived from a variety of sources including reference to the original 1975 Mineral Master Plan, as amended in 1978 and 1982, other County Master Plan elements as well as staff, Committee and El Paso County Planning Commission input. Policies are organized under a number of topical headings which relate to the key purposes of this document. One of these secondary purposes is to aid in the review of proposed land uses involving "mineral processing activities" which may occur separately from mining operations. Because this document is intended to address broad based and potentially competing objectives, it is important these goals, policies and recommended actions be applied within a reasonably holistic context. For example, situations will certainly arise wherein the stated policy to economically utilize a mineral resource will appear to compete with stated policy for environmental preservation. In these cases all relevant policies should be fully considered. The appropriate policy makers may then have to make a decision based upon a compromise or trade-off between or among potentially divergent positions.

1. *Resource Preservation*

Goal 1: ***Land use decisions should be made within a context which allows for the economical extraction of the commercial mineral resources necessary for the development and maintenance of El Paso County.***

Policy 1.1

Additional urban density and rural residential zoning and subdivision approvals should be discouraged if they can be expected to have an adverse impact on access to identified regionally significant commercial mineral resource deposits.

Policy 1.2

No sub-areas of the County should be considered off-limits to ~~all~~ mining activity based solely upon the preferences of area property owners.

Policy 1.3

Preference should be given to applications for new or expanded aggregate mining operations if it can be demonstrated that the majority of the product is needed and will be used within El Paso County.

Policy 1.4

Mining activities associated with preparation of sites for future development should be reasonably encouraged. Such activities should demonstrate an efficient use of resources and compatibility with existing and anticipated future land uses.

Policy 1.5

The use of recycled aggregate materials (including recycled asphalt) should be encouraged. Recycling options should be fully evaluated in association with proposals to use virgin materials.

Policy 1.6

Preference should be given to proposals to mine or rework previously disturbed sites.

Proposed Action 1.1

Periodically update the County's inventory of mineral reserves.

2. *Environmental Preservation*

Goal 2: ***Mining and mineral processing activities should be sited and operated such that adverse environmental impacts are reasonably minimized.***

Policy 2.1

New or expanded mining operations should only be permitted if it can be demonstrated that specific and cumulative visual impacts will be reasonably limited in comparison to other potentially available sites. In the event that other more visually acceptable sites may be identified, the burden should be on the operator to demonstrate that these options are unfeasible.

Policy 2.2

The ability or inability to reclaim a mining or mineral processing site to any prospective visual landform standard should be a prime consideration in the local review process.

Policy 2.3

Mineral extraction and/or processing applications should be comprehensively evaluated to identify all reasonably anticipated environmental impacts related, but not limited, to dust, noise, vibration, flooding, erosion, glare, water quality, integrity of water supplies, wildlife and modification of significant existing natural features and ecosystems.

Policy 2.4

Mineral extraction and/or processing operations should be internally designed so that off-site visual and other environmental impacts related to all aspects of the operation are reasonably minimized throughout the life of the activity.

Policy 2.5

New or expanded mining operations should be designed and operated to accommodate phasing and concurrent reclamation to the maximum extent practicable.

Policy 2.6

Mineral extraction and/or mineral processing operations should be encouraged to minimize the consumptive use of water through an applicable combination of soil preparation, drought tolerant landscaping, recycling of wash water and dust control measures which are not water-intensive.

Proposed Action 2.1

The level of analysis and techniques employed in the presently required or to be established visual impact analysis reports should be tailored to address the unique characteristics of the mineral extraction and/or mineral processing application. These reports should consider visual impacts as they will occur through the life of the operation, and should identify the key strategies which will be employed to mitigate these impacts as they occur

Proposed Action 2.2

The Resource Maps and related planning information overlays referenced in this document should be used as one aid in determining the relative acceptability of the selected site and proposed visual mitigation plans.

Proposed Action 2.3

Proposed operations should be designed so that structures, machinery, equipment storage and repair areas, utility lines, access roads, and stockpiles are not located in visually sensitive areas such as ridges, hilltops and scenic areas. Naturalistic screening, berming and/or landscaping should be employed where natural topography will not effectively screen the operation. Facilities which may be visible should be sensitive to the natural color, form and texture of surrounding areas.

Proposed Action 2.4

The operational plan should, at a minimum, incorporate or fully reference all current State and Federal regulations, standards and permits concerning fugitive dust. More detailed discussion of dust abatement and preventative measures may be required.

Proposed Action 2.5

The operational plan should demonstrate conformance with any applicable Federal, State and local noise regulations and should further specify any strategies to be used to reduce noise which might otherwise be objectionable due to its intensity, intermittence, beat and rhythm, frequency or shrillness.

Proposed Action 2.6

The drainage and erosion control element of the operational plan should be tailored (in terms of approach and level of sophistication) to the scale, extent and potential life of the proposed operation. The requirements of the County Drainage Criteria Manual should generally be applied. Particular attention should be paid to minimizing the introduction of sediment, suspended solids and/or toxic run-off into hydrologic systems.

3. *Resource Use*

Goal 3: ***Reasonable accommodation should be made to allow extraction and processing of mineral resources which are necessary to support efficient growth and development within El Paso County.***

Policy 3.1
The more economically significant potential new or expanded mining areas should be identified and addressed in all applicable elements of the El Paso County Master Plan as these are developed or amended.

Policy 3.2
The plans and approvals for mining operations should allow for the maximum practicable use of the resources available on a property.

Policy 3.3
Preference in approvals for mining operations should be given to those proposals which demonstrate a maximum economic benefit to the residents of El Paso County.

Policy 3.4
Extraction of commercial mineral deposits should be encouraged prior to or in conjunction with property development if this can be accomplished in a manner which is consistent with approved development plans.

Policy 3.5
Explore the appropriate use of mining in the mitigation of flooding, drainage and erosional problems as allowed by law.

Proposed Action 3.1
County development and municipal annexation proposals should be reviewed to assure consistency with the mineral resource preservation goals of this document. This review should include an initial evaluation of the feasibility of resource extraction concurrent with site preparation.

4. *Planning Considerations*

Goal 4: ***The review, analysis and actions taken related to mineral extraction and/or processing operations should be based upon an open and thorough process which addresses all relevant planning considerations.***

Policy 4.1
Mining activities should generally be allowed as Uses Permitted by Special Review in all County zone districts provided that the applicant can demonstrate that the proposed use is fully consistent with all applicable requirements and standards set forth in Sections 35.8 and 35.13 of the El Paso County Land Development Code.

Policy 4.2
The applicant/operator should demonstrate that the proposed extraction activity is presently, and will reasonably be expected to be compatible with the stated primary purpose of the applicable zone district.

Policy 4.3
Private market competition in the businesses of mineral extraction and processing should be reasonably fostered.

Policy 4.4
The applicant should demonstrate that the affected mineral deposit is, or will reasonably be expected to be of commercial value for purposes which are stated in the application.

Policy 4.5
Preference should be given to requests for mineral extraction and/or mineral processing sites which are located within parcels large enough to internally

accommodate the more acute impacts of the operation.

Policy 4.6

Preference should be given to requests for mineral extraction and/or mineral processing proposals for which the anticipated post-mining land use can be expected to be fully consistent with adopted master plans and/or zoning.

Policy 4.6

Sequential and ultimate areas of disturbance should be reasonably minimized.

Policy 4.7

Applications for mining or mineral processing should address and provide for reasonable mitigation of potential on and off-site impacts throughout the life of the operation. Potential impacts which should be addressed include, but are not limited to the following:

- traffic congestion safety and nuisance concerns
- potential damage to roads and bridges
- impacts to water supplies
- drainage and erosion control
- dust, noise and glare
- availability of emergency services
- site security and safety
- impacts to historic, archaeological, paleontological, and sensitive and/or unique natural features and ecosystems.
- noxious weeds

Policy 4.8

Approvals of new or expanded mineral extraction and mineral processing facilities should be contingent upon provision of and adherence to an operational plan which outlines all relevant elements, components and procedures related to the operation. This document should describe all of the basic elements of the operation, with specific attention to procedures related to mitigation of the potential impacts noted in Policy 5.f above. Report Guidelines are included in Section 35.13, C.2 of the El Paso County Land Development Code.

Policy 4.9

Approved mining operations should be designed and operated in a manner which reasonably limits hazards to employees and surrounding residents.

Policy 4.10

All interested citizens, and especially those who may be most directly impacted, should have the opportunity to effectively provide input in the review of plans for new or expanded mining operations.

Policy 4.11

This Plan should be periodically reviewed and amended when necessary.

Proposed Action 4.1

County review of mineral extraction and/or mineral processing requests should include an analysis of relative site suitability which addresses all of the applicable site-related factors outlined in this Plan or in Section 35.13 of the Land Development Code.

Proposed Action 4.2

Consideration should be given to conditioning mineral extraction and/or processing approvals in areas projected for development so that they expire or are modified, if appropriate, concurrent with actual development.

Proposed Action 4.3

Other uses associated with an approved Use Permitted by Special Review for a mineral extraction or mineral processing operation should be limited to those included in the approved plot plan and operational plan. Any additional uses should be subject to County review and approval.

Proposed Action 4.4

Historic, archaeological and geologically significant sites encountered during a mining operations should be preserved or salvaged.

Proposed Action 4.5

Applicants for mineral extraction and mineral processing operations should provide a traffic impact report which is detailed enough to reasonably assess the safety, capacity and noise impacts of the proposed use on all potentially affected roads, bridges and surrounding properties.

Proposed Action 4.6

Approvals for mineral extraction and mineral processing operations should be conditioned to require that trucks departing the property be loaded, swept and secured in a manner which reasonably limits the possibility that any of the load will escape.

Proposed Action 4.7

For larger or more controversial mining proposals, the applicant and County staff should coordinate in developing a customized approach to assuring there will be effective public communication and input.

Proposed Action 4.8

Applicants should be encouraged to meet with adjoining property owners and other potentially concerned parties early in the planning process.

Proposed Action 4.9

This Plan should be reviewed annually as part of a comprehensive evaluation of the effectiveness of the County Master Plan. G.I.S. data should be updated regularly, and the entire document should be reviewed for comprehensive amendment at least once every ten (10) years.

E. Implementation

1. General

The foregoing document is a comprehensive statement of long range development and operational land use policy. It is designed to be generally implemented through the normal review of County land use applications. In addition to all subdivision actions contemplated in C.R.S. 34-1-301 *et. seq*., this document should also be considered in the preparation of other County Master Plan elements, and in the review of privately initiated Sketch Plan and rezoning petitions.

It is envisioned that only limited amendments to Section 35.13 "Development Requirements for Mineral and Natural Resource Extraction Operations" of the El Paso County Land Development Code will be required to reference and maintain consistency with this document.

This Plan should also be proactively circulated among local municipalities and adjoining counties. Intergovernmental agreements with these jurisdictions may be appropriate in order to foster coordinated review of mining-related land use applications.

The El Paso County Board of Commissioners may chose to use this document as a basis for lobbying pursuant to changes in the State's Reclamation Act, especially with respect to issues of local land use control.

2. Public Involvement and Interrelationships with Other Jurisdictions

   It is the intent of El Paso County to meaningfully involve all interested citizenry in the implementation of this Plan. Applicants and the County are expected to freely exchange and discuss pertinent planning information with area residents. Input from adjoining municipalities and areas under federal jurisdiction should be actively sought and carefully considered.

   Applicants are strongly encouraged to participate in preapplication discussions with County staff for the purposes of focusing on potential issues and more specifically determining which materials need to be submitted as part of the application.

   As noted in Chapter II. C. 2 of this Plan, El Paso County shares jurisdiction over mineral extraction applications with the Colorado Mined Land Reclamation Board (MLRB). The MLRB, through the Colorado Division of Minerals and Geology (DMG) approves, enforces and administers the bonds for reclamation plans under the State Reclamation Act. The County has jurisdiction over a variety of land use issues relating to operational impacts and compatibility. Various other State and local agencies may also play an important role in the review of mining applications. Because land use compatibility is often interrelated reclamation planning, coordination between the County and the MLRB is especially critical. While El Paso County does not require concurrent processing of State and local mining applications, this approach is suggested in order to maximize efficiency.

3. Enhanced Reclamation and Inactive Mine Safety Programs

   It is also the intent of El Paso County to encourage partnering in a variety of 'extra-regulatory' activities which have the effect of reducing the net negative impacts of mining in the County. Principal among these activities are the ongoing enhanced reclamation plans for the Queens Canyon, Snyder and Pikeview Quarries. Those plans are the product of a cooperative effort among the State, El Paso County, City of Colorado Springs and Castle Concrete Company. The process began with a Charter, signed or endorsed by each entity, embracing the concept of cooperative, voluntary, enhanced reclamation. Through the efforts of their appointed Mining Reclamation Advisory Committee, the El Paso County Board of Commissioners and the Colorado Springs City Council endorsed the Enhanced Reclamation Plans for all three quarries, together with revised mining plans designed to eliminate or mitigate perceived undesirable visual impacts. With the concurrence of the City and County, the implementation of the enhanced reclamation plans is guided by the Colorado Mountain Reclamation Foundation. Opportunities for additional cooperative efforts of this kind may be available in conjunction with other sites and in the area of inactive mine safety. In situations where the County or the

community at-large may become financially involved, it is important to assure that the community, directly and through its duly elected representatives, is knowledgeable about the nature and intent of any such public/ private cooperative effort.

4. Additional Planning Information

   As previously discussed in this Chapter, it is recommended that the planning overlay information in this document be updated and augmented to maintain and enhance the usefulness of this Plan. It is specifically recommended that aggregate resource information for Fort Carson and the Air Force Academy be obtained and included in the overlays. Objective and comprehensive visual analysis information should also be integrated into this overlay system as it becomes available.

IV. SOURCES

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Dames and Moore Study

V. APPENDICES

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ANNOTATED LIST OF ACTIVE PERMITTED OPERATIONS

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EL PASO COUNTY MASTER PLAN FOR THE EXTRACTION OF COMMERCIAL MINERAL DEPOSITS

SUMMARY OF STATE-PERMITTED ACTIVE MINING OPERATIONS IN EL PASO COUNTY

Site Name	ID #	Company	State Permit #	Acres	General Location	Comments
Limestone						
Snyder Quarry	21	Castle Concrete Co.	M-77-210	118.30	West of Cedar Heights 67-13-32	Temporarily closed
Queens Canyon Quarry	36	Castle Concrete Co.	M-77-209	90.90	West of Colorado Springs 67-13-21	Closed - Under reclamation
Pikeview Quarry	110	Castle Concrete Co.	M-77-211	150.00	South of Air Force Academy 67-13-09	
Granite						
Menzer Quarry	3	Centennial Materials, Inc.	M-76-009 HR	40.00	Southwest of Highway 115 67-16-32	May petition for expansion
Clay						
Apache 9	97	Robinson Brick Co.	M-78-009	1364.00	South of Highway 24 near Calhan 62-12-16	
Guthrie Mine	92	Francis B. Harriet Guthrie	M-88-089	2.00	62-18-29	Used to line Sunset wastewater lagoon
Calhan Clay Pit	119	Summit Pressed Brick and Tile	M-93-080	320.00	West of Calhan 62-12-8	
Silica Sands						
Erin Pit	58	Colorado Silica Sand, Inc.	M-91-041	25.00	Northgate Area 66-12-16	
Phyllis "E" Mine	29	Colorado Silica Sand, Inc.	M-87-150	41.70	Briargate Area 66-12-27	

Site Name	ID #	Company	State Permit #	Acres	General Location	Comments
Pring Wolf I & II	47	Colorado Silica Sand, Inc.	M-82-150	49.80	Briargate Area 66-13-2	
Connor Pit	112	Colorado Silica Sand, Inc.	M-95-001	72.30	Briargate Area 66-12-26	
Coal						
Bacon Mine	77	Capstan Mining Co.	C-81-030	460.00	East of Colorado Springs off Highway 94 64-14-29	Under reclamation - No mining since 1981
Sand						
C & C Sand Pit #3	50	Hourglass, Inc.	M-83-120	9.90	66-12-34	
Volmer Road Pit	54	Pioneer Sand Co., Inc.	M-77-174	32.50	Vollmer Road south of Black Forest 65-13-5	
Daniels Sand Pit 2	17	Transit Mix Concrete	M-73-007-SG	325.60	South Academy near Drennan Road 66-15-3	Permit recently revised
Castle Sand Pit	18	Transit Mix Concrete	M-77-213	34.70	66-15-3	
Monks Plant No. 1	55 and 89	R. E. Monks Construction	M-83-193	35.00	65-13-5	
E. J. Sand Projects	117	Rocky Mountain Materials	M-83-040	9.80	64-14-33	
Sand Plant	19	Castle Concrete Co.	M-77-212	86.00	66-15-4	
Quartz						
Limber Pine	28	Colorado Quarries, Inc.	M-77-166	3.00	68-11-4	
Sand and Gravel						

Site Name	ID #	Company	State Permit #	Acres	General Location	Comments
Solberg Pit	87	Vida S. Solberg	M-81-044	174.00	64-13-21	
Summit Pit	23	Rocky Mountain Asphalt	M-88-102	28.10	North of Highway 24, West of Manitou Springs 67-13-31	Closed - No local approval
Fountain Gravel Pit	15	Rocky Mountain Materials	M-81-070	19.20	65-15-31	
Fountain Pit	307	Broderick & Gibbons	M-81-307	605.80	West of I-25 in Fountain 65-16-18	
Goss Sand & Gravel	93/95	David Goss	M-85-140	9.90	62-13-7	
Hale Pit	96/98	Earl L. Hale	M-81-121	9.90	63-12-24	
Wyatt	83/85	El Paso County	M-80-195	7.00	63-14-11	Active
Mayhew	103	El Paso County	M-80-187	7.00	60-13-12	Active
Sokol	99	El Paso County	M-80-193	7.50	62-12-22	Active
Hogden (Ed Cole)	91	El Paso County	M-80-194	7.00	63-12-8	Active
Norris/ State Pit	70/71	El Paso County	M-80-197	8.00	64-16-2	Reclaimed - Not released
Yoder	84	El Paso County	M-80-189	7.00	60-15-1	Active
Edwards	78/80	El Paso County	M-80-196	7.00	64-15-2	Active
Wilson	94/96	El Paso County	M-80-191	5.00	61-13-8	Reclaimed - Not released
Morris Pit	106	El Paso County	M-87-179	9.90	60-11-29	
Dole Pit No. 2	105	Elbert County	M-85-092	9.90	60-11-14	
Verver's Pit	42	Fountain Sand & Gravel	M-73-010	20.00	65-14-5	
Midway Pit	69	Midway Sand & Gravel	M-88-018	540.00	West of I-25 near Pueblo 65-17-22	
Houchin Gravel Pit	26	Charles W. Houchin	M-80-249	3.00	Ute Pass - North of Highway 24 68-13-15	
Chipita Ranch Pit	111	Chipita Ranch Co.	M-84-073	27.90	Ute Pass - North of Highway 24 68-13-15	Local approval not extended - under closure
Hanna Ranch Gravel Pit	9	City of Colorado Springs Utilites	M-86-017	25.40	South I-25 near Nixon Power Plant 65-16-18	City uses only

Site Name	ID #	Company	State Permit #	Acres	General Location	Comments
State Highway 83 Pit	66	Colorado Division of Highways	M-78-350	30.90	66-12-16	Closed
Continental Pit	20	Castle Concrete Co.	M-77-312	59.10	66-15-4	
Fountain Pit	5	Centennial Materials, Inc.	M-82-155	693.00	66-16-13	
Freeman Mine No. 1		R. E. Monks Construction	M-86-026	9.50	61-11-0	
Falcon Site	90	R. E. Monks Construction	M-86-053	312.00	63-13-16	
Red Rock Canyon Pit	34	Red Rock Canyon Corp.	M-76-033	40.00	67-14-10	
Vollmer Pit	58	Schmidt Construction Co.	M-83-035	80.00	65-12-32	
Drennan Road Pit	12	Swan Assoc.	M-77-001-SG	44.00	66-15-1	
Dellacroce Pit	115	Raymond Dellacroce	M-93-050	34.00	West Baptist Road	Recently approved
Temporary or Borrow Pits						
Templeton Gap Landfill	56	El Paso County	M-80-225	1.50	Powers and Woodmen 65-13-7	Used to cover closed landfill
Fox Coutry Borrow	118	Schmidt Construction	M-91-039	1.50	Tri-Lakes Area 66-11-21	Small, temporary operation - under reclamation
Fountain Landfill	70	BFI of Colorado	M-92-037	11.00	East of Fountain 65-16-11	Used for landfill cover
Sources: Colorado Mined Reclamation Division Monthly Reports 8/7/95 and El Paso County Planning Department;						
Several El Paso County permits which the State lists as active are not included because their releases have been approved.						

APPENDIX B

EVOLUTION OF EL PASO COUNTY MINING REGULATIONS INCLUDING SECTION 35.13 OF THE EL PASO COUNTY LAND DEVELOPMENT CODE

EVOLUTION OF EL PASO COUNTY'S

LAND USE REGULATIONS PERTAINING TO MINING

The following chronology is pieced together from several secondary sources including back-dated copies of the El Paso County Zoning Regulations. As such it should be considered a generalized outline subject to minor errors of omission and inexact dates.

1942 - Initial zoning of a core area of the County including unincorporated property surrounding Colorado Springs, Manitou Springs and Fountain.

- Zoning Regulations were very basic and did not define anything related to mining.

- Mining was initially allowed as a principally permitted use in the F (Forest and Recreation), A-2 (Farming), A-3 (Airport Farming), and A-1 (Garden Home) Districts. The M (Industrial) District was extremely permissive at that time and might have been interpreted to permit mining.

- All mining operations were subject to a 200-foot minimum setback from several named improvements including public roads and dwelling units not associated with the operations. The 1942 nonconforming use section was probably not clear enough to address the peculiarities of mining.

- This initial zoned area included the present Pikeview, Queens Canyon and Snyder Quarry sites.

1951 - Zoning Resolution amended to include several other zones, including the F-1 (Forest and Recreation) District which allowed mining as a principally permitted use.

1955 - The north central section of the County (including the Tri-Lakes area and future Air Force Academy) was zoned.

1958 - Nonconforming uses were by this time regulated such that they could not "be enlarged or extended in any manner whatsoever."

1962 - Zoned area expanded to include Cheyenne Mountain area.

1963 - Zones allowing mining appear to be same as in 1958, namely F, F-1, A-1, A-2, A-3 and possibly M.

1965 - Zoned area expanded to include several areas south and east; specifically including the present Menzer Quarry operated by Schmidt Construction on south Highway 115.

1966 - Cascade area (including Waldo Canyon) was zoned

EVOLUTION

1967 - Zoning of Upper Ute Pass area occurred.

1970 - Around this time the Zoning Resolution was amended to specify certain uses including "Mineral and Natural Resource Extraction" as uses subject to approval of location by the Planning Commission. This step removed mining from the principally permitted use category. Mining was still subject to the 200-foot setback, and the A-4 and A-5 (Farming) Districts were included with all original districts as permitting mining subject to "approval of location" by the Planning Commission .

- The newly adopted R-4 (Planned Development) District was written so that it theoretically could have allowed mining.

- The process for "approval of location" was not addressed well in the regulations. The Planning Commission's decisions from that time period indicate the consensus was that such approval was not required if materials were to be removed for non-commercial purposes (i.e. preparing the site for development).

1973 - The Colorado Open Land Mining Reclamation Act was adopted by the State, requiring State permits to mine.

1974 - In a civil case between the Castle Concrete Company and El Paso County a district judge made a declaratory judgment that, given the zoning regulations then in effect, the County could not limit mining operations under nonconforming use regulations as they are normally applied to other land uses.

1974 - Zoning Regulations were amended to require Location Approvals to be granted by the Board of County Commissioners rather than the Planning Commission.

1974 - A proposal to create a "Planned Resource Development District" for the purposes of short-term mineral extraction was tabled and apparently never again formally considered. This general type of district was later suggested as one of the strategies for the *Mineral Resource Master Plan*.

1975 - The *Master Plan for the Extraction of Commercial Mineral Deposits* was adopted by the Board of County Commissioners in response to State legislation (H.B. 1529) which called for development of such plans for the purpose of protecting such commercial deposits from future development activities which might preempt their recovery. The Plan provided a map and technical documentation describing commercial deposits as well as a few suggested policies for governing mining.

1975 - General Special Use review standards were adopted by the Board of County Commissioners as part of a major revision to the County's Land Use Regulations. "Mineral and Natural Resources Extraction" was classified as a "Special Use" in several zone districts including the F (Forest and Recreation), F-1 (Forest and Recreation), A-1 (Garden Home), A-2 (Agricultural), A-3 (Farming), A-4 (Farming), A-5 (Farming), M (industrial), and PHID (Planned Heavy Industrial) Districts. "Mineral and Natural

Resource Extraction" was now defined for the first time as "the physical withdrawal of minerals and natural resources."

- "Mineral" and "Natural Resources" were defined in very general terms.

- Additional Mineral Extraction Development requirements were adopted by the State at this time.

1976 - Several Special Use standards specific to mineral resource extraction were added to the Zoning Regulations.

1980 - Another major modification to County Land Use Regulations was made by the Board of County Commissioners. This new "Land Development Code" slightly expanded the Special Use review criteria as well as the development requirements for "Mineral and Natural Resource Extraction" and also classified mining as a Special Use in all zone districts.

1982 - The *Mineral Resources Plan* was revised to include further discussion of what was a "commercial" mineral resource and to reduce the areas so designated in the eastern part of the County. The map was specifically amended to show "potential" recourse deposits with the final determination to be made by the Board of County Commissioners.

1990 - The Board of County Commissioners approves a major revision to the *Land Development Code* through the adoption of a new Section 35.13 entitled "Development Requirements for Mineral and Natural Resource Extraction Operations." The new section expands on the general requirements, standards; report and procedures related to the review of mining operations and allows for a streamlined administrative process in some cases. The County's Special Use procedures (Section 35.8) are concurrently expanded, with the provisions that all preexisting or future Special Uses which are not substantially initiated within two (2) years will be deemed abandoned.

Attachment: Section 35.13 of the El Paso County *Land Development Code*

APPENDIX C

AGGREGATE SIZE CHART

APPENDIX C AGGREGATE SIZE CHART

Table of grain-size terminology

Wentworth				Unified Soil Classification				Modified Unified Soil Classification				
Component	mm	in.	U. S. sieve series	U. S. sieve series	mm	in.	Component	U. S. sieve series	mm	in.	Component	
Gravel: Boulder	256	10					Cobbles		256	10	Boulders	Gravel
Gravel: Cobble				3-in.	76.1	3		3-in.	76.1	3	Cobbles	
Gravel: Pebble	64	2 1/2	2 1/2-in.	3/4-in.	19.0	3/4	Coarse / Fine: Gravel	3/4-in.	19.0	3/4	Coarse / Fine: Pebbles	
	4	5/32	#5	#4	4.76	0.187		#4	4.76	0.187		
Sand: Granule	2	5/64	#10	#10	2.00	5/64	Coarse	#10	2.00	5/64	Coarse	
Sand: Very Coarse	1	0.0394	#18				Medium				Medium	Sand
Sand: Coarse	1/2	0.0197	#35				Sand					
Sand: Medium	1/4	0.0098	#60	#40	0.42	0.0165		#40	0.42	0.0165		
Sand: Fine	1/8	0.0049	#120				Fine				Fine	
Sand: Very Fine	1/16	0.0025	#230									
Silt				#200	0.074	0.0029		#200	0.074	0.0029		
Clay	1/256	0.00015	#400				Fines (silt & clay)				Fines (silt & clay)	

The grain size terms used in this report are adapted from two other common systems. The first system is the Wentworth scale, which is based on a modified geometric progression. The gravel cutoff is placed at 2 mm (5/64-in; #10 screen) and that for sand is placed at 1/16 mm (0.0025 in; #230 screen). This is the standard scale used in most geologic descriptions. The second scale is the Unified Soil Classification, an engineering scale with the gravel cutoff at 4.76 mm (0.187 in; #4 screen) and the sand cutoff at 0.074 mm (#200). This report uses the Unified Soil Classification modified by the addition of the Wentworth gravel terms. For visual classification (as in the map explanation) the 1/4-in. size may be used as equivalent to the #4 sieve size (Asphalt Institute, 1969, p. 69-86).

APPENDIX D

EMPIRE AS DRAFTED (by reference)

APPENDIX E

1974 SUMMARY OF EL PASO COUNTY SAND, GRAVEL AND QUARRY RESOURCES

gregate deposits along Cherry Creek, Sand Creek, and the South Platte River will become more valuable.

Analyses of the Denver problem and recommendations for its solution have been outlined by the Colorado Sand and Gravel Producers Association (1957), the Inter-County Regional Planning Commission (1961), and the U. S. Bureau of Mines (Sheridan, 1967). Other growing areas along the Front Range should learn from this example of inadequate zoning and mismanagement of aggregate resources.

Douglas

Douglas County, although not subject to section 92-36-5, C. R. S. 1963, was included in this study because of its rapidly increasing population and its strategic location between Denver and Colorado Springs. Abundant resources of fine aggregate occur in the terraces along Plum and Cherry Creeks; gravel deposits in the county are limited to the area adjacent to the South Platte River. Future supplies of coarse aggregate might be obtained from limestone in the mountains near Westcreek and Larkspar (Plate 2). Rhyolite flows in the vicinity of Castle Rock have been mined for building stone. Further testing might establish the suitability of this rock for concrete aggregate.

El Paso

El Paso County produces and consumes large quantities of sand, gravel, and quarry aggregate. The principal deposits in the county producing high-quality aggregate are Castle Concrete's Queen's Canyon and Lennox-Breed quarries west of Colorado Springs, the Schmidt Construction Quarry 15 miles southwest of Colorado Springs, the gravel-capped upland mesas west of Fountain Creek, and the large sand deposits in the southeastern part of Colorado Springs. Most high-quality gravel deposits in the county have been covered by the urban sprawl of Colorado Springs or lie within the U. S. Air Force Academy or the Fort Carson Military Reservation. Upland gravel deposits apparently cannot supply the demand for aggregate in Colorado Springs; therefore, quarry aggregate supplies a large part of the market, and increasing amounts of gravel are trucked into Colorado Springs from the Arkansas Valley, 40 miles to the south (Fig. 7). A great deal of the sand mined in the southeastern part of Colorado Springs is mixed with quarry aggregate. Three tons of sand are required for each 2 tons of quarry aggregate. Other sands northeast of the Colorado Springs area are mined and mixed with gravels brought in from the Arkansas Valley.

Widespread deposits of low-quality sands in the eastern half of El Paso County provide a large part of the aggregate required for maintaining the state and county highway systems. The large number of sand pits in northeastern El Paso County (Plate 3) indicate how pits have been conveniently developed for road maintenance. These widespread deposits substantially reduce the cost of county road maintenance.

The Fountain Sand and Gravel Company deposits located north of Colorado Springs near the south entrance of the Air Force Academy are of growing national importance. Material from these unique coarse-grained quartz sand deposits is used for fracturing petroleum-bearing reservoirs to increase the flow or yield of oil and gas. It is the unusually large size of the individual spherical sand grains that make this deposit unique. Demand for this coarse-grained sand is growing rapidly throughout the United States and Canada.

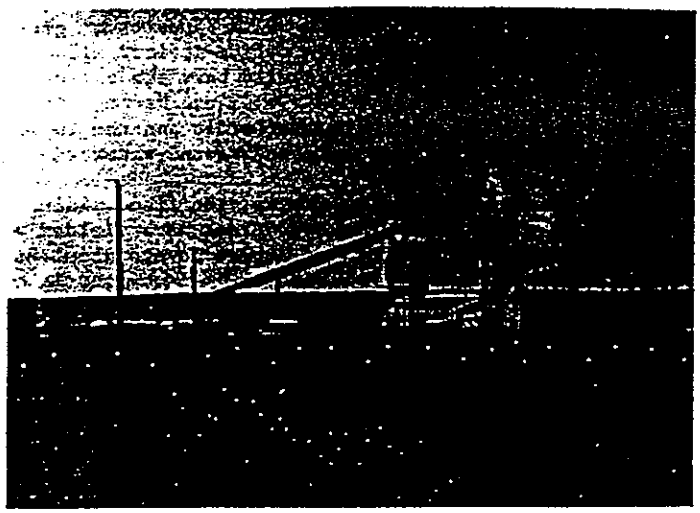

Figure 7. The Fountain Sand and Gravel Company plant northeast of Colorado Springs processes slag and gravels trucked from Pueblo 40 miles away. Photograph by P. C. Wicklein.

The most important aggregate deposits in El Paso County are located near Colorado Springs. Finding a solution to the problem of conservation of deposits near Colorado Springs that will satisfy the present landowners will not be easy. Planning will require a great deal of effort on the part of local government, with considerable input from the aggregate-producing industry and landowners.

Aggregate deposits in the eastern and northern parts of El Paso County are generally important only to the maintenance of the highway systems. Detailed plans involving the conservation of key deposits in this area should be developed in close cooperation with the county and state highway departments. Any El Paso County plan for the conservation of aggregate deposits should also consider Pueblo County, which provides aggregate to the Colorado Springs market. A more complete picture of aggregate resources of El Paso County may be obtained from the discussions on sand and gravel resources of the Arkansas River Basin and Pueblo County.

Jefferson

Annual sand and gravel production from Clear Creek and Bear Creek has exceeded 2,000,000 tons in recent years. Activity along Clear Creek is confined to the flood plain and terraces between Tabor Street and the Coors Brewery in Golden. More than 2,000 acres of flood-plain gravel land were lost due to the expansion of Arvada and Wheat Ridge. Two le-

APPENDIX F

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Preservation Act

not exceed the amount anticipated to be raised from fees collected pursuant to this section.

Source: L. 83: p. 1304, § 1.

PART 2

GEOLOGY

34-1-201. Definitions. As used in this part 2, unless the context otherwise requires:

(1) "Geologist" means a person engaged in the practice of geology.

(2) "Geology" means the science which treats of the earth in general; the earth's processes and its history; investigation of the earth's crust and the rocks and other materials which compose it; and the applied science of utilizing knowledge of the earth's history, processes, constituent rocks, minerals, liquids, gasses, and other materials for the use of mankind.

(3) "Professional geologist" is a person who is a graduate of an institution of higher education which is accredited by a regional or national accrediting agency, with a minimum of thirty semester (forty-five quarter) hours of undergraduate or graduate work in a field of geology and whose postbaccalaureate training has been in the field of geology with a specific record of an additional five years of geological experience to include no more than two years of graduate work.

Source: L. 73: p. 610, § 1. C.R.S. 1963: § 51-3-1.

34-1-202. Reports containing geologic information. Any report required by law or by rule and regulation, and prepared as a result of or based on a geologic study or on geologic data, or which contains information relating to geology, as defined in section 34-1-201 (2), and which is to be presented to or is prepared for any state agency, political subdivision of the state, or recognized state or local board or commission, shall be prepared or approved by a professional geologist, as defined in section 34-1-201 (3).

Source: L. 73: p. 610, § 1. C.R.S. 1963: § 51-3-2.

PART 3

PRESERVATION OF COMMERCIAL MINERAL DEPOSITS

34-1-301. Legislative declaration. (1) The general assembly hereby declares that:

(a) The state's commercial mineral deposits are essential to the state's economy.

(b) The populous counties of the state face a critical shortage of such deposits.

(c) Such deposits should be extracted according to a rational plan, calculated to avoid waste of such deposits and cause the least practicable disruption of the ecology and quality of life of the citizens of the populous counties of the state.

(2) The general assembly further declares that, for the reasons stated in subsection (1) of this section, the regulation of commercial mineral deposits, the preservation of access to and extraction of such deposits, and the development of a rational plan for extraction of such deposits are matters of concern in the populous counties of the state. It is the intention of the general assembly that the provisions of this part 3 have full force and effect throughout such populous counties, including, but not limited to, the city and county of Denver and any other home rule city or town within each such populous county but shall have no application outside such populous counties.

Source: L. 73: p. 1046, § 1. C.R.S. 1963: § 92-36-1.

Law reviews. For article, "1974 Land Use Legislation in Colorado", see 51 Den. L. J. 467 (1974).

Nothing in the geological survey act purports to grant to a surface owner the right as against the mineral owner to conduct tests and gather information concerning the existence and extent of commercial mineral deposits without the consent of the owner of the mineral estate. Grynberg v. City of Northglenn, 739 P.2d 230 (Colo. 1987).

34-1-302. Definitions. As used in this part 3, unless the context otherwise requires:

(1) "Commercial mineral deposit" means a natural mineral deposit of limestone used for construction purposes, coal, sand, gravel, and quarry aggregate, for which extraction by an extractor is or will be commercially feasible and regarding which it can be demonstrated by geologic, mineralogic, or other scientific data that such deposit has significant economic or strategic value to the area, state, or nation.

(2) "Extractor" means any individual, partnership, association, or corporation which extracts commercial mineral deposits for use in the business of selling such deposits or for use in another business owned by the extractor or any department or division of federal, state, county, or municipal government which extracts such deposits.

(3) "Populous county or populous counties of the state" means any county or city and county having a population of sixty-five thousand inhabitants or more according to the latest federal decennial census.

Source: L. 73: p. 1047, § 1. C.R.S. 1963: § 92-36-2.

34-1-303. Geological survey to make study. After July 1, 1973, the Colorado geological survey shall contract for a study of the commercial mineral deposits in the populous counties of the state in order to identify and locate such deposits. Such study shall be of sand, gravel, and quarry aggregate, and shall be completed on or before July 1, 1974, and shall include a map or maps of the state showing such commercial mineral deposits, copies of which may be generally circulated. Any commercial mineral deposits discovered subsequent to July 1, 1974, may be, upon discovery, included in such study.

Source: L. 73: p. 1047, § 1. C.R.S. 1963: § 92-36-3.

34-1-304. Master plan for extraction. (1) The county planning commission for unincorporated areas and for cities and towns having no planning commission or the planning commission for each city and county, city, or town, within each populous county of the state, shall, with the aid of the maps from the study conducted pursuant to section 34-1-303, conduct a study of the commercial mineral deposits located within its jurisdiction and develop a master plan for the extraction of such deposits, which plan shall consist of text and maps. In developing the master plan, the planning commission shall consider, among others, the following factors:

(a) Any system adopted by the Colorado geological survey grading commercial mineral deposits according to such factors as magnitude of the deposit and time of availability for and feasibility of extraction of a deposit;

(b) The potential for effective multiple-sequential use which would result in the optimum benefit to the landowner, neighboring residents, and the community as a whole;

(c) The development or preservation of land to enhance development of physically attractive surroundings compatible with the surrounding area;

(d) The quality of life of the residents in and around areas which contain commercial mineral deposits;

(e) Other master plans of the county, city and county, city, or town;

(f) Maximization of extraction of commercial mineral deposits;

(g) The ability to reclaim an area pursuant to the provisions of article 32 of this title; and

(h) The ability to reclaim an area owned by any county, city and county, city, town, or other governmental authority or proposed, pursuant to an adopted plan, to be used for public purposes by such a governmental authority consistent with such proposed use.

(2) A planning commission shall cooperate with the planning commissions of contiguous areas and the mined land reclamation board created by section 34-32-105 in conducting the study and developing the master plan for extraction.

(3) (a) A county planning commission shall certify its master plan for extraction to the board of county commissioners or the governing body of the city or town where the county planning commission is acting in lieu of a city or town planning commission. A planning commission in any city and county, city, or town shall certify its master plan for extraction to the governing body of such city and county, city, or town.

(b) After receiving the certification of such master plan and before adoption of such plan, the board of county commissioners or governing body of a city and county, city, or town shall hold a public hearing thereon, and at least thirty days' notice of the time and place of such hearing shall be given by one publication in a newspaper of general circulation in the county, city and county, city, or town. Such notice shall state the place at which the text and maps so certified may be examined.

(4) The board of county commissioners or governing body of a city and county, city, or town may, after such public hearing, adopt the plan, revise the plan with the advice of the planning commission and adopt it, or return the plan to the planning commission for further study and rehearing before adoption, but, in any case, a master plan for extraction of commercial mineral deposits shall be adopted for the unincorporated territory and any city and county, city, or town in each populous county of the state on or before July 1, 1975.

Source: L. 73: p. 1047, § 1. C.R.S. 1963: § 92-36-4. L. 75: p. 1336, § 1. L. 77: p. 289, § 67.

Cross references: For establishment and functions of a county planning commission, see § 30-28-133.

Applied in Hudspeth v. Board of County Comm'rs, 667 P.2d 775 (Colo. App. 1983).

34-1-305. Preservation of commercial mineral deposits for extraction. (1) After July 1, 1973, no board of county commissioners, governing body of any city and county, city, or town, or other governmental authority which has control over zoning shall, by zoning, rezoning, granting a variance, or other official action or inaction, permit the use of any area known to contain a commercial mineral deposit in a manner which would interfere with the present or future extraction of such deposit by an extractor.

(2) After adoption of a master plan for extraction for an area under its jurisdiction, no board of county commissioners, governing body of any city and county, city, or town, or other governmental authority which has control over zoning shall, by zoning, rezoning, granting a variance, or other official action or inaction, permit the use of any area containing a commercial mineral deposit in a manner which would interfere with the present or future extraction of such deposit by an extractor.

(3) Nothing in this section shall be construed to prohibit a board of county commissioners, a governing body of any city and county, city, or town, or any other governmental authority which has control over zoning from zoning or rezoning land to permit a certain use, if said use does not permit erection of permanent structures upon, or otherwise permanently preclude the extraction of commercial mineral deposits by an extractor from, land subject to said use.

(4) Nothing in this section shall be construed to prohibit a board of county commissioners, a governing body of any city and county, city, or town, or other governmental authority which has control over zoning from zoning for agricultural use, only, land not otherwise zoned on July 1, 1973.

(5) Nothing in this section shall be construed to prohibit a use of zoned land permissible under the zoning governing such land on July 1, 1973.

(6) Nothing in this section shall be construed to prohibit a board of county commissioners, a governing body of any city and county, city, or town, or any other governmental authority from acquiring property known to contain a commercial mineral deposit and using said property for a public purpose; except that such use shall not permit erection of permanent structures which would preclude permanently the extraction of commercial mineral deposits.

Source: L. 73: p. 1048, § 1. C.R.S. 1963: § 92-36-5. L. 75: p. 1336, § 2.

Law reviews. For article, "Severed Minerals as a Deterrent to Land Development", see 51 Den. L. J. 1 (1974).

Local governments can permit uses compatible with mining. By zoning, rezoning, granting a variance, or other action or inaction, local

governments can permit any use of land known to contain a commercial mineral deposit so long as the permitted use is not incompatible with mining, such as erecting permanent structures on this land; the preservation act does not require local governments to allow mining in any area where it is commercially practicable, but only to preserve access to the mineral deposits. C & M Sand & Gravel v. Board of County Comm'rs, 673 P.2d 1013 (Colo. App. 1983).

This section does not deprive landowners of reasonable use of their property, and thus does not constitute a governmental taking. Cottonwood Farms v. Board of County Comm'rs, 725 P.2d 57 (Colo. App. 1986), aff'd, 763 P.2d 551 (Colo. 1988).

JOINT REVIEW PROCESS

ARTICLE 10

Colorado Joint Review Process

34-10-101. Legislative declaration. The general assembly hereby finds, determines, and declares that continued beneficial development of its natural resources, including water resources, is important to the state of Colorado; that the many governmental permits and licenses to be obtained by a natural resources developer can cause confusion and delay; that the jurisdictional integrity of each unit and agency of local, state, and federal government must be maintained; and that an agency of state government the function of which would be to coordinate relations between developers of natural resources and units and agencies of local, state, and federal governments would make the permitting process more efficient and, therefore, offer a benefit to the people of Colorado. The general assembly further declares that the Colorado joint review process, created by this article, shall be the proper agency of state government to undertake the coordination function, so that problems arising in the preproduction stages of natural resources development projects can be expeditiously resolved.

Source: L. 83: p. 1306, § 1. L. 89: Entire section amended, p. 1372, § 1, effective May 26.

34-10-102. Colorado joint review process. (1) There is hereby created, in the division of minerals and geology, an agency to be known as the Colorado joint review process.

(2) The Colorado joint review process created by this section shall exercise its powers and perform its duties and functions specified in this article under the department of natural resources and the division of minerals and geology as if the same were transferred to the division of minerals and geology by a type 2 transfer as such transfer is defined in the "Administrative Organization Act of 1968", article 1 of title 24, C.R.S.

Source: L. 83: p. 1306, § 1. L. 92: Entire section amended, p. 1922, § 7, effective July 1.

C.J.S. See 39A C.J.S., Health and Environment, § § 115, 134.

34-10-103. Duties of the Colorado joint review process. (1) Sponsors of natural resource extraction, conversion, transportation, management, or water development projects may elect to utilize the Colorado joint review process. Upon receipt of a written request from a project sponsor, the Colorado joint review process shall initiate project coordination procedures. Project coordination procedures shall include, but not be limited to, the following:

(a) Filing of a project statement by the developer, which statement shall contain accurate information relating to the nature, location, size, and duration of the project;

(b) Filing of a list of governmental agencies by the developer, which list shall contain the names and addresses of all local, state, and federal governmental units and agencies which the developer reasonably expects to be involved in the permitting and licensing process with regard to the project;

(c) Service of the project statement upon each federal, state, and local governmental unit and agency contained in the list filed by the developer, together with a request to each such governmental unit and agency to participate;

(d) Organization and management of meetings involving the developer and all involved government units and agencies;

(e) Maintenance of continuing communication among all involved parties;

(f) Any other action which will facilitate the timely approval or denial of permits and licenses required by the developer for the commencement of the project;

(g) Preparation of a directory of federal, state, and local regulations applicable to various types of natural resource development activities. Such directory shall be updated annually. Revenues from sales of the directory shall be deposited in the joint review process revolving fund, which fund is hereby created. This fund shall only be used to publish and update the directory.

(2) Failure of the sponsor to utilize the Colorado joint review process established in this article shall not be used as grounds or rationale by any of the governmental agencies involved in the permitting or licensing process as grounds for the denial of any of the action requested by the sponsor.

Source: L. 83: p. 1307, § 1. L. 89: IP(1) amended, p. 1372, § 2, effective May 26.

34-10-103.5. Fees for utilization of process - cash fund - creation - general fund appropriations. (1) The director of the division of minerals and geology

APPENDIX G

MINERAL RESOURCE MAPS AND PLANNING OVERLAYS (adopted by reference)