

JEFFERSON COUNTY, COLORADO PLANNING DEPARTMENT • JULY 1987

AGGREGATE  
RESOURCES  
ROUNDTABLE  
REPORT

FINDINGS &  
RECOMMENDATIONS

---

This research document was produced as a part of the Aggregate Resources Roundtable, a joint public-private effort initiated by the Jefferson County Board of County Commissioners in an attempt to help resolve the controversies involved with mining activities in this metropolitan area. Appreciation of the efforts and contributions of all the parties in this program is gratefully acknowledged.

---

REPORT OF THE JEFFERSON COUNTY  
AGGREGATE RESOURCES MINING ROUNDTABLE

Prepared for the  
Jefferson County Commissioners

by

The Aggregate Resources Mining Roundtable

July 13, 1987

BOARD OF COUNTY COMMISSIONERS

Marjorie Clement, Chair 1986  
Rich Ferdinandsen, Chair 1987  
John Stone  
Donald Stanbro

Planning Director  
Leonard Mogno

AGGREGATE RESOURCES MINING ROUNDTABLE

Paul Banks  
HSI Hydro Search, Inc. (formerly Jefferson County Planning Dept.)

William Boast  
Homeowner at Large

Mac Graham  
Western Paving Construction Company

Mike Hart  
Flatiron Sand and Gravel Company

Jack Hurlburt  
Mobile Pre-Mix Sand and Gravel Company

Warren Kelvie  
Homeowner, Applewood Area

Robert Laird  
Jefferson County Geologist

Mike Leidich  
Robinson Brick Company

Mark Loye  
Colorado Mined Land Reclamation Division

Kay Palmer Marsh  
League of Women Voters

Sprague Mayger  
Asphalt Paving Company

Leonard Mogno  
Jefferson County Planning Department

Donald Moore  
Douglas County Planning Department

Judith Pearl  
League of Women Voters

Karen Purre  
Canyon Concerned Citizens (Coal Creek)

John Rold  
Colorado Geological Survey

Debbie Sauer  
Sauer Trucking Company

Jim Sells  
Colorado Rock Products Association

Bud Smead  
Jefferson County Public Works Department

Bill Smith  
City and County of Denver

Janet Stromberg  
Jefferson County Planning Department

Lawrence Watson  
Fairmont Homeowners Association

Anne Willhardt  
Planned Living Environment South Evergreen (PLEASE)

Tom Young  
Minerals Incorporated

#### FACILITATORS

Christopher Moore  
CDR Associates/Center  
for Dispute Resolution

John Ehrmann  
The Keystone Center

#### WITH SPECIAL THANKS TO:

Peggy Schlagel  
Flatiron Sand & Gravel Company

TABLE OF CONTENTS

	<u>Page No.</u>
I. Executive Summary.....	1
A. - J. Recommendations.....	1-2
II. Introduction.....	3
A. History of the Roundtable.....	3
B. Description of the Roundtable Process.....	4
C. Recommendations for How This Document Should be Used.....	5
D. Regulatory Functions.....	6
E. Handbooks.....	6
F. Negotiations.....	6
G. Definition of Mining.....	6
III. Aggregate Resources in the Metro-Denver Area.....	7
A. Summary of Supply and Demand Data.....	7
B. Overall Conclusions Regarding Supply and Demand...	8
IV. Recommendations on the Public Involvement Process....	11
A. Notification of Intent to Apply.....	11
B. Informal Meetings.....	12
C. Notification Recommendations.....	13
D. Planning Commission Process.....	15
V. Monitoring and Enforcement.....	17
A. Goal .....	17
B. Overview of Topic.....	17
C. Regulated Environmental Areas.....	18
D. Monitoring Recommendations.....	19
E. Enforcement Recommendations.....	20
VI. Impacts and Mitigations.....	22
A. Visual Impact.....	23
B. Air Quality.....	27
C. Noise Pollution.....	32
D. Water Quality and Quantity.....	36
E. Wildlife and Vegetation.....	41
F. Archaeological, Paleontological and Historic Resources.....	43
G. Open Space, Tourism, and Geologic Resources.....	46
H. On-Site/Off-Site Safety.....	47

I. Truck Traffic Safety.....	50
J. Reclamation.....	54
K. Blasting.....	56
L. Economic Issues.....	61
VII. References .....	65
VIII Appendices .....	66

I. EXECUTIVE SUMMARY



## I. THE EXECUTIVE SUMMARY

### A. THE INTRODUCTION

In February of 1986, Jefferson County Commissioners convened a Roundtable, giving them the charge to formulate recommendations to guide decision making in Jefferson County regarding rezoning and mining of aggregate. From the outset, the Roundtable members believed that the most effective way to address the problem was to develop a process that would help citizens, operators, and the County make effective, intelligent and responsible decisions. This process would be designed to reduce unnecessary conflict, promote the understanding of common interests and resolve genuine differences. Their recommendations would provide guidance to those involved in decision making on this complex topic.

The Roundtable consisted of people from citizen and homeowner groups, industry, state government, concerned adjacent cities and counties and the Jefferson County Planning Department. The group deliberated by consensus.

The Roundtable intends that this document will serve three purposes: first, as a formal report to the County Commissioners and to the people of Jefferson County; second, as a guide to anyone who is involved in the siting of an aggregate mining operation; third, as a common sense guide, providing recommendations. The report should also be used to form the basis for a handbook for citizens and operators.

If the negotiations resulting from the procedures as recommended in this report result in agreement on standards and mitigation procedures, the agreements should be incorporated into the official

plans. Finally, if any of the regulatory functions performed by external agencies are compromised by budget cuts or statutory changes, and if any of the recommendations in this study are threatened, the County should review the omissions and may desire to assume the new responsibilities.

#### B. AGGREGATE RESOURCES IN THE METRO DENVER AREA

The Roundtable requested the Jefferson County Planning Staff to solicit the assistance of a contractor who would conduct a supply/demand analysis of aggregates in the Front Range. The goal of the study was to assess the current and potential reserves of aggregate in the Denver metropolitan area and determine the need for aggregate to support future economic development. A summary of the findings and conclusions of this report may be found on pages 7-10 of this report.

#### C. RECOMMENDATIONS ON PUBLIC INVOLVEMENT

Early on, the Roundtable recognized that initial communications among all parties are especially important in prehearing negotiations. Therefore, the recommendation procedure for the aggregate mining proposal called for the following steps:

- 1) The filing of a notification of an intent to apply by the applicant, and the appointment of an ombudsperson by the County.
- 2) Informal meetings among the applicant, the County, and concerned citizens under the guidance of the ombudsperson.
- 3) Greatly expanded notification procedures, involving newspapers, citizen mailings and posting recommendations.

4) Planning Commission review, including if necessary, technical analysis by an objective panel.

5) Formal hearings conducted by the County Commissioners.

Emphasis must be placed on these early meetings and on the role of the ombudsperson. The purpose of the meetings is to provide the negotiating and dialogue forum that the hearing does not; the goal of these meetings is to gain citizen input before the final plans are developed.

Figure 1, following page 16, gives a time line of the procedures to be followed.

#### D. MONITORING AND ENFORCEMENT

With special regard for monitoring and enforcement, a goal of the Roundtable was to establish useful procedures and baselines in order to assist all parties in evaluating the impact of aggregate mining activity, and to ensure that regulations and standards are complied with through adequate and consistent enforcement action. To do this, the Roundtable identified nine potential areas for monitoring and enforcement: air; water; noise; impact on wildlife and vegetation; impact on historical, archaeological and paleontological sites; impact on property values and the economy.

Ten recommendations for monitoring and four recommendations for enforcement were presented. These included the need for effective monitoring processes, as well as timely enforcement. Each one was to be identified early and, insofar as possible, resolved in prehearing negotiations and in the hearing process. The Study also recommended continuous and periodic performance reviews based on appropriate standards and procedures, and means for dealing with them positively

and negatively. The ombudsperson should be given the job of overseeing negotiation, monitoring compliance, and enforcement of regulations affecting aggregate mining in the County.

The County should create an oversight or advisory board comprised of individual homeowners and/or business owners in the vicinity of the proposed aggregate mine as well as the operator and the ombudsperson. The companies should designate a representative who is known to the local community, would attend neighborhood meetings and could be contacted when questions or concerns arose. Annual reports should be required, and a registry of violations and complaints should be established to identify patterns of violations; but it is felt that the enforcement process should contain positive dimensions wherever possible, so that companies are encouraged to do a good job. The County should establish concise and firm conditions for operating aggregate mining, and an agency responsibility chart should be prepared by the County, detailing county, state, and federal responsibility for monitoring and enforcement.

Finally, the County should ensure that cost and fee structures are made efficient, fair, and equitable, and it should investigate alternative sources of funding for more effective monitoring and more effective enforcement.

#### E. IMPACTS AND MITIGATION

##### Visual Impact

The goal is to protect the visual resource which currently exists in Jefferson County and mitigate visual impacts resulting from aggregate mining operations.

The existing standards regarding visual impact are set by the Mined Land Reclamation Board (MLRB) and the Mineral Extraction Policy Plan (MEPP) of Jefferson County.

Before beginning specific recommendations, two questions need to be answered. First, is this a place where visual impacts are so high that the site is totally incompatible with aggregate mining? The second question relates to unique visual attractions in the County itself. Fourteen recommendations specifically cover the following areas: 1) site locations; 2) methods for mitigating visual impacts; 3) techniques for reclamation; 4) buildings and facilities; and 5) machinery and equipment.

#### Air Quality

The goal is to minimize impacts on air quality due to aggregate mining operations in the County.

The Colorado Department of Health is responsible for implementing and enforcing requirements of the National Clean Air Act, and the Appendix provides a brief summary of Federal legislation and national ambient air quality standards. Though the County does not have its own standards, it does monitor air quality (County Health Department), and mitigation techniques of various kinds are currently employed by aggregate mine or pit operators.

Five recommendations are made for assessing and monitoring a proposed project's impact on air quality. These cover measurement of ambient air quality at the property line of the proposed location before any aggregate mining begins, then monitoring through the operation of the aggregate mine, and, finally, into reclamation. Specific mitigation measures are proposed, and methods for monitoring and enforcement are proposed.

## Noise

The goal is to maintain acceptable levels of noise in urban, residential, rural, mountain, and commercial areas.

Existing standards are included in the Appendix under the Noise Abatement Act of the State of Colorado. Eleven mitigating measures are recommended having to do with time, methods, and recognition of surrounding environment, weather, etc. Furthermore, six specific monitoring-permitting measures were recommended, providing a procedure for assessing and monitoring noise impact. These include procedures to be followed before the project is permitted, and during its operation, both on and offsite.

## Water Quality and Quantity

The goal is to assure that aggregate mining activities minimize negative effects on water quality or quantity.

Specific Federal, state, and County standards regarding stream classification, water rights, ground water standards, dredge and fill permits, and land reclamation permit procedures are presented for guiding decisions on water quality and quantity. Special recognition is given to the ways in which aggregate mining operations may impact surface water as well as to effective mitigation of surface water impacts.

Twelve recommendations for assessing and monitoring a proposed project's impact on water are presented. Great emphasis is placed in these recommendations on the need for solid work in the initial stages and on citizen/operator discussion periods for ascertaining all potential effects to water quantity and quality, with recognition for guarantees of quantity and quality protection and the need for

appropriate mitigation to be presented in the water plan. Finally, specific recommendations exist regarding possible pollution, storm run-off, and site drainage.

#### Wildlife and Vegetation

The goal is to minimize the impacts of aggregate mining operations on wildlife, and on vegetation.

Endangered species are protected under the Federal Endangered Species Act. In the County, wildlife protection is primarily detailed in the County Land Use Plan, local community plans, and control is provided indirectly through MLRB regulations. The Division of Wildlife may be involved,

There are eight recommendations for mitigating impact on wildlife and vegetation. These include the need for pre-permit surveys and planning, the involvement of specialists, and the careful review of all ordinances and surveys.

#### Archaeological, Paleontological and Historic Resources

The goal is to preserve and protect unique archaeological, paleontological, and historic resources from damage by aggregate mining activities.

Federal regulations and state standards provide for the protection of archaeological, paleontological, and historic resources. Methods are given for cultural resources survey techniques in Class I, Class II, and Class III surveys. Two recommendations are specifically given regarding preapplication surveys and the opportunities for salvaging by experts.

Open Space, Tourism, Recreational Resources, and Geological Formations

The goal is to minimize the impacts of aggregate mining on open space, tourism, recreational resources, and unique geological formations.

No existing Federal or state standards address these areas, but the Jefferson County Open Space Division does issue certain policies.

Five recommendations are presented emphasizing the need for early consultation with the Jefferson County Open Space Program, the need for consulting with appropriate state and local agencies about recreational and tourism implications of aggregate mining activities, and recommending techniques to mitigate any factors that would inhibit effective and intelligent use of recreational resources, tourism, and/or open space.

Onsite/Offsite Health and Safety

The goal is to ensure on and offsite health and safety of citizens and employees who may potentially be affected by aggregate mining operations in Jefferson County.

Through OSHA and MSHA, onsite standards currently exist, primarily to regulate the health and safety of employees and visitors.

Though these standards are probably adequate, special needs must be reviewed in the early negotiations. Four mitigation measures and monitoring procedures are recommended. Mitigation measures include both on and offsite recommendations; monitoring procedures specifically recommend the clear establishment of standards in early negotiations as well as the designation of methods of monitoring



during operation. Finally, a specific enforcement measure is recommended, asking the County to publish a complaint telephone number where concerns about safety or health hazards can be registered.

#### Truck Traffic

The goal is to maintain the quality of life and safety in residential and commercial areas while allowing for the transportation of gravel products on County, state, and Federal highways.

Existing standards are implemented and enforced through both Federal law and Colorado State Statutes. The U.S. Department of Transportation has set safety standards for trucks, and the State of Colorado has incorporated those into its State Statutes. The State Highway Patrol and local law enforcement agencies are responsible for ensuring that those standards are met.

To ensure traffic safety and effective use, eight recommendations are made specifically under the heading of "Road Damage and Maintenance", four recommendations are under "Routing", three recommendations are under "Loss of Loads", five recommendations are under "Limit Truck Noise", two recommendations are under "Quantity of Traffic", and two recommendations are under "Alternative Transportation Methods".

#### Reclamation

The goal is to prevent erosion, water pollution, and other adverse environmental effects which may result from aggregate mining, and to reclaim mined lands to beneficial use after mining is completed.

The MLRB sets standards for mined land reclamation, and Jefferson County sets specific goals and policies under the MEPP.

Ten recommendations are listed, though some of them are already incorporated in the MLRB regulations and in the MEPP. A reclamation plan should be clearly developed in the early negotiations between citizens and operators under the guidance of the ombudsperson. Strong emphasis is placed on phased mining and reclamation, and specific concern is raised that all activities of reclamation consider preceding guidelines under Visual Impact, Wildlife and Vegetation, etc.

### Blasting

The goal is to provide an introduction to various blasting concepts, and minimize any adverse impacts due to blasting.

The United States Bureau of Mines has conducted research which has resulted in specific recommendations and standards that have already been established.

In addition, eight recommendations covering blasting time, limitation guidelines and monitoring procedures are presented. Need for response and for reports to adjacent property owners is emphasized.

### Economic Considerations

The goal is to obtain an accurate appraisal of the direct and indirect socio-economic benefits and costs of aggregate mining operations in the County in order to inform policy makers.

Considerations fall into two categories: the benefits and the costs, either public or private; and the costs incurred in administering the program that has been recommended by the Roundtable.

The Roundtable recommends that a study be conducted on the economic costs of aggregate mining, relating specifically to the costs and the benefits. Furthermore, since the Roundtable recommendations included the adoption of new procedures, the hiring of an ombudsperson, and the writing, production, and distribution of a handbook, a variety of options available to the County whereby it could raise money to cover the additional expenses is also listed.

#### GENERAL RECOMMENDATIONS

The report of the Roundtable includes the following recommendations addressing both substantive and procedural issues.

- A. The conclusions of the supply and demand study, which assessed requirements of current and projected supply and demand for construction aggregate in the metropolitan area and analyzed the role of Jefferson County, should be noted.
- B. The County should establish a preapplication process to facilitate interaction among citizens, applicants, and the County. Roundtable members believe that early and open communication is a vital component in addressing concerns.
- C. The County should designate an ombudsperson to assist in establishing productive working relationships among the County, citizens, applicants, and operators.
- D. There should be improved monitoring procedures which can be understood by all parties, and which include citizen involvement in the monitoring and enforcement process.

- E. A detailed study is needed to analyze costs and benefits associated with aggregate mining activities. The term "costs" includes direct and indirect costs to both the public and private sectors.
- F. The technical and procedural sections of this report should be used as a guide to identify the relevant issues and define the timeline to be used in reviewing the aggregate mining application for a particular site. The technical sections in this report are generic in nature and may or may not apply in their entirety to any particular site. They should be used to identify the issues relevant to a specific site.
- G. The Roundtable recommends that its report be incorporated into the Mineral Extraction Policy Plan and related County regulations and policies. The success of the policy recommendations depends on implementation, and the Roundtable members stand ready to assist in that process.
- H. A handbook on aggregate mining regulations and procedures in Jefferson County should be produced by the Jefferson County Planning Department for use by concerned citizens, industry, and government personnel.
- I. The Roundtable strongly recommends, upon approval of this report, that an "implementation committee" be formed. The committee should be formed from existing Roundtable members consisting of one representative from the industry, one representative from the citizens/homeowners group, and one representative from the County. The purpose of the "implementation committee" would be to ensure that the approved recommendations of the Roundtable report are expeditiously incorporated into the County policy.

J. The Roundtable members recognize that this report is not all-inclusive. It is a guidebook, not a rulebook. Issues will inevitably arise in the future which have not been addressed by the Roundtable. The ombudsperson and preapplication meetings among the applicant, citizens, and the County should be used to resolve these unaddressed issues.



## II. INTRODUCTION

## II. INTRODUCTION

### A. History of the Roundtable

Aggregate mining is historically one of the most controversial and adversarial activities on which the Commissioners must make decisions. For this reason, the Commissioners decided to convene a roundtable which could recommend policies regarding rezoning and mining of aggregate. They solicited membership for the Roundtable from diverse interests, including citizen and homeowners groups, the aggregate mining and transportation industry, Jefferson County government, State government, interested citizens, as well as representatives of adjoining counties and cities. The Aggregate Resources Roundtable was organized by the Jefferson County Commissioners in February, 1986.

The charge to the Roundtable by the Commissioners was clear: formulate recommendations to guide decision-making in Jefferson County regarding rezoning and mining of aggregate. Recommendations should be generic rather than site-specific. The Commissioners committed to consider incorporation of the Roundtable recommendations into County policies and procedures.

The Roundtable members recognized from the outset that aggregate mining has been, and will continue to be, an emotional issue. They believe that the most effective way to address this situation is to develop a process that will help citizens, operators, and the County to make wise decisions. This process should be designed to reduce unnecessary conflict, promote the understanding of common interests, and resolve genuine differences. The County and the applicant should expedite the process to determine the desirability of a proposed mining operation. This will



protect citizens, operators, and the County from unreasonable expenditures and unnecessary, protracted conflict. The recommendations provide guidance to those involved in decision-making on this complex topic. Strengthening policy development is also recommended. The Roundtable members stress that this report is neither an endorsement of, or justification against, any mining proposal.

The Roundtable requests that its recommendations supplement The Mineral Extraction Policy Plan and be incorporated as part of County procedures and regulations. In addition, the Roundtable recommends that this report guide County planners in the preparation of a handbook for citizens and operators on aggregate mining application, permitting, and operating procedures.

B. Process Followed by the Roundtable

The Roundtable operated by consensus. Recommendations were formulated through group discussion and decision-making; The Roundtable was convened by the Jefferson County Commissioners in February of 1986 to develop policies to guide decision-making on aggregate mining in Jefferson County. The group consisted of people from citizen and homeowner groups, industry, state government, concerned adjacent cities and counties, and the Jefferson County Planning Department. The group deliberated by consensus, and all conclusions and recommendations are supported by the entire group. This type of decision-making required all members to consider their own interests and those of others, and to carry on discussions frankly and in good faith.

The report was drafted through the course of the Roundtable's existence. Sub-groups discussed and formulated initial thoughts and proposals which were then reviewed,

revised, and added to by the full Roundtable. The Roundtable met in plenary session 30 times between March 1986 and June 1987. Roundtable members spent many additional hours in work groups and as individuals reviewing materials.

The Roundtable members decided early to divide their discussions into procedural and topical recommendations. In addition, aggregate supply and demand was studied. The procedural recommendations address proposed changes in the County's decision-making process. The topical recommendations address substantive issues which are often controversial when aggregate mining is proposed, such as noise, transportation, and monitoring and enforcement.

C. Intended Use of this Document

The Roundtable intends this document to serve two purposes:

1. As a formal report to the people of Jefferson County and the County Commissioners with the recommendation that it be incorporated into policy.
2. As a guide to anyone who is involved in siting of an aggregate mining operation. The Roundtable members feel strongly that the lack of information and communication have been major causes of conflict in aggregate mining applications and/or activities. Citizens and aggregate producers can benefit from the use of this document.
3. As a common sense guide. The recommendations contained in this report are just that -- recommendations only, and should not be rigidly applied to all aggregate mining applications. The applicability of these recommendations should be determined on a site specific basis.

D. If the regulatory functions performed by external agencies are seriously compromised by budget cuts or statutory changes, the County should examine these omissions and may desire to assume these responsibilities.

E. Handbooks

This report should be used to form the basis for a handbook for citizens and operators on aggregate mining applications and rezoning and operating procedures. This should be prepared by the County Planning Department.

F. Negotiations

If negotiations result in agreements on standards or mitigation procedures, these agreements should be incorporated in the official Zoning Resolution Development Plan. The Board of County Commissioners, through County Staff, should negotiate with applicants and citizens to modify requirements or mitigation procedures if such a modification would make the proposal acceptable.

G. It should be noted that all references to mines or mining contained in this report should be considered to be preceded by the word "aggregate." This report concerns itself specifically with aggregate mines and mining.

### III. AGGREGATE RESOURCES IN THE METRO-DENVER AREA

#### A. Summary of Supply and Demand Data

The Roundtable requested the County planning staff to solicit the assistance of a contractor who would conduct a supply/demand analysis of aggregates in the Front Range. Khalil Nasser, of the Colorado School of Mines was hired to conduct the study and and write the ensuing report.

The goal of the study was to assess the current and potential reserves of aggregate in the Denver metropolitan area and to determine the need for aggregates to support future economic development. The study area included the City and County of Denver, and adjoining Adams, Arapahoe, Boulder, Douglas, Jefferson, Clear Creek, and southwestern Weld Counties.

The study determined that the present aggregate supply in the Denver metropolitan area is 400 million tons, of which 343 million tons are permitted reserves and operating mines. The remaining 57 million tons are potential reserves that are zoned but not permitted.

Historically the trend has been toward increased demand for aggregate. However, the trend could reverse and the permitted aggregate resources could last longer than projected. This study does not address downward trends in aggregate demand, consumption rates, or population.

The total aggregate supply was calculated mainly on the basis of data collected from the permit files of the Mined Land Reclamation Division for each individual mine.

The projected per capita consumption was correlated with the yearly population projections for the region, provided by

III. AGGREGATE RESOURCES IN THE METRO-DENVER AREA

the Denver Regional Council of Governments, in order to estimate aggregate consumption up to the year 2010. Large projects, including the new airport and the E-470 section of the beltway system, were considered.

At 8.5 tons per capita, the average yearly consumption is 19 million tons. Current reserves will last 18 years, until 2004. Potential reserves would add 3 years, or until 2007. At 11.0 tons per capita, the average yearly consumption is 24.5 million tons. With this scenario, current reserves will last 14 years, until 2000. The consumption of the potential reserves would add 2 years, or until 2002.

B. Conclusions or Trends as Indicated by the Supply Demand Study

The County Commissioners should recognize the dual concerns of the citizens and aggregate mining interests of Jefferson County to preserve the quality of life in the County and to meet an increasing demand for aggregate. The County's citizens, industry, and government should cooperate to reconcile and meet these dual needs. This should include joint efforts to designate acceptable areas for mining and sites for preservation. These measures should be taken while considering the responsibility of all metro counties to provide a fair share of aggregate. Jefferson County should not become the sole provider of aggregate for the Metro Denver area.

In reviewing the supply and demand study, the Roundtable observed the following trends:

1. Depending upon the rate of consumption, permitted resources will be depleted in 16 to 21 years. The total amount of aggregate permitted today may have to be newly

- permitted in the region within the next 20 years.
2. Over the past 15 years, the percentage of aggregate reserves in crushed (quarried) stone has grown from 0% to 40%. This change results from the depletion of available and low cost alluvial resources and from changes in aggregate specifications, requiring increasing reliance upon quarried stone.
  3. The percentage of sand and gravel reserves supplying the metro area from southwest Weld County have grown from 0% in 1980 to 13% in 1987. This aggregate source comes from outside of the historic supply area.
  4. An obvious trend is the locating of coarse alluvial aggregate deposits farther from metropolitan markets. This means longer haul distances which translate into higher aggregate costs. The economic implications are apparent. Assuming that aggregate prices could increase to offset increased transportation costs, producers could consider developing more remote alluvial deposits. The potential areas seem to be Clear Creek, Gilpin, Larimer, Boulder, Park and Weld Counties.
  5. Another option is the search for suitable property in the Front Range area to sustain a long-term, high-tonnage, crushed-rock quarry operation. From the standpoint of haul distance, the mountain front in Boulder, Jefferson, and Douglas counties is the main source, but foothills residential development and the low success rate of applications in this area over the last 10 years is discouraging to the location of new sites.
  6. A new trend is the recycling of asphalt and concrete. Aggregate producers in the metro area currently recycle asphalt and concrete, which constitutes 5% of the local market. A major problem in recycling concrete is the presence of rebar that hinders processing.
  7. Other options include long-range truck haulage, intermediate to long distance unit train, and the

possibility of aggregate manufactured from natural and man-made materials. In the Front Range area, this option has not been economically feasible to date.

For a more complete explanation of the supply and demand for aggregate resources, see "Supply/Demand Analysis of Aggregates in the Denver Metro Area" (1987) prepared by Khalil Nasser. See also, "Strategic Resource Assessment Study - A Report on the Availability of Critical Construction Resources for Major Projects in the Denver Region" (1987) prepared by Strategic Resources Assessment Study Task Force, Marion Paul, Director.



#### IV. RECOMMENDATIONS ON PUBLIC INVOLVEMENT

Early communications between parties are especially important in pre-hearing negotiations.

The Roundtable recommends that the County Commissioners and the Planning Commission adopt procedures in the pre-hearing and hearing process that promote interaction with the applicant and the community. The objective of this process is to foster effective two-way communication between the applicant and the community, prior to a formal decision on the application by the County Commissioners.

The recommended procedure for an aggregate mining proposal calls for the following steps: 1) Filing of a Notification of Intent to Apply by an applicant and appointment of ombudsperson; 2) Informal meetings between the applicant, the County, and concerned citizens; 3) Planning Commission review including, if necessary, technical analysis by an objective panel, and; 4) Formal hearing conducted by the County Commissioners. See Figure I for an overview of the proposed process and timeline.

##### A. Notification of Intent to Apply

The applicant will notify the County Planning Department of its intent to file a formal permit application. At the time this notification is made, the County will designate a case manager who will be responsible for that application as it moves through the process. A County designated ombudsperson will be responsible for informing the applicant and the public of the process to be followed towards a formal decision by the County Commissioners. The ombudsperson will also serve as a liaison and facilitator for the community and the applicant.

## B. Informal Meetings

Informal meetings should involve citizens, the applicant, the ombudsperson and County planning staff. The first meeting should be held in a locale near the proposed aggregate mining operation. An assessment of the area near the proposed operation should be conducted by the County to determine the interested citizens who should be invited. The County should provide 30 days notice prior to the informal meetings.

The purpose of the meeting(s) is to provide the negotiating and dialogue forum that the hearing room does not. The meeting(s) should be facilitated by the ombudsperson, staffed by the County, and agendas planned collaboratively between all parties. No party would relinquish his or her right to testify, oppose, or support the application in the formal hearing process. The Board of County Commissioners should be apprised of the outcome of the pre-hearing negotiations by means of a written report prepared by the ombudsperson. The report would identify resolved and unresolved issues.

The applicant should have a conceptual and sketch plan (e.g., outline of quarry area, mining area, crusher location, etc.) at the time of the informal meetings, but should not provide a final draft plan. Notification of the informal meeting(s) should emphatically state that it is neither required nor desirable for the applicant to have a final or detailed plan. The goal of the meetings is to gain citizen input before final plans are developed by the applicant. The applicant should be required to present completed plans to the citizens prior to Planning Commission or County Commission hearings. Parties should be discouraged from using delay tactics or failure to disclose plans as a means to achieve their interests.

IV. RECOMMENDATIONS ON PUBLIC INVOLVEMENT

The period between the informal meeting and the formal application submittal could be up to 90 days to allow adequate time for the informal meetings between the applicant and citizens. If there is no need for the meetings to take 90 days, due to minimal citizen interest, the application could be submitted sooner. If the parties agree that more than 90 days is needed, then the application should be delayed.

C. Notification Recommendations. These recommendations apply to notification for both the informal meetings and the formal hearing process:

1. Newspapers

The minimum legal requirements for newspaper publication for County Commissioner hearings must be complied with.

Over and above the minimum legal requirements, the following should be done:

- a. A formal notice should run consecutively three times. The notice should run in the legal notice and in another section of a newspaper of local circulation in the same geographic area as the proposed site. The notice should be in layman's terms and should describe the subject property in terms easily understood, not a metes and bounds legal description, and should be accompanied by an index map. County Commissioners should direct Planning Staff to prepare standards for maps. The notice should contain the case number and name and phone number of the ombudsperson to contact for more information.

## 2. Property Owner/Interested Parties Recommendations

An executive summary should be mailed to citizens, and referral packages mailed to appropriate agencies within two weeks of the filing of the formal zoning application. On request, a full referral package may be reviewed by any interested parties at the County.

Referral packages should be mailed to those homeowners associations, public libraries, and individuals who are listed on the homeowner's registry in the area of interest maintained by the Planning Department. Each person and association on the registry has identified a geographic area of interest. For those areas where there is no organized homeowners group, other community organizations, such as the Grange or volunteer fire departments, should be identified and contacted by the County Planning Department. The County Planning Department can set a limit to the number of packets to be reproduced by the applicants.

The County should consider subscription mailings of Planning Commission and County Commissioner agendas to anyone who wants them for an annual rate (\$10 or \$15), similar to the subscription mailing of agendas by the Colorado Mined Land Reclamation Board.

The applicant should identify all adjacent property owners based on the County Assessor's records on the date of application.

The County should notify by mail, all property owners adjacent to the proposed mining site (properties with contiguous boundaries, including public rights-of-way).

The County may also initiate additional notices after assessing the area in which interested citizens live. It is not appropriate to predefine a set radius within which to

notify people, because each locale will be unique regarding the location of potentially affected citizens.

Should the County staff identify interested parties that are not included in the previous recommendations, they too should receive a notification of the application.

### 3. Posting Recommendations

Signs should be posted 15 days in advance of the first informal meeting and at least 30 days prior to the first Planning Commission hearing, not the current 7 to 10 days.

Signs should be posted by the applicant in consultation with the Planning Staff and public representatives on the property and along any public access roads.

Directional signs should be posted at heavily traveled roads or intersections near the proposed mining site.

Signs should be color coded to clearly distinguish informal meetings, Planning Commission hearings, and County Commissioner hearings.

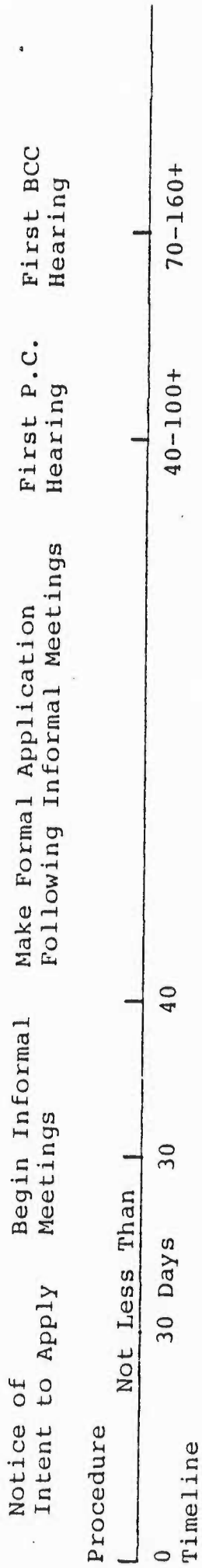
The County should notify mining applicants of proposed developments adjacent to or near proposed sites which could be impacted by or could impact on quarry operations.

### D. Planning Commission Process

Planning Commission hearings which follow the initial session, should also be as interactive as possible. The Planning Commission should enter into dialogues and discussions in its public hearing to allow modification of the applications. The Planning Commission should have information workshops and field trips with applicants, citizens, and staff. The Planning Commission should discuss

the plans for a proposed mining operation and send their observations and recommendations, in written form, to the County Commissioners. If the Planning Commission needs a technical briefing on a certain issue, they should do it in a workshop environment. If there is conflict over one or more technical issues, the Planning Commission should establish a technical review team. The team should be neutral and objective, its membership should be acceptable to all parties (county, citizens, and applicant), and it should be composed of experts on the issues in question. The technical review team will assist the Planning Commissioners in developing recommendations for the County Commissioners. The Roundtable urges the County Commissioners to also refer technical issues to this neutral review team.

FIGURE I. PROCEDURES AND TIMELINES





V. MONITORING AND ENFORCEMENT

## V. MONITORING AND ENFORCEMENT

### A. Goal

To establish useful procedures and baselines to assist all parties in evaluating the impact of mining activities and to ensure that regulations and standards are complied with through adequate and consistent enforcement actions.

### B. Overview of the Topic

This section deals with generic procedures for monitoring and enforcement of County policies and regulations that affect aggregate mining. Monitoring and enforcement of environmental and regulatory compliance aspects of a mining operation are major concerns for citizens, industry, and the County government. There is a need for greater credibility in this area through establishment of policies and procedures which involve citizens, so that they fully understand what monitoring requirements are in place and how compliance with regulations and standards will be enforced.

Industry is concerned about the monitoring and enforcement issues of cost, time, and standards. If monitoring is required, the standards should be clear, easily measured, and the process should be cost-effective in terms of personnel and equipment. Industry is also concerned about the potential for excessively punitive enforcement measures and equal treatment of public and private operators.

County staff have been concerned about monitoring and enforcement because of their desire to maintain reasonable standards for mining operations in a cost-effective manner. Personnel, equipment, and budgetary limitations are a factor in County monitoring and enforcement.

The Roundtable identified nine potential areas for monitoring and enforcement.

1. Air pollution (dust)
2. Water - quantity and quality
3. Noise pollution - operations and transportation
4. Blasting
5. Truck traffic
6. Reclamation
7. Impacts on wildlife and vegetation
8. Impacts on historic, archaeological and paleontological sites
9. Impacts on property values

C. Regulated Environmental Areas

<u>Area Regulated</u>	<u>Mandatory Monitoring</u>	<u>Responsible Enforcement Authority</u>
Air	Annual Inspection	County and State Health Dept.
Water Quality	Every 30 days	State Health Dept. & EPA
Water Quantity	No	State Eng. - Courts
Noise	No	Local & State Standards
Blasting	No	Local - County
Truck Traffic	No	Local - City - County - State
Reclamation	Upon Request Annual Reports	State MLRB

D. Monitoring Recommendations

1. There must be effective monitoring of potential areas of impact, as identified through pre-hearing negotiations and the hearing process. Associated with the monitoring process must be an efficient and timely enforcement process.
2. The public has expressed concerns about the life of a project and its inability to affect the standards of operation of a given project once approved. Periodic performance review through a public hearing process should occur. This procedure would allow an approved project to be subject to modifications and changes in its method of operation as the need arose. Additionally, a phased approval process, that requires compliance with defined standards and procedures, could be utilized before a project could move from one stage of development to the next. This approach would complement the enforcement process described above.
3. An ombudsperson should be designated to directly oversee the monitoring, compliance, and enforcement of regulations affecting aggregate mining in the County. This person should be the regular point of contact for the public, operators, and the County. The person should be proactive as well as reactive, and should work to resolve operator/community problems. The person should be on County payroll. All parties -- citizens, industry, and County -- should be involved in the process of defining the job description and performance standards of the ombudsperson.
4. The County should evaluate all costs and fee structures associated with monitoring and enforcement activities, with the goal of assuring that the system is efficient, fair, and equitable.

5. The County should create an "oversight" or "advisory" board comprised of individual homeowners living in the vicinity of a proposed mine, as well as the operator and the ombudsperson. This oversight board could help to resolve company/community disagreements.
6. The County should require annual monitoring reports for areas of concern identified in the pre-hearing negotiations and in the final permit. The review of this report should be administered or overseen by the County. Public notice should indicate where the public can obtain these reports.
7. The County should prepare an agency responsibility chart that details County, State, or Federal responsibility for monitoring and enforcement. The chart should designate both mail and phone contact points where complaints can be addressed and handled.
8. The County should establish a "Registry of Complaints and Violations" to identify patterns of violation. The ombudsperson should be responsible for monitoring the registry, investigating any patterns of violation, and responding to citizen complaints.
9. The County should encourage company representatives to attend neighborhood meetings where they would report on violations, give notification of what is being done, and receive feedback from the community.
10. Companies should designate a contact person who is known to the local community and can be contacted when questions or concerns arise. If possible, the community should designate a contact person who can be contacted by the company to transmit information.

#### E. Enforcement Recommendations

1. The enforcement process should contain a positive dimension, whenever possible, so that companies are encouraged to do a good job as opposed to pursuing

- punitive enforcement to modify industry behavior.
2. The County should establish concise and firm conditions for operating aggregate mining operations. If the company does not comply, the County should be prepared to promptly suspend any operation because of noncompliance with the terms and conditions of approval.
  3. The County should explore all available options for enforcement actions, including local ordinances and court action.
  4. Shortages of funding are often cited as a reason for inadequate enforcement. In response to this problem, the County should investigate alternative sources of funding, such as fees for application and/or operation, State funds, or other creative sources of revenue.

VI. TOPICAL RECOMMENDATIONS

	<u>Page No.</u>
A. Visual Impacts.....	23
B. Air Quality.....	27
C. Noise Pollution.....	32
D. Water Quality and Quantity.....	36
E. Wildlife and Vegetation.....	41
F. Archaeological, Paleontological, and Historic Resources.....	43
G. Open Space, Tourism, Recreational Resources, and Geologic Formations.....	46
H. On-Site/Off-Site Health and Safety.....	47
I. Truck Traffic.....	50
J. Reclamation.....	54
K. Blasting.....	56
L. Economic Considerations.....	61

## A. VISUAL IMPACTS

### 1. Goal

Protect the visual resource which currently exists in Jefferson County and mitigate visual impacts resulting from aggregate mining operations.

### 2. Overview of the Topic

The sights that surround people are an important aspect of the quality of life in a community. Maintaining and/or enhancing that quality of life by ensuring that land use does not adversely affect the well-being of County inhabitants is important to maintaining a sense of community.

The backdrop of the front range is a major landmark for the entire Denver Metropolitan Area. The unique landscape that characterizes different parts of Jefferson County is a valuable asset that attracts new residents and employers. Careful attention to enhancing and maintaining these natural attributes, as development occurs, can ensure a highly desirable quality of life in the county. This can be achieved by:

- a. Maintaining the visual quality of areas valued for their views.
- b. Using the natural landscape, vegetation, and topography to hide development.
- c. Maintaining landscapes that have a unique visual quality.

### 3. Existing Standards

The State Mined Land Reclamation Board (MLRB) sets standards for mined land reclamation. Rule 6 in the Rules and Regulations of the Mined Land Reclamation Board sets reclamation standards. The MLRB does not have minimization of visual impacts as explicit criteria for reclamation activities. The agency's concern is reclamation during and after mining operations. The Mineral



Extraction Policy Plan of (MEPP) Jefferson County, specifically Goals and Policies numbers One and Fourteen, details the current County reclamation standard, which relates directly to the mitigation of visual impacts.

#### 4. Recommendations

Landscape quality is the overall visual impression provided by the topography, vegetation, soils, sky, water, and structures of a site. Combined, these components form the landscape characteristics of visual dominance, variety, and uniqueness.

A central question regarding the visual impacts of a proposed mining operation is, "Is this a place where the threshold of visual impacts is so low, that the site is totally incompatible for mining?" Criteria to be used in answering this question include:

- a. Overall visibility of the site.
- b. Can the visual resource be: replaced, relocated or duplicated?
- c. Can impacts on the visual resource be mitigated on-site?
- d. Can the visual resource be found at alternative sites?

A second question relates to unique visual attractions in the County. The Roundtable recommends that unique visual attractions in the County be sensitively treated. Any mining plans in these areas should ensure that visibility and the sites are minimally disrupted. Unique landscapes are those where the visual attraction is unusual, such as: the hogback ridges and valleys with associated rock outcroppings, and scenic overlooks and vistas. These unique areas provide a sense of identity and pride for a community or region.

The following recommendations should be considered in order to minimize visual impacts. (Note: The notations MLRB or MEPP after a recommendation indicate that the recommendation is

supported by existing State Mined Land Reclamation Board or County Mineral Extraction Plan Policies).

- a. To the greatest extent possible, mines should be situated where they are not highly visible to the public (see MEPP, Goal One).
- b. A very high visibility ranking is given when the view is short, the slopes are steep, it is seen by large numbers of viewers, and/or it can be viewed for a long period of time. The "eyeball hours per year," i.e., number of people who see an operation and period of time that a mining operation is visible, should be minimized.
- c. Minimal amounts of vegetation should be disturbed during a mining operation to help mitigate visual impacts (see MLRB rules and regulations).
- d. Phased mining and reclamation measures should be considered to mitigate visual impacts. This procedure limits the number of mined acres that are disturbed at any given time (see MLRB rules and regulations).
- e. Berms, stockpiling of topsoil, trees, and other screening techniques should be utilized.
- f. Texturing or differential contouring should be encouraged to break up rock faces and reduce vertical, flat walls.
- g. The use of rock coloring, aging and sculpturing should be considered to help mining and reclamation have less visual impact. The use of this approach should take into account possible adverse environmental impacts.
- h. Results of visibility mitigation should be aesthetically pleasing and in keeping with the surrounding environment.
- i. Excavation in visually sensitive areas such as ridges, hilltops, and scenic areas should be minimized (MEPP).
- j. Buildings and facilities should be constructed and painted to minimize their visual impact. Locating

- structures, machinery and equipment storage and repair areas, utility lines, access roads and driveways, fences, gates, signs, and mined-material stockpiles in visually sensitive areas such as ridges, hilltops, and scenic areas should be avoided (MEPP).
- k. The location and design of structures, machinery and equipment storage and repair areas, utility lines, access roads and driveways, fences, gates, signs, and mined-material stockpiles should be sensitive to the natural color, form, and texture of the surrounding area (MEPP).
  - l. The excavated portion of the mine sites, structures, machinery and equipment storage and repair areas, utility lines, access roads and driveways, and mined-material stockpiles should be screened from view or camouflaged by methods to include, but not to be limited to, the following (MEPP):
    - (1) Existing and/or replanted vegetation;
    - (2) Existing landforms and/or artificially created landforms.
  - m. The glare from welding and night lighting of the mine site should not intrude on the privacy of neighboring residences (MEPP).
  - n. Avoid, if technically possible, high wall configurations in areas of high visibility.

## B. AIR QUALITY

### 1. Goal

Minimize impacts on air quality due to aggregate mining operations in the County.

### 2. Overview of the Topic

Air quality is a concern to all the residents of Jefferson County. The Roundtable participants want to assure that air quality does not decline, or changes only within acceptable and allowable standards, as a result of aggregate mining operations.

Many air quality problems related to aggregate mining are the result of misconceptions and confusion. The public is not clear what the standards are, who does the monitoring and where to go to register a complaint.

Citizens want accountability and responsiveness. Citizens generally go to their county government to redress their complaints.

Currently, the County has neither the time, finances, nor staff to duplicate the State Health Department's regulations, monitoring procedures, or enforcement role. There needs to be a balance of expenditures (and thus, taxes) for regulation, with the level of monitoring and standards that are desirable.

### 3. Existing Standards/Regulations

The air quality program in the State of Colorado is administered by the Colorado Department of Health, which is responsible for implementing and enforcing the requirements of the National Clean Air Act through enabling legislation passed into law by the State of Colorado. The State Health Department is the lead agency responsible for permitting and enforcement at the state and local level.

Tables One and Two in Appendix Three provide a brief summary The Chronology of Federal Legislation to control air pollution and National Ambient Air Quality Standards.

The EPA is currently developing new clean air standards, the Respirable Particulate Standards. These guidelines will focus on standards for human inhalation of particulates and other pollutants.

The County does not have its own air standards, but it does monitor air quality. The County submits air quality monitoring data to the State, and enforces air quality standards for the State. A mining applicant must have an emission control plan that is approved by the State Health Department, which may be obtained before or after the permitting process.

#### 4. Monitoring

Jefferson County air is monitored by the County Health Department. Monitoring air quality for particulates (dust) has historically relied on the hi-vol sampler which is essentially a vacuum with a filter over the inlet end to collect airborne suspended particulates.

A second way to assess particulate matter in the air would require the services of a trained person certified by the County Department of Health to measure opacity. This process requires a trained "smoke reader." Opacity is used for monitoring and enforcement in Colorado.

Monitoring is generally not required on specific mine permits and is not common in the County after operations begin. The Commissioners have mandated monitoring in one case.

The State Health Department conducts an annual inspection of mines and assesses the pollution emission from mines and

plants. Other inspections by the State are complaint-driven occurring only when a private party initiates some action.

#### 5. Mitigation Techniques

Mitigation techniques for dust emissions from mining and processing range from spraying water on the dust source to using state-of-the-art dust collectors. The methods used are usually determined by the sources to be controlled. For example, dust from unpaved roads which causes about 95% of all dust problems, can be controlled by watering, oiling, paving or using crusting agents which when, mixed with water and sprayed on the road surface, dry to form a hard surface. On the processing side, a number of control technologies are available, including: wet suppression, fabric collectors, mechanical collectors, and scrubbers. These methods, used alone or in combination, have proven to be effective in controlling dust emissions from mining operations.

#### 6. Enforcement

The County initiates enforcement when there has been a complaint and/or when high-wind velocity appears to be the cause of the pollution. Enforcement has historically been performed at the local level by the County Health Department. Activities which create emissions must be permitted by the State Health Department. To get a permit the applicant must have an emission control plan approved by the State Health Department. Once a permit has been issued, the County Health Department conducts annual inspections of the permitted facility as well as responding to possible violations and/or complaints.

#### 7. Recommendations

The Roundtable recommends the following procedures for assessing and monitoring a proposed project's impact on air quality:

- a. When a project is proposed, the ambient (existing) air quality at the property line of the proposed location

should be measured. These measurements should be made upwind and downwind of the proposed site and should be conducted during periods of diverse wind conditions. The measurements should be conducted by a qualified party and should meet accepted State and Federal procedures and standards.

- b. The applicant should be required to state whether the proposed operation will impact ambient air quality from pre-operation levels as measured at the property line.
- c. In situations where the air quality may be impacted by the proposed aggregate mining operation, an attempt should be made by all parties involved to negotiate an agreement on acceptable impacts. The parties should take into consideration the criteria and concerns listed above. Mitigation measures listed above may also be used to reduce air pollution. The negotiation process should examine the unique nature of the specific site. Variables for consideration include:
  - (1) Proximity of proposed operation to population centers;
  - (2) Current air quality/potential degradation;
  - (3) Density of housing/population - high or low;
  - (4) Pristine environments;
  - (5) Air currents/patterns - frequency, prevailing winds, shifts;
  - (6) Size of operation - longevity - quantity of release;
  - (7) People/neighborhood impacts (dust, visibility).
- d. In those situations where an agreement cannot be reached, the citizens and applicant should present the County Commissioners with a narrowed range of options for the Commission's consideration and decision-making.
- e. Monitoring and enforcement were noted as extremely important issues. A complaint-driven approach is only one way to handle monitoring and enforcement, and other approaches should be considered. The burden should not

be on the community, though community monitoring committees may be one aspect of a program. The County should be responsible for ensuring that credible monitoring takes place. Monitoring should occur:

- (1) At the premining stage to establish baseline/ambient air quality levels;
- (2) During initial startup of a new mining operation;
- (3) Periodically at the property line of the operation;
- (4) During significant changes in the existing operation.



## C. NOISE

### 1. Goal

Maintain acceptable levels of noise in urban, residential, rural, mountain and commercial areas.

### 2. Overview of the Topic

Citizens have often been concerned about noise impacts of potential and/or actual mining operations. Four dimensions of noise are important in determining subjective response:

- a. The intensity level of the sound.;
- b. The frequency spectrum of the sound;
- c. The time-varying character of the sound;
- d. The duration of the sound.

The effects of noise on people can be listed in three general categories:

- a. Subjective effects of annoyance, nuisance, stress, dissatisfaction;
- b. Interference with activities such as speech, sleep, learning;
- c. Physiological effects such as startle or hearing loss.

The sound levels associated with environmental noise, in almost every case, produce effects only in the first two categories. Mining activities may also increase the noise. Unfortunately, there is as yet no completely satisfactory measure of the subjective effects of noise, or of the corresponding reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance, and habituation to noise over differing individual past experiences with noise.

An important parameter in determining a person's subjective reaction to a new noise is the existing noise environment to which one has adapted: the so-called "ambient" noise. Ambient sources do not have single, identifiable origins. They are accumulations of noises that act as single sounds and are sometimes referred to as background noise. In general, the more a new noise exceeds the previously existing ambient, the less acceptable the new noise will be judged by the hearers.

### 3. Existing Standards

The Noise Abatement Act of the State of Colorado, Article 12, Title 25, specifies permissible noise levels for specific land uses, including urban areas (See Appendix 4).

### 4. Possible Mitigation Measures

There are a variety of ways to regulate and mitigate impacts of noise. Possibilities include:

- a. Regulate hours of mining operation;
- b. Utilize equipment with low noise emissions;
- c. Locate stockpiles to form sound buffers;
- d. Construct berms to act as sound buffers;
- e. Utilize alternate means of transportation, i.e. field conveyors;
- f. Rubberize surfaces in the plant;
- g. Enclose equipment;
- h. Utilize alternatives to back-up alarms on equipment;
- i. Limit the proximity of mining operations to residential development or commercial areas;
- j. Move operation out of line of sight;
- k. Limit operation when wind speed and direction is unfavorable for operation and produces excess noise.

### 5. Permitting/Monitoring Measures

The Roundtable recommends the following procedure for assessing and monitoring noise impacts of a proposed project:

- a. When a project is proposed, the ambient noise level at appropriate points on the property line should be measured. Measurement should include an assessment of daytime and nighttime noise, if extended hours of mining operations are proposed.
- b. The applicant may consider taking citizens to similar mining operations in other locations to take measurements and determine whether the projected noise levels are acceptable.
- c. Citizens, the applicant, and the County Planning Staff should attempt to negotiate an agreement on permissible levels. Mitigation measures listed above may be used to reduce noise pollution. The negotiation process should examine the individual characteristics of the specific site.
- d. In those situations where an agreement on acceptable noise standards cannot be reached, the citizens and applicant should present the County Commissioners with a narrowed range of options for the Commission's consideration and decision-making.
- e. Options to back-up beepers, such as alarms that regulate their volume or light intensity, should be considered when approved by MSHA.
- f. Monitoring and enforcement provisions are extremely important. A complaint-driven approach is only one way to handle monitoring and enforcement, and other approaches should be considered. The burden to monitor should not primarily be on the community, though community monitoring committees may be one aspect of a program. The County should be responsible for ensuring that credible monitoring takes place at the following times:
  - (1) At the pre-mining stage to establish baseline/ambient noise levels;
  - (2) During initial start-up of new mining operation;

- (3) Periodically at the property line of the operation;
- (4) During significant changes in the existing operation;
- (5) At times of high wind speed and adverse wind direction.

## D. WATER QUALITY AND QUANTITY

### 1. Goal

To assure that aggregate mining activities minimize negative effects to water quality or quantity.

### 2. Overview of the Topic

A decline in water quality or quantity is considered by citizens to be a very serious, potential impact of aggregate mining activities.

Wells are registered and/or adjudicated by governmental bodies. Registration logs show where a well is located. Adjudication apportions a certain amount of water to a consumer, and is conducted before a District Water Court. Most newer wells are registered, but many old ones are not. Wells built for commercial or agricultural purposes generally require augmentation or adjudication and place the owner on a list that designates priority rights over water use.

Potentially impacted wells should be measured for quantity, flow, and quality prior to any mining operation to obtain baseline data to assist in determining possible impacts of aggregate mining.

Many companies have a history of mitigating potential or actual impacts on water wells of residences adjacent to or near mining operations. Mitigation measures have included connecting affected properties to local water systems, trucking in water, drilling new wells, or refurbishing old ones.

If a citizen has a decline of water quality or quantity in his or her well, or changes in the water table result in a decrease of water and subsequent damage, he or she does not want to have to go through or pay for an expensive and protracted legal process to redress the grievance.

There has been a problem in the past with the presence of two or more water experts with conflicting sets of data on potential or actual impacts of mining on water resources.

### 3. Existing Standards

The following are Federal, State and County standards that guide decisions on water quality and quantity:

- a. Stream Classifications
  - (1) Standards for total dissolved solids, temperature, Ph (acidity).
  - (2) Biological oxygen demand (BOD).
    - (a) Set by Water Quality Control Commission (WQCC) of State Department of Health.
    - (b) Vary from stream to stream and in different reaches of same stream.
    - (c) Govern National Pollution Discharge Elimination (NPDES) permits granted and monitored by WQCC and EPA.
- b. Water Rights
  - (1) Granted by District Water Courts.
  - (2) Administered and monitored by State Engineer.
  - (3) Civil suits are generally used to handle disputes.
- c. Groundwater Standards
  - (1) Set by WQCC and EPA under National Clean Drinking Water Act.
  - (2) Any degradation is controlled by State Water Pollution Act and WQCC.
- d. Dredge and Fill Permits
  - (1) Issued by the Corps of Engineers - 404 Dredge and Fill Permits.
- e. Mined Land Reclamation Permit Procedures
  - (1) All water-related impacts are considered critical by Mined Land Reclamation Division.
    - (a) Hydrologic impact evaluations;
    - (b) Off-site impact evaluation.

#### 4. Surface Water

Mining operations may impact surface waters in several ways. They are: 1) introduction of contaminants (primarily sediment), 2) alteration of the volume of baseline flow, and 3) storm runoff impacts. Generally, construction aggregate mines have limited impact on surface waters compared to other types of mining operations. The potential impacts listed above are routinely controlled and are regulated by County policy (i.e. County drainage requirements), Colorado Department of Health regulations (i.e. National Pollutant Discharge Elimination System permit - NPDES), and the U.S. Army Corps of Engineers (i.e. "404" permit for dredge and fill in stream channels or wetlands). The Colorado Mined Land Reclamation Division also regulates hydrologic impacts to surface waters.

The Roundtable recognizes that dryland gravel mining and rock quarrying tend to have lesser impacts than mining in an alluvial valley or in a stream channel. Mining in or adjacent to a perennial stream greatly increases regulatory complexity. In any case, surface waters should be protected, and off-site drainage impacts should be mitigated.

#### 5. Recommendations

The Roundtable recommends the following procedures for assessing and monitoring a proposed project's impact on water:

- a. Potential or actual impacts on water quantity and quality due to proposed mining operations should be discussed at the pre-hearing meetings between the applicant, potentially affected citizens and permitting agencies. Procedures and mitigation measures should be negotiated prior to beginning mining operations.
- b. Citizens and operators should be advised by the County and/or State Engineer of their rights and responsibilities regarding water on their properties.

All wells that may be potentially affected by mining operations should be registered with the State Water Engineer -- Colorado Division of Water Resources.

- c. Potentially impacted wells should be measured and logged for quantity and quality of water by the applicant with permission from the property owner prior to the inception of mining operations. These measurements should take into consideration: seasonal production, wet/dry years, use of water by household appliances, annual history of production, age of the well, depth of the well, the lining and overall condition of the well, and any other relevant factors that might affect the well's performance. This information can then be used as baseline data from which impacts of mining can be measured.
- d. If there is to be a water augmentation plan, citizens need to know when the plan is being applied for, and the terms of the plan.
- e. If water is brought on-site and stored, it should be in adequate quantity to meet worst-case safety requirements as well as day-to-day operations. The company should negotiate with the local fire district regarding number of gallons to be stored, standards for access roads so that fire equipment can be accommodated, the utilization of compatible hook-ups, and a fire safety plan.
- f. If an applicant claims that its operation will not impact the water resources of citizens adjacent to the operation, then the applicant should be willing to make some guarantees to that effect. Guarantees by an applicant may include, but are not limited to: contingency plans, anticipatory mitigation measures, bonding or other tangible means of demonstrating good faith performance.
- g. Agreements need to be made between citizens, an applicant and governmental regulatory agencies regarding who will determine if a water supply has been impacted



by a mining operation, what standards and criteria will be used to make this determination, and what the time frame for the evaluation will be. These agreements need to be in place prior to the company's initiating mining operations.

- h. All required permits should be obtained by the applicant prior to the initiation of mining activities. Permits may not necessarily be issued prior to zoning approval, but evidence of permit issuance should be supplied to the County before mining begins.
- i. All fuel, chemicals, oil, grease, and blasting agents should be stored and maintained in such a way as to prevent accidental discharge to surface waters.
- j. Sediment should be controlled by revegetation, runoff diversion ditches, sediment ponds, and other erosion and sedimentation control techniques as appropriate.
- k. Stream flows should not significantly increase or decrease as a result of mining activities.
- l. Provisions for controlling storm runoff and site drainage should be included in the mining application. Off-site runoff and drainage impacts should be minimized or mitigated.

## E. WILDLIFE AND VEGETATION

### 1. Goal

To minimize the impacts of aggregate mining operations on wildlife.

### 2. Overview of the Topic

The Roundtable recognized that it is important to distinguish between wildlife habitat that cannot be replaced, relocated, or duplicated and habitat on which impacts can be mitigated on-site or at alternative locations.

### 3. Existing Standards

Endangered species are protected under the Federal Endangered Species Act. Research and extensive documentation is necessary before a species can be declared endangered or threatened.

In the County, wildlife protection is primarily detailed in the County land use plan, local community plans, and indirectly through MLRB regulations. When an applicant proposes a mining operation, the MLRB asks for comments on the proposal from the Colorado Division of Wildlife. The Division of Wildlife, while it cannot prevent a permit, does have the authority to comment and thereby affect a permitting decision by MLRB.

### 4. Recommendations

The Roundtable recommends consideration of the following measures to mitigate impacts on wildlife:

- a. Wildlife and vegetation surveys
  - (1) preapplication review - preferably by the Division of Wildlife;
  - (2) operational monitoring.
- b. Haulage patterns designed for minimal wildlife and vegetative disruption both on and off site.

- c. Special fence designs and/or prohibitions should be considered where potential adverse effects on wildlife habitat and migratory patterns exist.
- d. The possibility of offsets should be considered. The goal here is to improve nearby habitat in off-site areas to compensate for habitat loss on-site.
- e. The County should recognize potential wildlife impacts and stipulate appropriate monitoring and enforcement activities.
- f. The County should examine wildlife ordinances in other counties to determine whether similar measures are appropriate for Jefferson County.
- g. Citizen, homeowner and mining operator surveys can be considered in monitoring wildlife impacts.
- h. State Division of Wildlife and other interested groups should be brought into discussions with applicants and homeowners early on in the decision-making process so that wildlife concerns can be effectively addressed in the development of an application.

## F. ARCHAEOLOGICAL, PALEONTOLOGICAL, AND HISTORIC RESOURCES

### 1. Goal

To preserve and protect unique archeological, paleontological, and historic resources from damage by aggregate mining activities.

### 2. Overview of the Topic

Unique archeological, paleontological, or historic resources should be evaluated and protected from disturbance by aggregate mining, when possible. It is important that everyone be sensitive to these situations, so that appropriate actions can be taken.

### 3. Existing Standards

There are existing State and County regulations regarding archeological, paleontological, and historic resources. Federal regulations which pertain to this topic include 43 U.S.C., 1983, Title 43, Public Lands: Interior, Part 422, Chapter 1-7. Also see Colorado-Historical Monuments CRS 24-80-501, 2.

#### a. Synopsis of Cultural Resource Survey Techniques

A Class I is synonymous to literature review in cultural resource management programs. As that name implies the primary activities during the preparation of a Class I are examination and evaluation of existing data, including published and unpublished information about the study area, to accomplish a number of specific goals. Those objectives of a Class I Overview usually include the following:

- (1) identify the number, locations, kinds, and context of cultural resources that may be encountered within the project area;
- (2) the site settlement patterning of cultural resources as previously recorded;

- (3) the variability of cultural resources within the project area;
- (4) the potential nature, quantity, and distribution of as yet undiscovered cultural resources within the study area;
- (5) the potential for cultural resources to be located by pedestrian survey and the level of intensity (either a Class II sample survey, or Class III, a 100 percent survey) at which such a survey should be conducted;
- (6) develop contexts for evaluation of any resources located by a Class II or Class III survey; and
- (7) develop a bibliography for the study area.

The Class I can be an end in itself, or it is included as the first step in a Class II or Class III survey program.

A Class II survey, typically used when large acreages are involved, is also referred to as a sample survey. Based on the data gathered in the Class I and other factors, such as topography, any results of previous surveys near the study area, and the amount and types of previous land disturbance, the entire study area is statistically divided into areas based on their potential for cultural resources. This can be as simple as a high, medium, low ranking or as complex as division into percentile rankings. After the study area has been divided into potential zones, intensive pedestrian surveys are conducted on the parcels considered most likely to contain cultural resources. Again, this type of survey is usually reserved for the larger study areas which contain a variety of land forms and that can be divided into meaningful zones of differing potential to contain cultural resources. Both the Class II and Class III surveys require development of some, albeit

frequently limited, research design before field work begins.

The Class III survey is a 100 percent pedestrian survey of a study area. This type of survey frequently is used in areas where heavy ground disturbance is contemplated in an effort to locate and evaluate all cultural resources prior to their destruction by the activity. Even in this type of effort some small parts of the study area may not be surveyed, such as very steep hillsides which traditionally do not contain cultural resources. Equally, factors such as heavy ground cover have an impact on the results and level of intensity of the survey. For example, in areas with very good ground visibility the distance between transects may be much greater than in areas with more difficult visibility. Also, cutbanks and animal burrows, if present, may be examined for indications of buried cultural material. In addition, a Class III survey may require test excavations for the purpose of evaluating the study area.

#### 4. Recommendations

- a. A pre-application survey of potential archeological, paleontological and historic sites should be conducted. This survey should include a review of records at the State Historic Preservation Office.
- b. If the survey indicates that a unique resource does exist on-site, adequate opportunity should be provided for salvage by archeological or historic preservation experts.

G. OPEN SPACE, TOURISM, RECREATIONAL RESOURCES,  
AND GEOLOGIC FORMATIONS

1. Goal

To minimize the impacts of aggregate mining on open space, tourism, recreational resources, and unique geologic formations.

2. Overview of the Topic

At times, aggregate mining activities have the potential for adverse impacts on open space, tourism, recreation or unique geologic formations. These potential impacts should be evaluated in the planning for an aggregate mining operation.

3. Existing Standards

No existing Federal or State standards address these areas. The Jefferson County Open Space Division issues policies regarding open space land.

4. Recommendations

- a. Jefferson County Open Space Program should be consulted if a proposal has the potential for impact on Jefferson County Open Space Lands, or other adjoining County or City Open Space Programs.
- b. Appropriate buffer zones from Open Space Lands should be provided for in mining plans.
- c. Line of sight impacts should be evaluated.
- d. Recreational and tourism implications of aggregate mining activities should be considered, and addressed by appropriate State agencies/offices.
- e. Berming and other screening techniques (see visual impacts recommendations) should be utilized to minimize adverse impacts on open space recreational and tourism resources.

## H. ON-SITE/OFF-SITE HEALTH AND SAFETY

### 1. Goal

To assure on and off-site health and safety of citizens and employees who may potentially be affected by aggregate mining operations in Jefferson County.

### 2. Overview of the Topic

In general, the concerns fall into the area of site safety, prevention or mitigation of geological hazards, impacts on adjacent community facilities, and minimizing general impacts on human health. This category also includes a variety of issues which are often characterized as off-site or secondary impacts of a mining operation.

### 3. Existing Standards

The following on-site standards currently exist primarily to regulate the health and safety of employees and visitors who come into contact with mining activities:

Health and safety standards for mining operations are administered by several agencies. On-site standards (within the property boundaries) are implemented and monitored by the Federal Mine Safety and Health Administration (MSHA). MSHA inspections are unannounced. If a concrete or asphalt batching plant is also on-site, the Federal Occupational Safety and Health Administration (OSHA) would have jurisdiction in addition to MSHA. Both MSHA and OSHA standards protect visitors and the employees on the site only.

The Roundtable believes that the current regulations and standards on health and safety are adequate. However, special additional regulations may be desirable for projects with potentially high impacts. These standards may be negotiated at the pre-hearing meetings and stipulated as part of the operator's



plan, or may be required by the County as a condition for the permit.

#### 4. Recommendations

##### a. Mitigation Measures

- (1) A requirement of fencing around site to prevent unauthorized entry. Ponds and steep slopes may also be fenced.
- (2) A requirement that operators should work with citizens, businesses, and local fire districts to develop fire plans and assure adequate fire protection.
- (3) A complete analysis by the County and State of potential geological hazards when appropriate prior to permitting an operation.
- (4) The MSHA and OSHA standards should be considered for application where appropriate to off-site areas potentially impacted by aggregate mining operations.

##### b. Monitoring Procedures

- (1) The applicant, County, and citizens should attempt to agree and coordinate the monitoring of the health and safety plan before final application. Adequate time should be allowed to make needed changes in the application. The establishment of clear standards will not eliminate, but will curtail confusion over future monitoring requirements and practices.
- (2) Traffic should be monitored for operator adherence to safety requirements at nearest businesses, residences, schools, school bus stops, etc.
- (3) Operators and citizens should monitor road quality and load loss. A specific telephone number should be designated by the operator, which citizens may call to notify the company of problems or complaints.
- (4) The County should conduct thorough monitoring during the initial start-up of new mining operations and

during significant changes in the existing operation.

- (5) The County should take multiple or significant patterns of complaints seriously. The County should have an ombudsperson assigned to take complaints.
- (6) If citizens are used as "community monitors", they should be adequately trained for the task.

5. Enforcement Measures

- a. The operator and County should publish a complaint telephone number where concerns about safety or health hazards can be registered.

## I. TRUCK TRAFFIC

### 1. Goal

To maintain the quality of life and safety in residential and commercial areas while allowing for the transportation of gravel products on County, State, and Federal highways.

### 2. Overview of the Topic

Truck traffic is a major concern to citizens, companies and the County. Truck noise, wear on roads, pedestrian and vehicle safety, and traffic volume are all important to citizen and industry alike. Damage to roads may result from the passage of heavy trucks. Some of the concerns of the Roundtable included:

- a. Can roads be retrofitted so that they have increased carrying capacity?
- b. How can the repair of damage to roads, due to use by heavy trucks, be paid for?
- c. What are county and state responsibilities for maintaining roads?
- d. What solutions have other jurisdictions found to paying for road damage?
- e. How can payment for road damage be assessed equitably from all road users?
- f. How can other users of heavy trucks be identified and assessed?
- g. How can cumulative impacts of truck traffic be assessed?

### 3. Existing Standards

Truck traffic safety standards are implemented and enforced through both Federal law and Colorado State statutes. The U.S. Department of Transportation (DOT) has set safety standards for trucks, that apply to Federal highways. DOT standards have been adopted by the State of Colorado and have been incorporated into state statutes. The State Highway Patrol and local law enforcement are responsible for ensuring that these safety standards are met.

Truck weight monitoring and vehicle inspections are conducted by the Colorado Department of Revenue and the Colorado State Patrol.

#### 4. Recommendations

In answer to the above issues and problems, the Roundtable recommends the following options:

#### 5. Road Damage and Maintenance

- a. Weight of trucks can be limited on roads that do not meet state standards for carrying capacity. The County currently does not have weight standards, except on bridges.
- b. Truck traffic can be limited during seasons when heavy vehicle use and water saturation make damage to roads more likely. (There is a precedent for this in Iowa and Wyoming.)
- c. Existing County standards should be enforced.
- d. Intersections should be sanded where truck traffic enters public roads.
- e. The Roundtable believes that the County should assure that roads are adequate in size and specifications to carry heavy loads.
- f. Permit applicants should be required to provide road improvements, where needed, as a condition of operation. Improvements might include widening the road, entry lanes, acceleration/deceleration lanes, passing lanes, runaway truck ramps, or special stop or crossing areas (as with railroads, at high risk locations.)
- g. The integrity of the road-bed on main haul routes should be maintained. Deterioration of the road as a result of increased aggregate truck traffic should not be allowed to occur.
- h. In those cases where road improvements are required as a condition of operation and those costs are borne by the

applicant, the County should consider reimbursing the operator if other heavy traffic operations are permitted to operate on the same roads.

6. Routing

- a. Whenever possible, routing of truck traffic should avoid residential areas, commercial areas, schools, hospitals or other highly congested areas.
- b. Timing of truck traffic should be used to prevent congestion. Timing variations should be considered during hours when citizens are going to or coming from work, and during school bus schedules.
- c. Alternative routes should be identified so that the best one can be selected at the time of permitting the operation. Alternative routes should also be identified to provide options to haulers when and if normal routes are highly congested.
- d. Routing should take into consideration the distance of the mine from the end destination of the rock product. Haulers should not have to travel an unduly circuitous route that makes their product more expensive and causes the operator to be less competitive.

7. Loss of Loads

- a. Loss of loads from trucks during transit can create problems for motorists. Loss of load includes airborne particulates, dust and sand, and heavier rocks bouncing off of trucks.
- b. Tarps may be required or loads wetted where loss of load is a potential due to wind or truck speed.
- c. The State should be encouraged to enforce existing laws regarding loss of load. Loss of load due to aggregate bouncing off of trucks can be handled by requiring truck operators to:
  - (1) Clean the lips of the truck bed.
  - (2) Require tight tailgates.

- (3) Assure that rip-rap loading is conducted in a fashion which minimizes loss of load.
- (4) Strictly monitor the loading of trucks so as to allow only the legal amount in each load.
- (5) Provide or utilize "truck-baths" to wash off loose mud and dirt prior to entry on public highways.
- (6) Clean up any load lost on public rights-of-way.
- (7) Provide training for truck drivers on means to prevent the loss of loads.
- (8) Require all trucks to use mud flaps.
- (9) Provide a telephone number for citizens to report loss of load or receive complaints.

8. Limiting Truck Noise

- a. Prohibit the use of jake brakes on site except in emergencies.
- b. Prohibit banging tailgates on site.
- c. Grade roads on site below surface level or construct berms to act as noise barriers.
- d. Regulate the speed of trucks to minimize operational noise.
- e. Regulate the use and volume of back-up beepers on trucks and loaders. Consider utilizing light-based warning signals if legal.

9. Quantity of Traffic

- a. Utilize larger trucks where feasible, to lower the volume of traffic.
- b. Implement programs to teach "driver consideration."

10. Alternative Transportation Methods

- a. Consider rail transportation.
- b. Consider conveyor belt transportation.

## J. RECLAMATION

### 1. Goal

To prevent erosion, water pollution, and other adverse environmental effects resulting from aggregate mining and to reclaim mined lands to beneficial use after mining is completed.

### 2. Overview of the Topic

The reclamation of an aggregate mining site should address two important aspects of the mining operation: concurrent mining and reclamation and final reclamation. It is critical that an aggregate mining operation be designed from the outset to facilitate both types of reclamation activities. Appropriate and carefully designed reclamation can play an important role in addressing concerns regarding the environmental and visual aspects of aggregate mining.

### 3. Existing Standards

The State Mined Land Reclamation Board (MLRB) sets standards for mined land reclamation. Currently, Rule 6 sets reclamation standards. The agency's concern is reclamation during and after mining. The Mineral Extraction Policy Plan of Jefferson County, specifically Goals and Policies. Numbers One and Fourteen, detail the current County reclamation objectives.

### 4. Recommendations

The following recommendations regarding reclamation should be considered. The Roundtable wishes to emphasize that some of these recommendations are new and some are already incorporated in MLRB regulations and in the County Mineral Extraction Plan (MEPP) as noted.

- a. Reclamation plans are very important to citizens and should be a prominent part of applicant presentations to citizens.

- b. Mining and reclamation plans should be interrelated, and approval of the former should be contingent upon a satisfactory plan for the latter (MLRB).
- c. While MLRB requires formal action be taken, it is recommended that when changes in a reclamation plan are contemplated, the applicant communicates with the community and the County to discuss these plans and respond to citizen concerns.
- d. Phased mining and reclamation should be considered. This procedure limits the number of mined acres that are visible at any given time (MLRB).
- e. Reclamation plans should consider the stability of the reclaimed area, both in terms of the stability of the rock mass and surface stability. Surface stability can be enhanced through appropriate revegetation (MLRB).
- f. Test plots should be used to demonstrate feasibility of new reclamation techniques, such as experimental seed mixes prior to application of this technology to large, highly visible areas. A small test site should be used for experimentation prior to undertaking large reclamation projects with untested products. Back-up plans should be available if new techniques do not work.
- g. Reclamation of abandoned mine sites should be encouraged through incentives offered to current applicants.
- h. The location and design of the excavated portion of the mine site should be sensitive to existing and surrounding topographic form.
- i. The area of disturbance due to the mining activity should be kept to the minimum (MLRB).
- j. Reclamation objectives should be closely coordinated with visual mitigation recommendations.



## K. BLASTING

### 1. Goal

The use of explosives in the mining process is of great concern to the public. This section is written in order to provide an introduction to various blasting concepts and to minimize any adverse impacts due to blasting.

### 2. Overview of the Topic

When an explosive is detonated in the ground to break rock, an enormous amount of energy is released. The vast majority of this energy is used to do the work for which it was intended. The remaining energy goes out as vibration through or along the surface of the earth, and through the air.

Of the vibration that is earthbound, much of it comes to the surface within a few feet of the detonation and travels along the surface in the form of waves. Therefore, for all practical purposes it is only necessary to deal with the surface waves, disregarding the body waves that travel down into the earth, as they do not affect surface features and structures.

Surface waves go out along the ground after a detonation like waves travelling across the surface of a pond after a stone is dropped into the water. One difference is that the water ripples are large enough to be seen, while the ground ripples are so small they cannot be discerned by sight. A large ground wave would only measure 0.03 of an inch. Also, the length of the ground wave, crest to crest, is measured in 10's or 100's of feet, while the length of the water ripples is measured in inches.

Vibration is motion that repeats itself and is measured in displacement (A), frequency (f), velocity (V), and acceleration (a). A simple example of the repetitious motion of vibration is a weight on a spring which is free to move only up and down

(single degree of freedom system). When the weight is pulled down from its point of rest and released, it will oscillate up and down. Frequency is the number of complete up and down oscillations per second called cycles per second (Hz). Displacement is the distance either up or down from the point of rest measured in inches. The maximum displacement is called amplitude.

Particle velocity represents the speed at which the weight is moving up and down and is measured in inches per second. This speed is always changing. Another characteristic of vibration is acceleration. This is the rate of change of velocity and is measured in  $g(32 \text{ ft/sec}^2)$ . The maximum acceleration is at the top and bottom positions of the weight where it changes directions.

### 3. Existing Standards

The United States Bureau of Mines and others have conducted extensive research on blasting in order to evaluate its effects and also to determine reliable standards and predictive methods. As a result of this research, particle velocity, as a product of displacement and frequency ( $V = 2 Af$ ), is now generally accepted as a reliable criteria for impact assessment. The Bureau of Mines recommends that 2.0 inches per second peak particle velocity be used as a conservative limit to prevent damage from blasting. Jefferson County has adopted 0.5 inch per second peak particle velocity as its standard.

The following table summarizes the results of particle velocity research (DuVall, 1962) and indicates the conservative nature of the 0.5 and 2.0 inches per second limits.

<u>Velocity</u>	<u>Probable Degree of Damage</u>
2.0 inches per second	Widely recommended limit for blasting vibrations at or near buildings.
2.8-3.3 inches per second	Lower limits for the occurrences of damage as found by certain investigators.
5.4 inches per second	Less than a 50/50 probability of minor damage (fine plaster cracks, opening of old cracks).
7.6 inches per second	50/50 probability of major damage (falling of plaster, serious cracking).

When a blast is detonated, certain energy will escape into the atmosphere causing a disturbance in the air. Portions of this disturbance can be heard (noise) and portions of it are subaudible (air concussion). In this section the term air concussion includes all air effects from blasting.

The effects of air concussion are most noticeable in a structure, particularly in the winter when windows and doors are closed. The air concussion creates a difference of air pressures outside and inside the structure causing it to vibrate. This can cause windows and doors to rattle without causing structural damage.

U.S. Bureau of Mines Report of Investigation 8485 (Siskind, Stachura, et al, 1980) reported on studies of air blast from surface mines to determine damage and annoyance potential. Recommendations were made according to instrumentation used to measure the air blast. The recommendations were as follows:

<u>Low Frequency</u>	<u>Recommended Limit</u>
0.1 Hz	134 dB Peak
2.0 Hz	133 dB Peak
6.0 Hz	129 dB Peak
C-Slow	105 dB RMS

The Federal Office of Surface Mining (OSM) has modified the above as follows (Federal Register, 1979):

<u>Low Frequency</u>	<u>Limit</u>
0.1 Hz	135 dB Peak
2.0 Hz	132 dB Peak
6.0 Hz	130 dB Peak
C-Slow	109 dB RMS

When rock is broken by explosives, some energy is transmitted into adjoining material as seismic energy or ground vibration. Milli-second delay detonators, when used with the correct blast design to ensure adequate relief for the blasted rock, can be used effectively to minimize the transmitted ground vibration and to ensure that damage will not occur to adjacent structures. U.S. Bureau of Mines research has shown that transmitted ground vibrations can be effectively controlled by limiting the explosive charge weight fired in any delay period.

#### 4. Recommendations

- a. Blasting should take place during a regularly specified period of time.
- b. A seismograph should be used on every production blast.
- c. Operators should develop standard blasting procedures to be used for all blasting operations.
- d. All blasting operations should be performed by persons familiar with federal, state, and local safety

- regulations, who have the necessary licenses, and are experienced in controlled quarry blasting operations.
- e. Seismic Data: A report on the seismic monitoring of the operation should include the following: amount of explosives, number of delays, location, time of blast, climatic conditions and monitoring information. Seismic data will be available to County staff for any specific event at any time.
  - f. The operator should fill out a blasting report at the time of the blast, diagramming the shot and timing plan. Show decking, caps used, sequential timing method. Also, indicate if a misfire occurred and if complaints were received, their nature and what action, if any, was taken.
  - g. Blasting during adverse weather conditions should be avoided where such conditions could magnify the effects of a blast.
  - h. If requested by an adjacent property owner, the operator should conduct an inspection of adjacent structures prior to beginning any blasting operation.

## L. ECONOMIC CONSIDERATIONS

### 1. Goals

To obtain an accurate appraisal of the indirect and direct socio-economic benefits and costs of mining operations in the County to inform policy makers.

To identify funding sources to cover County costs of additional permitting, monitoring, and enforcement functions.

### 2. Economic Considerations

Economic considerations fall into two categories: 1) benefits or costs, either public or private, that result from initiating or refraining from mining activities in the County, and 2) costs incurred in administering the program recommended by the Roundtable. Category One is composed of extremely complex issues, and the Roundtable did not attempt to address it in any detail. The Roundtable does have some specific suggestions related to Category Two.

### 3. Recommendations

The Roundtable recommends the following measures to respond to the economic consequences of aggregate mining activities:

#### a. Study on the Economic Costs of Mining

In the process of attempting to look at some of the costs and benefits of mining as a land use, the Roundtable has come to the conclusion that the issue is beyond its means to address in any meaningful or objective manner. The information that is available is limited in scope to such areas as haul costs or road impacts. Little information is available on impacts of mining on private property values or less tangible issues such as quality of life.

Not only does the County need to know the cost and benefits of aggregate development, but how to pay the development costs, i.e. taxes, new roads, and so

forth. The cost/benefit component is essential to any meaningful effort to attempt to shape public policy regarding aggregate mining in the Metro Denver area.

The County, in cooperation with the private sector or other governmental entities, should commission a study to examine the direct and indirect economic costs and benefits of aggregate mining. Direct costs and benefits are those that are related to the price of the product. Indirect costs and benefits include environmental and social costs that are often more difficult to quantify.

The proposed study should consider the needs and impacts on four population groups: a) the citizens and community, b) the producers, c) the consumers, and d) the government.

The study might also examine or consider the effects of other developments, such as airports, landfills, racetracks, on property values as a way of assessing possible impacts of aggregate mining on adjacent property values.

The study should be conducted on a regional basis, i.e. the City and County of Denver, and Adams, Arapahoe, Boulder, Douglas, Jefferson, Weld and Clear Creek Counties. The study should address the following potential costs and benefits including, but not limited to:

(1) Costs

- (a) Cost of aggregate resources to County if it has to haul resources from farther away;
- (b) Road wear and improvements on County roads;
- (c) Impact on traffic;

- (d) Bridge repair/replacement;
- (e) Assigning and posting weight limits on county roads;
- (f) Additional expenses for law enforcement or monitoring;
- (g) Loss of jobs, potential impact on tourism, tax revenues and economic benefits if mining is or is not initiated;
- (h) Potential and/or actual losses or decline of property values due to mining operations;
- (i) Costs to consumers if aggregate must be hauled from farther away;
- (j) Costs to consumers if local mines are not developed;
- (k) Decline in quality of environment and quality of life.

2. Benefits

- (a) New jobs;
- (b) Secondary jobs;
- (c) Improved or better roads;
- (d) Lower construction costs;
- (e) Larger tax base;
- (f) Positive end-use of site;
- (g) Reclamation of old sites that are eyesores;
- (h) Possibility of public-private ventures for community good;
- (i) Tax write-off for industry involved in reclamation projects;
- (j) Demonstration of good neighbor policy;
- (k) Possibility of lower tax rates on private properties if they depreciate in value due to mining.



#### 4. Sources of Funding Roundtable Procedural Recommendations

The Roundtable has recommended that the County adopt new procedures for application, permitting, monitoring and enforcing regulations regarding aggregate mining in the County. The Roundtable has also recommended that the County hire an ombudsperson to oversee the new procedure and that the County Planning Department write, produce, and distribute a handbook which describes the new process. All of the above programs or personnel will require some funding. Listed below are a variety of options by which the County could raise monies to cover these additional expenses:

- a. A severance tax on aggregate extracted in the county.
- b. A grant from a private foundation.
- c. A cooperative funding initiative by several counties which could jointly share the services of an inter-county ombudsperson.
- d. A special mining application fee to cover advertising, posting, pre-application meetings, and so forth.
- e. An hourly charge system paid by an applicant to the County which would be used to cover the costs of processing valid complaints.
- f. Direct charges by the County to the applicant for case review time:
  - (1) A fee system, to be paid by the applicant to the County, that is based upon the amount of impacts that the County must mitigate. The more impacts the company mitigates on its own, the lower the social impact fee paid to the County.
  - (2) A fee system based upon acreage of the operation and the magnitude of impacts.

## VII. References

- "Clearing the Air: Reforming the Clean Air Act", Lester B. Lave and Gilbert S. Omenn, Brookings Institute, Washington, D.C., 1981
- "Jefferson County General Land Use Plan", Jefferson County Planning Department, 1986
- "Mineral Extraction Policy Plan", Jefferson County, 1977
- "Sand and Gravel Resources: Protection, Regulation and Reclamation", Joel T. Werth, American Planning Association, 1980
- "Supply/Demand Analysis of Aggregates in the Denver Metro Area", Khalil Nasser, Jefferson County Planning Department, 1987

VIII. APPENDICES

APPENDIX 1 .....Page 67  
The Ombudsperson

APPENDIX 2 .....Page 71  
Visual Impact Concerns

APPENDIX 3 .....Page 72  
Air Quality Concerns  
Table 1 - Chronology of Federal Legislation to  
Control Air Pollution  
Table 2 - National Ambient Air Quality Standards

APPENDIX 4 .....Page 73  
Noise Concerns  
Noise Abatement Act

APPENDIX 5 .....Page 75  
Water Concerns

APPENDIX 6 .....Page 76  
Wildlife Concerns

APPENDIX 7 .....Page 77  
On-Site/Off-Site Health and Safety Concerns

APPENDIX 8 .....Page 78  
Truck Traffic Concerns

APPENDIX 9 .....Page 79  
Reclamation Concerns

APPENDIX 10 .....Page 81  
Economic Impact Concerns

APPENDIX 11 .....Page 82  
Applicable Regulatory Authority

APPENDIX 12 .....Page 83  
Sample Criteria

## APPENDIX 1

### The Ombudsperson

The Aggregate Resources Roundtable recommends that the position of ombudsperson be established at Jefferson County. The role and responsibilities of this position are summarized below.

#### POSITION

The County should designate one person as ombudsperson whose primary responsibilities are to coordinate and oversee the public involvement pre-application process, to monitor mining operations for compliance with the conditions placed upon the activity and to enforce compliance when necessary.

#### RESPONSIBILITIES

##### General:

The ombudsperson should:

Be familiar with the requirements and conditions placed upon mining operations in Jefferson County.

Establish liaison with other regulatory agencies.

Maintain a list of the regulatory agencies and maintain files of the current regulations and laws that pertain to mining operations.

Prepare a chart showing the agencies, their responsibilities, telephone numbers and names of contact people, and the name and telephone number of the ombudsperson that can be distributed to interested people.

Develop and conduct an educational program to explain the new procedures that will be used to review mining applications.

Receive, review and distribute monitoring data to appropriate citizens and agencies.

Identify and prepare a list of qualified technical experts from which the citizens, applicants, and Planning Commission can select a panel of experts to review technical mining issues.

Establish and oversee a subscription mailing procedure for individuals and groups who are willing to pay to receive copies of the Planning Commission and Board of County Commissioners agendas listing mining application hearings.

Prepare signs that are color coded for the specific types of meetings, i.e. informal meetings in one color and public hearings in different colors.

## PREHEARING INFORMAL MEETING PROCESS

The ombudsperson should coordinate the pre-application process from the time that an intent to file an application is received through the Board of County Commissioner's Public Hearing. Specific duties of the ombudsperson should include but not be limited to the following:

Inform the applicant and citizens of the process to be followed.

Identify and notify adjacent property owners, citizens, organizations and more distant property owners who might be adversely affected.

Advance notification should be given to the ombudsperson 90 days prior to the submission of a formal mining application to allow adequate time for the informal meetings between the applicant, citizens, County agencies, and Planning staff. This length of time can vary when citizen concerns are minimal and may be extended by agreement of the applicant and citizens when the complexity of the issues appear to require more time.

Arrange informal meetings between the citizens, applicant, County agencies, and Planning Staff to identify the issues that the citizens consider germane to the site and the proposed mining activity.

Facilitate the informal meetings to ensure that open communication occurs and that a productive working relationship is established.

Coordinate the preparation of agendas developed by the applicant, citizens and County staff.

Oversee the posting of signs on the property 15 days prior to the first informal meeting and at least 30 days prior to the first Planning Commission hearing. Location of the signs should be determined through consultation with the planning staff and public representatives.

Advise the applicant on the preparation of a conceptual/sketch plan for the informal meetings.

## HEARING PROCESS

At the end of the informal meeting process, the ombudsperson should coordinate the review of the formal application through Planning Commission and Board of County Commissioner Public Hearings. These responsibilities should include but not be limited to the following:

Document the resolved and unresolved issues from the informal negotiation meetings and present them to the Planning Commission and the Board of County Commissioners.

Prepare legal notices and plain English advertisements to be published in appropriate newspapers in accord with the Aggregate Resources Report recommendations.

Prepare and mail to appropriate citizens and referral agencies an executive summary of the mining proposal within two weeks after the formal zoning application is filed.

Arrange workshops and field trips for the Planning Commission when appropriate.

Arrange and facilitate interactive meetings of the applicant, citizens, County staff, and Planning Commission when appropriate.

Coordinate the technical review process, document the findings and distribute them to the Planning Commission, Board of County Commissioners, applicant, citizens, appropriate agencies and County staff.

#### MONITORING AND ENFORCEMENT

A major concern of citizens is adequate monitoring and enforcement after a mining operation is allowed. The ombudsperson's responsibilities in these two areas should include but not be limited to the following:

Inform citizens, applicants, and operators of the monitoring and enforcement procedures that will be instituted in Jefferson County.

Coordinate citizen involvement in the monitoring and enforcement process, i.e. establish and oversee the activities of a citizen oversight group.

Attend neighborhood meetings in areas adjacent to mining operations periodically to establish a good relationship with citizens and to hear their concerns related to the mining activity.

Be a clearinghouse for citizen and mining operator complaints and respond quickly.

Facilitate the resolution of problems by working with citizens and operators.

Document the complaints received and their solutions.

Establish a Registry of Violations where a history of violations are documented so that patterns of violations can be more easily identified and provide an early warning that more intense

monitoring and enforcement may be required to control abuses of certain mining operations.

Maintain a current list of contact people for mining operations and community organizations to facilitate communication and the quick resolution of problems and communication.

Monitor mining operations regularly and not just in response to complaints.

Establish working relationships with other regulatory agencies to share with them information about noncompliance with their regulations and laws to ensure that appropriate enforcement occurs.

Prior to performance or site plan review hearings, meet with citizens and appropriate agencies to explain the hearing process, to alert the organization of the hearing date, and to identify any problems with the mining operation.

Initiate modification to conditions placed on the mining operation and initiate suspension of operation when problems cannot be solved quickly or the pattern of violations warrants such action.

#### FUNDING

Explore sharing the cost of the ombudsperson with other units of government.

## APPENDIX 2

### Visual Impact Concerns

- A. What visual criteria should be used to assess impact?
- B. What is an acceptable distance for impact?
- C. What visual impact will the mining operation have on the view of the front range?
- D. How many acres of mined land will be exposed to view, and what will be the visual impact?
- E. Does the operation visually impact open space or recreation areas?
- F. What current standards exist regarding visual impact?
- G. Are different standards needed for various types of locations -- mountains, recreation areas, plains, cities, etc.?
- H. What possible mitigation measures exist?
- I. What monitoring procedures are available?
- J. What do reclamation procedures cost?
- K. What is a realistic time frame for reclamation activities, and how long will there be a visual impact as a result of mining activities?



## APPENDIX 3

### Air Quality Concerns

Concerns raised about potential impacts on air quality due to aggregate mining include:

- A. What are potential effects on air from truck transportation (nitrus oxide/CO)?
- B. What are potential effects on air from blasting, hauling, crushing?
- C. What is the average amount of dust generated per ton of rock extracted in all phases of mining operations?
- D. Are there cumulative impacts of mining operations on air?
- E. What are health impacts of air pollutants resulting from aggregate mining?
- F. What standards - State - County - presently exist for airborne particulate matter?
- G. Should air quality standards be specific to different geographic locations and types of terrain, i.e. mountains, rural, city?
- H. What mitigation measures are available to limit air pollution?
- I. What monitoring/enforcement procedures are available? Are they adequate? What costs are involved?
- J. How can timely responses to air quality problems be assured?

## APPENDIX 4

### Noise Concerns

- A. How do we quantify noise?
- B. Measuring noise - what methods are available to measure ambient level, decibel level, potential for increase, relationship between noise and frequency, deflection and travel of noise, vibration effects?
- C. Timing of noise - when and what is acceptable? Duration effects?
- D. How will varying types of noise in mining (that produced by crushers, washers, conveyors, railroad connections, blasting, traffic, trucks, etc.) impact surrounding property owners?
- E. What are the effects of blasting as a noise vibration?
- F. Can environmental quality/compatibility of noise be maintained if a mining operation is permitted?
- G. What are health impacts of exposure to noise?
- H. What impacts to noise are created from varying types of geography - plains, mountains, cities?
- I. What impacts does weather have on noise?
- J. What are present standards, state and county, regarding noise?
- K. Should there be differing standards for various types of locations - mountains, plains, cities, rural, etc.?
- L. What monitoring procedures are available?
- M. What mitigation measures are available?
- N. Are there areas in the county where "quiet" is a resource to be preserved?

State of Colorado  
Noise Abatement Act  
Article 12, Title 25

<u>Zone</u>	<u>7:00 a.m. to next 7:00 p.m.</u>	<u>7:00 p.m. to next 7:00 a.m.</u>
Residential	55 db(A))	50 db(A))
Commercial	60 db(A))	55 db(A))
Light Industrial	70 db(A))	65 db(A))
Industrial	80 db(A))	75 db(A))

## APPENDIX 5

### Water Concerns

- A. Impacts of mining on water table, wells, aquifer in different types of terrain - i.e. mountain, plains, type of soil, etc.
- B. Effects of mining on major/minor streams, irrigation systems, including pollution and quantity.
- C. Present and future impact on erosion, flood plains, drainage systems.
- D. Consumptive use of water due to evaporation of water in pits or quarries.
- E. Pollution impacts on surface and subsurface water.
- F. Impact on water availability and pollution due to washing operations.
- G. Availability of water for:
  - 1. reclamation;
  - 2. fire control;
  - 3. operation of mine.
- H. Uses of water in transportation of gravel.
- I. State standards for water usage.
- J. Different geographic standards regarding the usage of water.
- K. Mitigation measures that should be considered.
- L. Monitoring procedures available - adequacy.
- M. Reclamation possibilities - costs - timetable.

APPENDIX 6

Wildlife Concerns

- A. Loss of habitat.
- B. Interruption of migration patterns.
- C. Affects on reproductive activities.
- D. Endangered species.

APPENDIX 7

On-Site/Off-Site Health and Safety Concerns

- A. What on-site safety measures are needed to assure citizen and worker health and safety? Considerations include:
1. Fencing;
  2. Animal safety/wildlife;
  3. Fire/fireplans;
  4. Prevention of trespassers (children and others);
  5. Storage of fuel/dynamite;
  6. Protection of citizens from dangers associated with ponds, graded slopes, etc.
- B. What can be done to prevent the exacerbation of geological hazards: rock slides, mud slides, etc.?
- C. Safety aspects regarding proximity to other facilities: hospitals, nursing homes, etc.
- D. Health aspects regarding noise, air, water (see these reports).

## APPENDIX 8

### Truck Traffic Concerns

- A. What types and rates of road deterioration result from truck traffic?
- B. What noise standards exist for truck traffic?
- C. What other forms of transportation exist to move aggregate?
- D. Can the hours of truck operation be regulated to lessen noise impacts of truck traffic?
- E. Can the number of trucks be varied at different times to avoid traffic congestion?
- F. What emission or pollution impacts will result from increased truck traffic?
- G. What routing alternatives exist for truck traffic?
- H. What impacts does the increase of haul trucks have on the location and operation of collateral industries (asphalt plants, welding operations, repair shops, etc.)?
- I. What safety requirements exist regarding the transportation of accessory materials for running operations (water, dynamite, etc.)?
- J. What methods can be used, or are required, to maintain haul and connecting roads to sites in all seasons?
- K. What technologies are available to control dust and particulates resulting from truck traffic?
- L. What are the risks of having truck fuel and dynamite on sites?
- M. What monitoring mechanisms for truck traffic impacts are available?
- N. What can be done to mitigate impacts of truck traffic?
- O. What future impacts on recreation, tourism, and the quality of community life will result from truck traffic?

## APPENDIX 9

### Reclamation Concerns

- A. Present Regulations
  - 1. Do they apply to the proposed resource extraction operation?
  - 2. What are the permits needed? Where do they come from? How is the public involved in decision-making?
  - 3. What are the contents of the permits?
  - 4. What are the penalties for non-compliance?
  
- B. Ensuring Environmental Quality Protection Through Monitoring
  - 1. What techniques will be used?
  - 2. What equipment is available?
  - 3. What is the frequency of monitoring?
  - 4. What procedures are available for operations review once mining has commenced?
  - 5. What methods of communication will be used to communicate with the public and operators regarding monitoring and enforcement?
  
- C. Responsibility for Monitoring and Enforcement
  - 1. Owner/operator on a self-reporting system, a consultant to the County or County personnel?
  - 2. Local body of government - city, county, region, or special district?
  - 3. Are there adequate people, monies available for accurate monitoring and enforcement?
  - 4. What timetable will be used regarding different types of enforcement?
  - 5. Monitoring and enforcement measures.
  
- D. Timing, After Non-compliance With Standard or Permit, for County Action
  - 1. When are corrective procedures and measures initiated or prescribed?
  - 2. What penalties are to be assessed?
  - 3. What possibilities exist for extended litigation?
  - 4. What procedures are available to speed up monitoring and enforcement?
  
- E. Government's Capability to Ensure Compliance
  - 1. Is government capable, having the will and resources, to assure compliance?



- F. Assurance Measures, Including Fees, to Guarantee Monitoring
  - 1. What assurance mechanisms are available? Bonding?  
Special fees?
- G. Payment for Consequences Resulting from Non-compliance
  - 1. Company? County?
- H. Reclamation Processes and Results
  - 1. What role for monitoring and enforcement?

APPENDIX 10

Economic Impact Concerns

- A. Possible effects on property values -- studies on values and proximity to mines, etc.
- B. Who will receive increase in tax base?
- C. Will public costs rise? How much? Under what conditions? How much have they risen already?
  - 1. Fire/police protection;
  - 2. Road maintenance;
  - 3. Emergency response equipment and facilities.
- D. How much does it cost the county to have a mining facility of its own? Private facilities?
- E. What is the average return from taxes on a mining site -- specific types of taxes, mineral, property, etc.?
- F. What tax income is presently generated from existing structures, land, residences?
- G. What are the economic and impacts on mining if Jefferson County:
  - 1. Population doubles or there is a major decline in population;
  - 2. Economic slump/boom;
  - 3. New transportation patterns develop;
  - 4. Rapid transit is installed;
  - 5. Recreational?
- H. What means are available to pay for monitoring and enforcement?

APPENDIX 11

<u>SUBJECT</u>	<u>LEGISLATION</u>	<u>RESPONSIBLE AGENCY</u>
Air	Clean Air Act 1963, <u>et seq.</u> (Federal) Air Quality Act 1967 (Federal) Colorado Air Quality Control Act (State) CRS 25-7-101 <u>et seq.</u>	Air Quality Control Commission Colorado Department of Health
Water	Clean Drinking Water Act (Federal) Colorado Water Quality Control Act (State) CRS 25-8-101 <u>et seq.</u>	Water Quality Control Commission Colorado Department of Health
Noise	Colorado Noise Abatement Act (State) CRS 12-34-32-101 <u>et seq.</u>	District court of judicial infraction occurs/Local Government
Reclamation	Colorado Mined Land Reclamation Act (State) CRS 34-32-101 <u>et seq.</u>	Mined Land Reclamation Board Mined Land Reclamation Division
Wildlife	Endangered Species Act 1973 (Federal) Migratory Bird Treaty Act of 1918 (Federal) Bald Eagle Protection Act of 1972	U.S. Forest Service Colorado Division of Wildlife (depending on situation)
Archaeology	Public Lands: Interior, Chapter 1, Part 422.1-7 Colorado-Historical, Prehistoric & Archaeological Resources CRS 24-80-401 <u>et seq.</u> Colorado-Historical Monuments CRS 24-80-501,2	Federal Dept. of Interior State Historical Society State Archaeologist
Zoning	County Planning and Building Codes CRS 30-28-101 <u>et seq.</u>	County commissioners or local governmental authority
Health & Safety	Mine Safety and Health Act 1977 (Federal)	Federal Mine Safety & Health Federal Occupational Health
Blasting	Local regulations	Local governmental agency

APPENDIX 12

The following format and chart may be used as a guide in deciding whether a sand, gravel, or rock deposit warrants protection.

APPENDIX 12

TABLE 2 CRITERIA FOR DECIDING WHETHER A SAND, GRAVEL OR ROCK DEPOSIT WARRANTS PROTECTION

	Write It Off	Consider for Protection	Protection Desirable	Protection Highly Desirable (1000' × 2,000 × 20')	Protection Critical
Economic Value	Small or low-grade deposit.	Small deposits (less than 2,000 tons) located near use area or near processing plant.	Medium-sized deposit (5 million tons). Deposit made economical to mine by upgrading material. Large, low-grade deposit that might be economical to mine in the future.	Large deposit (7.5 million tons). Can be mined economically in near future by upgrading the material.	Very large deposit (10 million tons) of concrete quality sand.
Access	Only practical route to site is through a residential area. More than 15 miles from use area. No noise buffering can be provided between existing access road and adjacent uses.	Longer alternate access route can be built.	Within 10 miles of use area; alternate access route available.	Large deposit, presently beyond economical hauling distance to present use areas. Near highways; access can be provided.	Within 5 miles of use area, adjacent to highway with access for trucks; adequate noise buffering for access road.
Compatibility with Surroundings	Adjacent land use presently incompatible with mining (appreciable residential development within range of excessive noise, dust, blasting vibrations, etc.)	Scattered development within outer range of impacts of mining; owners may not object to mining.	Adjacent land suitable for development and within commuting distance of use area.	Imminent incompatible development on adjacent land.	No incompatible land uses existing or likely in the foreseeable future (adjacent land in national forest, operator's ownership, agricultural land-use category, or with very steep topography, etc.).
Impact of Noise	Noise level in adjacent presently developed areas would clearly exceed standards if mining occurred.		Noise level in adjacent undeveloped areas would exceed standards for likely use, but use of these areas can be easily delayed or economical mitigation can be provided by barriers.		Noise at adjacent residential area less than 50 dB(A) due to distance or topographical barrier; berm can be constructed easily.
Impact of Blasting	Too close to existing subdivision.				Blasting not required; permanent open space between quarry and other uses; topographic barrier between quarry and other land uses; only occasional light blasting; blasting compatible with adjacent uses.

TABLE 2. CONTINUED

	Write It Off	Consider for Protection	Protection Desirable	Protection Highly Desirable (1000' × 2,000 × 20')	Protection Critical
Impact of Truck Traffic	Only access is local road through residential area.	Slightly longer alternate route exists.	Alternate truck route can be built at reasonable expense; alternate transportation (conveyor or slurry pipeline) can be used past residential streets.		Adjacent to free-way with access to site.
Visual Impact	Mining would destroy or create.	Mining activity cannot be screened and would permanently alter landscape.	Some activity visible from residential areas, but no permanent deterioration of landscape.	Mining activity can be easily screened by berms and/or vegetation.	Activity screened by topography or vegetation, or appreciably reduced by distance.
Biological Impact	Major stand of oaks; rare and endangered plants or animals on site.	Site includes prime wildlife habitat that would be permanently removed by mining.		Minor or temporary loss of wildlife habitat.	No significant biological resources; rehabilitation of site would replace or create riparian wildlife habitat.
Impact of Flooding	Mining would cause erosion of adjacent property; could be prevented only at great expense.		Mining would create erosion hazard for roads, bridges, and utility lines; however, these structures could be strengthened at reasonable costs.		Mining would create flood control channel and would not damage adjacent land.

Note: This Table is presented as a sample only and does not represent a recommendation of the Roundtable.

For more information about Appendix, the reader is referred to: American Planning Association, Report No. 347 Planning Advisory Service "Sand and Gravel Resources: Protection, Regulation and Reclamation" by Joel T. Werth, January, 1980



