

ANNOTATED MINUTES

Tuesday, November 26, 1996 - 9:30 AM
Multnomah County Courthouse, Room 602
1021 SW Fourth, Portland

REGULAR MEETING

Chair Beverly Stein convened the meeting at 9:33 a.m., with Commissioners Sharron Kelley, Gary Hansen and Tanya Collier present, and Vice-Chair Dan Saltzman arriving at 9:35 a.m.

CONSENT CALENDAR

UPON MOTION OF COMMISSIONER KELLEY, SECONDED BY COMMISSIONER HANSEN, THE CONSENT CALENDAR (ITEMS C-1 THROUGH C-14) WAS APPROVED, WITH COMMISSIONERS KELLEY, HANSEN, COLLIER AND STEIN VOTING AYE.

NON-DEPARTMENTAL

- C-1 Appointment of Ramsey Weit as City of Portland Representative to the AFFORDABLE HOUSING REVIEW COMMITTEE
- C-2 Appointments of Christa Meyer and Terri Thorson to the DUII COMMUNITY ADVISORY BOARD
- C-3 Appointment of Marie Sowers to the PORTLAND MULTNOMAH COMMISSION ON AGING
- C-4 Appointment of Stephanie Parish-Taylor to the PRIVATE INDUSTRY COUNCIL

DEPARTMENT OF HEALTH

- C-5 Intergovernmental Agreement 200847 with Oregon Health Sciences University, Providing Obstetrical and Gynecological Consultation to Health Department Clinics

DEPARTMENT OF AGING SERVICES

- C-6 Intergovernmental Revenue Agreement 400097 with the City of Gresham, Providing Coordination of Services and Programs for Gresham Area Seniors
- C-7 Amendment 1 to Intergovernmental Agreement 400016 with Oregon Senior and Disabled Services, Providing Administrative, Long Term Care, and Contracted Community Services Funds for the Period July 1, 1995 through June 30, 1997

DEPARTMENT OF COMMUNITY AND FAMILY SERVICES

- C-8 Intergovernmental Revenue Agreement 103117 with the State Office for Services to Children and Families, Funding Capitated Mental Health Services for Children Not Eligible for the Multnomah CAPCare Program Services

DEPARTMENT OF ENVIRONMENTAL SERVICES

- C-9 Intergovernmental Agreement 300757 with the City of Portland, Providing Design and Construction of 13 Off-Bridge Willamette River Bridges Accessibility Improvements
- C-10 ORDER Authorizing Execution of Deed D971381 Upon Complete Performance of a Contract to William D. Barnes

ORDER 96-203.

- C-11 ORDER Authorizing Execution of Deed D971382 Upon Complete Performance of a Contract to Michael Trojan

ORDER 96-204.

- C-12 ORDER Authorizing Execution of Deed D971383 Upon Complete Performance of a Contract to Margaret Lewis

ORDER 96-205.

- C-13 ORDER Authorizing Execution of Deed D971384 Upon Complete Performance of a Contract to Jeffrey Paul Fish

ORDER 96-206.

SHERIFF'S OFFICE

C-14 Intergovernmental Agreement 800847 with the Oregon Department of Transportation, Involving a Multi-Agency Effort to Enhance DUII Enforcement in Multnomah County

REGULAR AGENDA

AT THE REQUEST OF CHAIR STEIN AND UPON MOTION OF COMMISSIONER KELLEY, SECONDED BY COMMISSIONER COLLIER, CONSIDERATION OF THE FOLLOWING ITEM WAS APPROVED, WITH COMMISSIONERS KELLEY, HANSEN, COLLIER AND STEIN VOTING AYE.

DEPARTMENT OF SUPPORT SERVICES

UC-1 Intergovernmental Agreement 500407 with Riverdale School District Implementing a \$10,000 One Time Only Payment Included in the 1996-97 Adopted Budget

COMMISSIONER KELLEY MOVED AND COMMISSIONER COLLIER SECONDED, APPROVAL OF UC-1. DAVE WARREN EXPLANATION. AGREEMENT APPROVED, WITH COMMISSIONERS KELLEY, HANSEN, COLLIER AND STEIN VOTING AYE.

PUBLIC COMMENT

R-1 Opportunity for Public Comment on Non-Agenda Matters. Testimony Limited to Three Minutes Per Person.

Vice-Chair Dan Saltzman arrived at 9:35 a.m.

DIANNA ROBERTS COMMENTED IN OPPOSITION TO ADULT CARE HOME INSPECTIONS ON THURSDAY MORNINGS, AND THE COUNTY BOARD CONDUCTING EXECUTIVE SESSIONS CONCERNING PENDING LITIGATION. CHAIR STEIN ASSURED MS. ROBERTS THAT EXECUTIVE SESSIONS ARE CONDUCTED PER STATUTORY GUIDELINES.

DEPARTMENT OF COMMUNITY CORRECTIONS

R-2 Budget Modification DCC 5 Creating a Budget for the Centralized Casebank Unit, Transferring Existing Positions and Materials and Services

UPON MOTION OF COMMISSIONER KELLEY, SECONDED BY COMMISSIONER SALTZMAN, R-2 WAS TABLED.

NON-DEPARTMENTAL

R-3 RESOLUTION Approving the Fire Code Ordinance of Tualatin Valley Fire and Rescue, a Rural Fire Protection District

COMMISSIONER SALTZMAN MOVED AND COMMISSIONER COLLIER SECONDED, APPROVAL OF R-3. TUALATIN VALLEY FIRE MARSHAL JEFF GRUNEWALD EXPLANATION. RESOLUTION 96-207 UNANIMOUSLY APPROVED.

DEPARTMENT OF SUPPORT SERVICES

R-4 Intergovernmental Agreement 500317 with the State of Oregon Regarding Senate Bill 1145 Facilities Lease and Sublease Documents

CHAIR STEIN ADVISED THAT FINANCE DIRECTOR DAVE BOYER REQUESTED THAT R-4 BE POSTPONED INDEFINITELY. UPON MOTION OF COMMISSIONER KELLEY, SECONDED BY COMMISSIONER COLLIER, R-4 WAS UNANIMOUSLY POSTPONED INDEFINITELY.

DEPARTMENT OF COMMUNITY AND FAMILY SERVICES

R-5 Request for Approval of a NOTICE OF INTENT to Submit a Grant Application to Meyer Memorial Trust in the Amount of \$298,072 for a Two Year Period to Establish Hispanic Retention Programs at Roosevelt and Madison High Schools in Partnership with Portland Public Schools, Multnomah County and Private Non-Profit Organizations

COMMISSIONER SALTZMAN MOVED AND COMMISSIONER COLLIER SECONDED, APPROVAL

OF R-5. IRIS BELL EXPLANATION AND RESPONSE TO COMMISSIONER SALTZMAN'S COMMENTS IN SUPPORT. NOTICE OF INTENT UNANIMOUSLY APPROVED.

R-6 Approval of Application for a Grant from Meyer Memorial Trust in the Amount of \$298,072 for a Two Year Period

COMMISSIONER KELLEY MOVED AND COMMISSIONER HANSEN SECONDED, APPROVAL OF R-6. IRIS BELL EXPLANATION, COMMENTS IN SUPPORT, AND RESPONSE TO A QUESTION OF COMMISSIONER SALTZMAN REGARDING THE ATTRIBUTES OF PARTICULAR SCHOOLS. APPLICATION UNANIMOUSLY APPROVED.

DEPARTMENT OF COMMUNITY CORRECTIONS

R-2 Budget Modification DCC 5 Creating a Budget for the Centralized Casebank Unit, Transferring Existing Positions and Materials and Services

UPON MOTION OF COMMISSIONER KELLEY, SECONDED BY COMMISSIONER SALTZMAN, R-2 WAS UNANIMOUSLY POSTPONED INDEFINITELY.

There being no further business, the regular meeting was adjourned at 9:45 a.m.

Tuesday, November 26, 1996 - 10:00 AM
OR IMMEDIATELY FOLLOWING REGULAR MEETING
Multnomah County Courthouse, Room 602
1021 SW Fourth, Portland

EXECUTIVE SESSION

Chair Beverly Stein convened the meeting at 9:45 a.m., with Vice-Chair Dan Saltzman, Commissioners Sharron Kelley, Gary Hansen and Tanya Collier present.

E-1 The Multnomah County Board of Commissioners Will Meet in Executive Session Pursuant to ORS 192.660(1)(h) for Legal Counsel Consultation

Concerning Current Litigation or Litigation Likely to be Filed. Presented by Sandra Duffy.

EXECUTIVE SESSION HELD.

There being no further business, the executive session was adjourned at 11:05 a.m.

Tuesday, November 26, 1996 - 1:30 PM
Justice Building, 15th Floor Chief's Conference Room
1111 SW Second, Portland

MULTNOMAH CITIES/COUNTY JOINT MEETING

Portland Mayor Vera Katz and County Chair Beverly Stein convened the meeting at 1:36 p.m., with Gresham Mayor Gussie McRobert, Troutdale Mayor Paul Thalhofer, Portland Commissioners Erik Sten, Jim Francesconi, Charlie Hales, a representative of Commissioner Mike Lindberg, Portland Auditor Barbara Clark County Vice-Chair Dan Saltzman, and County Commissioners Sharron Kelley, Gary Hansen and Tanya Collier present.

JM-1 Elected Officials for Multnomah County and the Cities of Fairview, Gresham, Portland, Troutdale and Wood Village.

PRESENTATIONS, DISCUSSION AND RESPONSE TO QUESTIONS WITH MAYOR KATZ, CHAIR STEIN, COMMISSIONER KELLEY, MARY, CAROL FORD, COMMISSIONER SALTZMAN, MAYOR MCROBERT, MAYOR THALHOFER, A REPRESENTATIVE OF COMMISSIONER LINDBERG, COMMISSIONER FRANCESCONI, COMMISSIONER HALES, COMMISSIONER COLLIER, COMMISSIONER HANSEN, BARBARA CLARK, COMMISSIONER STEN. FOUR C GROUP TO DEVELOP AGENDA FOR NEXT JOINT MEETING TO BE SCHEDULED FOR A WEDNESDAY OR THURSDAY EVENING MID JANUARY, 1997.

There being no further business, the meeting was adjourned at 3:15 p.m.

Wednesday, November 27, 1996 - 9:30 AM
Multnomah County Courthouse, Room 602
1021 SW Fourth, Portland

LAND USE PLANNING MEETING

Chair Beverly Stein convened the meeting at 9:32 a.m., with Vice-Chair Dan Saltzman, Commissioners Sharron Kelley, Gary Hansen and Tanya Collier present.

P-1 CU 6-96/SEC 18-96 DE NOVO HEARING on the Appeal of the Hearings Officer Decision Regarding a Conditional Use Permit and a SEC Permit for the Mining of Approximately 250 Acres Previously Approved Under CU 17-90, on Property Located at 14545 NW ST. HELENS ROAD.

CHAIR STEIN EXPLAINED QUASI-JUDICIAL PROCESS. AT CHAIR STEIN'S REQUEST FOR DISCLOSURE, NO EX PARTE CONTACTS WERE REPORTED. AT CHAIR STEIN'S REQUEST FOR CHALLENGES AND/OR OBJECTIONS, NONE WERE OFFERED.

In order to allow proponents and opponents to coordinate their time, Chair Stein recessed the meeting at 9:36 a.m. and reconvened the meeting at 9:40 a.m.

AT THE REQUEST OF ARNOLD ROCHLIN, THE BOARD GRANTED 25 MINUTES FOR TESTIMONY FROM EACH SIDE. PLANNER PHILLIP BOURQUIN PRESENTED STAFF REPORT AND RECOMMENDATIONS TO ELIMINATE, OVERTURN AND DELETE CERTAIN HEARINGS OFFICER CONDITIONS, AND RESPONDED TO BOARD QUESTIONS. HEARINGS OFFICER LIZ FANCHER PRESENTED CONDITIONS, FINDINGS OF FACT AND CRITERIA USED IN HER DETERMINATION, ADVISING THIS WAS HER FIRST HEARING FOR MULTNOMAH COUNTY AND THE BOARD WILL HAVE MORE DISCRETION THAN SHE HAD. MS. FANCHER ADDRESSED MINING, RECLAMATION, STREAM DRAINAGE, RIPARIAN AND ROAD ISSUES AND RESPONDED TO BOARD QUESTIONS. AT CHAIR STEIN'S REQUEST, COUNTY ATTORNEY SANDRA DUFFY EXPLAINED THE BOARD NEEDS

TO DECIDE WHETHER THE ANGELL BROTHERS MEDIATED CONSERVATION EASEMENT REGARDING SITE SPECIFIC PLANS IS THE ONLY DOCUMENT TO LOOK AT, OR WHETHER THEY SHOULD LOOK AT THE ZONING CODE AND HEARINGS OFFICER DECISION IN MAKING ITS DETERMINATION. APPLICANT'S ATTORNEY FRANK PARISI SUBMITTED ANGELL BROTHERS MATERIALS REGARDING HISTORY, MEDIATION, HOURS OF OPERATION, MINERAL AND AGGREGATE RESOURCE INVENTORY, RECLAMATION AND CONDITIONS, AND TESTIFIED IN SUPPORT OF THE MEDIATED CONSERVATION EASEMENT, ADVISING THE ZONING CODE IS NOT APPLICABLE IN THIS CASE. IN RESPONSE TO A QUESTION OF CHAIR STEIN, MR. PARISI ADVISED ANGELL BROTHERS HAS OPERATED FROM 6:00 A.M. UNTIL 10:00 P.M. SINCE 1980. LES BLAIZE TESTIFIED IN SUPPORT OF THE MINING OPERATIONS. CHRIS FOSTER, HANK MCCURDY, CHRIS WRENCH, SETH TANE, DONNA MATRAZZO, ARNOLD ROCHLIN, JANE HART OF METRO AND PAULA THIEDE SUBMITTED WRITTEN AND PRESENTED TESTIMONY IN OPPOSITION TO APPLICANT'S REQUEST AND IN SUPPORT OF HEARINGS OFFICER DECISION. HANK MCCURDY AND ARNOLD ROCHLIN RESPONSE TO BOARD QUESTIONS. MR. PARISI REBUTTAL TO TESTIMONY, INCLUDING THE EASEMENT ISSUE. IN RESPONSE TO CHAIR STEIN'S REQUEST FOR CONTINUANCE OR OBJECTION TO HEARING, NONE WERE OFFERED. HEARING CLOSED.

At 11:10 a.m., Commissioner Gary Hansen advised he had to leave for a meeting in Salem but he supports a decision of the Board that best meets the original agreement.

LIZ FANCHER AND SANDRA DUFFY RESPONSE TO BOARD QUESTIONS REGARDING CERTAIN CONDITIONS. COMMISSIONER KELLEY'S MOTION TO ADOPT PLANNING STAFF RECOMMENDATION TO ELIMINATE CONDITION

14, AND ADD A CONDITION TO KEEP NW MCNAMEE AND NEWBERRY ROADS CLOSED TO THROUGH TRUCKS AS DIRECTED BY THE COUNTY ENGINEER ON OCTOBER 17, 1996, FAILED FOR LACK OF A SECOND.

COMMISSIONER COLLIER MOVED, SECONDED BY COMMISSIONER SALTZMAN, TO ELIMINATE CONDITION 14 OF THE HEARINGS OFFICER DECISION. MOTION TO ELIMINATE HEARINGS OFFICER CONDITION 14 APPROVED, WITH COMMISSIONERS COLLIER, SALTZMAN AND STEIN VOTING AYE, AND COMMISSIONER KELLEY VOTING NO.

FOLLOWING BOARD DISCUSSION AND RESPONSE TO QUESTIONS REGARDING HOURS OF OPERATION, NOISE, PRODUCTION AND DEQ ENFORCEMENT WITH SANDRA DUFFY, FRANK PARISI, HANK MCCURDY, SKIP ANDERSON, PHILLIP BOURQUIN, DAVID KING, ARNOLD ROCHLIN, COMMISSIONER KELLEY'S MOTION TO UPHOLD CONDITION 7 OF THE HEARINGS OFFICER DECISION, FAILED FOR LACK OF A SECOND.

COMMISSIONER COLLIER MOVED, SECONDED BY COMMISSIONER COLLIER TO AMEND HEARINGS OFFICER CONDITION 7 LIMITING THE HOURS OF OPERATION FROM 6:00 AM TO 10:00 PM. FOLLOWING DISCUSSION WITH SANDRA DUFFY, COMMISSIONER COLLIER RESTATED THE INTENT OF HER MOTION IS TO PROVIDE THAT MCC.7325(C) APPLIES, EXCEPT IN THE HOURS OF OPERATION, WHICH SHALL BE FROM 6:00 AM TO 10 PM ON THE APPLICABLE DAYS. BOARD DISCUSSION WITH PHILLIP BOURQUIN AND FRANK PARISI REGARDING ANGELL BROTHERS WILLINGNESS TO PURCHASE EQUIPMENT TO MONITOR NOISE AND SUBMIT QUARTERLY LOGS TO LAND USE STAFF. COMMISSIONER COLLIER MOVED AND COMMISSIONER SALTZMAN SECONDED, AN AMENDMENT TO THEIR

PREVIOUS MOTION ADDING THAT ANGELL BROTHERS WILL MONITOR NOISE AND SUBMIT QUARTERLY LOGS TO THE LAND USE PLANNING STAFF. COMMISSIONER SALTZMAN COMMENTS IN SUPPORT OF MOTION. MOTION PROVIDING THAT MCC.7325(C) APPLIES, EXCEPT IN THE HOURS OF OPERATION, WHICH SHALL BE FROM 6:00 AM TO 10 PM ON THE APPLICABLE DAYS, AND PROVIDING THAT ANGELL BROTHERS WILL MONITOR NOISE AND SUBMIT QUARTERLY LOGS TO THE LAND USE PLANNING STAFF, APPROVED, WITH COMMISSIONERS COLLIER, SALTZMAN AND STEIN VOTING AYE, AND COMMISSIONER KELLEY VOTING NO.

FOLLOWING BOARD DISCUSSION WITH ARNOLD ROCHLIN, FRANK PARISI, SANDRA DUFFY AND HANK MCCURDY REGARDING WATERSHED, RECONCILIATION REPORT, ORDINANCE 832, AMENDED MINERAL EXTRACTION MAPS, AND STREAMS, RIPARIAN, WILDLIFE PROTECTION ISSUES, COMMISSIONER COLLIER MOVED, SECONDED BY COMMISSIONER SALTZMAN, TO ADOPT THE PLANNING STAFF RECOMMENDATION TO OVERTURN AND DELETE CONDITION 12 OF THE HEARINGS OFFICER DECISION. IN RESPONSE TO SETH TANE'S STREAM DRAINAGE CONCERNS, COMMISSIONER SALTZMAN COMMENTED IN SUPPORT OF THE MEDIATED AGREEMENT. MOTION TO OVERTURN AND DELETE HEARINGS OFFICER CONDITION 12 UNANIMOUSLY APPROVED.

REGARDING PHASING AND RECLAMATION ISSUES, COMMISSIONER COLLIER MOVED, SECONDED BY COMMISSIONER SALTZMAN, TO OVERTURN AND DELETE CONDITION 15 OF THE HEARINGS OFFICER DECISION. PHILLIP BOURQUIN EXPLANATION AND RESPONSE TO QUESTION OF COMMISSIONER COLLIER REGARDING STAFF RECOMMENDATION THAT THE BOARD PLACE CONDITIONS REQUIRING RECLAMATION OF ANY PORTION OF THE SITE

THAT IS MINED AND NOT UTILIZED FOR ROADS, ETC. TO BE RECLAMATED WITHIN THREE YEARS. AT THE REQUEST OF COMMISSIONER KELLEY, E. FRANK SCHNITZER OF THE OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES, TESTIFIED IN SUPPORT OF ANGELL BROTHERS MINING OPERATIONS AND RECLAMATION PLAN, AND RESPONDED TO BOARD QUESTIONS REGARDING TIMING OF RECLAMATION PHASES AND FOREST VEGETATION. COMMISSIONER KELLEY MOVED, SECONDED BY COMMISSIONER SALTZMAN, PLACE CONDITIONS REQUIRING RECLAMATION OF ANY PORTION OF THE SITE THAT IS MINED AND NOT UTILIZED FOR ROADS, ETC. TO BE RECLAMATED WITHIN THREE YEARS. FOLLOWING BOARD DISCUSSION WITH ARNOLD ROCHLIN, FRANK SCHNITZER AND PHILLIP BOURQUIN REGARDING DOGAMI TESTING, PERMIT CONDITIONS AND STAFF CONCERNS, COMMISSIONERS COLLIER, KELLEY AND SALTZMAN WITHDREW THEIR PREVIOUS MOTIONS AND SECONDS. COMMISSIONER COLLIER MOVED, SECONDED BY COMMISSIONER SALTZMAN, TO OVERTURN AND DELETE CONDITION 15 OF THE HEARINGS OFFICER DECISION AND SIMPLY PLACE CONDITIONS REQUIRING RECLAMATION OF ANY PORTION OF THE SITE THAT IS MINED AND NOT UTILIZED FOR ROADS, ETC. TO BE RECLAMATED WITHIN THREE YEARS, AND REQUIRING DOGAMI INSPECTIONS AND PERMITS. MOTION UNANIMOUSLY APPROVED.

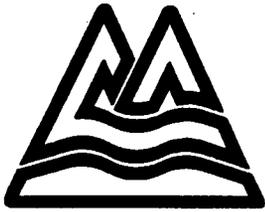
FOLLOWING DISCUSSION OF NOISE AND GROUNDWATER ISSUES WITH SANDRA DUFFY, COMMISSIONER COLLIER MOVED, SECONDED BY COMMISSIONER KELLEY, TO UPHOLD THE HEARINGS OFFICER FINDINGS AND CONDITIONS, INCLUDING 11 AND 17, WITH TODAY'S BOARD AMENDMENTS. CHAIR STEIN THANKED EVERYONE FOR THEIR PARTICIPATION. MOTION TO UPHOLD THE

**HEARINGS OFFICER FINDINGS AND
CONDITIONS, INCLUDING 11 AND 17, WITH
TODAY'S BOARD AMENDMENTS, UNANIMOUSLY
APPROVED. [FINAL ORDER 97-15 ADOPTED
FEBRUARY 13, 1997 AFFIRMING AND MODIFYING
THE OCTOBER 17, 1996 HEARINGS OFFICER
DECISION IN LAND USE PLANNING CASE CU 6-96
SEC 18-96]**

There being no further business, the meeting was adjourned at 12:36 p.m.

BOARD CLERK FOR MULTNOMAH COUNTY, OREGON

Deborah L. Bogstad



MULTNOMAH COUNTY OREGON

OFFICE OF THE BOARD CLERK
SUITE 1510, PORTLAND BUILDING
1120 SW FIFTH AVENUE
PORTLAND, OREGON 97204
CLERK'S OFFICE • 248-3277 • 248-5222
FAX • (503) 248-5262

BOARD OF COUNTY COMMISSIONERS
BEVERLY STEIN • CHAIR • 248-3308
DAN SALTZMAN • DISTRICT 1 • 248-5220
GARY HANSEN • DISTRICT 2 • 248-5219
TANYA COLLIER • DISTRICT 3 • 248-5217
SHARRON KELLEY • DISTRICT 4 • 248-5213

AGENDA

MEETINGS OF THE MULTNOMAH COUNTY BOARD OF COMMISSIONERS

FOR THE WEEK OF

NOVEMBER 25, 1996 - NOVEMBER 29, 1996

Tuesday, November 26, 1996 - 9:30 AM - Regular MeetingPage 2

Tuesday, November 26, 1996 -10:00 AM - Executive Session.....Page 4

Tuesday, November 26, 1996 - 1:30 PM - Joint Meeting.....Page 4

Wednesday, November 27, 1996 - 9:30 AM - De Novo HearingPage 5

Thursday, November 28, 1996 - HOLIDAY - OFFICES CLOSED

Thursday Meetings of the Multnomah County Board of Commissioners are **cable-cast** live and taped and can be seen by Cable subscribers in Multnomah County at the following times:

Thursday, 9:30 AM, (LIVE) Channel 30

Friday, 10:00 PM, Channel 30

Sunday, 1:00 PM, Channel 30

Produced through Multnomah Community Television

INDIVIDUALS WITH DISABILITIES MAY CALL THE OFFICE OF THE BOARD CLERK AT 248-3277 OR 248-5222, OR MULTNOMAH COUNTY TDD PHONE 248-5040, FOR INFORMATION ON AVAILABLE SERVICES AND ACCESSIBILITY.

AN EQUAL OPPORTUNITY EMPLOYER

Tuesday, November 26, 1996 - 9:30 AM
Multnomah County Courthouse, Room 602
1021 SW Fourth, Portland

REGULAR MEETING

CONSENT CALENDAR

NON-DEPARTMENTAL

- C-1 *Appointment of Ramsey Weit as City of Portland Representative to the AFFORDABLE HOUSING REVIEW COMMITTEE*
- C-2 *Appointments of Christa Meyer and Terri Thorson to the DUII COMMUNITY ADVISORY BOARD*
- C-3 *Appointment of Marie Sowers to the PORTLAND MULTNOMAH COMMISSION ON AGING*
- C-4 *Appointment of Stephanie Parish-Taylor to the PRIVATE INDUSTRY COUNCIL*

DEPARTMENT OF HEALTH

- C-5 *Intergovernmental Agreement 200847 with Oregon Health Sciences University, Providing Obstetrical and Gynecological Consultation to Health Department Clinics*

DEPARTMENT OF AGING SERVICES

- C-6 *Intergovernmental Revenue Agreement 400097 with the City of Gresham, Providing Coordination of Services and Programs for Gresham Area Seniors*
- C-7 *Amendment 1 to Intergovernmental Agreement 400016 with Oregon Senior and Disabled Services, Providing Administrative, Long Term Care, and Contracted Community Services Funds for the Period July 1, 1995 through June 30, 1997*

DEPARTMENT OF COMMUNITY AND FAMILY SERVICES

- C-8 *Intergovernmental Revenue Agreement 103117 with the State Office for Services to Children and Families, Funding Capitated Mental Health*

*Services for Children Not Eligible for the Multnomah CAPCare Program
Services*

DEPARTMENT OF ENVIRONMENTAL SERVICES

- C-9 *Intergovernmental Agreement 300757 with the City of Portland, Providing Design and Construction of 13 Off-Bridge Willamette River Bridges Accessibility Improvements*
- C-10 *ORDER Authorizing Execution of Deed D971381 Upon Complete Performance of a Contract to William D. Barnes*
- C-11 *ORDER Authorizing Execution of Deed D971382 Upon Complete Performance of a Contract to Michael Trojan*
- C-12 *ORDER Authorizing Execution of Deed D971383 Upon Complete Performance of a Contract to Margaret Lewis*
- C-13 *ORDER Authorizing Execution of Deed D971384 Upon Complete Performance of a Contract to Jeffrey Paul Fish*

SHERIFF'S OFFICE

- C-14 *Intergovernmental Agreement 800847 with the Oregon Department of Transportation, Involving a Multi-Agency Effort to Enhance DUII Enforcement in Multnomah County*

REGULAR AGENDA

PUBLIC COMMENT

- R-1 *Opportunity for Public Comment on Non-Agenda Matters. Testimony Limited to Three Minutes Per Person.*

DEPARTMENT OF COMMUNITY CORRECTIONS

- R-2 *Budget Modification DCC 5 Creating a Budget for the Centralized Casebank Unit, Transferring Existing Positions and Materials and Services*

NON-DEPARTMENTAL

- R-3 *RESOLUTION Approving the Fire Code Ordinance of Tualatin Valley Fire and Rescue, a Rural Fire Protection District*

DEPARTMENT OF SUPPORT SERVICES

- R-4 *Intergovernmental Agreement 500317 with the State of Oregon
Regarding Senate Bill 1145 Facilities Lease and Sublease Documents*

DEPARTMENT OF COMMUNITY AND FAMILY SERVICES

- R-5 *Request for Approval of a NOTICE OF INTENT to Submit a Grant
Application to Meyer Memorial Trust in the Amount of \$298,072 for a
Two Year Period to Establish Hispanic Retention Programs at Roosevelt
and Madison High Schools in Partnership with Portland Public Schools,
Multnomah County and Private Non-Profit Organizations*
- R-6 *Approval of Application for a Grant from Meyer Memorial Trust in the
Amount of \$298,072 for a Two Year Period*
-

Tuesday, November 26, 1996 - 10:00 AM
OR IMMEDIATELY FOLLOWING REGULAR MEETING
*Multnomah County Courthouse, Room 602
1021 SW Fourth, Portland*

EXECUTIVE SESSION

- E-1 *The Multnomah County Board of Commissioners Will Meet in Executive
Session Pursuant to ORS 192.660(1)(h) for Legal Counsel Consultation
Concerning Current Litigation or Litigation Likely to be Filed.
Presented by Sandra Duffy. 30 MINUTES REQUESTED.*
-

Tuesday, November 26, 1996 - 1:30 PM
*Justice Building, 15th Floor Chief's Conference Room
1111 SW Second, Portland*

MULTNOMAH CITIES/COUNTY JOINT MEETING

- JM-1 *Elected Officials for Multnomah County and the Cities of Fairview,
Gresham, Portland, Troutdale and Wood Village. 90 MINUTES
REQUESTED.*

*Wednesday, November 27, 1996 - 9:30 AM
Multnomah County Courthouse, Room 602
1021 SW Fourth, Portland*

LAND USE PLANNING MEETING

*P-1 CU 6-96/SEC 18/96 DE NOVO HEARING on the Appeal of the
Hearings Officer Decision Regarding a Conditional Use Permit and a
SEC Permit for the Mining of Approximately 250 Acres Previously
Approved Under CU 17-90, on Property Located at 14545 NW ST.
HELENS ROAD. 90 MINUTES REQUESTED.*

#1

PLEASE PRINT LEGIBLY!

MEETING DATE 11/27/96

NAME

Frank Parisi

ADDRESS

One SW Columbia / Suite 680

STREET

Portland 97250

CITY

ZIP

I WISH TO SPEAK ON AGENDA ITEM NO. _____

SUPPORT appeal OPPOSE _____

SUBMIT TO BOARD CLERK

#2

PLEASE PRINT LEGIBLY!

MEETING DATE 27 Nov 96

NAME

Les Blaize

ADDRESS

9630 N.W. SKYLINE

STREET

Port 97231

CITY

ZIP

I WISH TO SPEAK ON AGENDA ITEM NO. Quarry

SUPPORT OPPOSE _____

SUBMIT TO BOARD CLERK

#1

PLEASE PRINT LEGIBLY!

MEETING DATE 11/27/96

NAME

Chris Foster

ADDRESS

15400 NW McNamara

STREET

Portland 97231

CITY

ZIP

I WISH TO SPEAK ON AGENDA ITEM NO. _____

SUPPORT H.O. Decision OPPOSE _____

SUBMIT TO BOARD CLERK

#2

PLEASE PRINT LEGIBLY!

MEETING DATE 11/27/96

NAME HANK McCURDY
ADDRESS 14250 NW McNamee Rd
STREET
Portland Ore 97121
CITY ZIP

I WISH TO SPEAK ON AGENDA ITEM NO. _____
SUPPORT _____ OPPOSE Amend
SUBMIT TO BOARD CLERK AROS.

#3

PLEASE PRINT LEGIBLY!

MEETING DATE 11/27/96

NAME Chris Wrench
ADDRESS 3103 NW Wilson
STREET
Portland OR 97210
CITY ZIP

I WISH TO SPEAK ON AGENDA ITEM NO. Quarry Appeal
SUPPORT _____ OPPOSE X
SUBMIT TO BOARD CLERK X

#4

PLEASE PRINT LEGIBLY!

MEETING DATE 11/27/96

NAME SETH TANE
ADDRESS 13700 NW NEWBERRY RD
STREET
PDX 97231
CITY ZIP

I WISH TO SPEAK ON AGENDA ITEM NO. QUARRY
SUPPORT _____ OPPOSE X
SUBMIT TO BOARD CLERK X

#5

PLEASE PRINT LEGIBLY!

MEETING DATE 11/27/96

NAME DONNA MATRAZZO
ADDRESS 14300 NIWASAVIE ISLAND RD
STREET
PORTLAND OR 97231
CITY ZIP

I WISH TO SPEAK ON AGENDA ITEM NO. QUARRY
SUPPORT _____ OPPOSE
SUBMIT TO BOARD CLERK _____

#6

PLEASE PRINT LEGIBLY!

MEETING DATE 11/27/96

NAME Arnold Rocklin
ADDRESS PO Box 83645
STREET
Portland, OR 97283
CITY ZIP

I WISH TO SPEAK ON AGENDA ITEM NO. P-1
SUPPORT _____ OPPOSE _____
SUBMIT TO BOARD CLERK _____

#7

PLEASE PRINT LEGIBLY!

MEETING DATE 11/27/96

NAME JANE HART
ADDRESS METRO
STREET
600 NE Grand Ave
CITY Portland OR 97232 ZIP CODE

I WISH TO SPEAK ON AGENDA ITEM # _____
SUPPORT _____ OPPOSE _____
SUBMIT TO BOARD CLERK _____

#8

PLEASE PRINT LEGIBLY!

MEETING DATE 11/27

NAME Paula Thiede THESE
ADDRESS 13131 NW Potview Rd
STREET SW 97231
CITY SW ZIP 97231

I WISH TO SPEAK ON AGENDA ITEM NO. _____
SUPPORT _____ OPPOSE
SUBMIT TO BOARD CLERK _____

TESTIMONY TO HEARING
CLOSED

PLEASE PRINT LEGIBLY!

MEETING DATE 11/27/96

NAME E. Frank Schnitzer
ADDRESS OR Dept of Geology & Mineral Industries
STREET _____
CITY Albany ZIP 97355

I WISH TO SPEAK ON AGENDA ITEM NO. Angel Brothers
SUPPORT XXX OPPOSE _____
SUBMIT TO BOARD CLERK _____

Meeting Date: NOV 27 1996
Agenda No: P-1
Est. Start Time: 9:30

(Above Space for Board Clerk's Use ONLY)

AGENDA PLACEMENT FORM

SUBJECT: DeNovo Hearing in the Matter of an Appeal of Hearings Officer's decision on CU 6-96 & SEC 18-96.

BOARD BRIEFING Date Requested:
Amt. of Time Needed:
Requested By:

REGULAR MEETING Date Requested: November 27, 1996
Amt. of Time Needed: 1.5 hours

DEPARTMENT: DES **DIVISION:** Transportation & Land Use Planning
CONTACT: Phillip Bourquin **TELEPHONE:** 248-3043
BLDG/ROOM: 412 / 109

PERSON(S) MAKING PRESENTATION: Phillip Bourquin

ACTION REQUESTED

Informational Only Policy Direction Approval Other

SUGGESTED AGENDA TITLE

DeNovo Hearing in the Matter of an Appeal of Hearings Officer's regarding a Conditional Use Permit and a SEC permit for mining lands previously approved under CU 17-90.

96 NOV 19 PM 12:39
MULTNOMAH COUNTY
OREGON
BOARD OF
COUNTY COMMISSIONERS

SIGNATURES REQUIRED

Elected Official: _____

or

Department Manager: KB Larry F. Nicholas



MULTNOMAH COUNTY

CASE NAME Angell Brothers Rock Quarry

NUMBER

CU 6-96, SEC 18-96

1. Applicant Name/Address

Angell Bros., Inc.
P.O. Box 83449
Portland, OR 97283-0449

2. Action Requested by Applicant

The applicant is requesting approval of a Conditional Use and SEC permit for the mining of approximately 250 acres to include the area of land previously approved for mining under CU 17-90. The request includes expanded hours of operations.

3. Planning Staff Recommendation

Approval, subject to conditions, of a Conditional Use and SEC Permit for mining of approximately 250 acres to include the area of land previously approved for mining under CU 17-90. Denial of the Applicant's request for expanded hours of operation.

4. Hearings Officer Decision

Approval, subject to conditions, of a Conditional Use and SEC Permit for mining of approximately 250 acres to include the area of land previously approved for mining under CU 17-90. Denial of the Applicant's request for expanded hours of operation.

5. If recommendation and decision are different, why?

A substantial amount of information was submitted between the date of the Staff report (recommendation) and HO Decision which resulted in additional or modified conditions being placed on approval.

ISSUES

The following is a list of the most prominent issues followed by a itemized summary of the arguments, staff comments and recommendations.

1. Traffic
2. Hours of Operation
3. Watershed
4. Phasing and Reclamation
5. Noise
6. Groundwater

Action Requested of Board	
<input type="checkbox"/>	Affirm Hearings Officer Dec.
<input checked="" type="checkbox"/>	Hearing/Rehearing
<input type="checkbox"/>	Scope of Review
<input type="checkbox"/>	On the record
<input type="checkbox"/>	De Novo
<input checked="" type="checkbox"/>	New information allowed

ISSUE	CODE REQUIREMENT	WHO RAISED ISSUE?	HEARINGS OFFICER DECISION	STAFF CONCERNS/ COMMENTS	RECOMMENDATION
1. Traffic	<p><u>MCC .7325 (C)(1)(e):</u> If there are no traffic management requirements in the site specific Comprehensive Plan Program requirements, the applicant shall identify the most commonly used routes of travel from the site... The County surveyor shall certify that the applicant has identified the appropriate roads and those roads must be adequate to accommodate any additional traffic created by the extraction operation. If roads are inadequate a traffic management plan is required.</p>	<p>Neighbors concerned with number and size of trucks on McNamee and Newberry Roads.</p> <p>County Engineer responded stating, "Conditions of approval should include a requirement for a traffic management plan that includes the consideration of restrictions to truck traffic on the areas local roads.</p>	<p>Condition #14 of decision requires Applicant to submit a traffic management plan to County Engineer. Engineer to make findings regarding road improvements for Newberry Road or to develop a program to assure that the number and weights of trucks from the site can safely be accommodated on Newberry Road. Further, requires the County to hold additional public hearing(s) to review and determine whether and what related conditions and restrictions are necessary.</p>	<ul style="list-style-type: none"> • Condition #14 would result in unnecessary additional future County Hearings and possible appeals. • 10/17/96 -County Engineer closed NW McNamee Rd and NW Newberry Road to through trucks effective 10/31/96 . Closure should resolve concerns of neighbors. • Only access to the mine is Hwy 30. Reconciliation Report (Page IV-19) determined, "... traffic on Highway 30 will not be considered a conflicting use." 	<ul style="list-style-type: none"> • Eliminate Condition #14 of the Hearings Officer Decision. • Establish a finding that the West Hills Reconciliation Report determined 1) traffic is not a conflicting use; and 2) Hwy 30 is under the jurisdiction of ODOT. The applicable review agency, ODOT indicates Hwy 30 has sufficient capacity and structural capability to safely handle the traffic generated by the quarry operation . <p>Therefore, application of the criteria would be onerous, contrary to the intent of the plan, and is not applicable.</p>

ISSUE	CODE REQUIREMENT	WHO RAISED ISSUE?	HEARINGS OFFICER DECISION	STAFF CONCERNS/ COMMENTS	RECOMMENDATION
2. Hours of Operation	<p><u>MCC .7325(C) (4):</u> If no hours and days of operation are contained in the site-specific Comprehensive Plan Program, the following shall apply:</p> <p>(a) Operating hours shall be allowed from 7:00 am to 6:00 pm. No operations shall be allowed on Sundays or on New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, and Christmas Day.</p> <p>(b) Blasting shall be restricted to the hours of 9:00 am to 5:00 pm. No blasting shall be allowed on Saturdays, Sundays or on New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, and Christmas Day.</p>	<p>Appellant (Angell Bros) application requested expansion of operating hours to 20 hrs per day (6am - 2 am).</p> <p>Current hrs. are 6am to 10pm (16 hrs per day)</p> <p>Under this review Appellant seeks to maintain current hours (6am to 10pm - 16hrs) instead of (7am to 6pm - 11 hrs per day)</p> <p>Applicant argues the Conservation Easement is subject to termination if 107% of the prior years production cannot be achieved and it won't happen if hrs are reduced.</p>	<p>Condition #7 of decision limits hours of operation to that of this code section (7am-6pm).</p>	<ul style="list-style-type: none"> • No hours of operations are contained in the West Hills Reconciliation Report (includes Grant of Conservation Easement). • This standard was in place prior to the Grant of Conservation Easement. The production argument would be persuasive only if this were a new requirement that could be demonstrated to substantially limit production. • Termination of the Grant of Conservation Easement would be in direct conflict with the Recon. Report and the reliance on the easement for compliance with several approval criteria. 	<p>Uphold Condition #7 of the Hearings Officers Decision.</p>

ISSUE	CODE REQUIREMENT	WHO RAISED ISSUE?	HEARINGS OFFICER DECISION	STAFF CONCERNS/ COMMENTS	RECOMMENDATION
3. Watershed	MCC .7325 (C): The applicant has shown that the standards of this section, or site-specific requirements adopted as part of a comprehensive plan amendment, can or will be met by a specific date.	<p>Neighbors in opposition argued the proposed mining operation would be expanded into the North Angell Brothers Watershed in conflict with the site specific requirements of the Reconciliation Report.</p> <p>The opponents and Hearings Officer argue the conflict resolution portion of the Recon. Report [p. VI -16 and 17] would preclude mining in the Watershed as defined by a map on page III-143 as no other delineation exists in the report .</p>	<p>Condition #12 of the decision requires the applicant to submit for approval an amended mineral extraction map identifying the location of the south boundary of the North Angel Brothers stream watershed, as shown on page III-143 of the Recon. Report an all mining shall be confined to the extraction area shown on the revised map.</p>	<ul style="list-style-type: none"> • Condition #12 would result in additional County Hearing(s) and possible appeals. • The site-specific criteria are found in the Program to Achieve the Goal Section of The Recon. Report only. None of the four resource programs to achieve the goal preclude expansion of the mining area into the watershed. • The mining program to achieve the goal states the Preserve areas will encompass the North Angell Brothers stream drainage [p.VI -23] Preserves are described by legal and map in Exhibit B of the Record . 	<p>Overturn and delete Condition #12 of the Hearings Officers Decision</p>

ISSUE	CODE REQUIREMENT	WHO RAISED ISSUE?	HEARINGS OFFICER DECISION	STAFF CONCERNS/ COMMENTS	
4. Phasing & Reclamation	<p><u>MCC .7325 (C)(10): All phases of an extraction operation shall be reclaimed before beginning the next, except where the Approval Authority or DOGAMI finds that the different phases cannot be operated and reclaimed separately.</u></p>	<p>Neighbors in opposition argued the proposed reclamation plan would not result in total reclamation of each phase before preceding to the next and therefore fails to comply with this section.</p>	<p>Condition #15 of decision requires a revised operating and mine reclamation plan to comply with all site specific requirements relating to Scenic Views on pgs. VI-14 & VI -15 of the Recon. Report and all Programs to Achieve the Goal.</p>	<ul style="list-style-type: none"> • Condition #15 would result in additional County Hearing(s) and possible appeals. • DOGAMI testified at the HO hearing “phases proposed cannot be operated and reclaimed separately”. • Phases proposed are the same as in the Recon. Report. To revise the mine plan would go against the language of Agreed to Conservation Easement and contrary to the Program to Achieve the Goal for the site. • Site-specific requirements are the Programs to Achieve the Goal only. No Program requires reclamation of one phase prior to commencing the next, 	<p>only that reclamation be simultaneous.</p> <ul style="list-style-type: none"> • Applicants proposal includes concurrent reclamation but leaves some areas open for staging, roads etc.
					<p>RECOMMENDATION</p>
					<p>Overturn and delete Condition #15 of the Hearings Officers Decision and simply place conditions requiring reclamation of any portion of the site that is mined and not utilized for roads, etc. to be reclaimed within 3 years.</p>

ISSUE	CODE REQUIREMENT	WHO RAISED ISSUE?	HEARINGS OFFICER DECISION	STAFF CONCERNS/ COMMENTS	RECOMMENDATION
5. Noise	<p><u>MCC .7325 (C)(5):</u> Sound generated by an operation shall comply with the noise control standards of the Department of Environmental Quality. Compliance can be demonstrated by the report of a certified engineer. Methods to control and minimize the effects of sound generated by the operation on noise sensitive uses existing or approved (valid action or administrative decision) on the date of application may include, but not be limited to, the installation of earth berms, equipment location, limitations on the hours of operation, and relocation of access roads.</p>	<p>Opponents raised concerns with the exact, current locations of the homes identified in the Noise Study completed by the applicants consultant.</p> <p>Also argued that future noise levels cannot be predicted.</p>	<p>Condition #11 of decision requires, "The applicant to maintain compliance with DEQ standards. Complaints regarding noise to be forward to DEQ, and if DEQ determines DEQ standards is not met, County will pursue enforcement."</p> <p>The H.O. found criteria was satisfied by virtue of the 9/25/92 Report of Daly Standly & Associates, supplemental letter dated 6/10/94, and testimony by Mr. Standly at the hearing.</p>	<ul style="list-style-type: none"> • Condition #11 is verbatim the same condition recommended by staff. • A certified engineers report is in the record concluding compliance with this criteria. • Hours of operation will be reduced from current level to 7am-6pm. 	<p>Uphold Hearings Officers findings and Condition #11.</p>

ISSUE	CODE REQUIREMENT	WHO RAISED ISSUE?	HEARINGS OFFICER DECISION	STAFF CONCERNS/ COMMENTS	RECOMMENDATION
6. Groundwater	<p><u>MCC .7325 (E):</u> Proposed blasting activities will not adversely affect the quality or quantity of groundwater within wells in the vicinity of the operation.</p>	<p>Opponents raised concern that as the mining progresses the blasting may affect the aquifer.</p>	<p>Condition #17 of decision requires continued compliance with this code provision.</p> <p>H.O. found criteria was met through Engineered documents in the record and extensive data collection regarding the location of the aquifer during mining.</p>	<ul style="list-style-type: none"> • Condition #17 is reasonable and simply reaffirms the code. • A certified engineers report is in the record concluding compliance with this criteria. • The intent of this section is to require reasonable evidence identifying the potential for adverse impacts. If negative or adverse impacts were discovered by the applicants engineer, directing mining away from these areas would benefit both the neighbors wells and applicants potential liability. 	<p>Uphold Hearings Officers findings and Condition #17.</p>

MULTNOMAH COUNTY, OREGON

DECISION OF LAND USE HEARINGS OFFICER

Case File: CU 6-96, SEC 18-96

Proposed Action(s) and Use(s): Conditional Use approval for mineral extraction and Commercial Forest Use (CFU) district on property described below.

Location of Proposal: 14545 N.W. St. Helens Road

Legal Description of Property: Tax Lot '12', in the NW ¼ of Section 28, T2N, 1W, Willamette Meridian; and Tax Lots '2', '6', '8', and '11' in the E ½ of Section 29, T2N, R1W, Willamette Meridian.

Plan Designation: Commercial Forest

Zoning Designation: Commercial Forest Use (CFU); Significant Environmental Concern (SEC) Zone, subdistricts v (Scenic Views), h (Wildlife Habitat) and s (streams), and Protected Aggregate & Mineral (PAM) overlay.

Applicant: Angell Bros., Inc.
P.O. Box 83449
Portland, OR 97283-0449

Property Owner: Linnton Rock, Inc.
PO Box 2183
Grand Junction, CO 81502

Applicants' Counsel: Frank M. Parisi
Parisi & Parisi
1 S.W. Columbia
Portland, OR 97258

Hearings Officer: Liz Fancher

Hearings Officer's Decision: **Approval**, subject to conditions, of a Conditional Use Permit and SEC permit for the mining of approximately 250 acres to include the area of land previously approved for mining under CU 17-90, based on the findings and conclusions, contained herein.

96 OCT 22 PM 3:27
MULTNOMAH COUNTY
OREGON
BOARD OF
COUNTY COMMISSIONERS

RECEIVED
OCT 21 1996

Multnomah County
Zoning Division

Denial of the Applicant's request for expanded hours of operation.

OVERVIEW

The Hearings Officer was persuaded by the Applicant that the scope of review for its conditional use permit was narrow and confined, primarily, to the County's conditional use ordinances for mining activities and the West Hills Reconciliation Report, the section of County's comprehensive plan that addresses Goal 5 resources in the West Hills of Portland. This narrow scope, however, prevented the Hearings Officer from crafting conditions of approval to address all possible impacts of mine operations and from allowing the Applicant to use a different approach to mining than contemplated in the Report. The Hearings Officer required the Applicant to follow the reclamation approach it told the County it would implement and that is described in the Report. The Hearings Officer imposed this requirement to assure compliance with the comprehensive plan. The Hearings Officer did not impose the requirement because the Report plan is superior to the plan submitted by the Applicant.

BACKGROUND

- 1. Applicant's Proposal:** The Applicant requests approval for a Conditional Use Permit for mineral extraction on the Angell Bros. site. The site, as currently permitted, comprises approximately 113 acres. This Conditional Use Permit would bring the total area available for mining to approximately 250 acres. The Applicant also requested that the mine be allowed to operate 20 hours per day, from 6 AM to 2AM.
- 2. Site and Vicinity Characteristics:** About 25% of the total site is used for aggregate quarrying and processing. Most of the remaining area has been used for commercial forestry. The property that Angell Brothers intends to mine was formerly owned by Crown Pacific. Slopes in the central portion of the property were clear-cut in 1991. The entire site is zoned for Commercial Forest Use. The neighboring parcels are zoned CFU. Small scale forestry uses and rural residences are common in the neighborhood.
- 3. Notification and Public Participation:** Notice of the September 18, 1996 hearing and a detailed listing of the applicable criteria were sent to 53 neighboring property owners, interested parties, and affected agencies on August 28, 1996. On September 25, 1996, Multnomah County received a letter from Jody Scheer. Ms. Scheer indicated that she lives close to the quarry but did not receive notice of the September 18, 1996 hearing. Ms. Scheer requested that she be sent notices of future hearings regarding the Angell Brothers mine. Ms. Scheer did not request additional time to comment on the pending application, a request that the Hearings Officer would have granted if it had been requested. The Hearings Officer also finds that Ms. Scheer was entitled to submit written comments regarding the project, based upon the record and tape of hearing, with her September 25, 1996 letter. No such comments

were filed. The Scheer letter does not explain when Ms. Scheer obtained actual notice nor does it explain why comments regarding the pending applications were not submitted.

4. **Timing of Decision:** ORS 215.428 requires a final decision on this permit by the County, including resolution of all appeals under ORS 215.422, within 120 days after the application is deemed complete. The application was deemed complete on July 31, 1996. The September 18, 1996 Public Hearing took place on **Day 49** of the **120 day clock**.

At the September 18, 1996 hearing, the Applicant submitted new information into the record in support of its application. The Opponents requested and were given seven days to submit additional evidence into the record, until September 25, 1996 at 4:30 p.m. at the offices of the Multnomah County Transportation and Land Use Planning Division. No additional comment period was granted. Parties were given an opportunity to object to the procedure for filing post-hearing comments. No objections were raised. The Applicant did, however, submit a document entitled "Angell Bros. Rebuttal" into the record after the close of the record on October 2, 1996. ORS 197.763 (e) gives the Applicant the right to file final written arguments for a period of seven days following the close of the record of a land use hearing. New evidence may not be included with the written argument.

5. **Staff Report:** The Staff Report for this application was completed on September 10, 1996 and was made available to the public on September 11, 1996, seven days prior to the hearing.

CONDITIONAL USE ORDINANCE CONSIDERATIONS AND FINDINGS

1. **CFU Zone & PAM-EA Subdistrict:** Multnomah County Code (MCC) Sections 11.15.2042 through 11.15.2074 relating to the CFU zone are applicable to the site and the land use applications reviewed by the Hearings Officer. Section 11.15.2050 (D)(1) identifies mining and processing of aggregate as a conditional use, "pursuant to MCC.2053, 2074, .7105 through .7120, .7125 through .7135, .7305 through .7335 and .7605 through .7640. Multnomah County Ordinance No. 804, **Exhibit C-1**, however, adopted Section 11.15.7107 which provides that mineral extraction conditional uses are exempted from the provisions of MCC .7110(C), .7110(E), .7115, .7120, .7122 and .7125. Further, Ordinance No. 804 adopted MCC 11.15.6780 which provides that processing and mining are permitted uses in a PAM-EA subdistrict "subject to a finding by the Hearings Authority that all standards adopted as part of the *Goal 5 process* and the provisions of MCC.7305 through .7335 are met." MCC 11.15.6780 also states that "[r]eview by the Hearing Authority shall be under the procedural provisions of MCC .7105, .7107, .7110(A), .7110(B), .7110(D), .7130 and .7135."

The property is a Goal 5 protected aggregate resource site with a primary zoning of Commercial Forest Use. Uses allowed in the CFU zone pursuant to Statewide Planning Goal 4 and MCC 11.15.2048 include farm use, dwellings (under limited circumstances), forest operations or forest practices including, but not limited to, reforestation of forest land, road construction and maintenance. [MCC 11.15.2048]

2. Farm & Forest Use Compatibility Standards:

MCC 11.15.2053 - Specified uses of MCC .2050 ... (D) ... may be allowed upon a finding that:

The use will:

1. **Not force a significant change in, or significantly increase the cost of, accepted forestry or farming practices on surrounding forest or agricultural lands;**

FINDING: The West Hill Reconciliation Report contains Multnomah County's determination that "there is no indication that expanded mining at this site would force a significant change in, or significantly increase the cost of, accepted farming or forest practices on agriculture or forest lands." [p. IV-37] The Report also contains a wealth of information that, in combination with the facts in the record of this application, establish that mining at this site will not violate the above-cited approval criterion.

Item number 1 imposes requirements that are the same as the requirements found in ORS 215.296(1). The requirements of ORS 215.296(1) have been interpreted by the Land Use Board of Appeals in the cases of *Schellenberg v. Polk County*, 22 Or LUBA 673 (1992) and *Schellenberg v. Polk County*, 21 Or LUBA 425 (1991). The requirements of ORS 215.296(1) were recently applied to a mineral and aggregate and extraction operation in an EFU zone that was designated on the local government's Goal 5 inventory of mineral and aggregate sites in the case of *Mission Bottom Association, Inc. v. Marion County*, 29 Or LUBA ___ (1995).

In *Schellenberg I*, 21 Or LUBA at 440, LUBA held that to demonstrate compliance with ORS 215.296(1), findings must:

"* * * (1) describe the farm and forest practices on surrounding lands devoted to farm or forest use, (2) explain why the proposed use will not force a significant change in those practices, and (3) explain why the proposed use will not significantly increase the cost of those practices."

LUBA also found that the County's finding must identify the "surrounding lands devoted to farm and forest use" and describe the "accepted farming practices" occurring on such lands * * *." *Schellenberg I*, 21 Or LUBA at 441.

The Hearings Officer makes the following findings to demonstrate compliance with the requirements of the *Schellenberg* case:

- (1) **Identification of a "study area."**

FINDING: The Hearings Officer finds that the appropriate study area for purposes of determining compliance with MCC 11.15.2053 is the impact area adopted by the Board of County Commissioners in Multnomah County Ordinance No. 858, **Exhibit C-3** of the record of the pending Angell Brothers application (Sectional Zoning Maps ZC 1-96). **Exhibit C-3** is based upon **Exhibit C-4**, the West Hills Reconciliation Report, which contains the County's determination that the impact area is that area that includes uses which could be affected by the Angell Brothers mineral and aggregate operation.

(2) Identification of land within the study area devoted to farm or forest use.

FINDING: The West Hills Reconciliation Report, **Exhibit C-4**, identifies all of the land within the impact area (study area) that is devoted to farm and forest use and studies all of the lots in the area to determine the uses on the lot and potential impacts. This analysis includes an identification of farm and forest lands. The majority of the land in the impact area is zoned Commercial Forest Use, CFU, land designed for forestry. A small area is zoned Multiple Use Agriculture (MUA-20). An area on the westerly edge of Sauvie Island is zoned Exclusive Farm Use, EFU but is not used for farm use as it is developed with a dam. One lot in the impact area is zoned Rural Residential (RR) and is developed with a single family residences.

(3) Identification of timber, crops or livestock grown on those lands and the accepted farm or forest practices associated with each type of operation.

FINDING: The County studied the entire impact area during the Goal 5 ESEE analysis process as well as all agricultural uses allowed or occurring in the impact area and determined that the mining operations would not conflict with the agricultural uses allowed in the impact areas. **Exhibit C-3**. The County found on page IV-17 of the Report that the conflict with forestry uses was limited to the mine site property and that the identified forest uses and practices would not conflict with or be harmed by the operation of the Angell Brothers mine.

(4) Identification of operating characteristics of the proposed mining operation.

FINDING: The County identified the operating characteristics of the proposed mining operation in the West Hills Reconciliation Report, **Exhibit C-3**. Those characteristics include, but are not limited to, the generation of dust, noise, and traffic, the blasting of rock, the operation of heavy equipment on-site and the destruction of a hillside and two stream beds.

(5) Determination of impacts of proposed mining and aggregate operations on identified accepted farm and forest practices.

FINDING: The West Hills Reconciliation Report contains a determination that there are no adverse impacts of the proposed mining upon accepted farm and forest practices in the surrounding area. No conflicting potential or actual farm uses were identified by the ESEE study of the impact area. Additionally, no conflicts were found between surrounding lands used for forestry as the report concluded that the only area of conflict with forestry occurred on the subject property.

2: Not significantly increase fire suppression costs, or significantly increase risks to fire suppression personnel; and

FINDING: The Hearings Officer accepts the Applicant's argument that mining activities will decrease wildfire hazards and fire suppression costs by creating a fire break in the forest. The Hearings Officer finds that trucks and heavy equipment associated with mining operations increase risks of injury to fire personnel and are a potential source of fire hazard. The Hearings Officer finds, however, that the increase in risk is typical of all mining operations and, therefore is not significant. Additionally, Multnomah County has already determined, in its West Hill Reconciliation Report that "there is no indication that an expanded mining operation would increase fire hazard or costs and risks associated with fire suppression." [p. IV-37]

B. A statement has been recorded with the Division of Records that the owner and the successors in interest acknowledge the rights of owners of nearby property to conduct forest operations consistent with Forest Practices Act and Rules, and to conduct accepted farming practices.

FINDING: The Applicant has stated that it will record such a statement with the Division of Records and such recording has been included as a condition of approval of this application.

3. PAM Overlay Conditional Use Permit Standards:

MCC 11.15.7105 - Purposes: Conditional uses as specified in a district or described herein, because of their public convenience, necessity, unique nature, or their effect on the Comprehensive Plan, may be permitted as specified in the district or described herein, provided that any such conditional use would not be detrimental to the adjoining properties or to the purpose and intent of the Comprehensive Plan. Certain conditional use provisions of time limits, conditions, restrictions, and approval criteria shall not apply to Mineral Extraction conditional uses.

MCC 11.15.7107 - Mineral Extraction Exemptions from Standards

Mineral Extraction conditional uses are exempted from the provisions of MCC .7110(C), .7110 (E), .7115, .7120, .7122 and .7125.

FINDING: The Hearings Officer has applied these exemptions in reviewing this application, as noted below.

MCC 11.15.7110 - General Provisions:

A. Application for approval of a Conditional Use shall be made in a manner provided in MCC .8205 through .8280.

FINDING: The Applicant has applied for approval of this conditional use in the manner provided in MCC 11.15.8205 through .8280.

B. The Approval Authority shall hold a public hearing on each application for a Conditional Use, modification thereof, time extension or reinstatement of a revoked permit.

FINDING: The Hearings Officer held a public hearing on this conditional use permit on September 18, 1996.

C. Except as provided in MCC .7330, the approval of a Conditional Use shall expire two years from the date of issuance of the Board Order in the matter, or two years from the date of final resolution of subsequent appeals, unless: . . .

FINDING: MCC 11.15.7107 states that MCC 11.15.7110 (C) does not apply to mineral extraction conditional use applications like the one filed in this case.

D. A Conditional Use permit shall be issued only for the specific use or uses, together with the limitations or conditions as determined by the Approval Authority. Any change of use or modification of limitations or conditions shall be subject to approval authority approval after a public hearing.

FINDING: The conditional use permit issued in this case is issued for the specific use sought by the Applicant. Any change of use or modification of limitations or conditions shall be subject to approval authority approval after a public hearing.

E. The findings and conclusions made by the approval authority and the conditions, modifications or restrictions of approval, if any, shall specifically address the relationships between the proposal and the approval criteria listed in MCC .7120 and in the district provisions.

FINDING: MCC 11.15.7107 states that MCC 11.15.7110 (E) does not apply to mineral extraction conditional use applications.

MCC.7115 - Conditions and Restrictions: The approval authority may attach conditions and restrictions to any conditional use approved. Conditions and restrictions may include a definite time limit, a specific limitation of use, landscaping requirements, off-street parking, performance standards, performance bonds, and any other reasonable conditions, restrictions or safeguards that would uphold the purpose and intent of this chapter and mitigate any adverse effect upon the adjoining properties which may result by reason of the conditional use allowed.

FINDING: During the hearing of this application the Hearings Officer asked the Applicant and Opponents to comment on the meaning of MCC .7115. The version of MCC .7115 discussed and included in the County's listing of applicable criteria, however, contained the following language at the beginning of the section, which was the cause of the discussion and ambiguity in the meaning of the section: "Except as provided for Mineral Extraction and Processing activities approved under MCC .7305 through .7325 and .7332 through .7335." The quoted language was, however, repealed by Multnomah County Ordinance No. 804 and the section is now unambiguous. The Hearings Officer finds, however, that the section does not apply to the pending application as MCC 11.15.7107 provides that mineral extraction conditional uses are exempted from the provisions of this code section.

Conditional Use Approval Criteria: MCC 11.15.7120 (General): (A) A Conditional Use shall be governed by the approval criteria listed in the district under which the conditional use is allowed. If no such criteria are provided, the approval criteria listed in this section shall apply."

(B) "... Proposals for mineral extraction and processing shall satisfy the criteria of MCC .7325."

FINDING: Subsection (B) of MCC .7120 was repealed by Multnomah County Ordinance No. 804. MCC .7107 also provides that no portion of MCC .7120 applies to review of mineral extraction conditional use applications.

MCC 11.15.7315 - Purposes

The purposes of the Mineral Extraction section are to promote the public health, safety and general welfare through the protection of mineral and aggregate resources in accordance with LCDC Statewide Planning Goal #5 and the Multnomah County Comprehensive Plan. The regulations are designed to:

- (A) Recognize mineral and aggregate resource extraction as a land use influenced largely by the location of the natural resource and the location of the market;

- (B) Provide maximum flexibility for location of the extraction process within a variety of underlying zones, while at the same time minimizing potentially adverse effects on the public and property surrounding the extraction site;
- (C) Recognize mineral and aggregate resource sites which receive an ESEE designation for protection as being appropriate for extraction operations when in compliance with MCC .7325 - .7332.
- (D) Recognize mineral extraction as a temporary use dependent to a large degree upon market conditions and resource size and that reclamation and the potential for future use of the land for other activities must also be considered.

FINDING: The Hearings Officer has reviewed this application with the purposes stated in this section in mind. The Angell Brothers site has been determined to be an appropriate site for mining activity by the County subject to compliance with the following criteria.

Mineral Extraction (CU): MCC .7325 - Criteria for Approval: The approval authority shall find that:

- A. **MCC 11.15.7325(A): The site is included on the inventory of protected aggregate and mineral resource sites in the Comprehensive Plan.**

FINDING: This criterion is satisfied because the Angell Bros. site is included on the PAM inventory in the Comprehensive Plan. The West Hills Reconciliation Report concludes the entire 397 acre Angell Brothers property is a significant Goal 5 Mineral and Aggregate site based upon location, quality and quantity [pg IV-7, Reconciliation Report].

- B. **MCC 11.15.7325 (B): There is a proposed reclamation plan which will allow the property to be utilized as provided in the Comprehensive Plan and underlying district.**

FINDING: The Applicant has provided a proposed Reclamation Report as Chapter IV of the Operating and Reclamation Plans for Angell Bros. Quarry: Multnomah County, Oregon (Exhibit G, Appendix). The Reclamation Plan (Applicant Exhibit G-1) requires the site to be reclaimed to a condition that will support forest uses, consistent with the CFU zone. The Reclamation Plan was approved by DOGAMI by issuance of an Operating Permit (Applicant Exhibit H) in March of 1996 with thirteen conditions. Conditions 4, 9, 10, 11 and 12 require specific measures for successful reforestation. The Conservation Easement granted to The Friends of Forest Park requires that Western Oregon old growth conditions be maintained in Scenic Buffer Areas and in the Preserves, which is consistent with the CFU zone. The West Hills Reconciliation Report, the comprehensive plan document that governs this mineral and aggregate extraction application indicates that the property should be reclaimed so that it will enhance wildlife values and support forest vegetation. The Applicant has committed to conduct a reclamation plan which DOGAMI

has determined will allow for revegetation with forest vegetation. This fact is not particularly remarkable, however, as DOGAMI representative Frank Schnitzer opined that even mines that are not reclaimed support forest vegetation. The return of forest vegetation to the site will, thereafter, enhance wildlife values. Further, the grasses and open areas that will exist on the site prior to reforestation will provide food for deer and other wildlife.

C. **MCC 11.15.7325 (C)**: The applicant has shown that the standards of this section, or site-specific requirements adopted as part of a comprehensive plan amendment, can or will be met by a specified date.

FINDING: MCC 11.15.7325 (C) allows the Applicant to choose how to demonstrate compliance with this code section. The Applicant may establish that the standards of MCC 11.15.7325 (C) are met *or* that the site-specific requirements adopted as part of a comprehensive plan amendment can or will be met by the Applicant by a specified date.¹

Site-Specific Requirements: The Hearings Officer finds that the Applicant has not met its burden of proving that all of the site-specific requirements adopted as part of the comprehensive plan amendment which applies to the Angell Brothers site can or will be met by the Applicant by a specified date. This conclusion is supported by the following findings of fact and conclusions of law:

The comprehensive plan amendment relevant to this review is the West Hill Reconciliation Report, Revised May 1996, Exhibit C-4 of this application. The Applicant argues that MCC 11.15.7325 (C) is satisfied because the requirements of the Program to Achieve the Goal contained under the Angell Brothers Aggregate

¹It appears to the Hearings Officer that the County may have intended to require compliance with the Report *and* the subsections of Section C because the Section C contains code provisions, such as limitations upon hours of operation, which state that they apply any time there is no provision in the Report relating to the same matter. Further, it seems unlikely to the Hearings Officer that the County intended to provide no limitation upon mining hours for the Angell Brothers mine site. The Hearings Officer does not, however, have the ability to strike the word "or" and substitute the word "and" in this section so has applied the section as written. Goosehollow Foothills League v. City of Portland, 117 Or App 211, 843 P2d 992 (1992); 1000 Friends of Oregon v. Wasco County Court, 299 Or 344, 703 P2d 207 (1985); West Hills & Island Neighbors v. Multnomah County, 68 Or App 782, 683 P2d 1032, rev. den. 298 Or 150 (1984). The provisions of this section must, however, be disregarded where they cause a violation of requirements of the comprehensive plan (Reconciliation Report), which could be the case if the zoning ordinance is allowed to authorize operations that violate Report requirements. In such instances, relevant plan policies must take precedence. Reeves v. Yamhill Co., 132 Or App 263, 888 P2d 79 (1995); Baker v. City of Milwaukie, 271 Or 500, 533 P2d 772 (1975).

heading are legally enforceable obligations. The Applicant claims that these site-specific requirements include the 200 foot setbacks, the restriction on mining in the North Angell Brother Stream watershed, and the directives to minimize impacts on scenic views, watersheds and wildlife habitat and to minimize the amount of disturbed area at any one time. The Hearings Officer agrees that the requirements listed by the Applicant are site specific requirement but finds that there are other site-specific requirements in the Reconciliation Report that were not addressed by the Applicant which further define what is meant by the vague directives cited by the Applicant from the program to meet the goal section of the Report.

The Hearings Officer did not find a definition for the term “site-specific requirements” in the County’s land use regulations or in the Goal 5 regulations adopted by LCDC.² Lacking such a definition, the Hearings Officer applied a dictionary definition of the term and reviewed the Reconciliation Report to locate provisions of the Report that were stated as requirements for the mine mentioned in the report. These requirements were found in Chapters IV and VI of the Report. Chapter VI contains broad, sweeping requirements and Chapter IV contains the mine operator’s commitments to operate in a manner that will achieve these broad objectives. Chapter IV also contains provisions that were written as prohibitions and directives to the mine operator. For instance, Chapter VI requires that the mine operator “best enhance wildlife values” and “minimize the area mined at any given time.” If the Hearings Officer were to apply these goals without regard for the details found in Chapter IV, the Hearings Officer could impose *whatever measures* she believes best enhance wildlife values, preserve views and minimize the area mined. This is not, however, what is envisioned by the Goal 5 program nor by the Applicant.³ Further, OAR 660-16-010(3) requires that the mechanisms used by the County to limit conflicting uses, as done for the Angell Brothers site, “must designate with certainty . . . what specific standards or limitations are permitted on the permitted and conditional uses and activities for each resource site.” This administrative rule also requires that “[w]hatever mechanisms are used, they must be specific enough so that affected property owners are able to determine what uses

²The Hearings Officer referred to the Goal 5 rules in effect when the Angell Brothers application was approved by the County, not the current Goal 5 rules.

³At numerous times throughout the record of this matter, the Applicant has correctly claimed that the Hearings Officer must allow the Applicant to proceed with mining if the conditions of the Report are satisfied and County ordinance requirements are met by the mine plan. The Applicant has also correctly stated that the Hearings Officer may not impose more rigorous standards upon the mine operator than contemplated by the Report and mining ordinance, even where documented public problems exist. The “flip side” of this argument is, however, that the Hearings Officer also lacks the authority to excuse the Applicant from Plan and ordinance requirements.

and activities are . . . allow conditionally and under what clear and objective conditions or standards.” Based upon the foregoing findings, the Hearings Officer finds that the site-specific details relied upon by the County in Chapter IV in assessing the impacts of the mining operation upon conflicting resource uses are site-specific requirements which, if and when met by the Applicant, entitle the Applicant to mine the expansion area of the subject property.

Further, the Hearings Officer is bound by Oregon law to require that the mitigation measures described in the Report are undertaken as promised by the Applicant. Chapter IV lists commitments made by Angell Brothers with respect to mining operations in the land use approval process. These commitments were made in order to demonstrate compliance with the approval criteria for a site-specific land use application to obtain designation of the expansion area of the Angell Brothers site as a Goal 5 resource site. The Land Use Board of Appeals has determined that such applicant commitments are binding upon applicant’s once the land use approval is granted even if not specifically required by conditions of approval. Wilson Park Neighborhood Assn. v. City of Portland, 27 Or LUBA 106, remanded on other grounds, 129 Or App 33 (1994); Perry v. Yamhill County, 26 Or LUBA 73, aff’d 125 Or App 588 (1993); Friends of the Metolius v. Jefferson County, 25 Or LUBA 411 (1993). In this case, the Applicant made a commitment to mine and reclaim the site in a specific manner which would minimize impacts upon other protected resources, primarily by early reclamation of the site. Since that time, the mining plan has been changed to a plan that leaves large mined areas open and unreclaimed beyond County ordinance time frames. While the Hearings Officer understands that DOGAMI and the Applicant have determined that the prior plan was not practicable, the Hearings Officer cannot find, on this record, that the new plan complies with the site-specific requirements listed in Chapters VI and IV of the Report.

The Hearings Officer reviewed the West Hills Reconciliation Report to determine what site-specific requirements are contained in the Report. A listing of a number of the requirements found in the Report is found in **Appendix A**⁴ of this decision and is included for possible use by the County Board in its review of this application. The Hearings Officer then reviewed the pending land use application to determine whether it complies with the Report or whether it can comply with the Report by a specified date.

⁴This list is not exhaustive. It was developed to aid the Hearings Officer in reviewing the application for compliance with ordinance provisions that require compliance with site-specific requirements.

This review revealed that the following differences between the requirements of the Report and the plan proposed by the Applicant:⁵

- A. The application calls for the movement of the primary crusher uphill from its present location and for the continued movement of the crusher up the valley as mining progresses. [p. 19, Response to Approval Criteria] The Report, however, states that the “principal processing, weighing and loading facilities will remain at their present location and will be screened from public view by the Block 4 vegetated buffer strip.” [p.IV-15]
- B. The application abandons the concept of concurrent reclamation and the reclamation of each bench as mined. This is clear from the Applicant’s Response to Approval Criteria which indicates that “[a]lthough certain benches within Phase 1 will be reclaimed concurrently with mining, the majority of the benches will have to be left open to accommodate haul road and overburden stockpiles from Phase 3. As explained above, mining occurs in a similar fashion in Phase 2, to accommodate later mining in Phase 4.”[p. 19, Response to Approval Criteria] The Applicant also states that “[t]otally sequential reclamation will not begin until mining commences in Phase 3.”[p. 20, Response to Approval Criteria]

The goal reconciliation portion of the Reconciliation Report requires that the reclamation plan be a sequential mining plan which minimizes the amount of disturbed area at any one time and includes simultaneous reclamation [p.VI-17, 18, 25]. The site-specific analysis of the Angell Brothers mine further explains that the Applicant committed to begin reclamation upon the completion of mining on any given bench by recontouring and ripping the bench and adjacent sidewall [p.IV-13] and to provide “early visual screening” of the upper benches “immediately” following mining of the upper benches [p. IV-14]. The Applicant has not convincingly demonstrated that its plan will or can meet these standards by a specified date.

- C. The Conflict Resolution portion of the Reconciliation Report states that “[m]ining on the Angell Brothers site should not take place within the

⁵The Hearings Officer viewed the statement provided by Mr. Parisi in his discussion as the reclamation plan as the final word regarding the Applicant’s plans regarding the timing of reclamation and phasing. This was because the Hearings Officer found little, if any information on this point in the Reclamation Plan document that the Applicant identified as Exhibit G of its application and the December 1995 plan conflicts with Mr. Parisi’s recent discussion of the plan.

North Angell Brothers Creek watershed” [p. VI-16] and that expansion “should be allowed except for . . . the North Angell Brothers creek watershed.” [p.VI-17] Further, the Stream Resources section of the Report, Section III, states that the North Angell Brothers Creek could be impacted by expansion of the mine operation into the creek’s watershed. The program to achieve the goal, on p. VI-22 & 23 also indicates that Preserves encompass the North Angell Brothers stream drainage and that the preserves will not be mined by the Applicant. [p. VI-23] The locations of the preserves are not detailed in the Report. The map on Page III-143 of the Report, however, delineates the boundaries of the North Angell Brothers watershed and the location of the North Angell Brothers Creek. The North Angell Brothers creek does not include the tributary of that creek which was identified by the Opponents of this application as a part of the creek. The map on Page III-143, however, shows that the North Angell Brothers watershed includes lands that will be mined by the Applicant if this application is approved as proposed on Sheets 1 -4 of the Applicant’s Operating Plan. Further, the photographs submitted by Opponent Seth Tane confirm that the Applicant proposes to mine inside the watershed boundary of the North Angell Brothers Creek shown on the Report map.⁶

The Applicant claims that the site-specific requirements of the comprehensive plan amendment (the Report) have been “developed further” in the reclamation plan submitted with this application, DOGAMI Operating Permit and the Conservation Easement. The Applicant has not demonstrated, however, that it is permissible for it to amend a comprehensive plan in this manner and to do so would violate basic tenets of Oregon land use law. As a result, these further developments are irrelevant to determining compliance with MCC 11.15.7325 (C).⁷ Changes authorized in approvals obtained from governmental agencies that do not have responsibility for land use planning do not amend the comprehensive plan (the Reconciliation Report).

⁶The Hearings Officer notes that the program to achieve the goal for significant streams requires the County to adopt laws to create SEC overlay zones of 600 feet in width, based upon the centerline of significant streams, in order to protect the stream resource. No section of the stream resource program to achieve the goal, however, includes any limitations on mining of the Angell Brothers site. The mining program to achieve the goal, however, states that the Preserve areas will include the North Angell Brothers stream drainage. [p.VI-23]

⁷The Report references some of the cited documents, particularly the Conservation Easements, as a means of complying with Report requirements. To the extent these documents are incorporated into the Report, they were considered in determining compliance with the Report.

nor alter the land use review requirements of MCC 11.15.7325 (C). A comprehensive plan amendment is required to effectuate such a change. Further, the DOGAMI permit indicates states that “[i]ssuance of this permit is not a finding of compliance with state-wide planning goals or the acknowledged comprehensive plan.” The permit further cautions that “[the applicant must receive land-use approval from local governments before using this permit.]”

Based upon the foregoing findings, the Hearings Officer finds that the Applicant has not met its burden, under MCC 11.15.7325(C), of showing that the mining operations plan and revised reclamation plan can or will meet the requirements of the Report. The Hearings Officer therefore, must review the subsections of MCC 11.15.7325 (C) listed and discussed below.

Compliance with Requirements of MCC 11.15.7325 (C)

5. Access and traffic.

- a. **“Prior to any surface mining activity, all on-site roads used in the mining operation and all roads from the site to a public right-of-way shall be designed to accommodate the vehicles and equipment which will use them.”***[MCC 11.15.7325 (C)(1)(a)]*

FINDING: This criterion is satisfied. All new on-site roads will be cut out of basalt benches and will be at least 40 feet wide to accommodate the largest piece of equipment used on the site, a D-9 Caterpillar (see Operating and Reclamation Plan, Applicant Exhibit G-2, pp. 13 - 15). Further, the record shows establishes that the soils and rock in the area are sturdy enough to prevent significant rock and soil slides and to provide a stable surface for heavy equipment traffic.

No changes to any public right-of-way are planned as a result of this application. There are no roads between the site and Highway 30, the road that provides access to the site. The mine operator holds an easement across property owned by Ray Adams. The Applicant does not plan to develop this road for site access and has agreed that it will not use the easement for mine-related traffic is not authorized by this approval. As a result, the Hearings Officer did not review the adequacy of this easement for mining traffic use. Use of this road will be prohibited by the conditions of approval of this application to assure that this access will not be used unless and until such time as a new land use approval is obtained which reviews and authorizes the use.

- b. **All on-site and private access roads shall be paved or adequately maintained to minimize dust and mud within 100 feet of a public**

right-of-way or 250 feet of dust sensitive land use. [MCC 11.15.7325 (C)(1)(b)]

FINDING: The only access road to the site is paved for approximately 1,200 feet from the intersection of Highway 30. As shown on the water rights map in of the Operating and Reclamation Plan, no mining activity will occur within 100 feet of a public right-of-way, and there are no dust sensitive land uses within 250 feet of the site.

- c. **“No material which creates a safety or maintenance problem shall be tracked or discharged in any manner onto any public right-of-way.” [MCC 11.15.7325 (C)(1)(c)]**

FINDING: Opponents and the Applicant presented evidence that rocks, dirt and clay from the mine site find their way onto Highway 30. Opponents testified that the mine operator has refused to clean up mined materials dropped onto the highway or to take measures to prevent the discharge of materials onto the highway. The Opponents submitted testimony which indicates that the clay is slippery and creates hazardous driving conditions on the highway. The Applicant claims that these problems have been remedied by the construction of dry well on the property, construction of a new entrance which drains the haul road better, paving of 1,200 feet of the haul road, installation of a cattle guard at the entrance to collect rocks and mud from truck wheels and the purchase of a new water truck and mechanical sweeper truck. The Hearings Officer is not convinced that these measures will prove efficacious given the fact that none of the control measures involve containment of loads within the trucks by the truck operators. As a result, the Hearings Officer has required continued compliance with this section of the zoning ordinance throughout the life of the mine and has written a provision which authorizes the County to require the covering of loads if the County documents the existence of a problem through code or conditional use permit enforcement proceedings.

- d. **“The applicant shall submit all traffic information and traffic management plans required in any site specific Comprehensive Plan Program. The County Engineer shall review the submitted plans and shall certify, based on findings relating to the Multnomah County Rules for Street Standards, that the roads appropriately identified in the Plan:**

FINDING: This section does not apply to this application as the site specific comprehensive plan program for the Angell Brothers site does not require that traffic information and traffic management plans be submitted by the Applicant.

- e. **If there are no traffic management requirements in the site-specific Comprehensive Plan Program requirements, the applicant shall identify the most commonly used routes of travel from the site.**

FINDING: There are no traffic management requirements in the site-specific Comprehensive Plan Program requirements related to the Angell Brothers mine site. The Applicant claims that subsection (e) does not apply to the Angell Brothers site because subsection (e) applies only to situation where traffic issues exist. This argument is not supported by the text of this code section. Further, the quoted language is clear and unambiguous and requires the Applicant to identify the most commonly used routes of travel from the site. The Hearings Officer lacks the authority to interpret an unambiguous code provision to add limitations and qualifications that do not exist in the text. *Goosehollow Foothills League v. City of Portland*, 117 Or App 211, 843 P2d 992 (1992); *1000 Friends of Oregon v. Wasco County Court*, 299 Or 344, 703 P2d 207 (1985); *West Hills & Island Neighbors v. Multnomah County*, 68 Or App 782, 683 P2d 1032, rev. den. 298 Or 150 (1984). The Applicant identified Highway 30 and no other area road as the most commonly used route.

The Applicant argues that a traffic management decision was made in the Reconciliation Report and that, therefore, the Applicant does not need to comply with the requirements of this section. This is not, however, what this section says. MCC 11.15.7325(C) allows the Applicant to avoid proving compliance with the traffic standards of this subsection if the Applicant's mine operations are conducted in compliance with the terms of the Reconciliation Report, but a similar waiver does not apply when, as here, the Applicant seeks to justify mine operations by showing that its plan complies with the subsection requirements of MCC 11.15.7325(C).

The Hearings Officer also reviewed Policy 16-B, Section M of the County's Comprehensive Plan to determine whether the policy would excuse the Applicant from complying with the requirements of the PAM district. The section states that "[t]he County shall impose conditions on surface mining when necessary to lessen conflicts identified as part of a site-specific Goal 5 analysis. Where such conditions conflict with criteria and standards in the Protected Aggregate and Mineral Resources Overlay, the conditions developed through the Goal 5 process shall control. In the case of traffic, there is no need to impose conditions on the surface mining to lessen conflicts identified in the site-specific Goal 5 analysis, so there is no conflict with this section of the PAM overlay zone.

The County Engineer shall certify, based on findings relating to the Multnomah County Rules for Street Standards, that the applicant has identified the appropriate roads, and those roads:

- i) **Are adequate to safely accommodate any additional traffic created by the extraction operation for the duration of the activity, or**

FINDING: The County Engineer has not certified that the Applicant has identified the appropriate roads. Instead, the County Engineer has indicated that he believes that the Applicant should address traffic impacts on Newberry Road as a part of this application. **Exhibit H-1.** A portion of Newberry Road is located within the impact area for the Angell Brothers mine, as shown on Map 84, Ordinance No. 858, **Exhibit C-3** of the record and, therefore, is a relevant matter for consideration in the review. Further, there is overwhelming evidence in the record, from the Applicant and the Opponents, that Newberry Road is one of the most commonly used roads for mine-related traffic. This is because the road provides a major shortcut to areas of the community that are undergoing extensive growth and development.

The Applicant has argued that approval of this application will not generate “additional traffic” because there is an existing mining operation on the site. The Hearings Officer notes, however, that the approval of this application will create additional truck and vehicle traffic directly related to the mining operation over the life of the mine when compared to the amount of traffic that would be generated over the life of a mine on the existing site. Further, evidence in the record indicates that the Applicant may already be mining in the expansion area. Of particular note is the fact that Skip Anderson pointed to the expansion area when asked to show where the principal crusher and mining operations are presently occurring. If such is the case, the traffic that is presently occurring on area roads should be attributed to the proposed extraction operation.

- ii) **If the roads are inadequate to safely accommodate any additional traffic created by the extraction operation for the duration of the activity that:**
- **The applicant has submitted a traffic management plan that is sufficient for the County Engineer to make relevant findings regarding necessary road improvements;**
 - **The applicant has committed to financial installation of the necessary improvements under the provisions of 02.200 (a) or (b) of the Multnomah County Rules for Street Standards; and**
 - **A program has been developed for the numbers and weight of trucks from the site that can safely be accommodated at specific levels of road improvement. Based upon those findings, the Hearing Authority may attach related conditions and restrictions to the conditional use approval. [MCC 11.15.7325 (C)(1)(e)]**

FINDING: The County Engineer’s comments indicate that Newberry Road, a County road located within the impact area of the mine site, is inadequate to

safely accommodate additional traffic created by the extraction operation. This conclusion is supported by the substantial evidence (written and verbal testimony, videotapes and photographs) submitted by the Opponents which indicates that Newberry Road is of inadequate width and design to safely accommodate heavy truck traffic. Trucks must cross over the center line of the road to negotiate turns and numerous, documented grave truck accidents have occurred on the road. Applicant claims that it is not required to comply with MCC 11.15.7325(C)(1)(e) for a number of reasons, including the fact that no County roads are used for access to the site. A road does not, however, need to be a County road in order to be considered under MCC 11.15.7325(C)(1)(e). While the road must be reviewed for adequacy under County street standards, the road itself does not need to be a County road.

The Applicant has not submitted a traffic management plan to address these legitimate concerns. This must be accomplished prior to commencement of mining operations⁸ and has been required as a condition of approval. As a determination whether the Applicant has complied with this condition of approval will require the exercise of discretion, it is a land use decision which must be handled as such by the County and Applicant, with notice and an opportunity for a hearing.⁹

The Applicant's September 25, 1996 submittal claims that "some condition to mitigate perceived traffic problems will be drafted in a form that will violate the "rough proportionality" standard of Dolan v. City of Tigard." The Applicant then states that "it must be obvious that an attempt to impose a condition . . . along the lines that Angell Bros.' trucks are prohibited from using one or more of the commonly used routes would create a serious Dolan problem." Quite to the contrary, however, local governmental traffic regulations are not subject to the Dolan decision's "rough proportionality" test. In order to be subject to scrutiny under Dolan, an condition of approval must impose a taking of a property interest as the Dolan case is based upon the Takings Clause of the Fifth Amendment of the US Constitution. The case of Clark v. City of Albany, 137 Or App 293, 904 P2d 185 (1995) cited by the Applicant settles the matter *against* the Applicant. In that case, the Oregon Court of Appeals held that "not all conditions of approval

⁸If the Applicant has, in fact, already commenced mining operations, those operations should be halted until such time as all conditions of approval that are a precondition of mining approval in the expansion area are satisfied.

⁹It is hoped that if this decision is appealed, as anticipated, the Applicant may choose to comply with the requirements of the section by supplying the needed plan and information, in which case the condition of approval developed to assure compliance with this section should be deleted.

come within the ambit of the Dolan test” and that matters that are essentially traffic regulations are not exactions and are not subject to the Dolan test. Clark, 137 Or App at 300-301.

Further, the Hearings Officer has not yet imposed any conditions that require road improvements or the dedication of road right-of-way, conditions that would be subject to Dolan review. It is possible that the County’s review and the Applicant’s study will determine that no exactions are needed to assure compliance with the standards of MCC 11.15.7325 (C)(1)(e). If and when the County determines that exactions must be imposed to assure compliance with this subsection, Multnomah County will bear the burden of demonstrating that the conditions are “roughly proportional” to the impact of the mining operation’s traffic on County roads. Given the significant and documented impact of the operation on area roads, including Newberry Road, it seems likely that the County will be able to justify some road system related exactions under this section. The Hearings Officer also notes that the Applicant may choose to avoid the requirements of this section and any potential exaction for road improvements by demonstrating compliance with the Report, as the Report does not require road improvements to any area road.

2. Screening, landscaping and visual appearance. [MCC 11.15.7325 (C)(2)]

- a. All existing vegetation and topographic features which would provide screening and which are within 100 feet of the boundary of the proposed area of extraction shall be preserved.**

FINDING: The screening criteria in Subsection (a) are satisfied because all existing vegetation and topographic features within 200 feet of the extraction boundary will be preserved. This is twice the required minimum of 100 feet. There will be no logging or extraction in the Scenic Buffer Areas, in the Preserves or in any of the setbacks.

- b. If the site-specific Goal 5 analysis determines that existing vegetation and topography is insufficient to obscure the site from any key viewing areas and corridors, then measures as identified in the Goal 5 analysis to reduce or eliminate conflicts shall be implemented. Methods of screening may include landscape berms, hedges, trees, walls, fences or similar features. Any required screening shall be in place prior to commencement of the extraction activities.**

FINDING: The site-specific Goal 5 analysis, contained in Chapter IV of the Report,¹⁰ determines that existing vegetation and topography is insufficient to obscure the site from all key viewing areas and corridors. The Goal 5 measures needed to reduce the conflict with scenic resources include contemporaneous reclamation to promote early visual screening of benches immediately following mining of the upper benches [p. IV-14]; retention of all vegetation along Highway 30 [p.IV-14]; significantly increasing the length of a lower gradient reclaimed channel and increasing in acreage the final pit floor to allow construction of riparian habitat and wetlands along the pit floor; direct haul back of reclamation materials to retain maximum viability of topsoil and establishing the third type of typical bench configuration “wherever possible.” The Report also indicates that the existing land contours will be retained and that the principal processing, weighing and loading facilities will remain at their present location. [p. IV-15].

The Applicant’s operating plan complies with the requirement that all vegetation along Highway 30 be retained. There is, however, evidence to indicate that the upper benches may not be reclaimed immediately upon conclusion of mining the upper benches and compliance with the other listed requirements was not addressed by the Applicant. This subsection, therefore, requires the Applicant to comply with the requirements of the Goal 5 analysis relating to Scenic Views found on page IV-14 through IV-16 of the Report, including its requirements for immediate reclamation. Such compliance has been required as a condition of approval. As determination of compliance with this standard involves the exercise of discretion, it is a land use decision which must be made in compliance with notice and hearing opportunity requirements.

The McNamee Neighbors requested that the Hearings Officer require the Applicant to provide screening for the McGrew, Wruble, Adams, Rugh, Long and McCurdy residences. The Hearing Officer lacks authority to require this screening under this section of the County’s ordinance as these residences are not identified in the Reconciliation Report as key viewing areas or corridors.

¹⁰Section IV contains the analysis required by Goal 5. This is particularly evident from the fact that the Scenic Views section referenced by the Hearings Officer is found in a section entitled “Resource Analysis.” Section VI contains the County’s program to meet the goal, a program required as a result of the analysis which balances and reconciles conflicting resource values. This section might also be viewed as a part of the analysis but its provisions do not contain measures to protect scenic views not listed in Section IV.

- c. **The Approval Authority shall grant exceptions to the screening requirements if :**
- i) **The proposed extraction area is not visible from any key viewing areas and corridors identified in (b) above, or**
 - ii) **Screening will be ineffective because of the topographic location the site with respect to surrounding properties, or**
 - iii) **The area is part of the completed portion of a reclamation plan.**

FINDING: The Applicant has demonstrated that screening of the type described in subsection (b) of MCC 11.15.7325(C)(2) (landscape berms, hedges, trees, walls, fences or similar features which may be in place prior to commencement of extraction activities) will be ineffective because of the topographic location of the site with respect to surrounding properties. The Hearings Officer is, therefore, required to grant an exception to these screening requirements. The screening measures identified in the Report, however, will not be ineffective and, therefore, must be provided as required by the Report.

3. **Signing:** Signing shall be controlled by the standards of MCC .7932 (A)-(D), except that only one sign for each point of access to each differently named improved street may be allowed for any operation not in a GC, EC, LM, GM, HM, C-2, M-4, M-3, M-2, and M-1 district. [MCC 11.15.7325(C)(3)]

FINDING: The Applicant has not proposed any new signing for the mineral extraction operation.

4. **If no hours and days of operation are contained in the site-specific Comprehensive Plan Program, the following shall apply:**
- a. **Operating hours shall be allowed from 7:00 am to 6:00 PM. No operations shall be allowed on Sundays or on New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, and Christmas Day.**

FINDING: The Applicant's operating hours in the expansion area must comply with the limitations of this section. The Applicant has requested that the Hearings Officer allow it to operate 20 hours per day but has not cited any legal authority to support its request to a blanket variance from the standards of this ordinance. In the absence of any such legal authority, the Hearings Officer must decline to approve the Applicant's request.

- b. **Blasting shall be restricted to the hours of 9:00 am to 5:00 PM. No blasting shall be allowed on Saturdays, Sundays or on New Year's**

Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, and Christmas Day.

FINDING: The Applicant must comply with the blasting hours & days restrictions contained in this section.

- c. Short-term exceptions to the hours and days of operation may be approved pursuant to the provisions of MCC .8705. [MCC 11.15.7325 (C)(4)]**

FINDING: The Applicant has requested a blanket exception to operating hours, not a short-term exception. If the Applicant requires a short-term exception, it may seek one by following the provisions of MCC 11.15.8705.

5. Air, water, and noise quality.

- a. The applicant shall obtain and comply with the standards of all applicable emission discharge permits from the Department of Environmental Quality. Copies of all required permits shall be provided to the county prior to beginning mining.**

FINDING: The Applicant has obtained a DEQ Air Contaminant Discharge Permit. The Applicant has provided the County with a copy of the required permit and the permit is included in the record of this matter.

The DEQ Air Contamination Discharge Permit expires May 1, 2001. Compliance with the Air and Water requirements of this section will be met as long as the necessary DEQ permits remain valid and the Applicant complies with permit requirements. Therefore, prior to commencing expansion of mining activities and prior to the expiration date of the existing or subsequent air contamination permits, the Applicant shall submit copies of approved permits for continued operation to the County to ensure the expansion area continues to be permitted and so that the County may verify that mine operations comply with applicable emission discharge permits.

- b. The applicant shall obtain and comply with the standards of all applicable waste water discharge permits from the Department of Environmental Quality. Copies of all required permits shall be provided to the county prior to beginning mining.**

FINDING: The Applicant has obtained a DEQ Storm Water Discharge Permit. A copy of the permit is included in the record of this

application. According to Paul Kieran of DEQ, the Applicant will need to obtain DEQ approval of an amendment to this permit to authorize mining in the expansion area. Additionally, the Stormwater Discharge Permit expires December 31, 1996. Compliance with the waste water requirements of this section will be met as long as the necessary DEQ permits remain valid and the Applicant complies with permit requirements. Therefore, prior to commencing expansion of mining activities and prior to the expiration date of the existing or subsequent waste water permits, the Applicant shall submit copies of approved waste water permits for continued operation of mining in the expansion area to the County to ensure the expansion area continues to be permitted and so that the County may verify that mine operations comply with the waste water permits.

- c. **Sound generated by an operation shall comply with the noise control standards of the Department of Environmental Quality. Compliance with the standards can be demonstrated by the report of a certified engineer. Methods to control and minimize the effects of sound generated by the operation on noise sensitive uses existing or approved (valid action or administrative decision) on the date of application may include, but not be limited to, the installation of earth berms, equipment location, limitations on the hours of operation, and relocation of access roads.**

[MCC 11.15.7325 (C)(5)]

FINDING: The noise control criteria in (c) above is satisfied by virtue of the September 25, 1992 Report of Daly Standlee & Associates (Exhibit K of the Application) and the supplemental letter dated June 10, 1994 (Exhibit L of the Application). The report measured actual sound pressure levels at each of the four residences closest to the quarry. During this test, sound from the quarry was not audible at any of the residences. However, the engineer derived projections of future sound levels that might be present during expansion using worst-case assumptions. The Report concluded that no violations would occur during Phases 1 and 2, even if no protective measures were employed. The Report also concluded that if the existing excavator proceeded to a location that was in a direct line of sight with the residences and at the closest possible location to the residences, extremely minor violations (i.e., 1 dBA above DEQ standards) would occur at residence No. 2 during Phase 3 and at residences No. 1, No. 3 and No. 4 during Phase 4 unless the excavator exhaust was muffled. Replacing the factory-installed industrial grade muffler with a residential-grade muffler would reduce the sound pressure level to meet DEQ standards. In the meantime, Angell Bros. has replaced the excavator with a new Komatsu excavator which has a factory certified sound pressure level that qualifies under DEQ standards with no equipment modifications. The Supplemental Kerrie Standlee letter report and

hearings testimony (Exhibit L) confirms that no further equipment modifications are needed.

The Opponents raised concerns that Mr. Standlee had not considered the exact, current locations of existing homes in his noise study. This is true, but the evidence indicates that the home locations were moved a short distance. Mr. Standlee considered this movement and then testified that movement of the homes would not affect the conclusion of his noise study. The Hearings Officer finds this testimony persuasive. Further, the Hearings Officer finds that Mr. Standlee's evidence in this matter appears to be objective, given the fact that he initially determined that the mining operation did not comply with DEQ noise standards. This determination caused the mine to change its operations to then comply with DEQ standards.

The Opponents also noted that the location of the present mining operation is further from noise sensitive uses in the impact area. While this is true, Mr. Standlee's testimony and evidence also studied the impact of mine noise when the mine is closest to these uses and determined that the mine noise would not violate DEQ standards. The Hearings Officer accepts this determination.

Noise control measures are not needed to control or minimize the effects of sound generated by the operation under subsection (c) as the Hearings Officer is satisfied that DEQ noise standards will be met by the Applicant. A condition of approval requiring compliance with DEQ noise standards over the life of the mining operation has been included in this decision, however, to give the County the clear ability to revoke the Applicant's conditional use permit if its mine operations exceed DEQ standards.

(1) Fish and wildlife protection: Fish and wildlife habitat, water bodies, streams, and wetlands inventoried in the Comprehensive Plan shall be protected according to the program contained in the Comprehensive Plan. [MCC 11.15.7325 (C)(6)]

FINDING: These criteria are not satisfied as the program contained in the comprehensive Plan is not met by the Applicant's mining and reclamation plan. The Resource Protection Plan for Wildlife contains four elements:

- Minimization of the area mined at any given time.
- Demonstration that reclaimed areas are capable of supporting forest vegetation.
- Simultaneous reclamation along with mining to minimize non-vegetated areas.
- Reclamation of the site so as to best enhance wildlife habitat values. Reconciliation Report, p. VI-25.

The first directive, to minimize the area mined at any given time, is not satisfied by the Operating Plan for reasons explained above in the Hearings Officer's discussion of the differences between the Operating Plan & Reclamation Plan and the reclamation plan envisioned by the West Hills Reconciliation Report. The second directive, to demonstrate that reclaimed areas are capable of supporting forest vegetation, is satisfied by the testimony of Frank Schnitzer at the land use hearing that abandoned mine sites are capable of supporting forest vegetation without reclamation and by the reclamation requirements imposed upon the Applicant by its DOGAMI Operating Permit. The third directive, to achieve a simultaneous reclamation along with mining to minimize non-vegetated areas, is not satisfied by the current Reclamation Plan which calls for leaving large areas of the mine open and exposed for long periods of time following mining.

The discussion of the mine operations found in Chapter IV of the Report indicates that prompt reclamation of the upper benches was to occur immediately after mining to facilitate screening of the operations from key viewing areas and to provide wildlife corridors on the property. While the Hearings Officer sees merit in approaching the mine plan as currently proposed, it is not the method contemplated by the Reconciliation Report. The Hearings Officer, therefore, has required the Applicant to revise its plan to comply with this requirement.¹¹ The Applicant claims that the fourth directive, to reclaim the site so as best to enhance wildlife habitat values, is satisfied by the provisions in the Conservation Easement that exclude various portions of the property from mining and logging, by the agreement in the Conservation Easement to exclude residences in perpetuity and to turn the entire site into wildlife habitat at the conclusion of mining, and by conditions 5, 9 and 12 in the Operating Permit which minimize the environmental impacts of mining as it occurs on the site. The Applicant also notes that the Reclamation Plan proposes to create two new wetlands on the quarry floor, which will add some habitat value to the site. The Hearings Officer agrees with the Applicant's assessment of this issue but adds that prompt reclamation of the site, as required in the conditions of approval, will also assure that the Applicant's mining plan furthers wildlife habitat.

With respect to habitat, water bodies and wetlands off-site, these are primarily located within Burlington Bottoms, the east bank of the Multnomah Channel and the North Angell Bros. stream. The North Angell Brothers stream has been designated as being a significant Goal 5 resource and designated "1C" and is considered a potential conflicting use. The Rafton/Burlington Bottoms and the east bank of Multnomah Channel are also considered potential conflicting uses. [pg IV-28, West Hills Reconciliation Report, Revised -- May 1996] These resources are protected by the restriction that no mining will occur in the

¹¹The Applicant could also seek amendment of the Reconciliation Report to authorize the new approach to mining the site. This approach will require a demonstration that the new plan provides adequate safeguards for the Goal 5 protected scenic, wildlife and water resources that are affected by mine operations.

watershed of North Angell Bros. Stream and by the condition that Angell Bros. must remain in compliance with the DEQ Storm Water Permit. The Applicant has been required to comply with these restrictions as a condition of approval of this application.

(7) Setbacks:

(a) For mineral and aggregate processing activities:

- i) 200 feet to a property line, or**
- ii) 400 feet to a noise and dust sensitive land use existing or approved (valid action or administrative decision) on the date of application;**

(b) For access roads and residences located on the same parcel as the mining or processing activity, setbacks shall be as required by the underlying district; and

(c) For mineral extraction and all other activities:

- i) 100 feet to a property line, or**
- ii) 400 feet to a noise and sensitive land use existing or approved (valid action or administrative decision) on the date of application.**

[MCC 11.15.7325 (C)(7)]

Applicant: These criteria are satisfied. As shown on Exhibit G, Sheet 1, Figure 2, the setback from extraction activity is at least 200 feet to the property line, and the setback between the new location of the primary crusher (i.e. "processing activities" in MCC) and the Wruble residence, (which is the closest residence) is at least 1800 feet, over four times the required minimum of 400 feet. There are no new access roads or temporary residences in the present application, and the Conservation Easement prohibits permanent new residences.

FINDING: The Hearings Officer concurs with the Applicant's response. In addition, the criteria are clear and objective. The criteria include no provisions for requiring additional setbacks. The Mine Sequence Map (Sheet 4) submitted by the Applicant (back pocket of Operating and Reclamation Plan Document) clearly identifies the mining area and processing areas in compliance with the setbacks required by this code section. The nearest residences (Wruble, McGrew and Adams) based on the Mined Sequence Map will be a minimum of 600 feet from a proposed extraction area and well over 1,700 feet from the nearest crusher. While residential lots are located within 200 feet of the mine site, the lots themselves are not noise and dust sensitive uses. The County considers residences, but not residential yards, to be noise and dust sensitive uses and the Hearings Officer will defer to that interpretation.

1. Reclaimed Topography.

All final reclaimed surfaces shall be stabilized by sloping, benching, or other ground control methods. Reclaimed surfaces shall blend into the

natural landforms of the immediately surrounding terrain. These reclamation standards shall not apply where the Approval Authority finds that the standards conflict with the reclamation plan provided in the Comprehensive Plan or where DOGAMI finds that the standards are less restrictive than DOGAMI reclamation standards. [MCC 11.15.7325 (C)(8)]

Applicant: These criteria are satisfied by the Reclamation Plan (Exhibit G-1). The schematic version of reclaimed benches is set forth on Sheet 2 for purposes of demonstrating general slope stability, volume calculations, location of setbacks, etc. The actual appearance of the reclaimed benches is set forth in Figures 13 through 15, which demonstrate how these areas can be given random shapes, complex features, talus slopes, accelerated weathering, etc., and how they will look during reforestation.

Harmony with the "natural landforms" is shown by the comparison of overall pre-mine contours with post-mine contours, set forth in Figures 16 and 17. The overall shape of the reclaimed slopes blend in with the existing landform of the Tualatin ridge.

Sloping, benching and stability is set forth in Appendix A, The Engineering Geological Investigation. Essentially, the Investigation concluded that (1) no mass stability problems were encountered at the site; (2) the maximum final cut slopes of basalt would be 1.5:1, as required by DOGAMI regulations, and that the final cut slopes would be "unloaded," thus assuring slope stability at least as great as the existing landforms.

FINDING: The Hearings Officer concurs with and adopts these findings in support of this decision.

2. Safety and security.

Safety and security measures, including fencing, gates, lighting, or similar features, shall be provided to prevent public trespass to identified hazardous areas such as steep slopes, water impoundments, or other similar hazard where it is found that such trespass is probable and not otherwise preventable. [MCC 11.15.7325 (C)(9)]

FINDING: This criterion is satisfied by virtue of the existing fencing, gates, signage, and lighting on the northern boundary of the site, which borders Highway 30. With respect to the remainder of the site, public access is virtually impossible due to the steep terrain and the complete absence of roads connecting the site to adjacent parcels. The hiking trail recited in the Conservation Easement will not be placed on the site until mining is completed, for safety and security reasons.

3. Phasing program.

All phases of an extraction operation shall be reclaimed before beginning the next, except where the Approval Authority or DOGAMI finds that the different phases cannot be operated and reclaimed separately. [MCC 11.15.7325 (C)(10)]

FINDING: Testimony at the September 18, 1996 hearing from Frank Schnitzer of DOGAMI establishes that DOGAMI found that the different phases proposed by the Applicant cannot be operated and reclaimed separately. As a result, all phases of the extraction operation do not need to be reclaimed before beginning the next phase to satisfy this code section. The Hearings Officer's opinion on this matter is irrelevant as this section allows *either* DOGAMI or the Hearings Officer to relieve the Applicant of the phasing requirement imposed by this section. This section does not, however, relieve the Applicant of reclamation requirements imposed by the Reconciliation Report that are applicable to the mine operation and required to demonstrate compliance with other relevant land use criteria.

4. Reclamation Schedule.

The reclamation plan shall include a timetable for continually reclaiming the land. The timetable shall provide for beginning reclamation within twelve (12) months after extraction activity ceases on any segment of the mined area and for completing reclamation within three (3) years after all mining ceases, except where Approval Authority or DOGAMI finds that these time standards cannot be met. [MCC 11.15.7325 (C)(11)]

FINDING: The Applicant claimed an exception to the time standards contained in MCC 11.15.7325 (C)(11). DOGAMI supported this claim that the twelve month time standard cannot be met through their approval of the plan and evidence in the record of this case. The Applicant will, however, be required to complete reclamation within three years as the record does not establish DOGAMI determined that this time standard could not be met. Further, the Hearings Officer did not find a detailed time table in the Applicant's Reclamation Plan or Operating Plan. While the DOGAMI requires reclamation monitoring every five years, the permit allows great flexibility to the Applicant to justify areas of incomplete reclamation.

MCC 11.15.7325 (D): The proposed operation will not result in the creation of a geologic hazard to surrounding properties, such as through slumping, sliding, or drainage modifications, and have been certified by a registered soils or mining engineer, or engineering geologist as meeting this requirement.

Applicant: This criterion is satisfied for the reasons set forth [in Section 3.3.12, Applicants submittal] above (which deals with slope stability), and because any geologic hazard that might occur on the site would be contained on the Angell Bros. site itself, rather than on "surrounding properties." Also, Condition No. 10 of the DOGAMI Operating Permit requires that at the conclusion of mining in Phase 2 (which completes mining in the central core of the site and permits the greatest examination of slope stability), a slope stability investigation will have to be performed to DOGAMI's satisfaction before DOGAMI extends the Operating Permit for mining in Phases 3 and 4.

FINDING: The Applicant has submitted an "Engineering Geologic Investigation of the Angell Brothers Rock Quarry Multnomah County" revised in 1995 by Lidstone & Anderson (Registered Geologist and Registered Engineer) [Operating and Reclamation Plan, Appendix 'A']. The report concludes, "[a]lthough the probability of slope failure, other than rock topple and slope raveling, is very limited, the run out of any conceivable failure would be contained within the quarry itself due to cut slope orientation." Additionally, DOGAMI has required as a condition (Condition 10) of the June 11, 1996 Operating Permit, "[a] formal report and recommendations summarizing the data collected and geotechnical stability of the mine and reclamation area is required for the first three years. The report shall include a geologic map showing the location of the quarry faces at the time of the inspection and the faces with geology from previous inspections. Additional reports may be required at specific intervals during the life of mine and will be dependent on annual production and other factors such as apparent highwall stability."

The Hearings Officer finds that the Engineering Geologic Investigation certified by a registered professional engineer and geologist, along with the monitoring and condition(s) set forth under the June 11, 1996 DOGAMI Operating Permit, are adequate to conclude the proposed operation will not result in the creation of a geologic hazard to surrounding properties.

The Opponents have asked that the Hearings Officer require the Applicant to sponsor ongoing, continuous vibration monitoring by an independent, certified geophysicist. The Hearings Officer has not imposed such a requirement, however, as the record does not establish that there is a reasonably likelihood that the Applicant's mining operations will cause the geologic hazards envisioned by this section. The Applicant provided convincing evidence that the levels of dynamite used for blasting operations would be small and that the chance of such problems occurring is relatively small. Further, a monitoring program would not prevent the geological problems from occurring. Also, the County may institute a ground vibration monitoring program on adjacent lands, with the consent of landowners, if it determines that such monitoring is needed when mine operations advance toward area residences.

E. **MCC 11.15.7325 (E): Proposed blasting activities will not adversely affect the quality or quantity of groundwater within wells in the vicinity of the operation.**

Applicant: This criterion is satisfied by the design of Mine Plan, which has the final quarry floor at an elevation of approximately 130 feet mean sea level, which is at least 50 feet and possibly as much as 370 feet above the confining layer of the regional aquifer. Also, conditions 7, 9 and 10 in the Operating Permit require extensive data collection during mining, thus continuously improving knowledge about the depth and location of aquifers.

Staff: The Lidstone and Anderson, Inc. Engineering Geologic Investigation Report [Applicant Operating Plan; Appendix A-4] identifies the location and well logs of the most proximate wells to the Angell Bros. site, identifies geographic features and proposed quarry depth, and concludes, "it is anticipated that no significant groundwater flows will be encountered during the proposed mining plan. As the mine pit advances, Angell Brothers will continuously monitor the pit floor and pit walls for ground water. In the event that groundwater is encountered, Angell Brothers will notify DOGAMI and the operational plan will be modified in accordance with DOGAMI requirements.

There is no absolute, unarguable scientific or other method to demonstrate proposed blasting activities will not adversely affect the quality or quantity of groundwater within wells in the vicinity of the operation. The intent of this section is, however, to require mine operators to present reasonable evidence identifying the potential for adverse impacts. The intent is to provide for "good planning," if negative or adverse impacts are identified, directing mining operations away from these areas would be beneficial to both the neighboring property owners wells and the Applicants liability. Thus, staff concludes the Applicant has demonstrated based on reasonable and substantial evidence, neighboring wells will not be effected.

FINDING: The Hearings Officer concurs with the findings proposed by the Applicant and by Staff but finds that it is necessary to include a condition of approval in the decision of this matter to assure compliance with the requirements of this code section during mining operations. That condition allows blasting in the expansion area only so long as proposed blasting activities do not adversely affect the quality or quantity of groundwater within wells in the vicinity of the operation.

F. **MCC 11.15.7325 (F): If the site is zoned Exclusive Farm Use . . .**

FINDING: The site includes no land designated Exclusive Farm Use, therefore MCC 11.15.7325 (F) is not applicable to review of this application.

G. If the site is zoned Commercial Forest Use (CFU):

- (1) The proposed operations will not force a significant change in, or significantly increase the cost of, accepted farming or forest practices on agricultural or forest lands;**
- (2) The proposed operation will not significantly increase fire hazard or significantly increase fire suppression costs or significantly increase risks to fire suppression personnel; and**
- (3) A written statement recognizing the rights of adjacent and nearby property owners to conduct accepted forest practices has been recorded with the property deed in accordance with OAR 660-06-025 (1994).**

[MCC 11.15.7235 (G)]

FINDING: Compliance with the criteria contained in this section is satisfied by the Hearings Officer's findings regarding MCC 11.15.2053, which imposes the same requirements as found in this code section.

D. MCC 11.15.7331 - Site Reclamation:

- A. No mining shall begin without the operator providing the county a copy of a DOGAMI operating permit or exemption certificate.**
- B. When approving an application under this section the county shall determine the post-mining use of the property. The determination of post-mining use shall be coordinated with DOGAMI to ensure technical feasibility. The designated post-mining use shall conform to the Comprehensive Plan.**

FINDING: The Applicant has provided the County with a copy of its DOGAMI permit with its application. The post-mining use of the property is Commercial Forest Use, which is consistent with the plan and zone designations in the Comprehensive Plan. The Conservation Easement imposes the additional restrictions that Western Oregon old growth forest habitat be maintained, that no logging occur in certain areas at all, and that no residences be built on the site. All these restrictions are consistent with the plan and zone designations in the Comprehensive Plan. The reclamation sequence approved by DOGAMI (discussed above) and the numerous conditions imposed in the Operating Permit were designed "to ensure technical feasibility."

- E. MCC 11.15.7332 - Monitoring: The Planning Director shall periodically monitor all extraction operations. The beginning dates and frequency of monitoring shall be determined by the Approval Authority based upon any such requirement in the Comprehensive Plan Program and upon the number and type of *noise and dust sensitive* land uses, and other Goal 5 resources identified in the *ESEE Analysis*. If the Director determines that an extraction operation is not in compliance with MCC**

.7325 or site-specific requirements of the Comprehensive Plan Program, such enforcement proceedings deemed appropriate by the Multnomah County Legal Counsel shall be instituted to require compliance.

FINDING: The Applicant will be required to allow the Planning Director or her designee to periodically monitor the extraction operation. The Hearings Officer finds that site monitoring should occur within the first month of operations and should continue at least four times per year, in order to assure protection of the many conflicting Goal 5 resources that exist on the subject property. If the Report requires more frequent monitoring, the Report's requirements shall be followed by the Director.

Compliance with Significant Environmental Concern Requirements

MCC 11.15.6400 - Purposes: The purposes of the Significant Environmental Concern subdistrict are to protect, conserve, enhance, restore, and maintain significant natural and man-made features which are of public value, including among other things, river corridors, streams, lakes and islands, domestic water supply watersheds, flood water storage areas, natural shorelines and unique vegetation, wetlands, wildlife and fish habitats, significant geological features, tourist attractions, archaeological features, tourist attractions, archaeological features and sites, and scenic views and vistas, and to establish criteria, standards, and procedures for the development, change of use, or alteration of such features or of the land adjacent thereto.

Significant Scenic Views - MCC 11.15.6424 (C): Mining of a protected aggregate and mineral resource within a PAM subdistrict shall be done in accordance with any standards for mining identified in the protection program approved during the Goal 5 process. The SEC Application for Significant Scenic Views must comply only with measures to protect scenic views identified in the Goal 5 protection program that has been designated for the site.

FINDING: The applicable protection program is found in the West Hills Reconciliation Report at page VI-18, VI-22 and VI-23 and as follows:

Regulatory

- **Minimization of the area mined at any given time.**
- **Demonstration that reclaimed areas are capable of supporting forest vegetation.**
- **Simultaneous reclamation along with mining to minimize non-vegetated areas.**

- Screening of the operating face from key viewing areas as much as practicable through techniques such as landscaping, berming, and maintenance of intervening topography.

Non-Regulatory

- Multnomah County accepts, encourages, and will honor to the extent allowed by law, third party agreements to protect significant scenic views through private sales, dedications, donations, easements, or other use restrictions.

The Plan submitted by the Applicant does not minimize the area mined, as discussed earlier in this decision. Neither does the Plan provide any assure of simultaneous reclamation that minimizes non-vegetated areas. Instead, the Plan leaves large areas of the mine exposed and unclaimed for many years. As stated by the Applicant's attorney in the application: "[a]lthough certain benches within Phase 1 will be reclaimed concurrently with mining, *the majority of the benches will have to be left open* to accommodate haul roads and overburden stockpiles from Phase 3." The application further states that this same approach will be used in Phase 2. Basically, the mine plan proposed by the Applicant is a plan to mine in two areas and to begin reclamation when approximately 75% of each area has been mined.

The Hearings Officer has required the Applicant to revise its reclamation plan to provide for simultaneous reclamation which minimizes non-vegetated areas and which minimizes the area mined at any given time, in the manner specified in the Reconciliation Report, as a condition of approval of this application. If this application is revised as required by other sections of this decision, the application will comply with the requirements of this code section.

MCC 11.15.6426 (4) - Wildlife Habitat/Wildlife Conservation Plan: For Protected Aggregate and Mineral (PAM) resources within a PAM subdistrict, the applicant shall submit a Wildlife Conservation Plan which must comply only with measures identified in the Goal 5 protection program that has been adopted by Multnomah County for the site as part of the program to achieve the goal.

FINDING: The applicable measures to assure long-term protection of significant wildlife habitat in the West Hills are found in the West Hills Reconciliation Report at page VI-18, VI-22 and VI-23 and as follows:

Regulatory

- Multnomah County shall require the Angell Brothers expanded quarry site to take the following measures as part of its operation and reclamation plan:

- **Minimization of the area mined at any given time.**
- **Demonstration that reclaimed areas are capable of supporting forest vegetation.**
- **Simultaneous reclamation along with mining to minimize non-vegetated areas.**
- **Reclamation of the site so as to best enhance wildlife habitat values.**

Non-Regulatory

- **Multnomah County accepts, encourages, and will honor to the extent allowed by law, third-party agreements to protect significant wildlife habitat through private sales, dedications, donations, easements, or other use restrictions.**
- **Multnomah County will rely on state agency administration of state regulations that affect the protection of significant wildlife habitat in the West Hills, and will review and comment on state agencies' programs affecting protection of significant wildlife habitat in the West Hills.**

FINDING: The first three requirements listed for the protection of wildlife mirror the requirements for protecting scenic views. The findings of this decision establish that if the Applicant complies with the conditions of approval of this application, that these three requirements will be met. Further, the Hearings Officer finds that reclamation of the site, as required by this decision and the West Hills Reconciliation Report will serve to best enhance wildlife habitat values, as required by the fourth requirement of this program to meet Goal 5 for wildlife resources.

MCC 11.15.6428 (E) - Streams: For Protected Aggregate and Mineral (PAM) resources within a PAM subdistrict, the Mitigation Plan must comply only with measures identified in the Goal 5 protection program that has been designated for the site.

FINDING: The Hearings Officer finds that the Goal 5 protection program for the Angell Brothers site is found in the Program to Achieve the Goal section of the Angell Brothers Aggregate section of Chapter VI. The program to achieve the goal for the Angell Brothers mine calls for portions of the Angell Brothers site to be placed in areas called "Preserves" and to be protected from mining. The Report states that the Preserves encompass the North Angell Brothers "stream drainage," a term that, apparently, is not defined in the Report. The Preserves do not, however, include the entire North Angell Brothers watershed, as depicted in the Reconciliation Report. Further, the Conflict Resolution section of Chapter IV of the Report provides that "[m]ining on the Angell Brothers site should not take place within the North Angell Brothers Creek

watershed” [p. VI-16] and that expansion “should be allowed except for . . . the North Angell Brothers creek watershed.” [p.VI-17] This language indicates that the term “stream drainage” found in the Program to Achieve the Goal is referring to the watershed of the creek.

The watershed of the North Angell Brothers Creek is shown on the stream map found at page III-143 of the Reconciliation Report. This watershed map, however, far exceeds the “impact area” identified under Goal 5 as meriting Goal 5 protection. It is the impact area which must be studied by the County and protected, where appropriate, during its Goal 5 analysis of resources and conflicting uses. The impact area for a stream is the riparian area of the creek. The riparian area for North Angell Brothers stream is identified on page III-16 of the Report as being from 55 to 150 feet in width for the North Angell Brothers stream. The riparian area for the entire creek covers a maximum area of 16.36 acres.¹² This area is much smaller than the drainage area which is inventoried as including 350 acres [see p. III-5].

The Report’s Program to Achieve the Goal for streams protects a stream’s impact area by providing protection to an area of 600 feet centered on the middle of the stream, thereby protecting lands beyond the impact area. For the North Angell Brothers stream, this is an area of 65.45 acres in size, including land located beyond the boundaries of the Angell Brothers site.¹³ Mr. Parisi claims that the riparian area is the maximum area that can be protected under Goal 5 and the maximum area that should have been protected by the Program to Achieve the Goal for the Angell Brothers Aggregate site.¹⁴ As a practical matter, he is wrong as the County obtained approval to protect a broader area in its Program to Achieve the Goal for streams from LCDC and that issue is now closed and applied a broader protection area in its Program to Achieve the Goal for the Angell Brothers site by protecting the stream drainage rather than the riparian area (350 acres vs. 16.36 acres).

¹²This figure was calculated by using a length of .9 mile for the creek length (4752 feet) and multiplying it by 150 feet in width, the maximum width of the riparian area. This resulted in an area of 712,800 square feet or 16.36 acres.

¹³It is four times wider than the 150 foot wide riparian area calculated in footnote 12, so is also four times larger than the maximum riparian area.

¹⁴To the extent that Mr. Parisi’s argument is a claim that the Reconciliation Report violates Goal 5, it is not relevant at this time. The recent case of Friends of Neabeack Hill v. City of Philomath, 139 Or App 39, 911 P2d 350 (1996), rev. den. 323 Or 136, 916 P2d 311 (1996) held that acknowledged comprehensive plan provisions may not be challenged for failure to comply with Statewide Goals in a land use permit application case. Naturally, goal compliance is relevant to applications that propose an amendment to a comprehensive plan.

Evidence in the record of this case indicates that the area included within the Preserves protects all Angell Brothers property found within the SEC overlay zone. The Preserves do not, however, protect the watershed of the North Angell Brothers stream depicted on the Reconciliation Report map.¹⁵ The placement of land into the Preserves and the delineation of their boundaries occurred outside of the land use process. The determination of boundaries by private parties in such a setting is not a land use regulation and does not act to change the description of the North Angell Brothers Creek watershed found in the Report.

The Applicant claims that the compliance with the Goal 5 program for the mine is met by a 600-foot setback, centered on the creek. The Hearings Officer did not find any Report provision, however, that stated that the term "stream drainage" used in the mine's Program to Achieve the Goal is intended to apply to the 600-foot area. Further, the Program to Achieve the Goal for streams does not contain any requirements that apply directly to the Angell Brothers mine site. Instead, the stream section directs the County to take action to adopt a stream protection overlay zone and does not bind the mine operator in any way.

The Hearings Officer reviewed the Report many times in an attempt to harmonize the Plan's statements that no mining should be conducted in the North Angell Brothers watershed and the delineation of the Preserves agreed to by the parties to the negotiated settlement. The Hearings Officer expected that there would be some language in the Plan which would explain that it was ultimately determined that a portion of the watershed shown on the Report map should be not be included in the Preserves, but did not find such language.

The foregoing findings require the Hearings Officer to require the Applicant to remove all areas of the North Angell Brothers stream drainage from its mine operation plan, in order to comply with the Program to Achieve the Goal for the mine site as it relates to stream protection.

¹⁵There is evidence in the record that the tributary of the North Angell Brothers Creek identified by the Opponents does not drain into the Burlington Bottoms area, as does the North Angell Brothers creek. The northern creek is protected because it drains into Burlington Bottoms. The diverted creek is located in the area that is proposed for mining and it may be that the parties to the settlement excluded it from the watershed because it no longer drains to Burlington Bottoms. The Hearings Officer is, however, unable to find sufficient evidence in the record to show that the diverted creek and its watershed is no longer a part of the North Angell Brothers watershed (to contradict the mapped area shown on page III-143 of the Report).

CONDITIONS OF APPROVAL:

The application for conditional use approval sought in this application is approved subject to compliance with the following conditions of approval:

1. Approval is for a Conditional Use Permit and SEC Permit for mineral extraction and processing on 250 acres located at Tax lot '12', in the NW ¼ of Section 28, 2N, 1W, Willamette Meridian; and Tax Lots '2', '6', '8', and '11' in the E ½ of Section 29, T2N, R1W, Willamette Meridian as proposed and conditionally approved in this application.
2. The Applicant shall record a statement with the Division of Records that the owner and the successors in interest acknowledge the rights of owners of nearby property to conduct forest operations consistent with Forest Practices Act and Rules, and to conduct accepted farming practices prior to the commencement of mining in the area covered by the permit.
3. This Conditional Use permit is issued for the specific use or uses specified in the application for Conditional Use approval, together with the limitations or conditions as determined by the Approval Authority in this decision. Any change of use or modification of limitations or conditions shall be subject to Approval Authority approval after a public hearing.
4. Access associated with the mining of the site (transportation of rock, heavy equipment, etc.) shall be limited to a single point of access along Highway 30 in the location shown on the Applicant's application. Further, the Applicant shall not use the easement from the mine site to McNamee Road that crosses the property at 13780 NW McNamee Road presently owned by Ray Adams.
5. No material (rocks, clay or large quantities of dirt) which creates a safety or maintenance problem shall be tracked or discharged in any manner onto any public right-of-way. The Applicant shall maintain the storm water detention dry wells, cattleguard and paved haul road described in the application in good and functional condition throughout the life of the mining operations authorized by this permit. Further, the Applicant shall take whatever other measures are necessary to prevent the discharge of hazardous materials from trucks leaving the mine site.
6. In the event that it is determined in a judicial or quasi-judicial enforcement proceeding brought by Multnomah County against the Applicant or Owner that the Applicant's mining operation is resulting in a violation of MCC 11.15.7325 (C)(1)(c) or Condition #5 of this decision, the Applicant shall thereafter require that all trucks being loaded at the mine site be covered by the driver prior to leaving the mine site and the Applicant shall take whatever corrective actions

directed by the judicial or quasi-judicial officer who has jurisdiction over the enforcement matter.

7. All mineral and aggregate operations shall occur between the hours of 7:00 AM to 6:00 PM. No operations are allowed on any Sunday, New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, and Christmas Day.
8. Blasting shall occur between the hours of 9:00 am to 5:00 PM. No blasting shall be allowed on any Saturday, Sunday, New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, and Christmas Day.
9. The Applicant shall obtain approval to expand its DEQ issued Stormwater Discharge Permit to include the proposed mine expansion. The Applicant shall also furnish to the County, prior to commencing expansion of mining activities a valid DEQ Air Contamination Discharge Permit. The permits shall clearly identify the mine operations areas approved by DEQ. The Applicant shall maintain on file with Multnomah County throughout the life of the mine, copies of valid DEQ Air Contamination Discharge and Stormwater Discharge Permits. Complaints received by the Planning Department regarding air and water contamination will promptly be forward to DEQ as part of interagency coordination.
10. The Applicant shall comply with the June 11, 1996 Operating Permit authorized by the Department of Geology and Mineral Industries (DOGAMI) and subsequent decisions. A copy of the Applicant's 5 year reclamation and progress report as required by DOGAMI shall be submitted to the County, upon acceptance or approval by DOGAMI.
11. The Applicant shall maintain compliance with DEQ noise regulations. Complaints regarding noise will be forward to DEQ as part of an ongoing interagency coordination effort. In the event DEQ determines its standards are not being met, the Applicant will be subject to enforcement action as determined appropriate by the County.
12. The Applicant shall submit and obtain approval of an amended mineral extraction area map (currently Mine Sequence Map, Sheet 4) which shall identify the location of the south boundary of the North Angell Brothers Stream watershed, as shown on the map of the watershed found on page III-143 of the Reconciliation Report. All mining activities shall be confined to the extraction area shown on the revised map. The primary crusher shall be located, and shall remain, in the location shown on Sheet 4 as the "Existing Location of Primary Crusher."

13. Upon final Land Use Approval of this application and prior to commencement of quarry expansion beyond the existing 114 acres, the Applicant shall record with Multnomah County Records the "Grant of Conservation Easement" between Linnton Rock, Angell Bros. and Friends of Forest Park as agreed to through mediation and acknowledged on August 21, 1996.
14. The Applicant shall submit a traffic management plan to the County Engineer that is sufficient for the County Engineer to make relevant findings regarding road improvements for Newberry Road or to develop a program to assure that the numbers and weights of trucks leaving the mine site can safely be accommodated on Newberry Road prior to commencement of mining in the expansion area covered by this permit. Further, the County shall review the Engineer's recommendations and issue a land use decision determining whether and what related conditions and restrictions to the conditional use approval are needed to comply with MCC 11.15.7325 (C)(1)(e). The issue of whether the Applicant must comply with MCC 11.15.7325 (C)(1)(e) has, however, been determined in this proceeding and may not be revisited during the second review.
15. The Applicant shall revise the operating and mine reclamation plan to comply with all site-specific requirements relating to Scenic Views described on pages IV-14 through IV-15 of the Report and all relevant Programs to Achieve the Goal. Particularly, the Applicant's plan must provide for contemporaneous reclamation that promotes early visual screening of benches *immediately* following mining of upper benches. Additionally, the revised plan shall contain a commitment by the Applicant to maintain the principal processing, weighing and loading facilities at their "present location" as that term is used in the Reconciliation Report. Further, upon final reclamation, all structures, equipment, and refuse will be removed from the site. Excess fill from the waste rock stockpiles will be placed on the quarry floor, graded and covered with loess coversoil. All temporary culverts will be closed and abandoned in place. The quarry floor and operational areas will be shaped, graded, and revegetated to blend with the rest of the area. This area will be left in a condition with the final beneficial use of the property as an area protected by a conservation easement.
16. If a County rendered determination of compliance with any of the above conditions involves the exercise of discretion by the County, the County shall process its determination of compliance or non-compliance as a land use matter subject to County land use procedures regarding notices and opportunities for hearings and appeals.
17. The Applicant may conduct blasting on the subject property so long as the proposed blasting activities shall not adversely affect the quality or quantity of groundwater within wells in the vicinity of the blasting operation.

18. The Planning Director or her designee shall periodically monitor the mine site. Site monitoring should occur within the first month of operation and continue at least four times per year. If the Reclamation Report requires more frequent monitoring, the Director shall comply with the requirements of the Report.
19. This approval is valid for the life of the mine and shall remain valid provided compliance with all conditions and laws is achieved and maintained.

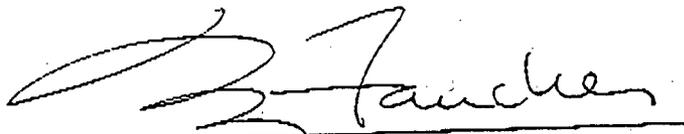
Appeal to the Board of County Commissioners:

The Hearings Officer's Decision may be appealed to the Board of County Commissioners (Board) by any person or organization who appears and testifies at the hearing, or by those who submit written testimony into the record. An appeal must be filed with the County Planning Division within ten days after the Hearings Officer decision is submitted to the Clerk of the Board. An Appeal requires a completed "Notice of Review" for and a fee of \$500.00 plus a \$3.50 - per- minute charge for a transcript of the initial hearing(s). [ref. MCC 11.15.8260(A)(1) and MCC 11.15.9020(B)] Instructions and forms are available at the County Planning Office at 2115 SE Morrison Street (in Portland) or you may call 248-3043, for additional instructions.

Failure to raise an issue prior to the close of the record at the final Board Hearing, (in person or by letter) precludes appeal to the Land Use Board of Appeals (LUBA) based on that issue. Failure to provide specificity on an issue sufficient for the Board to respond, precludes appeal to LUBA on that issue.

SIGNATURE PAGE - ANGELL BROTHERS

Decision dated this 17th day of October, 1996.

A handwritten signature in cursive script, appearing to read "Liz Fancher", written over a horizontal line.

Liz Fancher, Hearings Officer
Multnomah County

APPENDIX A

SITE-SPECIFIC REQUIREMENTS FOR ANGELL BROTHERS MINE EXPANSION

The site-specific requirements for the Angell Brothers mine expansion found in the West Hills Reclamation Report include the following:

1. The Applicant shall relocate the “first settling pond” and re-size the pond to maintain the same water quality standards. Sediment barriers (either rock piles or gabion dams) using waste rock materials will be placed in the sediment pond outflow ditch to reduce water velocity and permit additional sediment removal before the water enters the second settling pond. [P. IV-9]
2. The Middle Drainage will be protected throughout mining and reclamation operations in accordance with the DEQ Stormwater Permit and DOGAMI requirements. At critical locations the drainage will be diverted in a culvert. At less critical locations, a berm averaging four (4) feet in height will be constructed adjacent to the open channel to ensure commingling with disturbed area runoff. Berm height shall be designed to convey the 100-year 24-hour design event with a minimum of one (1) foot of freeboard. [p.IV-9]
3. The site shall be mined with a “directly advancing mining face.” [p.IV-11]
4. The mine plan encompasses a laterally sustainable earthwork balance which allows contemporaneous reclamation of the mined out benches. This minimizes the amount of reclamation materials stored in temporary stockpiles and allows the operator to haul and replace reclamation materials directly. Direct “haul-back materials provide natural seed sources, thereby providing a diverse assemblage of native and non-native vegetation. [p. IV-11]
5. The reclamation plan will be a continuous program of mine reclamation over the life of the mine. [p. IV-11]
6. Lands will be restored to the maximum extent practical for Commercial Forest Use zone, incorporating natural drainage features to enhance wildlife habitat quality and diversity, by providing a long-term naturally stable geomorphic landform, and developing an area-wide mosaic of plant communities that will result in a variety of wildlife habitats to support birds and mammals during various phases of their lives, and by assuring that mammals entering a bench from one side will be able to travel along it and exit on the other side. [p. IV-11 & 12]
7. Final reclamation cutslopes shall be 1.5:1 and benched. [p. IV-12]

8. Prior to placement of any fill materials on mined benches, Angell Brothers will pre-rip the bench floors to provide a "shear key" and improve vertical drainage below the final fill. [p.IV-12]
9. The reclamation plan shall include a "stratified replacement of two products of the mining operation: (a) 2-1/2 inch minus waste rock for coarse material substrate and (b) loess overburden material for cover soils." [p. IV-12]
10. Three typical reclamation bench configurations shall be used. The first is a horizontal fill on the bench floor, with the final surface being manipulated to provide local depressions, roughened surface features, and thicker fills. The second configuration "will be manipulated to produce a complex slope [4:1 to 3:1 variability]. Surface drainage will slope away from the highwall to minimize the collection of water against the back of the fill. The first and second type benches will be seeded with grasses and forbs and planted with deciduous trees, spruces and firs. The third bench will be "shot" by the operator and an angle of repose talus slope will form at the toe of the slope. The talus slopes will be allowed to revegetate itself naturally. The remaining portion of the third type of benches will be revegetated as provided for the first and second type benches. [p. IV-13]
11. The number and type of final bench configurations will vary throughout the mine area. Excess overburden and waste rock will be available throughout the mined area. [p.IV-13]
11. Upon completion of mining activities on any given bench, recontouring and ripping of the bench and adjacent highwall will be performed. Following placement of the coarse material substrate and loess material cover soil, and when weather permits, the site will be revegetated. Exposed soils will be mulched for erosion control when seeding must be delayed because of unfavorable weather conditions. Tree and shrub planting will occur the first autumn after ground cover has been established. [p.IV-13]
12. Native plant species suited to open and forested areas will be selected for test plots on the basis of climactic zone, soil type, moisture requirements and availability. In addition, the following guidelines will be followed: for each vertical layer from ground to tree canopy, a mixture of species will be used to include species that exhibit both warm and cool season growth and provide a balance of habitats and cover for a broad range of birds, mammals, reptiles and amphibian animals. Seeding and planting will be done at the beginning of the first growing season following seed bed preparation, preferably just prior to winter precipitation. [p.IV-13 & 14]

13. Commencing in approximately 1998, Angell Bros. will also establish a number of vegetation test plots, as specified on page IV-14 of the Report.
14. Angell Brothers will address ODF&W concerns regarding the wildlife corridor by restricting mining near the conservation easements adjacent to McNamee Road, if necessary, until forest cover has been reestablished. [p.IV-14]
15. Maintain vegetated buffers along the entirety of the site along Highway 30. [p.IV-14]
16. The Applicant shall engage in contemporaneous reclamation that promotes early visual screening of benches *immediately* following mining of upper benches. [p.IV-14]
18. Significantly increase the length of a lower gradient reclaimed channel and increase in acreage the final pit floor to allow construction of riparian habitat and wetlands along the pit floor. [p.IV-14]
19. Direct haul back of reclamation materials to retain maximum viability of topsoil. [p.IV-14]
20. Establish the third type of bench configuration wherever possible to achieve diversity in character of the reclaimed hillslopes. [p.IV-14]
21. The mined area will consist of an irregular, geometrically diverse series of benches and steps. [p.IV-15]
22. Mining activities will be conducted so that benches follow existing contour lines. [p.IV-15]
23. The principal processing, weighing and loading facilities will remain at their present location and will be screened from the public view by the Block 4 vegetated buffer strip. [p.IV-15]
24. The Applicant shall assure "full retention" of the existing land contours and all the vegetation near Highway 30. [p.IV-15]
25. Upon final reclamation, all structures, equipment, and refuse will be removed from the site. Excess fill from the waste rock stockpiles will be placed on the quarry floor, graded and covered with loess coversoil. All temporary culverts will be closed and abandoned in place. The quarry floor and operational areas will be shaped, graded, and revegetated to blend with the rest of the area. This area will be left in a condition with the final beneficial use of the property as an area protected by a conservation easement. [p.IV-16]

26. Reclamation success shall be monitored by the mine operator, as well as by DOGAMI annual monitoring as specified on p. IV-16 of the Report. [p.IV-16]
27. Monitoring will be tied to specific revegetation and hydrologic objectives. [p.IV-16]
28. Multnomah County shall require the Angell Brothers expanded quarry site to take the following measures as part of its operations and reclamation plan:
 - Minimization of the area mined at any given time.
 - Demonstration that reclaimed areas are capable of supporting forest vegetation.
 - Simultaneous reclamation along with mining to minimize non-vegetated areas.
 - Reclamation of the site so as to best enhance wildlife values. [p.VI-25]
29. Multnomah County shall require mining within a Goal 5 protected site to comply with standards identified in the Goal 5 protection program to protect scenic views. [p.VI-18]
30. Multnomah County shall require the Angell Brothers expanded quarry site to take the following measures as part of its operations and reclamation plan:
 - Minimization of the area mined at any given time.
 - Demonstration that reclaimed areas are capable of supporting forest vegetation.
 - Simultaneous reclamation along with mining to minimize non-vegetated areas.
 - Screening of the operating face from key viewing areas as much as practicable through techniques such as landscaping, berming and maintenance of intervening topography. [p.VI-18]
31. Mining on the Angell Brothers site should not take place within the North Angell Brothers Creek watershed. [p.VI-16] Expansion of the Angell Brothers quarry site should be allowed except for a 200 meter buffer area along the south and west sides of the property, and except for the North Angell Brothers creek watershed. [p.VI-17]
32. Quarry operations and reclamation of the quarry site should minimize impacts upon scenic views and wildlife habitat, by 1) maintenance of the natural terrain and vegetation within the buffer area and the North Angell Brothers watershed, and 2) a sequential mining plan which minimizes the amount of disturbed area at any one time during the life of the quarry operation and 3) a reclamation plan which sequentially restores the site to its natural vegetation after quarrying is completed. [p.VI-17]

33. Any mining must be conducted under appropriate DEQ and DOGAMI operating permits that insure acceptable levels of air and water quality and provide for bank stabilization, erosion control and reclamation. [p. VI-11]

34. Compliance by Angell Brothers and Linnton Rock Corporation with the requirements of the settlement agreement reached with the Friends of Forest Park. This agreement prohibits mining in a 73-acre scenic buffer area at the north end of the property, to provide conservation easements in areas designated as preserves. The preserves include an area of about 90 acres on the north of the property, a 625-foot strip on the south of the site, and an area on the west of the site that encompasses the North Angell Brothers stream drainage. No residences may be constructed on the site and the entire property will be burdened by a conservation easement at the conclusion of mining of the property. A Hiking Trail easement is also required. [p.VI-23]

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A Limited Liability
Partnership

October 31, 1996

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Via Telecopy and Hand Delivery

Mr. Phillip Bourquin
Multnomah County Planner
Transportation & Land Use Planning
2115 S.E. Morrison
Portland, OR 97214

RECEIVED

1996

Multnomah County
Permits Section

Re: Angell Bros. Quarry
Our File No. 110.01

Dear Mr. Bourquin:

Enclosed is Angell Bros. Notice of Review, together with a check in the amount of \$500.00, which represents the filing fee. You will see that I have signed the application, pursuant to a Power of Attorney given to me from Skip Anderson. Please call me if you have any questions.

Very truly yours,



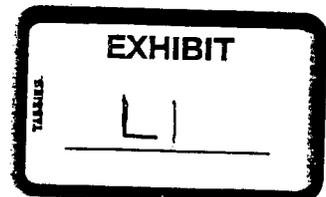
Frank M. Parisi

Enclosure

cc (via telecopy): Steve Oulman, DLCD
Dick Angstrom, OCAPA
Skip Anderson

Suite 680
Benj. Franklin Plaza
1 S.W. Columbia
Portland, OR 97258

Telephone:
(503) 417-1144
Facsimile:
(503) 721-2300
Email:
parisi@pacifier.com





DEPARTMENT OF ENVIRONMENTAL SERVICES
 DIVISION OF PLANNING AND DEVELOPMENT
 2115 SE MORRISON STREET
 PORTLAND, OREGON 97214 (503) 248-3043

RECEIVED

OCT 31 1996
 Multnomah County
 Permits Section

NOTICE OF REVIEW

1. Name: ANGELL BROS.

2. Address: P. O. BOX 83449, PORTLAND, OR 97283

3. Telephone: (503) 286 - 4201

4. If serving as a representative of other persons, list their names and addresses:

Frank M. Parisi, Esq. - Attorney for Angell Bros.

Parisi & Parisi

Benj. Franklin Plaza, Suite 680

One S.W. Columbia

Portland, OR 97258

5. What is the decision you wish reviewed (e.g., denial of a zone change, approval of a subdivision, etc.)?

Hearings Officer Decision in the matter of CU 6-96 and SEC 18-96.

6. The decision was announced by the Planning Commission on October 22, 1996

7. On what grounds do you claim status as a party pursuant to MCC 11.15.8225?
Applicant

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EXHIBIT
L2

8. Grounds for Reversal of Decision (use additional sheets if necessary):
See attached

9. Scope of Review (Check One):

(a) On the Record

(b) On the Record plus Additional Testimony and Evidence

(c) De Novo (i.e., Full Rehearing)

RECEIVED
OCT 31 1996
Mullman
Permits Section

10. If you checked 9(b) or (c), you must use this space to present the grounds on which you base your request to introduce new evidence (Use additional sheets if necessary). For further explanation, see handout entitled *Appeal Procedure*.

This does not apply pursuant to Resolution 95-55 dated March 16, 1995

Signed: Frank M. Parisi Date: 10/31/96
FRANK M. PARISI for F.H. "Skip" Anderson

For Staff Use Only

Fee:
Notice of Review = \$500.00
Transcription Fee:
Length of Hearing x \$3.50/minute = \$
Total Fee = \$

Received by: _____ Date: _____ Case No. _____

10. **OFFICER** PM 4: 28
**GROUNDS FOR REVERSAL OF HEARINGS
DECISION IN THE MATTER OF CU 6-96 AND SEC 18-96**

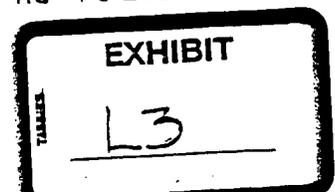
1. The Hearings Officer misinterpreted the amendments to the Multnomah County Comprehensive Plan, Zoning Ordinance and Sectional Zoning Maps that were completed during Periodic Review.

The amendments include, among other things, the May 1996 West Hills Reconciliation Report (the "Reconciliation Report"), which incorporates the August 19, 1995 Grant of Conservation Easement (the "Conservation Easement"), and the December 12, 1995 Angell Bros. Operating and Reclamation Plan (the "Operating and Reclamation Plan"). The Hearings Officer apparently believed that the Reconciliation Report merely outlined certain policy directives which Angell Bros. has now attempted to meet by way of the Operating and Reclamation Plan and the Conservation Easement. This is incorrect. Page I-4, Reconciliation Report states:

** * * Multnomah County agreed to enter a mediation process with the Department of Land Conservation and Development. The results of that mediation process are presented as revisions to the Reconciliation Report in the attached document. [emphasis added]*

In case this is not clear, the following history should be kept in mind: The Reconciliation Report was first completed by the Multnomah County Division of Planning on May 23, 1994, and was submitted as a part of its Periodic Review Order. The Reconciliation Report was rejected by DLCD. Innumerable discussions were had about revising it. The Reconciliation Report was not put in final form and approved by LCDC until after the mediation session occurred in July, 1995. The mediation session caused various additional documents to be drafted in August and September, 1995 to embody the settlement. During the mediation session, changes were negotiated to an early draft of the Operating and Reclamation Plan. The Conservation Easement was also negotiated. This occurred with the input of all the then interested parties, including the representative environmental groups and all affected state agencies. Formal agreements were drawn up, reviewed and signed. The Reconciliation Report was then amended (in August and September, 1995) to incorporate the Conservation Easement and the Operating and Reclamation Plan, which contain the "site specific requirements." The Reconciliation Report specifically adopts a

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Program to Achieve the Goal on Page VI-22 - 23, which is quoted in the footnote¹. The Program to Achieve the Goal incorporates the Conservation Easement. The Conservation Easement, in turn, incorporates the Operating and Reclamation Plan. The Reconciliation Report, together with the Conservation Easement and the Operating and Reclamation Plan are the County's "Program to Achieve the Goal" within the meaning of Goal 5. This is the operative "site specific program," not the various discussion items that the Hearings Officer focused on.

[Remainder of page intentionally left blank]

¹ e. Program to Achieve the Goal

Principal parties to the dispute surrounding development of the Angell Brothers quarry elected to pursue a structured mediation, which resulted in settlement terms being embodied in a Conservation Easement between Angell Brothers (the mining operator), Linnton Rock Corporation (the land owner of the Angell Brothers site), and Friends of Forest Park (the lead environmental group). Under the terms of the Conservation Easement, Angell Brothers agreed to mine only in particular areas, to give Conservation Easements in perpetuity to the Friends of Forest Park in areas called Preserves, and not to mine in a scenic buffer area of approximately 73 acres on the northern end of the site bordering Highway 30. At the conclusion of mining and reclamation, Angell Brothers will place the entire 397 acre site in a conservation easement. The Preserves include a large area of approximately 90 acres on the north of the site, a 625-foot strip on the south of the site, and an area on the west of the site that encompasses the North Angell Brothers stream drainage. Angell Brothers has also amended its agency permit applications, in accordance with the terms of the Easement. Angell Brothers has also agreed to convey a Hiking Trail Easement across the site upon the conclusion of mining, and has further agreed to promote and maintain Western Oregon old growth conditions on all of the Preserves and all of the scenic buffer area in perpetuity. Angell Brothers has also agreed not to allow any residences to be constructed on any portion of the property. The easements will be signed by all parties and deposited in an escrow with instructions to record the easements, if and when all agency permits in connection with the Angell Brothers mining are granted, periodic review at both the County and LCDC level is concluded on the site, and mining commences. The Angell Brothers Conservation Easement is the largest single conservation easement conveyed to the Friends of Forest Park. It is anticipated that Friends of Forest Park will assign the easement to METRO as part of the Greenspaces program. (Page VI-22 - 23, Reconciliation Report)

Accordingly, Condition No. 15, which requires Angell Bros. to revise its Operating and Reclamation Plan, should be eliminated, along with Appendix A, which purports to contain some of the "site specific requirements." A variety of comments by the Hearings Officer to the same effect on the following pages of her Decision should also be eliminated:

Page Number	Text
2	Comments in the first paragraph regarding the reclamation approach the Applicant told the County it would implement and the "different" approach now being used.
9	Comments in the paragraph labeled "Finding" to the effect that "the Angell Bros. site has been determined to be an appropriate site for mining activity by the County <u>subject to compliance with the following criteria.</u> " [emphasis added]
10-15	Comments which purport to explain that the Applicant has not met its "commitments" or "promises" or burden of proving that all of the site specific requirements have been met or that the Mine Plan has been "changed" ² or that concurrent reclamation has been "abandoned," or that the "Preserves" have not been specifically located, and other points (essentially all the text on these pages).
21	Comments in the second paragraph of the section labeled "Finding" to the effect that various requirements were not addressed by the Applicant.
25-27	Comments regarding the failure to meet the four directives for protection of fish and wildlife habitat
29	Comments in Section 3, "Phasing Program," in the paragraph labeled "Finding" to the effect that the Applicant is not relieved of requirements demonstrating compliance with relevant land use criteria.

² It is a mystery how such an enormous degree of confusion could have occurred. Seth Tane, for instance, submitted as an exhibit a drawing produced by David Evans & Associates (Exhibit I-8) that represents a conceptual mine plan that is at least five years out of date, and was completed before any surveys were done and before even the Esther Lev Wildlife Study was completed.

Page Number	Text
34	Comments under the section labeled "Nonregulatory" to the effect that the Applicant has not shown that it will "minimize the area mined" and that the Applicant has not satisfied the conditions of the Reconciliation Report.
35	Comments under the section labeled "Nonregulatory" in the paragraph labeled "Finding" to the effect that Applicant has not met the reclamation requirement.
37	Comments to the effect that the delineation of boundaries of the Preserves was done in a private setting rather than in a land use regulation setting, and that the North Angell Bros. Stream drainage is actually different from the pertinent area described in the Preserves.

2. The Hearings Officer misinterpreted the amendments to the Zoning Code in Multnomah County Ordinance Numbers 804, 827 and 858.

The mediated agreement that was incorporated into the Reconciliation Report and adopted by the County and approved by LCDC to settle the Periodic Review disputes approved a site specific Program to Achieve the Goal, as stated above. The parties to the mediation understood that these documents would govern mining on the Angell Bros. site. These documents were not intended to be later re-evaluated under terms of the Zoning Ordinance³. In addition, as stated in numerous places throughout the Zoning Code, as well as in the Policy section of the Multnomah County Comprehensive Framework Plan, if any ambiguity arises as to which standard should govern -- the Comprehensive Plan Amendments or the Zoning Code -- the Comprehensive Plan Amendments dealing with site specific issues must control. See e.g. MCC 11.15.7325(C), (C)(1)(d); (C)(1)(e); (2)(b); (4); (6); and (8). Comprehensive Framework Plan Policy 16-B, Strategy M provides as follows:

³ The only issues that presumably could be re-evaluated in the Conditional Use process would be changes to the Operating and Reclamation Plan or the Conservation Easement, but even in this situation, the standard of review for the County would be first, whether the changes were consistent with the Program to Achieve the Goal, and only secondarily whether they were consistent with the Zoning Code.

M. *The county shall impose conditions on surface mining when necessary to lessen conflicts identified as part of a site-specific Goal 5 analysis. Where such conditions conflict with criteria and standards in the Protected Aggregate and Mineral Resources Overlay, the conditions developed through the Goal 5 process shall control. [Emphasis added]*

The statements in the sections of The Zoning Code listed above and in Policy 16-B are also the rule of law. Baker v. City of Milwaukie, 271 Or 500, 511-512 (1975).

3. The Hearings Officer misinterpreted Section 11.15.7325(C)(1) of the Zoning Code, which deals with access and traffic.

The Hearings Officer believed that this section required Angell Bros. to submit various information regarding traffic for evaluation by the County Engineer, who could then determine whether mining would be allowed, based upon his evaluation of traffic issues.

The Hearings Officer's interpretation may appear to be correct, looking at the literal language of the Code (which requires the applicant to, at the very least, identify the most commonly used haul routes), but the conclusion that the Traffic Engineer can then deny the right to mine, is incorrect, for three principal reasons. First, the Reconciliation Report specifically addressed traffic as a "potential conflicting use," and rejected the claim on Page IV-19, as quoted in the footnote⁴, by stating that Highway

⁴ Impact Area

* * * *

Increased mine truck traffic on US Highway 30 has been identified as a concern relative to any expanded activity at this site (Linnton Letter).

The structural cross section of US Highway 30 is designed to accommodate truck traffic. This includes the type of traffic that is generated by the quarry. Therefore, the estimated maximum of 250 truck trips per day (estimated by applicant's submittal in PR 7-92) will not adversely effect the normal life cycle of the structural cross section of the roadway.

The "1992 Oregon Department of Transportation Traffic Volume Tables" indicate the section of Highway 30 north of the Sauvie Island Bridge has an average daily trip (ADT) count of 16,000, and the portion south of the bridge 20,000 ADT. Using those 1992 tables, ODOT staff computed the peak hour peak direction traffic volume at 1,200 vehicles. Given the four travel lanes with center left configuration, ODOT staff estimates the 1992 Level of Service to be "B". Consequently, Highway 30 has sufficient capacity to accommodate increased truck volume in the vicinity of the Sauvie Island Bridge.

Since ODOT indicates that US Highway 30 has sufficient capacity and structural capability to safely handle the traffic generated by the quarry operation, traffic on Highway 30 will not be considered a conflicting use. (Page IV-19, Reconciliation Report)

30 has adequate capacity and structural capability and therefore no traffic issues are presented by operations at the Angell Bros. site. In other words, the Reconciliation Report adopted a "site specific" resolution of potential traffic issues as part of the "Comprehensive Plan Amendment." A reading of the Zoning Code that allows traffic issues to once again become an impediment to mining must be read to harmonize with the site specific resolution in the Comprehensive Plan, which stated that traffic was not an issue, given the proximity, capacity and condition of Highway 30. Thus, while the applicant may have to supply a list of haul routes, the County Engineer should not be able to deny the applicant's right to mine.

Second, the MCC sections regarding access and traffic were specifically intended to apply only to sites, like the Howard Canyon site, where the site is served directly by a local collector road where traffic near the site entrance presents a genuine issue of capacity, safety, and structural capability. The Angell Bros. site is served only by State Highway 30, for at least 1.9 miles in each direction, so that only destination traffic is an issue.

Third, strategy M of the Multnomah County Comprehensive Framework Plan Summary (quoted above) provides that while conditions may be imposed "when necessary to lessen conflicts identified as part of a site specific Goal 5 analysis [none of which were identified here] * * * where such conditions conflict with criteria and standards in the protective Aggregate and Mineral Resources Overlay the conditions developed through the Goal 5 process shall control."

Accordingly, Condition No. 14, together with associated comments in the Hearings Officer's Decision on pages 17 through 20, should be deleted.

4. The Hearings Officer's decision on traffic has been superseded since the date of her decision by the County Engineer's issuance of a rule, effective October 31, 1996, which restricts "through truck traffic" on Newberry Road. A similar rule is expected for McNamee Road.

The restriction by the County Engineer applies to Angell Bros. as a police power regulation, regardless of any opinion by the Hearings Officer, the public, or Angell Bros. This regulation solves the Newberry Road traffic problems, which were the basis for the Hearings Officer's imposition of traffic conditions. There is thus no opportunity to make a land use decision about traffic management on Newberry Road. Accordingly, Condition No. 14, together with comments in the Hearings Officer's Decision on pages 17 - 20, should be deleted and a statement inserted to refer to the fact that the County Engineer's regulation has mooted the issue.

5. The Hearings Officer misinterpreted the Program to Achieve the Goal, which was based upon the assumption that the existing hours of operation at the Angell Bros. site (6:00 a.m. through 10:00 p.m., Monday through Saturday) would continue for the life of the mine.

The Program to Achieve the Goal contained as a fundamental assumption in the Conservation Easement and in the industrial noise analysis by Daley-Standlee and Associates that mining would occur as rapidly as possible with the existing processing equipment and the existing Operating and Reclamation Plan, and that this should be encouraged so that reclamation could commence as rapidly as possible, and so that the post mining use (old growth habitat without logging) could be achieved as quickly as possible.

The Conservation Easement was negotiated with this in mind. The Conservation Easement is subject to termination under paragraph 8.5 if the "Minimum Tonnage" is not achievable. The "Minimum Tonnage" is defined as 107% of the prior years' production, commencing with 1,700,000 tons in 1995. This level of production cannot be achieved with a 31% cutback in operating hours. Accordingly, the first sentence of Condition No. 7 should be revised to state that the existing hours of operation may be continued.

6. The Hearings Officer misinterpreted the Multnomah County Comprehensive Framework Plan Summary, Policy 16-B, Mineral and Aggregate Resources, including Strategies G, M, O and P, which recognize DOGAMI's jurisdiction to evaluate mining methods, and which describe a land use process that is supposed to protect significant sites like the Angell Bros. site from after-the-fact conditions and restrictions.

The Strategies read as follows:

G. *Mining and the associated processing of aggregate and mineral materials, in excess of the limited exemptions in Subsection H below, may only be allowed at sites included on the "protected sites" inventory. Approval of operation mining at a "protected site" shall be reviewed as a conditional use. The general conditional use provisions regarding time limits, conditions, restrictions, and approval criteria. [sic] (MCC 7110(C), 7110(E), 7115, 7120, 7122, and 7125, October, 1994), shall not apply. [Emphasis added]*

* * *

M. *The county shall impose conditions on surface mining when necessary to lessen conflicts identified as part of a site-specific*

Goal 5 analysis. Where such conditions conflict with criteria and standards in the Protected Aggregate and Mineral Resources Overlay, the conditions developed through the Goal 5 process shall control. [Emphasis added]

- O. The county recognizes the jurisdiction of the Department of Geology and Mineral Industries (DOGAMI) over mined land reclamation pursuant to ORS 517.750 to 517.900 (1994) and the rules adopted thereunder. [Emphasis added]
- P. Unless specifically determined on a case by case basis, it shall be the policy of the county, that DOGAMI delay its final decision on approval of a reclamation plan and issuance of an operating permit until the county decides all comprehensive plan amendments and/or conditional use approvals. It is also the policy of Multnomah County to participate in and cooperate with DOGAMI in their review of a permit application to that agency. [Emphasis added]

* * * *

The Hearings Officer's decision turns the Goal 5 Program on its head and allows the site specific program in the Comprehensive Plan to become subject to the terms of the Zoning Ordinance. The effect of this is to regulate mining activity as a nuisance, rather than protect the mining site from encroachment by uses, such as residences, which attempt to impose their sensitivity to industrial activities on mining operations.

Accordingly, each of the items mentioned in Paragraph No. 1 of this Grounds for reversal should be deleted.

7. The Hearings Officer misinterpreted the Program to Achieve the Goal with respect to the level of protection afforded to North Angell Bros. Stream.

The Hearings Officer heard testimony from a neighborhood group (See Record item E-3, page 11) that the USGS map appeared to show a "tributary" of North Angell Bros. stream located within the Preserves, and that if this were true, the "watershed" of North Angell Bros. stream was not being protected, as apparently called for in the Reconciliation Report. The Hearings Officer concluded that the Program to Achieve the Goal was intended to protect a theoretical maximum watershed of approximately 350 acres surrounding North Angell Bros. Stream.

Both the "tributary" argument offered by the neighbors, and the Hearings Officer's interpretation of the Program to Achieve the Goal are incorrect.

Chapter 3, Stream Resources, of the Reconciliation Report described the results of an elaborate County study of streams that started with a list of theoretical maximum watersheds and a variety of theoretical values that could be placed on stream resources. Data was then collected, "impact areas" were established, and streams were ranked according to the values observed in the field. Only the main channel of North Angell Bros. Stream was listed, and it was given value only to the extent of preserving (a) its identified riparian area, and (b) its flows into Burlington Bottoms. See Significance Matrix on page III-50 and Stream Profile on pages III-106 to 108. The Stream is depicted on a Map at page III-143 as a single stem. The riparian area is described in the Reconciliation Report as being between 55 feet to 150 feet in width with a median width of 78 feet (page III-16). The length on North Angell Bros. Creek is stated to be .9 miles on pages III-5 and III-12 of the Reconciliation Report. These boundaries (i.e. a stream length of .9 miles and riparian area of 55 to 150 feet wide) are the only areas ultimately protected by the Program to Achieve the Goal. On page VI-19, the Reconciliation Report states "the impact area for the stream study conducted by SRI-Shapiro for Multnomah County is defined by the existence of the riparian area." On page VI-25 the Summary states "the scenic area, stream riparian area, aggregate resource, and wildlife habitat areas should be designated 3-C" [Emphasis added]. There is nothing in the Program to Achieve the Goal about protecting a "watershed."

The Hearings Officer believed that the theoretical watershed (350 acres) of North Angell Bros. stream should nonetheless be used, because the stream setback that was surveyed and incorporated in the legal description of the Preserves in the Conservation Easement was referred to with the word "watershed." This is completely wrong. It ignores the actual findings of the stream studies, which listed the value of the stream as being limited to its identified riparian area and its flows into Burlington Bottoms.⁵ It also ignores the fact that the setback limits for mining were established during mediation to protect riparian and water supply values in a walking tour of the area. The setbacks were surveyed and incorporated into the Operating and Reclamation Plan and the Conservation Easement, and ultimately into the Program to Achieve the Goal in the Reconciliation Report.

The neighbors' discussions about a "tributary" to North Angell Bros. stream is a red herring in any event. The area in question is not part of the "watershed" in the sense that it is a recharge area that contributes water to North Angell Bros. stream which in turn discharges the water to Burlington Bottoms. Protection for this area was explicitly considered during the walking tour of the area. The so called "tributary" was observed not to flow into the main stem or into Burlington Bottoms, but rather to flow through a low lying area that had been used as a settling pond, and to be without any identified riparian zone for its entire length. There was thus no reason to protect it.

⁵ The length alone excludes the "tributary" sought to be protected by the opponents, because this would add an additional .5 miles of length, which would make the total length of North Angell Bros. Stream 1.6 miles, not the .9 miles listed in the Reconciliation Report.

Accordingly Condition No. 12 and the Hearings Officer's associated comments on pages 35 to 37 should be deleted.

8. The Hearings Officer erred by adding:

(a) Gratuitous conditions in the last sentence of Condition No. 3 and in Condition No. 16 regarding changes in operation, compliance problems that may arise and possible enforcement actions that may ensue;

(b) Gratuitous language on page 19 of the Hearings Officer's Decision about whether submittal of a Traffic Management Plan by Angell Bros. would require a new "land use decision" by the County;

(c) Gratuitous language about whether Angell Bros. should "halt" certain already commenced mining operations;

(d) Gratuitous language on page 21 about whether a future finding about compliance with the scenic criteria would constitute a new land use decision by the County; and

(e) Gratuitous comments on page 33 about the frequency of Planning Director inspections of the site.

These conditions were probably intended as explanatory, but if read literally they could arguably bind Multnomah County and Angell Bros. to procedures or outcomes that properly are a matter of discretion or interpretation for County Counsel or the Planning Director in the future. These comments and conditions should be deleted.

9. The Hearings Officer's decision on how to resolve concerns regarding tracking or discharging mined material onto public right-of-way is not supported by the evidence.

A claim was made at the hearing by Candace Staples that during an earlier clay-mining phase (which Angell Bros. clarified had ended in 1991) clay particles were tracked onto Highway 30 beyond normal levels. This evidence was introduced for impeachment purposes to suggest that Skip Anderson was a bad guy and that the Hearings Officer couldn't believe a word he said. The Hearings Officer did not accept the testimony for that purpose, but was concerned that tracking or discharging of material on the highway should not occur. Angell Bros. clarified that the clay-mining was the subject of a separate Conditional Use Permit that has since expired, and that clay mining was done solely for the purpose of obtaining sufficient covering material to close Phase I of the St. Johns Landfill. The source of the clay discharge was from truck tires, not truck loads. This problem was solved by paving the haul road and enlarging the entrance onto Highway 30 so that trucks would not have to travel off a paved surface while being loaded on the Angell Bros. site, and by installing a cattle-guard to dislodge

particles from tires. In addition, Angell Bros. purchased a water truck which was used on weekends during this period of time so that Highway 30 was in a good condition for weekend cyclists. There is no current problem with tracking or discharge of clay material from trucks onto the highway.

In Condition No. 6, the Hearings Officer suggested that if a problem occurs in the future "all trucks being loaded at the mine site [should] be covered by the driver prior to leaving the mine site and [Angell Bros.] shall take whatever corrective actions [are] directed by the judicial or quasi-judicial officer who has jurisdiction over the enforcement matter." The problem with this solution is that covering the loads would not prevent the problem that occurred in the clay-mining phase. In addition, stating that Angell Bros. must "take any actions required during enforcement," if understood literally, eliminates Angell Bros.' potential appeal rights. Accordingly, Condition No. 6 should be eliminated. The effect of this is to leave in place the condition that there be no off-site discharge of material on to any public right-of-way and that any violation of this is subject to the normal enforcement proceeding.

Associated comments in the "Findings" paragraph on page 16 of the Decision should also be deleted.

10. The Hearings Officer misinterpreted the Conservation Easement by concluding in Condition No. 13 that Angell Bros. should record the Conservation Easement "upon final land use approval of this application and prior to commencement of quarry expansion * * * *."

The actual terms that control the date of recording the Conservation Easement are in Section 16 of the Conservation Easement. Essentially they require Angell Bros. to record the easement when it has obtained all mining permits, and resolved any appeals in its favor. Condition No. 13 should be revised to state that the Applicant shall record the Conservation Easement in accordance with Paragraph 16.

11. The Hearings Officer misinterpreted the terms of DEQ Air Contaminant Discharge Permit in Condition No. 9 by requiring the DEQ Air Contaminant Discharge Permit to "clearly identify the mine operation areas approved by DEQ."

There is no such requirement in Air Contaminant Discharge forms or in DEQ Regulations beyond the requirement that the Applicant must list the location of the equipment subject to the Air Contaminant Discharge Permit. Accordingly, the sentence quoted above should be deleted from Condition No. 9.

12. The Hearings Officer misunderstood and mischaracterized terminology about the locations of the "primary crusher," the "principal crusher" and "principal processing equipment" in her comments on pages 13, 18 and 21.

The Mine Plan calls for the primary crusher - i.e. the cone crusher that crushes large material immediately after it is extracted - to be moved to the place designated on Figures 4 and 5. The secondary crusher, which is located on the floor of the pit near the stockpiles and scales, will not be moved. The secondary crusher was confusingly referred to by Angell Bros. as the "principal crusher" or "principal processing" facility.

Since the secondary crusher will not be moved, the Hearings Officer's comments on pages 13, 18 and 21 should be deleted, along with similar comments in Conditions 12 and 15.

13. A variety of items in the Hearings Officer's decision should be clarified, as follows:

(a) Condition No. 17 does not state explicitly how the Applicant will assure DOGAMI, the County, and the public that its proposed blasting activities will not adversely affect the quality or quantity of groundwater within wells in the vicinity. The solution to the potential ambiguity could be cured by providing the information outlined in Appendix E-1 of the Operating and Reclamation Plan. Appendix E requires construction of an observation well along the current middle drainage stream course at a location approximately 2,000 feet west of the existing office facility near the western boundary of Block 5 at a time when a minimum elevation of 300 feet is achieved at this location. This information, together with the five-year progress and summary reports to DOGAMI, should be made available to the County. If Condition No. 17 is revised accordingly, it will not be ambiguous, and better information will be generated.

(b) A similar issue occurs with respect to potential ground vibration from blasting. Although the Hearings Officer resolved this issue against persons who claimed that such studies were needed (see page 31 of the Decision), Angell Bros. has offered to provide seismic studies when mining reaches a certain point. This will permit DOGAMI to halt mining if DOGAMI has any question that groundwater may be damaged. As explained at the hearing, Angell Bros. has conducted seismic testing in the past, but since the results were always "non detect" as to the blasting activity, the tests are now conducted on a more infrequent basis.

(c) Condition No. 4 should be clarified to state that the existing "single point of access" onto Highway 30 allows entry both North and South onto Highway 30.

(d) Condition No. 4 should be clarified to make clear that Angell Bros. will not use the Adams' easement for commercial hauling, but may use it for emergencies, fire suppression, inspections, reclamation, etc.



Friends of Forest Park

P. O. Box 2413
Portland, OR. 97208

Dedicated to protecting and enhancing Portland's Forest Park

November 15, 1996

Multnomah County Board of Commissioners
c/o Department of Environmental Services
Division of Planning and Development
2115 S.E. Morrison Street
Portland, OR 97214

96 NOV 18 PM 3:46

Re: CU 6-96, SEC 18-96
Applicant: Angell Bros.
Hearing Date: 11/26/96

Dear Commissioners:

This letter is submitted to the record in proceeding CU 6-96, SEC 18-96, in support of the appeal filed by Angell Brothers. Friends of Forest Park is asking that you grant the appeal and issue the permits requested.

On August 22, 1995, Friends of Forest Park accepted from Angell Brothers and the Linnton Rock Corporation, a conservation easement covering the site that is the subject of these applications. The easement remains in escrow until Angell Brothers receives all permits necessary to carry out the submitted Mining Plan, and all appeals have been resolved. The easement has the potential for immediately protecting more than 163 acres adjacent to Forest Park from mining or other development, and to cover the entire 397 acre site when mining and reclamation activities have been completed.

Friends of Forest Park participated fully in development of the Mining Plan and in the structured mediation that resulted in the grant of the conservation easement. Our organization now has an interest in seeing that the Mining Plan remains "economically feasible," and that Angell Brothers receives all permits and approvals necessary to carry it out. We therefore urge you to grant the appeal of Angell Brothers and issue the permits as requested, without the additional modifications suggested by the Hearings Officer.

Multnomah County Board
of Commissioners
November 15, 1996
Page 2

Thank you for this opportunity to participate, and for your assistance in helping us protect the environs surrounding Forest Park.

Sincerely,

A handwritten signature in cursive script that reads "Mike Winslow".

Mike Winslow
President
Friends of Forest Park

cc: Frank Parisi

96 NOV 19 AM 11:25

November 15th, 1996

Christopher H. Foster
15400 NW McNamee Rd.
Portland, OR. 97231

*Please read
before the Hearing!*
- Chris Foster

Multnomah County Board Of Commissioners
c/o Land Use Planning and Transportation Division
2115 SE Morrison St.
Portland, Or. 97214

RE: Land Use Case File CU-6, SEC-16, Angell Bros. Appeal of the Hearings Officer's Conditions of Approval. **Testimony in Support of the Hearings Officer Decision.**
Appeal Hearing Date: November 26, 1996, 9:30 am.

Dear Commissioners,

I urge you to uphold the Hearings Officer's Decision and all Conditions of Approval as a sound logical and more importantly, correct legal analysis of the case before you. In spite of the obvious omissions and false assumptions of the Applicant's proposal, She crafted a decision which will allow the mining to go forward. Applications with far less defect are routinely denied. The Appeal Request and the new submissions into the Record, **are simply a re-run of what was submitted at the earlier hearing. If you want a read a comprehensive rebuttal of the Appeal before you today, read the Hearings' Officer's Decision again; Its a perfect fit.**

A Synopsis of the Friends of Forest Conservation Easement Agreement
-- What it does and does not do.--

Critical to the merits of the Applicant's Appeal is a thorough understanding of the Conservation Easement and its terms. I believe that once you understand how limited this agreement really is, you will discover, as the Hearings Officer did, that it is not the controlling document as a practical matter, nor as a matter of law. The Applicant maintains that the Conservation Easement Agreement resolves all issues, including an operating plan, reclamation detail, and including the bizarre claim of the hours of operation, even though these purported commitments are not written anywhere. Details have only recently been put on paper and made public. Basically, the Applicant claims that the Agreement gave them a blank page to fill in to their liking (subject to DOGAMI permits only) except for the very limited rights granted to the Friends of Forest Park. If anything, the Hearings Officer actually gave the Agreement more credit than its due.

The important provisions include:

1. The Friends agree to support an unspecified "Mine Plan" which as a practical matter, did not actually exist until some six months later after emerging from the DOGAMI permit process. The public's first view of the Mine Plan and all of the related details and operations was before the Hearings Officer.
2. Angell Brothers is allowed to unilaterally trash all of the protective measures if the Mine Plan becomes "Economically Infeasible" or if they lose 2 acres of mining area as the result of regulation either in the permitting process or at some later date. "Economically Infeasible" means that they cannot maintain an annual growth rate of 8% compounded. This means that they shall

CAF m-6

page 1 of 4

not be restricted from doubling sales every 9 years. For example, if in year 36 of a 40 year mine plan, a new clean water law slows their growth rate and they are not able to achieve sales equaling 16 times their 1996 base production, then Angell Bros. or their successors can unilaterally cancel the easements. Section 8.

3. In exchange for certain "encumbrances" on the Quarry property, The Friends agree to file briefs in support of whatever it is that Angell Bros. wants throughout the permitting process. If they do not support the application on all issues the deal is off and further, if the Friends interfere in any way making the Mine Plan "Economically Infeasible" (i.e. opposing them on key issues) then Angell Bros. has the right to "bring an action for relief in any court having jurisdiction." against the Friends. No one in the Friends of Forest Park is supporting this Appeal because they think its legal, its clear the support is for other reasons. Sections 16 and 6

4. The Conservation Easements are rights granted exclusively to the Friends of Forest Park The public has no rights, enforcement or otherwise, whatsoever. This is strictly a private agreement. Section 13 How could the Agreement possibly be the controlling document in the public land use process no matter how comprehensive it might be? While it may augment the Comprehensive and Site Specific Plan in a limited way, its relative importance is miniscule and hardly relieves Angell Bros. of public obligations which as a matter of law, still exist and prevail in the Comprehensive Plan and Zoning Code.

5. The Friends have no enforcement rights outside of the Preserves. See Section 5.3.4 The Scenic Buffer is separate and not the same as the Preserves See Exhibit 2. If you subtract the code's minimum mining setback of 100ft. where in no mining plan would existing vegetation be removable, the Friends succeeded in ultimately controlling uses only on about 45 acres. Only 12 of these acres is within the Burlington Bottoms Watershed. Realistically, much of the 45 acres could never be mined because the nearby property lines are upslope in areas already exceeding DOGAMI reclamation cut slope and benching requirements.

6. If the Agreement is not cancelled during the life of the mine or thereafter, no residential dwellings may be established. Although this provision is of some substance, the Applicant has exaggerated the alternative. Currently, provided that the PAM zoning designation could be removed, only two dwellings, (one per 160 acres) could be established. Further, Existing CFU and SEC provisions would place considerable restrictions upon their location to mitigate detrimental effects. To say what the future might hold is highly speculative.

The sum of the Easement Agreement and the benefits therein, which may be cancelled at anytime by Angell Brothers or their successors if they don't get enough of what they want, however hard-fought, are not worth an approval which is in plain violation of the code and Comprehensive Plan. Its inconceivable to imagine the Friends entering into an optional negotiation where they intended to eliminate important and binding environmental restrictions already conceded to by Angell Bros. and the DLCD in the form of the site specific plans within the West Hills Report in favor of the content and tone of this Easement. Its more likely that the Friends agreed to go away, declare peace, and drop their opposition to the expanded mining in exchange for some rather modest considerations and thats all. What they intended however, is perhaps not their key issue, as even if they intended the worse, the enabling land use actions of amending the detailing the changes never occurred.

Discussion of the Hearings Officer Decision and the Subsequent Appeal.

The task before you, is to give this Application the test of law as it existed at the time of submittal. We are not here to negotiate a new Comprehensive Plan, operating hours, conditions or haggle with the DLCD and mining industry representatives. On its present course,

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page 2 of 4

the next step in this process would be a LUBA review. The review here is out of the clutches of the LCDC; They have no jurisdiction over Conditional Use Permits. Its inconceivable that, for example, approval of hours beyond the express limits of the code would not be reversed at LUBA. Coursing through the Applicant arguments and positions is the very same logic displayed in the argument for expanded hours; (a) ***These regulations don't apply to us because the Agreement with the Friends implies something else which does not exist anywhere in writing in the public or private record but nevertheless overrules existing laws.*** To make the analysis even more odd the logic continues with, (b) ***Even though the Agreement is not enforceable by nor for the benefit of the public, and is unilaterally revokable by the Grantor for circumstances beyond the control the Grantee, it assures, by itself, that important public Goal 5 resources are protected and governs a land use decision. (In this case a Conditional Use Permit in satisfying several conditions) To find in favor of the Applicant requires agreeing with the logic and law of both (a) and (b).***

Needless to say, the Hearings Officer did not buy the logic. The Appeal is simply a re-run of the Applicant's original position before a new audience. The Hearings Officer concluded that the Applicant must comply with the County Code and with the Comprehensive Plan (West Hills Reconciliation Report including the incorporated Agreement with the Friends). While the Friends may be satisfied with the benefits granted to them, all of the tests of the approval process were far from over. The amendments to the Comprehensive Plan as approved by this Board incorporated the Easement Agreement, but did not, could not, and hopefully would not try to incorporate a non-existent future and unspecified Operating and Mining Plan which, as became apparent before the Hearings Officer, made significant departures from local regulations and site specific plans on the books. To agree to amendments this way would be a serious breach of land use laws. All of our local rules, especially the site specific conditions pertaining to the West Hills were fully scrutinized and later acknowledged by LCDC. The site specific plans for which Angell Bros. now seeks relief are the very same site specific plans and code revisions that they agreed to in meetings attended by themselves, DLCD and County Planning Staff. Methodically, the Hearings Officer applied the various applicable criteria and found that without attaching certain conditions, the present Application failed the test of fully acknowledged local laws. In most instances, the Applicant argues that the laws or criteria do not apply because of the Easement.

Here are some key excerpts from the Hearings Officers Decision for your consideration. All apply to the arguments in the Appeal ;

Page 14-15.

"The Applicant Claims that the site specific requirements of the comprehensive plan amendment (the Report) have been "developed further" in the reclamation plan submitted with this application, Dogami Operating Permit and the Conservation Easement. The Applicant has not demonstrated, however, that it is permissible for it to amend a comprehensive plan in this manner and to do so would violate basic tenets of Oregon land use law. As a result, these further developments are irrelevant in determining compliance with MCC 11.15.7325(C). Changes authorized in approvals obtained from government agencies that do not have responsibility for land use planning do not amend the comprehensive plan (the Reconciliation Report) nor alter the requirements of MCC 11.15.7325 (C). A comprehensive plan amendment is required to effectuate such a change. Further, the DOGAMI permit indicates that "issuance of this permit is not a finding of compliance with state-wide planning goals or the acknowledged comprehensive plan" The permit further cautions that " the applicant must receive land use approval from local governments before using this permit."

Based upon the foregoing findings, the Hearings Officer finds that the Applicant has not met his burden of proof, under MCC11.15.7325 (C), of showing that the mining operations plan and the revised reclamation plan can or will meet the requirements of the [West Hills] Report..."

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cu-6

Page 3 of 4

page 36.

"The Report's Program to Achieve the Goal for streams protects a stream's impact area by providing protection to an area of 600 feet centered on the middle of the stream, thereby protecting lands beyond the impact area. For the North Angell Brothers stream, this area is an area of 65.45 acres in size, including lands located beyond the boundaries of the Angell Brothers site. Mr. Parisi claims that the riparian area is the maximum area that can be protected under Goal 5 and the maximum area that should have been protected by the Program to Achieve the Goal for the Angell Brothers Aggregate site. As a practical matter, he is wrong as the County obtained approval to protect a broader area in its Program to Achieve the Goal for Streams from LCDC and that issue is now closed and applied a broader protection area in its Program to Achieve the Goal for the Angell Brothers site by protecting the stream drainage rather than the riparian area. (350 acres vs. 16.36 acres)"

page 37.

"Evidence in the record of this case indicates that the area included within the Preserves protects all Angell Brothers property found within the SEC overlay zone. The Preserves do not however protect the North Angell Brothers stream depicted on the Reconciliation Report map. The placement of land into the Preserves and the delineation of their boundaries occurred outside of the land use process. The determination of private parties in such a setting is not a landuse regulation and does not act to change the the description of the North Angell Brothers Creek watershed found in the Report."

While in some sense, Mr. Parisi is correct that the Preserves were created within the Comprehensive plan mediation process and confirmed, it is the nature, limited extent, and effect of the Agreement which makes it private. The disagreement over whether or not the Preserves were created in or out of land use process is a disagreement over the substance of the Agreement. Mr. Parisi paints a vastly different picture than whats actually on paper. The Agreement binds private parties only and is neither enforceable by nor for the benefit of the public. Further, it may be cancelled at any time by Angell Bros. for reasons beyond anyone's control. In the land use process, how could this constitute a lasting protection of Goal 5 Resources in the public interest? (If you haven't noticed, the CU permit to allow the Goal 5 mining is forever or until it is depleted.) Going back to an earlier issue, the Agreement makes important distinctions between the Preserves and the Scenic Buffer and I think the Hearings Officer generously overlooked the differences and treated them as one in the same. They are not one in the same and the Friends do not have the same authority within the Scenic Buffer. All of the SEC zone is in fact not protected by the Preserves. Finally, if the Preserves really supercede and amend all previous conflicting rules why were those rules not deleted from the Report? Even if they were intended to be deleted and someone just forgot, the rules on the books still apply until they are amended within the public process. This is a basic point of law and the point the Hearings Officer makes. Comprehensive Plan Amendments are public legislative proceedings. If what Mr. Parisi claims actually occurred last year when this Board confirmed the West Hills Report and Easement, I would have opposed it rather than supporting it. The Hearings Officer is correct that what Mr. Parisi purports to have occurred could only be discribed as " *not a landuse regulation* " and must have " *occurred outside of the the landuse process* " .

Chris Foster

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A copy of the Conservation Easement + Maps is attached

pg 4 of 4

AFTER RECORDING, RETURN TO:

Frank M. Parisi, Esq.
Lane Powell Spears Lubersky
520 SW Yamhill, Suite 800
Portland, OR 97204

GRANT OF CONSERVATION EASEMENT

WHEREAS Linnton Rock Corporation ("Linnton Rock") is the owner in fee simple of certain real estate in Multnomah County, Oregon, more particularly described in *Exhibit 1*, and incorporated herein by this reference ("the Property");

WHEREAS Linnton Rock Corporation, as Lessor, and Angell Bros., Inc. ("Angell Bros."), as Lessee, have executed that certain Lease dated October 15, 1991, for the purpose of mining, processing and selling aggregate and aggregate products on the Property;

WHEREAS Angell Bros. has participated and continues to participate in various proceedings to obtain all necessary permits from agencies of local, state and federal governments to permit extraction, processing and sale on the Property of aggregate and aggregate products (referred to hereafter as "Mining Uses"), as described in the Mine Plan and Reclamation Plan (referred to hereafter as the "Mine Plan") submitted to the Oregon Department of Geology & Mineral Industries ("DOGAMI") by Lidstone & Anderson, Inc. on February 14, 1995; and

WHEREAS such permits include, without limitation,

(a) an Oregon Department of Geology & Mineral Industries' Reclamation Permit and Operating Permit,

(b) the adoption by Multnomah County of an Ordinance that designates the Property as a Significant Goal 5 Aggregate Resource Site protected under the Protected Aggregate and Mineral Sites Zone, and the adoption by Multnomah County of an Ordinance amending the Comprehensive Plan with the adoption of a "Program to Achieve the Goal" that permits Mining Uses as and to the extent identified in the Mine Plan,

(c) a Multnomah County Conditional Use Permit authorizing Mining Uses as stated in the Mine Plan,

(d) adoption by the Oregon Land Conservation and Development Commission of an Order approving the permit described in (b) above, and all other elements of Multnomah County Periodic Review Order No. 93-RA-876 that pertain to the Property (all of the above permits referred to hereafter as "Mining Permits");

WHEREAS the Mine Plan describes certain areas of the Property for Mining Uses (referred to hereafter as "the Mining Areas"), certain areas of the Property for conservation uses (referred to hereafter as "the Preserves"), and certain other areas of the Property as scenic buffer areas (referred to hereafter as "Scenic Buffer Areas"), all of which are described in *Exhibit 2* and *Exhibit 3* and incorporated herein by this reference;

WHEREAS all of the Mining Permits will be issued by the date of recordation of this Conservation Easement;

WHEREAS Linnton Rock and Angell Bros. (referred to herein as "Grantors") intend to foster, preserve, and protect conservation values over the Property, as and to the extent that Mining Uses, as described in the Mining Plan, are permitted to occur;

WHEREAS Friends of Forest Park is a nonprofit organization organized under the laws of the State of Oregon ("Grantee") and wishes to honor the intentions of Grantors as stated in this Conservation Easement with respect to Mining Uses described in the Mine Plan and with respect to Conservation Uses in the Preserves, and is willing to undertake all duties necessary to protect this Conservation Easement in the Preserves and Grantors' right to conduct Mining Uses as described in the Mine Plan;

WHEREAS Friends of Forest Park, Angell Bros., and Linnton Rock intend to create a "Conservation Easement" within the meaning of ORS 271.715(1) that complies with all provisions of ORS 271.715 *et seq*;

NOW, THEREFORE, Grantors hereby grant this GRANT OF CONSERVATION EASEMENT in favor of Grantee on the terms and conditions described below.

1 The Property

Grantors warrant that they hold the interests in the Property recited above and that they have the authority to grant and record this GRANT OF CONSERVATION EASEMENT and that Angell Bros. has applied for all necessary permits to mine in the Mining Areas and will continue to provide all materials reasonably necessary to obtain the Mining Permits.

2 Grantee warrants that it is a nonprofit organization in good standing under the laws of the state of Oregon, that its stated purposes include retaining or protecting the natural, scenic, or open space values of real property, assuring the availability of real property for agricultural, forest, recreational, or open space use, protecting natural resources, maintaining or enhancing air or water quality, or preserving the historical, architectural, archaeological, or cultural aspects of real property, and that it has the authority to accept this GRANT of Conservation Easement.

3 Grant of Easement

This Conservation Easement shall apply to and encumber the Property as follows: Upon recordation, the Preserves and the Scenic Buffer Areas; and upon the conclusion of mining and the release of the DOGAMI reclamation bond, all other areas of the Property.

This Conservation Easement shall become effective upon recordation, which shall occur through Escrow Account No. 623564 established at Fidelity National Title Company, Portland, Oregon, upon satisfaction of the conditions set forth in Section 16, and shall remain in effect so long as none of the conditions in Section 8.5 have occurred.

This Conservation Easement is subject to the provisions of ORS 271.715 *et seq.*

4 Forest Management

It is understood and acknowledged by all parties hereto that portions of the Preserves and Mining Areas have been clearcut and require extensive reforestation. The following forest management and timber harvesting practices shall be observed (a) within the Preserves and the Scenic Buffer Areas upon recordation of this Conservation Easement, and (b) upon conclusion of mining and the release of the DOGAMI Reclamation Bond, upon all other areas of the Property, in order to achieve by natural growth process and sustain in perpetuity Western Oregon old growth forest conditions, and in order to foster, preserve, and protect the scenic views of the Property within surrounding viewsheds:

4.1 Forest management and harvesting shall be consistent with the restoration, maintenance, and enhancement of Western Oregon old growth forest structure and habitat type, including, without limitation, the following elements: multi-storied canopy; numerous large diameter (32" at breast height ("dbh") or greater) trees; diversity of age classes, natural mix of native species vegetation; standing hard and soft snags; large and small down logs.

4.2 No douglas fir, western red cedar, or western hemlock smaller than 32" dbh shall be harvested nor shall any douglas fir, western red cedar, or western hemlock be harvested if there would be remaining after harvest less than 8 trees 32" dbh and larger per acre, except for commercial thinning, which shall be permitted only with the Grantee's reasonable professional review and permission, and only when shown to be consistent with the achievement of the purposes of this Conservation Easement and this section.

4.3 All forest management plans and timber harvest plans, or similar documents, shall be submitted to Grantee for Grantee's reasonable professional review, prior to any submission to government agencies for approval, and prior to implementation, to ensure the protection of old growth Western Oregon forest values and other conservation values and purposes of this Conservation Easement.

5 Rights of the Grantee and Restrictions on Use of the Property

5.1 The Property

No residences or other permanent structures shall be constructed or allowed to remain on any portion of the Scenic Buffer Areas or Preserves, and no residence shall be constructed or allowed to remain on any portion of the Mining Area except for one temporary residence for a caretaker or security person, which shall be located within the Mining Areas and shall be removed promptly upon completion of Mining and release of the DOGAMI reclamation bond.

5.2 The Preserves

The Preserves shall be set aside for protection of wildlife habitat, scenic quality and water quality. Extraction of aggregate resources shall not occur in the Preserves.

5.3 Access to Preserves

5.3.1 Possessory Rights

Grantors shall convey to Grantee an easement approximately ten feet in width for pedestrian passage ("Hiking Trail Easement") through the Property when the following events have occurred: (a) extraction of aggregate resources has been completed; and (b) all reclamation (including, without limitation, the establishment of Western old growth forest conditions on previously mined areas) has been completed and accepted by DOGAMI, and the reclamation bond has been released. Grantee shall have possessory rights only to such portions of the Preserves as are specifically subject to the Hiking Trail Easement.

5.3.2 Conservation Assessment

Grantee, at its option, shall have the right to enter the property for conservation purposes once per calendar year, upon thirty (30) days' notice to Grantors. Failure to schedule such visits within each calendar year shall constitute a waiver of the right to do so, but shall not constitute a waiver of such right in a succeeding calendar year, nor a waiver of the right to enforce any violation of the terms of this Conservation Easement which would have been apparent upon a visit.

5.3.3 Inspection to investigate Violation

In the event Grantee reasonably believes that the terms of this Conservation Easement have been or are about to be violated, Grantee shall give written notice to Grantors, who shall respond in writing within fifteen (15) days. If, following receipt of Grantors' written response, Grantee still reasonably believes that the

terms of this Conservation Easement have been or are about to be violated, Grantee, accompanied by Grantors, may conduct further inspection of the area in which the suspected violation occurred at such reasonable time as the parties may agree.

5.3.4 Interference outside of Preserves

Nothing in this Conservation Easement shall be construed as giving Grantee the right to enter any portions of the Property that are not within the Preserves or to inspect, monitor, or in any way interfere with activities on any portion of the Property other than in the Preserves. With respect to Mining Uses, Grantee shall have only such rights as inure to the general public, such as the right to review Department of Geology inspection reports or other public records, and shall have only such enforcement rights as would inure to the general public.

6 Enforcement

In the event that any party violates any of the terms of this Conservation Easement, the other party shall have all rights to bring an action for relief in any court having jurisdiction thereof and to seek any relief to which that party may prove it is entitled.

7 Liability

7.1 Wrongful Acts of Grantee

Grantee shall hold harmless, defend, and indemnify Grantors and the Grantors' officers, agents, employees, successors in interest, and assigns against all claims, demands, actions, and suits (including attorney fees and costs) brought against any of them caused by the wrongful acts or omissions of Grantee, its officers, agents or employees, arising out of the Grantee's use of the Conservation Easement.

7.2 Injury to Grantee

Grantee hereby acknowledges that Mining Uses are an ultrahazardous activity, and Grantee warrants that it will conduct any activities pursuant to this Conservation Easement, and exercise any rights conferred by this Conservation Easement, at its own risk, and Grantors shall not be liable for injuries or damages of Grantee except to the extent that such injuries or damages are proximately caused by negligence of Grantors. In addition, with respect to injuries attributable to Grantee's own negligence, Grantee shall hold harmless, defend and indemnify Grantors.

8 Term and Successor Interests

8.1 Term of Interests

Except as expressly set forth in Section 8.5 regarding termination, this Conservation Easement shall continue in perpetuity.

8.2 Effect of Covenants

This Conservation Easement and each term, condition and covenant contained herein respecting the Property is intended to run with the land, even to the extent it imposes a negative burden and even to the extent the benefit does not touch or concern real property.

8.3 Binding Effect on Successors in Interest

Except as expressly set forth herein regarding termination, this Conservation Easement shall be binding upon the Property and Grantors and Grantee, and the heirs, personal representatives, successors, assigns, and transferees of Grantors and Grantee, as the case may be; provided, however, that Grantors and Grantee shall have no personal liability arising out of any acts or events occurring after any transfer or conveyance of Grantors' or Grantee's interest in the Property, provided that Grantors or Grantee is not in default of the terms of this Conservation Easement at the time of such transfer or conveyance.

8.4 Modification

This Conservation Easement may not be modified in any respect, except by consent of Grantors and Grantee, and then only by written instrument duly executed and acknowledged by all such parties, duly recorded in the office of the Multnomah County recorder.

8.5 Interference with Mining

8.5.1 Termination

This Conservation Easement shall terminate and all rights granted hereunder shall be extinguished if the Mining Uses described in the Mine Plan become Economically Infeasible as the result of actions, plans, recommendations taken or made by, or eminent domain proceedings instituted by, any court, agency, Indian tribe, local government, or legislative body following recordation of this Conservation Easement. "Economically Infeasible" means (a) the inability of Angell Bros. to produce and transport off the Property the Minimum Tonnage, or (b) the loss of more than two acres of Mining Area as described in the Mine Plan. In calendar year 1995, the Minimum Tonnage shall equal 1,700,000 tons, and in subsequent calendar years the Minimum Tonnage shall equal 108% of the

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Minimum Tonnage applicable during the preceding calendar year, until mining is completed and the DOGAMI reclamation bond is released.

8.5.2 Indemnity for Grantee's own acts

Grantee shall indemnify and hold harmless Grantors from any interference caused by Grantee making the Mining Uses described in the Mine Plan Economically Infeasible, other than interference caused by Grantee in enforcing this Conservation Easement.

8.5.3 Exception for violations of Mining Permits

The conditions precedent to termination of this Conservation Easement stated in Section 8.5.1 and the Indemnity stated in Section 8.5.2 shall not be deemed to occur in the case of (1) Angell Bros.' violation of any term of any Mining Permit or (2) an allegation by any governmental body having jurisdiction thereof that any term of any Mining Permit has been, or may be, violated, as to which Angell Bros. has received notice of the alleged violation and an opportunity to cure the alleged violation and fails to cure the alleged violation for one year after notice, or such longer period of cure as may be agreed to by the governmental body having jurisdiction thereof.

9 Assignment to third parties

Grantee may assign its interest in this Conservation Easement only if Grantee first obtains the written consent of the Grantors. The following are eligible assignees of the Grantee's interest:

9.1 Governmental units or agencies

Grantee's interest is assignable to the State of Oregon, Multnomah County, the City of Portland, Metro, or any park and recreation district, or other governmental agency, public corporation, or political subdivision.

9.2 Qualified charitable organizations

Grantee's interest is assignable to any charitable organization, charitable association, or charitable trust, whose purpose is to protect the natural, scenic, or open space values of real property, or to protect natural resources, or to maintain or enhance air or water quality.

9.3 Third parties other than assignees

Nothing in this Easement shall be interpreted as conveying either (a) to any third party other than one to whom Grantee has made a valid assignment pursuant to this Section 9,

or (b) to the general public, the right to enforce the terms of this Conservation Easement, or any other rights to the Property.

10 Attorney Fees

In case any suit or action is instituted to enforce any of the rights or provisions expressed in this Conservation Easement, the party not prevailing agrees to pay the prevailing party's costs and disbursements related to said proceedings and such sum as the court may adjudge reasonable for attorney fees at trial and/or appeal of said action.

11 Consideration

Grantors are granting this Conservation Easement to Grantee in consideration of Grantee's acceptance of this Conservation Easement to be held exclusively for conservation purposes.

12 Appraisal

On or before the date of recordation, Grantor shall deliver to Grantee complete copies of the "qualified appraisal" and "appraisal summary" pertaining to this Conservation Easement, as those terms are defined by Internal Revenue Regulations adopted pursuant to § 170(a)(1) of the Internal Revenue Code and § 155 of the Tax Reform Act of 1984. Grantee makes no representation or warranty as to the adequacy of such appraisal or appraisal summary, nor does Grantee make any representation or warranty as to the income tax or property tax consequences of the donation of this Conservation Easement, except as expressly provided herein.

13 No Public Dedication

Nothing contained in this Conservation Easement shall be deemed to be a gift or dedication of the Property or of any portion of the Property to the general public or for the general public or for any public purposes whatsoever. If Grantors convey to Grantee a Hiking Trail Easement, under the terms of which Grantee may acquire the right to invite the general public at specified times and for specified purposes to use a Hiking Trail as discussed in this Section 13, the public shall have only such rights as are specifically set forth in the Hiking Trail Easement.

Linnton Rock Corp. may, in its sole discretion, make a charitable gift or quitclaim of its interest in all or any portion of the Property to Grantee at the conclusion of mining, and in that event, Linnton Rock Corp. shall be relieved of any further obligation under this Conservation Easement with respect to such portion of the Property so conveyed.

14 Waiver

Except to the extent stated in Section 5.4.2, the failure of either party to enforce any right provided for in this Conservation Easement or to insist on strict performance of this

Conservation Easement shall not constitute a waiver of the right to do so, and shall not extinguish this Conservation Easement or be deemed a waiver of any rights and remedies provided herein in case of subsequent breach or default in any covenant, condition, or restriction.

15 Notices

All notices given pursuant to this Conservation Easement shall be in writing and shall be given by personal delivery, by United States mail, or by United States Express Mail or other established express delivery service, postage or delivery charge prepaid, return receipt requested, to the addresses listed below. All notices shall be deemed given upon "receipt," meaning the earliest of any of the following: (a) the date of delivery of the notice as shown on the return receipt; (b) the date of actual receipt, or (c) the date of attempted delivery, as evidenced by the postmark on the return receipt or the date of receipt of notice of nondelivery.

Angell Bros. Rock
PO Box 83449
Portland, OR 97283
Attn: Skip Anderson

Linnnton Rock Corp.
PO Box 2183
Grand Junction, CO 81502
Attn: W.L. Wilson, President

Friends of Forest Park
PO Box 2413
Portland, OR 97208
Attn: John Sherman

16 Recording

16.1 Initial Recording

Grantors shall record this GRANT OF CONSERVATION EASEMENT in the office of the Multnomah County recorder, together with Exhibits 1, 2, and 3 when the following Conditions have been satisfied or waived:

16.1.1 All Permits Obtained

Angell Bros. shall have obtained all Mining Permits.

16.1.2 No Appeals

The appeal period, if any, shall have expired on all approvals of Mining Permits or, if any appeals have been filed by any person whatsoever,

(a) Grantee shall have intervened and filed briefs in support of Angell Bros.,

(b) the appeals have been resolved by an appellate judgment in favor of Angell Bros. on all issues, or, if any issues are resolved against Angell Bros., they have been resolved on such terms as permit Angell Bros., in its reasonable discretion, to conclude that Mining Uses described in the Mine Plan have not become Economically Infeasible,

(c) all further avenues of review from such appellate judgment have been exhausted, and

(d) a period of sixty (60) days from the date of such appellate judgment has elapsed.

16.2 Recording of Extinguishment of Conservation Easement

In the event this Easement is terminated pursuant to Section 8.5, Grantors shall forthwith record with the office of the Multnomah County Recorder an instrument extinguishing this Conservation Easement.

17 Exhibits Each of the exhibits listed below and attached to this Conservation Easement are incorporated herein by this reference and made a part hereof.

- Exhibit 1 Legal Description of the Property
- Exhibit 2 Legal Description of The Preserves
- Exhibit 3 Legal Description of the Scenic Buffer Areas

DATED this 19th day of August, 1995.

Grantors: Linton Rock Corp
By: M. J. Wilson
Title: President

DATED this 21st day of August, 1995.

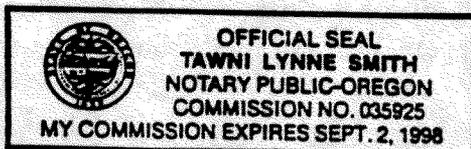
Grantors: Angell Bros. Inc.
By: Frank H. Anderson
Title: President

STATE OF OREGON)
) ss.
County of Multnomah)

This instrument was acknowledged before me on 21st August, 1995,
by ~~Skip~~ Anderson as President of Angell Bros. Rock.

Frank H.

Tawny Lynne Smith
Notary Public for Oregon
My commission expires: 9-2-98



STATE OF COLORADO)
County of Montezuma) ss.

This instrument was acknowledged before me on Aug. 19, 1995,
by W.L. Wilson as President of Linnton Rock Corp.

Dolores Cochran
Notary Public for Oregon
My commission expires: 1-22-99

Aug. The foregoing Conservation Easement is hereby accepted by Grantee this 22 day of
Aug., 1995.

Grantee: FRIENDS OF FOREST PARK
By: [Signature]
President Friends of Forest Park

STATE OF OREGON)
County of Multnomah) ss.

August 22, 1995.

Personally appeared John Lee Sherman, who, being duly sworn, did
say that he/she is the President of Friends of Forest Park, and that said instrument was signed
and sealed in behalf of said organization by authority of its board of directors; and acknowledged
aa said instrument this GRANT OF CONSERVATION EASEMENT to be its voluntary act and
deed.



Before me:
Sandra Hauck
Notary Public for Oregon
My commission expires: 9-28-99

AFTER RECORDING, RETURN TO:

Frank M. Parisi, Esq.
Lane Powell Spears Lubersky
520 SW Yamhill, Suite 800
Portland, OR 97204

EXHIBIT 1
TO
CONSERVATION EASEMENT
Legal Description of Property

EXHIBIT A
TO
LEASE AND AGREEMENT BETWEEN
LINNTON ROCK CORP. as LESSOR
and ANGELL BROS., INC. as LESSEE

PARCEL NO. 1

The portion of the Northwest quarter of Section 28, Township 2 North, Range 1 West of the Willamette Meridian in the County of Multnomah and State of Oregon, lying westerly of the westerly line of the United Railways Company right of way, EXCEPT that part acquired by the State of Oregon by and through its State Highway Commission by decree filed November 30, 1967, in Suit 325396.

PARCEL NO. 2

Southeast quarter of the Northeast Quarter (SE 1/4 of NE 1/4) of Section 29, Township 2 North, Range 1 West of the Willamette Meridian, in the County of Multnomah and State of Oregon.

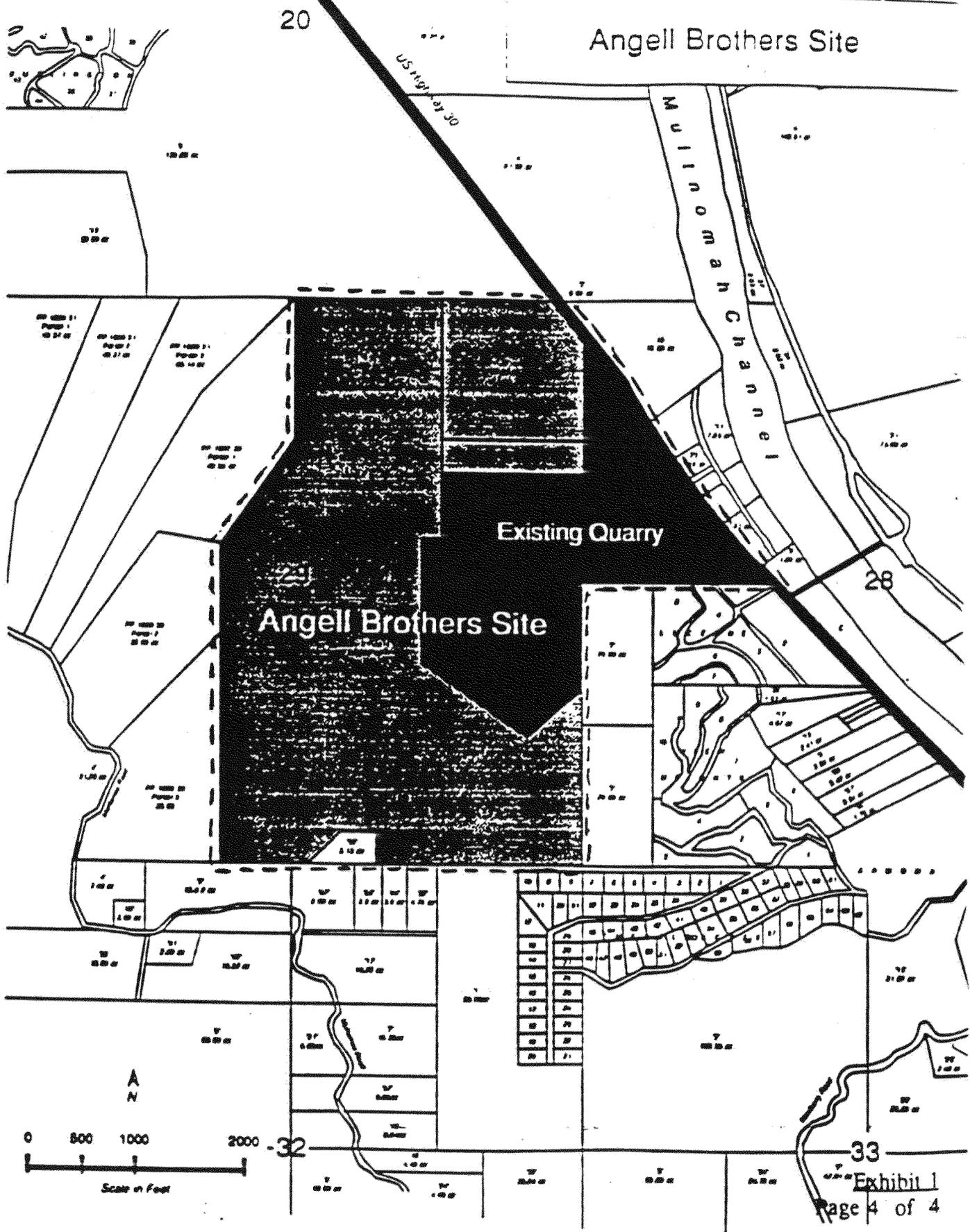
PARCEL NO. 3

The Northwest quarter of Northeast quarter of Section 29, Township 2 North, Range 1 West of the Willamette Meridian, in the County of Multnomah and State of Oregon, consisting of 40 acres of land more or less.

PARCEL NO. 4

That portion of the Northeast quarter of the Northeast quarter of Section 29, Township 2 North, Range 1 West of the Willamette Meridian in the County of Multnomah and State of Oregon lying Westerly of the Westerly line of the United Railways Company right of way, consisting of 33.05 acres of land more or less.

Map of the Property



Angell Brothers Site

Existing Quarry

Angell Brothers Site

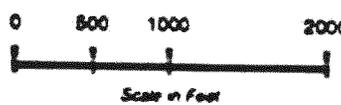


Exhibit 1
Page 4 of 4

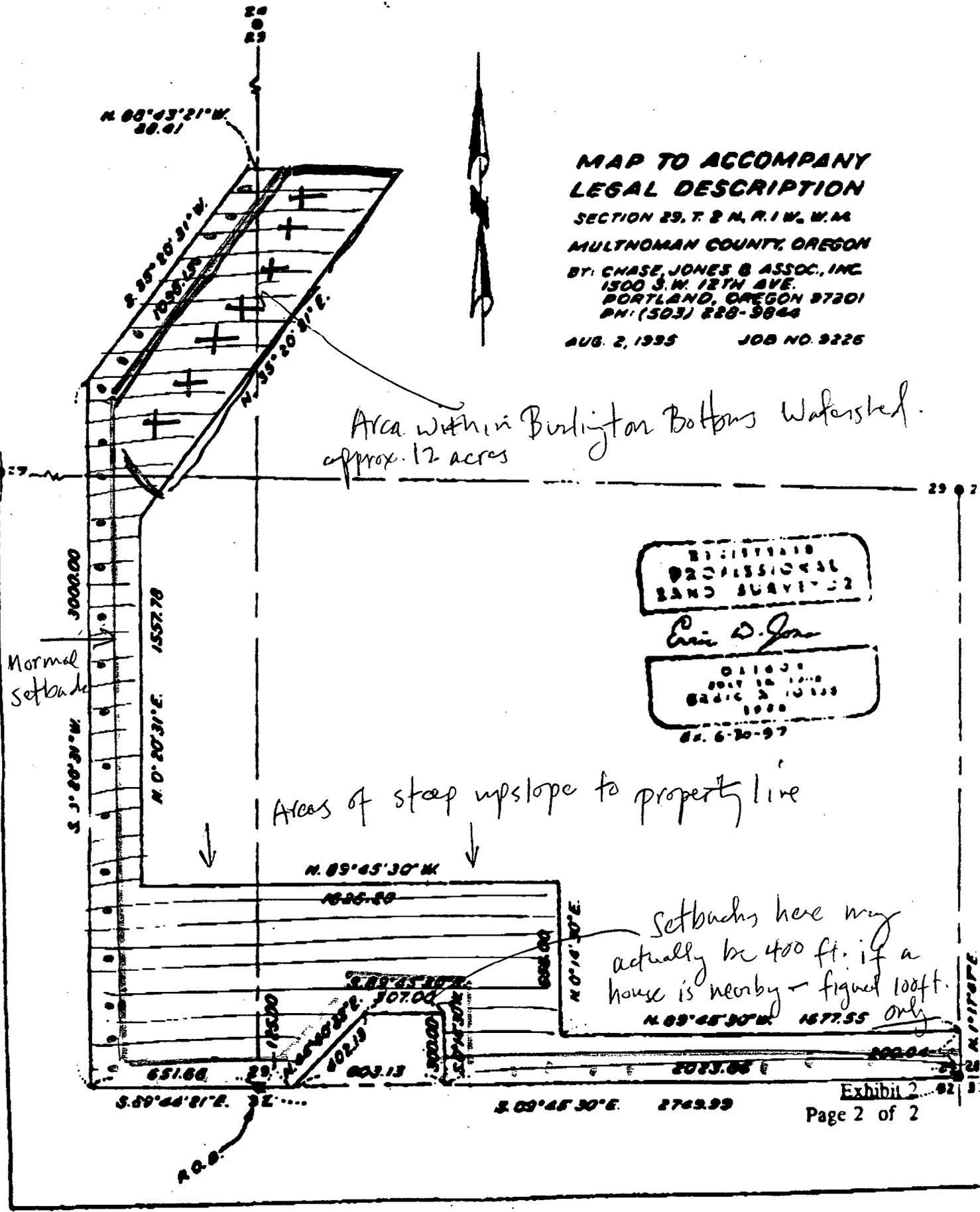
EXHIBIT 2
To
CONSERVATION EASEMENT

Legal Description of the Preserves

A tract of land in Section 29, Township 2 North, Range 1 West of the Willamette Meridian in the County of Multnomah and the State of Oregon, being more particularly described as follows:

Beginning at the South 1/4 corner of said Section 29; thence South 89°45'30" East along the south line of said Section 29 a distance of 125.00 feet; thence North 44°40'32" East 420.13 feet; thence South 89°45'30" East parallel with the south line of said Section 29 a distance of 307.00 feet; thence South 0°14'30" West a distance of 300.00 feet to a point in the south line of said Section 29; thence South 89°45'30" East along said south line 2023.86 feet to the southeast corner of said Section 29; thence North 1°17'47" East along the east line of said Section 29 a distance of 200.04 feet; thence North 89°45'30" West parallel with the south line of said Section 29 a distance of 1577.55 feet; thence North 0°14'30" East 656.00 feet; thence North 89°45'30" West a distance of 1626.29 feet; thence North 0°20'31" East 1557.78 feet; thence North 35°20'31" East to a point in the south line of the N.W. 1/4 of the N.E. 1/4 of said Section 29; thence westerly along the south line of said N.W. 1/4 of the N.E. 1/4 of Section 29 to the southwest corner of said N.W. 1/4 of the N.E. 1/4; thence North 88°43'21" West along the north line of the S.E. 1/4 of the N.W. 1/4 of said Section 29 a distance of 38.41 feet to a point; thence South 35°20'31" West 1098.13 feet; thence South 0°20'31" West 3000.00 feet to a point in the south line of said Section 29; thence South 89°44'21" East along said south line of Section 29 a distance of 651.66 feet to the Point of Beginning.

**MAP TO ACCOMPANY
LEGAL DESCRIPTION**
SECTION 29, T. 2 N., R. 1 W., W.M.
MULTNOMAN COUNTY, OREGON
BY: CHASE, JONES & ASSOC., INC.
1500 S.W. 12TH AVE.
PORTLAND, OREGON 97201
PH: (503) 288-9844
AUG. 2, 1995 JOB NO. 9225



Area within Burlington Bottoms Watershed.
approx. 12 acres

REGISTERED
PROFESSIONAL
LAND SURVEYOR
Eric D. Jones
O 11831
EXPIRES 12/31/98
BASIC 3 10/15/98
1998
EX. 6-20-97

Areas of steep upslope to property line

Setbacks here may actually be 400 ft. if a house is nearby - figured 100ft. only
N 09°45'30\"/>

Map of the "Preserves" - total acreage - 74

33 acres - Minimum normal setbacks by code (100ft)
Area within normal setbacks.

12 acres + Area of the "Preserves" within N. Angell
Approx. Bros. Creek Watershed. - (Burlington Bottoms)

(All handwritten notations are by C. Foster.)
(includes calculations.)

Del

**UNIT Corporation
1912 NW Aspen
Portland, Oregon 97210**

November 21, 1996

Commissioner Beverly Stein
Multnomah County Board of Commissioners
1120 SW 5th Avenue, Room 1500
Portland, OR 97204

BOARD OF
COUNTY COMMISSIONERS
96 NOV 22 PM 3:30
MULTNOMAH COUNTY
OREGON

Re: Angell Bros. Rock Quarry

Dear Commissioner Stein:

This letter is being written to you in support of the Angell Bros. upcoming appeal.

I represented the Friends of Forest Park during the mediation, and I attended mediation sessions conducted by Ty Tice. I reviewed and approved the Mine and Reclamation Plan prepared for Angell Bros. by Lidstone & Anderson.

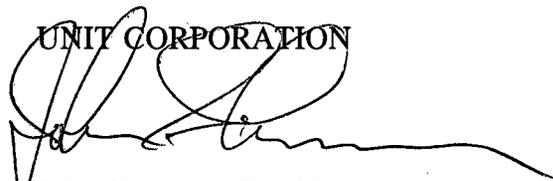
In furtherance of my representation, Skip Anderson, President of Angell Bros., and I walked the property to establish the location of various set-backs, Scenic Buffer Areas and the Preserves. I confirmed at that time that, specifically with respect to the North Angell Bros. Stream, the western set-back designated in the Mine Plan was sufficient to protect the riparian area and the main channel, which is the only channel that contributes water to Burlington Bottoms.

It is in the interest of the Friends of Forest Park that, pursuant to the terms of the Angell Bros. Mine Plan, the site be mined expeditiously, thereby allowing the entire site to be protected by the conservation easement as quickly as possible.

Please feel free to submit this letter into the record at the hearing.

Very truly yours,

UNIT CORPORATION



John Sherman, President

McNamee Neighbors
c/o David & Susan King
14310 NW McNamee Road
Portland, Oregon 97231



503 621 1000
{voice/message}
503 621 3390
{Fax}
dking@teleport.com
{Internet}

TO: Multnomah County Board of Commissioners
CC: Phil Bourquin Multnomah County Planning Dept.
FROM: McNamee Neighbors of the Angell Bros Quarry
RE: CU 6-96, SEC 18-96
Angell Bros Quarry Conditional Use Permit

96 NOV 25 PM 2:07
MULTNOMAH COUNTY
OREGON
BOARD OF
COUNTY COMMISSIONERS

Who We Are

We are neighbors who live on McNamee Road, on or near the western boundary of the Angell Bros Quarry. Due to our location, we believe that we are the neighborhood most affected on a daily basis by the sights, sounds, dust, and geological shakings associated with the expanded mining operations. We are participating in the Conditional Use Permit process because our daily lives are likely to be negatively affected unless our neighbor, Angell Bros, follows the rules — in this case, the conditions set forth by the Hearings Officer in accordance with Multnomah County ordinances.

It is our belief that Angell Bros should follow all rules regarding the operations of their quarry. In the spirit of those rules, they should be prepared to contain their nuisance behavior within the boundaries of their own property. We are concerned about plans to excavate rock that is a mere 200 feet from some of our property boundaries, to dig down within a few dozen feet of our aquitard thus threatening our water supply, and to use explosive charges to loosen rock a few hundred yards from our homes without independent seismic monitoring.

Our concerns have been conveyed in a timely fashion, first to Angell Bros, then to the County Planning Department staff, and finally to the Hearings Officer, both in writing and in our own voices. We prepared a position paper on these issues in a memorandum dated 9 September 1996. That memorandum is part of the record for this case and is attached. That memorandum is the most detailed statement of our concerns regarding the conditional use permit.

Several of us took time from our work to testify at the public hearing. There we were entertained by the applicant's attorney, Mr. Parisi, who asserted that due to prior agreements with the Friends of Forest Park, no further regulation was in order. Parisi went on to argue that our neighborhood concerns were somehow illegitimate since some of us built our homes after the quarry's initial expansion plans had been set in place. We are pleased to note that the Hearings Officer was not persuaded by Parisi's incorrect assertions.

McNamee Neighbors

Regarding the Hearing Officer's Findings

We encourage the Multnomah County Board of Commissioners, at the very least, to uphold the Hearings Officer's decision. While several of our concerns are not addressed by her findings, we believe that all conditions she did place on Angell Bros operations are appropriate, necessary, and proper. Those requirements most important to us are as follows:

- A requirement that Angell Bros not mine the North Angell Bros Creek watershed.
- A requirement that Angell Bros revise their mining plan so that reclamation is sequential.
- A requirement that Angell Bros follow the law with respect to hours of operation (i.e., 7AM to 6PM, etc.).
- A requirement that Angell Bros not use the Adams easement as an access point for the mine's operations.
- A requirement that Angell Bros modify their operations as necessary to ensure that trucks coming to and from the quarry do not create hazards on the roadways by scattering mud and rock and that the trucks be dispatched to appropriate roadways in view of the hazards they otherwise create.

Who is Minding the Store?

We want to highlight one of our continuing concerns: enforcement. Due to our concern with noise and dust, we checked with Oregon's DEQ to see what rules Angell Bros operates under and how they are enforced. What we found was distressing.

- With respect to sound, for example, there are explicit noise levels set by DEQ, but due to funding cuts, there is no enforcement officer.
- Water discharge from the quarry is monitored by self-report: Angell Bros provide tests of turbidity twice a year.
- Seismic monitoring, if it is done at all, is managed by Oregon's Department of Geology and Mineral Industries [DOGAMI], an organization that has no charter with respect to investigating vibration damage to residences that neighbor the mine.

In short, when we investigated enforcement of Angell Bros operations, we found that no one is minding the store. The attitude expressed by Parisi and Anderson in response to our request for independent enforcement was

McNamee Neighbors

remarkable. It essentially boiled down to this: "If you have a problem with our operations, then sue us."

De Novo Evidence

Since this hearing is de novo, we offer one new and serious matter for your consideration.

- Neighbors Adams and Rugh, whose properties overlook the quarry operations both current and future, report extensive roadwork and logging far outside the original confines of the quarry.
- It appears to Adams and Rugh that Angell Bros Quarry has begun its expansion prior to gaining approval. In particular, it appears to Adams and Rugh that overburden has been stored outside the original boundary of mining operations.
- Especially in the light of the Hearings Officers findings that a new sequential reclamation mining plan is needed, this action, if correctly interpreted, shows a serious disregard for County ordinances.

Both Adams and Rugh are unable to attend the 27 November 1996 hearing due to holiday travel plans. Knowing that they could not attend, we contacted the enforcement officer at the Multnomah County and asked that she look into this matter and be prepared to testify at today's hearing. Lisa Estrin told us that, due to a large backlog of complaints, it was unlikely that she could look into this matter prior to the Board meeting.¹

- We ask that the Board of Commissioners today demand an explanation from Skip Anderson as to whether Angell Bros operations have expanded operations beyond their original boundaries prior to the issuance of a conditional use permit.
- We urge the Board to dispatch the County Planning Officer to the Angell Bros site today to confirm or deny our contention and to verify independently that Mr. Anderson's testimony is true.

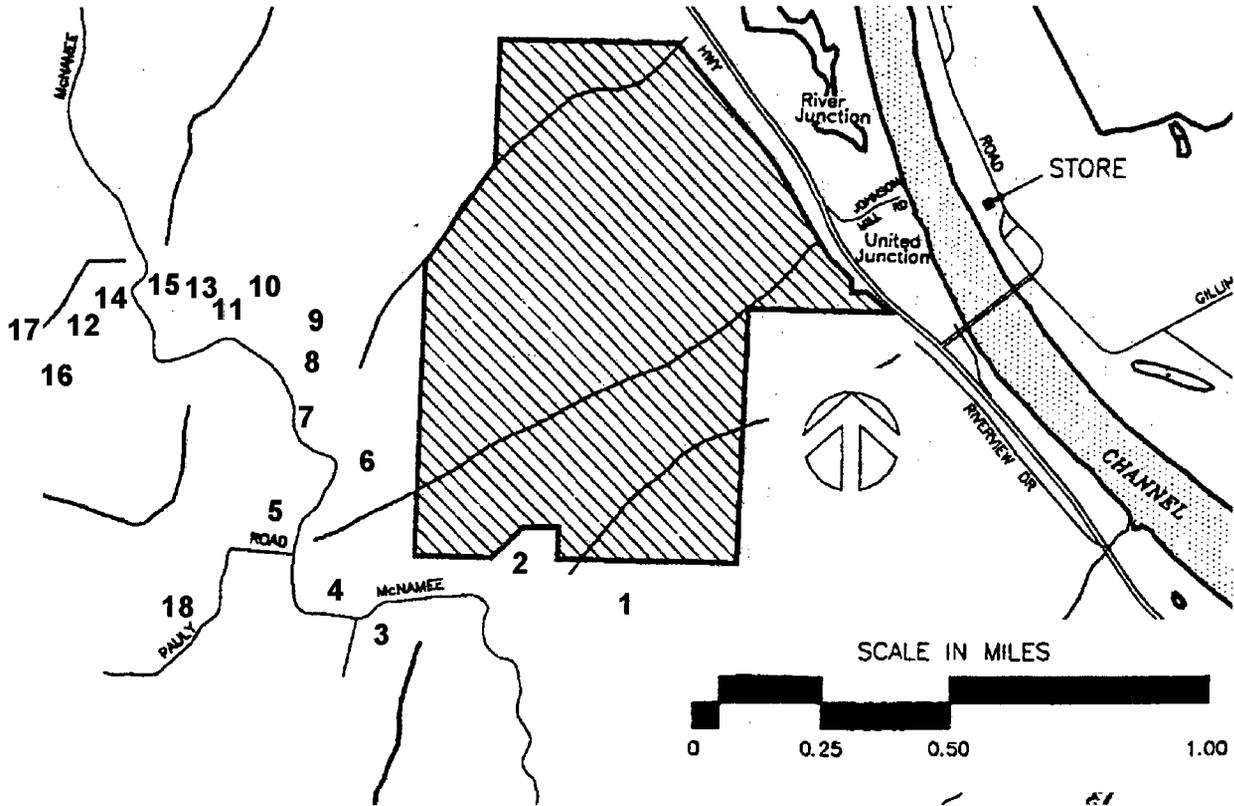
In summary, ...

Although we recognize the Hearings Officer's decision is perhaps a fair compromise in a difficult situation, we believe the issues and arguments raised in our 9 September 1996 submittal are valid and should have been followed. We realize as well that the land use process is time consuming and expensive for all involved, and we thank you for your patience in giving this matter careful review.

1. Once again, enforcement of whatever conditions are stated emerges as a tremendous concern to us.

McNamee Neighbors

Where McNamee Neighbors of Angell Bros Quarry live

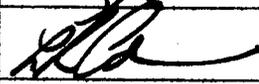
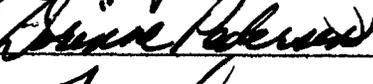
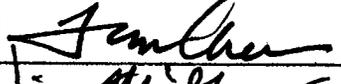
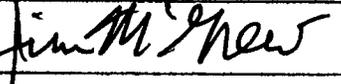
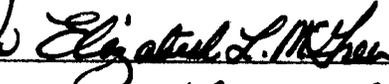
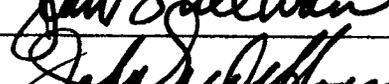
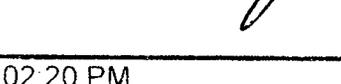


1	J & L McGrew	2	D Wruble	3	L & L Luethe
4	R & E Pletz	5	D Peterson et al	6	R Adams
7	T & D Long	8	D & C Rugh	9	H & C McCurdy
10	D & S King	11	J Chen & J Flynn	12	J Sullivan
13	D & T Bernards	14	K Foster	15	P & C Staples
16	B & P Bewick	17	J Hall	18	R & M Hansen

McNamee Neighbors

McNamee Neighbors of Angell Bros Quarry

We, the undersigned, have read this document and support the requests made therein.

Name	Signature	Address
DAVID KING		14310 NW McNamee Rd
Ray Adams		12700 N.W. McNamee Rd
Colleen & David Rugh	Colleen Rugh	14180 NW McNamee Rd.
Darlene A. Winkle		13162 NW McNamee Rd
Kurt Kimes		13555 N.W. McNamee Rd.
DORINNE PEDERSEN		13555 N.W. McNamee Rd.
John Chen		14320 NW McNamee Rd
Jim McGrew		13154 NW McNamee Rd.
ELIZABETH L. MCGREW		13154 NW McNAMEE RD
David Berwards		14350 N.W. McNamee Rd.
Emma Pletz		13236 NW McNamee Rd
Mary Hansen		11021 NW Dowley Rd
JEAN SULLIVAN		14347 N.W. McNamee
JOHN SULLIVAN		
John DeWaney		14347 NW, McNamee
Candice R. Staples		14440 NW McNamee
John B. Hall		14377 N.W. Mc Namee Rd.
HANK McCURDY		14250 N.W. McNAMEE Rd.
Tom King		14030 NW - McNamee Rd.

November 26, 1996

Beverly Stein, Chairperson
Multnomah County Commissioner
1120 SW 5th Ave.
Room 1500
Portland, OR 97204

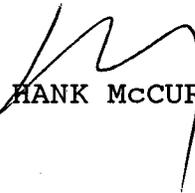
HAND DELIVERED

RE: Angell Brothers Conditional Use Permit Application

Greetings:

Please find enclosed Memorandum in Opposition to Angell Brothers Appeal In the Matter of CU6-96 and SEC18-96 scheduled for hearing on November 27, 1996.

Very truly yours,


HANK McCURDY

HM:ct
Enclosure

BOARD OF
COUNTY COMMISSIONERS
96 NOV 26 PM 4:19
MULTNOMAH COUNTY
OREGON

BOARD OF
COUNTY COMMISSIONERS

96 NOV 26 PM 4:19

MULTNOMAH COUNTY
OREGON

Memorandum in Opposition to Angell Brothers Appeal
In the Matter of CU6-96 and SEC18-96

The hearings officer did not misinterpret the Multnomah County Comprehensive Plan Zoning Ordinance and Sectional Zoning Maps completed during periodic review.

Background

As part of the periodic review process, Multnomah County limited residential development and prohibited expansion of the Angell Brothers site (see page 6 of the "Supplemental Director's Report to the Land Conservation and Development Commission." February 28, 1995.) Angell Brothers objected to LCDC's acceptance of Multnomah County's inventory of significant resources, claiming wildlife habitat and scenic views were not significant goal five resources. (Page one of "Supplemental Director's Report to the Land Conservation and Development Commission." February 28, 1995.) The director recommended mediation or accept the director's appointment of a hearings officer to resolve the matter.

Angell Brothers then met with the Friends of Forest Park, and a document called "Conservation Easement" resulted.

The "Conservation Easement" was not incorporated into and adopted by the County as a part of its comprehensive plan (West Hills Reconciliation Report). Angell Brothers insists that the mediated settlement negotiated between it and Friends of Forest Park is or has become the ordinance that governs the conditions to be used to regulate the expansion of the Angell Brothers quarry. It is Angell Brothers' primary argument for reversal of the Hearings Officer's opinion that the Conservation Easement is the ordinance as to the site specific requirements for expansion.

Angell Brothers takes great license in stating that the Reconciliation Report comprehensively adopts the Conservation Easement. Although the Conservation Easement references the Reconciliation Report and the Reconciliation Report also references the Conservation Easement, in neither document is there any language that requires or states that the Conservation Easement become part of the ordinance.

A: "Grant of Conservation Easement"

A review of the Conservation Easement document itself shows that in the recitals portion (Pages one and two) that Angell Brothers is participating in various proceedings to obtain "all necessary permits from agencies of local, state and federal governments to permit extraction...as described in the mine plan and reclamation plan...including a Multnomah County conditional use permit authorizing mining uses as stated in the mine plan" and including also "the adoption by Multnomah County of an ordinance that designates the property as a significant goal five aggregate resource site protected under the aggregate and mineral sites zone."

The conditions precedent to the easement going into effect are found at section 16, page 9 of the document. Section 16 provides that Angell Brothers will record the easement when all permits have been obtained and when all appeals, if any, shall have been resolved in favor of Angell Brothers "on all issues, or, if any issues are resolved against Angell Brothers, they have been resolved on such terms as permit Angell Brothers, in its reasonable discretion, to conclude that mining use as described in the mine plan have not become economically infeasible..."

The Conservation Easement is completely devoid of any language requiring as a condition precedent that it be adopted as the ordinance amending the comprehensive plan. ¹

¹ There are multiple problems with the Conservation Easement. Paragraph 16.1.2 leaves it in Angell Brothers' discretion to conclude that the mining uses allowed by the County have become economically infeasible as defined in paragraph 8.5.1 including "the inability to produce and transport off the property a certain minimum tonnage or the loss of more than two acres of mining area as described in the mine plan." In other words, the ability of Angell Brothers years hence to argue that mining has become economically infeasible negates the entire conservation easement. In a letter dated October 12, 1992 to the Multnomah County Planning Commission, Frank Parisi, the attorney for Angell Brothers, estimated that the Angell Brothers resource has a value of \$42 million, and that "if the current robust market continues, the mine could be played out in approximately 30 years." Paragraph 8.5.1 requires that Angell Brothers shall derive as "minimum tonnage" 108% of the prior years tonnage, starting with a base year of 1995 for 1,700,000 tons. In other words, the tonnage of each succeeding year will geometrically appreciate to be an astounding tonnage, even for a period of ten years let alone the thirty years that Angell Brothers apparently contemplates will be the life of the mine. In short, the conservation easement is, in great likelihood, not worth the paper that it is written on.

Section 9 of the Conservation Easement says that the grantee (Friends of Forest Park) may only assign the easement to certain designated assignees, including the State of Oregon, Multnomah County, the City of Portland Metro, or any park or recreation district, or other governmental agency upon the written consent of Angell Brothers, which will be granted only in Angell Brothers unfettered discretion. This language is hardly the language of a document intended to be embodied in the public law governing land use.

B: "The West Hills Reconciliation Report"

The West Hills Reconciliation Report does not adopt or otherwise incorporate the Conservation Easement.

Angell Brothers argues that the language in the introduction of the West Hills Reconciliation Report: "the results of that mediation process are presented as revisions to the reconciliation report in this attached document." proves that the Conservation Easement became the ordinance.

The result of the mediation process was that the expansion of the quarry was allowed. The terms of that expansion were not, except to the extent that the ordinance sets forth the broad policy strokes for the expansion, adopted by the West Hills Reconciliation Report. Nor does the Conservation Easement purport to incorporate the terms under which the expansion will be allowed. Rather, it sets forth the geographical area within which the expansion will be allowed.

Angell Brothers argues on page two of its appeal that the "program to achieve the goal incorporates the Conservation Easement. The Conservation Easement, in turn, incorporates the operating and reclamation plan." Angell Brothers concludes that the Reconciliation Report, together with the Conservation Easement and the Operating and Reclamation Plan are the County's program to achieve the goal. Both the Angell Brothers' assertions and conclusion are incorrect.

The Program to Achieve the Goal (found in the Reconciliation Report) is broken down into non-regulatory and regulatory portions. The strongest language in favor of Angell Brothers' argument under the non-regulatory portion of the Program to Achieve the Goal (VI-24, Conflict Resolution and Protection Program) reads as follows:

"Multnomah County accepts, encourages and will honor to the extent allowed by law, third party agreements to protect significant wildlife habitat through private sales, dedications, donations, easements, or other use restrictions."

The regulatory portion of the Program to Achieve the Goal found that page VI-25 of the Reconciliation Report provides as follows:

"Multnomah County shall require the Angell Brothers expanded quarry site to take the following measures as part of its operation and reclamation plan: (emphasis added)

- Minimization of the area mined at any given time;**
- Demonstration that reclaimed areas are capable of supporting forest vegetation;**
- Simultaneous reclamation along with mining to minimize non-vegetated areas;**
- Reclamation of the sites so as to best to enhance wildlife habitat values."**

Thus, it is clear that Multnomah County did not adopt and incorporate "whole cloth" the Conservation Easement and Angell Brothers mine plan and reclamation plan submitted on February 14, 1995. Rather, Multnomah County reserved certain requirements that it would impose upon "the Angell Brothers expanded quarry site."

The second prong of Angell Brothers' argument is that the Conservation Easement in turn incorporates Angell Brothers' operating and reclamation plan. This argument also is simply incorrect. Angell Brothers' Operating and Reclamation Plan was submitted in final form as the "Final Revision" in December of 1995. The Conservation Easement was executed by the parties on August 19 and August 22, 1995. Thus, the Angell Brothers' Operating and Reclamation Plan that Angell Brothers presents as its proposal as to how it should mine the quarry wasn't yet completely drafted when the Conservation Easement was executed. Nor does the Conservation Easement contemplate that any revision of the Operating and Reclamation Plan of February 1995, which is the only such plan mentioned in the Conservation Easement.

Further, the addition of a revision of the February 1995 Operating and Reclamation Plans, in December of 1995 clearly indicates that Angell Brothers does not consider its February 1995 Operating and Reclamation Plan to be the final document in that regard, although it claims that its Operating and Reclamation Plan is incorporated in the Conservation Easement. It is obvious, however, that the Conservation Easement mentions only a Mine and Reclamation Plan dated February 14, 1995.

C: The Hearings Officer did not misinterpret the amendments to the Zoning Code and Multnomah County Ordinance Numbers 804, 827, and 858.

Angell Brothers' arguments in this regard rest on its

original argument that the Conservation Easement and its Mining Plan, purportedly incorporated into the Conservation Easement, were adopted "whole cloth" by the County into the Reconciliation Report. Angell Brothers then argues that if there are any ambiguities arising as to which standard should govern, the Reconciliation Report or the Zoning Code, that the Reconciliation Report shall control. Angell Brothers does not then go on to describe areas where such ambiguity exist, or specifically what part of the Reconciliation Report controls on a particular issue.

Of course, the underlying problem is Angell Brothers' basic premise that the Conservation Easement and the Mining Plan of February 1995 is incorporated into the Reconciliation Report in its entirety.

The more fundamental problem is, however, that Angell Brothers misunderstands the function of the Reconciliation Report, which is that of a policy statement from which the specifics of the conditions for implementation of the expansion are developed in the conditional use process.

D: The Hearings Officer correctly decided that Multnomah County Code Section 11.15.7325 applied.

Angell Brothers does not dispute that the above referenced code section is the applicable section in deciding what conditions to apply to the Angell Brothers' expansion. Angell Brothers disagrees with the Hearings Officer's application of that section.

E: Access and Traffic

It appears that Angell Brothers tries to assert that language in the Reconciliation Report states that all traffic will not be considered a conflicting use with reference to the fact that the traffic on Highway 30 would not be considered a conflicting use. Angell Brothers studiously avoids the traffic problems on other roadways such as Newberry Road and McNamee Road.

The Hearing Officer's decision is not superseded by the decision of the County Engineer. The fact that they are parallel decisions rendered under separate legal avenues does not lead to the superseding of one over the other.

F: Regulation of Hours.

Angell Brothers again argues relying upon the contention that the Conservation Easement is incorporated in its entirety into the Reconciliation Report that the mine that needs to be mined as rapidly as possible. Angell Brothers' argument is that rapid mining will lead to rapid reclamation and long hours will

allow it to meet the "minimum tonnage" as set forth in the conservation easement.

Angell Brothers does not contend that MCC11.15.7325(c) restricted the Hearings Officer's ability to limit hours.

Assuming just for the purposes of argument, that the Conservation Easement was adopted in its entirety by the Reconciliation Report, the limitation of hours reasonably required by the Hearings Officer does not conclusively limit Angell Brothers' ability to mine the site rapidly. There is no evidence that it cannot achieve its minimum tonnage by hiring more workers and using more equipment. In other words, there is nothing that prohibits Angell Brothers from using its time allowed more efficiently.

G: North Angell Brothers' Creek Watershed.

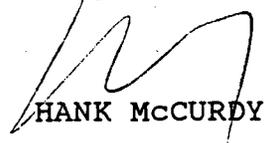
Angell Brothers argues that the tributary to the main stem of North Angell Brothers Creek is a "red herring." Angell Brothers argues that the tributary of North Angell Brothers Creek is not part of the watershed. Angell Brothers also argues that the significant matrix and stream profiles found at III-50 and III-106 to 108 show that the area to be protected is merely the riparian area of the main stem.

The Hearings Officer carefully analyzed, (pages 10-12 of her opinion), the North Angell Brothers Creek issue and whether it included the tributary. Based on the clear language of paragraphs VI-16 and 17 and VI-23 of the Reconciliation Report, she concluded correctly that the tributary was included in the watershed.

CONCLUSION

At the very least, the Hearings Officer's decision should be upheld. If Angell Brothers is dissatisfied with the Hearings Officer's decision based upon the Reconciliation Report, its remedy is an amendment of that ordinance.

Respectfully submitted,


HANK McCURDY

November 26, 1996

Chairman Beverly Stein
Multnomah County Board of Commissioners
1120 SW 5th
Room 1515
Portland, OR 97204

Re: Angell Brothers Quarry Expansion

Dear Chairman Stein,

We oppose the current Angell Brothers expansion plan.

In 1985 Angell Brothers purchased the timber land located between their existing mining operation and our property. We assumed it was going to be used as a buffer zone.

In 1992 Angell Brothers proposed an expansion to within 1200 feet of our property. We were not concerned as this seemed like sufficient separation from their operation. This expansion was later rejected by the County for various reasons.

A 200 foot extraction limit easement is now proposed from our property line. Our concerns are the dust and noise their operation will produce. This summer for nearly two weeks our house and cars were covered with dust from their operation when they expanded to a ridge, approximately 2000 feet north of us. This proposed expansion will not be like living adjacent to a farm which is cultivated over a short period every year or a construction site which has exposed earth and construction equipment for only a short duration. This quarry operation could operate continuously for years, with crushers, caterpillar tractors, loaders, and trucks rumbling and associated backup beepers. Dust will certainly become intolerable.

Please consider moving this easement line further from us, to protect the livability of our property. I believe our residence is the closest one to their proposed expansion, a jog in the line places our nearest neighbor over 600 feet away. Other neighbors are further away.

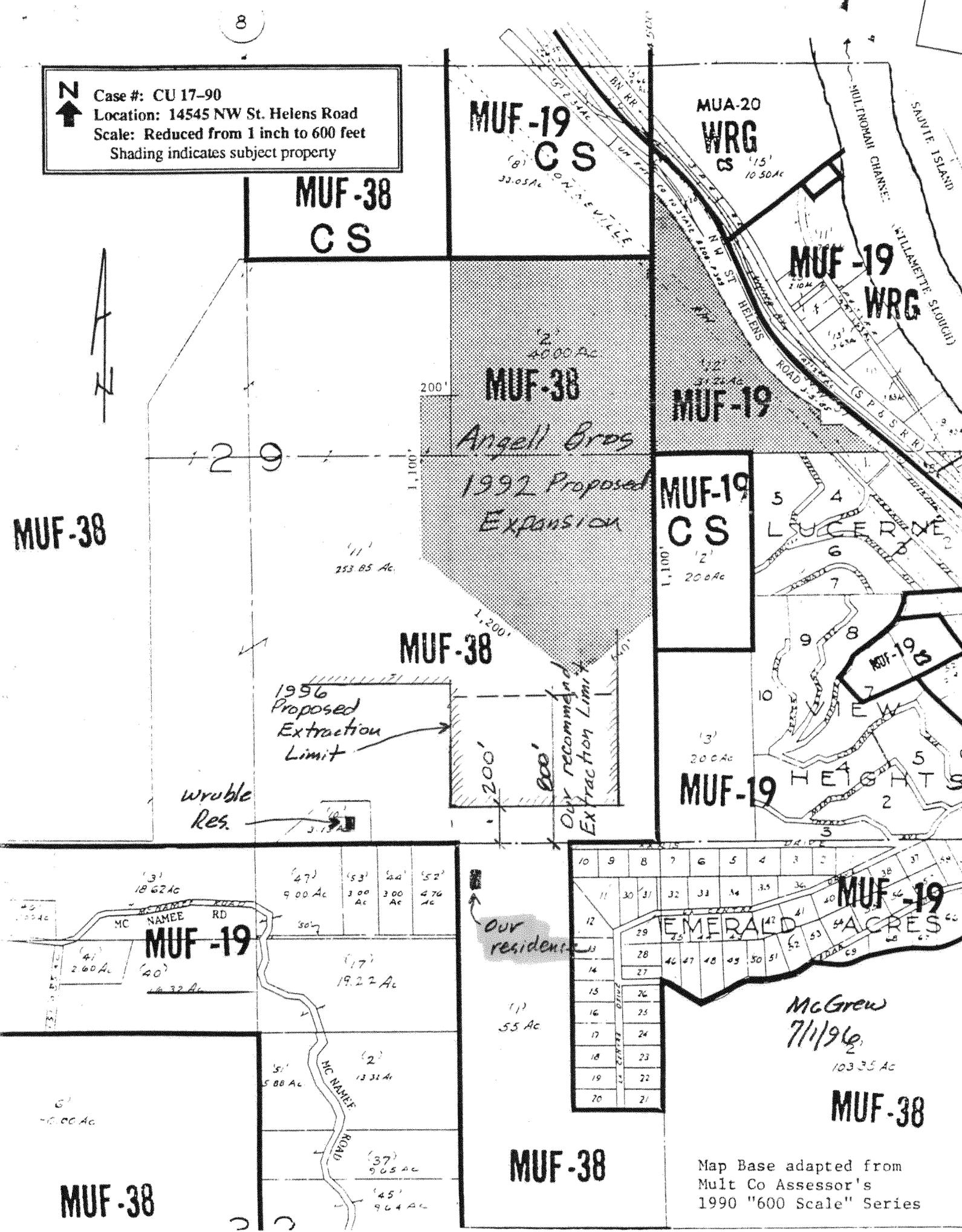
Sincerely,

James R. McGrew
Elizabeth L. McGrew

James R. McGrew
Elizabeth L. McGrew
13145 NW McNamee Road
Portland, OR 97231 289-5786\232-2117

BOARD OF
COUNTY COMMISSIONERS
96 NOV 26 PM 4:19
MULTNOMAH COUNTY
OREGON

N
 Case #: CU 17-90
 Location: 14545 NW St. Helens Road
 Scale: Reduced from 1 inch to 600 feet
 Shading indicates subject property



MUF-38

MUF-38
CS

MUF-19
CS

MUA-20
WRG

MUF-19
WRG

MUF-38

MUF-19

MUF-19
CS

MUF-38

MUF-19

MUF-19

MUF-19

MUF-19

MUF-38

MUF-38

MUF-38

Map Base adapted from
 Mult Co Assessor's
 1990 "600 Scale" Series

Angel Bros
 1992 Proposed
 Expansion

1956
 Proposed
 Extraction
 Limit

Our recommended
 Extraction Limit

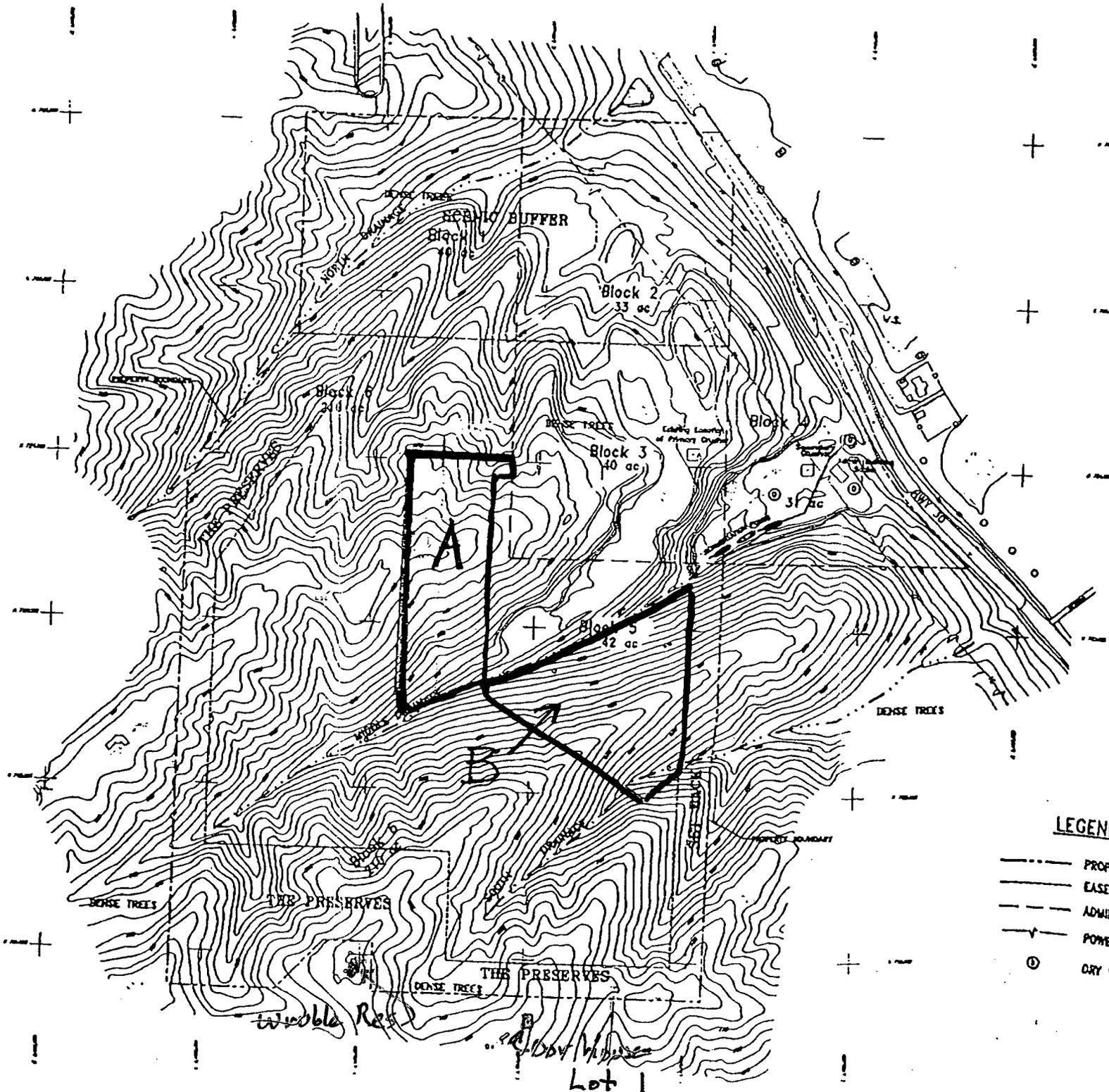
wruble
 Res.

Our
 resident

McGrew
 7/1/96
 103.35 Ac

10	9	8	7	6	5	4	3	2	1
11	30	31	32	33	34	35	36	37	38
12	29	28	27	26	25	24	23	22	21
13	46	47	48	49	50	51	52	53	54
14	45	44	43	42	41	40	39	38	37
15	26	25	24	23	22	21	20	19	18
16	25	24	23	22	21	20	19	18	17
17	24	23	22	21	20	19	18	17	16
18	23	22	21	20	19	18	17	16	15
19	22	21	20	19	18	17	16	15	14
20	21	20	19	18	17	16	15	14	13

(3) 18.62 Ac
 MC NAMEE RD
 (4) 2.60 Ac
 (47) 9.00 Ac
 (53) 3.00 Ac
 (54) 3.00 Ac
 (52) 4.76 Ac
 (20) 10.32 Ac
 (17) 19.22 Ac
 (2) 13.31 Ac
 (37) 9.05 Ac
 (45) 9.64 Ac
 (1) 5.55 Ac
 (6) 10.00 Ac



LEGEND

- PROPERTY/LEASE BOUNDARY
- EASEMENT/SET BACK
- ADMINISTRATIVE UNIT BOUNDARY
- POWER LINE
- DRY WELL

11/27/96
FRANK PARESI
SUBMITTAL

**MATERIALS SUBMITTED
BY ANGELL BROS.
NOVEMBER 27, 1996**

CASE NO. CU 6-96 AND SEC 18-96

**Parisi & Parisi
1 SW Columbia
Suite 680
Portland, OR 97258
(503) 417-1144**

A LITTLE HISTORY

FRIENDS OF FOREST PARK

**1912 NW Aspen
Portland, Oregon 97210
Phone (503) 241-9348
Fax (503) 241-8326**

Date: May 16, 1995

To: Skip Anderson & Ty Tice

From: John Sherman, President

Number of pages transmitted: 7

Re: Conservation Easements

This is a first draft of Conservation Easements. I will be back in Portland June 1. We will undoubtedly need to get together to refine this document. It will also need a companion survey description of the "Preserves" (the buffers and set-backs).

Also, if the Measure 26-26 Bond Measure passes, Friends of Forest Park would prefer approaching Metro on becoming the Grantee of the easements instead. They are a more logical grantee than Friends of Forest Park or Multnomah County.

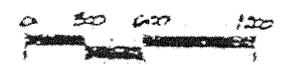
Additionally, if 26-26 passes, we might be able to have Metro pick up costs associated with the survey and potential appraisal issues.

MAP A

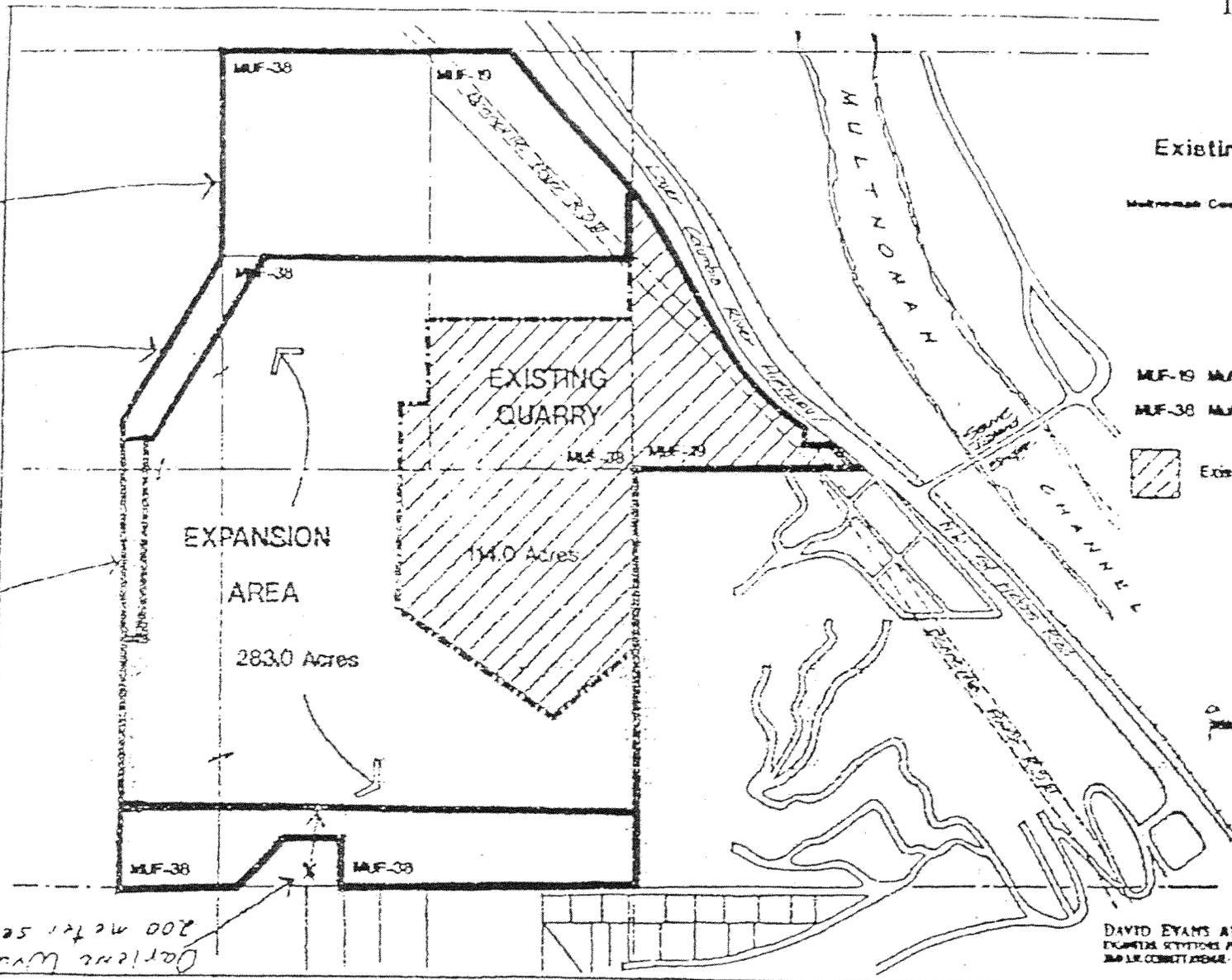
Angel Brothers, Inc.
**Existing & Proposed
 Quarry Site**
 Multnomah County-Columbia River Hwy

Legend

- MUF-19 Multiple Use Forest 19 Acres
- MUF-38 Multiple Use Forest 38 Acres
-  Existing Quarry



DAVID EVANS AND ASSOCIATES, INC.
 ENGINEERS, ARCHITECTS, PLANNERS, LANDSCAPE ARCHITECTS
 2800 N.W. CORBETT AVENUE, PORTLAND, OR 97201 (503) 251-4664



73 ac. Forest

500 feet 500'

500 feet 500'

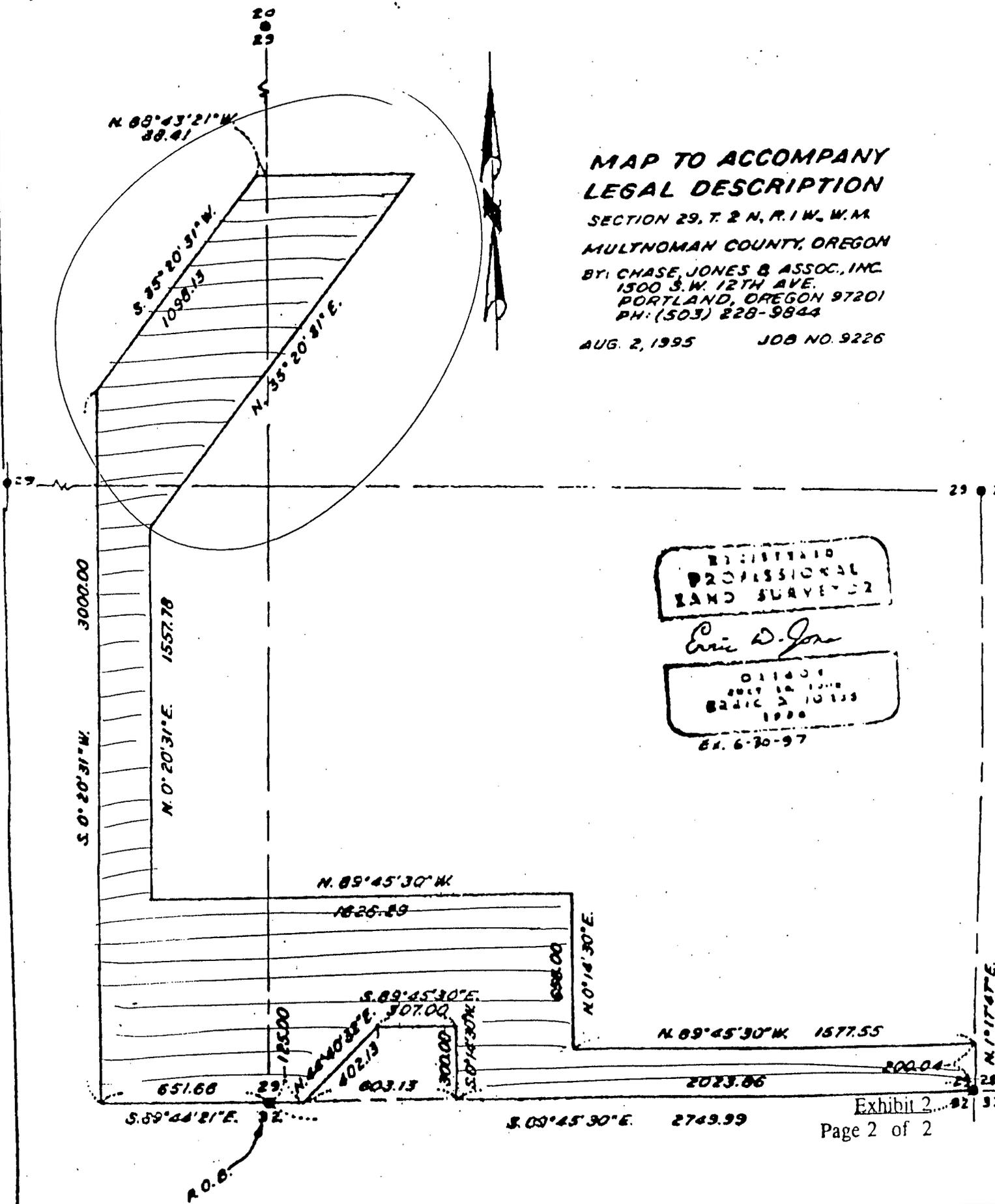
200 meters 50' back
 Carline Waddle home

**MAP TO ACCOMPANY
LEGAL DESCRIPTION**

SECTION 29, T. 2 N., R. 1 W., W.M.
MULTNOMAH COUNTY, OREGON

BY: CHASE, JONES & ASSOC., INC.
1500 S.W. 12TH AVE.
PORTLAND, OREGON 97201
PH: (503) 228-9844

AUG. 2, 1995 JOB NO. 9226



REGISTERED
PROFESSIONAL
LAND SURVEYOR

Eric D. Jones

011631
EXPIRES 12/31/98
BASIC 3 10133
1998

EX. 6-30-97

Exhibit 2

LANE
POWELL
SPEARS
LUBERSKY

Frank M. Parisi
(503) 778-2116

August 16, 1995

VIA MESSENGER

Sherri L. Strazz
Assistant Vice President
Fidelity National Title Company of Oregon
900 SW Fifth Avenue
Portland, OR 97204

Law Offices

520 S.W.
Yamhill Street
Suite 800
Portland, OR
97204-1383

(503) 226-6151

Facsimile:
(503) 224-0388

A Partnership
Including
Professional
Corporations

Re: Angell Bros. Rock
Our File No. 701062-1

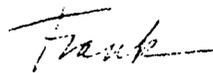
Dear Sherri:

Enclosed is the Grant of Conservation Easement I described to you on the telephone. Please note Sections 3 and 16 regarding establishment of an escrow and recording the Easement. Please let me know whether or not you need a separate letter of instructions.

I will obtain signatures immediately and present you with an executed original of the Conservation Easement on Monday, August 21. It is essential that the escrow be established and that the executed original be held in escrow by the end of business on the 21st so that I can inform the Multnomah County Commissioners in a land use hearing on August 22, 1995 that the Conservation Easement has been signed and deposited in escrow.

Please call me if you have any questions.

Very truly yours,


Frank M. Parisi

Enclosure

cc (w/enc):

Via Facsimile

Neil S. Kagan, Esq. (667-2337) (additional enclosure)

Skip Anderson (286-8701)

W.L. Wilson (303) 243-8090

Ty Tice (206) 441-8149

Gordon Howard 248-3389

Anchorage, AK
Los Angeles, CA
Mount Vernon, WA
Olympia, WA
Portland, OR
San Francisco, CA
Seattle, WA

London, England

LPPORT1 JACGINFMP\10944FMP.LTR

LANE
POWELL
SPEARS
LUBERSKY

Frank M. Parisi
(503) 778-2116

August 21, 1995

VIA FACSIMILE TRANSMISSION
241-8326

Law Offices

520 S.W.
Yamhill Street
Suite 800
Portland, OR
97204-1383

(503) 226-6151

Facsimile:
(503) 224-0388

*A Partnership
Including
Professional
Corporations*

John Sherman
Friends of Forest Park
PO Box 2413
Portland, OR 97208

Re: Angell Bros. Rock / Conservation Easement
Our File No. 701062-1

Dear John:

Attached is a copy of the original Conservation Easement signed by Mr. Wilson. All of the changes suggested by you, Skip, Neil and Mr. Wilson on Friday afternoon have been made to the document. Please call my secretary, Sandi (778-2243) and make arrangements for signature either today or at a time that permits you to review the document carefully to be sure there are no mistakes. If you notice anything particular, however, let me know as soon as possible.

Very truly yours,



Frank M. Parisi

Enclosure

LPPORT1 J:ACGI\FMP\10962\FMP.LTR

Anchorage, AK
Los Angeles, CA
Mount Vernon, WA
Olympia, WA
Portland, OR
San Francisco, CA
Seattle, WA
London, England

**UNIT Corporation
1912 NW Aspen
Portland, Oregon 97210**

November 21, 1996

Commissioner Dan Saltzman
Multnomah County Board of Commissioners
1120 SW 5th Avenue, Room 1500
Portland, OR 97204

Re: Angell Bros. Rock Quarry

Dear Commissioner Saltzman:

This letter is being written to you in support of the Angell Bros. upcoming appeal.

I represented the Friends of Forest Park during the mediation, and I attended mediation sessions conducted by Ty Tice. I reviewed and approved the Mine and Reclamation Plan prepared for Angell Bros. by Lidstone & Anderson.

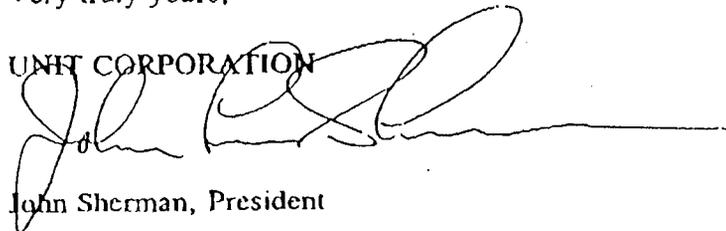
In furtherance of my representation, Skip Anderson, President of Angell Bros., and I walked the property to establish the location of various set-backs, Scenic Buffer Areas and the Preserves. I confirmed at that time that, specifically with respect to the North Angell Bros. Stream, the western set-back designated in the Mine Plan was sufficient to protect the riparian area and the main channel, which is the only channel that contributes water to Burlington Bottoms.

It is in the interest of the Friends of Forest Park that, pursuant to the terms of the Angell Bros. Mine Plan, the site be mined expeditiously, thereby allowing the entire site to be protected by the conservation easement as quickly as possible.

Please feel free to submit this letter into the record at the hearing.

Very truly yours,

UNIT CORPORATION



John Sherman, President

MEDIATION



OREGON CONCRETE & AGGREGATE PRODUCERS ASSOCIATION, INC.

707 13th St. SE #116
Salem, Oregon 97301
(503) 588-2430
FAX (503) 588-2577

November 25, 1996

Scott Erickson, President
Viesko Quality Concrete

Mike Alltucker, Vice President
Eugene Sand & Gravel, Inc.

Steve Wildish, Treasurer
Wildish Land Co.

Mr. Phillip Bourquin
Multnomah County Planner
Transportation & Land Use Planning
2115 S.E. Morrison
Portland, OR 97214

DIRECTORS

Skip Anderson
Angoll Brothers, Inc.

Terry Boyer
Valley Equipment Company

Mike Haftorson
Lakeshore Concrete Co.

Skip Huffman
Pozzolanic Northwest, Inc.

Tom Miller
C.C. Melsol Company, Inc.

Dave Pallott
Burch Concrete & Supply

Dugan Pearsall
Cascade Pumice Company

Jim Records
Baker Rock Resources

John Shaffer
Pacific Rock Products, Inc.

Al Steward
Fibermesh Company

Don Skundrick
LTM, Inc.

Dave Turin
Mt. Hood Rock Products

Managing Director
Richard L. Angstrom

Assistant Managing Director
Merilyn Grannell

Administrative Assistant
Sylvia Montagne

Multnomah County Commissioners
Beverly Stein
Dan Saltzman
Gary Hansen
Tanya Collier
Sharon Kelley

RE: **Angell Bros. Quarry**
Our File No. 110.01

Dear Commissioners and Staff:

The Oregon Concrete and Aggregate Producers Association (OCAPA) supports the Angell Bros.' appeal in Case Nos. CU 6-96 and SEC 18-96. As you may recall OCAPA was a participant in the mediation sessions that resulted in the settlement. In these kind of cases we like to stay in the background and deal only with issues of statewide significance. There is a very important issue at stake in this case.

It is absolutely essential that the Angell Bros. Expansion come on-line as scheduled due to the severe shortage of material for highway repairs and for the large number of construction projects currently underway. There is already a shortage of aggregate within the Portland/Metro area. This shortage is significant and alleviated on by the fact that millions of tons of rock are imported from Salem, Scappoose, Oregon City and Clarke County.

Keeping the settlement in place is also important for another reason. This is the first major land use case that had widespread policy implications and that

Page 2
Oregon Concrete and Aggregate Producers Association

was settled under structured mediation. It points to a way of avoiding "train wrecks", as we call them, in areas where environmental values and resource extraction values conflict. Structured mediation is quicker, more cost effective, less contentious, and much more satisfying. I urge you, at all costs, to keep the results of the mediation intact so that members of my trade association can be confident that other disputes that may arise in the future can be handled in the same manner.

Very truly yours,



Richard Angstrom
Managing Director

MEDIATION SERVICES

87 Virginia Street, Unit 4
Seattle, WA 98101

Fax: (206) 441-8149 Phone: (206) 448-5673

FAX TRANSMITTAL

Date: November 26, 1996 **Pages:** one
Send To: Phil Bourquin **fax:** (503) 248-3389
Multnomah County Land Use Planning
2115 S.E. Morrison
Portland, OR 97214
From: Ty Tice, Mediator
Subject: DLC/D/Multnomah County Aggregate Mining Mediation

.....
It's ironic that I should call Skip Anderson of Angell Bros. Mining Company today to invite his participation in the Governor's Conference of "Collaborative Approaches to Problem Solving" scheduled to occur on January 7, 1997.

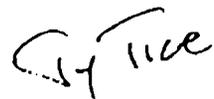
As mediator on this case, I was asked by Donna Silverberg of the Governor's office to present the Angell Bros. - Friends of Forest Park mediation agreement as an example of "How Collaborative Processes Can Work for You". The 18 member steering committee for the conference is representative of public and private natural resource and land use decision makers who sustain and manage Oregon's rich natural heritage.

Unfortunately, Skip Anderson informs me that a recent hearing examiner proceeding is recommending changes in the terms of the mediation agreement to be considered by the Multnomah County Commission tomorrow. The mediation agreement, arrived at informally well over a year ago, has already passed muster before multiple county and state public policy review and permitting forums. In my experience, attempts to change collaborative agreements after the fact usually upset the delicate balance of gives and takes resulting in the entire agreement package coming apart.

Certainly, elected officials have the authority and responsibility to act in the public interest on all matters of public policy. However, to substantively change this mediation agreement so long after the fact, and without a compelling reason, will sound a discouraging note to others contemplating collaborative approaches to problem solving in the future.

Thank you for considering these comments.

cc: Frank Parisi, Attorney at Law



This facsimile may contain confidential information that is protected by mediation privilege. If the reader of this message is not the intended recipient nor an employee responsible for delivering the facsimile; please do not distribute this facsimile, notify us immediately by telephone, and return this facsimile by mail. Thank you for your cooperation.



Friends of Forest Park

P. O. Box 2413
Portland, OR. 97208

Dedicated to protecting and enhancing Portland's Forest Park

November 15, 1996

Multnomah County Board of Commissioners
c/o Department of Environmental Services
Division of Planning and Development
2115 S.E. Morrison Street
Portland, OR 97214

96 NOV 15 PM 3:46

Re: CU 6-96, SEC 18-96
Applicant: Angell Bros.
Hearing Date: 11/26/96

Dear Commissioners:

This letter is submitted to the record in proceeding CU 6-96, SEC 18-96, in support of the appeal filed by Angell Brothers. Friends of Forest Park is asking that you grant the appeal and issue the permits requested.

On August 22, 1995, Friends of Forest Park accepted from Angell Brothers and the Linnton Rock Corporation, a conservation easement covering the site that is the subject of these applications. The easement remains in escrow until Angell Brothers receives all permits necessary to carry out the submitted Mining Plan, and all appeals have been resolved. The easement has the potential for immediately protecting more than 163 acres adjacent to Forest Park from mining or other development, and to cover the entire 397 acre site when mining and reclamation activities have been completed.

Friends of Forest Park participated fully in development of the Mining Plan and in the structured mediation that resulted in the grant of the conservation easement. Our organization now has an interest in seeing that the Mining Plan remains "economically feasible," and that Angell Brothers receives all permits and approvals necessary to carry it out. We therefore urge you to grant the appeal of Angell Brothers and issue the permits as requested, without the additional modifications suggested by the Hearings Officer.

On October 21, 1994, Multnomah County transmitted the completed Reconciliation Report to the Department of Land Conservation and Development. The Department received two objections to the West Hills Reconciliation Report, one from an attorney representing the Angell Brothers and the Oregon Concrete & Aggregate Producers Association, and one from Dan McKenzie, a property owner in the West Hills. On February 7, 1995, the Director of the Department of Land Conservation & Development issued a report which found significant flaws in the West Hills Reconciliation Report. In response to County and objector comments, the Director issued a revised report on February 28, 1995, which did not change the staff recommendation regarding the West Hills Reconciliation Report.

Given this set of circumstances, Multnomah County agreed to enter a mediation process with the Department of Land Conservation and Development. The results of that mediation process are presented as revisions to the Reconciliation Report in the attached document. The Multnomah County Board of Commissioners adopted this document on September 7, 1995

farm or forest use.

- J. To approve surface mining at a site zoned Commercial Forest Use (CFU), the county shall find, as part of the conditional use approval criteria, that:
1. The proposed mining will not force a significant change in, or significantly increase the cost of, accepted farming or forest practices on agriculture or forest lands;
 2. The proposed mining will not significantly increase fire hazard or significantly increase fire suppression costs or significantly increase risks to fire suppression personnel; and
 3. A written statement recognizing the rights of adjacent and nearby property owners to conduct accepted forest practices has been recorded with the property deed in accordance with OAR 660-06-025 (1994).
- K. The county shall not independently apply the Protected Aggregate and Mineral Resources Overlay Subdistrict (PAM) to land within another county, or within a city or its urban growth boundary. The county shall encourage protection of significant sites through cooperative agreements with another county or a city where the resource or its impact area extends across jurisdictional boundaries.
- L. The county shall require increased setbacks, insulation, screening, or similar measures as conditions of approval for any new conflicting use within an impact area surrounding an aggregate or mineral resource site when such measures are necessary to resolve conflicts identified in a site-specific Goal 5 analysis.
- M. The county shall impose conditions on surface mining when necessary to lessen conflicts identified as part of a site-specific Goal 5 analysis. Where such conditions conflict with criteria and standards in the Protected Aggregate and Mineral Resources Overlay, the conditions developed through the Goal 5 process shall control.
- N. Based upon the Goal 5 ESEE analysis and the existing base zoning district, the county shall determine the appropriate post-mining use of the site.
- O. The county recognizes the jurisdiction of the Department of Geology and Mineral Industries (DOGAMI) over mined land reclamation pursuant to ORS 517.750 to 517.900 (1994) and the rules adopted thereunder.
- P. Unless specifically determined on a case by case basis, it shall be the policy of the county, that DOGAMI delay its final decision on approval of a reclamation plan and issuance of an operating permit until the county decides all comprehensive plan amendments and/or conditional use approvals. It is also the policy of Multnomah County to participate in and cooperate with DOGAMI in their review of a permit application to that agency.
- Q. No surface mining or processing activity, as defined by the zoning ordinance, shall begin without land use approval from the county, and approval of a reclamation plan and issuance of an operating permit by DOGAMI and Department of Environmental Quality.
- R. When the aggregate or mineral site has been reclaimed, the county may rezone land to remove the Protected Aggregate and Mineral Resources Overlay Subdistrict (PAM) without revising the ESEE Analysis for the site. Rezoning shall not relieve requirements on the part of the owner or operator to reclaim the site in accordance with ORS 517.750 through 517.900 and the rules adopted thereunder.

HOURS OF OPERATION

Operating hours shall be allowed from 7:00 am to 6:00 pm. No operation shall be allowed on Sundays or on New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, and Christmas Day.

- (a) The Approval Authority may allow alternative hours on sites for which the ESEE analysis has identified other potential operating time periods.

Angell Brothers, Inc. requests that it be allowed to continue to operate between the hours of 6:00 a.m. and 10:00 p.m. seven days a week.

Angell Brothers, Inc. has been permitted to operate during the hours of 6:00 A.M. to 10:00 P.M. since 1980, which operating hours were confirmed by its 1986 permit. Because of few conflicting or sensitive uses nearby, this facility should be allowed to continue current operating hours. (Staff Note: The ESEE analysis for this site identified the 6:00am to 10:00pm operating hours as appropriate due to few nearby conflicting or sensitive uses.)

Operational hours for quarrying operations are to a large extent dependent upon seasonal weather variations and demand for the resource. Typically, operating hours are greater in the summer and less in the winter months when weather reduces construction activity.

Angell Brothers, Inc. does not usually operate on Sundays. However, Angell Brothers wishes to retain the option of operating on Sundays in order to meet the needs of customers who may require Sunday deliveries. It is not uncommon for projects, including many which benefit the general public, to request Sunday aggregate deliveries in order to minimize the disruption which would be caused by weekday operation. Customers which have in the past been serviced by Angell Brothers on Sundays include Tri-Met, the City of Portland, Burlington Northern, and airport projects. [Staff Note: The only mechanism provided by the Zoning Code for altering days of operation is that of MCC .7325(C)(4)(b) (described below). Therefore, the staff recommends denial of the blanket request for occasional Sunday operation; suggesting that a Temporary Permit be obtained as that occasional need arises.]

Angell Brothers, Inc. will restrict blasting on site to between the hours of 9:00 a.m. and 5:00 p.m. Mondays through Saturdays.

- (b) Short-term exceptions to the hours and days of operation may be approved pursuant to the provisions of MCC.8705.

No specific exceptions to the aforementioned proposed hours and days of operation are requested at this time. When and if Angell Brothers requests such exceptions, the request will be made with the understanding that they are to be reviewed pursuant to the provisions of MCC.8705.

(d) Hours and days of operation

Operating hours shall be allowed from 7:00 am to 6:00 pm. No operation shall be allowed on Sundays or on New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, and Christmas Day.

- (i) *The Approval Authority may allow alternative hours on sites for which the ESEE analysis has identified other potential operating time periods.*

Angell Bros. requests to continue operations between 6:00 a.m. to 10:00 p.m. six days a week. Angell Bros. has been permitted to operate during these hours since 1980. Because of few conflicting or sensitive uses nearby, this facility should be allowed to continue current operating hours.

Operational hours for quarrying operations are to a large extent dependent upon seasonal weather variations and demand for the resource. Typically, operating hours are greater in the summer and less in the winter months when weather reduces construction activity.

Angell Bros. does not usually operate on Sundays. However, Angell Bros. wishes to retain the option of operating on Sundays in order to meet the needs of customers who may require Sunday deliveries. It is not uncommon for public construction projects to request Sunday aggregate deliveries in order to minimize weekday disruption. Customers which have in the past been serviced by Angell Bros. on Sundays include Tri-Met, the City of Portland, Burlington Northern, and airport projects.

Angell Bros. will restrict blasting on site to the hours of 9:00 a.m. to 5:00 p.m. Mondays through Saturdays.

STAFF COMMENT: The existing hours of operation has had no reported adverse impact on the surrounding area. The Sunday operation, however, was specifically denied by CU 17-90; therefore, must be discontinued. Occasional exceptions must be processed under MCC .8705 as Temporary Permits. Blasting is infrequent and well monitored to avoid any off-site impacts.

- (ii) *Short-term exceptions to the hours and days of operation may be approved pursuant to the provisions of MCC.8705.*

No specific exceptions to the aforementioned proposed hours and days of operation are requested at this time. If Angell Bros. requests such exceptions, the requests will be made with the understanding that they are to be reviewed pursuant to MCC .8705.

STAFF COMMENT: Staff concurs.

(e) Air, water and noise quality

- (i) *The discharge of airborne contaminants and dust created by the extraction operation shall comply with the air quality standards established by the Department of Envi-*

Skip Anderson
September 21, 1992

Maximum Future Sound Exposure Levels Around Angell Bros. Quarry

<u>Receiver</u>	<u>Predicted Level (dBA)</u>	<u>During Expansion Phase</u>
Residence 1	52	4
Residence 2	51	3
Residence 3	50	4
Residence 4	56	4

COMPARISON OF PREDICTED SOUND LEVELS WITH DEQ REGULATIONS

Quarry operations are expected to occur at Angell Bros., Inc. Quarry between 6:00 a.m. and 10:00 p.m. Future noise levels from the quarry expansion will be limited by DEQ regulations to an L50 sound exposure level of 50 dBA between 6 a.m. and 7 a.m. and 55 dBA between 7 a.m. and 10 p.m. (the L50 sound level is that sound level equalled or exceeded 50% of an hour - the L50 sound level is usually a result of sound from a continually operating source such as a quarry operation).

A comparison of the predicted sound exposure levels shown in the previous section with the allowable level indicates the noise from the quarry mining operations during Phase 3 will exceed the DEQ allowable level at Residential Site 2 if noise mitigations are not incorporated into the mining plan. Note should be made that this condition only occurs when the excavation equipment is on the south side of the excavation area at a position nearest residence 2 where there is direct line of sight between the excavation equipment and the site.

During Phase 4 mining operations, the DEQ allowable noise levels will be exceeded at Residential Sites 1, 3 and 4 if noise mitigations are not included in the mining plan. There will be no violations of the DEQ regulations during expansion operations in Phase 1 or 2 of the mining plan. Again, the condition will only occur when the excavation equipment is located at the nearest position where there is direct line of sight between the equipment and the residences. In many cases, this condition will only occur for a day or two because the excavation equipment will be moving to a position where there is not direct line of sight between the equipment and the residence.

NOISE MITIGATIONS

The maximum noise exposure levels predicted for the residences is primarily a result of noise radiating from the rock excavator. Therefore, to reduce the noise exposure level at the residences to meet the DEQ regulations, noise from the rock excavator must be reduced.

June 10, 1994

Angell Brothers, Inc.
P.O. Box 83449
Portland, Oregon 97283-0449

Attn: Mr. F.H. "Skip" Anderson

Re: Angell Bros. Rock Quarry Expansion Noise Study

File 167922



Daly • Standlee & Associates, Inc.
4900 SW Griffith Drive
Suite 216
Beaverton, Oregon 97005
(503) 646-4420
Fax (503) 646-3385

At your request, Daly-Standlee & Associates, Inc. measured the sound radiating from the new Komatsu excavator that is now used by Angell Bros. at the quarry in western Multnomah County. The measurements were made to determine if the new excavator is quieter than the previous excavator used at the quarry and to determine if using the new excavator at the quarry will have any effect on the results of the quarry expansion noise study conducted in September, 1992.

The sound radiating from the new excavator was measured on June 10, 1994 while it was excavating material at the quarry. The sound level radiating from the excavator was 74 dBA at a distance of 150 feet from the excavator. The overall sound pressure level of 74 dBA is 5 dBA lower than the 79 dBA at 150 feet from the original excavator used at the quarry.

Octave band sound level data for the new excavator was used to predict the sound levels that would radiate to the receivers used in the September, 1992 noise study. The results of the calculations show that using the new excavator reduces the noise radiating from the operations in expansion area enough to insure the DEQ noise regulations are met at all four receivers during all phases of the expansion. In other words, the results indicate that no additional noise controls will be needed to insure the DEQ regulations are met.

I hope this information will be of help to you in developing your mining plan for the expansion area. If you have any questions, please feel free to call at any time.

Sincerely,
Daly-Standlee & Associates, Inc.

Kerrie G. Standlee
Kerrie G. Standlee, P.E.

167922-1.let

Site #4
Angell Bros., Inc.

**Mineral and Aggregate
Resources Inventory**

BEFORE THE BOARD OF COUNTY COMMISSIONERS

FOR MULTNOMAH COUNTY, OREGON

In the Matter of Adopting an Economic,)
Social, Environmental, and Energy (ESEE)) **FINAL ORDER** #90-59
Analysis for Mineral and Aggregate)
Inventory Site #4, Angell Brothers, Inc.)

Oregon Revised Statute 197.640 requires counties to review their comprehensive plans and land use regulations periodically and make changes necessary to keep plans and regulations up to date and in compliance with the statewide planning goals. A Proposed Local Review Order intended to bring the County into compliance was presented to the Department of Land Conservation and Development (DLCD) on February 28, 1989. DLCD recommended changes to selected items in the Proposed Local Order which included revising the Statewide Planning Goal 5 Economic, Social, Environmental, and Energy Analysis of the mineral and aggregate sites. The Oregon Administrative Rule guiding this analysis is found in Chapter 660, Division 16.

During the process of revising the subject mineral and aggregate ESEE Analysis public hearings were held before the Board of County Commissioners on December 19, 1989, January 9, 1990, February 20, 1990, March 6, 1990, March 27, April 17, and April 24. On each of those dates written and oral testimony was taken and heard regarding this site.

Based upon that testimony the Board adopts the following ESEE Analysis for Site #4, Angell Brothers, Inc. Quarry, which concludes the following:

1. The appropriate classification of the 113.22 acres in the easterly center of the site, as depicted on the attached map as existing quarry site (cross hatching) and area for expansion (large dot pattern), is "3C, Specifically Limit Conflicting Use".
2. The ESEE Analysis for the remainder of the site, 283.37 acres, is at "Step 2, Identify Conflicting Uses" until on-going wildlife studies described in the analysis are completed at the time schedule specified.

The Board further finds that, with the encouragement of the Board, an agreement regarding mine operation expansion during the wildlife corridor study has been reached at the conclusion of three informal meetings of the quarry operator and neighborhood groups representatives. The Board is in agreement with the following results of those discussions which were confirmed at the Board Hearing of April 17, 1990:

1. An additional 42 acres of aggregate and clay material should also be included with the present operation area in an ESEE analysis designation of "3C" in order to ensure a continued amount of aggregate and clay material needed for operation of the mine during the wildlife study period.
2. This expansion area should be toward the south as shown on the attached map. The southerly boundary line is at two angles drawn as to have the least protrusion.

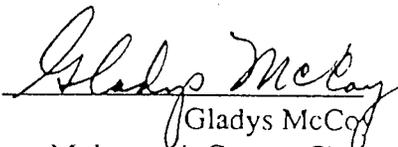
sion into a potential wildlife corridor area to the southwest and also provide a 100 foot buffer to a stream to the southeast.

3. The attached map also shows two areas which Angell Bros. Inc. has agreed not to mine during the study time period. The areas are:
 - A. A 400 foot by 800 foot area in the northwest corner of tax lot "2" which may be important for scenic view considerations; and
 - B. An 111 acre area which was the subject of a conditional use approval for clay mining in 1989. The southerly 42 acre expansion area will provide the clay material that would have been mined from the 111 acres to the north and west of the present operation. Where possible, existing trees and vegetation will be preserved on the 111 acre area.
4. The reclamation plan for a site will have a very important influence on wildlife and views. The neighborhood groups and wildlife organizations with an interest in the reclamation plan are to participate in an informal review of any proposed reclamation plans before the plans are submitted with a conditional use application. There are five guidelines which should be part of the reclamation plan which are in addition to those required by State regulations:
 - A. Twenty four inches of top soil for adequate reforestation;
 - B. Where possible, six feet of top soil around streams to insure reforestation and wildlife habitat;
 - C. Landscaping for wildlife access and ease of moving across restored area;
 - D. Streams restored to the land surface (not confined to drain pipes); and
 - E. A bond to insure that the above reclamation is achieved.

This order and the foregoing are to become attachments to the Local Review Order to be submitted to the Department of Land Conservation and Development.

Approved the 24th day of April, 1990.

(Seal)


Gladys McCoy
Multnomah County Chair

Reviewed:
Lawrence Kressel, Multnomah County Counsel

By: 
John DuBay
Chief Deputy County Counsel

Angell Brothers, Inc.
**Existing & Proposed
 Quarry Site**

Multnomah County-Columbia River Hwy

Legend

MUF-19 MULTIPLE USE FOREST
 19 ACRES

MUF-38 MULTIPLE USE FOREST
 38 ACRES

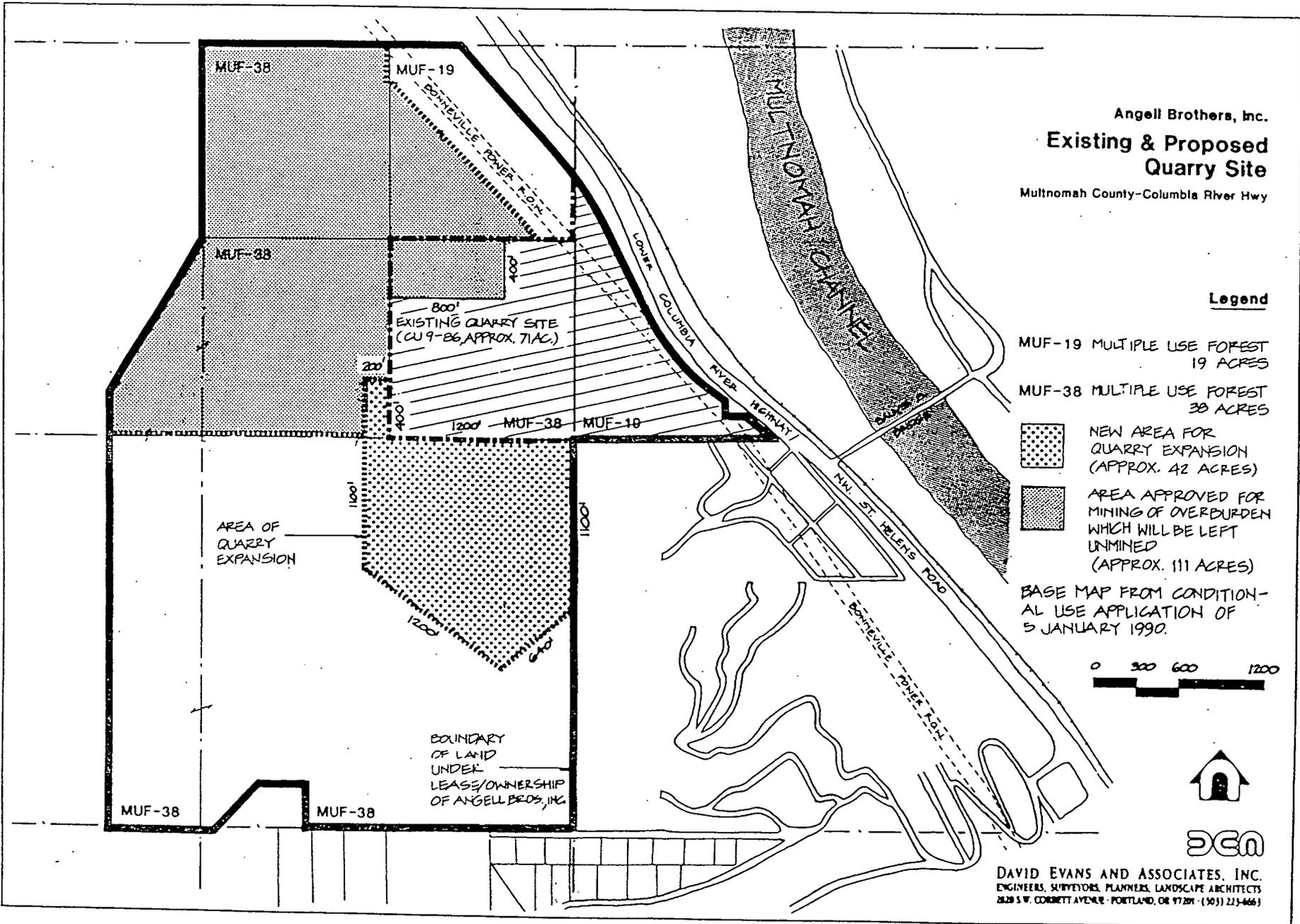
 NEW AREA FOR
 QUARRY EXPANSION
 (APPROX. 42 ACRES)

 AREA APPROVED FOR
 MINING OF OVERBURDEN
 WHICH WILL BE LEFT
 UNMINED
 (APPROX. 111 ACRES)

BASE MAP FROM CONDITION-
 AL USE APPLICATION OF
 5 JANUARY 1990.



DAVID EVANS AND ASSOCIATES, INC.
 ENGINEERS, SURVEYORS, PLANNERS, LANDSCAPE ARCHITECTS
 2828 S.W. CORBETT AVENUE - PORTLAND, OR 97201 - (503) 223-6665



Multnomah County
GOAL 5 INVENTORY
(4/24/90)

Type of Resource: Mineral and Aggregate
Mult. Co. Inv. Site #4
Angell Brothers, Inc.

Location:

Tax Lot '12 in the Northwest 1/4 of Sec. 28, T. 2 N., R. 1 W.; Tax Lots '2', '6', '8', and '11' in the eastern one-half of Sec. 29, T. 2 N., R. 1 W.

Description:

DOGAMI I.D. #26-0019

This operating rock quarry is located on the west side of State Highway 30, just north of the Sauvie Island Bridge. The present size of the approved extraction activities cover the majority of two tax lots totalling 71.22 acres in area. The easternmost parcel of 31.22 acres (TL '12', Sec. 28, T. 2 N. R. 1 W.) contains the processing equipment and stockpiles. The existing general mining and operations master plan calls for retaining the north and south knob type hills at the entrance for screening of the operation to viewing from the east.

A 1978 DOGAMI publication estimated that reserves of the mineral and aggregate resource were 7 million cubic yards of material. A study by H. G. Schlicker and associates was submitted in August, 1989 which covered an adjoining 325.37 acres. That report concluded that based upon their materials tests, borings, and seismic studies, the potential expansion area most likely contains approximately 220 million cubic yards of very good aggregate material.

A. Available information indicates site is important (ability to yield more than 25,000 cubic yards of material in less than 5 years):

NO-Designate 1A: Do not include in plan inventory.

YES – Go to B.

B. Is available information sufficient to determine the location, quality and quantity of resource at the site ?

NO – Designate 1B : Address the site in future when information becomes available.

YES – Include in plan inventory and go to C.

C. Zoning:

Multiple Use Forest - 19 and Multiple Use Forest - 38

OAR 660-16-005: *"It is the responsibility of local government to identify conflicts with inventoried Goal 5 Resource Sites."*

Are there conflicting uses ?

NO – Designate 2A : Preserve resource.

YES – Go to D.

D. Describe existing or potential conflicting uses:

Single family residences: In the MUF-19 zone as a primary use on a lot of 38 acres, as a use under prescribed conditions on a new lot of between 19 and 38 acres with a forest or farm management plan, as a use under prescribed conditions on a lot of record of between 10 and 38 acres with a forest or farm management plan, or as a conditional use on a lot of record of less than 10 acres. The MUF-38 zone requirements are identical to the MUF-19 zone except that new lots must be at least 38 acres in area.

A range of potential conditional uses and community service uses are listed in the MUF zoning districts but to be approved the approval authority shall find that the proposed use "Will not adversely affect natural resources" (MCC 11.15.7120(B)). In the MUF zone such uses include churches, schools, cottage industries, service commercial, and tourist commercial establishments.

There is the possibility of a "Wildlife Corridor" in the West Hills that provides migrating routes and intermingling of species between Forest Park and the Coast Range. If such a corridor exists, the impact on this corridor by an expansion of the subject mineral and aggregate operation would be relevant. There are studies in progress that are investigating this potential conflict and until that research and field studies are completed during calendar year 1991, the County cannot adequately identify conflicting uses as required by OAR 660-16-005.

Although OAR 660-16-000 (5) (c) states that when a site is included on the inventory then it "...must proceed through the remainder of the Goal 5 process", it is the County's position that the gathering of information on potential conflicting uses based upon a committed expenditure of funds and a published timetable is "proceeding" through the process. The County is at step designation "2" on the OAR flow chart at this time. Also see 3.A.(1).(b).in the Environmental section below and the Wildlife Habitat Goal 5 Inventory.

Another potential conflict which is under study are the scenic views of the Tualatin Mountains from the Multnomah Channel and the State owned wildlife areas on Sauvie Island. See Scenic Views Goal 5 Inventory.

Describe consequences of allowing conflicting uses:

OAR 660-16-005 (2): "...Both the impacts on the resource site and on the conflicting use must be considered in analyzing the ESEE consequences. The applicability and requirements of other Statewide Planning Goals must also be considered, where appropriate, at this stage of the process. A determination of the ESEE consequences of identified conflicting uses is adequate if it enables a jurisdiction to provide reasons to explain why decisions are made for specific sites."

ECONOMIC:

1. Impacts on resource:

Potential loss of site which is the largest in operation in the County which also contains significant remaining reserves of the resource. The location, less than one mile outside the Urban Growth Boundary and with direct access to a State Highway, has many advantages in supplying this resource to the metropolitan area.

2. Impacts on conflicting uses:

Homes and tourist commercial uses too near the noise or dust of an extraction operation will have reduced value. This quarry has operated for many years, so reductions in value, if any, may have already occurred.

3. Requirements of other applicable State Goals:

A. Transportation Goal 12:

Direct access is onto State Highway 30 which is capable of handling all anticipated traffic.

B. Areas Subject to Natural Disasters and Hazards, Goal 7:

The majority of the entire site is located in a slope hazard area. This should not present a problem due to the requirement in MCC 11.15.7325 (D) that all proposed operations be certified by competent professionals (such as a registered mining engineer) to not result in the creation of a geologic hazard to surrounding properties.

SOCIAL:

1. Impacts on resource: N/A

2. Impacts on conflicting uses:

A. The nearest conflicting uses are two homes which are 700 feet away from the subject property. At 1000 feet away to the northeast are 29 houseboats. The impact on houseboats will decrease as the excavation area moves to the west or south. The closest house to the mapped 55 acre potential expansion area is approximately 1200 feet away to the south.

B. Residences near Multnomah Channel, houseboats on the channel, and residences on the southerly 2 miles of Sauvie Island which are east and northeast of the gap in the ridge at the entrance to the mining operation are able to view the slopes under excavation. Screening can mitigate part but not all of this potential impact.

3. Requirements of other applicable State Goals: N/A

ENVIRONMENTAL:

1. Impacts on resource: N/A

2. Impacts on conflicting uses:

A. Noise, dust particulates, and blasting are potential impacts on such sensitive land uses as homes, schools, and public parks. However, the site is in compliance with DEQ noise and particulate regulations.

B. Angell Bros. Inc. has been permitted to operate during the hours of 6:00 A.M. to 10:00 P.M. since 1980, which operating hours were confirmed in its 1986 permit. Because of few conflicting or sensitive uses nearby, this facility should be allowed to continue current operating hours.

3. Requirements of other applicable State Goals:

A. Goal 5, Open Spaces, Scenic and Historic Areas, and Natural Resources:

(1).Fish and wildlife areas and habitat:

(a).Existing 71.22 acre approved extraction operation:

An intermittent stream flows northeasterly through the center of tax lot '12' (the 32 acre parcel fronting on the highway). In conjunction with the present operation most of the length of the stream near the mining has been enclosed in a culvert. The stream is classified Class II by the State Department of Forestry and the decision to allow piping through the site was made because "the stream is not considered a 'fishing' creek" and it dries up in late summer. The State Department of Environmental Quality has approved the water discharge system. The value of the mineral and aggregate resource in this location outweighs the value the stream may have for fish and wildlife habitat at this time, considering that at some time in the future the fish and wildlife potential may be restored. No significant wildlife area exists on the area currently approved for extraction activities.

(b).Adjoining 325.37 acres (potential expansion area):

Recent studies suggest that the wide variety of wildlife found in Forest Park may be directly attributable to the opportunity for species interaction with the Coast Range ecosystem. Such interaction may be possible due to the rural, relatively undeveloped

character of the Tualatin Range (West Hills), which enables this area to function as a "corridor" for animal movement. Thus, the wildlife diversity of Forest Park may result from either migratory patterns or general long-term recruitment from more rural reservoirs. If this is the situation, the "wildlife corridor" should be located and recognized for its role in maintaining the species diversity of Forest Park.

The County and City of Portland have budgeted and expect to spend up to \$25,000 on studies of this issue. Phase 1, the initial research, is currently underway. Phase 2, the field survey work and the application of research and field evaluation results to specific land use recommendations, will be completed by early 1991. Staff will then complete the ESEE Analysis and propose Plan amendments to complete the Goal 5 process for this factor by the end of 1991.

The property owner has requested a "3C" designation on the entire potential expansion area of 325.37 acres, but has agreed to an immediate "3C" designation of approximately 42 acres of the expansion area to permit operation during and after the corridor study. Following the study, the designation of the remaining expansion area of 283.37 acres would be determined.

The owner submitted a memorandum from Lawrence L. Devroy, Natural Resources Manager at David Evans & Associates, regarding a wildlife inspection on the proposed 42 acre expansion area performed on March 21, 1990. The report concludes that "... no well-defined wildlife corridor appears to exist in the (42 acre) area of the proposed expansion since no areas of heavy use were observed." In addition, the 42 acre area is located far to the eastern edge of the potential corridor area to minimize any impacts which the expansion may cause in the corridor.

(2). Outstanding scenic views and sites:

Testimony from several citizens at public hearings points to some concern over the potential adverse impacts on scenic views of the Tualatin Mountains at the subject property if the mining is extended into the adjoining lands. Considering the Sauvie Island Wildlife areas have the most public use of any other wildlife area in the Northwest, a great many people are exposed to those views. Therefore, a study of this potential conflicting Goal 5 resource has been started and the

timetable should closely follow that of the Wildlife Corridor studies. A "3C" designation of the 42 acre expansion area will minimize view impacts until such time as a view study is prepared relating to the entire area.

ENERGY:

1. Impacts on resource:

Allowing noise and dust sensitive uses too close to the resource could alter the manner, location and extent of extraction activities, resulting in greater use of energy to the operator. This close-in site is energy efficient for transporting the materials to the largest market.

2. Impacts on conflicting uses: N/A

3. Requirements of other applicable State Goals: N/A

CONCLUSION:

The resource at this site should:

Be fully protected – Designate 3A.

Not be protected due to overriding benefits from allowing conflicting uses – Designate 3B.

- X FOR THE MAPPED EASTERLY CENTER 113.22 ACRES CONTAINING THE EXISTING MINING OPERATION AND AN EXPANSION AREA: Be partially protected by conditions which minimize the impact of conflicting uses - Designate 3C.

- X FOR THE ADJOINING REMAINDER OF THE SITE, 283.37 ACRES: No ESEE designation assigned until more information is available from on-going studies of potential conflicting uses. At this time the ESEE analysis is at step "2" on the OAR flow chart.

PROGRAM:

The existing approved mining operation of 71.22 acres and an expansion area of 42 acres are designated "3C". This designation will allow the mining operator to apply for renewal of the Conditional Use approval for the existing mining operation area and apply for an expansion area that would meet their aggregate needs for at least the wildlife and scenic views study period.

The expansion area is due south of the area to be worked next in the existing operation. This expansion direction appears to be the least intrusive into where a wildlife corridor would most likely be located. It is also in the direction of least visibility from Sauvie Island due to the ridgeline on the property to the east. This program will allow uninterrupted operation of the mine during the time needed to complete the wildlife studies and, if warranted, put appropriate protection measures in place.

Designation of the adjoining acreage of 283.37 acres will be completed when the needed information is obtained on potential conflicting uses. Multnomah County and the City of Portland expect to spend up to \$25,000 during the time period 1989-1991 in the contracting of studies in an attempt to verify the existence of a "Wildlife Corridor" in the area of further potential aggregate extraction expansion. The Goal 5 ESEE process for this remainder area is expected to be completed during 1991.

8 Term and Successor Interests

8.1 Term of Interests

Except as expressly set forth in Section 8.5 regarding termination, this Conservation Easement shall continue in perpetuity.

8.2 Effect of Covenants

This Conservation Easement and each term, condition and covenant contained herein respecting the Property is intended to run with the land, even to the extent it imposes a negative burden and even to the extent the benefit does not touch or concern real property.

8.3 Binding Effect on Successors in Interest

Except as expressly set forth herein regarding termination, this Conservation Easement shall be binding upon the Property and Grantors and Grantee, and the heirs, personal representatives, successors, assigns, and transferees of Grantors and Grantee, as the case may be; provided, however, that Grantors and Grantee shall have no personal liability arising out of any acts or events occurring after any transfer or conveyance of Grantors' or Grantee's interest in the Property, provided that Grantors or Grantee is not in default of the terms of this Conservation Easement at the time of such transfer or conveyance.

8.4 Modification

This Conservation Easement may not be modified in any respect, except by consent of Grantors and Grantee, and then only by written instrument duly executed and acknowledged by all such parties, duly recorded in the office of the Multnomah County recorder.

8.5 Interference with Mining

8.5.1 Termination

This Conservation Easement shall terminate and all rights granted hereunder shall be extinguished if the Mining Uses described in the Mine Plan become Economically Infeasible as the result of actions, plans, recommendations taken or made by, or eminent domain proceedings instituted by, any court, agency, Indian tribe, local government, or legislative body following recordation of this Conservation Easement. "Economically Infeasible" means (a) the inability of Angell Bros. to produce and transport off the Property the Minimum Tonnage, or (b) the loss of more than two acres of Mining Area as described in the Mine Plan. In calendar year 1995, the Minimum Tonnage shall equal 1,700,000 tons, and in subsequent calendar years the Minimum Tonnage shall equal 108% of the

Minimum Tonnage applicable during the preceding calendar year, until mining is completed and the DOGAMI reclamation bond is released.

8.5.2 Indemnity for Grantee's own acts

Grantee shall indemnify and hold harmless Grantors from any interference caused by Grantee making the Mining Uses described in the Mine Plan Economically Infeasible, other than interference caused by Grantee in enforcing this Conservation Easement.

8.5.3 Exception for violations of Mining Permits

The conditions precedent to termination of this Conservation Easement stated in Section 8.5.1 and the Indemnity stated in Section 8.5.2 shall not be deemed to occur in the case of (1) Angell Bros.' violation of any term of any Mining Permit or (2) an allegation by any governmental body having jurisdiction thereof that any term of any Mining Permit has been, or may be, violated, as to which Angell Bros. has received notice of the alleged violation and an opportunity to cure the alleged violation and fails to cure the alleged violation for one year after notice, or such longer period of cure as may be agreed to by the governmental body having jurisdiction thereof.

9 Assignment to third parties

Grantee may assign its interest in this Conservation Easement only if Grantee first obtains the written consent of the Grantors. The following are eligible assignees of the Grantee's interest:

9.1 Governmental units or agencies

Grantee's interest is assignable to the State of Oregon, Multnomah County, the City of Portland, Metro, or any park and recreation district, or other governmental agency, public corporation, or political subdivision.

9.2 Qualified charitable organizations

Grantee's interest is assignable to any charitable organization, charitable association, or charitable trust, whose purpose is to protect the natural, scenic, or open space values of real property, or to protect natural resources, or to maintain or enhance air or water quality.

9.3 Third parties other than assignees

Nothing in this Easement shall be interpreted as conveying either (a) to any third party other than one to whom Grantee has made a valid assignment pursuant to this Section 9,

RECLAMATION

LIDSTONE & ANDERSON, INC.
Water Resources and Environmental Consultants

736 Whalers Way, Suite F-200
Fort Collins, Colorado 80525
(970) 226-0120

November 26, 1996

Mr. Frank Parisi
Parisi & Parisi
Suite 680
1 SW Columbia
Portland, OR 97258

Re. Multnomah County Conditions of Approval; Angell Brothers Operating and Reclamation Plan (DOGAMI Permit No. ID 26-0019); Condition No. 15

Dear Frank

I am the President of Lidstone & Anderson, Inc. (LA) and was the Principal in Charge for the preparation of the Operating and Reclamation Plan (ORP) for the Angell Brothers Quarry, Multnomah County, Oregon. I have reviewed the Multnomah County Hearing Officer's Conditions of Approval (CU6-96). Skip Anderson of Angell Brothers (AB) has requested that I review Condition No. 15 and present a response. I offer the following testimony for your submission to Multnomah County on November 27, 1996.

I have reviewed the site specific requirements relating to Scenic Views described on pages IV-14 through IV-15 of the Angell Brothers Reconciliation Report ("The Report"), and in my opinion the December 12, 1995 Operating and Reclamation Plan (ORP) submitted to DOGAMI by Angell Brothers is in compliance with Condition No. 15, which is *to provide for contemporaneous reclamation that promotes early visual screening of the benches immediately following mining of the benches* (my italics). On page IV-14 of "The Report", it states:

"Shaping, grading, erosion control and visual impact mitigation maximize the protection of scenic views by the following measures: **maintaining vegetated buffers along the entirety of the site along Highway 30; contemporaneous reclamation that promotes early visual screening of benches immediately following mining of the upper benches; significantly increasing the length of a lower-gradient reclaimed channel and increasing the acreage of (sic) the final pit floor to allow construction of riparian habitat and wetlands along the pit floor; direct haulback of reclamation materials to retain maximum viability of topsoil and establishing the third type of bench configuration wherever possible to achieve diversity in character of the reclaimed hillslope.**"
(emphasis added).

Branch Office: Box 27, Savery, Wyoming 82332

Mr. Frank Parisi
November 26, 1996
Page Two

As proposed, the mine and reclamation plan leaves vegetation on the slopes and ridgetops adjacent to Highway 30. This vegetated buffer provides both visual and noise screening from that direction. In our preparation of the ORP, LA's intent was to balance extraction of the aggregate reserve at the Angell Brothers' Quarry, with minimizing disturbance to the environment and maintaining the Scenic Views. Mine safety, extraction sequence, haul road construction, mine traffic, storage and sequential placement of reclamation materials were also important design considerations. Furthermore, as is true with any LA mine plan, compliance with environmental laws, including the requirements of Oregon DEQ and DOGAMI were critical design considerations. The Angell Brothers ORP satisfied the goals stated above by (1) visually isolating the site from neighboring viewpoints and (2) hydrologically isolating the working face, processing facilities, stockpile locations and haul roads from both surface and subsurface waters. The ORP provided sequential mining and reclamation of the benches, considered long term slope stability of reclamation benches, geomorphic stability of fill slopes and the wetland/riparian environment.

It is possible that the Hearing Officer may have misunderstood Angell Brother's proposed mining and reclamation sequence. This sequence is discussed, specifically, on pages 5 and 6 as well as pages 15ff of the above referenced ORP. LA prepared Figure 5 (Sheet 3) and 6 of the ORP to demonstrate the proposed sequence. Let me paraphrase and reference the commitment in the Angell Brothers Operating and Reclamation Plan.

Angell Brothers (AB) intends to advance the 450 Bench (working bench) into the Block 6 area. Following advancement of that bench, initial mining will take place in the Phase 1A area. This area includes the upper benches. In other words, AB will mine the upper benches (Phase 1A) first. "Benching and extraction of the rock resource will continue from the top of the ridge down to the 450 Bench. As rock extraction activities are completed, the individual benches will be reclaimed. Waste rock from the primary crusher (2 1/2 inch minus screenings) will be returned to the upper benches and placed as coarse material substrate. Stripped overburden (loess) will then be replaced on the final surface and revegetated in accordance with the permit requirements." (Source: page 15 of the ORP (December 15, 1996)).

In other words, AB has committed to mine the upper benches first (Phase 1A) and reclaim these benches upon completion of the mining of Phase 1A. Specifically this commitment can be found on Page 5 of the ORP: "Once an upper bench is mined, AB will reclaim the bench to its final configuration" As mining progresses AB will reclaim all upper benches immediately behind themselves, leaving the 450 Bench as a running bench. It is important to note that the 450 Bench is a lower bench and will be visually protected by the "maintained vegetated buffers".

Mr. Frank Parisi
November 26, 1996
Page Three

Once mining is completed in the Phase 1 area, AB will then move their mining operation across the Middle Drainage and construct a running bench (450 Bench) on the south side of the drainage, followed by the mining of the upper Phase 2 (Phase 2A) benches.

In this manner AB will contemporaneously reclaim the upper benches behind their mining operation. This is an important consideration both economically and environmentally since it will reduce the surface area and volume of reclamation materials stockpiled at any one time. Waste rock generated during the aggregate processing operation will be directly hauled to upper benches upon completion of that bench and placed as *coarse substrate* reclamation materials. As the upper benches are advanced along the native ridgetop, loess material (reclamation cover soils) will be stripped in advance of the mining operation and directly replaced on the previously mined and partially backfilled (with waste rock) bench. As mining of the lower benches is completed, reclamation materials will be conveyed to these locations and reclamation will be completed in a similar manner as described above. In summary, it is my contention that **the current Angell Brothers Mine and Reclamation Plan meets Condition No. 15 and that no revision to the mine plan is necessary.**

It is my understanding that the Hearing Officer has suggested that Angell Brothers "mine from the top, down". I assume that she feels that such a mine plan would meet the intent of "contemporaneous reclamation" more fully than the DOGAMI approved Operating and Reclamation Plan. LA has reviewed this option and finds that it is neither environmentally acceptable nor will it meet the site specific requirements of the Scenic Views, described on pages IV-14 through 15. I have prepared and enclosed an exhibit which can be used to present the principal limiting factors of this alternative. My concerns can be outlined as follows:

1. Large volumes of loess (overburden) will have to be stockpiled on site. Overburden loess would have to be stockpiled adjacent to the stripped areas. This would require an increase in disturbed acreage and a relatively complicated sediment control scheme around the stockpiles. The current operating plan leaves significantly smaller, temporary stockpiles on the top of the ridge, and provides for a more realistically accomplished stockpile sediment control. Under the DOGAMI approved plan, the main stockpiles are located within the disturbed area (i.e. on mining benches). Sediment control measures have been developed for these stockpiles and all sediment is contained within the mine pit area.
2. AB will have to construct a long (7310 foot), steep gradient (6.5%) haul road to transport rock product to the processing facilities on the lower bench and pit floor. This will require almost 20 acres of additional disturbance, including the removal of trees and vegetation within the scenic buffer. Mine and operator safety and haul road traffic are important considerations. Although this drawing

shows a 6.5% gradient haul road, good engineering would not recommend the implementation of this option. Standard mine engineering design requirements and ODOT specifications suggest that a 6.5% sustained grade for a 40 Ton haul truck would be dangerous and is not recommended.

3. The construction of the haul road would require numerous drainage crossings, culverts, steep cut slopes and long fill slopes. Controlling haul road runoff, spill and sediment control would be major operational issues. Haul road drainage, road crown and the maintenance of an adequate road surface would be required.
4. Because of the extreme length and sustained grade of the haul road, such a road must be designed for two-way traffic, hence a minimum width of 60 feet. Because of the steepness of the existing "natural" slope, extremely large cuts and fills would be required to build this road. The typical road cross section, presented on this exhibit demonstrates the anticipated width of construction disturbance (120 feet).
5. Contemporaneous reclamation of the upper benches could not be directly achieved. When "mining from the top, down", cover soil is generated at a rate far in excess of the generation of the 2½ inch minus waste rock. Hence cover soil (loess) must be stockpiled, and placement must be delayed, until enough rock is mined to allow partial backfill of the benches. Volumetrically, AB would need to mine the lower Phase 1A benches, before sufficient waste rock is available for the reclamation placement of the *coarse substrate* in the upper benches. The placement of the *coarse substrate* is essential for subsurface drainage and to ensure the long term stability of the reclamation fill and revegetated benches.
6. Finally the Hearing Officer's proposed plan would limit access to the southeast Block 6 mining reserves. In order to maintain "mining from the top, down" in the Phase 2 area, AB would have to construct a similar length haul road from the top of the ridge to the 450 bench (mining or retreating through the haul road on a periodic basis). Based on the topography and the restrictions imposed by the setbacks and conservation easements, such a road would be difficult to engineer. In place of this road, AB could construct a suspension bridge across the Middle Drainage Canyon or might have to access their southeastern reserves from Skyline Road.

Mr. Frank Parisi
November 26, 1996
Page Five

In summary, the Hearing Officer's proposed "mining from the top, down" plan is not in compliance with the site specific requirements relating to the Scenic Views, described on pages IV-14 through IV-15 of "The Report" because:

- a. It disturbs the vegetated buffers, in particular the Scenic Buffer, along Highway 30;
- b. It does not promote contemporaneous reclamation, but in effect creates the need for very large stockpiles within the Scenic View area; and
- c. It does not allow the direct haul back of reclamation materials.
- d. The construction of the required haul road to transport materials:
 - (1) would significantly increase the nature and characteristics of the mine disturbance;
 - (2) would not be prudent with respect to Mine Safety and Health Administration (MSHA) issues;
 - (3) would ensure that compliance with DEQ storm water requirements would be difficult, and
 - (4) would not be in conformance with the approved DOGAMI mine and reclamation plan. I suspect that DOGAMI would reject such a proposed plan outright.

My apologies for the length of this letter and submittal. I hope it answers your and the Hearing Officer's questions. If there are any questions or concerns, please don't hesitate to call.

FOR LIDSTONE & ANDERSON, INC.

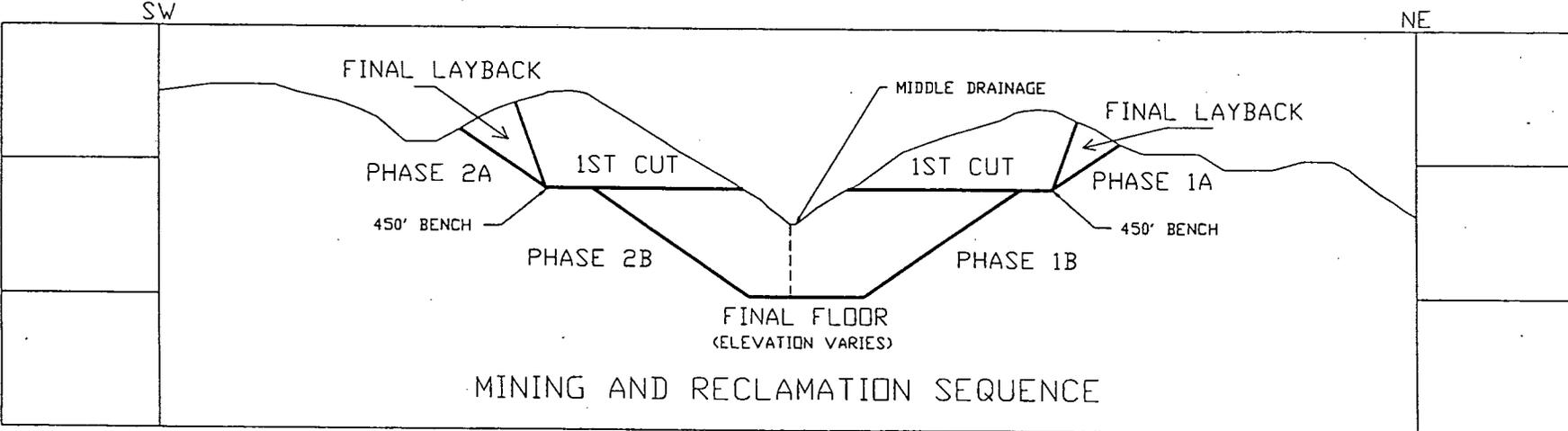
Sincerely,



Christopher D. Lidstone, CGS
President

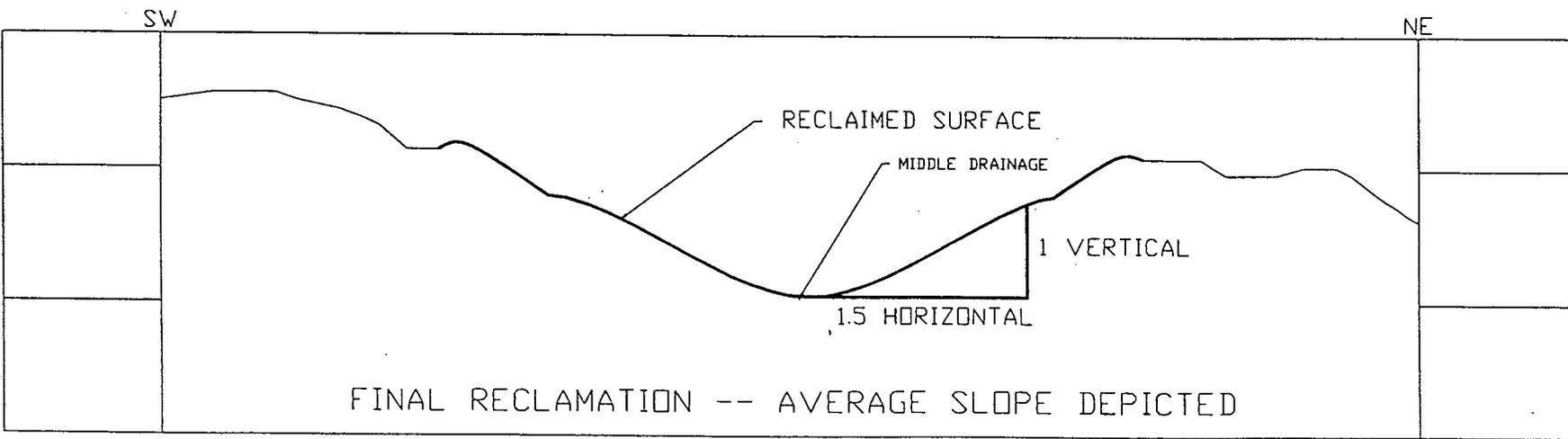
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enclosure

TYPICAL CROSS SECTION
MINING AND RECLAMATION SEQUENCE



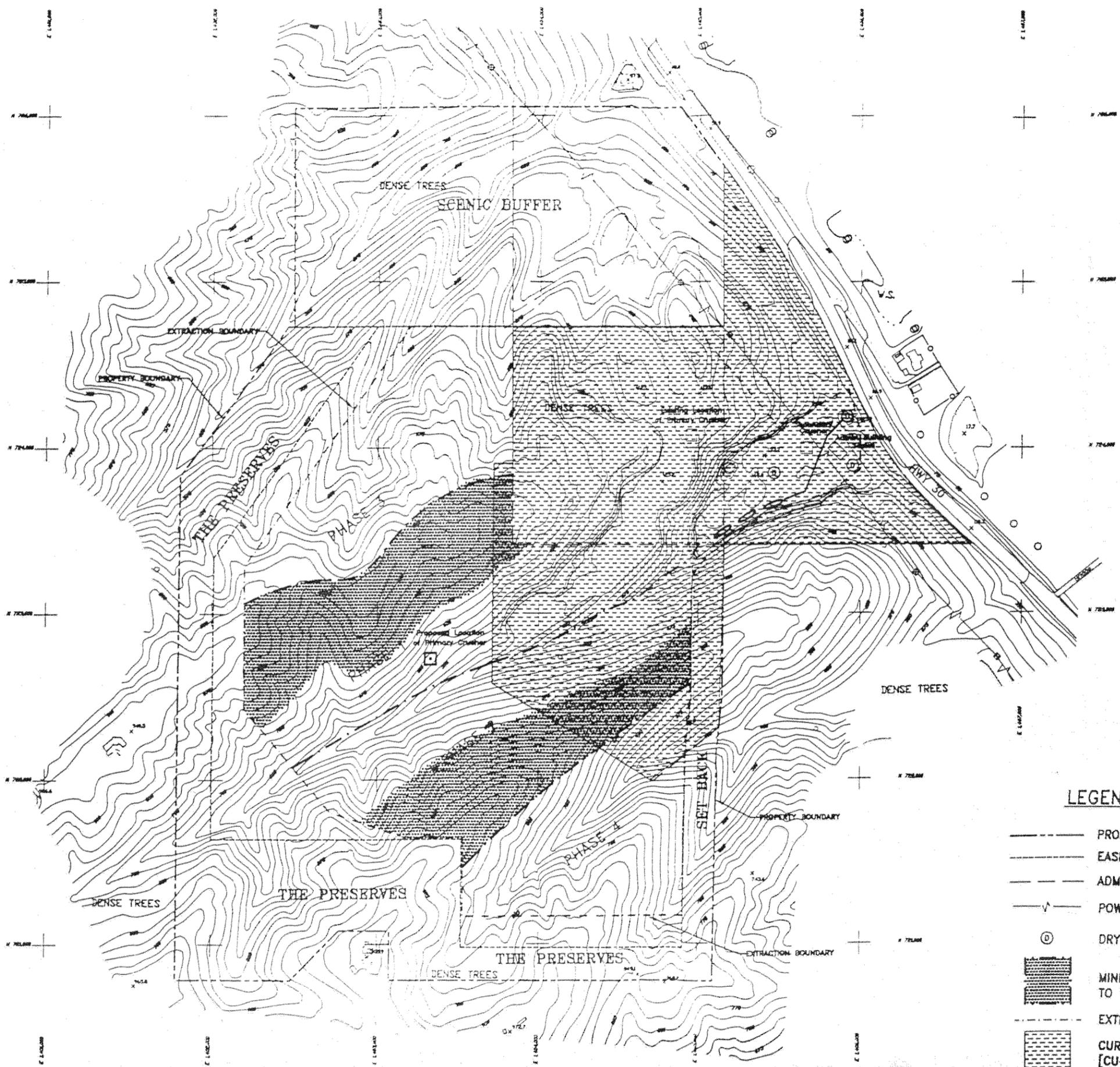
MINING AND RECLAMATION SEQUENCE

18



FINAL RECLAMATION -- AVERAGE SLOPE DEPICTED

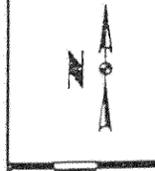
Figure 6



LEGEND

-  PROPERTY/LEASE BOUNDARY
-  EASEMENT/SET BACK
-  ADMINISTRATIVE UNIT BOUNDARY
-  POWER LINE
-  DRY WELL
-  MINING COMMENCES AT STIPPLED AREA PRIOR TO MINING LOWER PORTION OF PHASE BLOCK
-  EXTRACTION BOUNDARY
-  CURRENT MINING BLOCK
[CU-34-80a, CU-9-86, CU-17-90]

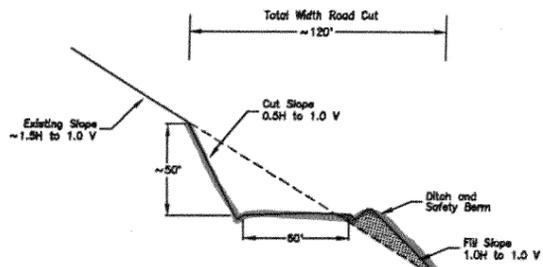
Topography prepared by Data Map Digital Services, Inc.
from aerial photography by SAC, Corp., on March 28, 1984.



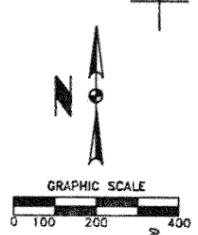
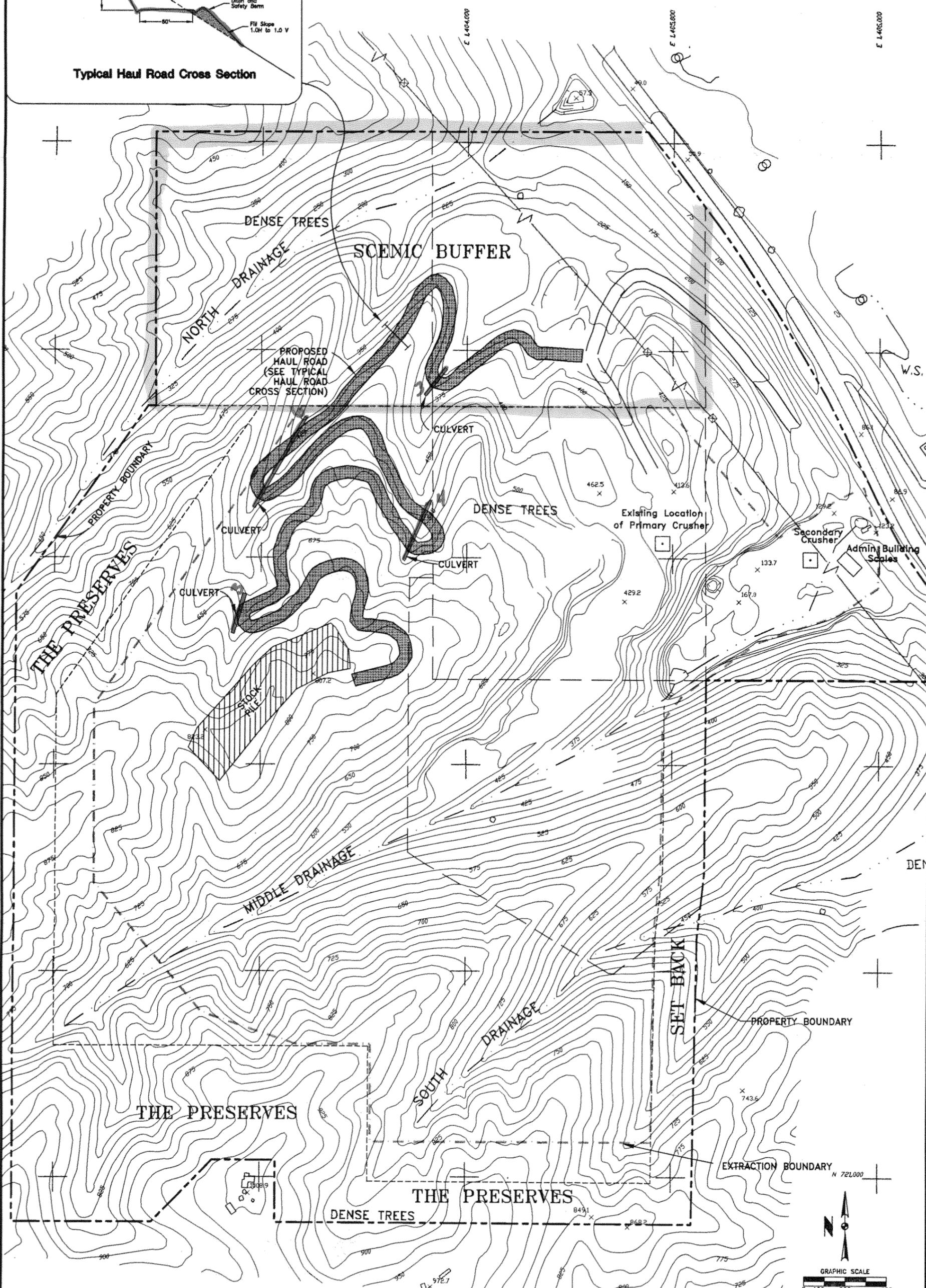
Project No.	OR-AB-01
Date:	2-13-95
Design:	CMJ
Drawn:	JHF
Checked:	COL
Revisions:	11-29-95
ACAD File:	EG-BASE.D

Figure
5

ANGELL BROTHERS QUARRY MULTNOMAH COUNTY, OREGON HAUL ROAD ALIGNMENT REQUIRED TO SATISFY HEARING OFFICER'S CONDITIONS



Typical Haul Road Cross Section



00230473

W.S.

DEN

November 26, 1996

PHIL BOURQUIN
MULT CO LAND USE
PLANNING
2115 SE MORRISON
PORTLAND OR 97214

DEPARTMENT OF
ENVIRONMENTAL
QUALITY

NORTHWEST REGION

RE: Angell Bros. Rock Quarry
Multnomah County
File # 100111
Erosion/Sediment Control Considerations Related to
Multnomah County Recommendation on Angell Bros.
Reclamation Requirements

Dear Mr Bourquin:

The Department has recently been made aware of a Multnomah County Hearings Officer's recommendation not to accept the current reclamation plan for the Angell Bros. quarry. The Hearings Officer instead is recommending a reclamation plan that would result in a "top-down" mining approach as opposed to the original plan of mining from the bottom of the site toward the middle, then moving upgradient, and reclaiming as mining progressed. This new approach, as communicated to the Department by the Department of Geology and Mining Industries, would result in the addition of a 60 foot wide, 1&1/2 mile long haul road, with associated soil stockpiling.

If implemented, this approach could have a decidedly negative impact on erosion and sediment control for this site. Steep haul roads and stockpiling, either on steep slopes or near state waters, are by far the two greatest obstacles to an effective plan for controlling sediments onsite. This is evidenced by experiences with stormwater runoff from several large quarries in Washington and Clackamas counties over the past four years. Roads are difficult to control for several reasons: Due to the frictional forces of heavy equipment, they result in the production of a tremendous amount of fine particulate matter (fines); these fines are highly mobile and cascade downgradient in stormwater runoff; and roads are difficult areas to control sediments because they are active, and thus not appropriate for barriers, dams or filtration devices. Stockpiling of large volumes of soil spoils in steep-sloped areas is both uncertain and unwieldy. Saturation and slumping can easily occur. At best they usually result in constant surveillance and they often result in damage control (turbid discharges to state waters) throughout the wet weather season.

The Angell Bros. quarry had significant water quality problems four years ago. They spent a great deal of time and money installing a treatment and capture

John A. Kitzhaber
Governor



2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471
DEQ-1

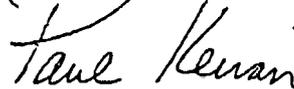
November 26, 1996

Page 2

system that is now considered to be a model for the industry. This system's efficiency could be severely diminished by overloading it with additional fines.

Thank you for your time with regards to this matter, if you have any questions feel free to call me at 229-5937.

Sincerely,

A handwritten signature in cursive script that reads "Paul Keiran". The signature is written in black ink and is positioned below the word "Sincerely,".

Paul Keiran
Stormwater Specialist
Northwest Region

PRK:PRK

Cc:

Frank Schnitzer, DOGAMI
1534 Queen Ave SE
Albany, OR 97321

CONDITIONS

CONDITIONS OF APPROVAL ACCEPTABLE TO ANGELL BROS.

The application for conditional use approval sought in this application is approved subject to compliance with the following conditions of approval:

1. Approval is for a Conditional Use Permit and SEC Permit for mineral extraction and processing on 250 acres located at Tax lot 12, in the NW 1/4 of Section 28, T2N, R1W, Willamette Meridian; and Tax Lots 2, 6, 8, and 11 in the E 1/2 of Section 29, T2N, R1W, Willamette Meridian as proposed and conditionally approved in this application.
2. The Applicant shall record a Compatibility Statement with the Multnomah County Division of Records in the form of Exhibit F to the Application that the owner and the successors in interest acknowledge the rights of owners of nearby property to conduct forest operations consistent with Forest Practices Act and Rules, and to conduct accepted farming practices prior to the commencement of mining in the area covered by the permit.
3. This Conditional Use permit is issued for the specific use or uses specified in the application for Conditional Use approval, together with the limitations or conditions as determined by the Approval Authority in this decision.
4. Access associated with the mining of the site (transportation of rock, heavy equipment, etc.) shall be limited to the Northbound and Southbound access point along Highway 30 in the location shown on the Applicant's application. Further, the Applicant shall not use the easement from the mine site to McNamee Road that crosses the property at 13780 NW McNamee Road presently owned by Ray Adams for commercial hauling. Applicant may use this easement for emergencies, fire suppression, inspections, reclamation, etc.
5. No material (rocks, clay or large quantities of dirt) which creates a safety or maintenance problem shall be tracked or discharged in any manner onto any public right-of-way. The Applicant shall maintain the storm water detention dry wells, cattleguard and paved haul road described in the application in good and functional condition throughout the life of the mining operations authorized by this permit. Further, the Applicant shall take whatever other measures are necessary to prevent the discharge of hazardous materials from trucks leaving the mine site.
6. All mineral and aggregate operations shall occur between the hours of 6:00 AM to 10:00 PM (i.e., the existing hours of operation). No operations are allowed on any Sunday, New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, and Christmas Day.
7. Blasting shall occur between the hours of 9:00 am to 5:00 PM. No blasting shall be allowed on any Saturday, Sunday, New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, and Christmas Day.
8. The Applicant shall maintain on file with Multnomah County throughout the life of the mine, copies of valid DEQ Air Contamination Discharge and Stormwater Discharge

Permits. Complaints received by the Planning Department regarding air and water contamination will promptly be forwarded to DEQ as part of interagency coordination.

9. The Applicant shall comply with the June 11, 1996 Operating Permit authorized by the Department of Geology and Mineral Industries (DOGAMI) and subsequent decisions. A copy of the Applicant's 5 year reclamation and progress report as required by DOGAMI shall be submitted to the County, upon acceptance or approval by DOGAMI.
10. The Applicant shall maintain compliance with DEQ noise regulations. Complaints regarding noise will be forwarded to DEQ as part of an ongoing interagency coordination effort. In the event DEQ determines its standards are not being met, the Applicant will be subject to enforcement action as determined appropriate by the County.
11. Before mining commences under this Conditional Use Permit, the Applicant shall record with Multnomah County Records the "Grant of Conservation Easement" between Linnton Rock, Angell Bros., Inc., and the Friends of Forest Park dated August 21, 1996 as stated in paragraph 16 therein.
12. The Applicant may conduct blasting on the subject property so long as the proposed blasting activities shall not adversely affect the quality or quantity of groundwater within wells in the vicinity of the blasting operation.
13. The Planning Director or her designee shall periodically monitor the mine site. Site monitoring should occur within the first month of operation under this permit and as otherwise determined by the Planning Director.
14. This approval is valid for the life of the mine and shall remain valid provided compliance with all conditions and laws is achieved and maintained.

**CONDITIONS OF APPROVAL PROPOSED BY HEARINGS OFFICER,
MARKED UP BY ANGELL BROS.**

The application for conditional use approval sought in this application is approved subject to compliance with the following conditions of approval:

1. Approval is for a Conditional Use Permit and SEC Permit for mineral extraction and processing on 250 acres located at Tax lot ~~'12'~~12, in the NW 1/4 of Section 28, ~~2N,~~ T2N, R1W, Willamette Meridian; and Tax Lots ~~'2', '6', '8', and '11'~~2, 6, 8, and 11 in the E 1/2 of Section 29, T2N, R1W, Willamette Meridian as proposed and conditionally approved in this application.
2. The Applicant shall record a ~~statement with the~~ Compatibility Statement with the Multnomah County Division of Records in the form of Exhibit F to the Application that the owner and the successors in interest acknowledge the rights of owners of nearby property to conduct forest operations consistent with Forest Practices Act and Rules, and to conduct accepted farming practices prior to the commencement of mining in the area covered by the permit.
3. This Conditional Use permit is issued for the specific use or uses specified in the application for Conditional Use approval, together with the limitations or conditions as determined by the Approval Authority in this decision. ~~Any change of use or modification of limitations or conditions shall be subject to Approval~~
- ~~4. Authority approval after a public hearing.~~
4. Access associated with the mining of the site (transportation of rock, heavy equipment, etc.) shall be limited to ~~a single point of access~~ the Northbound and Southbound access point along Highway 30 in the location shown on the Applicant's application. Further, the Applicant shall not use the easement from the mine site to McNamee Road that crosses the property at 13780 NW McNamee Road presently owned by Ray Adams for commercial hauling. Applicant may use this easement for emergencies, fire suppression, inspections, reclamation, etc.
5. No material (rocks, clay or large quantities of dirt) which creates a safety or maintenance problem shall be tracked or discharged in any manner onto any public right-of-way. The Applicant shall maintain the storm water detention dry wells, cattleguard and paved haul road described in the application in good and functional condition throughout the life of the mining operations authorized by this permit. Further, the Applicant shall take whatever other measures are necessary to prevent the discharge of hazardous materials from trucks leaving the mine site.
- ~~6. In the event that it is determined in a judicial or quasi-judicial enforcement proceeding brought by Multnomah County against the Applicant or Owner that the Applicant's mining operation is resulting in a violation of MCC 11.15.7325 (C)(1)(e) or Condition #5 of this decision, the Applicant shall thereafter require that all trucks being loaded at the mine site~~

~~be covered by the driver prior to leaving the mine site and the Applicant shall take whatever corrective actions~~

- - directed by the judicial or quasi-judicial officer who has jurisdiction over the enforcement matter.
 -
6. All mineral and aggregate operations shall occur between the hours of ~~7~~6:00 AM to 6:00 PM-10:00 PM (i.e., the existing hours of operation). No operations are allowed on any Sunday, New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, and Christmas Day.
 7. Blasting shall occur between the hours of 9:00 am to 5:00 PM. No blasting shall be allowed on any Saturday, Sunday, New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, and Christmas Day.
 8. ~~The Applicant shall obtain approval to expand its DEQ issued Stormwater Discharge Permit to include the proposed mine expansion. The Applicant shall also furnish to the County, prior to commencing expansion of mining activities a valid DEQ Air Contamination Discharge Permit. The permits shall clearly identify the mine operations areas approved by DEQ.~~ The Applicant shall maintain on file with Multnomah County throughout the life of the mine, copies of valid DEQ Air Contamination Discharge and Stormwater Discharge Permits. Complaints received by the Planning Department regarding air and water contamination will promptly be forwarded to DEQ as part of interagency coordination.
 9. The Applicant shall comply with the June 11, 1996 Operating Permit authorized by the Department of Geology and Mineral Industries (DOGAMI) and subsequent decisions. A copy of the Applicant's 5 year reclamation and progress report as required by DOGAMI shall be submitted to the County, upon acceptance or approval by DOGAMI.
 10. The Applicant shall maintain compliance with DEQ noise regulations. Complaints regarding noise will be forwarded to DEQ as part of an ongoing interagency coordination effort. In the event DEQ determines its standards are not being met, the Applicant will be subject to enforcement action as determined appropriate by the County.
 11. ~~The Applicant shall submit and obtain approval of an amended mineral extraction area map (currently Mine Sequence Map, Sheet 4) which shall identify the location of the south boundary of the North Angell Brothers Stream watershed, as shown on the map of the watershed found on page III-143 of the Reconciliation Report. All mining activities shall be confined to the extraction area shown on the revised map. The primary crusher shall be located, and shall remain, in the location shown on Sheet 4 as the "Existing Location of Primary Crusher."~~

~~11. Upon final Land Use Approval of this application and prior to commencement of quarry expansion beyond the existing 114 acres Before mining commences under this Conditional Use Permit, the Applicant shall record with Multnomah County Records the "Grant of Conservation Easement" between Linnton Rock, Angell Bros. ~~and Friends of Forest Park as agreed to through~~, Inc., and the Friends of Forest Park dated August 21, 1996 as stated in paragraph 16 therein.~~

~~12. mediation and acknowledged on August 21, 1996.~~

~~12. The Applicant shall submit a traffic management plan to the County Engineer that is sufficient for the County Engineer to make relevant findings regarding road improvements for Newberry Road or to develop a program to assure that the numbers and weights of trucks leaving the mine site can safely be accommodated on Newberry Road prior to commencement of mining in the expansion area covered by this permit. Further, the County shall review the Engineer's recommendations and issue a land use decision determining whether and what related conditions and restrictions to the conditional use approval are needed to comply with MCC 11.15.7325 (C)(1)(e). The issue of whether the Applicant must comply with MCC 11.15.7325 (C)(1)(e) has, however, been determined in this proceeding and may not be revisited during the second review.~~

~~12. The Applicant shall revise the operating and mine reclamation plan to comply with all site-specific requirements relating to Scenic Views described on pages 1V-14 through IV-15 of the Report and all relevant Programs to Achieve the Goal. Particularly, the Applicant's plan must provide for contemporaneous reclamation that promotes early visual screening of benches immediately following mining of upper benches. Additionally, the revised plan shall contain a commitment by the Applicant to maintain the principal processing, weighing and loading facilities at their "present location" as that term is used in the Reconciliation Report. Further, upon final reclamation, all structures, equipment, and refuse will be removed from the site. Excess fill from the waste rock stockpiles will be placed on the quarry floor, graded and covered with loess coversoil. All temporary culverts will be closed and abandoned in place. The quarry floor and operational areas will be shaped, graded, and revegetated to blend with the rest of the area. This area will be left in a condition with the final beneficial use of the property as an area protected by a conservation easement.~~

~~12. If a County rendered determination of compliance with any of the above conditions involves the exercise of discretion by the County, the County shall process its determination of compliance or non-compliance as a land use matter subject to County land use procedures regarding notices and opportunities for hearings and appeals.~~

12. The Applicant may conduct blasting on the subject property so long as the proposed blasting activities shall not adversely affect the quality or quantity of groundwater within wells in the vicinity of the blasting operation.

13. The Planning Director or her designee shall periodically monitor the mine site. Site monitoring should occur within the first month of operation ~~and continue at least four times per year. If the Reclamation Report requires more frequent monitoring, the Director shall comply with the requirements of the Report~~ under this permit and as otherwise determined by the Planning Director.

14. This approval is valid for the life of the mine and shall remain valid provided compliance with all conditions and laws is achieved and maintained.

McNamee Neighbors
c/o David & Susan King
14310 NW McNamee Road
Portland, Oregon 97231



11/27/96
Hawk 503 621 1000
McCuey {voice/message}
Submitted 503 621 3390
{Fax}
dking@teleport.com
{Internet}

TO: Multnomah County Board of Commissioners
CC: Phil Bourquin Multnomah County Planning Dept.
FROM: McNamee Neighbors of the Angell Bros Quarry
RE: CU 6-96, SEC 18-96
Angell Bros Quarry Conditional Use Permit

Who We Are

We are neighbors who live on McNamee Road, on or near the western boundary of the Angell Bros Quarry. Due to our location, we believe that we are the neighborhood most affected on a daily basis by the sights, sounds, dust, and geological shakings associated with the expanded mining operations. We are participating in the Conditional Use Permit process because our daily lives are likely to be negatively affected unless our neighbor, Angell Bros, follows the rules — in this case, the conditions set forth by the Hearings Officer in accordance with Multnomah County ordinances.

It is our belief that Angell Bros should follow all rules regarding the operations of their quarry. In the spirit of those rules, they should be prepared to contain their nuisance behavior within the boundaries of their own property. We are concerned about plans to excavate rock that is a mere 200 feet from some of our property boundaries, to dig down within a few dozen feet of our aquitard thus threatening our water supply, and to use explosive charges to loosen rock a few hundred yards from our homes without independent seismic monitoring.

Our concerns have been conveyed in a timely fashion, first to Angell Bros, then to the County Planning Department staff, and finally to the Hearings Officer, both in writing and in our own voices. We prepared a position paper on these issues in a memorandum dated 9 September 1996. That memorandum is part of the record for this case and is attached. That memorandum is the most detailed statement of our concerns regarding the conditional use permit.

Several of us took time from our work to testify at the public hearing. There we were entertained by the applicant's attorney, Mr. Parisi, who asserted that due to prior agreements with the Friends of Forest Park, no further regulation was in order. Parisi went on to argue that our neighborhood concerns were somehow illegitimate since some of us built our homes after the quarry's initial expansion plans had been set in place. We are pleased to note that the Hearings Officer was not persuaded by Parisi's incorrect assertions.

McNamee Neighbors

Regarding the Hearing Officer's Findings

We encourage the Multnomah County Board of Commissioners, at the very least, to uphold the Hearings Officer's decision. While several of our concerns are not addressed by her findings, we believe that all conditions she did place on Angell Bros operations are appropriate, necessary, and proper. Those requirements most important to us are as follows:

- A requirement that Angell Bros not mine the North Angell Bros Creek watershed.
- A requirement that Angell Bros revise their mining plan so that reclamation is sequential.
- A requirement that Angell Bros follow the law with respect to hours of operation (i.e., 7AM to 6PM, etc.).
- A requirement that Angell Bros not use the Adams easement as an access point for the mine's operations.
- A requirement that Angell Bros modify their operations as necessary to ensure that trucks coming to and from the quarry do not create hazards on the roadways by scattering mud and rock and that the trucks be dispatched to appropriate roadways in view of the hazards they otherwise create.

Who is Minding the Store?

We want to highlight one of our continuing concerns: enforcement. Due to our concern with noise and dust, we checked with Oregon's DEQ to see what rules Angell Bros operates under and how they are enforced. What we found was distressing.

- With respect to sound, for example, there are explicit noise levels set by DEQ, but due to funding cuts, there is no enforcement officer.
- Water discharge from the quarry is monitored by self-report: Angell Bros provide tests of turbidity twice a year.
- Seismic monitoring, if it is done at all, is managed by Oregon's Department of Geology and Mineral Industries [DOGAMI], an organization that has no charter with respect to investigating vibration damage to residences that neighbor the mine.

In short, when we investigated enforcement of Angell Bros operations, we found that no one is minding the store. The attitude expressed by Parisi and Anderson in response to our request for independent enforcement was remarkable. It essentially boiled down to this: "If you have a problem with our

McNamee Neighbors

operations, then sue us.”

De Novo Evidence

Since this hearing is de novo, we offer one new and serious matter for your consideration.

- Neighbors Adams and Rugh, whose properties overlook the quarry operations both current and future, report extensive roadwork and logging far outside the original confines of the quarry.
- It appears to Adams and Rugh that Angell Bros Quarry has begun its expansion prior to gaining approval. In particular, it appears to Adams and Rugh that overburden has been stored outside the original boundary of mining operations.
- Especially in the light of the Hearings Officers findings that a new sequential reclamation mining plan is needed, this action, if correctly interpreted, shows a serious disregard for County ordinances.

Both Adams and Rugh are unable to attend the 27 November 1996 hearing due to holiday travel plans. Knowing that they could not attend, we contacted the enforcement officer at the Multnomah County and asked that she look into this matter and be prepared to testify at today's hearing. Lisa Estrin told us that, due to a large backlog of complaints, it was unlikely that she could look into this matter prior to the Board meeting.¹

- We ask that the Board of Commissioners today demand an explanation from Skip Anderson as to whether Angell Bros operations have expanded operations beyond their original boundaries prior to the issuance of a conditional use permit.
- We urge the Board to dispatch the County Planning Officer to the Angell Bros site today to confirm or deny our contention and to verify independently that Mr. Anderson's testimony is true.

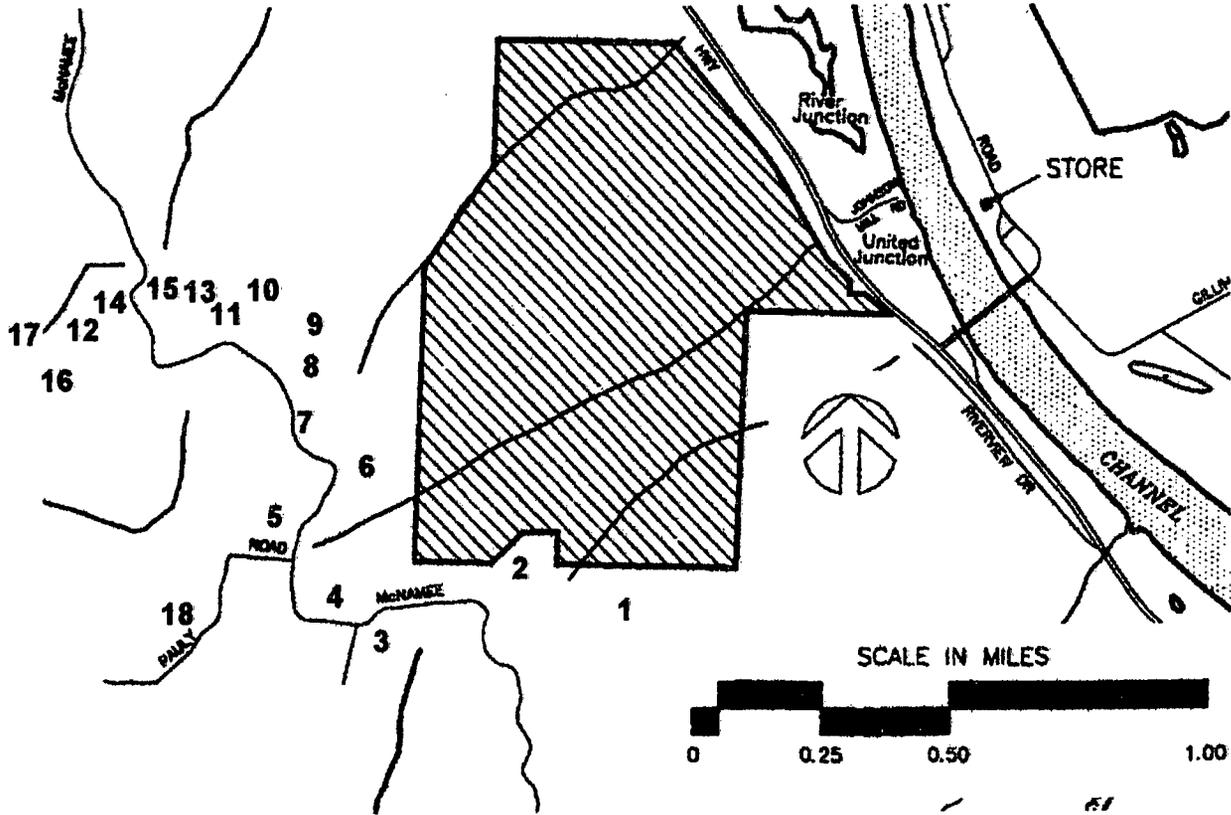
In summary, ...

Although we recognize the Hearings Officer's decision is perhaps a fair compromise in a difficult situation, we believe the issues and arguments raised in our 9 September 1996 submittal are valid and should have been followed. We realize as well that the land use process is time consuming and expensive for all involved, and we thank you for your patience in giving this matter careful review.

1. Once again, enforcement of whatever conditions are stated emerges as a tremendous concern to us.

McNamee Neighbors

Where McNamee Neighbors of Angell Bros Quarry live

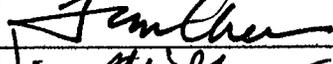
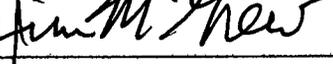
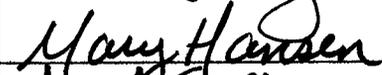
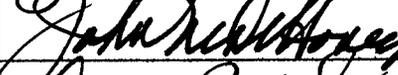


1	J & L McGrew	2	D Wruble	3	L & L Luethe
4	R & E Pletz	5	D Peterson et al	6	R Adams
7	T & D Long	8	D & C Rugh	9	H & C McCurdy
10	D & S King	11	J Chen & J Flynn	12	J Sullivan
13	D & T Bernards	14	K Foster	15	P & C Staples
16	B & P Bewick	17	J Hall	18	R & M Hansen

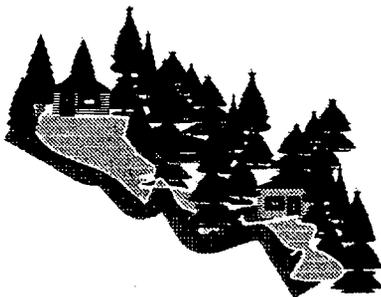
McNamee Neighbors

McNamee Neighbors of Angell Bros Quarry

We, the undersigned, have read this document and support the requests made therein.

Name	Signature	Address
DAVID KING		14310 NW McNamee Rd
RAY ADAMS		12780 N.W. McNamee Rd
Colleen & David Rugh	Colleen Rugh	14180 NW McNamee Rd.
Darlene A. Wamble		13162 NW McNamee Rd
Kurt Kinsey		13555 N.W. McNamee Rd.
DORINNE PEDERSEN		13555 N.W. McNamee Rd.
John Chen		14320 NW McNamee Rd
Jim McGrew		13154 NW McNamee Rd.
ELIZABETH L. MCGREW		13154 NW McNAMEE RD
David Bernards		14350 N.W. McNamee Rd.
Emma Pletz		13236 NW McNamee Rd
Mary Hansen		110731 NW Duncay Rd
JEAN SULLIVAN JOHN SULLIVAN		14347 N.W. McNamee
John Dewoney		14347 NW. McNamee
Candice R. Staples		14440 NW McNamee
John B. Hall		14377 N.W. Mc Namee Rd.
HANK McCURDY		14250 N.W. McNAMEE Rd.
Tom Long		14600 NW. McNamee Rd.

McNamee Neighbors
c/o David & Susan King
14310 NW McNamee Road
Portland, Oregon 97231



503 621 1000
{voice/message}
503 621 3390
{Fax}
dking@teleport.com
{Internet}

TO: Phil Bourquin Multnomah County Planning Dept.
FROM: McNamee Neighbors See signatures below
RE: CU 6-96, SEC 18-96
Angell Bros Quarry Conditional Use Permit

Who We Are

We are neighbors who live on McNamee Road, on or near the western boundary of the Angell Bros Quarry. We understand that the quarry will be expanding operations dramatically. Rather than excavating and crushing rock thousands of yards from our homes, Angell Bros will be operating a few hundred feet from some of our property lines. While we don't begrudge Angell Bros the right to expand their operations, we believe strongly that they need to remain citizens in good standing in the community.

Our signatures and addresses conclude this Memorandum as Appendix E.

The Basic Issue

Many of the facts gathered in support of the Angell Bros Quarry expansion concern its current operations. As we shall note in the details that follow, studies of sound, seismic hazard, dust, and noise are based primarily on facts about the current smaller and more distant activities of the quarry. Our concern, in a nutshell, is that these facts are a weak basis for extrapolating to the expanded operations.

It is our contention that the actual impact of Angell Bros quarry on our neighborhood is unknown. An incremental expansion is therefore indicated. It is most important that potential adverse impact on our neighborhood be regularly monitored. Contingency plans for adverse impact should be made explicit. Third-party monitoring agencies should be a part of the Angell Bros' contract with its community. Finally, we, as neighbors, want regular access to the monitoring information.

McNamee Neighbors

The Details

Our neighborhood was informed by a Multnomah County, Oregon, "Notice of Hearing" [NOH] dated 28 August 1996 that a public hearing will be held for Case File CU 6-96, SEC 18-96 on 18 September 1996 at 9 AM regarding the conditional use and significant environmental concern permit for Angell Bros Quarry Expansion.

We also have a document entitled "Angell Bros. Response to Approval Criteria" [RAC], which exists in two forms: an undated version included in the appendix to the 12 December 1995 "Operating and Reclamation Plan for Angell Brothers Quarry" [ORP] and an 11 June 1996 version attached to a cover letter from attorneys Parisi & Parisi.

These detailed responses to Angell Bros' conditions of use will refer by page and paragraph to the following documents:

- the 28 August 1996 Notice of Hearing, where approval criteria for conditional use are listed (identified as NOH),
- the 11 June 1996 Response by the Angell Bros Quarry (referred to as RAC), and
- additional information included in the 12 December 1995 Operating and Reclamations Plan (referred to as ORP).

Issue 1. Access & Traffic

Criteria regarding access to the quarry are established on NOH pp. 5-7, section 3.C.(1) and Angell Bros responds on RAC pp 8-10, section 3.3.3 - 3.3.5.

- Angell Bros describes only a single access road to their site: the entrance from Highway 30. There is a second potential access road in our neighborhood — an easement that allows Angell Bros to cross the property of Ray Adams, at 13780 NW McNamee Road, which lies between Angell Bros' land and McNamee Road.
- We believe that implicitly Angell Bros cannot use the McNamee Road access because it is not a part of their operating plan.
- ☞ We ask the hearing officer to make explicit that access to the quarry other than the Highway 30 entrance is not permitted.

McNamee Neighbors

Issue 2. Visual Screening

Criteria regarding screening, landscaping, and visual appearance are established on NOH p. 7, section 3. C. (2), and Angell Bros responds on RAC pp 10-11, section 3.3.6.

- All responses from Angell Bros relate to the lower portions of their property and Angell Bros states that all key viewing sites are North of the site. We understand that the phrase "key viewing site" has a formal definition: public lands that can see the quarry. Nonetheless, our neighborhood in general, and some of us in particular, will view the quarry in its expanded form.

☞ We ask the hearing officer to include as a condition of use that Angell Bros offer to provide visual screening for the following McNamee neighbors: McGrew, Wruble, Adams, Rugh, Long, McCurdy. Appendix A includes a map showing where these and other neighbors live. Please recognize that these people's views are dramatically affected.

Issue 3. Hours of Operation

Criteria regarding hours of operation are established on NOH pp. 7-8, section 3. C. (4), and Angell Bros responds on RAC pp. 12-13, section 3.3.8.

- Angell Bros asserts that they meet "these criterion" [sic] and go on to assert that they have operated 16 hours / day for some time and would like to operate 20 hours / day with this permit.
- The primary reason given for extending hours is market demand. In addition, Angell Bros remarks that they have received no complaints regarding their hours of operation to date.
- We note a troubling line of reasoning here: Because Angell Bros has received no complaints regarding its current hours of operation on a small scale, the quarry should therefore be allowed to operate additional hours on a larger scale.

If Angell Bros were asking for the same hours and the same size quarry operation, then this argument might make sense. However, they are asking for dramatically expanded operations (and expanded in the direction of our neighborhood) and greater hours.

☞ We ask the hearing officer to restrict Angell Bros' operations to 13 hours / day (7AM - 6PM), and no operations on Sundays or on New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, and Christmas Day, as criterion NOH 3. C. 4. a. states.

McNamee Neighbors

Issue 4. Level of Sound, Amount of Dust

Criteria regarding sound and dust are established on NOH p. 8, section 3. C. (5), and Angell Bros responds on RAC pp. 13-15, section 3.3.9.

- A member of our neighborhood investigated DEQ permits and enforcement with respect to Angell Bros operations, and the findings (reviewed by DEQ staff) are included in Appendix B.
- With respect to dust, DEQ regulations focus entirely on the crusher operation, — not on the acquisition of rock, which will occur close to Angell Bros boundaries.
- With respect to sound, DEQ's enforcement activities have been entirely curtailed due to funding cuts, and hence there is no one to respond to problems that might occur.
- Angell Bros cites sound studies conducted by Daly Standlee & Associates and reported on 25 September 1992 and supplemented on 10 June 1994. Those studies refer specifically to tests made on 17 September 1992, at the "residential sites" of Wruble, Adams, Rugh, and McCurdy (receivers 1 - 4, respectively in Figure 1 of Daly-Standlee & Assoc. 25 September 1992 report).

Kindly note the following: (1) In September of 1992, none of the property owners granted access to Daly-Standlee & Associates, nor were they aware of any tests made on their property. (2) On 17 September 1992, the residences of Rugh and Adams had not yet been built. Subsequently the locations of those building sites were moved, with Multnomah County approval, to sites significantly closer to the Angell Bros boundary. Thus in two important cases, the data upon which this study is based were not obtained at the current and legal location of those residences.

- Kindly note as well that the Daly-Standlee results of 25 September 1992 are based on a computer model extrapolated to apply to operations a few hundred feet from some of our neighbors and in direct line of sight, while being based on operations that are currently a few thousand yards away and not in direct line of sight.
- The Daily-Standlee results are also based upon the evaluation of individual pieces of equipment and not on the cumulative noise generated by the various items of equipment and machinery which will undoubtedly be operating all at the same time.

Further, the noise generated from one of the crushers will be of a greater or lesser volume impact upon the residences at the western boundary of the quarry depending upon the crusher's location. Angell Brothers intends to

McNamee Neighbors

use both a primary and secondary crusher moving one of the crushers southward as mining progress. The Daily Standlee reports do not evaluate the noise from both crushers or the location of the crusher that Angell Brothers intends to move.

The 9/21/92 Daily-Standlee report concludes that the existing sound level of the "vicinity of the 4 residents" is 43 dba and was from industrial sources: the Burlington saw mill, train and airplane noise. This is probably an inaccurate assessment, because the Burlington saw mill is not audible in vicinity of the 4 described residences. The Burlington saw mill is probably a good 2 miles away (as the crow flies). It is located in the Cornelius Pass canyon and sheltered a substantial ravine and many stands of timber. Further, the airplane and train noise is intermittent.

The fact that the Burlington saw mill is indeed an audible and the fact that no one at the 4 residences referred to in the Daily-Standlee report ever remembers anyone from Angell Brothers or Daily-Standlee coming onto their property or asking for permission to come onto their property calls into question the integrity of that report.

- ☞ We ask the hearing officer to reject the sound analyses of Daly-Standlee since they are based on faulty data.
- ☞ We ask the hearing officer to require continuing monitoring of sound levels as the expansion of the quarry proceeds. We ask that results be provided to members of our neighborhood. We ask that Angell Bros be required to mitigate levels of sound that exceed DEQ standards.

McNamee Neighbors

Issue 5. Setbacks from Property Line

Criteria regarding setbacks are established on NOH pp. 8-9, section 3. C. (7), and Angell Bros respond on RAC pp. 16-17, section 3.3.11.

- The criteria require a 400 ft. setback from noise and dust sensitive land uses that exist or are approved — e.g., residences — for both the processing (the crusher) and extraction (blasting, the excavators and bulldozers) of minerals
 - Angell Bros claims all setbacks exceed 200 ft. required by DOGAMI and that the crusher is 1800 ft. away from the Wruble residence. Various maps in different reports convey different setbacks, mining areas, and sequences of operation.
 - David King contacted the DOGAMI Reclamationist, Frank Schnitzer, and notes regarding his conversation are included in Appendix C. It appears that while 200 ft is the closest that DOGAMI considers safe from a technical and geological perspective, it is not a required distance. Namely, Angell Bros can be held to the criterion distance of 400 ft for its excavation.
- ☞ We ask that the hearing officer make certain that the 400 ft. criteria is met for both extraction and processing of minerals and particularly with respect to the contiguous properties for neighborhood residents McGrew, Wruble, Adams, Long and Rugh.

Issue 6. Geological Hazards

Criteria regarding geological hazards are established on NOH p. 10, section 3. D., and Angell Bros respond on RAC pp. 22-23, section 3.3.15.

- Examples of geological hazards included in criterion 3. D. include slumping and sliding, and Angell Bros asserts that, due to the staircase design of their mining operations, such problems will not occur.
- Another well-known example of a geological hazard is the vibrations transmitted through the earth. This hazard is identified in the Angell Bros' ORP in correspondence dated 24 May 1992 from Steve Harris of the Austin Powder Company. It is Harris's claim that the blasting program at Angell Bros does not create sufficient vibrations to cause damage to nearby structures. His focus is on buildings to the East and South of the current operations.
- Kindly note that there is no description of Mr. Harris's professional background, nor is there a stamp indicating his engineering or geophysical certifications, if any.

McNamee Neighbors

- By coincidence, the uncle of one of our neighbors is a qualified expert in this matter. Mr. Kenneth King's resume is included in Appendix D. A licensed geologist and geophysist, Kenneth King has over 20 years experience both as a scientist with the United States Geological Survey and as a private consultant. His work has been used as the basis for building code revisions in the Northwest. While at USGS, it was Mr. King who was asked to assess risks to the Lincoln Memorial.

Also included in Appendix D is a 1993 report that Mr. King prepared for the Public Works Department in Kansas City, Missouri. On pages 5 and 6, King makes a series of recommendations for an assessment and monitoring program to protect the interests of both a local mine and the neighborhood near its boundaries. In addition, Kenneth King has added comments (in bold face type) for us to consider.

- In essence, Kenneth King's viewpoint is as follows:

(1) Vibration damage to neighboring structures is a possibility when mines use explosives. There are other sources of vibration as well. Instrumentation will help sort out the source.

(2) To mitigate or avoid damage, it is prudent for mining operators to monitor vibrations continuously and systematically. This is particularly relevant to expanding operations.

(3) An audit of a sample of existing structures is also wise. Prior to the expansion of mining, it is important to know the condition of foundations, plaster walls, etc.

(4) Due to advances in technology, the initial and ongoing costs of such a monitoring program are relatively modest.

- Also included in Appendix D is a memorandum prepared by David King to communicate Ken King's viewpoint to the McNamee Neighbors. This memorandum was Faxed to Multnomah County planning staff to alert them to this issue in anticipation of a fuller explanation from Ken King. Thus the memorandum is a matter of public record.

☞ We ask that the hearing officer consider Kenneth King's credentials and viewpoint, and that the Angell Bros conditional use permit require ongoing, continuous vibration monitoring by an independent, certified geophysist.

☞ We further request that Angell Bros contract with an independent specialist who will provide an audit of the current condition of structures for McNamee neighbors.

McNamee Neighbors

- ☞ Finally, we ask that the results of the monitoring process be reported and interpreted in lay terms to the McNamee community at least twice a year.

Issue 7. Potential Well Damage

Criteria regarding potential well damage are established on NOH p. 10, section 3. E., and Angell Bros responds on RAC p. 23, section 3.3.16.

- At issue is the threat to the aquifer that supplies water to our neighborhood wells. David King's memorandum in Appendix D provides context gained from conversations with an expert, Kenneth King. The aquifer is contained by an aquitard which, if compromised, would be catastrophic. Additional information obtained from DOGAMI's Frank Schnitzer is located in Appendix C.
- Studies by Angell Bros indicate that at its deepest point, their mining operations may come as close as 50 feet to the aquitard. Also noted in the Angell Bros study is that monitoring is crucial to avoiding the problem.
- In Appendix D, comments directly (p. 6, annotation to Kansas City report) and indirectly (David King's memorandum) from Kenneth King indicate his opinion that breaking an aquitard is unlikely. Systematic seismic monitoring, however, would make the assignment of responsibility much clearer.

- ☞ We ask that the hearing officer consider the risk to our neighborhood's aquifer as further reason to insist that Angell Bros undertake comprehensive, independent seismic monitoring program as a part of the conditional use permit.

- ☞ We ask that the hearing officer consider the risk to the aquifer as further reason to proscribe an incremental approach to the mining operation so that additional data can be gathered as the mine approaches the aquifer.

- ☞ We ask that the hearing officer require Angell Bros to prepare and circulate a contingency plan identifying the steps necessary to supply our neighborhood with water in the event that their mining activities drain our aquifer.

(It is our suspicion that water would need to be imported by pipeline over a distance of several miles and at an extraordinary cost.)

- ☞ We ask that the hearing officer require Angell Bros to monitor water levels in our wells and accept responsibility for drops in those levels coincident with the mine's blasting and the appearance of water at the Angell Bros site.

McNamee Neighbors

Issue 8. Phases of Mining and Reclamation

Criteria regarding phases of mining and reclamation are established on NOH p. 9, section 3. C. (11).

- MCC 11.15 7325(c)(11) provides that the reclamation plan "... shall include a time table for continually reclaiming the land. The time table shall provide for the beginning of reclamation within 13 months after extraction activity ceases" and further provides that any deviation from the following standards set forth below must be supported by a finding that the standards cannot be met.
 1. All phases of an extraction operation shall be reclaimed before beginning the next.
 2. The reclamation plan shall include a time table for continually reclaiming the land.
 3. Reclamation must begin within 13 months of completion of any segment (phase).
 4. Completion of reclamation within 3 years after mining activity has stopped.
- Angell Brothers claims "These criteria are satisfied" but sets out a plan that does not meet the criteria and instead claims to fall within an exception. Angell Brothers alleges factual support for the application of the exception, when no facts supporting the application of the exception have been established. Nowhere has DOGAMI found or the "Approval Authority" found that the different phases "cannot be operated and reclaimed separately." Nor is there any finding by DOGAMI or the "Approval Authority" that these time standards "cannot be met."

See P. 18 of Angell Brothers' 6/11/96 "Response to Approval Criteria." (hereinafter "A.E.R.R. 6/11/96"). Angell Brothers relies on a April 28, 1996 letter from Frank Schnitzer of DOGAMI from Gordon Howard. Mr. Schnitzer sanctions what he terms a more "practical" response but his conclusions do not state that the four requirements of the ordinance set forth above cannot be followed. Granted, it may be more expensive to follow the rule, rather than the exception which emasculates it, but there is no reasonable conclusion to suggest that the rule, rather than its exception "cannot" be followed.

McNamee Neighbors

- Further, Angell Brothers seeks to avoid the requirement of reclamation after completion of each segment of mining by its illogical description of phases of mining. Angell Brothers wants to mine part of phase 1. It then wants to mine part of phase 2. It then, after mining part of phase 2, wants to mine phase 3; apparently finish mining the rest of phase 1 upon completion of phase 3. Thereafter, it will complete mining phase 4 and move on to completion of mining of phase 2. (A.B. R.R. pg. 19).
 - Angell Brothers application fails to meet the reclamation requirements. The fact that the 4/28/96 letter of Frank Schnitzer of DOGAMI to Gordon Howard sanctions what may indeed be a more convenient approach for maximizing profits for the quarry does not mean that this approach meets the requirements of the ordinance. In fact it does not and in short, the criteria are not satisfied.
 - The importance of prompt reclamation of mined areas to mitigate the impact on wildlife values is found at page VI-16 and 17 of the West Hills Reconciliation Report Revised 9/95 (hereafter W.H.R.R.R. 9/95) by its emphasizing the necessity of sequential mining and restoration of the each sequenced mined after completion of that sequence.
 - The Angell Brothers' mining and reclamation plan, though perhaps cost efficient, represents a hopscotch approach jumping from one area to the next before a "phase" is complete and leaves large areas in an unreclaimed state for indeterminable periods of time.
 - Abdicating reclamation monitoring to DOGAMI to exercise its discretion to determine what is a good practice does not satisfy the requirement of a plan which requires:
 1. Reclamation of one phase before mining can start on the next. MCC 11.15 7325(c)(10).
 2. A reclamation time table. MCC 11.15 7325(c)(11).
- ☞ We ask that the hearing officer require Angell Bros to expand their operations with a logical, sequential mining and sequential reclamation plan that follows DOGAMI and other regulations.

McNamee Neighbors

Issue 9. North Angell Brothers Stream Watershed

- The W.H.R.R.R. 9/95 at VI-16 recognizes the importance of the Raftan/ Burlington Bottoms and Eastbank of the Multnomah channel as significant "3-C" resources and concludes "Therefore mining of the Angell Brothers site should not take place within the North Angell Brothers Creek watershed, but instead should be directed to the watershed of the Middle and South Angell Brothers creeks..." The W.H.R.R.R. 9/95 reiterates at V1-17 again that "Expansion of the Angell Brothers quarry site should be allowed except for a 200 meter buffer area along the south and west sides of the property and except for the North Angell Creek watershed."
 - The Angell Brothers' application does not comply with the W.H.R.R.R. - 9/95. The Angell Brothers' Revised Response to Approval Criteria (hereafter A.B.'s R.R.) inaccurately states at pg. 3, that the Resource Protection Report (i.e., the W.H.R.R.R. - 9/95) allowed expansion of the Angell Brothers' site "... but required extraction areas to observe a 600' set back from the North Angell Brothers Stream."
 - It should be noted that the North Angell Brothers stream has two branches or drainages. The main drainage area parallels the western boundary of the Angell Brothers' quarry site. However, another ravine far deeper into the Angell Brothers' site channels water into the North Angell Brothers stream main branch at nearly the precise geographic center of the Scenic Buffer area at the northern end of the Angell Brothers' site. The North Angell Brothers complete watershed is illustrated on figure 6 of the 12/12/95 "Operating and Reclamation Plans" submitted by Angell Brothers.
 - As demonstrated by figure 4 of the "Operating and Reclamation Plans," it is Angell Brothers' intent not only to mine significant portions of the North Angell Brothers stream watershed but to use this area for stock pile locations.
- ☞ We request that the hearing officer The North Angell Brothers' watershed needs to be clearly delineated and posted as out of bounds not to be disturbed by any quarrying activity whatsoever.

McNamee Neighbors

Issue 10. General Monitoring

Criteria regarding general monitoring are established on NOH p 10, section 3. E., and Angell Bros responds on RAC pp 24-25, section 3.3.19.

- This criterion places the burden of monitoring on the County, and Angell Bros response is to say, "The {Multnomah County} planning director is welcome to accompany the DOGAMI Reclamationist on any inspections."
 - Our research has shown an alarming trend with respect to monitoring activities. Namely, state and county governments are less able than in years past to monitor operations like Angell Bros.
 - We observe that there is a shift occurring in government from providing broad services under general funding to providing narrower services with usage fees aimed specifically at citizens and organization who use those services. Campsite fees are paid by campers, for example, and building inspection fees are paid by those who build.
- ☞ We ask the hearing officer to require Angell Bros to pay for any and all monitoring services not provided by government. In particular, as we have noted elsewhere, we ask that Angell Bros fund independent consultants who are available to our neighborhood directly and who monitor seismic activity, indications that mining is approaching the aquitard, and sound intensity. We ask that these contractors report results to Angell Bros, to the County of Multnomah Planning Director, and to each member of our neighborhood.
- ☞ We ask the hearing officer to require Angell Bros to welcome a member of our neighborhood to accompany DOGAMI Reclamationist on all inspections.

Issue 11. Our Community

When we look at site maps and read the many studies associated with the Angell Bros expansion, we wonder whether people understand that our neighborhood exists. There are more of us than just McGrew, Wruble, Adams, Rugh and McCurdy — those closest to the quarry and mentioned by name in Angell Bros materials. Here are some anecdotes intended to make our community more vivid for Angell Bros, Multnomah County Planning Staff, and the Hearing Officer.

- 21 September 1996 will be the third annual "McNamee Day". This neighborhood event, organized by the Bernards and Staples families, is held in Moses McNamee's 100+ year old orchard and is attended by 50 to 60 friends and neighbors who live on or near 5.3 mile McNamee Road. Newcomers often visit the cemetery near the orchard where a headstone marks McNamee's grave.

McNamee Neighbors

- If you drive in our neighborhood in the early morning hours, you will regularly see Dorinne Petersen and Rik Kalmback walking McNamee Road collecting debris from the roadside.
- When Forest and Lamont, the McCurdy family llamas, escaped their fence last week and no one was home, it took the combined efforts of the Staples, King, and Rugh families to round them up.
- Devon, Ian, Brendan, Ramona, Sam, Sarah, Warren, Sofia, Sabine, Sacha, Jared, Michelle, Nicole, Wesley, Christina, and Jessica are children of the undersigned who live on the part of McNamee Road that is nearest the quarry.

Issue 12. Community Distrust

Emotion often runs high in our neighborhood when we gather to discuss the quarry. It seems that the longer someone has lived in the neighborhood, the more problems that neighbor has observed. Here are some anecdotes:

- Angell Bros holds an easement allowing them to cross the property of Ray Adams. Some time ago, Skip Anderson, representing the quarry, offered to give the easement back to Adams. After some months, when Adams asked that the promise be kept, the offer was withdrawn.
- Over the last few years Angell Bros has communicated dramatically different plans for the quarry's expansion. One day the setbacks are 1000 feet and the upper portions of the quarry are to be held in reserve. The current plan brings the quarry much closer to our properties than ever disclosed before, and much sooner as well.
- At a neighborhood meeting Angell Bros representative Skip Anderson offered several times to meter sound levels for anyone who asked. "We'll do it tomorrow if you want." Skip fails to understand that the sound we are worried about is not the sound today or tomorrow. It is the sound his excavators will make in the future when they operate in our lines of sight and a few hundred feet from residences.
- Road conditions at the entrance to Angell Bros on Highway 30 are very well known to most of us since this is the road we use to go to Portland. We all know to expect rock and clay scattered across Hwy 30 at Angell Bros. While it appears from these planning documents that the quarry has taken steps to improve matters, our first-hand experience tells us that the problem still exists.

The cumulative effect of experiences like these is a significant measure of doubt in the minds of many of us that the quarry will be a good neighbor without the stringent monitoring that we are asking for.

McNamee Neighbors

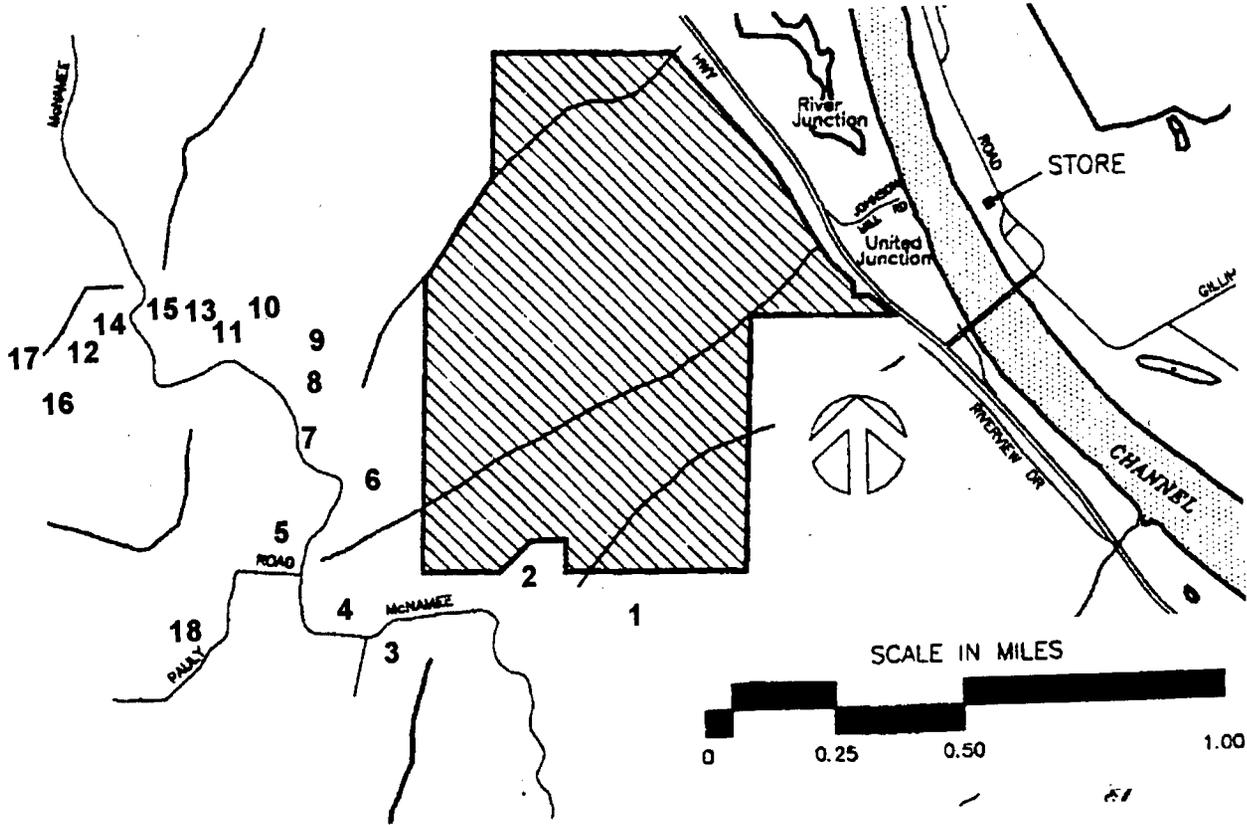
Conclusions

As a condition of issuing the conditional use permit to Angell Brothers for its quarry expansion, we ask the hearing officer to find the following:

1. There should be a full and strict protection of the entire North Angell Brothers Crook watershed.
2. A logical, sequential mining and sequential reclamation plan should be required.
3. There should be seismic monitoring devices placed in pertinent locations, most logically at the 4 residences referred to in the Daily-Standlee reports. The same should be required for sonar monitoring devices.
4. An independent sonar study should be conducted along the same lines as the Daily-standlee report purported to do. The expert hired to do this should be selected by a neutral third party agreed upon by Angell Brothers and the McNamee Neighbors and if they should not be able to agree, then the selection should be made by the head of the Engineering department of the University of Portland or some other neutral body.
5. The reasonable cost of the sonar and seismic monitoring devices should be determined and purchased by the engineers selected in the process or a similar process described above.
6. The estimated costs of monitoring the seismic and sonar devices should be escrowed at the beginning of each year and a procedure should be established for payment of these fees other than directly from Angell Brothers. Angell Brothers should be required to pay for all of the seismic sonar monitoring devices as well as their monitoring until completion of the mining.

McNamee Neighbors

Appendix A: Where we live



1	J McGrew	2	D Wruble	3	L & L Lueth
4	R & E Pletz	5	D Peterson et al	6	R Adams
7	T & D Long	8	D & C Rugh	9	H & C McCurdy
10	D & S King	11	J Chen & J Flynn	12	J Sullivan
13	D & T Bernards	14	K Foster	15	P & C Staples
16	B & P Bewick	17	J Hall	18	M Hansen

McNamee Neighbors

Appendix B: Angell Bros & the DEQ

This appendix contains:

- a memorandum prepared by David King reporting to his neighbors his conversations with members of the Department of Environmental Quality.

The Phœbus Group
14310 NW McNamee Road
Portland, Oregon 97231



503 621 1000
{voice/message}
503 621 3390
{Fax}

dking@teleport.com
{Internet}

MEMO

TO: McNamee Neighbors
FROM: David King
RE: Angell Bros. and the DEQ

The Phœbus Group

My assignment was to explore DEQ's relationships with the Angell Bros.

DEQ is divided into groups associated with different issues. Relevant to us are the water quality group and the air quality group. Noise is a responsibility of the air quality group. Here's what I discovered:

Issues Associated with Water

Julie Schmidt (229 5438) is permit coordinator and Paul Keiran (229-5937) is storm water expert for the Water Quality group at DEQ.

I spoke with Julie who explained that Angell Bros. operate with a 1200-A permit, which is a general permit for quarry operations used throughout the state. This permit regulates the release of storm water to a river. Paul Keiran is the person to talk with.

I have received by mail from Julie a copy of permit 1200-A as well as a general note on storm water regulation and a handbook regarding permits. 1200-A is up for review and revision in 1996, by the way. This revision is not directly related to the Angell Bros., however.

Paul Kiernan left a message in response to my call and indicated that the Angell Bros. results for the past several years have been good. If there is evidence to the contrary, then Paul wants to know about it.

This permit for discharge is regarding storm water only. Water used in processing rock is a different matter. This water cannot leave the premises.

Also, testing storm water is a responsibility of Angell Bros. They are asked to test twice a year. These self-administered tests are what Paul's positive report refers to.

DATE: 09 September 1996 04:46 AM

PAGE 1 OF 2

FAX from The Phœbus Group

Issues of Air, Dust, and Noise

Kathy Amidon (229 5568; Fax 229 6957) handles the air quality permit for Angell Bros. This permit was just reviewed, public testimony was accepted some weeks ago, and a new permit allowing additional dust to be created by the crusher was approved. DEQ lets the public know that a permit is under discussion by placing a copy in the local library. I have requested a copy of the new permit along with other general information.

Sound is also regulated by Kathy's group, but due to funding cuts, there is no enforcement. From Kathy's point of view, the issue of sound is far simpler than dust: an instrument is set up and either the operation is too noisy or it is not. The County is the likely enforcement agency, according to Kathy.

Dust is a bit tricky to measure. The goal of the DEQ is not to prohibit some dust from appearing on a rooftop, but rather to guard the public health risks associated with dust in the air. Kathy will be interested in any reports of extensive dust here in our neighborhood, and will investigate if called upon.

Note that the permit Angell Bros. has is for dust created by the crusher; dust created in the process of acquiring the rock (which is more relevant to us) is regulated by the Dept. of Mining, not the DEQ. Also, note that Kathy sees Angell Bros. as a good citizen to date. When I raised questions about self-regulation, she told me that on average the mining industry has come into compliance with very few exceptions, and Angell Bros. has been in compliance.

In summary

It appears that we have some protection afforded by DEQ, but only as and when a problem arises. It also appears that the permits aim at particular issues (i.e., the crusher) while leaving other issues (i.e., mining the rock) entirely open. I think I need to talk with the Oregon Department of Geology and Mining Industries (DOGAMI for short).

McNamee Neighbors

Appendix C: Angell Bros and DOGAMI

This appendix contains:

- a memorandum written by David King reporting to his neighbors a conversation with Frank Schnitzer at Oregon's Department of Geology and Mining Industries.

The Phœbus Group
14310 NW McNamee Road
Portland, Oregon 97231



503 621 1000
{voice/message}
503 621 3390
{Fax}

MEMO

dking@teleport.com
{Internet}

TO: McNamee Neighbors
FROM: David King The Phœbus Group
RE: Angell Bros and DOGAMI

DOGAMI stands for the Oregon Department of Geology and Mineral Industries and as their name implies, they are a major agency involved in setting conditions and monitoring Angell Bros operations.

I called DOGAMI because Angel Bros argued for a 200 ft. setback and cited DOGAMI permission while the County has a 400 ft. criterion (MCC 11.15.7325 (C) (7)).

General Notes

DOGAMI and Angell Bros have a continuous working relationship. DOGAMI is responsible for the technical aspects of the mining operations. The size and angle of the staircase, for example, is a DOGAMI concern.

I asked whether we missed an opportunity for public comment regarding Angell Bros expansion plans and the answer was revealing: DOGAMI has no window for public comment. Put in other terms, 'livability' of surrounding properties is not DOGAMI's charter.

A Chat with Frank Schnitzer

Frank Schnitzer is a reclamationist with DOGAMI and he has worked with Angell Bros and lots of other mines for many years. He explained that the 200 ft setback is deemed a safe distance on geological grounds. The decision is entirely unrelated to dust and sound concerns, etc.

In Frank's experience, the county may well ask for a greater setback and get it. DOGAMI would have no problem with a 400 ft. setback. Frank pointed out that DOGAMI gets pushy when things go the other way. Namely he recently imposed a 200 ft. setback from a river in a situation where the county (not ours) had allowed 100 ft. 100 ft wasn't safe on geological grounds.

So, it sounds to me like we're clear of DOGAMI concerns when we press Angell Bros on the setback issue.

DATE: 09 September 1996 01:50 PM

PAGE 1 OF 2

FAX from The Phœbus Group

I asked Frank about two other issues: seismic vibration monitoring and threats to wells.

- Frank indicated that most wells monitor seismic motion when blasting, but that continuous monitoring wasn't common. There is no DOGAMI monitoring service offered of this kind.
- Frank believes that this particular quarry is no threat to our aquifer. He believes they'll be 100 ft away at their closest point. By monitoring the appearance of water (springs, upticks in the well at Angell Bros) downhill, Angell Bros will have plenty of warning as they approach the aquitard.
- I asked Frank if he's ever seen an aquifer compromised in his 20 years experience. He's seen one - a mine called Carban (sp?) on Cooper Mountain. The operators mined through an aquitard in the summer and by the time they noticed the volumes of water increasing, it was too late. Repairs have been underway ever since! Well levels dropped, but no wells went dry. It does happen, but very rarely.

DOGAMI can be reached at 503 967 2039. Gary Lynch and Frank Schnitzer are the folks closest to Angell Bros operations. I found Frank to be a bit terse, which is consistent with a technician being bored to tears by a novice. However, he was polite and informative.

It is Frank who, for the time being, will be managing the reclamation of the mine.

Kind regards,

McNamee Neighbors

Appendix D: Angell Bros and Seismic Risk

This appendix contains:

- the curriculum vita for Kenneth King,
- a report prepared by Kenneth King for the Public Works Department for Kansas City, Missouri,
- a memorandum written by David King reporting to his neighbors a conversation with Kenneth King.

K. King, consultant
 Licensed geologist, geophysicist
 specialties in
 Vibration Hazards and Risks
 Ground, Structure, and Acoustic vibration investigations

PROFESSIONAL/TECHNICAL PERSONNEL RECORD

<u>Name (last) (first) (initial)</u>	<u>Home station</u>	<u>Date prepared</u>	<u>Birthdate (month)(day)(year)</u>	<u>Classification title</u>
King, Kenneth W.	2949 Vivian St. Lakewood, Co. 80219 (303) 238-3333	1996	Sept. 10, 1933	Geologist/Geophysicist

Scientific, technical, or special skills

General engineering geophysics, vibration engineering, and geology which includes ground-response, building response and acoustic response expertise; blast and ground shaking documentation; reflection and other subsurface techniques. Supervised approximately 200 scientific projects and taught blast, aircraft-vehicle traffic documentation, core and bore-hole techniques.

Education:

<u>School/College</u>	<u>years</u>	<u>Specialization</u>	<u>Degree</u>
Penn. State University	1952-1956	Geology/Mineralogy	B.S.
Penn. State University	1956-1967,74	Geophysicists	M.S.
University of California	1959	Mathematics	N/A
University of Nevada	1968-1970	Management	MBA
University of Southern Nevada	1975	Stratigraphy	N/A

Professional Memberships and licenses

A.A.P.G.	Sigma Gamma Epsilon (Advisor)
S.S.A.	Professional License - Geology, 1972, Del.
Southern Nevada Geologic Soc.	Professional License - Geophysicist, 1974, Cal.
Southern Nevada Management Soc.	Association of Professional Geologist, 1988, Co.
Adjunct professor-Geophysics- Colo. School of Mines 1990-92	

Lectureships, symposia, invited conference participation. -since 1982.

University of Utah	1982,84,87 Inv. lecture
Fed. Highway Com./Nat. Park const. workshop	1986,88 Inv. and part.
Ground motion hazards workshops	1984,85,86,87,88,89 Inv. and part.
Nat. Park (engineering symposia)	1986,87,88,91 Inv. and part.
Puget Sound-Portland hazards symposia	1987,88,89 Inv. and part.
Nat. Park and/or hist. Society	1987,88,89,91,92 Inv. and part.
Colorado State University lecture	1987,88,89,90 Inv.
University of Washington lecture	1987 Inv.
City of Seattle-Const./Park lectures	1986,87,88 Inv. and apply
Water Resources Division-Reflection symposia	1986,87,88 Inv. lecturer
Bureau of Land Management lectures	1988 Inv. lecturer
Assoc. of Engineering Geologists lecture	1988,89 Inv. lecturer
Oregon Dept. of Transportation lecture	1989,92 Inv. lecturer
SSA, AGU lecture	1990,91 Inv. lecturer

Other committees, special assignments, significant consultant roles

Soils Lab/Drilling Committee USGS	1987-88
Nat. Park (Western Dist.)	1984,85,86,87,88,89,90,91
Nat. Park (Eastern Dist.)	1986-87,88
Oak Ridge Nat. Lab (Acoustical/Vibration)	1987
Utah State (Dike program)	1986-87
Washington State (Waste program)	1986-87
WRD-USGS waste mapping, water table, etc.	1985, 86, 87, 88
Bureau of Land Management-Engineering Council	1988, 89
Office of Surface Mining	1991,92,93

Career Experience

1960-1979 USC&GS/NOS/NOAA - Geophysicist	I was in charge of the seismic programs for all nuclear projects and some large quarry/mine blasts. lead investigations of structure damage from vibrations.
1979-1993 USGS - Research Geophysicist.	In charge of Seismic Urban Hazards Investigations Group. Earthquakes, landslides, vibrations.... Main investigation was in vibration induced risks to buildings
1993 Private consultant	Vibration risks and hazards

Bibliography

Most significant work since 1982

Wasatch Front Urban Area Seismic Response Report (1982-92)

It is held as the standard for the Wasatch urban site response (vibration hazards)(update in 1992).

Seismic, Vibration Hazard Investigation of Chaco Culture National Historic Park, (1985); Acoustic Studies at White Sands National Monument, 1988, Pagueate, NM, blasting and construction vibrations: These works established the scientific foundation for the allowable levels of vibrations at historic sites. Before this work, most historic structures were being damaged due to mines, roads, aircraft, construction and or public-induced vibrations as they were using the BOM published vibration standards for blasting. Our studies establish a better standard for protecting irreplaceable structures and still allow improvement and development.

Study of Loma Prieta earthquake aftershocks and building damage.

Mapped site response/damage for Santa Cruz and Los Gatos and studied effects of topography and soils on damage/structures.

Study of vibration hazards at Pueblo Grande from blasts, freeway construction, railroad and airport. (1988-1990) - (Hohokum structures)

Study at Pagueate to discern damage from natural sources, construction, and mining blasts. (Very old Native American pueblo)

Study near Evansville, Id. (1991-93)—Damage—Mine Blasts

Used a variety of tools as; specific site response, site natural frequency, area attenuation, sonic study, building response, shear wave velocity, compressional velocity, soils tests, gamma logs, shear logs, etc. to discern cause of structural damage. (large complicated law suite which required a very well documented investigation.

High-resolution Vibration investigation at Mesa Verde. Set the vibration standards for construction etc. on the cliff/adobe structures.).

1993---Retired (Thank God no more govt. paper work!!!!).....

93 Vibration investigation at East Kansas City. Establish vibration levels of damage on urban home structures from underground blasting.

93 Historic Fremont site in western Colorado. Set vibration standards for road building, well drilling and pipe-line construction near the historic site.

93-94 Taos Pueblo. Setting the vibration standards for road construction and other improvements. Investigation of effects from air traffic. (in progress)

93 Lincoln's Memorial, Setting the vibration standards for the construction rehabilitation (in progress)

94 Arkansas State Highway, Establishing the vibration standards for construction at an archaeological site.

94 Kansas City. Establishing the maximum permissible vibrations induced from a major underground mine to a housing and cultural center

94 Pheonix, Establish cause and prevention of damage to Hohokum structures.

94 San Miguel Mission, Found cause of damage and methods to reduce hazards.

94 Aztec NM, Zoned the ruins for allowable induced vibrations for planning traffic plans.

95 Philippines--taught engineers how to test historic buildings and damping vibrations.

95 Farnington, NM, Establish limits for San Juan Coal Co. blasts near historic homes.

95 Pheonix, set standards for fire works blasts over historic cemetery.

95 Thailand, wrote standards for building testing; AID & world bank grant.

95 Pinnacles NM, set vibration standards (traffic) for a historic building.

95 Taos Pueblo, document aircraft flyovers and establish noise-vibration standards.

96 BHP mining, strip mine at 4-corners did an inspection and documentation for strip mining. Set up owner program.

96 Pipe Spring NM; set up vibration zonation for aircraft, road building, public use for the monument.

96 Navajo Mine; Set up vibration standards at several historic structures; set up documentation and inspections.

all abstracts are deleted for brevity

King, K., 1996, Vibration induced from Helicopters; NPS issue.

King, K., 1995, Vibrations from cast blasting--surface mining. BHP inc.

King, K., 1995, Vibration hazards at the Taos Pueblo, BIA

King, K., 1994, Vibration hazards from bridge building-operation; DAH, Ark.

King, K., 1993, Vibration hazards to urban homes in East Kansas City (review by city)

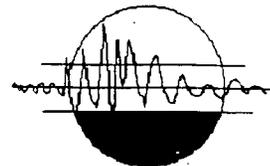
King, K., 1993, Vibrations induced to Lincoln Memorial from construction equipment (in review-NPS)

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- John Morgart (505 988-6717), Santa Fe, National Park Service, construction.



**INVESTIGATION OF THE VARIANCE OF INDUCED GROUND SHAKING
IN THE GRACEMOR HOUSING AREA, KANSAS CITY, MISSOURI**

by

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for

Kansas City, Missouri Public Works Department

July 20, 1993

INDUCED VIBRATION STUDY--GRACEMOR AREA

July, 1993

INTRODUCTION

Gracemor is a housing unit in an area located within the eastern city limits of Kansas City, Missouri. The area is east of I-35, mostly east of I-435; and approximately 1,000 to 4,000 feet north of the Randolph limestone mine. The area of concern for this study has approximately 1,300 homes. Most of the homes are single dwelling, one to two story, and in the general price range of \$50,000 to \$120,000. (a very blue collar area)

The homes are built on the Knox-Sibbey soil which was formed in a thick layer of wind deposited loess (USDA, 1961). The loess is approximately 10 to 30 feet deep and consists of friable, silty, clay loam. The loess is underlaid by a north to northwest shallow dipping (2-5 degrees) shale. The area is dissected by a dendritic type drainage pattern which results in 50 to 80 feet of moderate relief for the area.

The Randolph Mine is presently producing approximately 800 tons of limestone per working hour from a single thick formation of limestone which is approximately 100 to 120 feet deep. The mine normally operates eight hours a day, five days a week. During this project the operators made their ore blasts, which are at the north, northeast, and north west working face of the mine, at the end of the afternoon shift or approximately 5:00 pm to 6:00 pm on Monday through Thursday; and, 4:00 pm to 5:00 pm on Fridays. The daily series of blasts average 10 to 15 separate rooms or areas that were shot singular or by doublets with approximately 250 to 850 pounds of ammonia-nitrate/diesel fuel (ANFO) mixture per room. The shot patterns are a mixture of "slab", "V", or "trim" blasts. The "V" blasts are the larger rock-moving events which put the most vibratory energy into the ground. A number of homeowners have reported hearing and feeling vibrations from the mine blasting over the past several years. Recently some home owners have suspected that the vibrations induced by the blasting from the mine may have damaged their homes. The Kansas City Public Works Department in response to the citizens requests has initiated a multi-phase investigation of the complaints.

One phase of the investigation is to establish the variability of the induced ground shaking from the mine blasts in the Gracemor area. Many vibration studies have shown that induced ground shaking from blasts or earthquakes will have significant amplitude differences over a small area. For example, the induced ground motion variation in Santa Cruz, California from the Loma Prieta earthquake was a factor of 5 over a distance of less than 3 miles (King, and others, 1990; King and Williams, 1990) and the variance of induced ground motion from mine blasts in McCutchanville-Daylight, Indiana area was a factor of 4 (King and Leyendecker, 1993). Other investigators; Algermissen, 1991, Bollinger, 1977, Borchardt, 1970, Gutenberg, 1945, Hays, 1982, Herrmann, 1986, Joyner, 1981, to name just a few, have found large differences in induced ground vibrations in small areas. After the ground shaking variability can be defined, the Kansas City Public Works Department can better allocate and direct the other phases of the investigation.

ACKNOWLEDGMENTS

The readers should be aware that the following project was a team effort between Kansas City Public Works Department employees; (John Nash, Anita Simmons, Don Rogers, and Jerry Cook); councilpersons (Mr. Webber and Mrs. Bohachick); Hunt Midwest personnel (John Hays, Tony McLaughlin, and three loaders/shooters); and last but certainly not least, the home owners.

GENERAL METHODOLOGY

Methods for mapping or zoning urban areas for vibration hazards or risks have evolved from geophysical and geologic urban-hazards research projects (Murphy and others 1975; Roger and others, 1979; King and others, 1982, 86, 90, 91; Algermissen and others, 1991, 1992). The method consists of comparing the parameters of the induced vibrations (amplitudes and spectra) at selected sites underlain by alluvium and a standard reference site. Ideally the standard site would be at the same distance from the source of induced vibratory energy as all of the comparison sites and, the standard site would have the lowest vibration amplitudes. With the ideal case, the difference in the amplitudes and spectra of the induced shaking at the comparison sites verses the standard site would be due to amplification by the soils underlying the comparison sites (site response) and would give a qualified quantity which will indicate the amount of ground shaking amplification to expect at various sites. Seldom does the ideal situation exist in the field and Gracemor is no exception. The standard site, which was chosen because of its location near the center of the study area, did not have the lowest vibration amplitudes documented and, the distances from the mine blasts to the sites under study vary from approximately 2,500 feet to 4,500 feet (Fig. 1).

The relative magnitude of ground-vibration-amplification can be calculated by distance normalizing the comparison site vibration amplitudes to the standard site distances to the mine blasts and then comparing the distance

-corrected comparison site vibration amplitudes to the standard site vibration amplitudes. The site amplifications were derived by: $A_{(i,b)} = (C_{(i,b)}f) / S_b$, where A = site amplification, C = Amplitude at a comparison site, f = distance-attenuation factor, S = amplitude at the standard site, i = comparison site index, and b = mine blast number. Some amplification values were below 1.0 due to the fact that the standard site did not have the lowest ground vibration amplification and did have some amplitude amplification due to the effects of the site response at the "standard" site.

Equipment-software

The ground vibration recording equipment used on this project are White Industrial Seismology Inc. seismograph systems that are an improved and advance version of the Dallas Instrument ST-4D blast recorder. The seismic system is a portable, triaxial, velocity-sensing seismograph which has been designed to store data in one megabyte of hard memory and then input the data to an IBM type PC computer. The equipment amplification and gain electronics are not similar to the normal blast recording systems as they have been modified according to specifications developed by and for K.King consultant for this phase of investigation. The internal noise of the electronics has been reduced to allow documentation of vibrations from 0.02 mm/sec to 31.7 mm/sec peak particle velocities. The vibration data were digitized and recorded into solid state memory at 256 samples per second per channel by the field seismograph. The sample rate allows frequency resolution sufficient to analyze ground vibrations in the 1 to 50 Hz spectral range which contains the frequency bandwidths that low rise buildings are most sensitive and susceptible to vibration damage. (Algermissen, 1992).

The seismometers were buried and coupled carefully in the soil ("A" or "Ba" type soil when possible), leveled, oriented, and calibrated for each field event using standardized procedures developed by U.S. Geological Survey (Carver and others, 1986). Extra care was taken in the installation of the seismometers to assure that the seismometers were level to within 3 degrees of the horizontal and the horizontal orientation was within 5 degrees.

Analysis

The data recorded during the tests had a 2.0 second pre-trigger and 48 seconds of post trigger documentation time. These data were displayed on low response strip chart on the field system (Fig.2 and Figs. 7-13). The data were imported into a IBM clone PC computer for analysis. The analytical software by White Industrial Seismology Inc. was modified to K.King, consultant specifications to allow a more thorough analysis of the vibration data. These data were then reduced to amplitude-normalized seismograms and a Fourier Transform was applied (Figs. 3 and Figs. 14-27). A 4-second duration window of digital data from the recorded vibrations, beginning approximately 0.2 second before the first impulsive compressive wave arrival and including all of the major wave train, was selected for analysis. The window is tapered with a whole-cosine bell (Hanning window) before being transformed by a standard Fast Fourier Transform (FFT) program to prevent manufactured or splinter frequencies from entering the spectra. It was unnecessary to normalize spectral amplitudes by window length as all spectra in this study were derived from data windows with identical duration; therefore, although the amplitudes are dimensionless, the amplitudes can be compared (Fig. 3, 14-27). The spectra are plotted on linear scales which allows select frequency analysis (modification by K.King, consultant).

Transfer functions or spectral ratios were derived from the data from sites at or near the Gracemor landslide to indicate the amount of vibrations induced into the slide material from the mine blasting (Fig.4, 29). The transfer function is calculated using $Tff = STf/SBf$ where TF = transfer function, f = frequency in cycles/second, ST = spectra at top of slide, SB = spectra at rock site.

A range or distance scaling function (vibration amplitude decrease with increase distance from the mine blasts; attenuation or "f") was derived by linear least-squares regression of the peak-particle velocity data versus the distance to the blast. The data fit a power-law function equation of $Y = BX^m$ where Y = peak particle velocity, B = y intercept of the line, X = distance, m = attenuation exponent (slope) (Fig. 5). The derived exponent was used to normalize the comparison sites amplitudes to the standard site distance-to-blast amplitudes.

Operations

Twenty-seven sites were selected for the study. The site which is in the approximate center of the study (4917 N. Sycamore Drive) was selected for the standard site. Five portable seismic systems were deployed each day to study the mine blast induced vibrations to the Gracemor area except for day 6/9 when three systems were deployed for training and equipment testing (Fig.1). Generally the sites for each daily series of mine blasts were located at the same approximate distance from the blasts. The induced ground motions from two series of blasts (6/14, 6/18) were

documented by the 5 stations which included a three-station linear array oriented on a line toward the blast locations. The linear arrays were used to study the effects of distance-from-the-blasts on the vibration amplitudes (attenuation).

The mine-blast-induced vibrations at the Gracemor landslide were documented for the project on 6/17/93. The landslide study had a seismic system deployed off the slide material on a shale outcrop near the toe of the landslide. A second and third seismic system were located progressively upslope on the landslide and, a fourth system was located approximately 2 blocks west of the slide array at a similar distance from the mine (Fig.1, 28). The fifth system was located south of the landslide array at the standard site.

DISCUSSION

The induced ground vibrations from the mine blasts were documented on 8 different days. Blast induced vibrations from several blasts were recorded on each of these days. The seismic data from the mine blast that indicated the largest induced vibration amplitudes at the occupied sites were selected for further analysis. The location of the blasts which were used for this project are shown on Figure 1. The multi-room blasts are shown by the double triangles on figure 1.

Ambient vibrations (normal cultural background) was measured at all sites. The natural background (without heavy vehicular traffic) of the area is approximately 0.02-0.03 mm/sec with frequency peaks at 18 to 25 Hz. Heavy traffic, 5 ton trucks at 50 feet distance and the freeway at 100 feet, induces a general background vibration level of 0.03-0.05 mm/sec in the frequency bandwidth of 12 to 25 Hz. The city street maintenance tractors and backhoes induce approximately 0.07-0.10 mm/sec ground shaking at 50 feet in the 12 to 25 Hz bandwidth (Fig.5). Analysis could be made on the blast data which was within the ambient vibration levels due to the general differences in spectra between the ambient and the induced motions from the blasts. However, even though these frequencies (18-25 Hz) from traffic or blasts are perceptible and can vibrate windows or bric-a-brac, they are above the natural frequencies of the houses and will cause little or no effect on the buildings' structural integrity (Algermissen and others, 1991).

The vibration attenuation study found an average vibration attenuation function of -1.04 (Fig. 5). This factor is slightly on the low side. Vibration energy attenuate approximately 10% faster in most other areas that have been studied; that is, with an attenuation function of approximately -1.4 (King, 1990). The Bureau of Mines also used a higher attenuation function during their blasting-damage limit study (Siskind, 1980). The lower attenuation is probably due to the efficient transmission of the energy through the limestone and the fact that the housing is not located on deep alluvium which would absorb the energy.

Table 1 shows the comparisons of the spectra and amplitudes. The one and two story houses in McCutchanville-Daylight, Indiana area which similar to those in the Gracemor area and which were tested for a vibration project, have natural frequencies from 5 to 15 Hz. (King, 1993). The Gracemor homes will be more sensitive to the blast induced frequencies that are "in tune" or similar to the natural frequencies of the homes which are in the 5 to 15 Hz bandwidth (Algermissen and others, 1991). The induced vibrations which are most likely to cause damage to the structures is in the horizontal plane (Hays, 1969); therefore, the vibration amplification function was calculated only from the maximum horizontal component which in most cases was the radial direct wave. A summation of the data and analysis is shown in Table 1. The maximum frequencies shown on table 1 are not necessary the peak frequencies of the derived spectra. In some cases the peak frequencies were in the 18 to 20 Hz bandwidth which were being driven or induced by the ambient background and not by the mine blasting. In these cases, the second highest peak at a lower frequency were selected to be the frequency of concern.

Table 1 shows that the predominate horizontal frequency recorded at the sites from vibrations induced by the mine blasting is from 5-15 Hz with a median value of approximately 12 Hz. It is probable that this frequency is the natural frequency of the soil column under the houses. If 12 Hz is at or close to the natural frequency of the soil column and assuming an average shear-wave velocity of the soil to be approximately 600 ft./sec; the 1/4 frequency formula (soil period = $(4 \times \text{soil thickness})/\text{shear wave velocity}$) would indicate that the soil column is approximately 13 to 19 feet thick which agrees well with the Terracon investigation of the school and the slide soil thickness (Kansas City reports). That is, the induced vibration spectra indicates that the sites are most sensitive to induced frequencies that are similar to the natural frequencies of the houses and that those frequencies are being amplified by a soil column has a thickness under the houses or the depth to competent bedrock (hardrock with transmission velocities above 8,000 ft./sec) is approximately 13 to 19 feet. The data also show vibration amplification functions from a maximum of 2.7 at 4800 N. Sycamore Avenue to a minimum of 0.6 at 5000 Randolph Road. The sections or zones of the map (Fig 6) is based on amplification values greater than 1.4, values from 1.0 to 1.4 and, values below or at 1.0. The areas that have the highest amplification function will have the highest perceptibility of the mine blasts. It is also probable that the homes in the area of the highest amplification factor and have a site natural frequency in the 5-15 bandwidth, will have the highest risk of damage.

It should be noted that a maximum amplification factor of 2.7 is medium to low in comparison to similar amplification factors found in investigation of other areas such as McCutchanville, Indiana (maximum of 9.2); Daylight, Indiana, (maximum of 4.3); and Olympia, Washington, (maximum 6.4). The data show that a ground motion "hot spot" or areas of high ground vibration amplification probably does not exist in the area tested. The small variance in amplification factors found in this investigation indicate that the soils underlying the homes are probably moderately uniform; that is, most are moderately well drained and the soil column underlying the homes vary in the 10's of feet and not in the 100's of feet.

A series of mine blasts were recorded to help with the investigation of the Gracemor landslide (Fig.1, 28). The normal ambient vibration background in the Gracemor landslide area without heavy vehicle traffic is approximately 0.02 mm/sec in the 1 to 20 Hz. bandwidth. Only two of the mine blasts recorded gave sufficient vibration amplitudes at the shale site to be used for analysis (Fig.12). The time-histories (seismograms) can not show the low amplitude motions with detail due to the resolution of the recorders; however, it is evident that the motions at the 0.02 mm/second level are in the natural background and below the value of freeway and adjacent traffic (usually at the 0.03 mm/second level).

Table 2 gives a summary of the peak-particle motions and the peak frequencies. The comparisons of the peak-particle motions agree well between the events except when the motions approach 0.02 mm/sec vibration level. Figures 24 and 25 give a visual comparison of the spectra derived from the data induced by these events. The spectral peaks at or near 20 Hz are believed to be due to traffic and not induced by the mine (Figs.12, 24, 25, Channel 2 -vertical component-of stations 225 and 219). Most spectra show that the landslide sites with the exception of the site located on shale show a higher sensitivity to 8-10 Hz frequencies.

The peak-particle amplitudes show a general amplification factor of three (3) on the soil sites verses the rock (shale) site (Table 2). This is normal to that found in other areas of similar geology (King, 1990; King and others, 1992; Hays and others, 1982). The depth of the soil at the thick slide site (well 2A) is approximately 22 feet. If one assumes the depth of weathering in the shale to be approximately 3-5 feet and the average shear wave velocity of the upper 25-30 feet of the soil column to be approximately 500-600 ft/sec. (the upper values for loess and shale weathered soils) then the calculated period for the soil site would be approximately 6-8 Hz which agrees well with the observed peak frequencies. The data also show that the area near Well 2A does not receive more vibration energy from the mine blasts than the comparison site. Figures 4 and 29 indicates that the horizontal spectral amplitudes of the induced motions are slightly larger in narrow band-widths at the comparisons site whereas the well site had greater spectral amplitudes at 10.25 Hz in the vertical component. The narrow spectral peak at 10.25 Hz is not considered significant due to the fact that the peak in the vertical component, is relatively low, and is less than 1 Hz wide. Usually an amplification factor must be based on at least 2 Hz bandwidth to be significant (King, 1990).

A vibration amplification anomaly does not exist at the landslide site and the area does not show abnormally amplification or "tuning" by the soils natural frequency. It is also evident that the blast induced motions at the Gracemor slide, if the blasting on June 17, 1993 is typical, are very near ambient background levels. Heavy truck traffic on Richmond Ave. induced vibrations up to 0.05 mm/sec. with the average being 0.03 mm/sec at a 30 foot distance. The average traffic on 53rd Street induced approximately 0.02 mm/sec during ambient testing; however, no heavy traffic was present near the landslide during the testing period. These values along with peak-particle velocity values and peak frequencies are ancillary information for the analysis of the potential problems and causes of the landslide (landslide investigation and analysis is being done by Terracon Consultants).

Summary

1. The ground shaking attenuation would be considered on the low side; that is, it is possible that approximately 10% more vibratory energy is arriving at the housing than would be normally expected. However, this would not be considered a significant amount until or unless the mine significantly increases its blast size or decreases the distance to the homes.
2. The natural frequencies of the soil columns under the buildings of Gracemor are in the same bandwidth as the natural frequencies of the structures.
3. The mine blasts are inducing ground shaking frequencies at the Gracemor area that are in the bandwidth of the natural frequencies of the soil columns and the homes; thereby the homes/sites will be more sensitive to the blasting due to the "tuning" or reinforcement of the natural frequencies.
4. The ground motion vibration amplification variations show a pattern which is probably due to subsurface stratigraphy.
5. There is an area of moderate ground motion amplification in the Gracemor area. Approximately 224 homes are in this area.
6. There is not an area of high ground motion amplification in the Gracemor area.
7. The landslide area is not an area of high or moderate induced ground vibration amplification.
8. The ambient vibration background of the Gracemor area is 0.02 to 0.05 mm/sec. with some peaks in the 0.10 mm/sec range in the 15-25 Hz bandwidth.
9. The higher frequencies (15-25 Hz) are more perceptible, but are minimal in effects to the structures.
10. The ground vibrations measured during the testing period were below the vibration levels needed to precipitate damage to the homes; however, the buildings in zone three have all the parameters in place (natural frequency of the soil column, natural frequency of the homes, low area attenuation) to indicate a real increase in risk if the mine explosive sizes increase and or the distance to blasting decreases.

RECOMMENDATIONS

1. A base line house damage inspection (documentation) should be made as soon as possible.
 - The inspection must be coordinated with the home owners before, during, and after for their input.
 - Documentation must include:
 - a. the ambient temperature, moisture of air and soil.
 - b. basic structure type: that is type and orientation of roof truss, foundation type and orientation, location-orientation of shear walls, additions if any.
 - c. condition of stress connections (foundation, shear walls, roof etc.).
 - d. room by room damage documentation (scale drawing-not written) and documented damage by size, type, and location.
 - e. Note nail pops, type of wall material, stoop location, gutter drainage, driveway condition etc.

(we now do this with video tape)
2. I recommend inspecting 20 buildings (approximately a 1-10 sampling rate) in zone III, 20 buildings in zone II and 10 buildings in zone I. I also recommend a 50-50% split between complaint and noncomplaint homes.

3. The inspected homes should be re-inspected in approximately one year if there is not a large surge in complaints. If the complaints increase in number and intensity and if the mine is continuing operating closer to the homes; a 6 month inspection/documentation should be made.

4. Drill approximately 10 soil sample boreholes in the area (some of this information may exist, but location is very important). Selection of boreholes to be made by the city public works department, soils contractors, and vibration expert. Soil samples should be taken approximately 5 feet below foundation level, at foundation level, and at mid-wall-basement level. These soils should be tested for void ratios, expansiveness, and Atterberg limits. The borehole should be tested with penetration tests at the sample locations, waterlevel and permeability and, if possible, shearwave tests. The boreholes will be located in pairs according to amplification zone, owner complaint, and building inspections. If 10 boreholes can not be made, then 8, if not 8 then 6, etc., but a minimum of 2 should be made for future reference. The borehole parameters will help discern the causes and effects of sources of continuing damage (and complaints).

Not needed with todays experience and technology unless BIG money is involved--even then, its a rip off and not needed unless it is a national or big population \$\$ problem (earthquakes, nuclear, shopping centers, highrise, etc.)

5. The city should independently document the induced ground shaking at pertinent locations. The mine may cooperate by loaning their equipment to the city and inform them of the blasting schedule. I could help select the locations and analyze the data on a as-needed-basis. The Public Works Department Engineering Division have personnel who are very capable of appropriately, and with no bias, operating such a program. I believe that I (as a neutral outside agent) could advise, consult and analyze the data from such a program. The mine blasting will intensify as it gets closer to the homes and some modification of the blasting techniques may need to be made. However, and related to number 5 below, documentation with analysis, and any modifications should be done on a timely fashion, not after the fact.

6. A formal organized system should be set in place to document all damage complaints (this could/should be a citizens group). The system must have a very short turn-around; that is, the complaints should be immediately documented and plotted on a base map. The city engineer and the mine's general manager should be appraised of the information on a timely basis. It is probable that clusters of complaints will form in the future and it is possible that the mine could adjust the operations to be more compatible with mitigating the complaints. The complainant should be informed of any appraisals-action by the Engineering Department and of the mine; if nothing else a recognition and documentation that the complainant has been heard by the city and the mine. Known concern and a phone call could help contain the complaints.

Considering my experience to date, I would use a home owners committee in place of the city. The cities that I have worked with (7) all cities had a tendency to increase the bureaucracy, costs, and slow down the communications. They all seem to start off with good intentions but soon your problems are put on a back burner for more recent problems. A home-owner committee working with the mine can do much better. I could help set up the necessary operations which would be the least interference to the mine and the home owners lives. No one has time to mess with it day by day; but, proper documentation must be done----and it really would not cost much. My experience shows that the mine will usually fund the purchase of approximately 6-8 instruments--- some state law requires 2; then you get a good college student who will be around for about 2 years and I train him to operate the equipment and pick up the data and send it to me (could be his MS thesis). That takes care of the vibration monitoring. He should also document the water levels at several wells (once a week). Then the damage documentation: Start out with a base line inspection (video of the more critical homes---a few short tests will show those---This could be as few as 2 and as many as 30. The thirty home inspection is only in a very heavily populated area. Your area should not need more then 3-5. The base line homes should be reinspected once a year. Three base sites would be choose for the continuing vibration documentation "standard sites". Any complaints should be directed to a member of the owners committee. The major break down in communications is always between a complainant and some daily worker at the mine. A committee member will know the right person at the right place at the right time. Timing and documentation is vital for both the mine and the homeowners. I doubt if they could crack the aquatard--BUT, you need the vibration and the water level documentation for any chance of retribution. The documentation also helps eliminate the nuisance complaints for both sides. So- a. establish a owners committee b. establish political base--county, city, state, etc. c. meet with mine and get funds d. establish vibration "standard sites" e. establish base line home inspections f. monitor vibrations and well levels f. monitor salmon river migration with aquatic sampling devices.

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FIGURES

1. Location map showing homes, mine, vibration sites.
2. Seismograms event 6/9
3. Fourier spectrum event 6/9
4. Spectral ratios-Landslide event 6/17
5. Attenuation graph
6. Vibration amplification map
7. Seismograms event 6/10
8. Seismograms event 6/11
9. Seismograms event 6/14
10. Seismograms event 6/15
11. Seismograms event 6/16
12. Seismograms event 6/17-landslide area
13. Seismograms event 6/18
14. Fourier spectrum event 6/10
15. Fourier spectrum event 6/10
16. Fourier spectrum event 6/11
17. Fourier spectrum event 6/11
18. Fourier spectrum event 6/14
19. Fourier spectrum event 6/14
20. Fourier spectrum event 6/15
21. Fourier spectrum event 6/15
22. Fourier spectrum event 6/16
23. Fourier spectrum event 6/16
24. Fourier spectrum event 6/17
25. Fourier spectrum event 6/17
26. Fourier spectrum event 6/18
27. Fourier spectrum event 6/18
28. Map showing vibration locations on Gracemor landslide
29. Spectral ratios from the Gracemor landslide

TABLES

1. Scalings of seismigrams, spectrum, and derived amplification factors
2. Scalings from the Gracemor landslide data

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14310 NW McNamee Road
Portland, Oregon 97231



503 621 1000
{voice/message}
503 621 3390
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MEMO

dking@teleport.com
{Internet}

TO: McNamee Neighbors
CC: Ken King
FROM: David King The Phœbus Group
RE: Angell Bros. and Seismic Hazards

My uncle, Ken King, is a geophysicist who assesses the hazards of seismic activity. Since retiring from the US Geological Survey, Ken spends some of his time consulting for regional governments (where the results of his work are written into building codes) and companies who need an independent viewpoint on the seismic impact of their operations. In the remainder of his time, Ken works to protect historical structures by analyzing potential threats from vibrations of all kinds (e.g., earthquake, mining, railroad traffic, airplane traffic). He has worked with American Indian tribes in the southwest, for example, and is in the midst of examining California's adobe Missions.

I called Ken (who lives in Colorado) and reviewed the Angell Bros situation with him. In particular, I read to him from the 24 May 1992 correspondence included in Angell Bros Reconciliation Report from a Mr. Steve Harris of the Austin Powder Company. Harris's letter, addressed to Skip Anderson, claims that the blasting activity at the quarry is not problematic.

Harris makes two broad claims: First, that seismic measures of blasting at the quarry indicate levels of movement too small to affect damage. Second, Harris asserts, "In my opinion there are no wells that I am aware of close enough to be affected by the blasting operations."

Harris's 1992 opinion is based on the past operations of the quarry - leaving us with the same conundrum that Skip Anderson presented at our neighborhood meeting. Namely, ability of the quarry to be a good neighbor circa 1992 is simply not evidence that they can continue to do so. Common sense dictates that blasting a few hundred yards from Hwy 30 is very different than blasting a few hundred yards from McNamee Road.

FAX from The Phœbus Group

I asked Ken King to comment on these two categories of concern, and here's a synopsis of what he had to say.

Seismic levels

As the quarry expansion continues, the effect of blasting will change. It may remain at levels that do not damage our structures, and it may not. A lot depends on the underlying rock formations, and the size and location of the blasts set off by Angell Bros.

Ken suggested that mines and neighbors alike profit from an prior assessment of structure condition and a seismic monitoring program during the mine's operation. Here's how that works:

- Prior to the onset of Angell Bros expansion, neighbors may have an inspection made of their houses and other structures. Videotapes are taken, particularly of interior walls and foundations. This assessment provides a baseline against which cracks and other damage may be measured.
- Prior to the onset of Angell Bros expansion, three or four seismic instruments¹ are set into place. On a half-yearly basis, data are drawn from these instruments and examined by a qualified seismologist. These instruments time-stamp all seismic events and thus provide an audit trail of both blasting activity and any other seismic activity in the region.

Ken pointed out that monitoring protects both parties. For example, if we were to experience a significant earthquake in our region, then the instruments would document its local magnitude. Reports of cracks or other damage coinciding with this event would not be

1. When I was growing up, we visited Uncle Ken's seismographs, which were placed strategically near the San Andreas fault in central California. The seismograph was contained in a small housetrailer and cost tens of thousands of dollars. Data we recorded on film since computer memory as we now know it had not yet been invented.

Meanwhile, the same instrument today can be held in one hand and costs a few thousand dollars. The instrument can be left in place for months. When connected to a portable computer, information about the time, magnitude, and direction of seismic activity is moved to the computer for analysis.

the responsibility of the quarry.

In Ken's experience, 3 or 4 instruments are sufficient, although they must be placed thoughtfully. At ~\$4K / instrument, the cost of setting monitoring into place is in the neighborhood of \$20,000. The cost of a seismologist retrieving the data and analyzing it is \$2-5,000 per occurrence and varies with the complexity of what's been going on.

Wells and mines

Ken's view is that mines can and have caused problems for neighboring wells. It doesn't happen very often, but it certainly can happen and it can happen in the situation that we find ourselves in.

Here are a few terms that Ken suggested we learn:

- aquifer - the porous rock containing the water that our wells draw upon.
- aquitard - the non-porous rock the surrounds the aquifer like a container.
- pore pressure - the pressure developed within the aquifer that forces water into our wells.

In the process of blasting, it is possible for a mine to pop a hole in the aquitard. When this happens, the aquifer drains and pore pressure drops. Or, in plain English, the wells go dry.

According to Ken there are a few reports in the literature regarding problems with wells. Ken pointed me to Internet Web sites for the Seismological Society of America and the United States Geological Survey. I have inquiries posted to librarians and geologists regarding these articles.

What troubles me about the well issue is Mr. Harris's perspective, as expressed in his 24 May 1992 letter. Namely, he points out that the well at the Angell Bros quarry has not dropped nor shown any other effect of the blasting to date. If I understand how this problem works, then that's the last well we'd expect to have a problem. And, if the aquitard were damaged, then we would expect more water down there and less water up here - not less water down there as Mr. Harris

implies.

My Conclusion is

I think it is reasonable to ask the County to include seismological monitoring by an independent consultant as a part of the conditional use permit for Angell Bros. It is done in other mines that are near neighborhoods of people. In addition, I think that the county should ask Angell Bros to offer to our neighborhood an assessment of existing structures prior to the expansion of the mine. Once again, an independent consultant should be employed. Finally, I suggest that analyses on a six month basis be reported to the county and to the McNamee community directly.

Well-wise, I suspect that we have little choice but to wait and see. I think it is important that the County identify this risk as a possible hazard and ask Angell Bros to prepare a plan to be set into motion if such a problem occurs. My guess is that if Angell Bros blows the aquifer, then our neighborhood will need to import and distribute water with a system paid for by Angell Bros.

Finally, please note that monitoring is a neutral activity that may favor the neighbors or the quarry. For example, if we have a substantial earthquake that compromises an aquitard, then the seismic data will shelter the quarry from liability and we'll be passing the hat to build that water system ourselves.

As usual, questions and comments to David King, 621 1234.

Kind regards,

Memorandum in Opposition to Angell Brothers Appeal
In the Matter of CU6-96 and SEC18-96

The hearings officer did not misinterpret the Multnomah County Comprehensive Plan Zoning Ordinance and Sectional Zoning Maps completed during periodic review.

Background

As part of the periodic review process, Multnomah County limited residential development and prohibited expansion of the Angell Brothers site (see page 6 of the "Supplemental Director's Report to the Land Conservation and Development Commission." February 28, 1995.) Angell Brothers objected to LCDC's acceptance of Multnomah County's inventory of significant resources, claiming wildlife habitat and scenic views were not significant goal five resources. (Page one of "Supplemental Director's Report to the Land Conservation and Development Commission." February 28, 1995.) The director recommended mediation or accept the director's appointment of a hearings officer to resolve the matter.

Angell Brothers then met with the Friends of Forest Park, and a document called "Conservation Easement" resulted.

The "Conservation Easement" was not incorporated into and adopted by the County as a part of its comprehensive plan (West Hills Reconciliation Report). Angell Brothers insists that the mediated settlement negotiated between it and Friends of Forest Park is or has become the ordinance that governs the conditions to be used to regulate the expansion of the Angell Brothers quarry. It is Angell Brothers' primary argument for reversal of the Hearings Officer's opinion that the Conservation Easement is the ordinance as to the site specific requirements for expansion.

Angell Brothers takes great license in stating that the Reconciliation Report comprehensively adopts the Conservation Easement. Although the Conservation Easement references the Reconciliation Report and the Reconciliation Report also references the Conservation Easement, in neither document is there any language that requires or states that the Conservation Easement become part of the ordinance.

A: "Grant of Conservation Easement"

A review of the Conservation Easement document itself shows that in the recitals portion (Pages one and two) that Angell Brothers is participating in various proceedings to obtain "all necessary permits from agencies of local, state and federal governments to permit extraction...as described in the mine plan and reclamation plan...including a Multnomah County conditional use permit authorizing mining uses as stated in the mine plan" and including also "the adoption by Multnomah County of an ordinance that designates the property as a significant goal five aggregate resource site protected under the aggregate and mineral sites zone."

The conditions precedent to the easement going into effect are found at section 16, page 9 of the document. Section 16 provides that Angell Brothers will record the easement when all permits have been obtained and when all appeals, if any, shall have been resolved in favor of Angell Brothers "on all issues, or, if any issues are resolved against Angell Brothers, they have been resolved on such terms as permit Angell Brothers, in its reasonable discretion, to conclude that mining use as described in the mine plan have not become economically infeasible..."

The Conservation Easement is completely devoid of any language requiring as a condition precedent that it be adopted as the ordinance amending the comprehensive plan. ¹

¹ There are multiple problems with the Conservation Easement. Paragraph 16.1.2 leaves it in Angell Brothers' discretion to conclude that the mining uses allowed by the County have become economically infeasible as defined in paragraph 8.5.1 including "the inability to produce and transport off the property a certain minimum tonnage or the loss of more than two acres of mining area as described in the mine plan." In other words, the ability of Angell Brothers years hence to argue that mining has become economically infeasible negates the entire conservation easement. In a letter dated October 12, 1992 to the Multnomah County Planning Commission, Frank Parisi, the attorney for Angell Brothers, estimated that the Angell Brothers resource has a value of \$42 million, and that "if the current robust market continues, the mine could be played out in approximately 30 years." Paragraph 8.5.1 requires that Angell Brothers shall derive as "minimum tonnage" 108% of the prior years tonnage, starting with a base year of 1995 for 1,700,000 tons. In other words, the tonnage of each succeeding year will geometrically appreciate to be an astounding tonnage, even for a period of ten years let alone the thirty years that Angell Brothers apparently contemplates will be the life of the mine. In short, the conservation easement is, in great likelihood, not worth the paper that it is written on.

Section 9 of the Conservation Easement says that the grantee (Friends of Forest Park) may only assign the easement to certain designated assignees, including the State of Oregon, Multnomah County, the City of Portland Metro, or any park or recreation district, or other governmental agency upon the written consent of Angell Brothers, which will be granted only in Angell Brothers unfettered discretion. This language is hardly the language of a document intended to be embodied in the public law governing land use.

B: "The West Hills Reconciliation Report"

The West Hills Reconciliation Report does not adopt or otherwise incorporate the Conservation Easement.

Angell Brothers argues that the language in the introduction of the West Hills Reconciliation Report: "the results of that mediation process are presented as revisions to the reconciliation report in this attached document." proves that the Conservation Easement became the ordinance.

The result of the mediation process was that the expansion of the quarry was allowed. The terms of that expansion were not, except to the extent that the ordinance sets forth the broad policy strokes for the expansion, adopted by the West Hills Reconciliation Report. Nor does the Conservation Easement purport to incorporate the terms under which the expansion will be allowed. Rather, it sets forth the geographical area within which the expansion will be allowed.

Angell Brothers argues on page two of its appeal that the "program to achieve the goal incorporates the Conservation Easement. The Conservation Easement, in turn, incorporates the operating and reclamation plan." Angell Brothers concludes that the Reconciliation Report, together with the Conservation Easement and the Operating and Reclamation Plan are the County's program to achieve the goal. Both the Angell Brothers' assertions and conclusion are incorrect.

The Program to Achieve the Goal (found in the Reconciliation Report) is broken down into non-regulatory and regulatory portions. The strongest language in favor of Angell Brothers' argument under the non-regulatory portion of the Program to Achieve the Goal (VI-24, Conflict Resolution and Protection Program) reads as follows:

"Multnomah County accepts, encourages and will honor to the extent allowed by law, third party agreements to protect significant wildlife habitat through private sales, dedications, donations, easements, or other use restrictions."

The regulatory portion of the Program to Achieve the Goal found that page VI-25 of the Reconciliation Report provides as follows:

"Multnomah County shall require the Angell Brothers expanded quarry site to take the following measures as part of its operation and reclamation plan: (emphasis added)

- Minimization of the area mined at any given time;**
- Demonstration that reclaimed areas are capable of supporting forest vegetation;**
- Simultaneous reclamation along with mining to minimize non-vegetated areas;**
- Reclamation of the sites so as to best to enhance wildlife habitat values."**

Thus, it is clear that Multnomah County did not adopt and incorporate "whole cloth" the Conservation Easement and Angell Brothers mine plan and reclamation plan submitted on February 14, 1995. Rather, Multnomah County reserved certain requirements that it would impose upon "the Angell Brothers expanded quarry site."

The second prong of Angell Brothers' argument is that the Conservation Easement in turn incorporates Angell Brothers' operating and reclamation plan. This argument also is simply incorrect. Angell Brothers' Operating and Reclamation Plan was submitted in final form as the "Final Revision" in December of 1995. The Conservation Easement was executed by the parties on August 19 and August 22, 1995. Thus, the Angell Brothers' Operating and Reclamation Plan that Angell Brothers presents as its proposal as to how it should mine the quarry wasn't yet completely drafted when the Conservation Easement was executed. Nor does the Conservation Easement contemplate that any revision of the Operating and Reclamation Plan of February 1995, which is the only such plan mentioned in the Conservation Easement.

Further, the addition of a revision of the February 1995 Operating and Reclamation Plans, in December of 1995 clearly indicates that Angell Brothers does not consider its February 1995 Operating and Reclamation Plan to be the final document in that regard, although it claims that its Operating and Reclamation Plan is incorporated in the Conservation Easement. It is obvious, however, that the Conservation Easement mentions only a Mine and Reclamation Plan dated February 14, 1995.

C: The Hearings Officer did not misinterpret the amendments to the Zoning Code and Multnomah County Ordinance Numbers 804, 827, and 858.

Angell Brothers' arguments in this regard rest on its

original argument that the Conservation Easement and its Mining Plan, purportedly incorporated into the Conservation Easement, were adopted "whole cloth" by the County into the Reconciliation Report. Angell Brothers then argues that if there are any ambiguities arising as to which standard should govern, the Reconciliation Report or the Zoning Code, that the Reconciliation Report shall control. Angell Brothers does not then go on to describe areas where such ambiguity exist, or specifically what part of the Reconciliation Report controls on a particular issue.

Of course, the underlying problem is Angell Brothers' basic premise that the Conservation Easement and the Mining Plan of February 1995 is incorporated into the Reconciliation Report in its entirety.

The more fundamental problem is, however, that Angell Brothers misunderstands the function of the Reconciliation Report, which is that of a policy statement from which the specifics of the conditions for implementation of the expansion are developed in the conditional use process.

D: The Hearings Officer correctly decided that Multnomah County Code Section 11.15.7325 applied.

Angell Brothers does not dispute that the above referenced code section is the applicable section in deciding what conditions to apply to the Angell Brothers' expansion. Angell Brothers disagrees with the Hearings Officer's application of that section.

E: Access and Traffic

It appears that Angell Brothers tries to assert that language in the Reconciliation Report states that all traffic will not be considered a conflicting use with reference to the fact that the traffic on Highway 30 would not be considered a conflicting use. Angell Brothers studiously avoids the traffic problems on other roadways such as Newberry Road and McNamee Road.

The Hearing Officer's decision is not superseded by the decision of the County Engineer. The fact that they are parallel decisions rendered under separate legal avenues does not lead to the superseding of one over the other.

F: Regulation of Hours.

Angell Brothers again argues relying upon the contention that the Conservation Easement is incorporated in its entirety into the Reconciliation Report that the mine that needs to be mined as rapidly as possible. Angell Brothers' argument is that rapid mining will lead to rapid reclamation and long hours will

allow it to meet the "minimum tonnage" as set forth in the conservation easement.

Angell Brothers does not contend that MCC11.15.7325(c) restricted the Hearings Officer's ability to limit hours.

Assuming just for the purposes of argument, that the Conservation Easement was adopted in its entirety by the Reconciliation Report, the limitation of hours reasonably required by the Hearings Officer does not conclusively limit Angell Brothers' ability to mine the site rapidly. There is no evidence that it cannot achieve its minimum tonnage by hiring more workers and using more equipment. In other words, there is nothing that prohibits Angell Brothers from using its time allowed more efficiently.

G: North Angell Brothers' Creek Watershed.

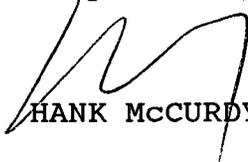
Angell Brothers argues that the tributary to the main stem of North Angell Brothers Creek is a "red herring." Angell Brothers argues that the tributary of North Angell Brothers Creek is not part of the watershed. Angell Brothers also argues that the significant matrix and stream profiles found at III-50 and III-106 to 108 show that the area to be protected is merely the riparian area of the main stem.

The Hearings Officer carefully analyzed, (pages ³⁵⁻³⁷~~10-12~~ of her opinion), the North Angell Brothers Creek issue and whether it included the tributary. Based on the clear language of paragraphs VI-16 and 17 and VI-23 of the Reconciliation Report, she concluded correctly that the tributary was included in the watershed.

CONCLUSION

At the very least, the Hearings Officer's decision should be upheld. If Angell Brothers is dissatisfied with the Hearings Officer's decision based upon the Reconciliation Report, its remedy is an amendment of that ordinance.

Respectfully submitted,


HANK McCURDY

11/27/96
CHRIS WRENCH
SUBMITTAL

November 27, 1996

Testimony before the Multnomah County Commission

Re: CU 6 - 96/SEC 18/96 Angell Bros. Quarry Appeal

By: Chris Wrench
3103 NW Wilson St.
Portland, Oregon 97210
phone 227-4671

Dear Commissioners:

I am speaking as an individual, not as a member of an organization. I urge you to uphold the Hearings Officer's decision here. It takes a brave person to attempt to enforce the County Code and existing agreements on a gravel quarry and she deserves your defense. Angell Bros. Quarry is breaking their word and she is trying to hold them to it! They're trying to confuse you. Better believe her, not them.

The gravel industry is essentially out of control. My daughter and son-in-law just sued DOGAMI in Marian County Circuit Court to get it to apply basic and long-standing State regulations, not some little picky one, on the gravel pit next to their house. The Court made DOGAMI enforce its regulations. Nothing had before. But both of them are attorneys, and besides their own time and expertise, they've spent \$30,000 so far trying to make that quarry obey the law. Hey, our society isn't supposed to work like that! The same quarry is planning an expansion which the Oregon Department of Water Resources says will destroy an aquifer serving 100 wells, and nobody has yet figured out how to stop this, even though one of the people that will lose their water is an Asst. State Attorney General. The County Commissioners have approved it: "We need cheap gravel for the roads."

Somebody has to keep these people from making a mockery of our system of government. Can only the Courts restrain them? You're going to have a ring-side seat to see a case of it if you grant this appeal. A LUBA appeal is certain. DLCD is helpless to control them. The Republican Party Platform contains, as you know, a pledge to kill State land use planning, and due to the fact that the gravel industry actually wants the State to be able to override local land use law, the industry makes this into a win-win situation for itself by the simple expedient of defending DLCD in exchange for getting what it wants. It was impossible for the State to avoid this trap.

I'm a member of the Friends of Forest Park Board -- I'm not going to stand here under false pretences -- but remember I stated at the outset that I was speaking as an individual. Friends of Forest Park sent you a letter

supporting the quarry's appeal. You know this is a small, non-profit organization that can't afford the lawsuit it's threatened with and it's hog-tied by the mediation settlement. Angell Bros. is violating that mediated agreement with the most utter ruthlessness and Friends of Forest Park can't fight because its ass is in a sling. Look at the quarry's new extraction plan. Compare it to the old one on the schedule of reclamation. Their new plan puts reclamation off until mining is finished perhaps in a century. So why such a fulsome letter of support from Friends of Forest Park? You must understand that we had no option but to write this.

This industry just plain evades controls. Angell Bros. says DOGAMI makes them do this or that -- anybody who knows DOGAMI falls about laughing at this. I beg you to send a firm signal that Multnomah County, at least, intends to set some limits and make them stick. Uphold your Hearings Officer's decision.

November 26, 1996

Seth Tane
13700 NW Newberry rd..
Portland, OR., 97231

To: Multnomah Board of County Commissioners

Beverly Stein, Chair
Dan Saltzman
Gary Hansen
Tanya Collier
Sharron Kelley

11/27/96
SETH TANE
SUBMITTAL

Re: CU 6-96, SEC 18-96, Angell Bros. Inc. Expansion

Dear Commissioners,

I am testifying in opposition to the applicant's appeal of the Hearing Officer's Decision in this matter.

We are at a crucial juncture in the complex and drawn out process by which you, as our elected representatives, have undertaken to act in the public interest to balance all of the protected resources, and uphold the Comprehensive Plan while considering the applicant's request to more than double the size of the Angell Bros. Inc. quarry.

A truly impartial Hearings Officer, unfamiliar with any of the charged political background, and from outside the area, rendered a carefully reasoned, extensively cited, **approval** of the quarry operator's permit applications. Extensive documentation supports a far more rigorous set of conditions that should have been required in light of Angell Bros. Inc. poor record of acting in good faith. The Hearings Officer dedicated a tremendous amount of work into her decision, and it stands up very well to the applicant's desperate attempts to grab for still more, by invoking the threat even at this early stage, of abrogating the entire agreement by way of the termination clause inserted into the Grant of Conservation Easement offered after "gun at the head" style secret mediation.

Mr. Parisi rants on indignantly about an outdated version of the many that his client has offered that I used to *illustrate* the lack of congruence amongst the mumbo jumbo of the various "phases", "blocks", "Preserves", "Easement", and "scenic buffer" shown on the maps provided by the applicant in the "Mine Plan" and the Grant of Conservation Easement. I challenge the applicant to unequivocally provide any final set of mine phase plans and protected areas for the entire proposed project and property both in map form and on the ground to modern surveying standards. To date the applicant has stated that no plan is available for the mining and reclamation of the final phases. I further challenge the applicant to reply to the photographic evidence that appears to show "over the line" current operations.

We can not trust the applicant to live up to the spirit of mediation, when he has already logged extensively, cut an enormous road across a tributary drainage to the North Angell Bros. Creek at its confluence, diverted it to the already inadequate storm water treatment system that "handles" Middle Angell Bros. Creek flows and scalped a large equipment storage lot in the area labeled "dense trees" in the "Scenic Buffer" of figure 7 in the Mine Plan.

Some Scenic Buffer !

The issue of Traffic deserves a late breaking footnote and some observations:

Recently the Multnomah County Engineer and Portland Department of Transportation agreed with local residents in their clamor for relief from the gravel trucks roaring past their houses and threatening their safety, and closed Newberry and MacNamee Rd. to through heavy truck traffic. They had promised to include Germantown in the closure but have since at first stalled, and now agreed again to close the road. This state of affairs is not guaranteed or permanent, and reports have come in this past week that impossibly steep and curvy Logi Trail, and Germantown road, have begun to see gravel truck traffic after the closure. If there are no traffic criteria other than those regarding the actual entrance on Highway 30, rest assured that Angell Bros. will find some way to remove the prohibitions, or use some minor later change to nullify the Grant of Conservation Easement, our only "protection".

The issue of the North Angell Bros. Creek watershed is an example of the kind of duplicity we have come to expect. Watershed is what was defined in the Reconciliation Report, the West Hills Rural Area Plan, and incorporated into the Comprehensive Plan. Watershed is plainly what was intended, not some shifting distance from a truncated portion of the main stem that is now also at risk from the applicant's "non extraction" related activities, that he promises to be "careful" with. The reports made by the Planning Director / designee after the required quarterly inspections will be interesting indeed.

The applicant's assertions that the law exists only to insure the mining industry's unfettered prospering is absurd. Mr. Parisi *wishes* that his curious mix of selective excerpts from private conversations with John Sherman and promises of future final plans for some new model of reclamation and mine phasing plans are superior to all state and local law and statute that might interfere with aggregate extraction.

The long and short of the story is this: Your decision will be appealed to LUBA by the applicant, ***no matter how you rule !*** There is no longer a need to fear LCDC or DLCD. The close scrutiny that your decision receives will be by a fresh, new LUBA, that has no past history of involvement with this case, and is not subject to any form of pressure from LCDC, DLCD, the aggregate industry, or anyone else. LUBA will uphold the Hearing Officer's Decision if the applicant can offer nothing better than his grounds for reversal before you now. The Hearings Officer's Decision actually anticipates many of Mr. Parisi's arguments, and is the best rebuttal of many of his points.

The sad truth is that this is an insatiably greedy industry. By his own testimony Mr. Anderson has no idea when he would need to expand beyond the current permitted reserves of rock. The underlying rationale for this expansion **was** a more efficient sequence that would permit more rapid, top down reclamation and minimize conflicts with wildlife habitat and other resources. He has now cast aside this cloak for a vague promise of something better (just you wait !) instead. Without the minimal protections afforded by the Hearing Officer's Decision, and adherence to *all* of the original agreement, we might just as well forget the balanced protection of all of our resources in the rural West Hills of Multnomah County, and see what else Mr. Anderson figures he is entitled to...

Respectfully,



Seth Tane

**METRO**11/27/96
JANE HART
SUBMITTAL

November 26, 1996

Metro Regional Parks and Greenspaces Department
600 NE Grand Avenue
Portland, OR 97232-2736Multnomah County Board of Commissioners
c/o Land Use Planning and Transportation Department
Portland, OR 97214Re: Land Use Case File CU 6-96 SEC 18-96, Angell Bros. Appeal of the Hearings Officer's Conditions of Approval. **Testimony in Support of the Hearings Officer Decision.** Appeal Hearing Date: November 27, 1996, 9:30 am.

Testimony to the Commissioners:

On behalf of the Metro Regional Parks and Greenspaces Department we would like to thank you for the opportunity to present this testimony on Case file CU-6-96, SEC 18-96, for the Conditional Use approval process for mineral extraction at the Angell Brothers Quarry in the West Hills.

I am here today to urge you to uphold both the West Hills Reconciliation Report which you have previously approved and the Hearings Officer's Decision regarding protection of the North Angell Brothers Creek Watershed and other lands that are the subject to a conservation easement between Angell Brothers, Linnton Rock Corporation and the Friends of Forest Park.

Metro has a strong interest in resolution of this issue before you today for the following reasons:

- a. In the future, Metro will be the recipient of the Angell Brothers Conservation Easement. The program to achieve protection of these lands, including the North Angell Brothers Creek watershed is described in the adopted Reconciliation Report in Chapter VI (Reconciliation), C (Resource Protection), 3 (Angell Bros. Aggregate), e (Program to Achieve the Goal) pg. VI-22 and VI-23.
- b. Burlington Bottom wetlands, the downstream receiving waters of the North Angell Brothers Creek, have been designated a natural area of regional significance by both the Metropolitan Greenspaces Master Plan (adopted by Metro Council in 1992),

and the Forest Park Acquisition Refinement Plan (adopted by Metro Council in February 1996).

c. The Forest Park Refinement Plan identifies targeted properties for potential acquisition with open space bond monies. There were several reasons why the refinement plan did not identify the Angell Brothers Quarry as part of the target area for acquisitions. For instance:

- As I mentioned earlier, Metro expects to receive the Angell Brothers Conservation Easement negotiated by Friends of Forest Park. The refinement plan purposely did not identify the same area for acquisition because Metro was led to believe that it's protection had been addressed through the conservation easement and the related language in the West Hills Reconciliation Report referenced earlier in this testimony.
- Angell Brothers Quarry is flanked by three other natural areas of regional significance including Forest Park to the South, the Tualatin Mountains and the Ancient Forest Preserve to the north, and Burlington Bottom and Multnomah Channel to the east. A refinement plan objective is to better connect the wildlife corridor and access for people from Forest Park north to the Ancient Forest and on towards the coast. Metro recently purchased with public tax dollars about 300 acres of land directly south of the Quarry and is looking at lands north of the Quarry to meet the connectivity objective. Another refinement plan objective is to maintain water quality of the Burlington Bottom Wetlands. Keeping mining activities out of the N. Angell Brothers Creek watershed supports that objective.

In closing, Metro supports your previous adoption of the West Hills Reconciliation Report and we support the findings and conclusions of the Hearings Officer's report.

11/27/96
FRANK SCHNITZER
SUBMITTAL

Best Management Practices for Reclaiming Surface Mines in Washington and Oregon



by David K. Norman,
Peter J. Wampler,
Allen H. Throop,
E. Frank Schnitzer,
and Jaretta M. Roloff

WASHINGTON
DIVISION OF GEOLOGY
AND EARTH RESOURCES

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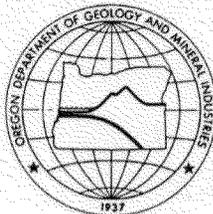
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January 1996

OREGON DEPARTMENT OF
GEOLOGY AND MINERAL INDUSTRIES

Donald A. Hull - State Geologist



WASHINGTON STATE DEPARTMENT OF
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Jennifer M. Belcher - Commissioner of Public Lands
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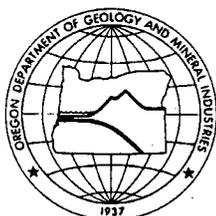
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WASHINGTON DEPARTMENT OF NATURAL RESOURCES

Jennifer M. Belcher—*Commissioner of Public Lands*
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Front Cover: A reclaimed quarry in mountainous terrain. Naturally hazardous conditions (cliffs) are present in the immediate area. Chutes, spurs, scree slopes, and soil on the scree have created a natural appearance. Trees now grow on the slope where soil is located and complete the reclamation. The site will be used for forestry in the future. Note the person midslope for scale. Photo by M. A. Shawver.



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Contents

CHAPTER 1. MAPS AS MANAGEMENT TOOLS

- 1.1 INTRODUCTION**
- 1.1 TYPES OF MAPS**
- 1.1 MAP SIZES**
- 1.2 BASIC ELEMENTS**
 - 1.2 Map scale**
 - 1.2 Graphic scales**
 - 1.2 North arrow**
 - 1.2 Explanation block**
 - 1.2 Title block**
- 1.3 TOPOGRAPHIC CONTOURS**
- 1.3 BOUNDARIES**
 - 1.3 Permit area boundary**
 - 1.3 Mining boundaries**
 - 1. Boundaries of cities and counties**
 - 1.3 Property lines**
- 1.4 OTHER COMMON MAP ELEMENTS**
 - 1.4 Existing watercourses, ponds, and wetlands**
 - 1.4 Processing plant**
 - 1.4 Haul roads**
 - 1.4 Soil and overburden stockpiles**
 - 1.4 Product stockpiles and waste-rock dumps**
 - 1.4 Interim watercourses and ponds**
- 1.5 Typical cross sections**
- 1.5 SITE ACCESS MAP**
- 1.6 PRE-MINING TOPOGRAPHIC MAP**
- 1.7 RECLAMATION SEQUENCE MAP**
- 1.9 FINAL RECLAMATION MAP**
- 1.9 GEOLOGIC MAP**
- 1.10 MAP UPDATES**
- 1.10 REFERENCE**

FIGURES

- 1.5 Figure 1.1. Site access map.**
- 1.6 Figure 1.2. Pre-mining topographic map.**
- 1.7 Figure 1.3. Reclamation sequence map.**
- 1.8 Figure 1.4. Final reclamation map.**
- 1.8 Figure 1.5. Cross sections for the final reclamation plan.**

CHAPTER 2. STORM-WATER AND EROSION CONTROL

- 2.1 INTRODUCTION**
- 2.1 MAINTENANCE AND EMPLOYEE INVOLVEMENT**
- 2.2 EROSION**
- 2.2 STORM-WATER REGULATION**
- 2.3 TURBIDITY AND SUSPENDED SEDIMENT**
- 2.3 Turbidity**
- 2.3 Suspended sediment**
- 2.4 EROSION CONTROL**
- 2.4 Controlling raindrop erosion**
- 2.4 Controlling surface runoff**
- 2.5 STORM-WATER DIVERSION**
- 2.6 PASSIVE STORM-WATER CONTROL**
- 2.9 SEDIMENT CONTROL ON THE MINE SITE**
- 2.11 STORM-WATER AND EROSION-CONTROL STRUCTURES**
- 2.12 Conveyance channels and ditches**
- 2.12 Slash windrows and brush sediment barriers**
- 2.13 Straw bales**
- 2.14 Bio bags**
- 2.15 Silt fences**
- 2.15 Erosion-control blankets**
- 2.16 Vegetation**
- 2.17 Contour and diversion ditches**
- 2.18 Rock and log check dams**
- 2.19 Sediment/silt ponds**
- 2.19 Filter berm**
- 2.19 Trench subdrains and French drains**
- 2.20 Infiltration galleries and dry wells**
- 2.21 STORM-WATER SETTLING PONDS**
- 2.22 Configuration, location, and size**
- 2.23 Maintenance**
- 2.23 Drainage**
- 2.24 STORM-WATER TREATMENT**
- 2.24 Land application**
- 2.25 Flocculants**
- 2.26 Water clarifiers**
- 2.26 STREAM BUFFERS**
- 2.27 STREAM DIVERSION**
- 2.27 Perennial or permanent streams**
- 2.27 Intermittent or ephemeral streams**
- 2.28 REFERENCES CITED**

FIGURES

- 2.2 Figure 2.1. Diagram showing factors that affect the rate of erosion.**
- 2.3 Figure 2.2. Diagrammatic sketch showing the topography created by different types of erosion.**
- 2.5 Figure 2.3. Diagram of small, discontinuous terraces, berms, and furrows that can effectively slow runoff and decrease sediment transport.**

- 2.5 Figure 2.4. Diagram showing benching and terracing of unconsolidated material to control runoff.
- 2.6 Figure 2.5. Diagram showing diversion of streams and overland flow around the mining site.
- 2.6 Figure 2.6. Diagrams showing berms and ditches diverting runoff to a collection sump.
- 2.7 Figure 2.7. Diagrammatic sketch of a water bar or cross-ditch
- 2.9 Figure 2.8. Profiles of elevated haul roads with drainage ditches on the sides.
- 2.8 Figure 2.9. Sketch of a slope that allows water to drain toward the highwall.
- 2.11 Figure 2.10. Map and cross section of storm-water control at an upland processing area.
- 2.11 Figure 2.11. Map of a storm-water control system at a quarry site.
- 2.12 Figure 2.12. Diagram of a rock-lined diversion ditch.
- 2.13 Figure 2.13. Diagram of a slash windrow filter.
- 2.13 Figure 2.14. Diagrammatic sketch of a brush sediment-barrier.
- 2.13 Figure 2.15. Diagrammatic sketch of a straw-bale sediment barrier.
- 2.14 Figure 2.16. Diagrammatic sketch of a straw-bale barrier with a gravel check dam.
- 2.15 Figure 2.17. Diagram of a filter-fabric silt fence.
- 2.16 Figure 2.18. Diagrammatic sketch showing erosion blanket installation.
- 2.16 Figure 2.19. Diagrammatic sketch showing the effect of vegetation on storm-water runoff.
- 2.17 Figure 2.20. Diagram of contour ditches.
- 2.17 Figure 2.21. Diagram of a diversion ditch upslope from an overburden pile.
- 2.18 Figure 2.22. Diagram of a rock check dam.
- 2.18 Figure 2.23. Diagram of a log check dam.
- 2.19 Figure 2.24. Idealized filter-berm cross section.
- 2.19 Figure 2.25. Diagram of a trench subdrain.
- 2.20 Figure 2.26. Diagram of an infiltration gallery.
- 2.22 Figure 2.27. Diagram of settling pond construction.
- 2.22 Figure 2.28. Diagram of of retention pond design.
- 2.24 Figure 2.29. Diagrammatic sketch of a standpipe with an antiseep collar set through a berm.
- 2.25 Figure 2.30. Diagram of a land application system for storm water.

CHAPTER 3. OPERATION AND RECLAMATION STRATEGIES

- 3.1 INTRODUCTION**
- 3.1 POST-MINING RECLAMATION**
- 3.1 INTERIM RECLAMATION**
- 3.2 CONCURRENT OR PROGRESSIVE RECLAMATION**
- 3.3 SEGMENTAL RECLAMATION**
- 3.4 MINING TO RECLAIM**
- 3.4 SITE PREPARATION**
 - 3.4 Permit and disturbed area boundaries**
 - 3.4 Permanent setbacks or buffers**
 - 3.5 Reclamation setbacks**
 - 3.5 Setbacks to protect streams and flood plains**
 - 3.6 Conservation setbacks**
 - 3.6 Topsoil and overburden storage areas**
- 3.7 VISUAL AND NOISE SCREENS**
 - 3.7 How noisy is it?**
 - 3.9 Noise-control methods**
 - 3.9 Visual screens**
- 3.9 REMOVING VEGETATION**
 - 3.9 Disposing of vegetation**
 - 3.9 Transplanting vegetation**
 - 3.9 Using vegetation for habitat**
- 3.10 THE SOIL RESOURCE**
 - 3.10 Soil development**
 - 3.12 Soil fertility**
 - 3.12 Soil types**
 - 3.12 Soil inventories**
- 3.13 REMOVING AND STORING TOPSOIL AND SUBSOILS**
 - 3.13 Live topsoiling**
 - 3.13 Stripping and salvage**
 - 3.14 Constructing storage piles**
- 3.15 WASTE AND OVERBURDEN DUMPS AND STOCKPILES**
 - 3.15 Site selection**
 - 3.15 Site preparation**
 - 3.16 Dump and stockpile construction**
- 3.17 DUST CONTROL**
 - 3.17 Controlling dust with water**
 - 3.17 Controlling dust with chemicals**
- 3.17 REFERENCES**

FIGURES

- 3.1 Figure 3.1. Diagram of a mine site showing center-outward excavation**
- 3.2 Figure 3.2. Diagrammatic sketch showing concurrent and progressive extraction and reclamation of a shallow dry pit.**
- 3.3 Figure 3.3. Diagram of a segmental reclamation plan with four segments showing segment size and direction of working.**
- 3.5 Figure 3.4. Sketch showing buffer strips of native vegetation.**

- 3.6 Figure 3.5. Map showing visual and noise screening at a quarry site.
- 3.7 Figure 3.6. Map showing visual and noise screening at a processing area.
- 3.8 Figure 3.7. Graph of noise levels and human response for some common noise sources.
- 3.10 Figure 3.8. Diagrammatic sketch of soil profile development over time.
- 3.11 Figure 3.9. Diagrammatic sketch of the residual soil profile that develops over time on a bedrock surface.
- 3.14 Figure 3.10. Diagram of topsoil handling in a four-segment mine.
- 3.16 Figure 3.11. Diagram of proper procedure for waste-dump construction.

TABLE

- 3.8 Table 3.1. Summary of noise measurements and projected noise levels in decibels.

CHAPTER 4. RESTORING LANDFORMS

- 4.1 INTRODUCTION**
- 4.1 SUBSEQUENT USE**
- 4.2 SLOPE TYPES**
- 4.2 CREATING SLOPES**
- 4.4 REGRADING**
- 4.5 REPLACING TOPSOIL AND SUBSOIL**
- 4.6 AMENDING OR MANUFACTURING SOIL**
 - 4.6 Adding organic matter**
 - 4.6 Improving moisture-holding capacity**
 - 4.6 Improving drainage**
 - 4.7 Using fertilizers**
- 4.8 RESTORING DRAINAGE**
- 4.8 CREATING PONDS FOR WILDLIFE**
 - 4.8 In-water slopes**
 - 4.10 Special problems near rivers**
- 4.11 BUILDING HABITAT**
 - 4.11 Islands**
 - 4.12 Structures that enhance habitat**
 - 4.13 Off-channel ponds for salmon**
 - 4.14 Outlet channels**
- 4.14 FORMING WETLANDS**
 - 4.14 Soils**
 - 4.15 Hydrology**
 - 4.15 Vegetation**
- 4.15 REFERENCES**

FIGURES

- 4.1 Figure 4.1. Diagrammatic sketch showing how the steepness of the final slope influences the intensity of proposed land use.**
- 4.2 Figure 4.2. Profile and plan view of common slope types.**
- 4.3 Figure 4.3. Sketch showing how to blend mine slopes with pre-existing terrain.**
- 4.3 Figure 4.4. Diagram showing common slope ratios.**
- 4.4 Figure 4.5. Sketch showing dozer tracking to reduce runoff.**
- 4.8 Figure 4.6. Plan views of pond shorelines.**
- 4.9 Figure 4.7. Plan view and cross section of a well-designed irregular wetland.**
- 4.9 Figure 4.8. Diagrammatic sketch showing how slope variations affect habitat.**
- 4.10 Figure 4.9. Diagrammatic sketches showing how islands can be developed in an undrained pit.**
- 4.11 Figure 4.10. Plan view and cross section of a reclaimed gravel pit.**
- 4.11 Figure 4.11. Plan view and cross section of horseshoe island construction.**
- 4.12 Figure 4.12. Sketch of a submerged tree crown, anchored top and bottom.**
- 4.13 Figure 4.13. Sketch of a submerged crib structure that provides habitat.**
- 4.12 Figure 4.14. Sketch of rock piles that provide homes for small mammals.**
- 4.13 Figure 4.15. Sketch of typical nesting boxes.**
- 4.13 Figure 4.16. Sketch of a snag left as a nesting site for cavity-dwelling birds.**

TABLE

- 4.7 Table 4.1. Nitrogen and carbon content of common organic soil amendments.**

CHAPTER 5. RECLAMATION TECHNIQUES FOR QUARRIES

- 5.1 HIGHWALL AND BENCH RECLAMATION**
- 5.2 RECLAMATION BLASTING**
 - 5.2 Highwalls**
 - 5.3 Benches**
- 5.3 MINIMIZING OFFSITE IMPACTS**
 - 5.3 Causes of damage**
 - 5.4 Vibration effects under various conditions**
 - 5.4 Pre-blast survey**
 - 5.4 Use and placement of vibration-measuring equipment**
 - 5.5 Blasting plans and logs**
- 5.5 BACKFILLING**
 - 5.5 Fill materials**
 - 5.6 Fill slopes**
- 5.6 DRAINING PIT FLOORS**
 - 5.6 Blasting**
 - 5.7 Ripping**
- 5.7 REFERENCES**

FIGURES

- 5.2 Figure 5.1. Diagram showing reclamation blasting to create scree slopes.**
- 5.2 Figure 5.2. Sketch showing proper blasting of highwalls to leave rough surfaces that can provide nesting and perching habitat for birds.**
- 5.3 Figure 5.3. Diagram showing conceptual blasting patterns for obliterating quarry benches.**
- 5.4 Figure 5.4. Diagram showing topsoil placed on benches and on a fractured quarry floor to prepare a site for revegetation.**
- 5.5 Figure 5.5. Diagram showing quarry slopes that are backfilled and compacted so that the final slope is stable.**
- 5.6 Figure 5.6. Sketch of ripping or decompaction of pit floors with rippers mounted on heavy equipment.**

CHAPTER 6. LANDSLIDES AND SLOPE FAILURES

6.1 TYPES OF SLOPE FAILURES

6.1 Rockfalls

6.1 Slides

6.2 Earthflows

6.2 Slumps

6.2 Soil creep

6.2 Raveling

6.2 ANATOMY OF A LANDSLIDE

6.3 IDENTIFYING UNSTABLE SLOPE CONDITIONS

6.3 Tension cracks

6.4 Hummocky ground

6.4 Displaced and distorted trees

6.4 Springs and seeps

6.4 Scarps

6.5 Toe bulge

6.5 SURFACE DRAINAGE CONTROL IN UNSTABLE AREAS

6.6 SLOPE STABILIZATION

6.7 SLOPE FAILURES ABOVE THE MINE

6.7 REFERENCES

FIGURES

6.1 Figure 6.1. Diagrammatic sketch of a rockfall.

6.2 Figure 6.2. Diagrammatic sketch of a complex slide called a slump-earthflow.

6.3 Figure 6.3. Diagrammatic sketch of soil creep.

6.4 Figure 6.4. Diagram of structural features of slumps and the effect of cutting and filling on the stability of short slopes.

6.5 Figure 6.5. Diagram of forces acting on slide masses and large stockpiles.

6.6 Figure 6.6. Diagram of toe, blanket, and chimney drains.

CHAPTER 7. REVEGETATION

- 7.1 INTRODUCTION**
- 7.2 SPECIAL PROBLEMS AT MINE SITES**
- 7.3 SUCCESSFUL REVEGETATION STRATEGIES**
- 7.4 CLASSES OF VEGETATION**
 - 7.4 Grasses**
 - 7.4 Forbs and shrubs**
 - 7.4 Trees**
- 7.4 SELECTING PLANTS FOR A SITE**
 - 7.5 Grasses and legumes**
 - 7.5 Forbs and shrubs**
 - 7.6 Trees**
- 7.6 SOWING SEEDS**
 - 7.6 Seed drills**
 - 7.6 Broadcast seeding**
 - 7.6 Hydroseeding**
 - 7.7 Seedbed preparation**
 - 7.7 Mulching**
- 7.9 TRANSPLANTING**
 - 7.7 Planting times**
 - 7.9 Planting techniques**
 - 7.9 Tools required**
- 7.10 PROPAGATING FROM CUTTINGS**
 - 7.11 Determining cutting length**
 - 7.11 Collecting cuttings**
 - 7.11 Storing cuttings**
 - 7.11 Planting cuttings**
- 7.12 BIOTECHNICAL STABILIZATION**
 - 7.12 Brush layering**
 - 7.13 Contour wattling**
- 7.14 RIPARIAN AND WETLAND AREAS**
 - 7.14 Ecological functions**
 - 7.15 Plant selection**
- 7.15 AGRICULTURAL AND FORESTRY SUBSEQUENT USES**
 - 7.15 Topsoil**
 - 7.16 Factors to consider**
- 7.16 REFERENCES**

FIGURES

- 7.1 Figure 7.1. Diagrammatic sketch of sequence from pioneer to climax vegetation.**
- 7.7 Figure 7.2. Cross section of seed germination.**
- 7.8 Figure 7.3. Diagram of the steps in transplanting bareroot or container plants.**
- 7.9 Figure 7.4. Diagram of transplanted seedlings on a slope.**
- 7.10 Figure 7.5. Diagram of steps in propagation by cuttings.**
- 7.12 Figure 7.6. Diagram of brush layering in trenches.**
- 7.13 Figure 7.7. Diagram of brush layering of live plant materials on fill.**
- 7.14 Figure 7.8. Diagram of wattle construction and placement.**

TABLES

- 7.17 Table 7.1. A partial listing of appropriate native plants suitable for erosion control and slope stabilization.**
- 7.20 Table 7.2. Plant selection guide for legumes, except for lupines—Species characteristics, adaptations, and seeding rates.**
- 7.21 Table 7.3. Plant selection guide for lupines—Species characteristics, adaptations, and seeding rates.**
- 7.22 Table 7.4. Plants for special-use situations.**

Preface

The term *best management practices* (BMPs) has generally been used to describe mechanical means of minimizing or eliminating water-quality problems. The BMPs presented here, however, apply as well to reclamation, planning, and specific methodologies to promote an integrated approach to mining. The techniques and guidance provided in this manual should not be construed as rules or laws, but merely the most effective and economical reclamation and mining practices known to Oregon Department of Geology and Mineral Industries (DOGAMI) and the Washington Department of Natural Resources (DNR) at the present time.

This manual provides information about planning the mine from start-up to final reclamation, incorporating water and erosion control during operation and reclamation, soil salvage and replacement, land shaping, and revegetation.

This manual was compiled and written by DOGAMI and DNR to provide technical information and guidance to landowners, land-use planners, and mine operators. We urge miners to use this manual as a resource in developing an environmentally and financially sound mine. However, while this manual is a broad overview of mine reclamation and development and other BMPs, it is not a comprehensive document, nor should it necessarily be considered the final word. Mining and reclamation will continue to evolve and improve. Locking in on technique or even just one BMP can be dangerous. Miners should consider the range of BMPs discussed here before selecting one to the exclusion of others.

Reclamation of mines, especially large mines, is a complex multidisciplinary undertaking and goes far beyond this document. Trained professionals such as agronomists, biologists, engineers, geologists, hydrogeologists, landscape architects, planners, and soil scientists can be helpful in planning and completing a mining project.

Implementation of BMPs is in everyone's best interest. For mine operators, using BMPs can result in more efficient and profitable mining. For society, BMPs can mean cleaner, more usable, and aesthetically pleasing lands. Effective reclamation as the final BMP at a site can reduce water pollution and loss of topsoil, provide fish and wildlife habitat, and allow timber production, agriculture, and other uses to be re-established.

Funding This project was partially funded by U.S. Environmental Protection Agency grant X000798-01-0 as means of transferring technical information regarding mine regulation and environmental issues. The original grant was an agreement between Idaho, Oregon, and Washington in 1993 and has been referred to as the Tri-State agreement for mining. BMPs for mining already exist in Idaho and helped pro-

vide the impetus for Oregon and Washington to generate this BMP guidance.

Future Work

This preliminary Best Management Practices manual, which is being published as Open File Report 96-2, should be considered a document in progress. We would appreciate any comments, particularly on places where we have given too much or too little information. Comments should be directed to the authors.

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1 Maps as Management Tools

INTRODUCTION

Preparing accurate maps of the mining property and its surroundings is a key step in developing a surface mining operation. Maps allow geographic information to be summarized in a compact form. Their primary purpose is to describe geographic features and the spatial relations of these features. Maps benefit the operator by clearly defining the area in which mining is permitted, and they assist in long-range planning for both efficient use of the mine resource and timely reclamation.

TYPES OF MAPS

Surface mining regulations in both Washington and Oregon require that maps be submitted before mining permits are issued. To meet regulatory requirements, maps must provide sufficient detail to characterize the site. Types of maps that may be required for permit applications are:

- *A site access map* showing the regional setting of the site and how to get there from the nearest town.
- *A pre-mining topographic map* establishing the location and setting of the mine site as it exists before mining.
- *A geologic map* giving a detailed description of the geologic setting and the type of deposit to be mined (required only if specifically requested).
- *A reclamation sequence map* showing the borders and sequence of segments to be mined and reclaimed, including the directions in which soils will be moved during salvage and replacement, and the location of storage areas and other mine-related features.
- *A final reclamation map* and at least two intersecting cross sections showing the mine site as it will appear after reclamation and revegetation.
- *A revegetation map* showing the location and types of plants used for revegetation. (This may be combined with the final reclamation map if the information will not obscure contours.)

MAP SIZES

The map size preferred for review is 11 x 17 inches, which is easy to photocopy and store. If maps are small, they may be grouped together on a single sheet of paper. If the maps submitted are larger than 11 x 17 inches or if they are in color, seven or more copies must be provided. The copies will be forwarded to other reviewing agencies.

Because the 11 x 17 size is generally not practical for internal working purposes, draft and working copies may be larger. For example, some larger mines may require a scale of 1" = 200' or 1" = 400' and thus large sheets. Draft and working copies may be reduced on a photocopier for submission.

BASIC ELEMENTS

Basic elements required on every map are the:

- map scale, both written out as a ratio and shown graphically as a bar or rake scale
- north arrow
- explanation block or legend
- title block

Map Scale

Every map, regardless of the size of the site, should include a scale that indicates the relationship between the size of features on the map and the size of the same features on the ground. Most scales are represented by stating that 1 inch on the map represents a certain number of inches, feet, or miles on the ground. For example, 1" = 200' means that 1 inch on the map represents 200 feet on the ground.

The scale that best represents a site will depend on the detail required and the size of the site, and the level of detail depends on the size and complexity of the mine. A map of a 50-acre rock quarry near a stream will normally require greater detail than a map of a 5-acre upland gravel extraction site. For some proposals, it may be acceptable to give only an approximate scale.

<u>Site size</u>	<u>Suggested Map scale</u>
3-6 acres	not less than 1" = 50'
10-20 acres	not less than 1" = 100'
20-80 acres	not less than 1" = 200'
>80 acres	not less than 1" = 400'

Note: If the map is reduced or enlarged, make sure the verbal scale is adjusted as well. Maps without a scale will not be accepted.

Graphic Scales

Map scales shown graphically should also be included. They will remain accurate when the map is reduced or enlarged. Examples of a bar scale (left) and a rake scale (right) are shown below:



North Arrow



All maps must show true north. This is typically done by drawing a line oriented N-S with an arrow pointing north. The north arrow in conjunction with the scale allows the map to be properly oriented during field inspections and to be related to other maps. Examples of north arrows are shown on the left.

Explanation Block

The explanation block or legend defines all symbols and patterns used and may contain the scale.

Title Block

The title block should contain the following information:

- title of map,
- application or permit number,
- name and address of applicant or permit holder(s),
- signature of applicant or permit holder(s),
- map or exhibit number, and
- date the map was drawn or revised.

**TOPOGRAPHIC
CONTOURS**

Topographic contours are lines on a map that connect points of equal elevation. For example, a 100-foot contour line links all points that have an elevation of 100 feet. Although not required on all maps, contours are useful in determining the steepness of slopes and the location of watercourses. Contours are deemed adequate for mine permitting if they accurately reflect the conditions of the site. Generally, contour intervals should be between 5 and 20 feet.

Typically, only large and/or complex sites require surveyed contour lines. Most applications for small sites can use a photocopied enlargement of a U.S. Geological Survey (USGS) topographic map. Enlarging a USGS 7.5-minute quadrangle (1" = 2,000') by 400 percent yields a map at a scale of 1" = 500'. Care must be taken to ensure that the scale of the enlargement is accurate.

USGS maps are usually available at local hunting or sporting goods stores. They may also be ordered from the Washington Department of Natural Resources Photo and Map Sales (360-902-1234), the Nature of the Northwest Information Center (503-731-4444), or the U.S. Geological Survey (509-353-2524).

BOUNDARIES

Several types of boundaries may be required on maps: the permit area boundary, the mining area boundary (including present and future mining areas), and the property lines. The symbols for all should be included in the explanation block.

**Permit Area
Boundary**

This is the boundary within which mining is permitted. Any mining, processing, or activity related to mining taking place outside of this area constitutes mining without a permit and may invoke closure and/or civil penalties. In some places, the permit boundary may be coincident with the property boundary. However, the permit boundary may cross property lines and can include property held by different landowners. Once the boundary has been defined, changes to it typically require an amendment to the reclamation permit and may require land-use approval by the local jurisdiction.

The permit boundary is commonly indicated on maps as a dashed or solid line. This line type and width should be distinguishable from the property line boundary and should be clearly labeled as 'permit boundary'.

**Mining
Boundaries**

Mining boundaries show the areas to be mined or excavated. Several maps may be needed to show areas affected by short-term and long-term operations.

**Boundaries of
Cities and Counties**

Boundaries of cities, counties, and other municipalities must be shown if they cross the map area.

**Property
Lines**

Tax lot maps from the county assessor's office are good sources of property line information. Property line locations are critical in determining setbacks to property lines and the likelihood of potential impacts to adjacent landowners.

The property line boundary is typically shown on maps as a solid line. The property line type and width should be distinguishable from the permit boundary line and should be clearly labeled. The letters 'PL' are commonly used to indicate a property line on maps, but this line and abbreviation must also be identified in the explanation block.

OTHER COMMON MAP ELEMENTS

The following map elements should be shown on one or more of the required maps.

Existing Watercourses, Ponds, and Wetlands

All streams, rivers, wetlands, and ponds on and adjacent to the site must be indicated on the map. Accurate location of these features allows reviewers to assess potential mining-related impacts and also aids the miner in the design of erosion and storm-water control systems to protect water quality.

Streams and rivers are represented by lines that are distinct from those used for haul roads, permit boundaries, and property lines. Ponds, wetlands, and lakes should be labeled and/or patterned to distinguish them from other mine features.

Processing Plant

Proper location of processing facilities makes good use of the topography for screening and noise control, for example, by siting them in a low area. The location of the processing facility can be labeled or a symbol may be used. (See Noise and Visual Screens, p. 3.7.)

Haul Roads

Most roads can be placed to minimize potential problems. Proper location, construction, and drainage can minimize turbid water and slope-stability problems. Roads can be shown as lines whose width or line type (dashed, etc.) distinguish them from property lines and permit boundaries. (See p. 2.9.)

Soil and Overburden Stockpiles

Soil should be preserved for reclamation. The reclamation sequence map must show where topsoil, subsoil, and overburden will be stored until they are reapplied during reclamation. Soil stockpiles can be indicated by drawing a line around the proposed location, adding a distinctive pattern, and labeling the area 'topsoil', 'subsoil', or 'overburden'. (See Removing and Storing Topsoil and Subsoils, p. 3.9.)

Product Stockpiles and Waste-Rock Dumps

Stockpiles of usable rock and waste-rock dumps are generally indicated on maps by drawing a line around the proposed location, adding a distinctive pattern, and labeling the area 'stockpile' or 'waste dump'. Stability and potential erosion problems are criteria to be considered in selecting the location of a stockpile or dump. Site topography will influence these factors. (See Waste and Overburden Dumps and Stockpiles, p. 3.4.)

Interim Watercourses and Ponds

Temporary watercourses and ponds, including settling ponds and drainage ditches to control storm-water runoff, should be distinguished from permanent natural features. They may be represented by a unique line or pattern. (See Storm-Water Control, p. 2.4.)

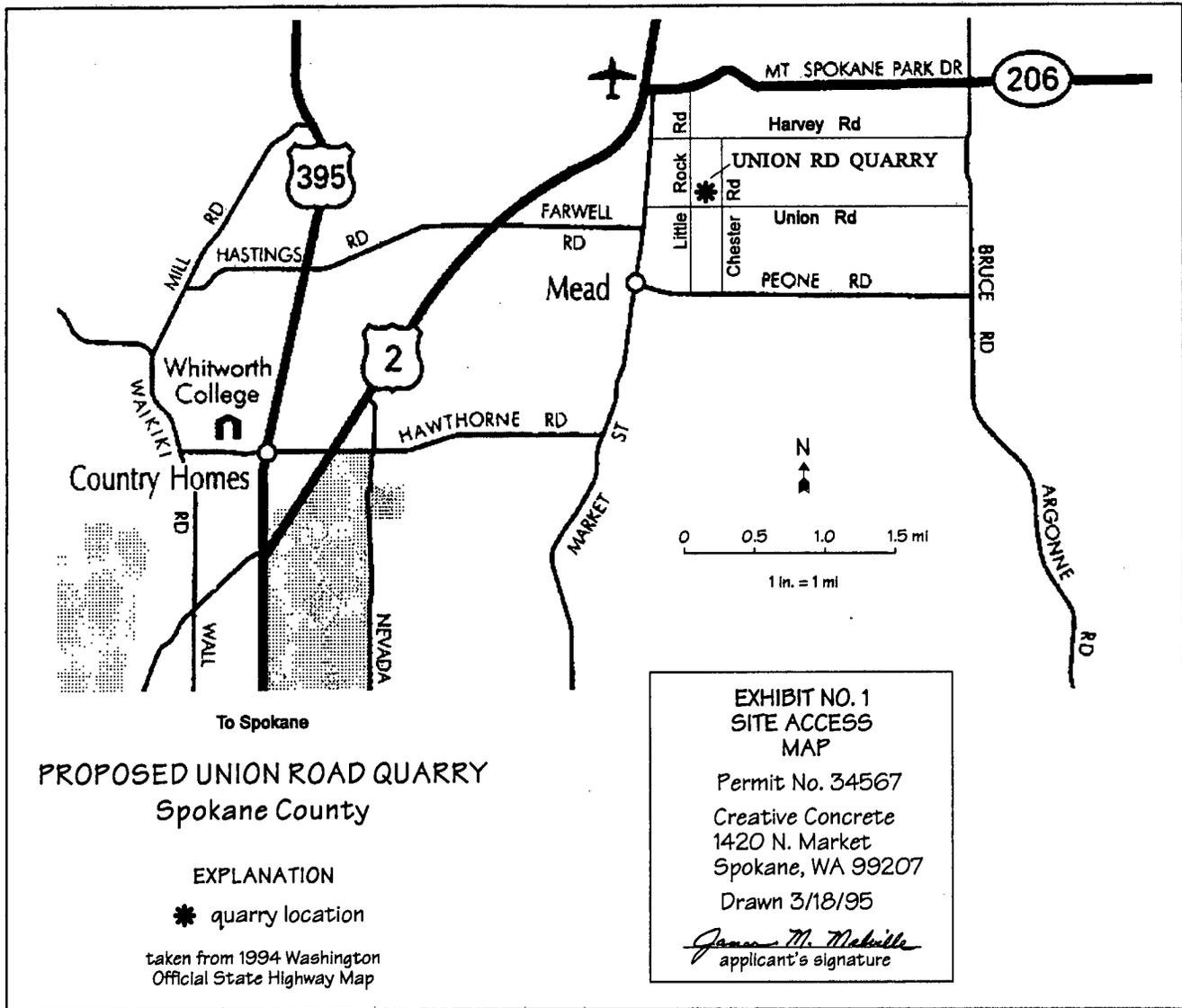


Figure 1.1. Site access map for the fictitious Union Road Quarry, taken from a highway map. Note verbal scale, bar scale, north arrow, and explanation and title blocks. (Not to scale; this map has been reduced to fit on the page.)

Typical Cross Sections

A cross section or profile shows what the mining site would look like if a vertical slice were taken through it. The purpose is to show the slope of the original land surface and reclaimed land surface, the water level of ponds and wetlands, and the types and placement of vegetation. Cross sections are usually taken through the areas that will show the most information. It is generally best if a cross section is drawn so that the vertical and horizontal scales are the same. In some cases, the vertical scale can be exaggerated to accentuate topographic features.

SITE ACCESS MAP

The site access map (Fig. 1.1) can be a copy or tracing of the pertinent part of a road map that clearly shows how to get to the site from the nearest town. The preferred size for this type of map is 8½ x 11 inches. A site access map shows the regional setting of the site and includes nearby geographical features and public road access to the site.

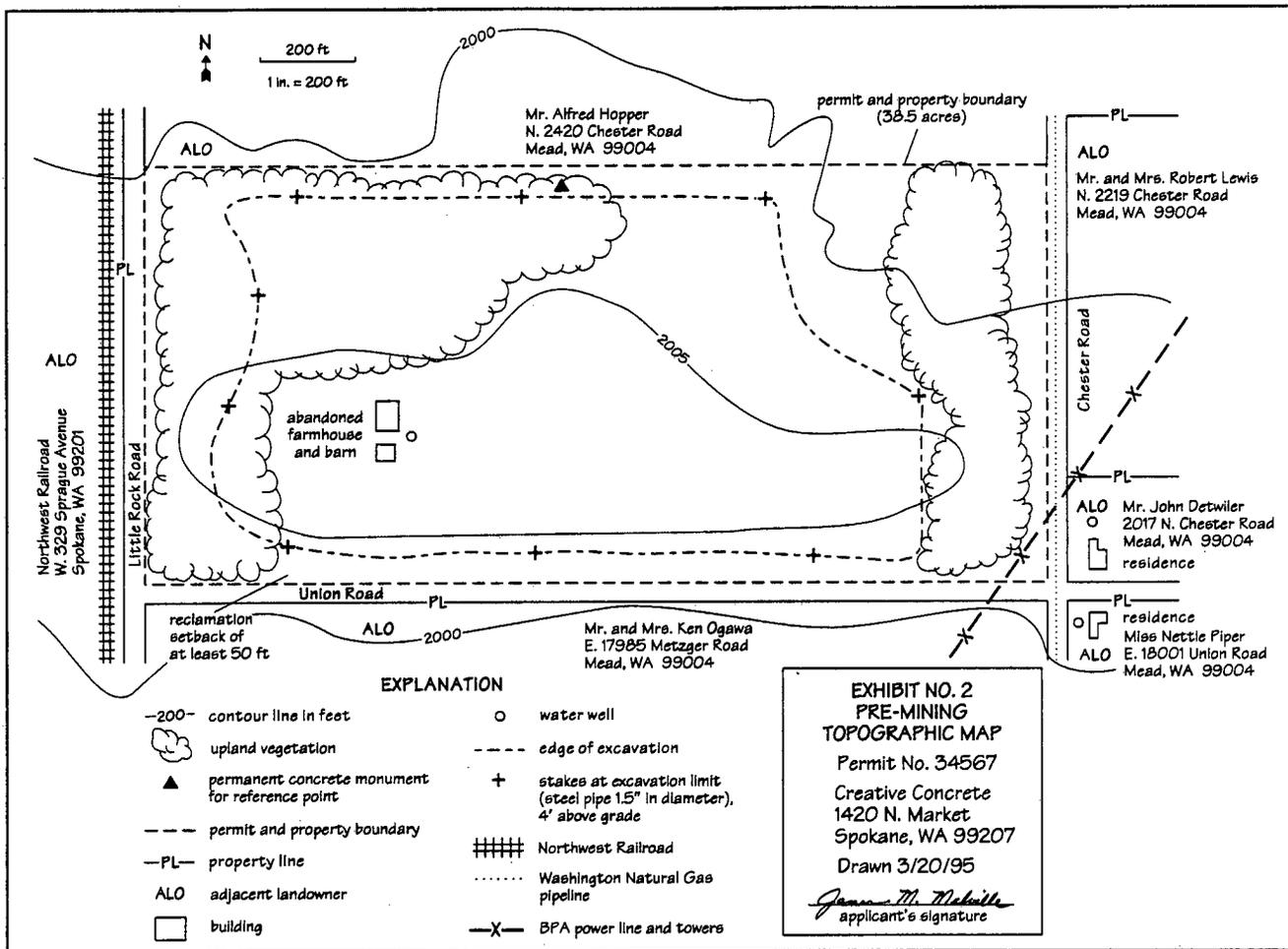


Figure 1.2. Pre-mining topographic map for the quarry in Figure 1.1. Note existing buildings and vegetation, pre-mining contours, verbal scale, bar scale, north arrow, and explanation and title blocks. (Modified from Norman and Lingley, 1992. Not to scale; this map has been reduced to fit on the page.)

PRE-MINING TOPOGRAPHIC MAP

The pre-mining topographic map establishes the location and setting of the mine site (Fig. 1.2). It must show the following features:

- Permit area plus an appropriate border on all sides (depends on site topography, drainage, etc.)
- Elevations and contours, natural ground slopes, drainage patterns, and other topographic features
- Boundaries and names of counties and municipalities (if they cross the map area)
- Boundaries of property ownership adjacent to the mine
- Names and addresses of adjacent property owners
- Locations and names of any other nearby mines
- Locations and names (if any) of all roads, railroads, utility lines, or any other rights of way
- Locations and names (if any) of all streams and natural and artificial drainways on or adjacent to the mine site
- Locations and names of significant buildings, parks, and other artificial features

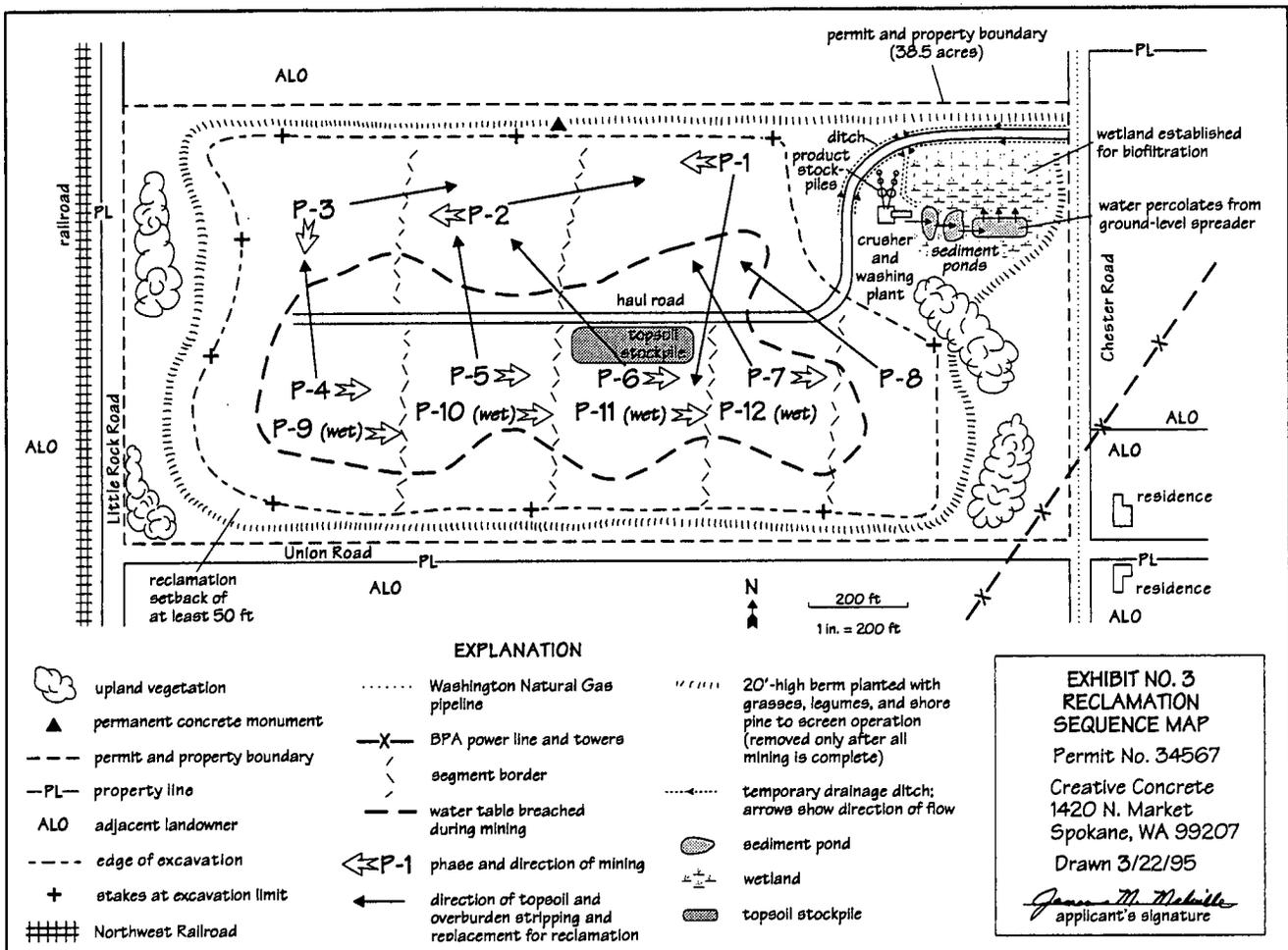


Figure 1.3. Reclamation sequence map for the site in Figure 1.2. This map shows the location and sequence of segments to be mined according to the operating and reclamation plan (counterclockwise from the northeast, in this instance), as well as details of soil placement, screening, and drainage. This site is mined first as a dry site, but as mining proceeds into the southern segments, the water table is penetrated. (Modified from Norman and Lingley, 1992. Not to scale; this map has been reduced to fit on the page.)

- Locations and names (if any) of all wells, lakes, springs, and existing wetlands on or adjacent to the mine site
- Boundaries of the areas that will be disturbed by mining.

RECLAMATION SEQUENCE MAP

The reclamation sequence map shows the details of the plan for mining and segmental reclamation (Fig. 1.3). It should cover the same area as the pre-mining topographic map and display the following information:

- Permit area plus an appropriate border on all sides
- Boundaries of the areas that will be disturbed by mining
- Locations of all permanent boundary markers
- Locations of proposed access roads to be built in conjunction with the surface mining operation
- Locations and types of setbacks and berms
- Numbered segments and the direction and sequence of mining

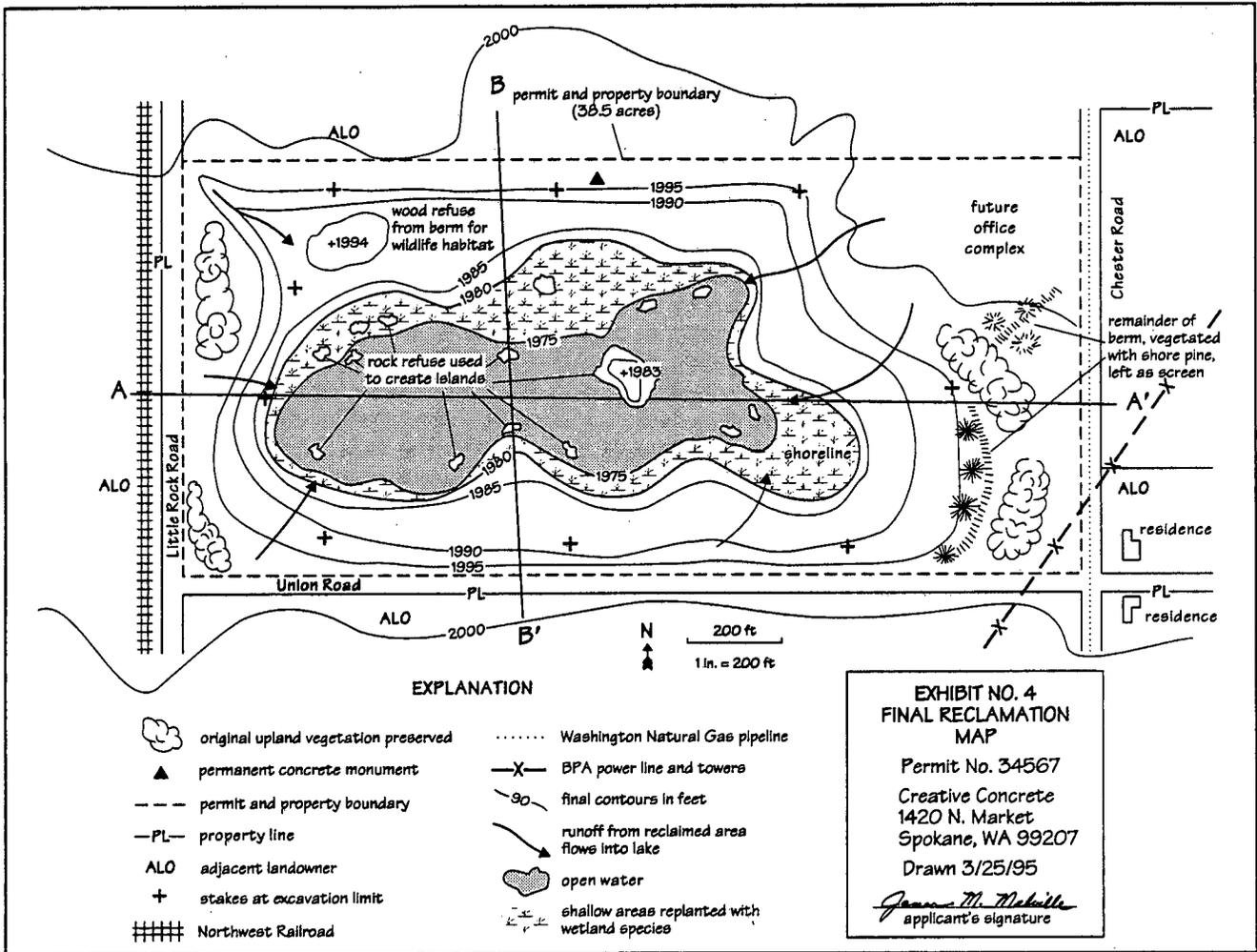


Figure 1.4. Final reclamation map of the site in Figure 1.2, showing how it will appear after reclamation. The site will accommodate a small office complex and wildlife habitat when it has been reclaimed. Cross sections A-A' and B-B' are shown in Figure 1.5. (Modified from Norman and Lingley, 1992. Not to scale; this map has been reduced to fit on the page.)

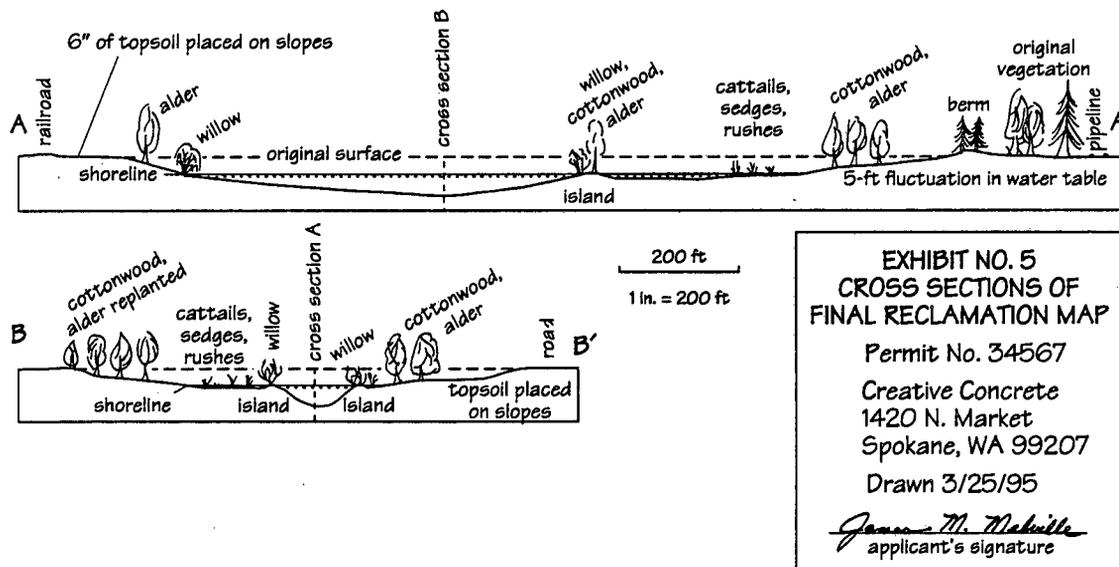


Figure 1.5. Cross sections for the final reclamation plan of the mine shown in Figure 1.4. The types and placement of vegetation and the slope of the pond banks are shown. (Modified from Norman and Lingley, 1992. Not to scale; this map has been reduced to fit on the page.)

- Soil storage areas and sequence of stripping, storing, and replacement on mined segments
- Overburden storage areas and sequence of stripping, storing, and replacement of overburden on mined segments
- Waste rock piles and how they will be reclaimed and stabilized
- Operation plant and processing areas
- Measures to be taken to protect adjacent surface resources, including prevention of slumping or landslides on adjacent lands
- Location and description of storm-water and erosion-control systems, including drainage facilities and settling ponds
- Other pertinent features.

FINAL RECLAMATION MAP

On all sites that require a state reclamation permit (reclamation plan), a description of the post-mining topography is usually sufficient, but for complex sites, post-mining topographic maps should be prepared (Fig. 1.4). This is a topographic map of the site as it will look after final reclamation, usually presented in the form of post-mining contour lines or post-mining pit outlines. It must show all applicable data required in the narrative portion of the reclamation plan and details of the mine reclamation. The map should cover the same area as the pre-mining topographic map, at the same scale, and should display the following information:

- Permit area plus an appropriate border on all sides
- Final elevations and contours, adjacent natural ground slopes, reclaimed drainage patterns, and other topographic features
- Locations and names (if any) of all roads, railroads, utility lines, or any other rights of way
- Locations and names (if any) of all streams and drainages
- Locations and names (if any) of significant buildings, parks, and other structures, facilities, or features
- Locations and names (if any) of all lakes, springs, and wetlands
- Location and depth of topsoil to be replaced after seedbed preparation
- Permanent drainage and water-control systems (with expanded view, if needed)
- Area to be revegetated and proposed species
- At least two cross sections (generally at right angles) with horizontal and vertical scales the same that show the original and final topography and the water table (Fig. 1.5)
- Other information pertaining to the permit and required by statute or special conditions of the permit.

GEOLOGIC MAP

In addition to the preceding four types of maps, a detailed description of the geologic setting and the type of deposit to be mined is

sometimes required in geologically complex areas and for certain industrial mineral or metal mines.

MAP UPDATES Current aerial photos or updated maps may be required as mining progresses.

REFERENCE Norman, D. K.; Lingley, W. S., Jr., 1992, Reclamation of sand and gravel mines: Washington Geology, v. 20, no. 3, p. 20-31.

2 Storm-Water and Erosion Control

INTRODUCTION

Protecting water quality and preventing erosion are two important tasks mine operators must address. Federal legislation and increasing concern and scrutiny by state and local agencies and the public require that mine operators pay close attention to even small or temporary discharges of storm water. The quality of those discharges, particularly their turbidity, is a direct reflection of how sediment on the site is handled. Expensive solutions to water-quality problems can often be avoided by incorporating storm-water- and erosion-control techniques into the mine development plan. For most mine sites, a good storm-water control system can minimize or even eliminate storm-water discharge during the operation phase. When mining ceases, erosion control is still necessary but should rely on those techniques that can function without maintenance.

Controlling storm-water and the erosion it causes requires integrated management starting at the top of the watershed above the mining area. No single action will produce permanently effective results. A good system has numerous individual components that must function separately but also respond as a unit during storms. The failure of one component can cause other components to fail and ultimately affect water quality. Furthermore, control practices are likely to change over the life of the operation. Good planning and constant maintenance are needed to keep the storm-water system working at peak efficiency.

This chapter describes basic techniques that can be combined to make a comprehensive storm-water and erosion-control system. Specific techniques appropriate to a given site depend on climate, topography, and the erodibility of the material present. The following general guidelines are applicable everywhere:

- ☛ Carefully plan the areas to be cleared in order to minimize disturbance.
- ☛ Retain sediment by using erosion-control BMPs.
- ☛ Interrupt the flow of surface water to reduce velocity.
- ☛ Use revegetation and mulching to stabilize cleared areas as soon as practical.
- ☛ Isolate fines produced during mining and processing.
- ☛ Develop a plan for maintaining storm-water and erosion-control structures and stick to it.

MAINTENANCE AND EMPLOYEE INVOLVEMENT

Although water quality is ultimately the operator's responsibility, maintenance of storm-water and erosion-control systems must be a priority for management and involve all mine employees. Managers should explain to staff why controlling storm water and erosion is

so important. An effective program requires that everyone be on the lookout for seemingly insignificant situations that can snowball into major problems if not addressed in time.

We encourage operators and their employees to experiment with improving their storm-water systems. Operators should not feel limited to the information provided in this document. Common sense and innovation, with an emphasis on early recognition and response to erosion and sediment-transport problems, are the key to effective storm-water control.

EROSION

The rate of erosion is affected by four main factors (Fig. 2.1):

- *climate*, which determines how much rain and snow will fall on a site,
- *soil characteristics*, which determine erodibility and infiltration rates,
- *topography or slope*, which determines the velocity of runoff and the energy water will have to cause erosion, and
- *vegetation*, which slows runoff and prevents erosion by holding soils in place.

Each of these factors plays a role in determining which BMPs should be used to control erosion on a given site.

Erosion begins when raindrops displace soil particles. Raindrops may combine into sheets of water and flow over the surface (overland flow) to cause sheet erosion. Topography then concentrates water to produce rill and gully erosion. When water from rills and gullies joins, larger erosive streams and channels form (Fig. 2.2).

A single raindrop may move a splashed particle 2 feet vertically and 5 feet horizontally. The velocity of a raindrop is more than ten times higher than typical surface runoff velocities, which means that soil particles are more likely to be dislodged by raindrop impact than by surface runoff. Once the particles are mobilized, however, much less energy is required to keep them suspended or moving.

STORM-WATER REGULATION

The Washington Department of Ecology (DOE) and the Oregon Department of Environmental Quality (DEQ) regulate the discharge of

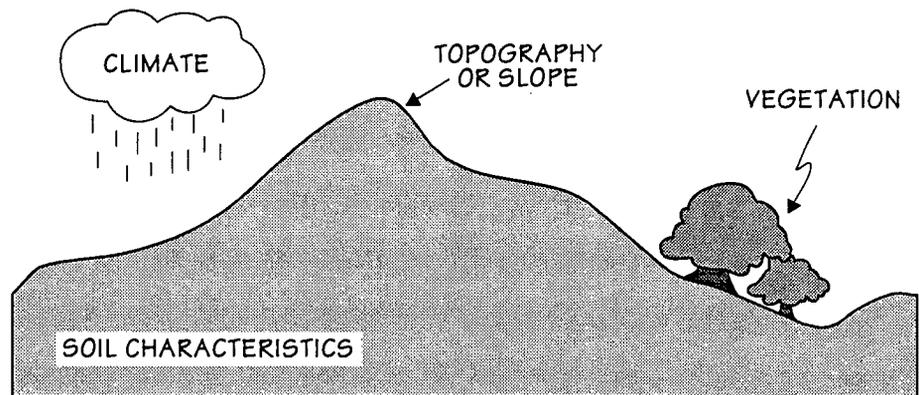
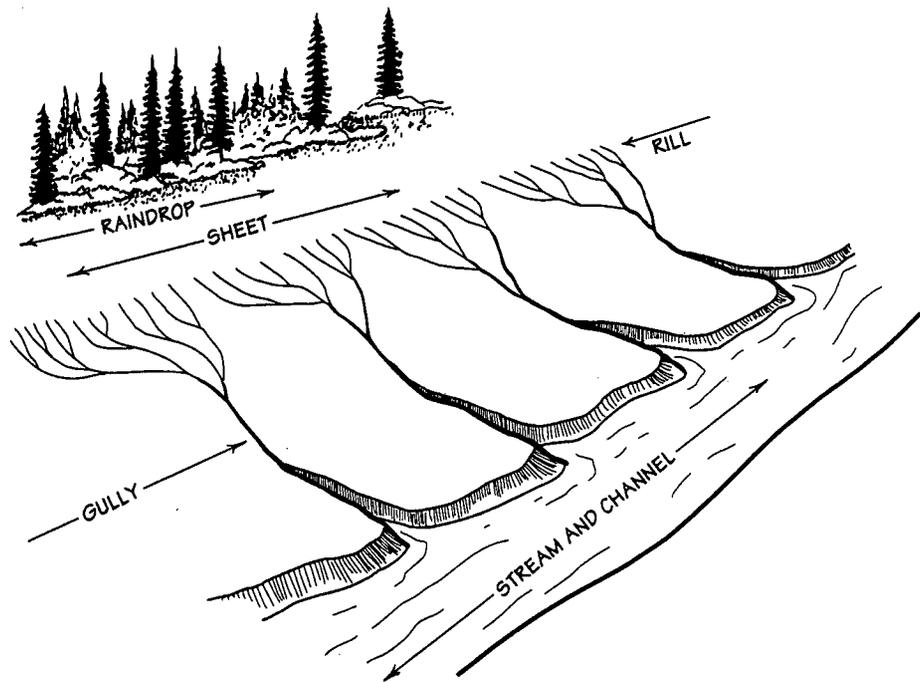


Figure 2.1. The rate of erosion depends on climate, soil characteristics, topography or slope, and vegetation.

Figure 2.2. Topography created by different types of erosion. Raindrop erosion affects any bare surface. If the water does not infiltrate, raindrops combine into sheets of water (overland flow) to cause sheet erosion, and sheets further concentrate to produce rill and gully erosion. Water from rills and gullies then combines to form streams and channels. (Redrawn from Beckett, Jackson, Raedere, Inc., 1975.)



storm water and waste water into public waters. The Stormwater Management Manual for the Puget Sound Basin (Washington State Department of Ecology, 1992) is a good source of 'best management practices' (BMPs) and is available from DOE.



For many mine sites, DOE requires a Stormwater Pollution Prevention Plan (SWPPP). As part of the SWPPP, an Erosion and Sediment Control Plan is required with the general discharge permit.

TURBIDITY AND SUSPENDED SEDIMENT

Erosion results in stream water that has high turbidity and a large sediment load. Turbid, sediment-laden water can adversely affect frogs and toads, clams, bottom-dwelling insects, and the appearance of stream systems. High levels of turbidity can also interfere with the feeding habits of fish, especially juveniles, and clog gills. Settleable solids can cover spawning gravels and suffocate eggs.

Turbidity

Turbidity is a measure of the amount of light that can pass through water in a straight line. Turbidity is reported as Nephelometric Turbidity Units (NTU). A high NTU value means that little light is transmitted through the water because it is absorbed or deflected by particles in the water.

Suspended Sediment

Suspended sediment is composed of settleable and nonsettleable solids. Settleable solids (sand- and silt-size particles) are heavier than water and will settle in calm water. Nonsettleable solids (clay-size particles) take a long time (or distance) to settle out of suspension—in some cases, years—and are the chief cause of turbidity.



In Washington, turbidity must not be more than 5 NTU greater than the background turbidity when the background turbidity is 50 NTU or less, or there must not be more than a 10 percent increase in tur-

bidity when the background turbidity is more than 50 NTU. There is no standard for suspended solids or settleable solids in the water-quality regulations.

For example, in the sand and gravel general discharge permit, DOE is allowed by regulation to give a facility a 10:1 mixing zone to meet an effluent limit. DOE sets the end-of-pipe effluent limit at 50 NTU and assumes that the background level for turbidity in the receiving water is zero. With a 10:1 mixing zone, this should result in a 5 NTU final effluent quality at the end of the mixing zone.



In Oregon, operators are required to meet two standards:

- Settleable solids must be less than 2 milligrams/liter.
- Turbidity must be less than 10 percent above the background turbidity of the stream or river being sampled.

EROSION CONTROL

Assuming that the general guidelines given on p. 2.1 are being followed, the two most important things that can be done to minimize erosion, sedimentation, and turbidity are preventing raindrop erosion and slowing surface-water runoff velocities in the bare areas.

Practices that reduce erosion can be classified as either short- or long-term, although considerable overlap exists between the two. All require maintenance to be effective. They are described in detail later in this chapter.

Short-term erosion control methods include:

- | | |
|-------------------------|--------------------------------------|
| ■ mulching, | ■ jute netting and/or mulch fabrics, |
| ■ slash windrows, | ■ brush sediment barriers, and |
| ■ straw bales, | ■ plastic coverings. |
| ■ filter fabric fences, | |

Long-term erosion control methods include:

- | | |
|----------------------|---|
| ■ vegetation, | ■ rock-lined ditches, and |
| ■ diversion ditches, | ■ contours, berms, swales, and ditches. |
| ■ rock check dams, | |

Controlling Raindrop Erosion

On flat ground, raindrop erosion is typically not a problem, but on slopes, more soil is splashed downhill than uphill. Covering steep slopes with plastic sheeting or mulch and/or revegetating bare areas reduces raindrop impact. Gravel on berms or other bare areas at the plant site can also significantly reduce sediment movement during heavy rains.

Controlling Surface Runoff

Runoff velocities can be controlled by retarding flow and/or breaking up or minimizing slope length. Retarding flow on a slope can be accomplished with organic debris or geotextiles. Small, discontinuous terraces, berms, and furrows on the overburden cut above the mine or on reclaimed slopes can effectively slow runoff and decrease sediment transport (Fig. 2.3). Benches cut in overburden or



Figure 2.3. Small, discontinuous terraces, berms, and furrows can effectively slow runoff and decrease sediment transport. The relief is exaggerated for illustrative purposes. (From Banks, 1981.)

other unconsolidated material likely to erode should be sloped into the hillside and away from the center of the bench to allow drainage to either side (Fig. 2.4). For reclamation, benches and terraces should have shapes and dimensions that appear natural so they blend in with the landforms of the area.

Other methods for reducing runoff velocities involve long-term structures incorporated into the drainage-ditch system. (See *Storm Water and Erosion-Control Structures*, p. 2.11.) These structures should be used in the interior of the mine in conjunction with settling ponds. Using only one method is generally not successful. Attempting to trap or control sediment in settling ponds may not work unless some sediments have been dispersed and trapped upslope of the final pond or discharge point.

Long-term erosion-control methods are more cost-effective if properly planned and coordinated with mining activities. At many sites, short-term erosion control will be needed until long-term controls are established. Some methods, such as revegetation, can be effective in both the short and long terms.

STORM-WATER DIVERSION

Conventional storm-water control methods tend to concentrate flows using ditches, berms, and ponds. The best strategy for storm-water control, however, is to divert storm water and overland flow around the mining site and back into the original drainage (Fig. 2.5). Keeping 'clean' water separate from 'dirty' water is the easiest way to minimize the amount of water that has to be treated or contained. To do this, mine operators must know where and how much water enters the mine site during storms of various sizes. Depending on

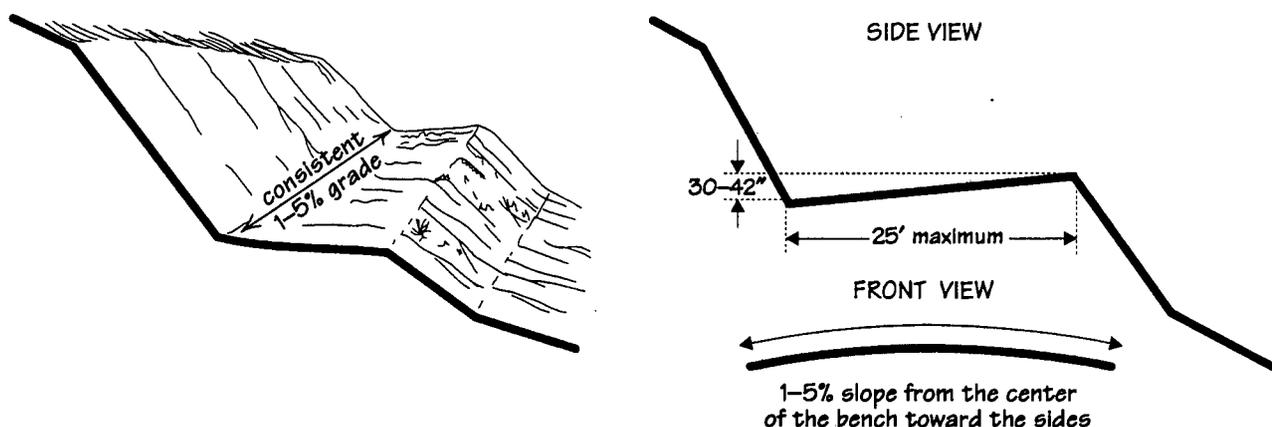


Figure 2.4. Benching and terracing of unconsolidated material to control runoff. Benches cut in overburden or other material likely to erode should be sloped into the hillside (side view) and away from the center of the bench (1-5% slope or grade) to allow drainage to either side (front view). (Modified from Law, 1984. Copyright © 1984 by Van Nostrand Reinhold Company Inc. Used by permission of the publisher.)

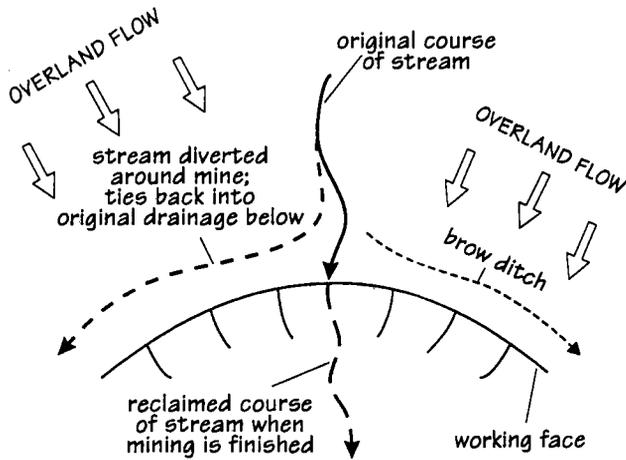


Figure 2.5. The best strategy for storm-water control is to divert streams and overland flow around the mining site. Not to scale.

the size of the operation, the type and duration of precipitation, the type of material being mined, and the topography, passive control of storm water may be all that is needed.

If storm water cannot be diverted around the site, that water should be isolated from the storm water onsite to provide the best possible protection of surface waters.

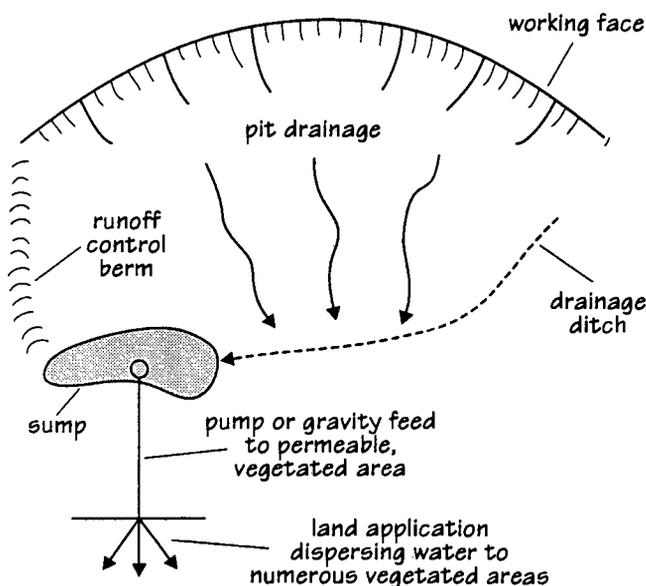
PASSIVE STORM-WATER CONTROL

Passive storm-water control techniques rely on gravity to do their work. Their goal is to disperse storm water at numerous locations rather than to concentrate flows, which then have to be treated to remove sediment. Passive control structures are typically nonengineered and can easily be built at any mine site. They should be placed to prevent overland flow over any significant distance.

Small operations on permeable materials (such as sand and gravel, cinders, and pumice) and sites developed on flat or gently sloping terrain are good locations to use passive techniques. These techniques will also work on quarry sites where the rock is highly fractured and/or the size of the disturbance is fairly small. Passive techniques can and should be incorporated into designs for larger sites that require offsite discharge of storm water.

At most sites, roads and processing areas are the biggest sources of sediment because equipment is constantly being moved across them. Good road design and limiting traffic movement to specific areas can minimize disturbance and therefore sediment production.

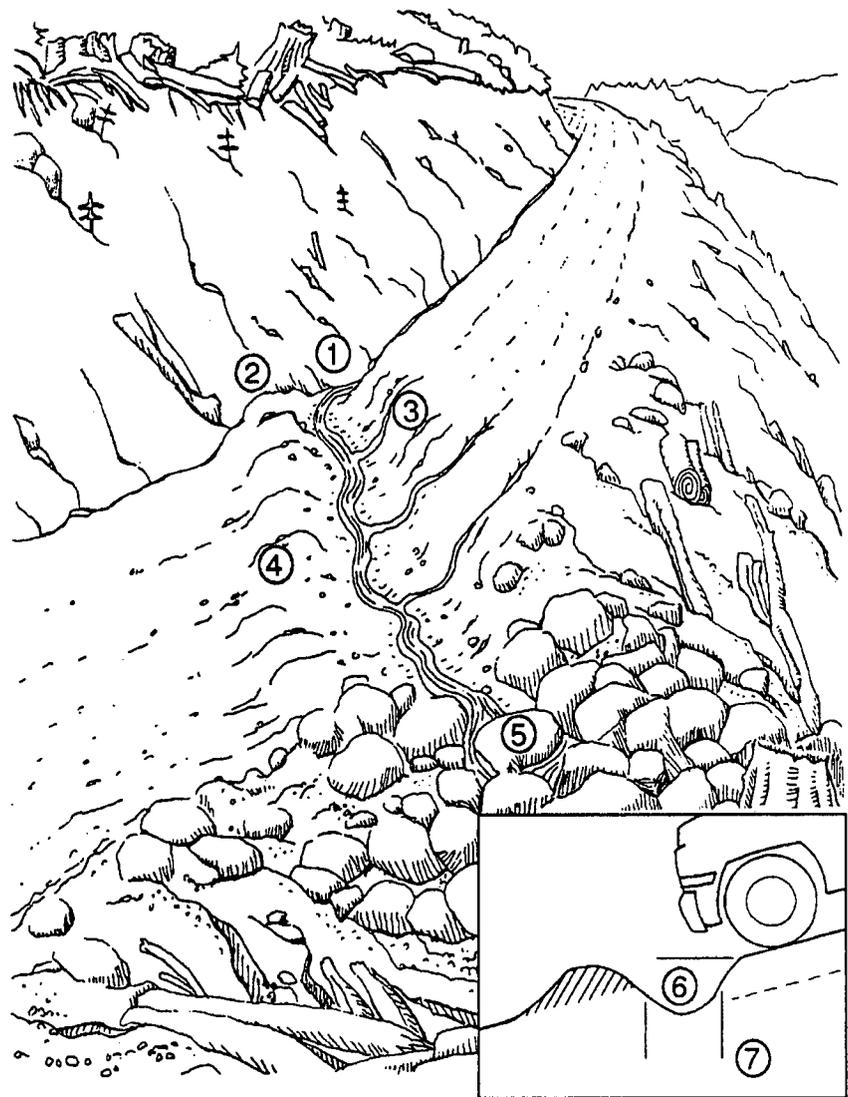
The techniques suggested in the next few pages can reduce the amount of contaminated water that requires treatment prior to discharge offsite. Applying an appropriate combination of these techniques may eliminate offsite discharge of storm water altogether.



Construct berms and ditches to divert runoff away from natural drainages and slopes and into vegetated areas around the mine site. If possible, select vegetated areas on gentle slopes. Doing this at numerous locations is the key to success (Fig. 2.6).

Figure 2.6. Berms and ditches divert runoff to a collection sump from which it can be dispersed into vegetated areas at numerous locations around the mine site. Not to scale.

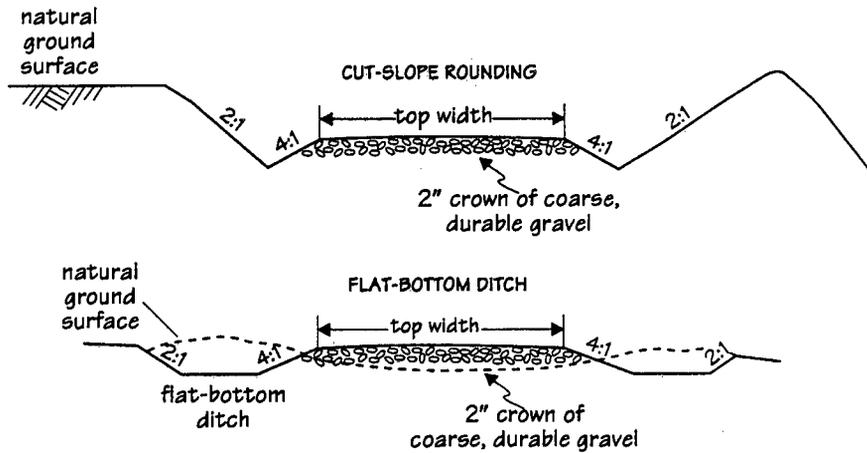
Figure 2.7. The water bar or cross-ditch intercepts, directs, and disperses surface-water flow off a road to stable sites on the downhill side of the road. 1, The cross-ditch is cut into the roadbed from the cutbank or ditchline completely across the road surface, extending beyond the shoulder of the road. 2, Physical blockage of the the ditchline is required to deflect water flow into the cross-ditch. 3, The cross-ditch should be placed at a minimum skew of 30° to the ditchline—greater on steep road gradients. 4, The excavated material is spread on the downhill grade of the road, creating a berm. 5, Water should always be dispersed onto a stable slope with vegetation or riprap protection. 6, The cross-ditch berm should dip to allow vehicle crossover without destroying the ditch. 7, The cross-ditch must be cut to the depth of the ditchline to prevent water ponding and to ensure drainage from the ditchline. (From Chatwin and others, 1991.)



- Construct closely spaced water bars (Fig. 2.7) on roads susceptible to erosion, for example, ungraveled roads, roads with steep grades, and roads on highly erodible soils. Very little maintenance is required if water bars are properly constructed, placed in correct locations, and closely spaced. Wide water bars, also called rolling ditches, can perform the same function as conventional water bars while providing smoother passage for vehicles.
- Use water bars on exploration roads above the mine cut or other roads that receive only occasional use.
- Elevate frequently used roads (Fig. 2.8), such as haul roads, and other heavy traffic areas to keep runoff away from these areas where it is more likely to pick up sediment.
- Make sure roads are well covered with durable, coarse rock of appropriate size.

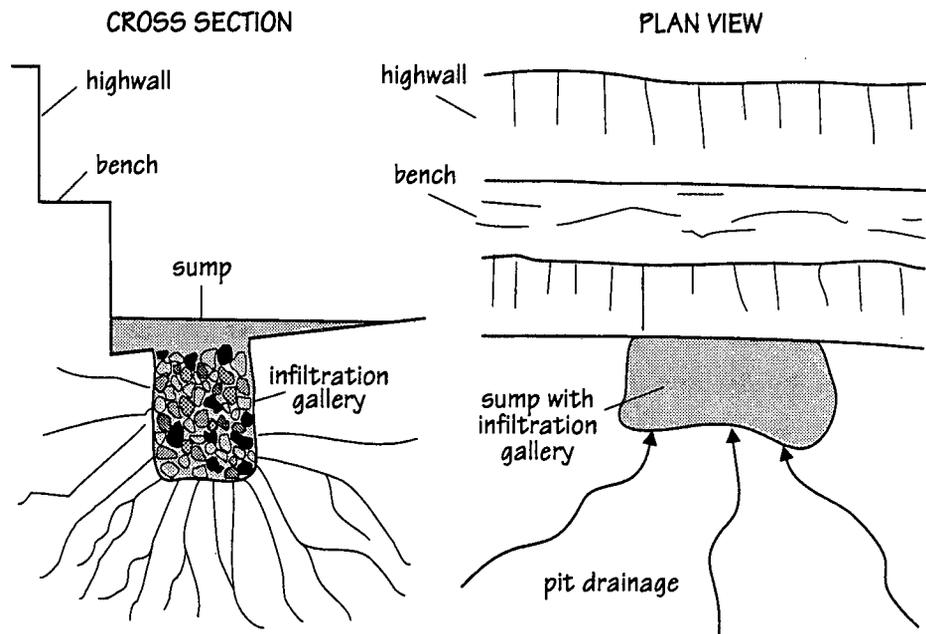
2.8 STORM WATER AND EROSION CONTROL

Figure 2.8. Profiles of elevated haul roads with drainage ditches on the sides to keep runoff from entering heavy traffic areas where it is more likely to pick up sediment. (Modified from U.S. Bureau of Land Management, 1992.)



- On the pit or quarry floor, establish and maintain a slope that allows turbid water to drain toward a low point where it can be collected in a pond or a sump to allow water to infiltrate (Fig. 2.9). This practice stops sediment-laden sheetwash from leaving the pit and may create beneficial wetlands after reclamation. However, this method is not recommended if oil and grease are present to contaminate ground water.
- In both excavation and processing areas, develop and maintain places that will readily accept runoff and precipitation. For hard-rock sites, fracture the quarry floors and/or leave shot rock in place. For gravel and soft-rock quarries, rip and/or minimize areas compacted by heavy equipment.
- When processing rock on the excavation floor, make sure adequate drainage is provided. Fines produced during processing will potentially decrease permeability and increase runoff. This will likely result in an increase in the amount of turbid water to be treated.

Figure 2.9. Establish and maintain a slope that allows water to drain toward the high-wall to collect sediment and help form wetlands or to allow water to infiltrate (note infiltration gallery) if the area must be drained. This practice is not recommended if oil and grease are present as potential ground-water contaminants. Discharge to ground water may require a permit. (See also Fig. 2.26.)



- ☛ Use filter berms built of porous materials, such as sand and gravel or processed quarry rock that contains no 200-mesh or smaller material, to remove sediments. (See p. 2.19.)
- ☛ Use dry wells or infiltration galleries and horizontal subdrains to allow storm water to infiltrate into the ground rather than run off the site. (See p. 2.19 and 2.20.)
- ☛ Regrade, reshape, revegetate, and otherwise protect areas that have the potential to produce runoff or sediment.
- ☛ Minimize the disturbed area by maximizing the area reclaimed each fall.
- ☛ Establish and maintain vegetated buffer strips between disturbed areas and any natural drainage. Silt fines may be incorporated into the soil in these areas.
- ☛ Minimize the amount of water requiring treatment by isolating ground water from storm water. Sumps and trenches or shallow wells at the lowest point of the excavation can dewater the mine area prior to mining.



In Washington, any process water to be discharged to ground is regulated by the Department of Ecology. This includes process water discharged to dry wells and drain fields.

SEDIMENT CONTROL ON THE MINE SITE

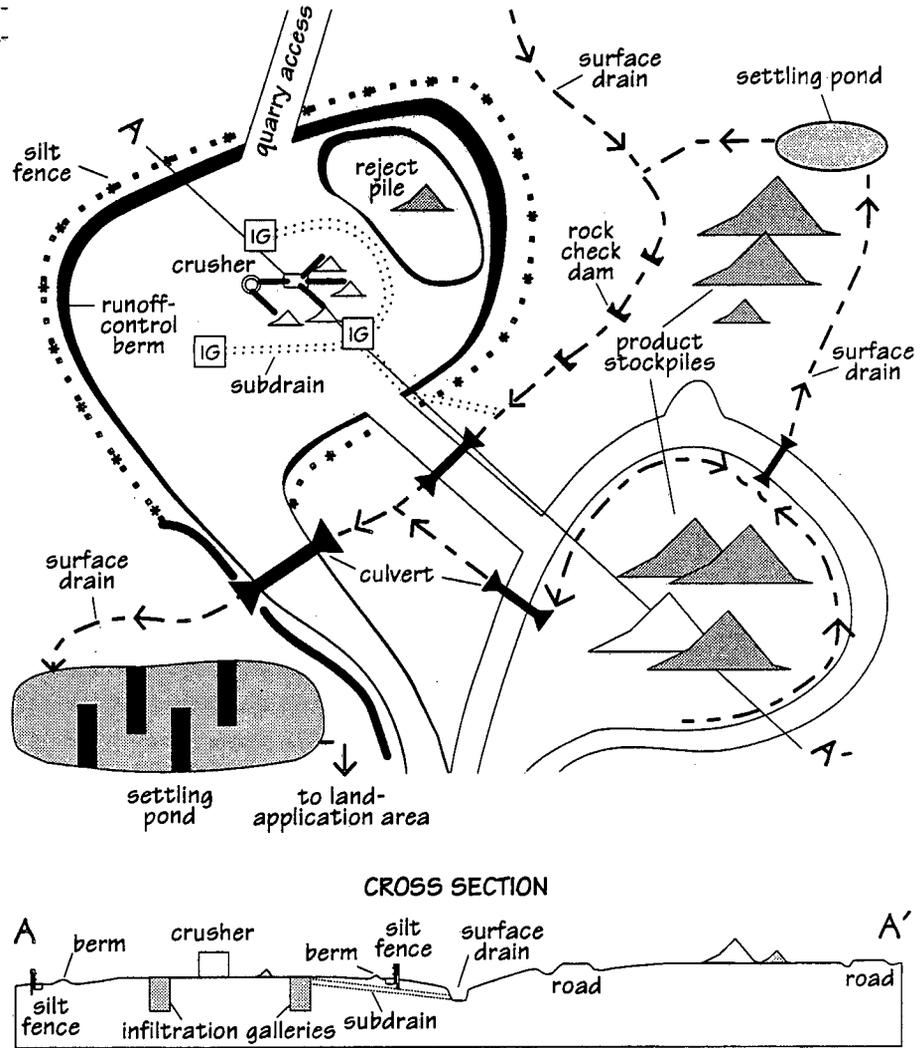
If sediment gets into the water onsite, it can become an environmental contaminant requiring treatment. Removing soil fines from water can be a difficult and costly process. The best approach is to isolate the source of the sediment. Passive storm-water controls can reduce or eliminate suspended fines before they reach the settling pond system. Undersize or reject fines may be a saleable aggregate product and, in some mines, may be an appropriate or necessary soil amendment for reclamation. (See Replacing Topsoil and Subsoil, p. 4.5.)

Soils with sand as the dominant particle size are coarse-textured, light, and easily erodible. Water soaks into these soils rapidly. Silts and clays make fine-textured, heavy soils that are slow to erode and slow to drain. Clay-rich soils commonly cause the worst impacts on water quality because they contain fine particles that settle slowly, travel far, and remain in suspension for a long time in settling ponds. Soils dominated by the clay fraction may require several large settling ponds in series. Flocculants can help settle clay particles. (See Flocculants, p. 2.25.)

One of the best methods for removing sediment from water is onsite land application. Turbid water is sent through dispersal systems that allow it to slowly soak into vegetated areas. The potential downslope/downstream impacts of land application should be assessed before constructing this type of control. (See Land Application, p. 2.24.)

For effective sediment control, operators need to determine both the dominant particle size of the source materials and the

Figure 2.10. Hypothetical storm-water control at an upland processing area. IG, infiltration gallery.



amount of precipitation and/or storm flow that can be anticipated. Particle-size analysis of soil, overburden, and reject fines produced from processing may be necessary at some sites to determine if they are likely to erode into the storm-water system. Ideally, representative storm-water runoff from the site or from a similar site (if mining has not yet started) should be sampled to predict the size range of the suspended particles that may require treatment.

The two basic methods of removing sediments are by filtering and by gravity separation. Filtering may be accomplished by using:

- designed sand, gravel, or rock graded filters with appropriate size gradations and layers,
- undisturbed soils or embankments,
- filter fabrics,
- infiltration galleries,
- French or trench drains, and
- dispersal (sheet flow) through vegetated areas.

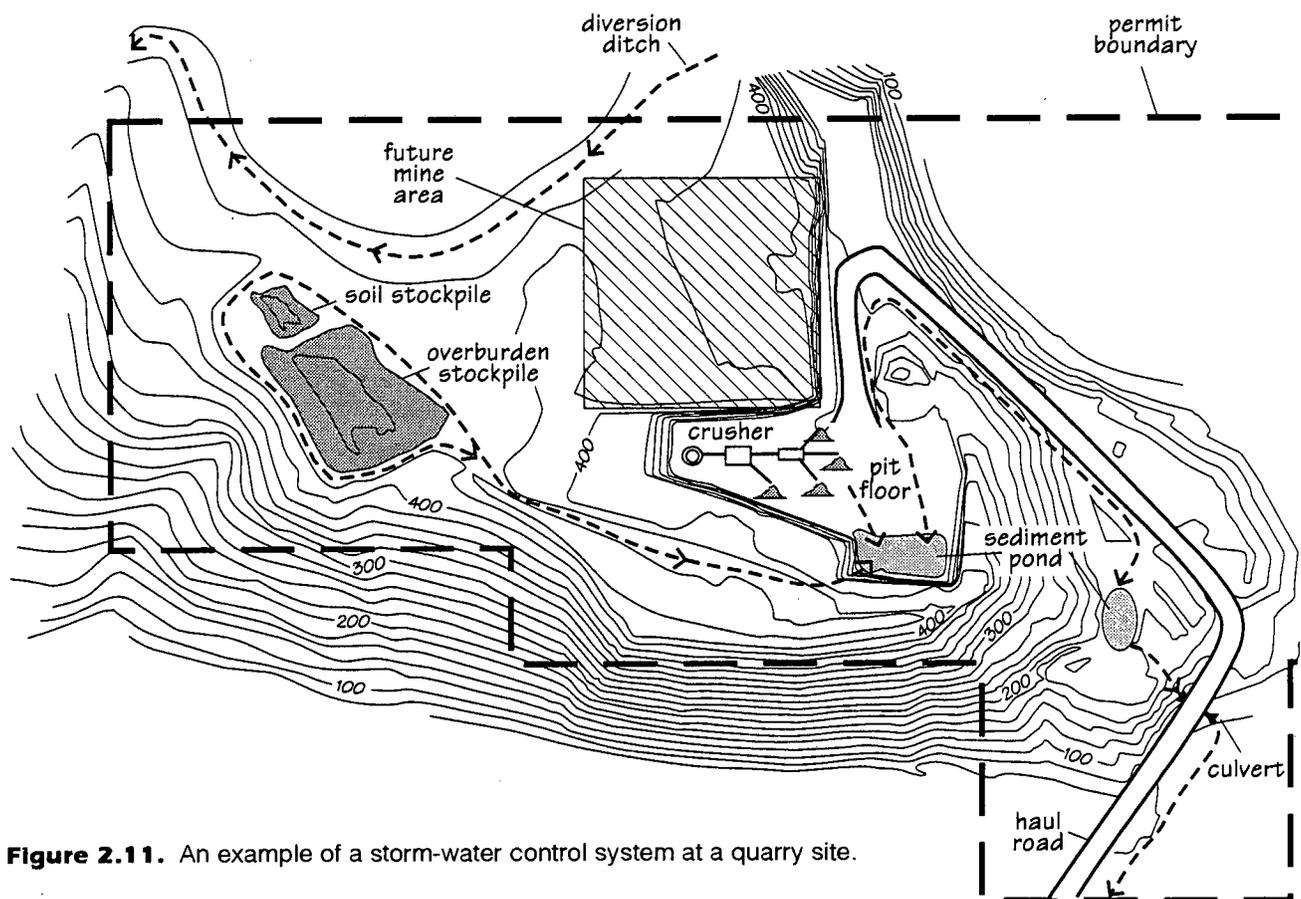


Figure 2.11. An example of a storm-water control system at a quarry site.

Gravity separation requires that water velocity be reduced to facilitate settling. Settling ponds or dispersal on flat terrain (as in a land application) use gravity separation. In still water, a sand particle (0.05–2 mm) will settle at rates of 1 foot/second to 1 foot/several minutes. A silt particle (0.05–0.002 mm) may take several minutes to 6 hours to settle 1 foot. Clay particles (<0.002 mm) can take from 1 day to several months to settle. Pond surface area, retention time, and the particles' settling velocity determine the effectiveness of a settling pond system.

STORM-WATER AND EROSION-CONTROL STRUCTURES

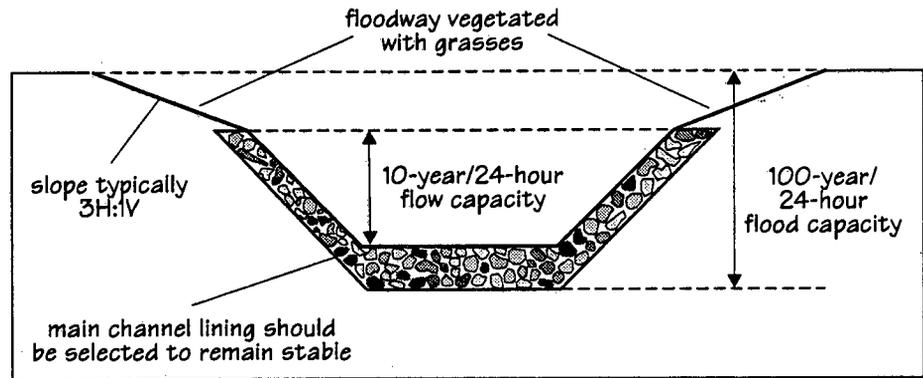
The techniques discussed above and the structures described below can be organized in many different ways. The erosion/sedimentation controls at a site will likely change over time as the configuration of the site changes. Examples of storm-water control systems for an upland processing area and a quarry floor are shown in Figures 2.10 and 2.11, respectively. The profile shown in Figure 2.10 illustrates possible proper drainage techniques in a processing area. The location and choice of the various structures and techniques are site-specific.

Conveyance Channels and Ditches

Channels and ditches are permanent, designed waterways, shaped and lined with appropriate vegetation or structural material to safely convey runoff to a sediment pond, vegetated area, or drainage. The advantages of open channels are that they are generally inexpensive

2.12 STORM WATER AND EROSION CONTROL

Figure 2.12. Details of construction for a rock-lined diversion ditch.



to construct, can be lined with vegetation, and make it easy to trace the water. One disadvantage of grass-lined channels is that they may, if improperly designed, erode during high flows and become a source of sediment themselves.

The design of a channel or ditch cross section and lining is based primarily on the volume and velocity of flow expected in the channel. If flow is low and slow, grass channels are preferred to riprap or concrete lining. Although concrete channels are efficient and easy to maintain, they allow runoff to move so quickly that channel erosion and flooding can result downstream. Grass-lined or riprap channels (Fig. 2.12) more closely duplicate a natural system. Riprap and grass-lined channels, if designed properly, also remove pollutants via biofiltration.

In addition to the primary design considerations of capacity and velocity, other important factors to consider when selecting a cross section and lining are land availability, compatibility with surrounding environment, safety, maintenance requirements, and outlet conditions.

Slash Windrows and Brush Sediment Barriers

Most mine sites have to be cleared of vegetation prior to mining. Slash windrows and brush barriers can be easily and inexpensively constructed with the vegetative debris. These are effective for filtering coarse sediment and reducing water velocity.

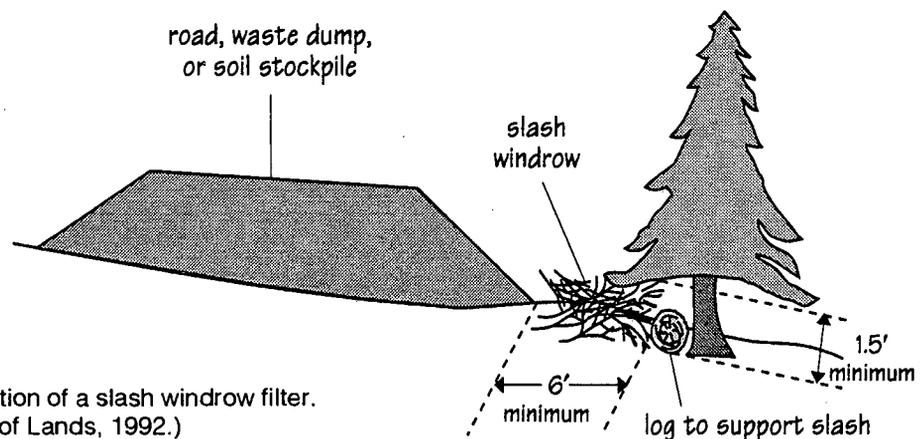


Figure 2.13. Details of construction of a slash windrow filter. (Modified from Idaho Department of Lands, 1992.)

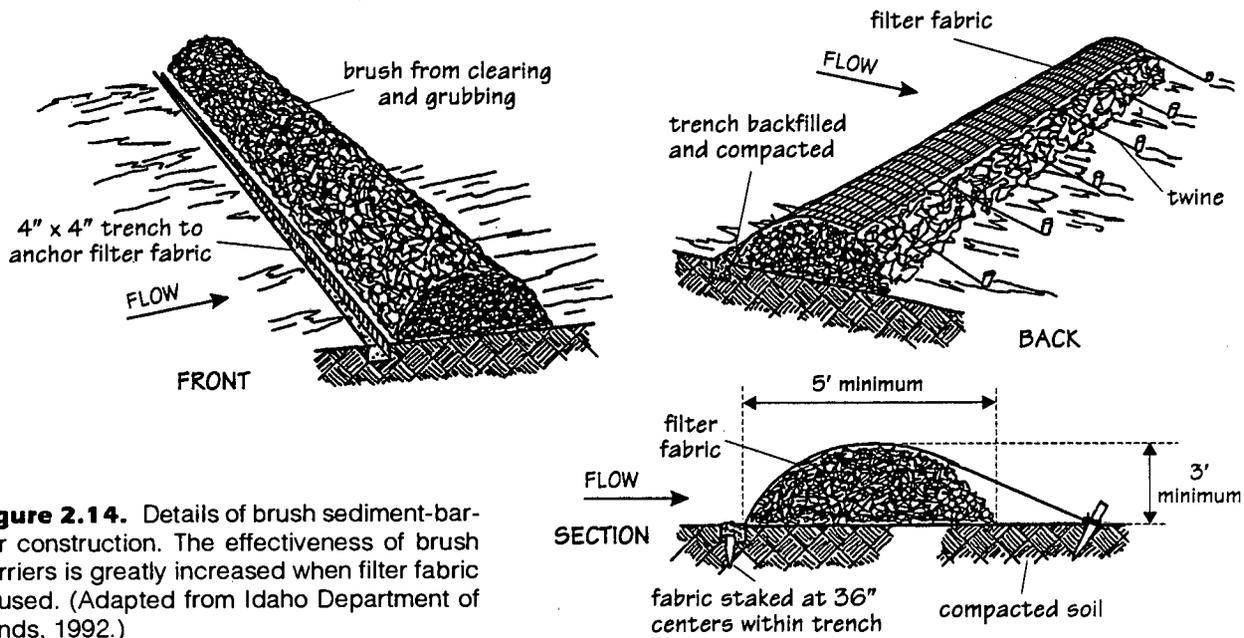


Figure 2.14. Details of brush sediment-barrier construction. The effectiveness of brush barriers is greatly increased when filter fabric is used. (Adapted from Idaho Department of Lands, 1992.)

Slash windrows are constructed by piling brush, sticks, and branches into long rows below the area of concern. The windrow may be supported at the base by large logs or rocks (Fig. 2.13).

Brush sediment barriers require somewhat more effort, planning, and expense, but they are generally more effective than slash windrows. Brush sediment barriers are linear piles of slash, typically wrapped in filter fabric or wire mesh. Construction details are provided in Figure 2.14.

- Slash windrows should be used below roads, overburden and soil stockpiles, and any other bare areas that have short, moderate to steep slopes.
- Brush sediment barriers are most effective on open slopes where flow is not concentrated; they can help prevent sheet flow and rill and gully erosion during heavy rains.

Straw Bales

Straw bales are a well-known temporary erosion-control method (Fig. 2.15). They are fairly cheap and readily available. However, they are frequently installed incorrectly, making them ineffective.

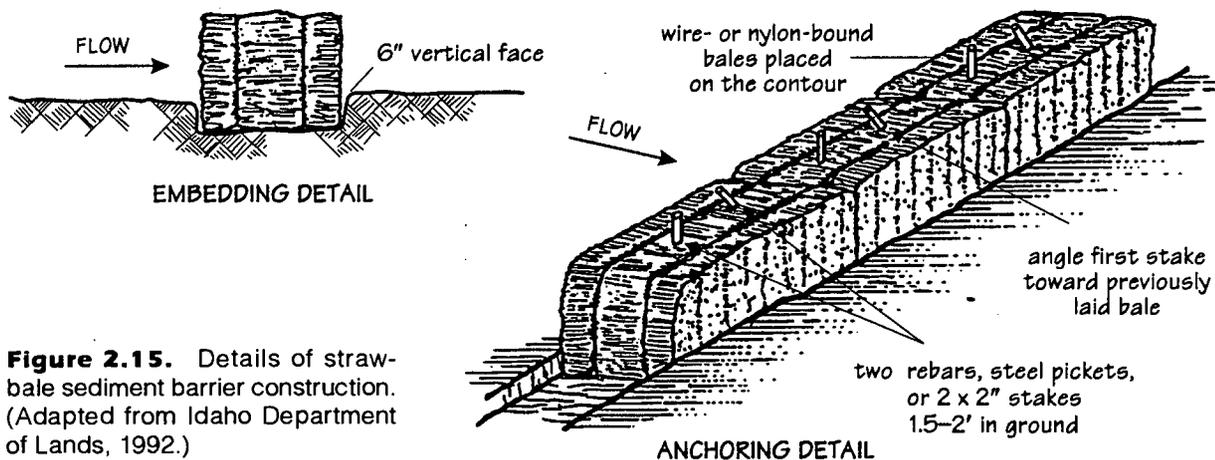
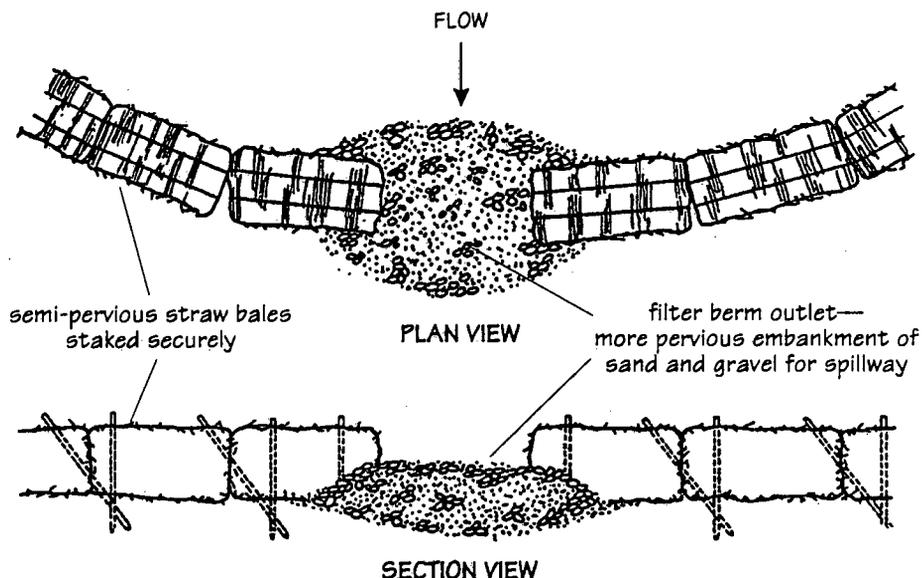


Figure 2.15. Details of straw-bale sediment barrier construction. (Adapted from Idaho Department of Lands, 1992.)

Figure 2.16. Details of construction for a straw-bale barrier combined with a gravel check dam. (Adapted from Idaho Department of Lands, 1992.)



Simply placing straw bales on the ground surface without proper anchoring and trenching will provide only minimal erosion control. Proper ground preparation, placement, and staking are necessary to provide a stable sediment barrier. Straw bales also require frequent repair and replacement as they become clogged with sediment. Only certified weed-free straw should be used.

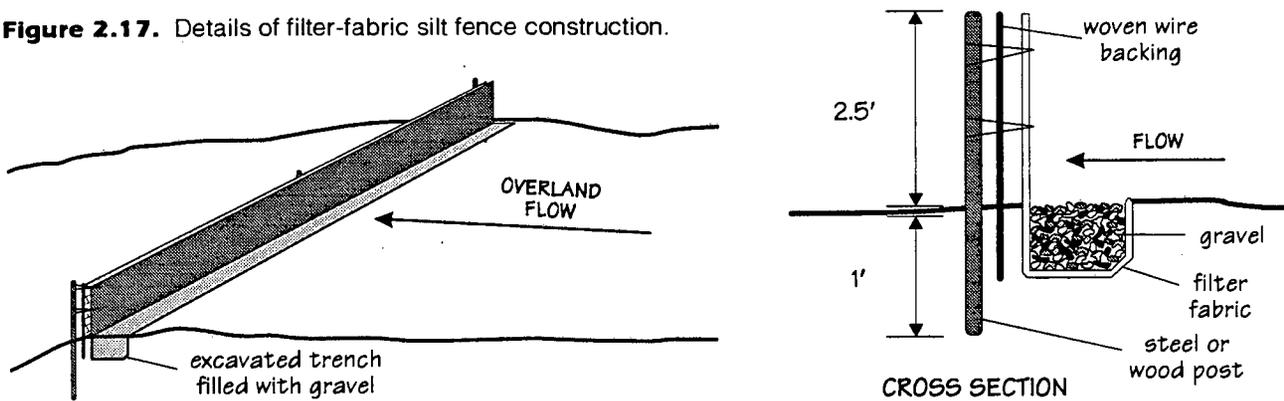
Straw bales used in conjunction with a check dam or filter berm constructed of sand and gravel, as shown in Figure 2.16, provide a more effective erosion-control system that requires less maintenance and can handle larger volume flows.

- ☛ Straw bales are most practical below disturbed areas where rill erosion occurs from sheet runoff.
- ☛ Straw bales may be used in minor swales and ditch lines where the drainage area is smaller than 2 acres and/or where effectiveness is required for less than 3 months.

Bio Bags

Bio bags are woven nylon net bags filled with bark chips. They are about the size of straw bales and can be used as an alternative to straw bales for erosion control. Bio bags are much lighter than straw bales; they must be staked down to keep them in place. They are more permeable, but slow water sufficiently to cause sand, silt, and clay to drop out. They fit the contours of the land, avoiding the bridging problem of straw bales. They hold together better and can therefore be removed more easily when saturated. Wildlife won't tear them apart to eat them, and they will not introduce grass and weed seeds to the site.

Bio bags may not be as readily available as straw bales. Their unit price is comparable to that of straw bales, but because they are smaller, more units are needed per application, making them slightly more expensive. They are not as biodegradable as straw bales.

Figure 2.17. Details of filter-fabric silt fence construction.

Silt Fences A silt fence is made of filter fabric that allows water to pass through. Woven fabric is generally best. Depending on its pore size, filter fabric will trap different particle sizes. The fence is placed perpendicular to the flow direction and is held upright by stakes (Fig. 2.17). A more durable construction uses chicken wire and T-posts to support the fabric vertically.

It is essential to key the filter fabric into the substrate to prevent flow under or around the fence. Maintenance is required to keep the fence functioning properly. Rock check dams or other methods may be needed to slow water enough to allow it to pass through the fence. Although silt fences are more complicated and expensive to install than straw bales, they provide better erosion control in some situations, for example, in coastal climates where hay bales decay rapidly or in locations that are difficult to access with vehicles.

- ☛ Silt fences should be used below disturbed areas where runoff may occur in the form of sheet and rill erosion.

Erosion-Control Blankets

Erosion-control blankets are made of a variety of artificial and natural materials, including jute, coconut husk fibers, straw, synthetic fabrics, plastic, or combinations (Fig. 2.18). Applying erosion blankets over large areas can be prohibitively expensive. However, small applications in areas that are oversteepened and/or prone to erosion, in conjunction with cheaper methods such as hydromulching and/or hay mulch and netting, can be very effective. The effectiveness of jute netting and mulch fabrics is greatly reduced if rills and gullies form beneath these fabrics. Therefore, proper anchoring and ground preparation are essential.

- ☛ Erosion-control blankets can be used on steep slopes where severe erosion-control problems are anticipated.

Where water infiltration is not desirable, for example, on the surface of an active landslide, an impermeable erosion blanket may be appropriate. In this situation, special care must be taken to provide a place where the energy the water has gained can dissipate, such as a slash windrow or brush sediment barrier at the base of the slope.

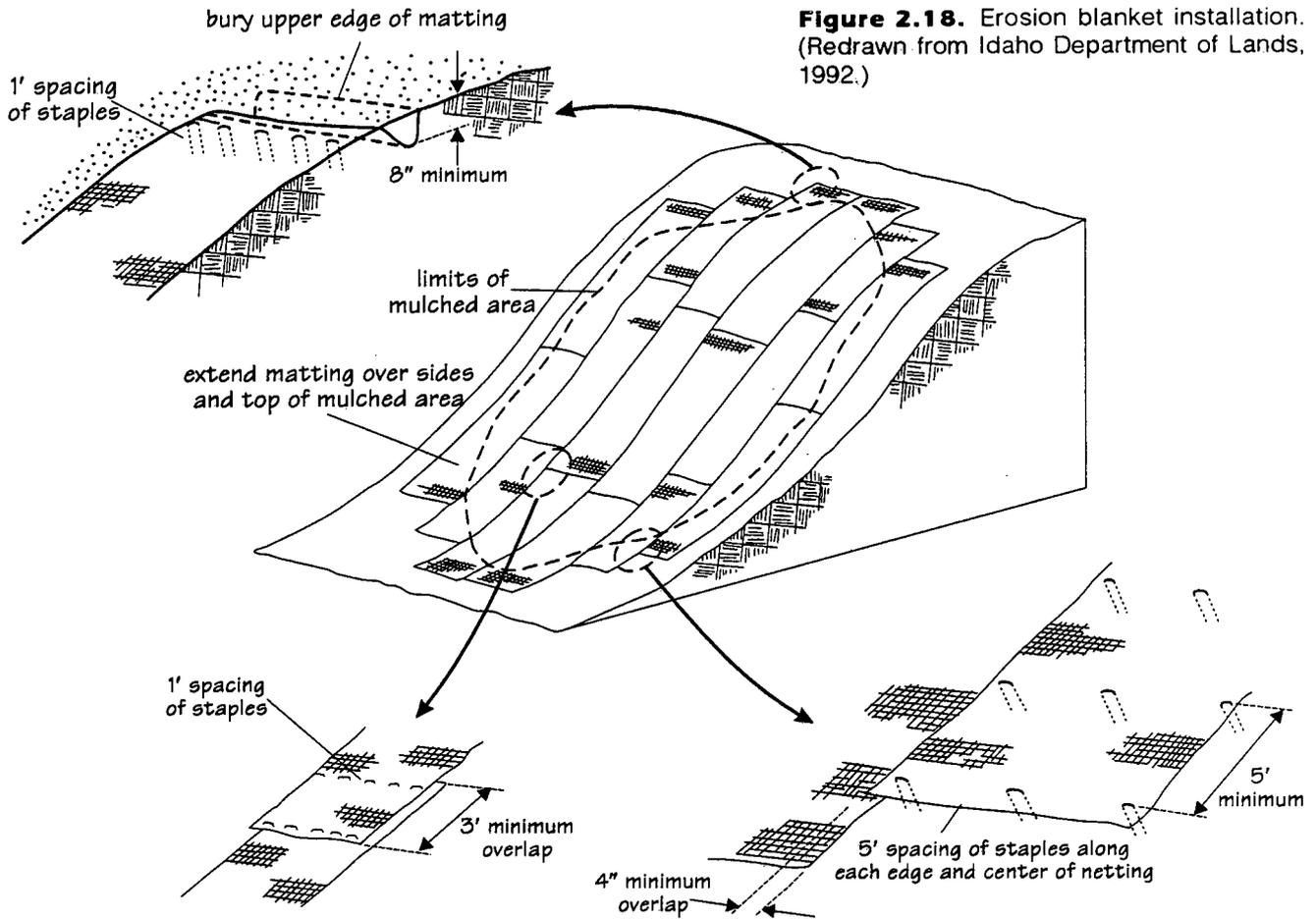


Figure 2.18. Erosion blanket installation. (Redrawn from Idaho Department of Lands, 1992.)

Vegetation

Vegetation absorbs some of the energy of falling rain, hold soils in place, maintains the moisture-holding capacity of the soil, and reduces surface flow velocities (Fig. 2.19).

- ☛ The most effective way to use vegetation is to leave it undisturbed to prevent erosion and reduce the speed of surface water flows.

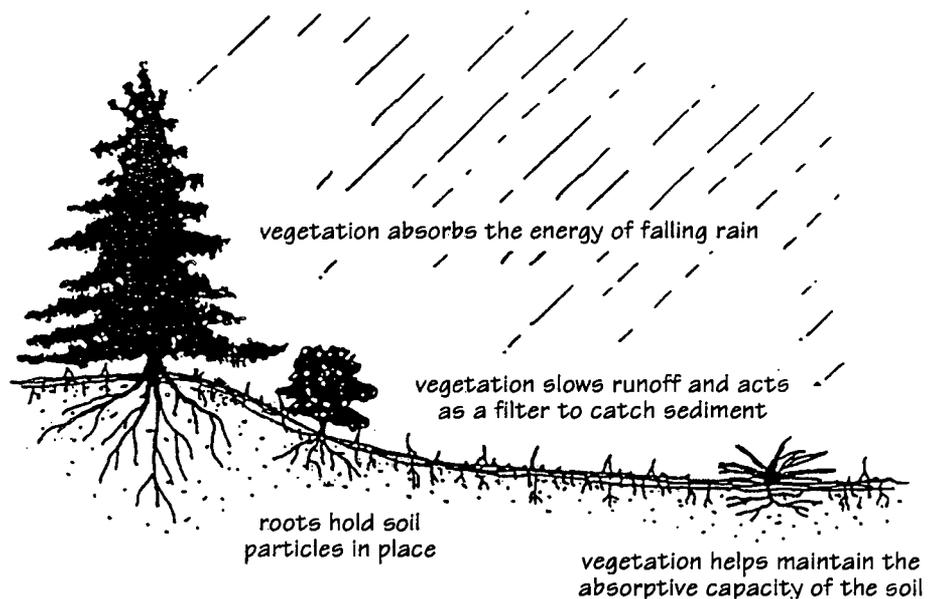


Figure 2.19. Effect of vegetation on storm-water runoff. (Modified from Washington State Department of Ecology, 1992.)

Figure 2.20. Placement and construction of contour ditches.

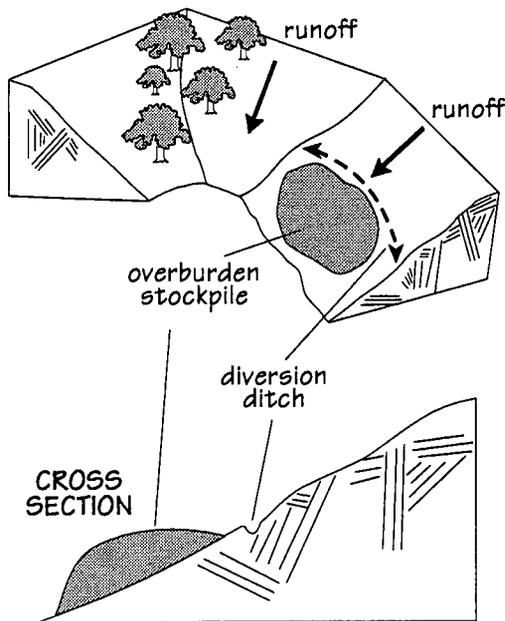
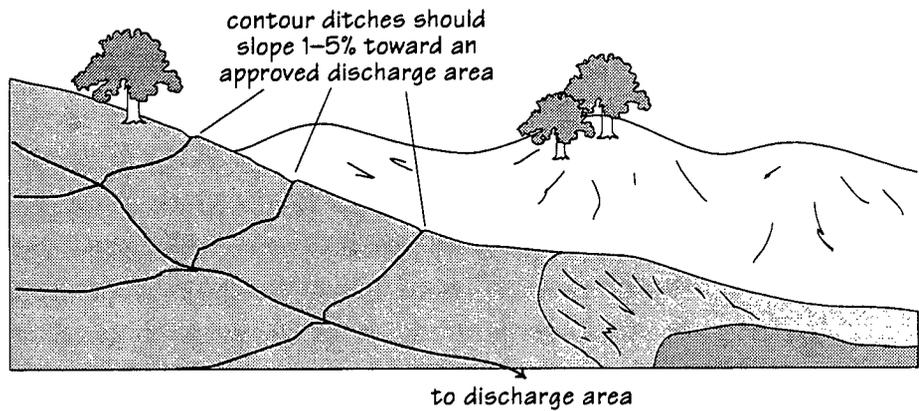
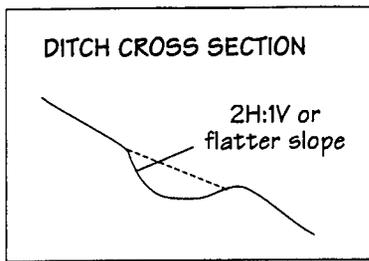


Figure 2.21. A diversion ditch (left) can be placed upslope from an overburden pile to prevent saturation of the pile.

- ☛ If a new area must be cleared for mining, clear only the amount needed for expansion within one year.
- ☛ As an area is cleared of vegetation, save the sod or slash and stake it down across the cleared slopes to temporarily reduce storm-water runoff until the area is mined.
- ☛ Replace topsoil and replant mined areas as soon as possible.
- ☛ Consider temporary revegetation on stockpiles that might wash or blow away or at mine sites that have erosion problems and will be dormant for a while. (Topsoil should not be replaced in this situation; see Interim Reclamation, p. 3.4.)

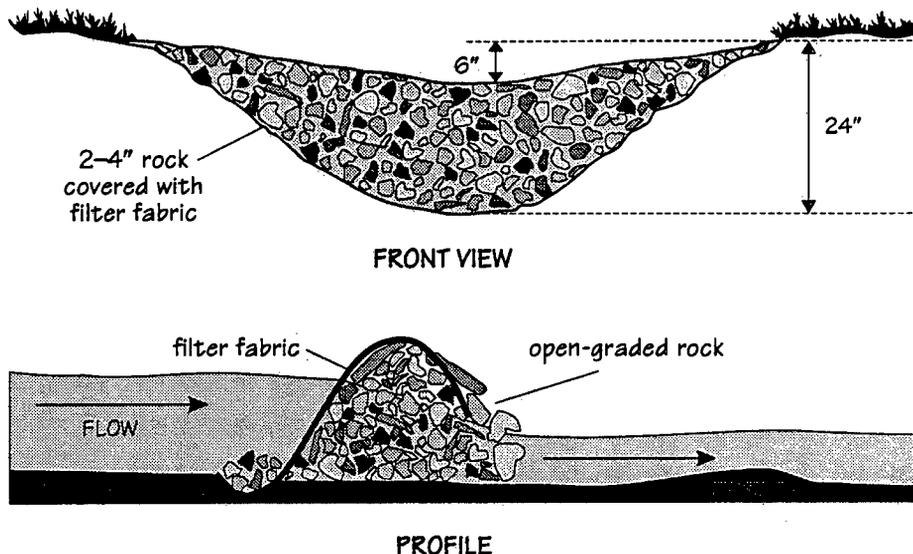
Contour and Diversion Ditches

Contour ditches are constructed along a line of approximately equal elevation across the slope (Fig. 2.20). Diversion ditches guide water around unstable areas to prevent both erosion and saturation with water (Fig. 2.21), reducing the likelihood of slope failure. Both types of ditches should have a 1 to 5 percent grade directed away from steep slopes to the appropriate drainage or vegetated areas.

Ditch channels may need to be lined to prevent scouring and minimize sediment transport. When their slope is greater than 5 percent, ditches are typically lined with rock. Where slope stability is of concern, impermeable liners may be used. Rock check dams, described below, should be placed in diversion and contour ditches at decreasing intervals as the slope increases.

- ☛ Contour and diversion ditches should be used to direct surface runoff away from disturbed areas and prevent rills and gullies from forming.

Figure 2.22. Details of rock check dam construction.



Rock and Log Check Dams

Check dams are typically constructed from coarse crushed rock ranging from about 2 to 4 inches in diameter, depending on the water velocities anticipated. A check dam can generally withstand higher velocity flows than a silt fence, and the integrity of the structure will not be affected if it is overtopped in a large storm event. The tops of check dams are lower than the channel margins so that water can spill over (instead of around the sides) during heavy storms (Fig. 2.22).

The effectiveness of rock check dams for trapping sediment can be improved by applying filter fabric on the upstream side. The bottom of the fabric must be anchored by excavating a trench, applying the fabric, and then filling the trench with coarse rock. This structure functions like a silt fence, but it is more durable. Choosing the proper size of filter fabric mesh is important to minimize clogging. The filter fabric must be replaced when it becomes clogged. Gabions (wire baskets filled with coarse rock) and filter fabric would function in the same manner.

As a temporary solution, burlap bags filled with crushed rock may also be used. Where they are readily available, logs can be used to construct check dams instead of rock (Fig. 2.23).

Figure 2.23. Details of log check dam construction. (From Washington Department of Ecology, 1992.)

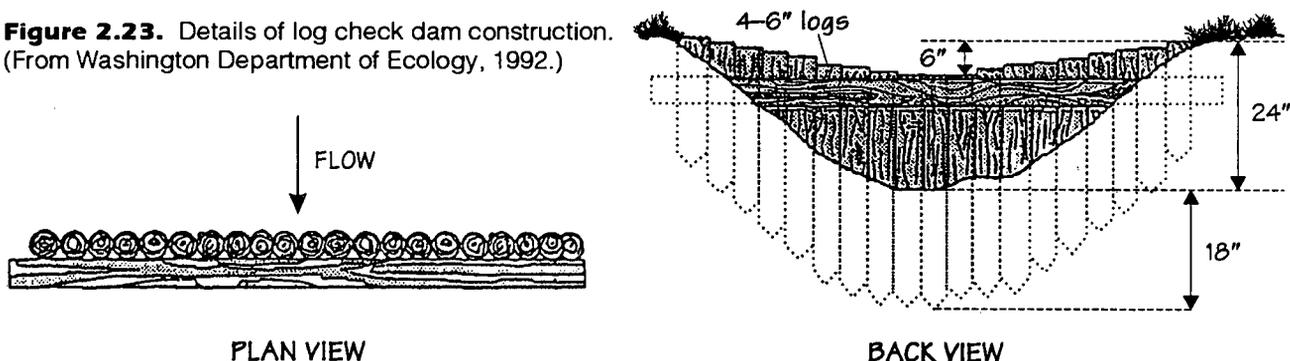
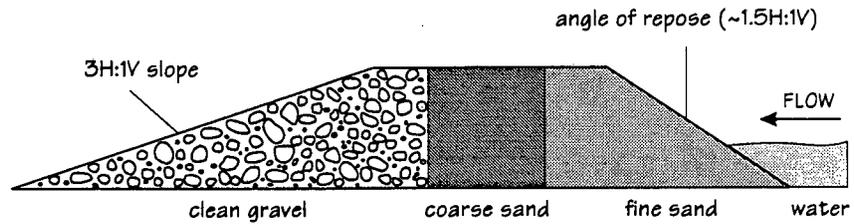


Figure 2.24. Idealized cross section of a filter berm showing details of construction.



- ☛ Check dams can be used to slow surface flow in ditches.
- ☛ Check dams are a common means of establishing grade control in a drainage to minimize downcutting.

Filter Berm

A filter berm (Fig. 2.24) allows the passage of water but not soil particles. It can be constructed of sand and gravel or crushed and screened quarry rock free of 200-mesh or smaller material. Using pit-run sand and gravel or quarry rock is not recommended because silt and clay will be present. In the ideal berm, fine sand, coarse sand, and gravel are placed sequentially from the upstream side to the downstream end of the berm. The sand may need periodic replacement as it becomes clogged with sediment.

- ☛ Filter berms should be used in channels with low flow.

Trench Subdrains and French Drains

The terms 'trench subdrain' and 'French drain' are sometimes used interchangeably. A French drain is a ditch partially backfilled with

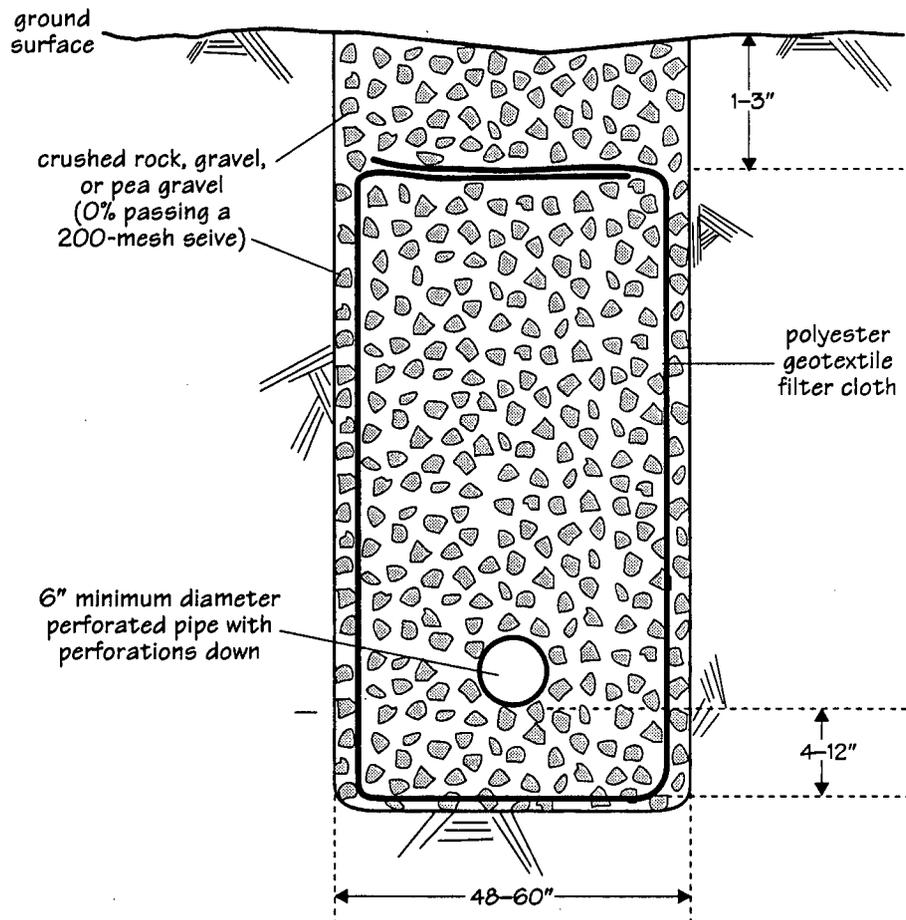


Figure 2.25. Details of trench subdrain construction.

loose, coarse rock to provide quick subsurface drainage and covered with a compacted clay cap. A trench subdrain is a ditch backfilled all the way to the top with loose, coarse rock, which allows water to enter more freely (Fig. 2.25). Both types of drains are designed to allow the movement of water while preventing or minimizing the movement of soil particles, and both require an outlet to remove water. Either can be improved by placing perforated pipe in the drain. (See also Figs. 3.11 and 6.6.)

Several filtering methods can improve the long-term effectiveness of these drains. Early applications relied on open-graded aggregate free of 200-mesh or smaller material, but this may eventually become clogged. Current practice is to wrap the perforated pipe in filter fabric so that sediment is trapped on the surface of the fabric rather than in the pore spaces. Because maintenance may eventually be required for subdrains, placement of clean-outs along the pipes is recommended.

- ☛ Drains are used for dewatering landslides and agricultural lands and stabilizing highway road cuts.
- ☛ Drains are also well suited for storm-water control.

Infiltration Galleries and Dry Wells

Infiltration galleries (or dry wells) are similar to trench subdrains and French drains except that there is no direct outlet for the water that enters them. These drains are deeper than they are long.

Infiltration galleries are created by excavating a hole—the deeper the better—which is then backfilled with coarse rock (Fig. 2.26). Typically, the holes are dug to the maximum reach ($\approx 20'$) of the backhoe used. If possible, water percolation should be improved by fracturing the bottom of the hole. This may require drilling and shooting. Backfilling to the surface with coarse rock allows heavy equipment to pass safely over these structures, making them well suited for installation around a crusher or screening plant. Be-

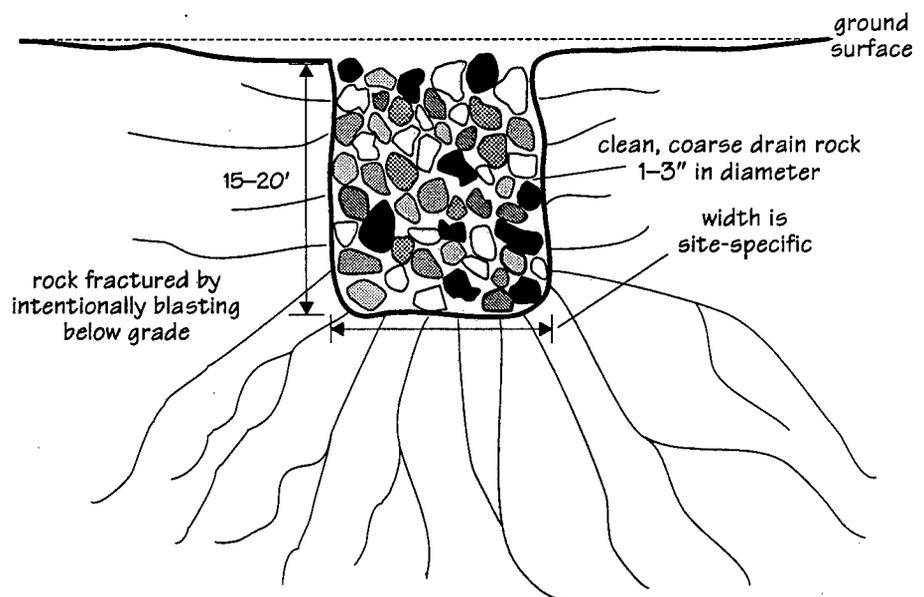


Figure 2.26. Details of infiltration gallery construction. (See also Fig. 2.9.)

cause there is no outlet for water, these galleries should be located where fines and storm water accumulate. Grading should direct storm-water runoff to them. The exact size and number of infiltration galleries needed is site specific. Maintenance is typically limited to periodic replacement of the fill with clean rock.

- ☛ Infiltration galleries are best suited for quarry sites or areas where natural infiltration of storm water is minimal and the water table is low enough to allow drainage. They should be used alone only where grades prevent connection to a gravity-flow subdrain or where volumes of storm water are small.
- ☛ Infiltration galleries should not be used if oil and grease are present to contaminate the ground water.

STORM-WATER SETTLING PONDS

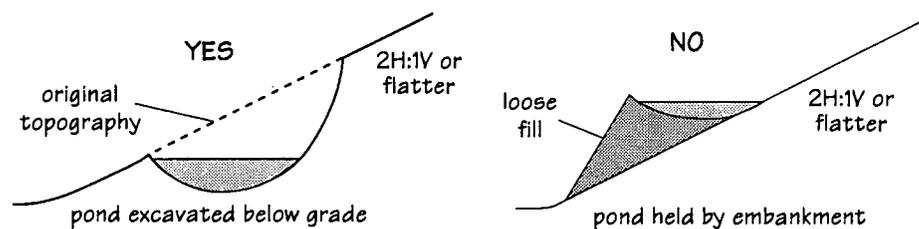
Most mine operations cannot rely solely on passive storm-water control methods and must employ settling ponds as an integral part of their storm-water system. These flat-bottomed excavations can range from small hand-dug sumps to ponds covering several acres. They slow water velocities enough to allow sediment to settle out of suspension. The number and size of ponds needed will depend on the site conditions. Construction of numerous ponds in the upper part of the drainage systems enhances effective trapping of sediments. For example, upper quarry benches and floors can be bermed so that they function as sediment basins during the rainy season.

Two types of ponds are commonly used—detention and retention. Detention ponds reduce the velocity of storm water, allowing sediment to settle before it moves off-site. Retention ponds are large enough to accept all storm water without surface discharge.

Ponds can be developed by building embankments or by excavating below grade. Excavated ponds are preferable because they are less likely to fail than embankments (Fig. 2.27). Embankments have to be carefully constructed using the same techniques that would be used for constructing waste and overburden dumps and stockpiles (see p. 3.15). Ideally, ponds should be situated at the bottom of a slope. Soil or geotextile liners may be required where stability is a concern. Many ponds are designed for the life of the operation, whereas others are used for only a short time.

- ☛ Settling ponds are the best method of gathering turbid water to allow sediment to settle out.

Figure 2.27. Details of settling-pond construction. The excavation method on the left is preferred because it is less likely to fail and cause flooding than an constructed embankment (right).





In Washington, water impoundments that contain more than 10 acre-feet of water must be approved by the Dam Safety Section of the Department of Ecology.



In Oregon, water impoundments with dams more than 10 feet high or with a capacity of more than 9.2 acre-feet of water must be approved by the Dam Safety Section of the Oregon Water Resources Department.

Configuration, Location, and Size

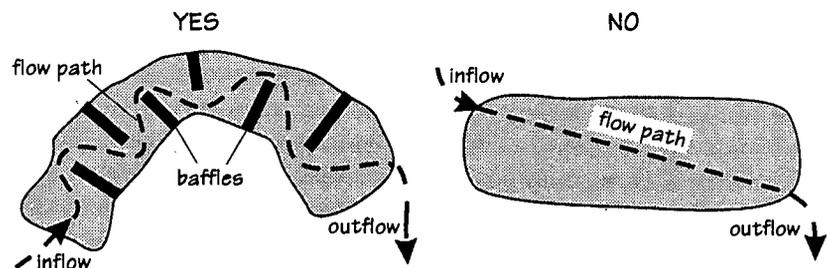
Storm-water detention ponds should be designed to maximize both velocity reduction and storage time. That is, storm-water entering a pond should spread out and migrate as slowly as possible toward the discharge point. Baffles constructed across the pond (Fig. 2.28) can reduce flow rates. A good rule of thumb is that the flow path of the pond should be at least five times the length of the pond. The inlet and outlet should be located so as to minimize the velocity and maximize the residence time.

If ponds are to be placed in the lowest area of the watershed, several should be constructed in a series. This will enable the first pond to slow the high-velocity waters coming into it and allow subsequent ponds to settle out sediments more effectively. For maximum treatment effectiveness, ponds should be placed as close as possible to those areas most likely to contribute sediment, such as the pit floor, the processing plant, and other areas of heavy equipment activity.

There are several widely used methods for determining the appropriate size of storm-water ponds for a given site. Most methods begin with estimating the size of the watershed and estimating runoff using infiltration rates. This information is then used to calculate the amount of runoff on the basis of annual precipitation or a storm event of a certain size. Observations of flow characteristics and locations made near the mine during storm events can be invaluable in developing a good storm-water pond system.

However, choosing an appropriate size for storm-water ponds can be difficult without site-specific information such as a storm hydrograph—a graph of the volume of water flowing past a certain point during a storm event. When hydrographic information is not available, theoretical calculations are used to estimate the flow volume for a given storm event. The calculations quickly become complicated because storm intensity and duration can have a significant

Figure 2.28. Details of detention pond design. The pond on the left, which maximizes the length of the flow path, is preferable to the pond on the right, which does not keep water in the pond long enough for optimum settling.



effect on the amount of runoff. Also important, but even more complicated, are determining the influence of road systems and vegetative cover on runoff.

The Natural Resources Conservation Service (formerly Soil Conservation Service) has developed a simplified method for estimating storm-water runoff. This method can work well if the limitations are understood, and it yields a good starting point for determining pond size. For more information, contact the local office of the Natural Resources Conservation Service.

There are many resources for information on designing storm-water ponds. (See the list of references at the end of the chapter.) For determining spillway designs and diversion ditch liner specifications, *Urban Hydrology for Small Watersheds* (Soil Conservation Service, 1986) is a good resource.

☛ For most mining situations, storm-water ponds should be designed to handle at least a 25-year/24-hour event or larger.

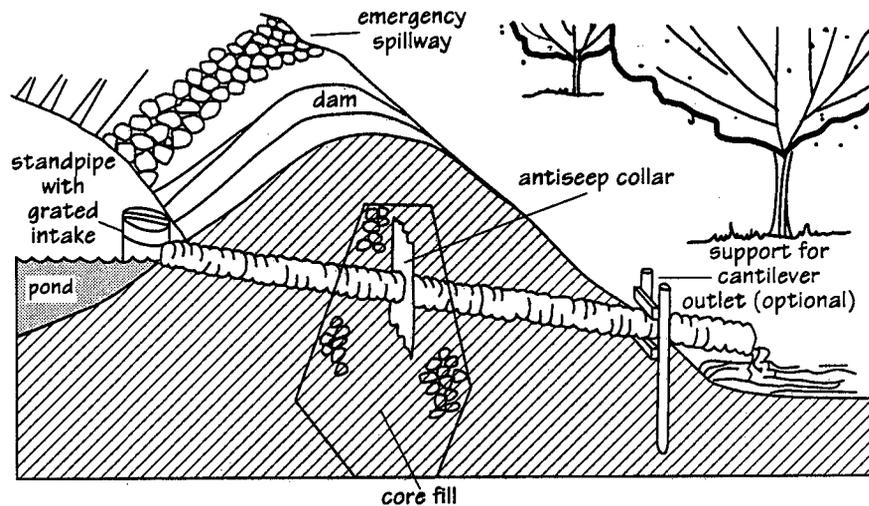
☛ In Washington, RCW 78.44 sets a standard for water control: "Diversion ditches, including but not limited to channels, flumes, tight-lines and retention ponds, shall be capable of carrying the peak flow at the mine site that has the probable recurrence frequency of once in 25 years as determined from data for the 25-year, 24-hour precipitation event published by the National Oceanic and Atmospheric Administration." The data for 25-year, 24-hour precipitation events can be found in Miller and others, 1973. Furthermore, if the site is located in a watershed that is prone to erosion, heavy storms, and/or flooding, design specifications may require planning for a 100-year storm event.

Maintenance Settling ponds must be cleaned out regularly to remain effective. Spillways should be kept open and ready to receive overflow during large storms. Settling ponds should be constructed and placed so that onsite equipment can be used to maintain them. In some situations, sediment can be pumped out of settling ponds as a slurry instead of being removed with heavy equipment. Regardless of the method of sediment removal, all sediment removed should be placed in a stable location so that it will not enter waterways.

Drainage The method of releasing water from storm-water ponds can be critical in determining their efficiency. Standpipes, spillways, and infiltration are the most common release methods.

Standpipes are vertical pipes rising from the bottom of the pond and connected to a gently sloping pipe that passes through the side of the pond to the discharge point (Fig. 2.29). Antiseep collars must be attached to the pipe where it passes through the dam or settling pond wall to prevent water from flowing along the outside of the pipe. A grate or screen should be placed over the standpipe intake to prevent debris from clogging it.

Figure 2.29. Section through a berm showing standpipe with antiseep collar. (Modified from U.S. Soil Conservation Service, 1982.)



Spillways are overflow channels that are part of the construction of all water impoundments. For small settling ponds used intermittently and designed for low maintenance, spillways may handle all water discharged from the pond. Where water is recirculated to the processing plant or where discharge is through a standpipe or subdrain, a spillway allows overflow during extremely wet weather or when the primary drain system becomes clogged.

Spillways should be located in undisturbed material and not over the face of a constructed dam. If the spillway is placed on erodible material, it must be rock lined to limit erosion that would compromise the safety of the dam.

STORM-WATER TREATMENT

In some places, additional treatment is required to reduce the turbidity of storm water prior to discharge to public waters. (See p. 2.3.) When storm water contains abundant clay-size particles too fine to settle using conventional pond treatment, land application is the treatment of choice. Alternative treatment methods include the addition of flocculants or the use of water clarifiers.

Land Application

Land application involves sending storm water through dispersal systems that allow the turbid water to slowly soak into vegetated areas. Land application may be a feasible technique to handle all sediment-laden water, or it may just increase storm-water storage capacity. Some of the most common distribution systems are perforated pipe laid across a slope, level spreaders, and sprinkler systems. Where large flat areas are available and water dispersal is not an issue, water can be discharged directly from the distributor pipe, eliminating the need for a perforated application pipe. Turbid water must not be allowed to enter wetlands or creeks.

Perforated Pipe. Plastic pipe with holes drilled in it can disperse a fine spray of water over a large surface area (Fig. 2.30). This method works well if the pipes are laid along slope contours; pipes laid perpendicular to slope contours develop excessive hydraulic head at the

CROSS SECTION

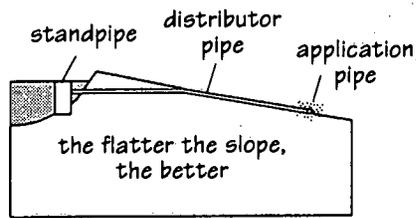
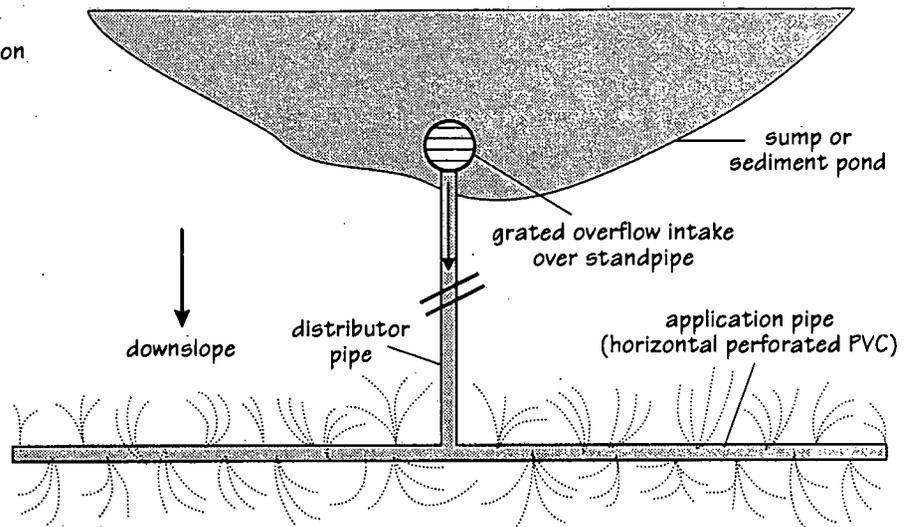


Figure 2.30. Typical land application system for storm water using a perforated pipe laid along a slope contour as a delivery system. The length of the distributor pipe is not to scale. The application area should be a reasonable distance from the pond in a stable vegetated area that can handle the extra water.

PLAN VIEW



lower perforations, resulting in uneven distribution of water and increased erosion potential.

Level Spreader. A level spreader is a trench excavated along the contour and filled with gravel or other permeable material that will allow turbid water to percolate into the ground. Level spreaders work best where the surrounding soil is fairly permeable.

Sprinkler Systems. Sprinkler systems use commercially available sprinklers to apply storm water. Sprinkler systems work well where:

- There is sufficient hydraulic head to distribute the storm water from sprinkler heads.
- The storm water contains only fine clays that will not clog sprinkler heads.
- There is sufficient vegetation to prevent erosion at the sprinkler heads.

Land application systems generally cannot handle the surges in water volume during a large storm because the storms often occur in winter when the soils may already be saturated. Assuming that soils will always accept the storm water can be a serious error. A simple infiltration analysis can determine the capacity and infiltration rate of a site's soils. The design of a land application system should assume that saturated soils occur and that existing or planted vegetation will filter sediments. Concentration of the outflows from a land application system should be avoided because it may cause soil erosion and create problems elsewhere.

Flocculants

Flocculants are most commonly used to clean storm-water discharges or water recycled from rock-washing operations. Proper use of chemical flocculants can reduce the size of settling ponds required for a given site. Most flocculants are not toxic to aquatic organisms and fish. However, the supplier or manufacturer and the state water quality agency should be asked about the environmental effects of the flocculant chosen.

Most flocculants are composed of high-density (heavy) organic polymers with a strong positive charge. The positively charged particles act like a magnet to attract negatively charged clay particles. The adsorption of clay onto the flocculant speeds settling of smaller and lighter clay particles. Alum is an inorganic flocculant that works in much the same way as the organic flocculants.

Chemical flocculants are designed for use with specific types of clay. The key to using a chemical flocculant is maintaining the proper mixture of flocculant and pond water and thoroughly mixing and agitating the flocculant mixture in the pond, making sure not to overagitate. Flocculants are commonly diluted in a large container before they are added to the settling pond.

At least two ponds should be used to remove suspended solids. The first pond should allow slow mixing of the flocculant and the water to be treated, with a retention time of 20 minutes. The second pond should ideally retain water for 3 to 8 hours. Alternatively, the flocculant mixture can be injected into the waste-water stream before it enters the settling ponds. Ponds must be situated where they can easily be cleaned on a frequent basis.



In Washington, a National Pollution Discharge Elimination System (NPDES) permit from the Department of Ecology is required if flocculant-treated storm water is to be discharged offsite.

Water Clarifiers

Water clarifiers are a mechanical method of separating solids and water. They consist of a series of closely spaced inclined plates. A flocculant is injected to assist in separation. These systems are widely used as a final treatment for sewage effluent prior to discharge. In some situations, it may be possible to rely on smaller storm and process water ponds if a water clarifier is used. Due to their initial capital costs, however, clarifiers are not used extensively in the aggregate industry.

STREAM BUFFERS

Vegetated stream buffer zones (areas that will not be mined, disturbed, or developed) vary in width from site to site. (See Permanent Setbacks and Buffers, p. 3.26.) Factors usually considered in establishing buffers are the purpose of the buffer, the size of the stream, and the rate of meander of a stream. The primary reasons to establish and maintain buffers are to:

- Preserve water quality.
- Protect the path of the existing stream or river.
- Protect riparian habitat.
- Minimize the potential for turbid water/sediment discharges into public waters.
- Maintain tree cover over streams to moderate water temperature to insure fish survival.
- Protect a river or stream from capture because of lateral migration of a river.

- Protect the habitat of threatened or endangered riparian and aquatic species.

STREAM DIVERSION

Stream diversion can be beneficial to water quality and mine operations by isolating public waters from the mine activity. To insure the long-term stability of landforms, a highly technical approach to stream diversion has been required at large open-pit mines in the western states where numerous sections of land are being affected. For aggregate sites in the Pacific Northwest where the scale is significantly smaller, a less technical approach is appropriate because typically only a small portion of the total watershed is being impacted.

Streams can be classified as perennial or permanent (containing water all year round) or intermittent or ephemeral (containing water only when it rains). Technical discussions and research on classification of drainages, drainage density, and reconstruction techniques for reclaimed mine sites are ongoing and complex.

IMPORTANT: Before diverting any perennial or intermittent streams, check to see if a permit is needed.



In Washington, contact the Departments of Ecology, Fish and Wildlife, and Natural Resources.



In Oregon, contact the Departments of Environmental Quality, Fish and Wildlife, and Geology and Mineral Industries and the Division of State Lands.

Perennial or Permanent Streams

Diversion of perennial streams is beyond the scope of this manual and will not be covered. If a perennial stream must be diverted, the proper state and local agencies should be consulted.

Intermittent or Ephemeral Streams

Diversion of intermittent or ephemeral streams is not as critical as for perennial streams but may still require permits. The basic rule of thumb is to replace existing drainages and drainage conditions. In some mines, segments of drainages may be significantly altered, particularly those located in an upland quarry site. The same channel carrying capacity, length, characteristics, and gradient as the original stream should be maintained in the diversion.

On quarry sites after mining, channel length may be shortened if streams are directed over the highwall to enhance reclamation diversity. Channel stability is not generally affected by steepening the gradient or shortening the channel if the channel foundation is hard rock. Decreasing channel length or increasing channel gradient on alluvial or colluvial materials should not be undertaken without thorough analysis.

If the drainage diversion will be short term, a rock-lined diversion channel may be all that is needed. For diversions that will be in place for several years, the diverted stream should be shaded, habitat areas, such as pools and riffles, rootwads or logs, should be created,

and biotechnical bank-stabilization vegetation methods should be used.

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3 Operation and Reclamation Strategies

INTRODUCTION

Four general strategies can be used in surface-mine reclamation. Some mines may use all four of these strategies:

Post-mining reclamation – reclamation only after all resources have been depleted from the entire mine.

Interim reclamation – temporary reclamation to stabilize disturbed areas.

Concurrent (progressive or continuous) reclamation – reclamation as minerals are removed; overburden and soil are immediately replaced.

Segmental reclamation – reclamation following depletion of minerals in a sector of the mine (Norman and Lingley, 1992).



In Washington, the Department of Natural Resources (DNR) encourages segmental reclamation wherever site conditions permit.



In Oregon, segmental reclamation is considered a variant of concurrent reclamation. The Department of Geology and Mineral Industries (DOGAMI) encourages concurrent reclamation wherever possible.

POST-MINING RECLAMATION

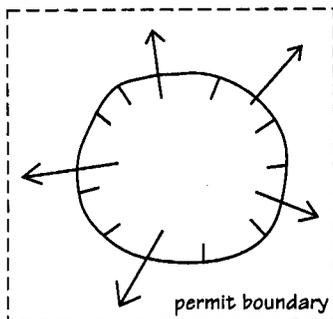


Figure 3.1. For a mine site beginning a center-outward excavation, the preferred segmental reclamation method is not possible, and post-mining reclamation then becomes the method by default.

Reclaiming after all resources have been depleted from the entire mine is generally discouraged by regulating agencies because it results in large areas being left unreclaimed for long periods, but it may be necessary at many quarries and metal mines and at some sand and gravel deposits (Fig. 3.1).

Advantage

- Complete resource depletion is more easily attainable in some instances.

Disadvantages

- Stockpiled soils will have deteriorated during the mine's life and will not be as fertile as the soils in place.
- Revegetation will probably be more expensive and take longer.
- The site generates negative public opinion for a long period.
- The land is not providing a beneficial use while unreclaimed.
- No reclaimed segments are available as test plots for revegetation.
- Bonding liability is very high.

INTERIM RECLAMATION

Interim reclamation is done seasonally to stabilize mined areas or stockpiles and to prevent erosion. If a mine is to remain inactive for more than 2 years or if a stockpile, excavated slope, or storage area needs rapid stabilization, it may be appropriate to temporarily reclaim it by doing earthwork and using fast-growing vegetation, such

as grasses or legumes, to stabilize the site. However, topsoil should not be moved for interim reclamation; significant amounts are lost each time topsoil is moved.

Advantages

- Soil viability is maintained.
- Fewer storm-water control structures are needed because the erosion-prone area is vegetated.
- Air and water quality are improved in the short term.
- Sites that use interim reclamation are often easier to convert to final reclamation than those that do not.

Disadvantages

- Areas may be redisturbed as plans change.
- Cost may be greater than when material is moved only once.

CONCURRENT OR PROGRESSIVE RECLAMATION

Concurrent or progressive reclamation typically involves transporting material from the new mining area to the reclamation area in one circuit (Fig. 3.2). This is the method used in strip mining minerals such as coal where a small amount of mineral is mined compared to a large amount of overburden moved.

Concurrent reclamation is viewed by the public as the preferred technique. However, progressively reclaiming land that overlies known mineral resources can be wasteful. Thin soils may render progressive reclamation impractical or impossible on some sites. It is also impractical for those operations that must blend different sand and gravel sizes from various parts of the mine site to achieve product specifications.

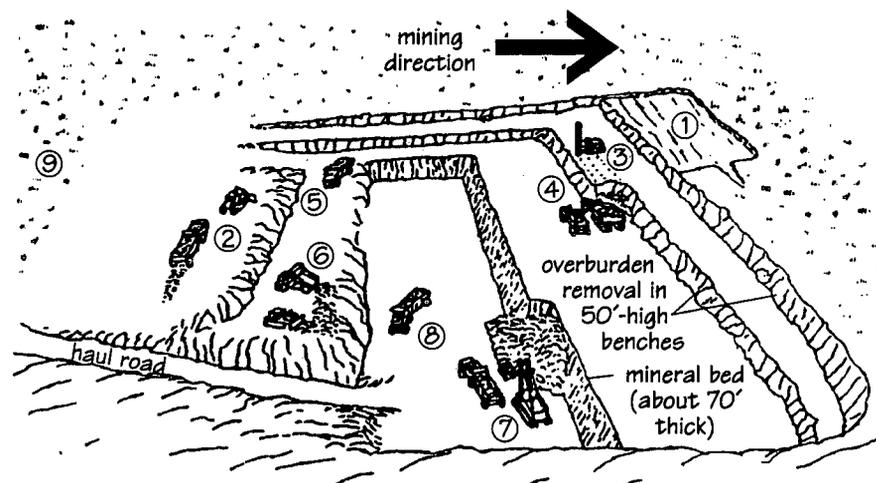
Advantages

- Soil is immediately moved to the reclamation area.
- Soil and subsoil profile are more easily reproduced than in other types of reclamation.
- Materials are moved only once.
- Disturbance at any given time is minimized.

Figure 3.2. Concurrent or progressive extraction and reclamation of a shallow dry pit.

- 1, removal of topsoil;
- 2, spreading topsoil on graded wastes;
- 3, blasthole drilling of overburden;
- 4, loading of overburden;
- 5, hauling of overburden;
- 6, dumping of overburden;
- 7, loading of product;
- 8, hauling of product;
- 9, reclaimed land.

(Modified from U.S. Bureau of Land Management, 1992.)



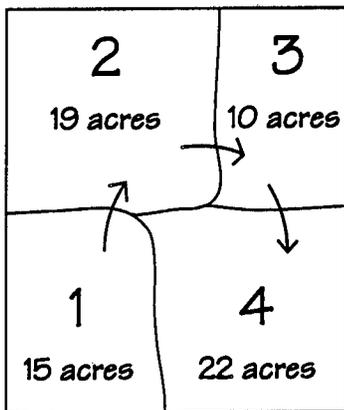
SEGMENTAL RECLAMATION

Figure 3.3. A segmental reclamation plan with four segments showing segment size and direction of working.

- Offsite impacts are minimized in any given area.
- Mined land can be reclaimed earlier for agriculture or grazing.
- Bond liability tends to be low.

Disadvantages

- Progressive reclamation is generally not feasible in quarries or deep gravel deposits.
- Progressive reclamation typically does not work if the water table is above the excavation depth.

In segmental reclamation, the mine is divided into segments with fairly uniform characteristics and the order of mining and reclaiming these segments is determined (Fig. 3.3). Prior to mining, soil in the first segment is stockpiled to minimize handling and protect the resource. After resource extraction from the first segment, its slopes are reshaped according to the reclamation plan. Soil is then stripped from the second segment and spread on the slopes of the first segment.

Revegetation of the floor of the first segment does not occur until the area is no longer needed for mineral processing or maneuvering trucks. Immediately prior to replacing topsoil and planting, the pit floor is plowed or ripped because most plants cannot grow in soils that have been overcompacted by heavy machinery. Prompt planting in the correct season with grasses, legumes, and trees will quickly produce a cover that reduces erosion, retains moisture, and moderates soil temperature.

Segmental reclamation works best in homogenous deposits where aggregate mining proceeds in increments. Typical working cells or segments will be larger in heterogeneous deposits (for example, fluvial deposits) where blending minerals from many places in the mine may be required (Norman and Lingley, 1992).

Advantages

- Topsoil for most segments is handled only once and is not stored. This reduces reclamation cost and preserves soil quality.
- Final slope angles and shapes can be established during excavation rather than as a separate operation.
- Clay and silt, which are critical for retaining the moisture and nutrients essential for vegetation, are less likely to be washed away because they are immediately revegetated.
- The potential for establishing a diverse self-sustaining soil/plant ecosystem is enhanced because revegetation of reclaimed segments will be monitored as mining continues.
- Restoration of chemical, physical, and biological processes is less expensive when reclamation is started as soon as possible and spread over the life of the mine.

- Reclamation is less expensive because it does not require mobilization of personnel or equipment for the sole purpose of reclamation.
- Short-term environmental impacts are reduced.
- Bonding liability at any given time is minimized.

Disadvantages

- Thin soils may render this technique impractical.
- It is impractical for those operations that must blend different sand and gravel sizes from various parts of the mine site in order to achieve product specifications.
- Poorly planned segmental reclamation may result in disturbing more land per unit of mineral produced.



By law (RCW 78.44) in Washington, a segment is defined as a 7-acre area with more than 500 linear feet of working face. Larger segments must be approved by DNR in a segmental reclamation agreement.

MINING TO RECLAIM

Mining the slope to the final contours reduces reclamation costs by eliminating some of the earthwork necessary for final reclamation. This can result in reclamation being completed earlier, the performance security being reduced, and operating costs being lower in the long run.

SITE PREPARATION

Before mining begins, steps must be taken to mark permit boundaries, setbacks, buffers, segments, and storage and processing areas. Setbacks, buffers, and storage areas should remain undisturbed until reclamation. Keeping equipment and stockpiled materials out of these areas will help preserve them. Flagging, fences, or monuments will alert operators to areas to be avoided. If vegetation is present on slopes that might be unstable if bare, then those plants should be protected. Activity near trees and shrubs should be kept outside the area below the longest branches (or drip line).

Permit and Disturbed Area Boundaries

Permit boundaries and the limits of the area to be disturbed (permit boundary minus setbacks and buffers) should be identified with clearly visible permanent markers. Markers should be maintained until the reclamation permit is terminated.

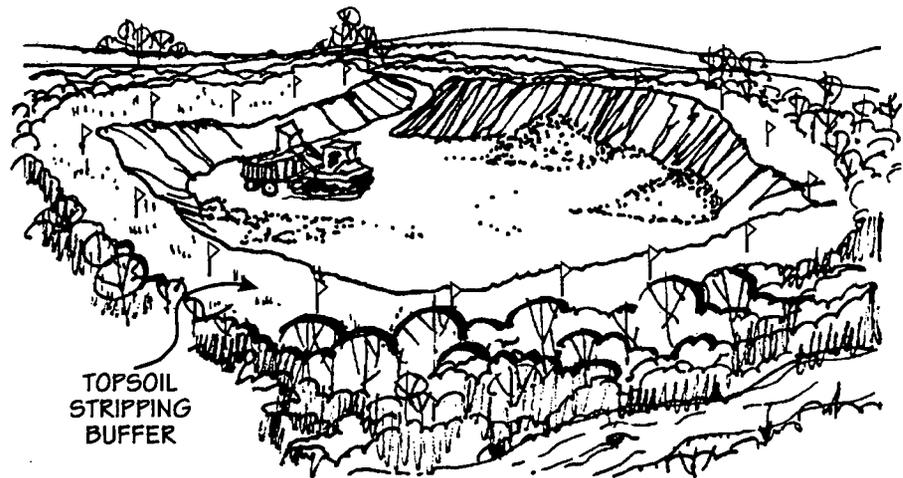
Permanent Setbacks or Buffers

Permanent setbacks or buffers are necessary at many mines (Fig. 3.4). They are lands (that may or may not have vegetation) that remain undisturbed during mining to provide habitat or visual and/or noise screening.



In Washington, the minimum permanent setback for quarries (mines in consolidated deposits) permitted after June 30, 1993, is 30 feet. This area cannot be mined, and the material cannot be used for reclamation. Permanent setbacks are not required for gravel pits (unconsolidated deposits) but may still be useful if the mine has close

Figure 3.4. Buffer strips of native vegetation protect adjacent land and water and visually screen the operation. Note that the flags marking the limits of the disturbed area show employees where to stop mining. (Modified from Green and others, 1992.)



neighbors or adjacent scenic resources. However, setbacks may still be required by local government.



In Oregon, mine setbacks are site-specific and designed to provide lateral support for adjacent lands. Setbacks for the purpose of minimizing conflicting land uses are determined by the local land-use authority.

Reclamation Setbacks

Reclamation setbacks are lands along the margins of surface mines that must be preserved to provide enough material to accomplish reclamation. If the cut-and-fill method will be used to restore slopes (rather than mining to a final slope), the reclamation setback from the property boundary (or permanent setback, where used) should be wide enough to ensure that sufficient material is available for reclamation.



In Washington, the width of the reclamation setback for pits (mines in unconsolidated deposits) permitted after June 30, 1993, must equal or exceed the maximum anticipated height of the adjacent working face.

Note: A setback equal to the working face will provide only enough material for a 2:1 slope. To meet the standards of the law for slopes of between 2:1 and 3:1, a setback of 1.5 times the vertical height of the working face is required.

Setbacks to Protect Streams and Flood Plains

Streams and flood plains are areas prone to damage by and slow to fully recover from mining operations without proper planning. Mining in or near streams and flood plains requires greater care on the part of the operator and is subject to closer regulation than mining in less sensitive areas.



In Washington, no mine, including haul roads, stockpiles, and equipment storage, may be located within 200 feet of or on the 100-year flood plain of a stream that has a flow greater than 20 cubic feet per second unless a Shoreline Permit is issued by the local jurisdic-

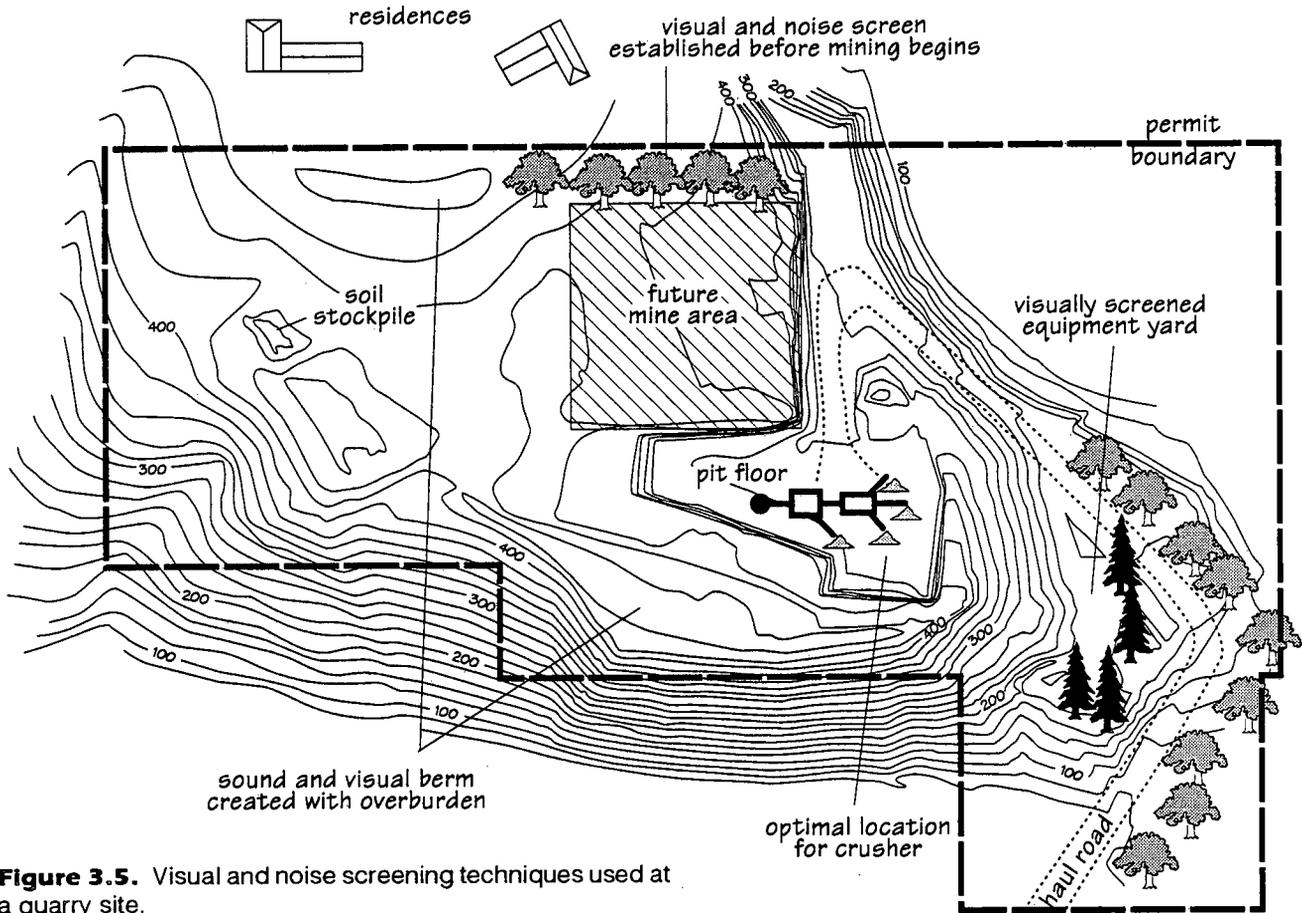


Figure 3.5. Visual and noise screening techniques used at a quarry site.

tion (Washington Department of Ecology, 1992). Wide setbacks may be necessary for stream and flood-plain stability and to prevent breaching of the pit at a later date. The depth of excavation and pit size may be limited in these areas.



In Oregon, mining is not explicitly prohibited on the 100-year flood plain. Setbacks are site-specific to protect riparian areas and stream integrity. Depending on flood frequency, bank stability, and the potential for lateral migration of the river channel, wider setbacks may be required or depth of excavation may be limited.

Conservation Setbacks

In special instances, setbacks that will not be mined or disturbed may be necessary to protect unstable slopes, wildlife habitat, riparian zones, wetlands, or other sensitive areas or to limit turbid water discharge from areas that will be disturbed.

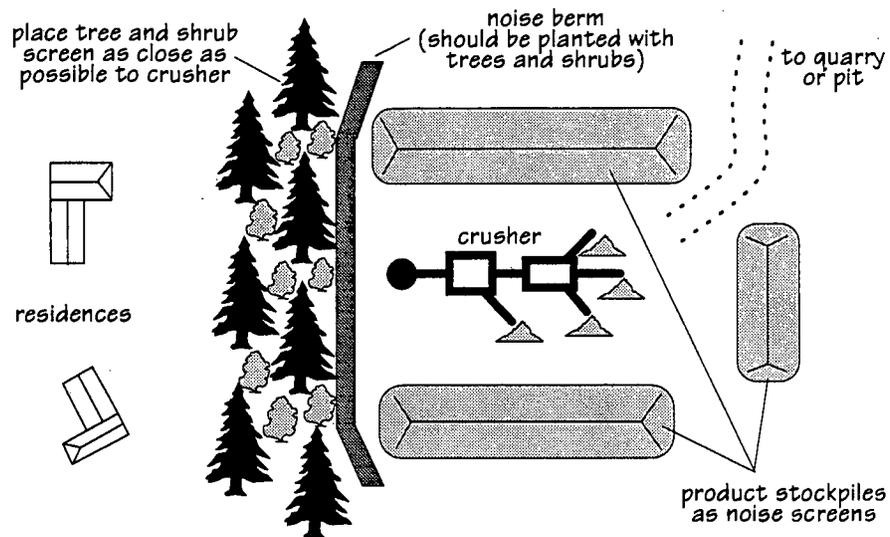
Topsoil and Overburden Storage Areas

Prior to mining a segment, all available topsoil and overburden should be stockpiled in separate, stable storage areas for later use in reclamation or immediately moved to reclaim adjacent depleted segments. Topsoil needed for reclamation cannot be sold, removed from the site or mixed with sterile soils.



In Washington, topsoil should not be used to create screening berms required by local government because this may preclude its timely use for reclamation.

Figure 3.6. Visual and noise screening techniques used at a processing area.



VISUAL AND NOISE SCREENS

The value of visual and noise screens cannot be overstated. The adage 'out of sight, out of mind' is particularly applicable to mine sites. The more the public can be screened from the unpleasant aspects of mining, such as dust, noise, and an unsightly view, the less likely they are to aggressively oppose mining operations.

The following are some ways to reduce the noise and visual impacts of mining (Figs. 3.5 and 3.6):

- ☛ Plan mine development to minimize offsite impacts.
- ☛ Use existing topography as a noise and visual screen.
- ☛ Store overburden in berms along the site perimeter; establish vegetation on them immediately to reduce noise.
- ☛ Plant trees and other visual screens well ahead of the mining to give them time to establish before they are needed—the denser and wider the better.
- ☛ Plant tree barriers as close to the noise source as possible and between noise sources and the neighbors.
- ☛ Plant trees that will quickly be tall enough screen the mine with shrubs to fill in the gaps, particularly if the foliage is sparse on the lower parts of the trees. Use evergreens if the site will be operated year round.
- ☛ Reduce noise by placing loud stationary equipment, such as the crusher, in an excavated area below the pit floor.
- ☛ Surround the crusher with product stockpiles to reduce noise.
- ☛ Enclose the crusher in a building.
- ☛ Muffle the exhaust systems on trucks and other equipment.
- ☛ Line dump truck beds with rubber.

How Noisy Is It?

Figure 3.7 summarizes the noise level, in decibels (dBA), from some common sources. Table 3.1 summarizes noise measurements for common mining equipment.

3.8 RECLAMATION AND OPERATION STRATEGIES

Figure 3.7. Noise levels and human response for some common noise sources. (Modified from Barksdale, 1991.)

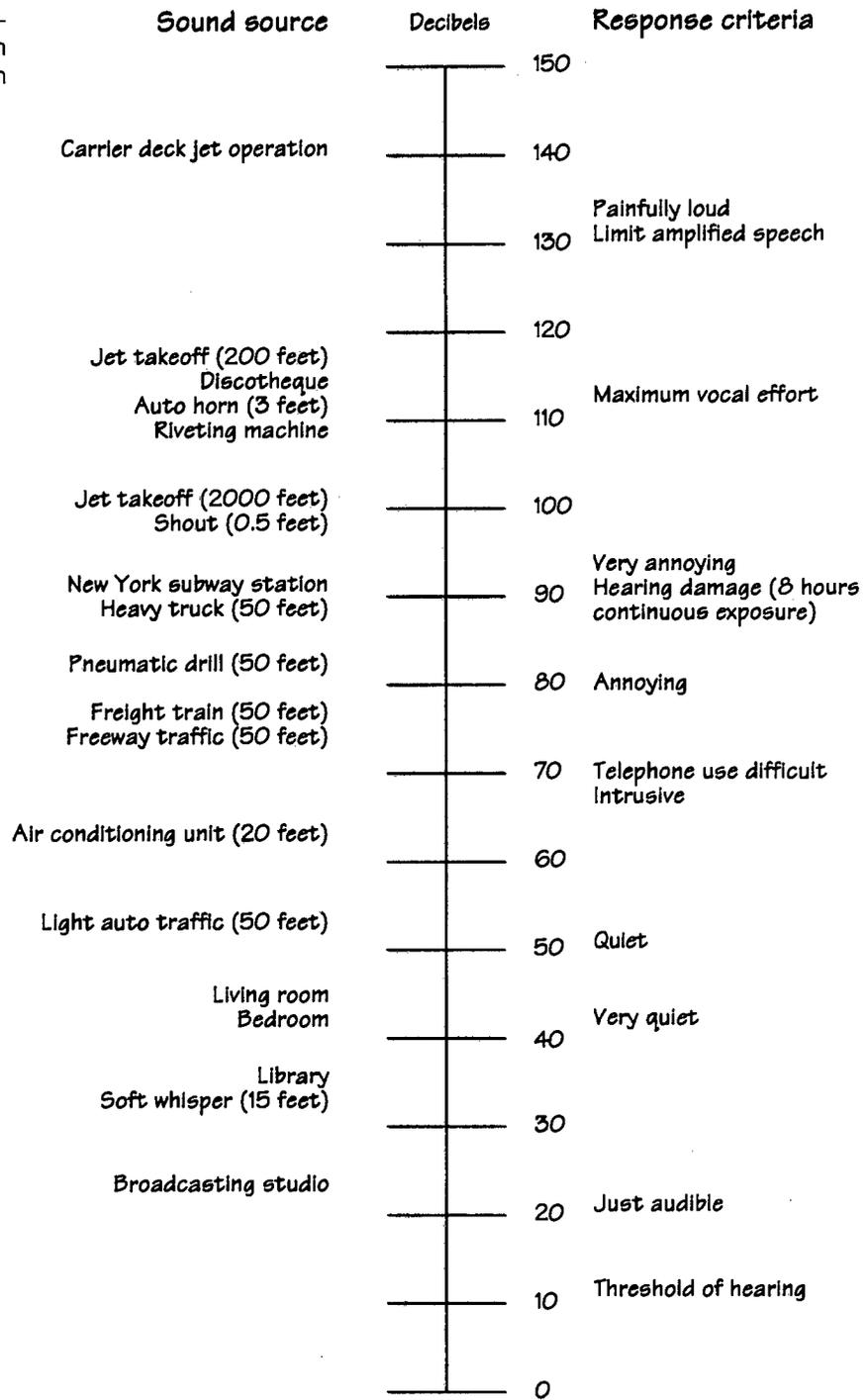


Table 3.1. Summary of noise measurements and projected noise levels in decibels (dBA) for common mining equipment (Barksdale, 1991)

Noise source	Measurements	Projected noise levels		
		1,000 ft	2,000 ft	3,000 ft
Primary and secondary crusher	89 dBA at 100 ft	69.0 dBA	63.0 dBA	59.5 dBA
Hitachi 501 shovel, loading	92 dBA at 50 ft	66.0 dBA	60.0 dBA	56.5 dBA
Euclid R-50 pit truck, loaded	90 dBA at 50 ft	64.0 dBA	58.0 dBA	54.4 dBA
Caterpillar 988 loader	80 dBA at 300 ft	69.5 dBA	63.5 dBA	60.0 dBA

Noise-Control Methods

Noise-control measures, such as berms and tree barriers, can reduce the noise experienced by adjacent landowners by as much as 12 dBA, whereas earthen berms with vegetation can reduce noise up to 15 dBA, depending on the size and configuration of the berms, the type and density of vegetation, and the distance to the listener.

Visual Screens

The least expensive visual screen is the existing topography and vegetation on the site. Plan to leave large buffer zones of trees and vegetation between the mining site and nearby roads and buildings. Narrower buffer screens can be created with vegetation (preferably native evergreens), walls, fences, or berms, although they are generally less effective than buffer zones, which rely on distance for their effectiveness.

REMOVING VEGETATION

In a well-planned operation, vegetation is removed from areas to be mined only as needed and is preserved when possible to screen the site and limit erosion that may result in turbid water discharge.

Disposing of Vegetation

Grass and small shrubs can be incorporated into the topsoil stockpile, and larger material can be chipped and used as mulch or to add organic matter to the soil. Burial of large volumes of woody debris is permissible only in areas above the water table because anaerobic decomposition of woody debris produces nitrates, which can degrade water quality. Vegetation should not be buried in areas where building construction is planned because the soil may collapse as the vegetation decays.



In Washington, a permit from the county health district is required for burial of more than 2,000 cubic yards of debris. If burning will take place, a burning permit may be necessary.



In Oregon, a permit from the Department of Environmental Quality is generally required for burial of debris and may be required for burning.

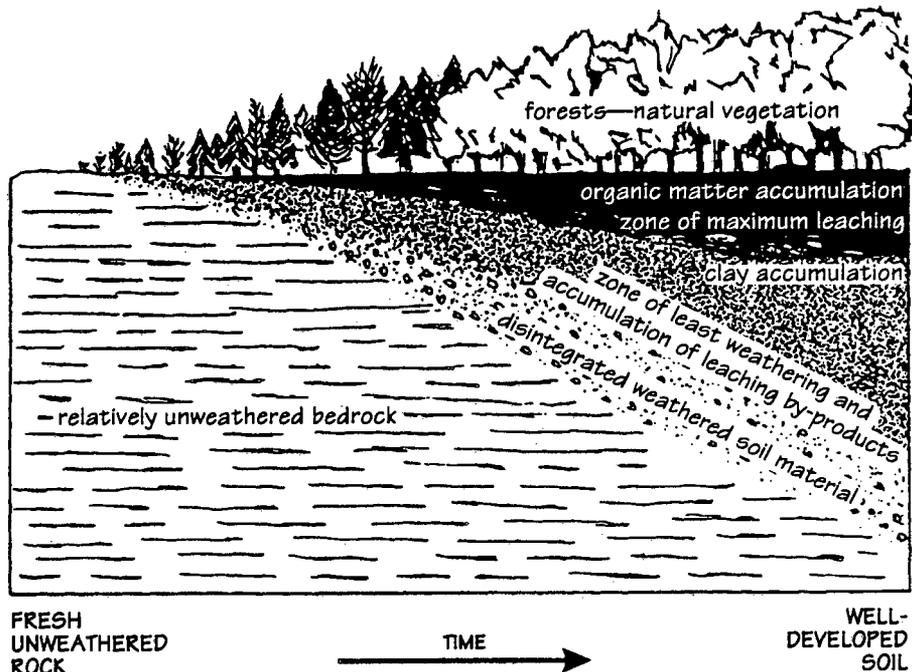
Transplanting Vegetation

Bushes and small trees, together with some surrounding soil, can be scooped up using backhoes or front-end loaders with tree spades and transplanted to mined-out segments or areas to be used as screens. (See p. 7.9.) This technique is a cost-effective means of quickly establishing a natural appearance in reclaimed segments, introducing seed trees, and providing screening. These plants are already adapted to the area. Moving the soil along with the plant protects rootlets and microorganisms that are important to plant health. Additionally, the soil may contain seeds or shoots of other vegetation, which may spread across nearby areas.

Using Vegetation for Habitat

Some of the trees and shrubs that have been cleared prior to mining can be set aside for future use (with leaves, needles, and roots intact) in new lakes or wetlands as artificial 'reefs' to provide habitat or as brush piles above ground to provide cover for wildlife or reduce erosion. (See Structures to Enhance Habitat, p. 4.12.)

Figure 3.8. Soil profile development over time. Organic matter accumulates in the upper horizons, and the rate of accumulation is dependent on the type and amount of vegetation present. Clay and the by-products of chemical leaching accumulate in the lower horizons. (Modified from THE NATURE AND PROPERTIES OF SOILS, 8/E by Brady, ©1974. Reprinted by permission of Prentice-Hall, Inc., Upper Saddle River, NJ.)



THE SOIL RESOURCE

Soil is one of the most important components of successful reclamation. Without soil, vegetation cannot be established. A typical soil is composed of approximately 45 percent minerals (sand, silt, and clay particles), 5 percent organic matter, and 50 percent pore space for air and water. Organic matter, air, and water in a soil allow it to support a tremendous amount of animal and plant life, most of which is invisible to the naked eye.

The word ‘topsoil’ is often used to describe a broad range of soil types. It may refer to high-quality river-bottom loams suitable for intensive agriculture or to the top layer of the soil resource, generally the most fertile slice.



In Washington, topsoil is defined in the reclamation law [RCW 78.44] as the “naturally occurring upper part of a soil profile, including the soil horizon that is rich in humus and capable of supporting vegetation together with other sediments within four vertical feet of the ground surface”.



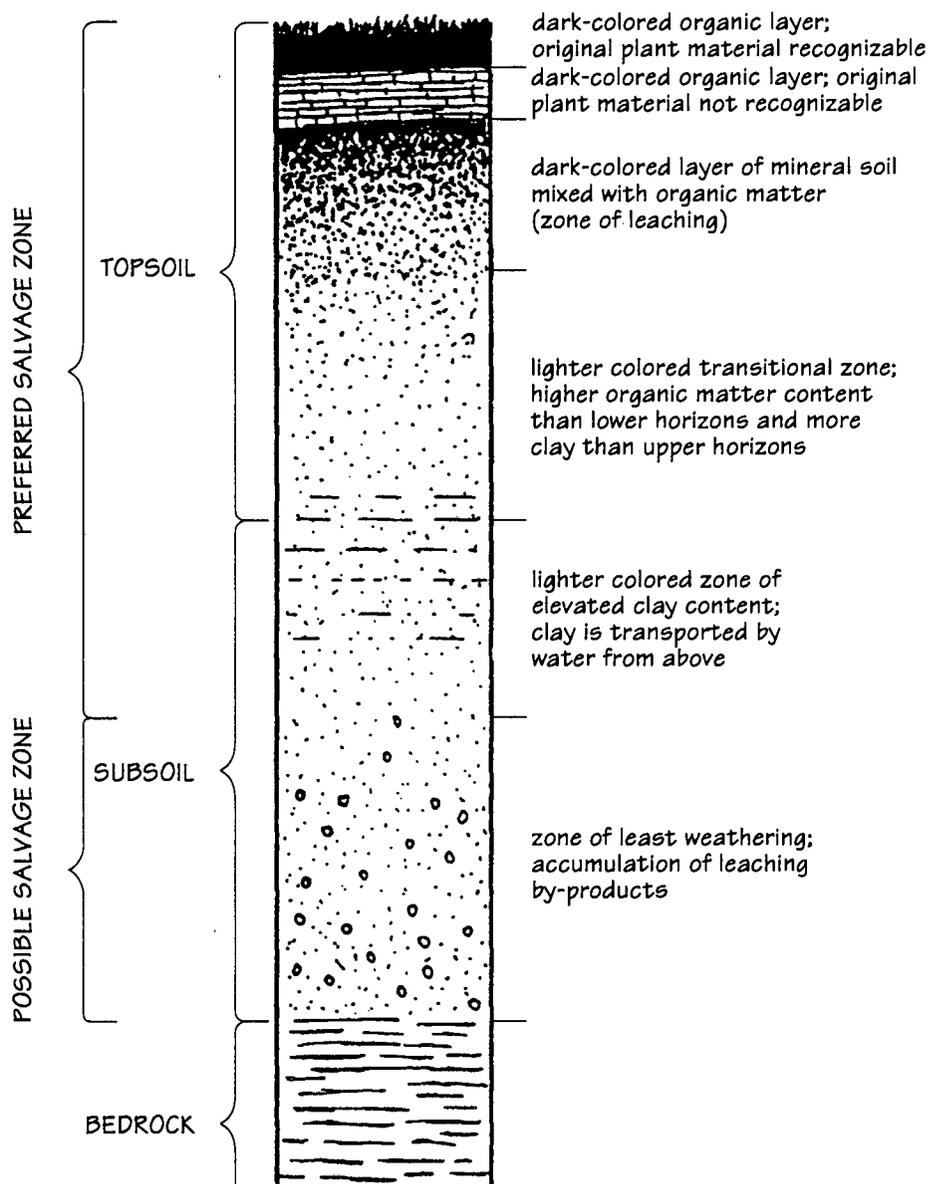
In Oregon, soil salvage requirements are determined on a site-specific basis.

Soil Development

Soils may be defined in terms of soil profile development (Fig. 3.8). Weathering creates chemical and physical changes in bedrock or other parent material. Over time, layers or soil horizons develop. A soil horizon is chemically and/or physically different from the soil horizons above or below. A soil horizon may be leached of certain minerals, or it may be altered by the deposition or formation of other minerals.

Plants decay and contribute organic matter to the top of the soil profile (topsoil). This is where organic matter accumulates and the

Figure 3.9. Diagrammatic sketch of the residual soil profile that develops over time on a bedrock surface. The thickness of the layers can vary widely within a mine site and between nearby sites. No scale is intended here. (Modified from THE NATURE AND PROPERTIES OF SOILS, 8/E by Brady, ©1974. Reprinted by permission of Prentice-Hall, Inc., Upper Saddle River, NJ.)



maximum leaching of minerals occurs. Water moving through the upper soil carries clay and dissolved minerals to deeper layers (subsoil).

The conceptual soil profile in Figure 3.9 shows the major horizons in a soil weathered from bedrock. Climate is the most influential factor in soil formation because it determines the degree of weathering that occurs. Thin, poorly developed soils are common in arid areas, whereas thick, well-developed soils are common in wetter areas.

Topsoil can be identified by its dark color and organic content. It also has a high water-retention capacity. Subsoils commonly contain fewer nutrients, but abundant clay in subsoils can adsorb moisture and nutrients. Overburden is the material removed to allow access to the material that is being mined. At most aggregate opera-

tions, overburden consists of clay and silt that is poorly drained. Examples include volcanic ash overlying basalt or decomposed rock that overlies an unweathered rock.

Soil Fertility

Soil fertility is created by the recycling of organic matter and the weathering of minerals. Soil systems continually produce and recycle organic matter through the vegetative cover they support. Organisms in soil convert organic matter (through decomposition) to a form plants can use. Decomposition of organic matter also produces fairly strong acids that can react with minerals in the soil to extract base cations such as Ca^{++} , Mg^{++} and K^+ , which are essential for plant growth.

Unweathered geologic materials and subsoils are typically less desirable as reclamation media for mined lands because they lack the organic matter and elevated concentrations of dissolved minerals found in more fertile soils.

Soil Types

Rocks weathering in place form residual soils. Eolian, alluvial, or colluvial soils form from weathering of materials deposited by wind, water, or gravity, respectively. Alluvial soils, although they are generally young soils with poorly developed soil profiles, are typically fertile because they include silts and flood deposits.

Soil Inventories

The Natural Resource Conservation Service (NRCS, formerly the Soil Conservation Service) is responsible for classifying, naming, and mapping the nation's soil resources. Traditionally the mapping focus has been on the agricultural suitability and fertility of soils. NRCS soil surveys also provide information about erosion hazards, flooding potential, soil stability, and suitability for various uses, including drain fields, road building, timber harvesting, and housing development, as well as information on suitable trees to plant and potential wildlife habitat and recreational development.

For most areas, Order III soil surveys are available as published or unpublished maps on a countywide basis. Unpublished surveys may be available at the local NRCS office; published surveys should be available at the local library. Order III maps are at a scale of 1:20,000. Boundaries are field checked, but most of the mapping is done in the office from aerial photographs.

In an Order III survey, soils are grouped into 'associations' and 'complexes' on the basis of genetic similarities. That is, if soils have the same parent material and have been subjected to the same soil-forming processes, they may be grouped together on an Order III Survey map, even though the depth of the individual soils in the group may be significantly different.

For mine development and reclamation, it is important to know how much soil is present and where it is in the project area. Order I and Order II soil surveys can provide this information. They are commonly available for areas of intensive agricultural production and can be obtained from the NRCS, DOGAMI, or DNR.

On-site soils investigations can be accomplished with a backhoe or a shovel and a hand auger. If the mine operator is doing the soil investigation, the NRCS, DOGAMI, or DNR should be contacted for information about soil types at the mine site and for recommendations on how to handle them. Understanding the approximate fertility level of each soil type and different soil horizons will contribute to wise use of the resource.

REMOVING AND STORING TOPSOIL AND SUBSOILS

Topsoil, subsoil, and overburden should be removed separately before mining and retained for reclamation. Placing several inches of soil with elevated organic matter over a lower quality subsoil material can make a dramatic difference in revegetation success. If adequate soils are not reserved to accomplish the approved reclamation plan, miners may need to import soil—often at considerable expense. It is important to ensure that soil resources are protected and used to their maximum potential, because few mine operations can afford to import soils.

The pore space in soil is essential for the proliferation of bacteria, fungi, algae, and soil-dwelling insects and worms. One gram of soil may contain as many as 3 billion soil bacteria. Consequently, soils must be properly handled and stored to protect both the pore spaces and soil organisms. Porosity, or structure, can be permanently damaged if soils are stripped when they are excessively wet or dry. This is a particular problem with clay-rich soils and loams. Stockpiling aggregate on top of a soil stockpile, compaction caused by the passage of heavy equipment, burial by either overburden, or creation of large soil stockpiles can destroy the dynamic qualities of a soil.

Live Topsoiling

'Live topsoiling' means placing stripped soil directly onto an area that has been mined out or backfilled or on a reshaped surface for reclamation (Fig. 3.10). Soil should be spread with a minimum of equipment traffic to avoid compaction and protect pore spaces. Because the soil contains viable seeds and the soil organisms are relocated to the same ecological niche, revegetation can occur within a short time (Munshower, 1994).

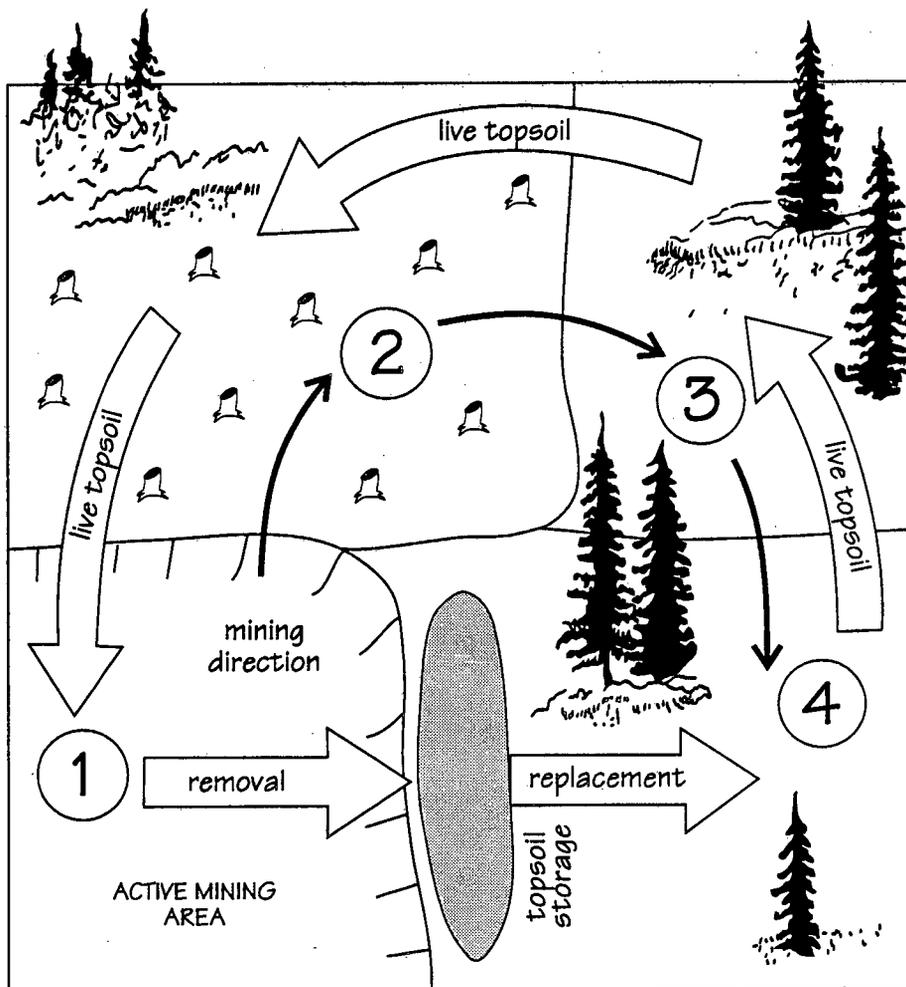


In both Washington and Oregon, live topsoiling is recommended wherever possible. However, live topsoiling may not be practical, particularly in quarry operations where concurrent reclamation opportunities are limited or where the soil contains noxious or undesirable weeds and the site is being reclaimed to cultivated cropland.

Stripping and Salvage

Before soils can be stripped and stockpiled, areas to be stripped and storage areas should be marked. (See Fig. 1.3.) Equipment operators who are stripping soils by horizon or separating soils from subsoils should have enough information to identify and segregate topsoil, subsoil, and overburden. A color change is typically the most obvious indicator of a change in soil horizons. Soil horizons that contain a fairly large amount of organic matter can generally be recognized

Figure 3.10. Topsoil handling in a four-segment mine. Segment 1 is the first to be mined. Its topsoil is removed and stored just inside segment 4. When mining of segment 1 is finished, topsoil is taken from segment 2 and placed directly on segment 1 (live topsoiling). The topsoil from segment 3 is placed on segment 2. The topsoil from segment 4 is placed on segment 3. When mining is completed, the stockpiled topsoil from segment 1 is used to reclaim segment 4.



in the field by their darker color and position at the top of the soil profile. Another technique is to identify stripping depths on survey stakes placed on 100 to 200 foot centers. It is best to move the soil only once. This also reduces operating costs.



By law in Washington [RCW 78.44], topsoil needed for reclamation cannot be sold or mixed with sterile soil unless specific authority has been granted in the permit documents. Subsoils capable of supporting vegetation must be salvaged to a depth of 4 feet and stored in a stable area if not immediately used for reclamation.



In Oregon, subsoil salvage depth must be adequate to accomplish reclamation according to the approved plan.

Constructing Storage Piles

Choosing an appropriate method for storage pile construction is also important. Continually driving heavy equipment over the soil while constructing scraper-built or end-dump piles can permanently damage soil structure and reduce the pore space essential for microorganisms. This type of construction should be avoided.

Soil storage piles should be constructed to minimize size and compaction so soil organisms can ‘breathe’. Extensive experience

and research have shown that the size of soil storage piles can significantly affect soil viability (Allen and Friese, 1992). Soil storage piles should be no more than 25 feet in height. Available plant material such as grasses, shrubs, and chipped tree limbs should be incorporated into the piles. However, if large amounts of woody material are added, soil may become nitrogen deficient.

Soil storage piles should be revegetated. They are good areas to do test seedings to prepare for final revegetation. To retain soil microbes deep in the soil pile, it can be aerated by deep ripping, disking, and tilling every 2 or 3 years.

Recent research (Allen and Friese, 1992) has shown that soil microbes can be regenerated in sterile soils by spotting live soil throughout the area and by using inoculated trees and shrubs. Microbes will spread to other areas in a relatively short time (weeks to a few months).

WASTE AND OVERBURDEN DUMPS AND STOCKPILES

Large amounts of overburden exist at many mine sites, and operations frequently create large volumes of waste rock. Dumps and stockpiles are created to temporarily or permanently store both overburden and unwanted material separated from the salable product on the site, for example, crusher scalplings, oversize material, and reject fines. During reclamation, overburden and waste can be used to create landscape diversity. It is important to plan the location of overburden or waste piles so they can be used in reclamation.

Site Selection

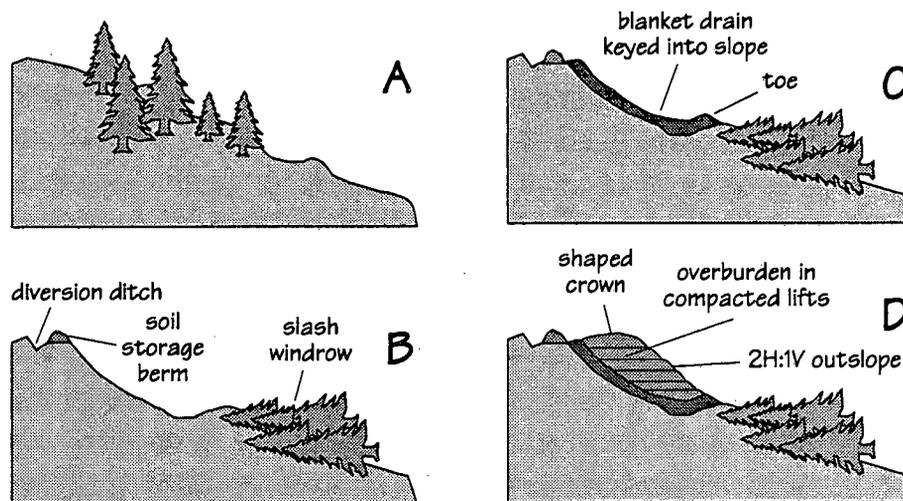
Dumps and stockpiles can result in landslides and increased sediment load that may pollute nearby waters if they are not properly designed and maintained. Careful planning is necessary to ensure that dumps and stockpiles are placed in a geologically stable location, and that they can be revegetated successfully. Locations next to waterways or where springs or seeps are present will probably not be acceptable. Ideally, from both construction and water-quality protection standpoints, these materials should be removed and placed only during dry periods.

Site Preparation

Storage sites for overburden and waste rock dumps should be properly prepared. All vegetation, soil, and subsoil must be stripped from the site prior to dump construction. Any buried vegetation will rot; this soft material provides little resistance to sliding and increases the potential for downslope movement. Slash cleared from the stockpile area can be used below the stockpile to filter runoff. (See Slash Windrows and Brush Sediment Barriers, p. 2.12.)

Before overburden is stockpiled, all vegetation should be cleared, and the drainage for the pile must be prepared. Undrained and uncompacted fill dumped over vegetation without drainage is prone to mass wasting and landslides that waste topsoil. Soil placed over permanent waste piles will promote self-sustaining vegetation. (See Topsoil and Overburden Storage Areas, p. 3.7.)

Figure 3.11. Proper procedures for waste dump construction. Trees removed from the site are used to construct a slash windrow to filter runoff. A blanket drain (a French drain that covers a slope instead of being confined to a trench; see Trench Subdrains and French drains, p. 2.19 and Fig. 6.6.) is laid down first to prevent the buildup of water, and the dump itself is constructed of thin, compacted layers.



Large dumps and stockpiles or those located on steep ground should have diversion ditches constructed above them (Fig. 3.11B). A blanket drain should be installed on any slopes where drainage problems are anticipated (Fig. 3.11C). (See also Trench Subdrains and French Drains, p. 2.19.)

Dump and Stockpile Construction

Stability is important, particularly for dumps that will become permanent features. Both dumps and stockpiles should be constructed using thin, compacted layers (Fig. 3.11D). Before compaction, layers may be as thin as 12 to 18 inches. When compacted by rubber-tired equipment, they will result in a much more stable dump than one prepared by simply end-dumping or pushing with a bulldozer.

Dumps and stockpiles on hillsides or filling ravines need a properly constructed toe to key the pile into competent material. The toe should have a blanket drain to prevent the buildup of water. (See Fig. 6.6.)

Dumps and stockpiles should be shaped to prevent water from ponding. The top should be sloped to direct runoff to a drainage system and to avoid critical areas, or it should be crowned to disperse runoff around the perimeter. The slopes of the dump or stockpile should be constructed with appropriate runoff control structures. The top and overall shape should be rounded off to blend into the natural topography. (See Slope Stabilization, p. 6.6.)

Most final slopes should be between 2H:1V and 3H:1V. Generally, the flatter the slope, the more stable it will be and the easier to access for reclamation. Terraces should be constructed at 30-foot intervals vertically, or other methods of slope shaping should be used to reduce water velocities.

When shaping is complete, the dump or stockpile should be seeded and mulched to establish vegetation.

DUST CONTROL

Neighbors often complain about dust from mining operations. Dust is generated by the crusher, rock drills, and other mining equipment, and from disturbed areas, including haul roads and stockpiles.



In Washington, the Department of Ecology or the local air pollution control authority has review and permit authority over rock crushers, batch plants, fugitive dust emissions from mining operations, and haul roads. Contact these agencies for further information.



In Oregon, emissions from on-site processing require a permit from the Department of Environmental Quality.

Controlling Dust with Water

Controlling fugitive dust is usually a matter of frequent application of water or chemicals. Water trucks are typically used for conveying these liquids. However, sprinklers and irrigation pipe installed in the berms alongside haul roads can significantly decrease dust without the expense of using a water truck several times a day.

Controlling Dust with Chemicals

Chemical dust suppressants, such as magnesium chloride, are appropriate where water is in short supply. Most chemical dust suppressants require repeated application. There are numerous chemical dust suppressants designed for a variety of uses. The local and state water-quality agency can provide information about appropriate chemicals and how to apply them.

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3.18 RECLAMATION AND OPERATION STRATEGIES

4 Restoring Landforms

INTRODUCTION

Land shaping is an important but often underemphasized part of the reclamation process. Common objectives for land shaping include:

- minimizing erosion,
- reducing slope angles to provide stability for post-mining development,
- contouring aesthetically pleasing landforms to blend with the surrounding area,
- forming shapes and slopes consistent with the subsequent use planned for the site (Fig. 4.1),
- increasing revegetation success, and
- providing diverse wildlife and fish habitat.

SUBSEQUENT USE

Reclamation of a mine site, and thus its subsequent use, can be driven by high land values, zoning, and/or environmental protection and the state regulations that set minimum standards for reclamation and water quality.

In urban areas, high land values motivate miners to reclaim for intensive use. For example, in Portland, Oregon, gravel pits are typically backfilled with construction waste and developed as building sites. Building sites can also be developed directly without backfilling. Government-owned sites where the water table is high often become parks with ponds. In rural areas, less intensive uses such as wildlife habitat, agriculture, or timber production can also be profitable. (See *Agricultural and Forestry Subsequent Uses*, p. 7.15.)

Imagination and careful planning can yield a wide variety of landforms that make the site better for a specific use than it was prior to mining. For example, wetlands and fishing ponds can be created from rock quarries and gravel pits if proper water conditions exist. Many agricultural sites have been enhanced by selective gravel removal, making them easier to irrigate or till after gravel-

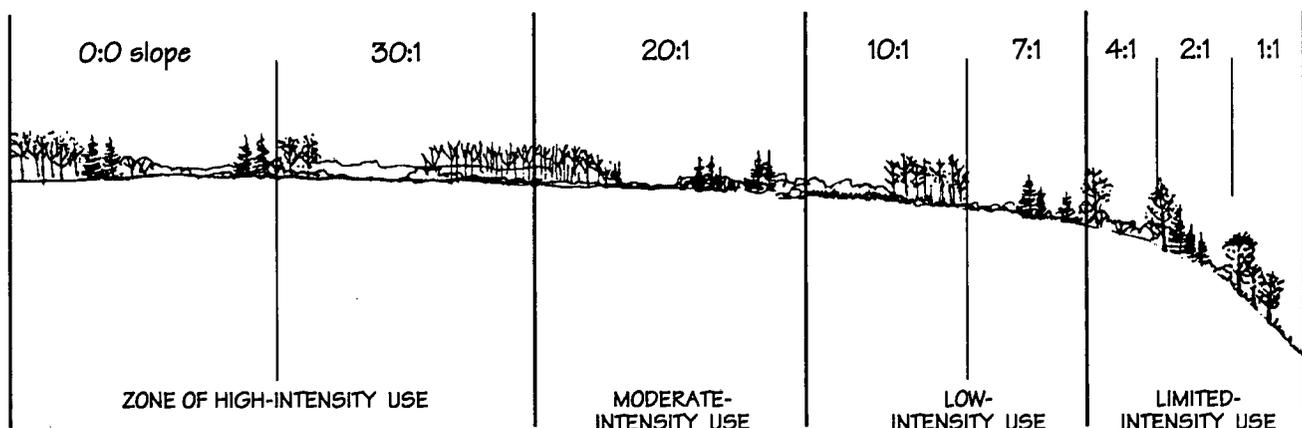
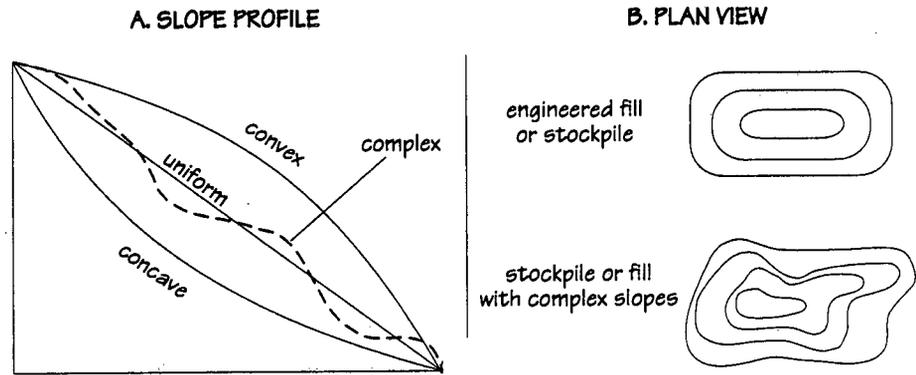


Figure 4.1. The steepness of the final slope strongly influences the intensity of proposed land use for reclaimed mine sites. Fewer options are available on steeper slopes. (From Green and others, 1992.)

Figure 4.2. A, profile of common slope types. B, plan view of different stockpile designs. Complex slopes are preferred.



rich knobs have been selectively removed from the fields. Mining can level areas of hilly topography making them more suitable for agricultural or industrial uses. In eastern Oregon and Washington, many of the mine sites developed on rangeland are returned to their previous condition by revegetation, generally with native species.



In Washington, RCW 78.44.031 identifies subsequent use as a criterion for guiding the reclamation scheme, while RCW 78.44.141 sets forth reclamation standards that must be met for various uses.



In Oregon, the subsequent use of the mined land must be compatible with the local comprehensive land-use plan.

SLOPE TYPES

Profiles of four basic slope types are shown in Figure 4.2. Convex slopes erode rapidly and yield the most sediment. Concave slopes are less affected by erosion and typically yield less sediment than convex slopes. The steepness of the slope is a major factor influencing the amount of sediment production. Surface-water runoff velocities are higher on longer, steeper slopes, and more soil particles are typically dislodged and transported. Sediment production on uniform slopes is intermediate between concave and convex slopes. Long uniform slopes should be avoided because they can be severely eroded in a single storm event.

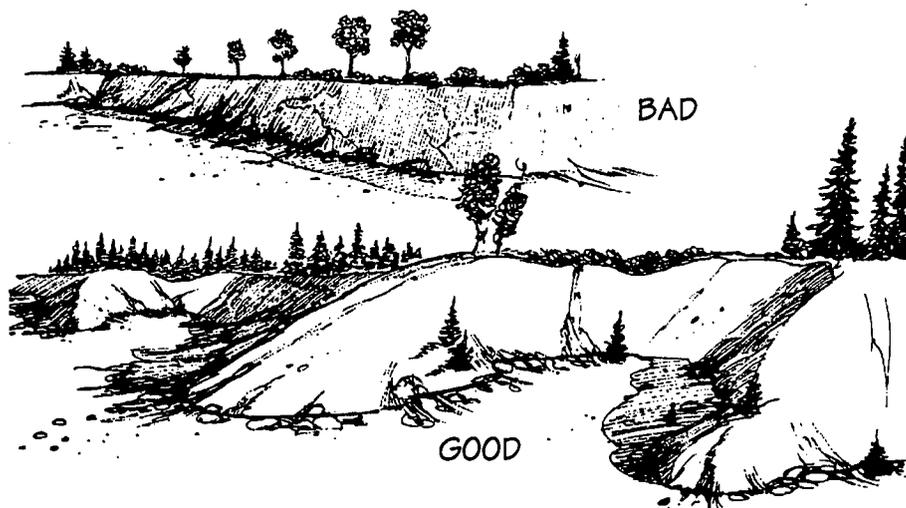
☛ Complex slopes generally produce the least sediment and are the most stable. Complex slopes are preferred for mine site reclamation.

CREATING SLOPES

Where the goal of reclamation is to restore natural slopes that blend with surrounding landforms, sinuous slopes that are curved in plan and section and irregular in profile should be created (Fig. 4.3). Irregular slopes will intercept more runoff and reduce its velocity, trap seeds, and speed revegetation. Rectilinear slopes should be avoided because they are prone to sheet erosion and gullying and because they look unnatural.

Natural-looking topography can be achieved early on through a well-planned extraction operation and if equipment operators fully understand the post-mining use of the site. Sinuous slopes can be formed by mining to the prescribed angles (generally the most inex-

Figure 4.3. A key element in restoring topography is creating natural-looking slopes that blend with the surrounding landforms. Rectilinear slopes (top) are inappropriate for reclamation in unconsolidated materials. Slopes should be curved in plan and section and irregular in profile (bottom). (Redrawn from Green and others, 1992.)



pensive means of reclamation) or by using the cut-and-fill method, which requires a reclamation setback or material from overburden stockpiles. (See Reclamation Setbacks, p. 3.5.) Backfilling to create appropriate slopes can be the most expensive reclamation technique when it is done after mining.

A reclaimed site should consist entirely of stable slopes. A rule of thumb is that slopes are unstable if pioneer plants cannot establish themselves naturally, if the slopes ravel or show signs of soil creep and tension cracks, or if landsliding is noted. (See Identifying Unstable Slope Conditions, p. 6.3.) In general, unconsolidated materials are stable and can sustain vegetation at slopes of 3 feet horizontal to 1 foot vertical (commonly expressed as 3H:1V) (Fig. 4.4) (Norman and Lingley, 1992).

For variety, a few locally steeper areas (1.5H:1V to 2H:1V) may be created (if stable), especially if they mimic locally steeper slopes nearby. However, steep slopes greatly increase the potential for erosion. Long, steep slopes produce more and faster runoff and allow less infiltration than a series of short, gentle slopes separated by

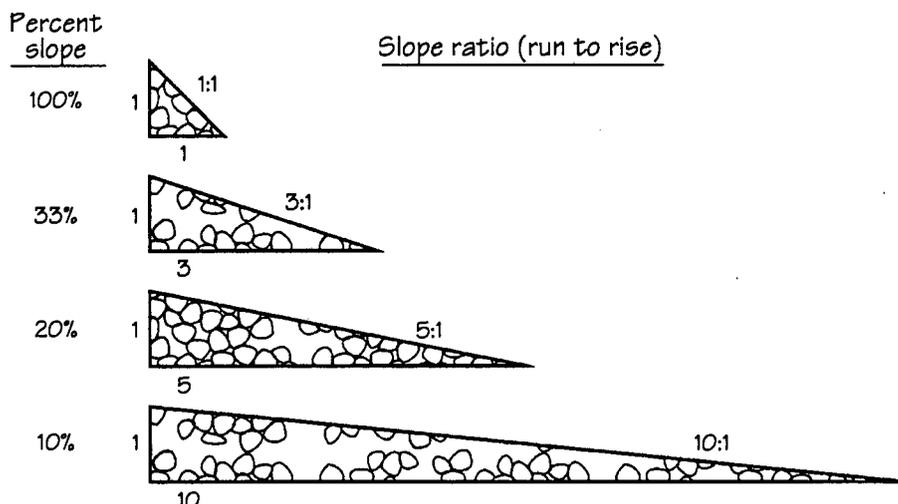
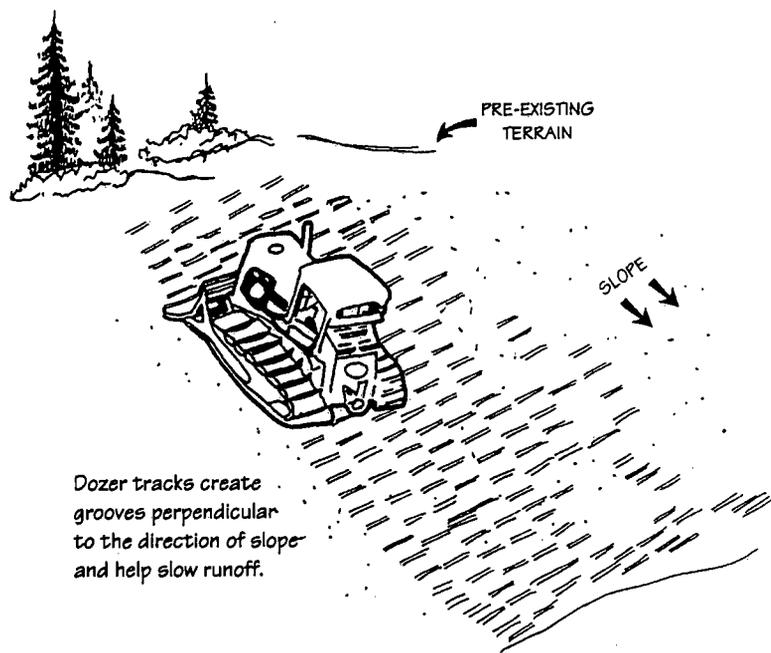


Figure 4.4. Slopes are expressed as the ratio of the horizontal run to the vertical rise. This diagram shows the percent slope of several common ratios. (Redrawn from Green and others, 1992.)

Figure 4.5. Dozer tracking can reduce runoff and enhance revegetation. Tracked equipment should be run up and down a slope, not across, to increase slope roughness. (Modified from Law, 1984.)



benches or terraces. New drainages or contour ditches should be established within the reclaimed area to contain the expected surface water runoff. The diverted and/or cleaned water should be directed to the drainage, it occupied before mining to prevent drying up or flooding of areas downstream; this water should have approximately the same velocity, volume, and quality as the drainage it is entering.

Some guidelines for slope shaping are:

- ☛ Slopes steeper than 3H:1V should be kept shorter than 75 feet by creating breaks in slope, such as irregular terraces, berms, or basins. (See Figs. 2.3 and 2.4.)
- ☛ If the site is to be dry after mining, then pit floors should be graded to a slope of 2 to 5 percent to promote drainage.
- ☛ Some mounds, hills, and depressions can be left on pit floors to vary the topography for subsequent use (Norman and Lingley, 1992).
- ☛ In the final grading, bulldozers or other tracked equipment should be run up and down a slope, not across it, to increase slope roughness (Fig. 4.5). (Older bulldozers are generally unable to back up sand and gravel slopes steeper than 3H:1V.)
- ☛ Final slopes should be revegetated immediately to minimize erosion.

REGRAIDING

After the land has been shaped, it should be regraded to produce a rough, irregular surface, particularly on slopes (Fig. 4.5). This ensures that replaced soil is keyed into the substrate to slow erosion.

Roads, pit floors, and stockpile areas should be ripped at close intervals to provide drainage prior to replacing the soil. Placing a loose, friable soil over a compacted base does not increase soil mois-

ture-holding capacity, drainage, or slope stability and will result in inadequate root development and penetration. A good rule of thumb is that ripper spacing should be less than or equal to the depth of ripping.

REPLACING TOPSOIL AND SUBSOIL

Understanding the soil resources of a site and the post-mining land use will lead to effective site development, using the best management practices for soil replacement. The type of vegetation planned for reclamation may dictate soil replacement depth. Deeper soils will be needed for agricultural production or establishing trees, particularly for timber production. More important than the depth of the replaced soil is how replacement is done. Soils should not be compacted. The less equipment is run over soils, the better. The most skilled and experienced equipment operators should be used for soil replacement—their skill will pay off.

Topsoil should be replaced on slopes as soon as possible after restoring topography. Soil horizons from stockpiles should be replaced separately in the proper order for best use of the resource. After the topsoil is spread, it should be tilled to construct a proper seed bed.

A minimum soil replacement depth of 12 inches of topsoil is recommended for reclamation for most post-mine uses. Upland sites may have soil depths, prior to mining, of 6 inches or less. On these sites, reject soil fines and rock fines produced during rock processing may be used to supplement pre-existing soil resources as a growth medium. Generally fines would be mixed with organic material and put in place before the topsoil is added.

The minimum recommended soil depth for timber production is 4 feet over rock and 2 feet over gravel or soft overburden to establish an effective rooting depth of 4 feet. Timber growth rates are generally directly related to the depth of the soil available.

A common problem in reapplying topsoil and subsoil is spreading them too thickly initially so that little is left for remaining areas. If the volume of topsoil at the site is limited, its application should be restricted to low areas or excavated depressions that will conserve soil, retain moisture, and catch wind-blown pioneer seeds. These low areas are also ideal sites for planting trees.

Varied soil replacement depths mimic natural soil-forming processes and should be incorporated into reclamation strategies where possible. Thinner layers of soil on the upslope areas and thicker layers on the lower slopes may naturally encourage different vegetation types. These parts of the slopes should be planted differently to encourage post-mining vegetation diversity.



In Washington, topsoil is defined as the naturally occurring upper part of a soil profile, including the soil horizon that is rich in humus and capable of supporting vegetation, together with other sediments within 4 vertical feet of the ground surface [RCW 78.44].



In Oregon, topsoil is not defined by law; however, sufficient soil must be retained onsite for reclamation.

AMENDING OR MANUFACTURING SOIL

Where little or no topsoil exists prior to mining, it may be necessary to amend or even manufacture soils. Amending soil can significantly reduce the time required for revegetation and performance security release. (See *The Soil Resource*, p. 3.10.)

Reconstructed soils should have the same soil characteristic as topsoil. Soil characteristics that have the greatest effect on plant growth are the amount of organic matter, moisture-holding capacity, drainage, and available nutrients.

Adding Organic Matter

Organic matter improves both the fertility and physical condition of a soil. The chief problem with using subsoils for reclamation is usually a lack of organic matter. Subsoils can be used in place of topsoils if they are combined with organic products, such as wood chips, paper sludge, rice hulls, mushroom compost, mint clippings, farm manure, processed municipal biosolids, straw, or native hay. In some instances, trading loads of rock for manure and straw from local dairies, farms, and ranches may be mutually beneficial. However, weeds should not be imported with the manure or straw. Knowing the quality of the hay can prevent this from happening.

Quarry sites are generally developed where mineable rock is at or very near the surface. In these cases, reject fines, scalplings, or other fine-grained materials can be used to replace topsoil, provided they are amended with organic matter.

Biosolids and some other soil amendments may not be appropriate at sites near sensitive aquifers or waterways.



A solid waste permit from the local health district may be needed for application of biosolids, paper mill sludge, manure, etc. In Washington, contact the Department of Ecology. In Oregon, contact the Department of Environmental Quality or the local health department.

Improving Moisture-Holding Capacity

In the arid regions of the Pacific Northwest, the moisture-holding capacity of a soil is often the factor limiting planting success. A thick soil will hold more water than a thin one, and clay soils will hold more water than sandy soils. Moisture-holding capacity can be increased by adding large amounts of clay or other fine-grained geologic material or by increasing the thickness of the subsoil. A mulch layer at the surface also helps conserve water by insulating the soil against evaporation.

Improving Drainage

In areas that are not being developed as wetlands, soils that do not drain well can cause plants to rot. Adding organic matter, sand, or other coarse materials improves drainage by modifying the structural characteristics of a soil. Adding lime or gypsum neutralizes acidic soils, which usually develop in wet areas.

Using Fertilizers

Natural Fertilizers. Adding organic matter can improve both the fertility and physical condition of a soil or fine-grained substitute. However, it may not provide any short-term fertility benefits and possibly no long-term benefits unless it is worked into the top 6 inches of soil. The smaller the particle size and the greater the surface area of the fertilizer, the faster it will be broken down by soil microbes.

The natural range of carbon to nitrogen in soils is 8:1 to 15:1. Organic amendments that help reclaimed soil achieve this ratio provide significant benefits. For example, amendments high in carbon and low in nitrogen, such as wood chips, may require additions of nitrogen-rich fertilizers (Table 4.1). This is because when an organic amendment rich in carbon is added to the soil, all the nitrogen available to plants will be tied up by soil microbes trying to consume the carbon. Soil microbes need nitrogen to consume the carbon and can preferentially absorb nitrogen before plant roots can use it. This means that there will be no nitrogen available to plants until the carbon:nitrogen ratio has dropped to 8:1–15:1. Therefore, adding amendments high in nitrogen will help plants grow under these conditions. Amendments in which carbon greatly exceeds nitrogen should be used sparingly.

Chemical Fertilizers. If a quick cover of vegetation is needed to provide erosion control or if the soil or manufactured soil substitute is of poor quality, applying a fertilizer is recommended. Organic matter should be added to achieve a long-term response before seed-

Table 4.1. Nitrogen and carbon content of common organic soil amendments. The natural range of carbon to nitrogen in soils is 8:1 to 15:1. Organic amendments that help reclaimed soil achieve this ratio provide significant benefits. (Modified from FERTILIZERS AND SOIL AMENDMENTS by Follett, Murphy, and Donahue, © 1981. Reprinted by permission of Prentice-Hall, Inc., Upper Saddle River, NJ.)

Material	Organic Carbon (C) (%)	Total Nitrogen (N) (%)	Carbon: Nitrogen (C:N) Ratio
Sewage sludge (dry weight basis)			
Aerobic	35	5.60	6:1
Anaerobic	30	1.90	16:1
Alfalfa hay	43	2.40	18:1
Grass clippings, fresh	43	2.20	20:1
Leaves, freshly fallen	20–80	.50–1.00	40:1–80:1
Moss peat	48	.83	58:1
Corn cobs	47	.45	104:1
Red alder sawdust	50	.37	135:1
Paper, mostly newspaper	43	.26	172:1
Hardwood sawdust	50	.20	250:1
Douglas fir			
Old bark	59	.20	295:1
Sawdust	51	.07	728:1
Wheat straw	45	.12	375:1
Pine sawdust	51	.07	729:1

ing directly into soil substitutes. Avoid applying fertilizers in areas where runoff into streams could occur.

Some research shows that native plants do not respond well to chemical fertilization, and fertilizers are not generally needed for the long-term survival of these species. Fertilization tends to depress plant community diversity by indirectly decreasing desirable native plant populations, such as warm season grasses and legumes. Fertilizers tend to give a competitive advantage to opportunistic species such as annual grasses and herbaceous plants, many of which are weeds.

RESTORING DRAINAGE

Where the pit or quarry is mined below the water table or surface drainage collects on the mined property, productive ponds and wetlands can be formed with careful water management.

Where appropriate to the subsequent use, a pond creates additional plant and habitat diversity, even though it may contain water only on a seasonal basis. Shallow process-water ponds, as well as low places on excavation floors and in stockpile areas at upland sites, can be developed as seasonal wetlands, even in arid areas east of the Cascades.

Extraction ponds (ponds being mined for gravel) and some upland rock pits with a permanent water source make ideal sites for constructing wetlands if the water table is shallow. Sediment from washing and screening rock can be deposited to form shallow deltas that, when combined with the permanent water supply, can easily be revegetated with wetlands species.

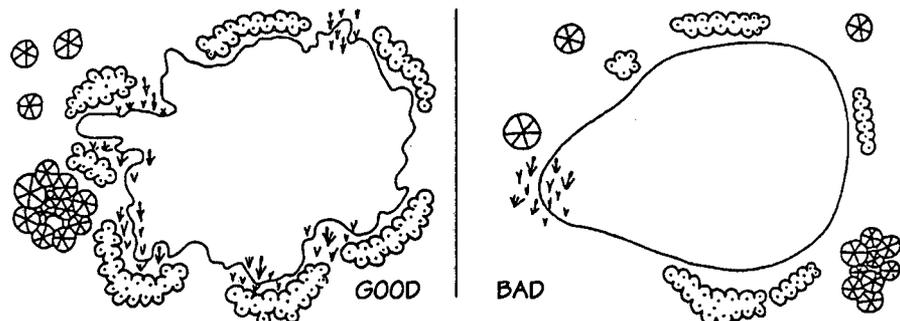
CREATING PONDS FOR WILDLIFE

Ponds for wildlife habitat should have irregular outlines (Fig. 4.6). The bottom of the pond should also be irregular so as to offer a variety of habitat possibilities for plants, bottom dwellers, and fish (Fig. 4.7). Both water deeper than 10 feet and benches and bars with water depths less than 2 feet should be provided. As a general rule, 25 percent of the pond should be less than 2 feet deep, 25 percent 2–6 feet deep, and 50 percent deeper than 10 feet. Water deeper than 15 feet can provide a cool summer refuge for fish (Norman and Lingley, 1992).

In-Water Slopes

Slopes should be very gentle, 5H:1V or flatter, to allow development of wetland plant species (Fig. 4.8). In general, the more shal-

Figure 4.6. The shorelines of ponds used for wildlife habitat should be irregular and planted for cover with a mixture of open meadows and shrubs in the surrounding area. The shape of the pond on the left is better suited to supporting wildlife than that of the pond on the right. (Redrawn from Szafoni, 1982.)



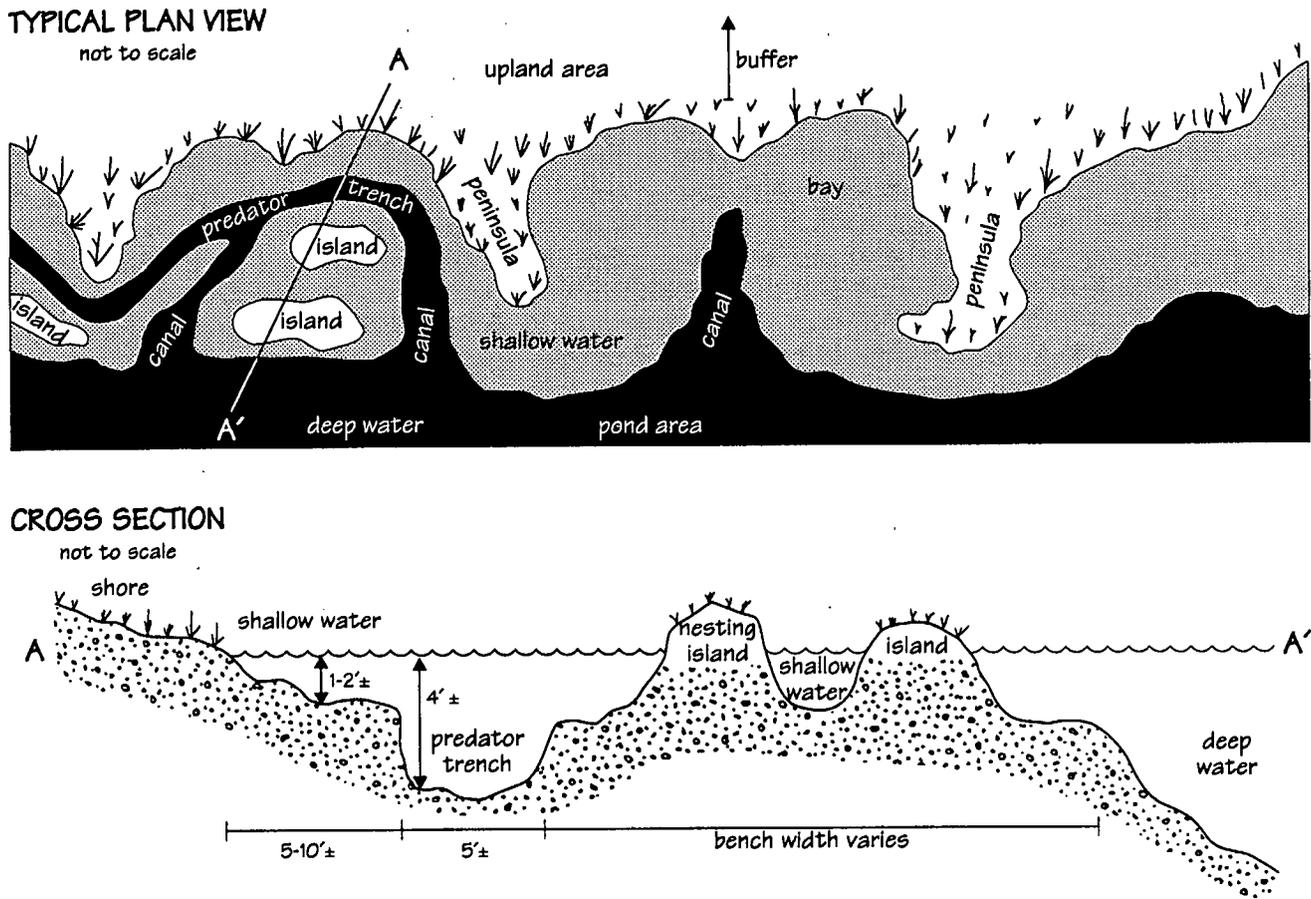


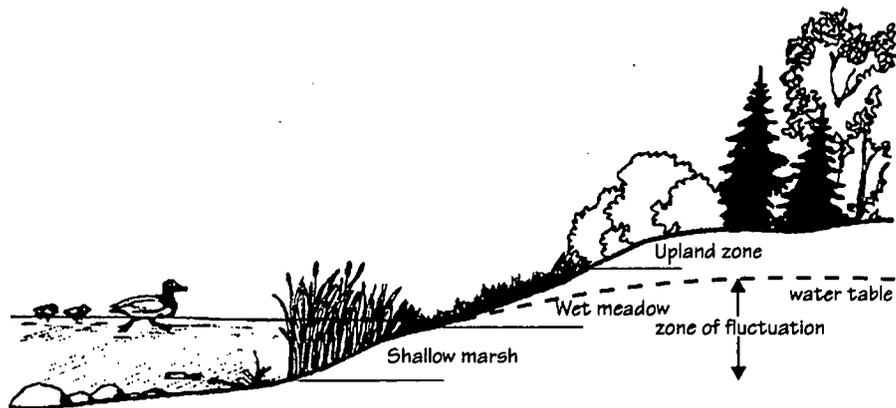
Figure 4.7. Plan view and cross section of a well-designed irregular wetland or pond shoreline. Note large areas of shallow water. Steep slopes along parts of the shore will discourage the growth of wetland plants and provide clear access to the pond. Bird nesting sites are provided. The trench discourages predators, but the shallow water offers sites for food for fish and cover plantings. Islands can be constructed from fill, unmined material, or sediments saved from digging the trench.

low areas, the better. Slope variations will enhance the plant diversity in created wetlands.

The most economical means of shaping final pond slopes is to create them as material is excavated (Fig. 4.9). In mines that are being dewatered while operations proceed, resloping must be done before allowing the pits to fill with water.

Windward pond shores can be protected from wave erosion by placing boulders at the range of pond levels.

Figure 4.8. Slope variations will enhance the habitat diversity of created wetlands. To successfully establish wetland vegetation, seeds and transplants must be placed in sites with the correct water depth. (Modified from Green and others, 1992.)





In Washington, slopes in unconsolidated materials (sand, gravel, or soil) below the permanent water table should not be steeper than 1.5H:1V. Slopes at the water/land interface should be between 2H:1V to 3H:1V. Solid rock banks must be shaped so that a person can escape from the water in those places.



Oregon statutes require a 3H:1V slope to 6 feet below the low-water mark of a pond to provide a means of escape in the event that someone were to fall in.

Special Problems Near Rivers

Mining sand and gravel near rivers can eliminate wetlands and fish and wildlife habitat, result in channelization of rivers, and may even result in channel capture, if not planned properly. If mining is allowed by local jurisdictions, leaving ponds and depressions, can replace lost fish and wildlife habitat and wetlands, if they are not located too near the river (below the first terrace) and are not overly deep or large.

A desirable post-mining pond configuration for a gravel pit near a river is long, narrow, and moderately deep, with irregular islands and peninsulas, and connected on the downstream side to the river (Fig. 4.10) (Woodward-Clyde, 1980). This somewhat mimics a natural river system on a flood plain.

BUILDING HABITAT

Subsoils, mine waste rock, construction fill, or boulders can be used to create rock reefs, islands, and other features to provide habitat.

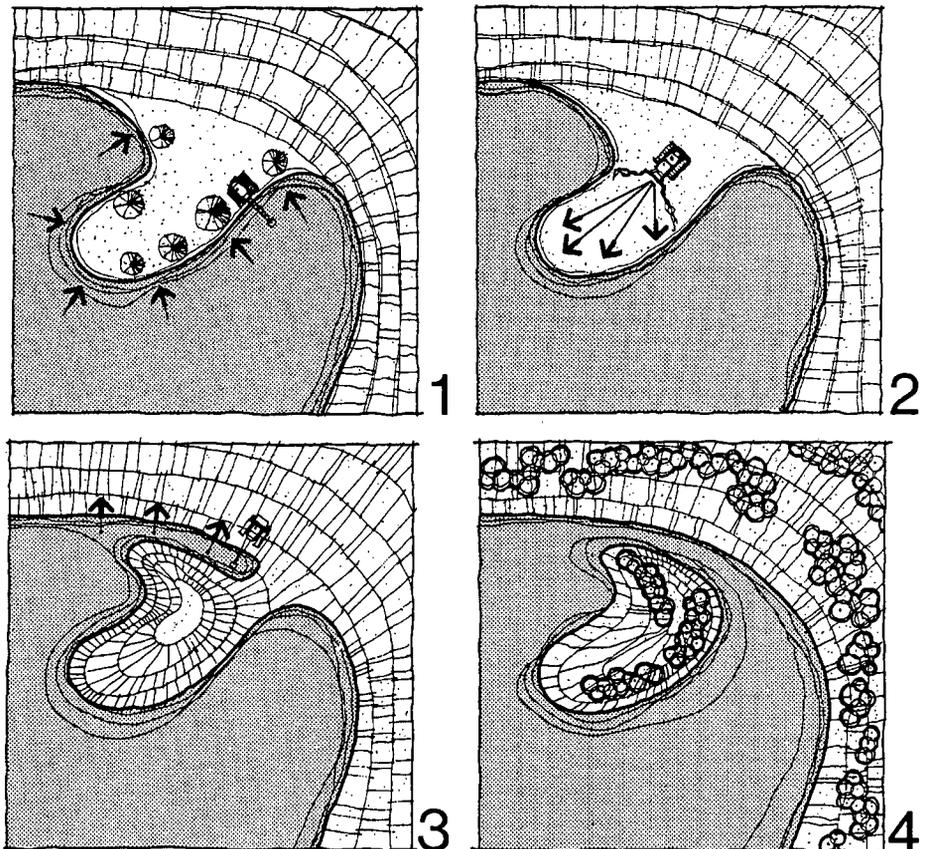
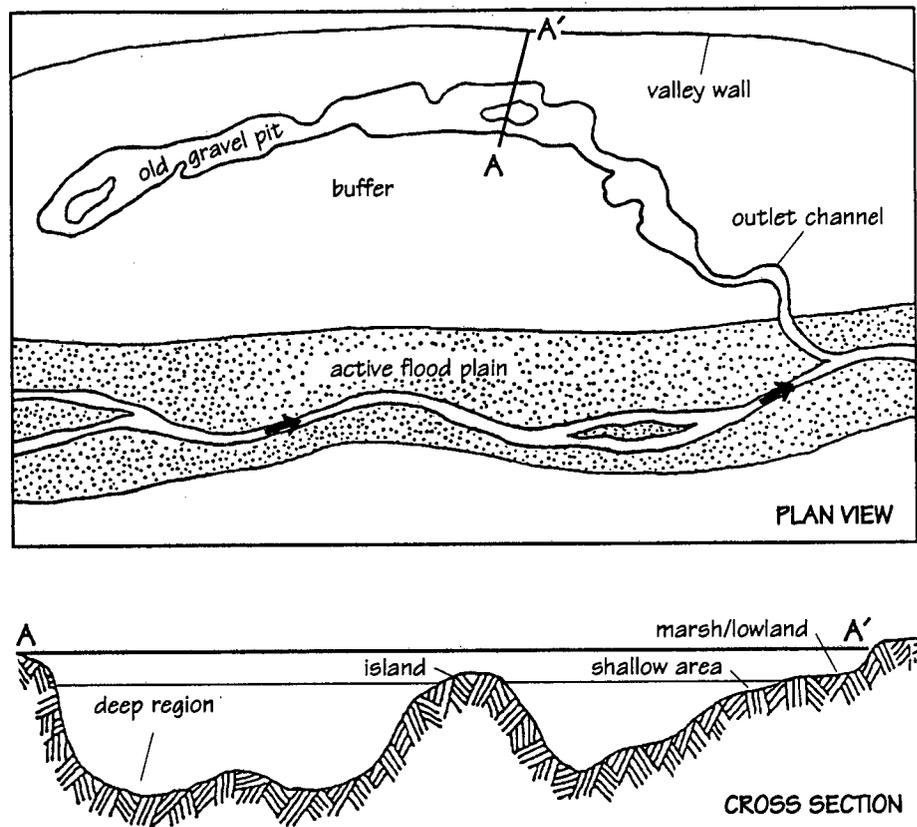


Figure 4.9. Islands can be developed in undrained pits during operations. They start as peninsulas (1), which are then graded to provide the appropriate final shapes and slopes (2). Channels can then be dredged to separate the tips of the peninsulas from the mainland (3). Step 3 should not be undertaken until final water levels are known. (4) Final configuration of constructed island. (Redrawn from Michalski and others, 1987.)

Figure 4.10. Plan view and cross section of a reclaimed gravel pit with pond shape that mimics a natural river system. Not to scale. (Modified from Woodward-Clyde, 1980.)



Islands

Islands can be formed as part of the mining process or made after the basic mine shape is in place (Fig. 4.9). If the mine itself consists of individual cells separated by dikes, portions of the dikes can be removed to create post-mining peninsulas or islands for use as habitat. If the excavation is dewatered, silt and sand can be compacted or boulders can be placed on the floor of the excavation to create islands for bird and turtle loafing.

Many small islands are better than a few large islands. They should range from 0.1 to 0.5 acres if they are meant to provide waterfowl nesting sites. Smaller islands may provide only resting sites, and larger islands may encourage predators to take up residence. Adequate separation of the island from the mainland, with water depths between them exceeding 30 inches, will discourage predators. Soil, logs, and rocks should be placed on the island to enhance habitat diversity.

Irregular islands are better than round islands (Fig. 4.8). Horseshoe-shaped islands are ideal for waterfowl (Fig. 4.11). The opening of the horseshoe should be in the lee of the prevailing wind to provide shelter for young birds. The banks between the prongs of the horseshoe should be more gently

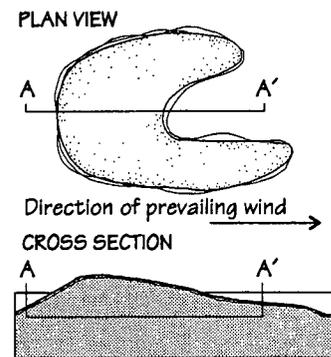
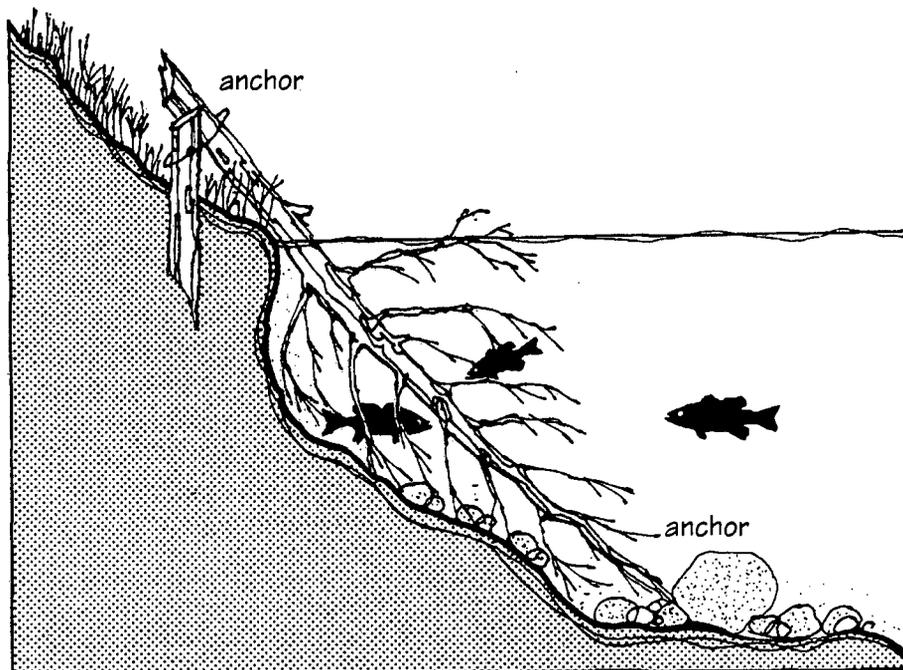


Figure 4.11. Plan view and cross section of a horseshoe island. (Redrawn from Michalski and others, 1987.)

Figure 4.12. A submerged tree crown, anchored top and bottom, provides cover where the bank drops off steeply in some parts of the pit. (Modified from Michalski and others, 1987.)



sloped than the outer banks to increase the sheltering effect.

Structures That Enhance Habitat

To create cover for fish and habitat for aquatic insects, submerged and anchored tree crowns can be placed along steep banks (Fig. 4.12). Where possible, logs and stumps should be lashed together and anchored to form reefs (Fig. 4.13). These lashed materials can be either placed by helicopter or dragged into place by bulldozer. Root wads with soil attached also provide ideal cover (Cederholm and Scarlett, 1991; Cederholm and others, 1988).

Depending on the plan's habitat objective, branches that stick out of the water may be removed to minimize roosting by predatory birds until a robust fishery is established. Alternatively, protruding

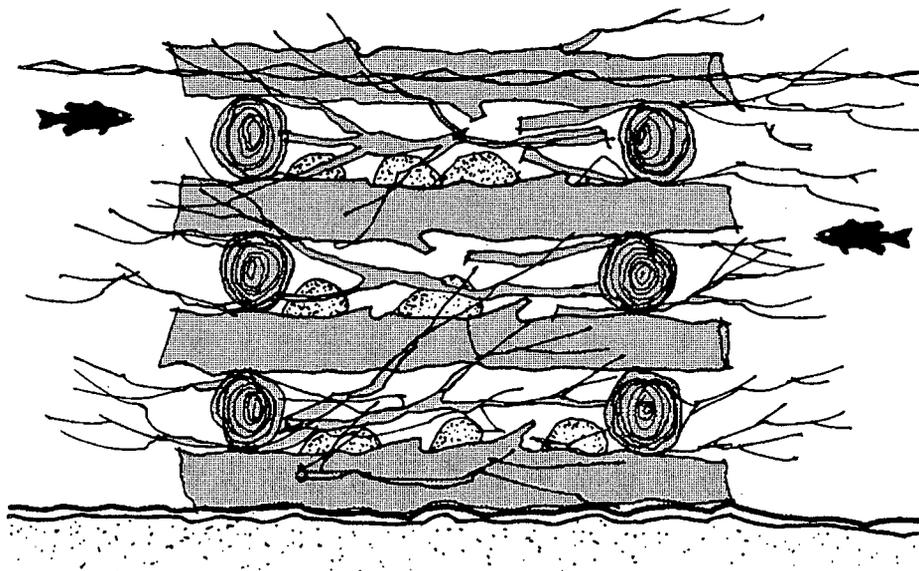


Figure 4.13. A submerged crib structure provides habitat for aquatic insects and cover for fish that feed on them. Rocks are used to anchor the crib in place. (Modified from Michalski and others, 1987.)



Figure 4.14. Piles of rock provide homes for small mammals. (From Green and others, 1992.)

branches and logs just breaking the surface may be left to provide sunning areas for turtles and other amphibians.

Structures that can be constructed in or near ponds to enhance habitat for wildlife include:

- ▮ submerged crib structures (Fig. 4.13),
- ▮ piles of angular rock (Fig. 4.14),
- ▮ nesting boxes (Fig. 4.15),
- ▮ trees, logs, and root wads lashed together, submerged, and anchored (Fig. 4.12), and
- ▮ nesting poles and snags for osprey and cavity-dwelling birds (Fig. 4.16).

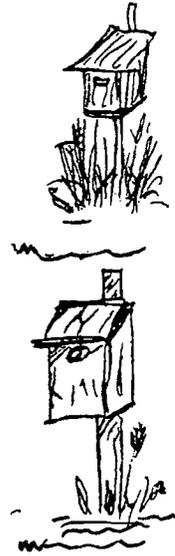


Figure 4.15. Typical nesting boxes.

Groups interested in wildlife or fish habitat enhancement, such as Ducks Unlimited or Trout Unlimited, the Boy Scouts (and similar groups), or schools, can be invited to help in enhancing reclamation of a pond by constructing nesting boxes, planting willows, or other activities. U.S. Fish and Wildlife staff may provide technical assistance, and the agency may be a source of potential grants.

Off-Channel Ponds for Salmon

At mine sites near rivers, off-channel ponds can be excavated and connected to the river after mining by a stable outlet channel that allows access for fish (Fig. 4.9). This channel must be shown on the reclamation plan. These ponds can provide valuable habitat for salmon (Cederholm and Scarlett, 1991; Cederholm and others, 1988).



Figure 4.16. Snags make good nesting sites for cavity-dwelling birds. (From DeGraaf and Shigo, 1985.)

The following questions should be addressed in selecting sites for creating off-channel salmon habitat:

- Is the section of river or stream near a site used in any way by salmon? Is any part of the whole river or stream used for spawning, travel to spawning areas, or for rearing of fry?
- Will the depth of excavation be compatible with final off-channel habitat (that is, not too deep for spawning, but deep enough to provide cold-water habitat)?
- Is the potential mine site stable? Or is it prone to capture during floods and by lateral migration of the river?
- Is the substrate of the excavation going to be suitable for the habitat desired?
- Is there sufficient water circulation to provide oxygen and keep the water cool?
- Can an outlet channel be connected to the river where it can be easily found by migrating fish?



The Oregon or Washington Department of Fish and Wildlife should be consulted before undertaking any off-channel pond creation project.

Outlet Channels

Outlet channels allow fish to enter and leave the off-channel ponds. These are integral parts of off-channel habitat and should mimic natural river sloughs whenever possible. In some situations, a weir is necessary to control the water level in the outlet channel and ponds.

Outlet channels should join the river system where fish are likely to notice them—for example, near a pool or eddy where fish tend to rest. Riffles or fast water areas are less desirable outlet sites because fish may not find the outlet, and it may be left high and dry during low water. Joining an outlet channel to an existing tributary or slough instead of the river is a good strategy where feasible.

FORMING WETLANDS

Natural wetlands can be defined by three broad environmental indicators: soils, hydrology, and vegetation. The viability of created wetlands can be enhanced by addressing these three elements in the reclamation plan.

Soils

Soils are essential to vegetation, both above and below the water surface. In creating wetlands, pond banks and bottoms should be covered with at least 12 inches of fine materials that have a large clay component to help seal the bottom of the pond. In some places, process fines can be substituted for soils; however, they are less desirable than native soil because they are less fertile. Material routinely removed from roadside ditches may be a good source of wetland soil and vegetation if it is not contaminated with oil and grease. If any wetlands on the project are disturbed, that soil should be used in new wetland creation.



In Washington, a solid waste permit from local jurisdictions may be necessary for disposing of material acquired from ditch cleaning.

Hydrology

A wetland must have water present at least seasonally. A common reclamation challenge at many mine sites is the seasonal fluctuation of the water table. The highly permeable nature of sand and gravel creates a situation where vegetation on pond banks is inundated during the wet season and high and dry during the summer. This results in a zone, similar to that found along reservoirs, in which upland and wetland plants will not readily grow. Here are some ways to reduce water fluctuation and the related adverse effects:

- ☛ Seal the bottom of the pond and the downstream banks with clay-rich material. This may happen naturally over time, but it may take many years.
- ☛ Reduce bank slopes to 5H:1V or flatter to allow a more gradual transition from the wetland to upland environment.
- ☛ Install a head-gate or weir at the outlet of the pond to retain water.
- ☛ Anchor jute netting or some other organic mulch fabric over the bank slopes to capture fines and retain soil moisture.

Vegetation

Wetlands are characterized by many plant species that do not grow in upland areas. Most created wetlands in western Washington and Oregon will develop a wetland community on their own if conditions are hospitable and given enough time. Willows, cattails, and other wetland plants will often volunteer on the site in a year or two. To speed the reclamation process, however, suitable species can be obtained from nearby sources or purchased for planting.

Propagating wetland species can be difficult and can, in some places, produce a plant community composed of only a few species, that is, far less diverse than natural populations on undisturbed sites. The best way to establish a diverse community is to transplant soils and plants from an existing wetland, particularly one that is being eliminated by mining. Care must be taken when planting nursery stock to replicate as nearly as possible the plant community surrounding the site being reclaimed.

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5 Reclamation Techniques for Quarries

HIGHWALL AND BENCH RECLAMATION

Many quarry operations create benches and highwalls composed of solid rock. Shaping the tall rock faces and engineered benches created during production blasting can be difficult. Vertical cliffs may be incorporated in the reclamation landscape if natural cliffs exist in the area of the mine. The extent and types of cliffs present should be shown on maps and cross-sections submitted in the permit application.

Primary reclamation concerns for these areas are stability and aesthetics. Some post-production blasting may be necessary to break up linear features. The effects of blasting the highwall should be carefully considered when preparing both the operating and reclamation plans. If blasting is contemplated, seek the help of a qualified professional before proceeding. A poorly designed blasting plan can result in unsafe conditions that are difficult and expensive to fix.

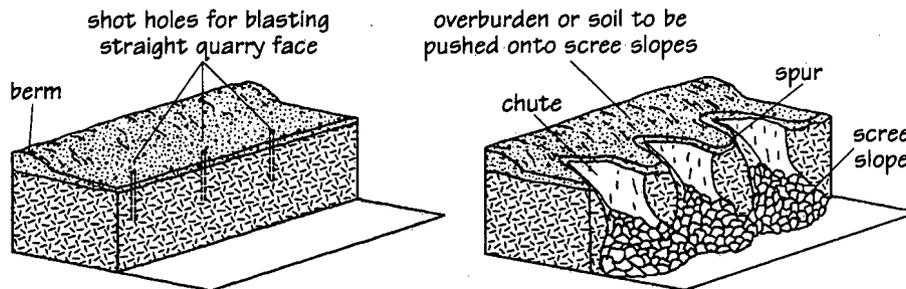
Public access and safety should also be addressed as part of the reclamation plan wherever steep cliffs are to be left. After mining, a bench or berm may be needed at the base or top of steep highwalls to catch falling rock. Placing a berm at the top of the quarry or a 10-foot-high by 15-foot-wide bench near the top will improve safety by discouraging access and reducing the likelihood of injury due to falling.

Where adequate moisture is present (west of the Cascade Range), wide benches may be revegetated. Benches to be revegetated should slope toward the highwall to trap moisture and soil. (See Fig. 2.4.) They should also slope gently to the side to promote drainage. Enough soil should be placed on the bench to support the proposed vegetation.

West of the Cascades, trees planted on benches may eventually break up the line of the face, although it may take years before benches are screened from view, even in smaller quarries. Revegetation may not be a viable reclamation technique in dry areas, larger quarries, and open pits unless combined with other methods discussed in this chapter. In arid areas east of the Cascades, bench revegetation will probably not obscure linear features.

Several methods of reclaiming quarry walls are effective in achieving stable slopes and preparing the site for the proposed subsequent land use. Excavated quarry slopes are generally more stable than fill slopes. However, once a material is blasted, it is no longer considered consolidated and must be reclaimed to a shallower angle, depending on the nature of the rock.

Figure 5.1. Blasting at the holes shown in the left sketch can create scree slopes (right), which may then be stabilized by plantings.



**RECLAMATION
BLASTING**

Reclamation blasting is a fairly new technique: The amount of fracture desired often differs from that for production blasting. Chutes, spurs, scree slopes, and rough cliff faces can be intentionally created by strategically placed blast holes (Fig. 5.1) (Norman, 1992; Coppin and Bradshaw, 1982). Because few people have the field experience necessary for this type of blasting, the use of a contractor familiar with this technique is recommended.

Highwalls

Selective blasting produces a natural appearance and stabilizes a site. Selective blasting can be used to modify benches, break up linear features, and blend highwalls with their natural surroundings. Proper blasting of highwalls leaves rough surfaces that can provide nesting and perching habitat for birds (Fig. 5.2). However, the rough surface should be free of loose rock.

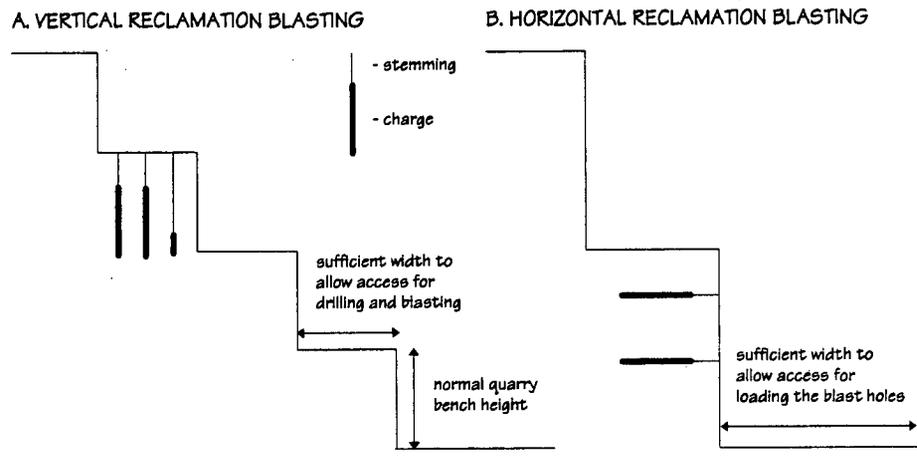
Reclamation blasting that reduces the entire highwall to a scree or overburden slope is essentially a cut-and-fill method. This technique can be used only where there is sufficient material remaining in a setback behind the quarry face to create the desired slope. Blasting for this purpose will not be possible if the operator has mined to the permit boundaries.

The highwall profiles of Figure 5.3 show two conceptual blasting patterns for reclamation. In 5.3A, vertical holes are drilled across the bench floor. The outermost row of holes is only lightly charged to minimize flyrock and keep the blasted material on the slope. Most of the rock fracturing is done by the explosives in the



Figure 5.2. Proper blasting of highwalls leaves rough surfaces that can provide nesting and perching habitat for birds. (From Green and others, 1992.)

Figure 5.3. Conceptual blasting patterns for obliterating quarry benches.



rows farther back from the face. The blasthole design of Figure 5.3B uses horizontal blast holes. PVC pipe can be inserted into the drilled holes to keep them open and serve as a water drain. The final pit configuration must allow for access to the drilled holes for loading with explosives.

The final choice of blast pattern, delays, stemming depth, etc. depends upon the rock type, structural geology, blasting agent, and other highly variable conditions that cannot be addressed in this manual. Although this method can be less expensive than backfilling (Thorne, 1991; Petrunyak, 1986), the operator has only one chance to get it done right. Doing proper research and consulting appropriate experts before starting reclamation blasting cannot be stressed enough.

After the blasting is completed, topsoil and overburden stored above the final slope can be pushed onto the blasted rubble to promote revegetation. For quarries in which there are multiple benches, the final slope will approximate the overall slope of the benches. Proper setback must be accounted for from the lowermost bench to the uppermost one.

Benches

If selective blasting of benches is impractical or dangerous, other reclamation methods may be necessary, such as leaving wide benches that can be revegetated or pushing rock over the side of the pit to hide the benches (Fig. 5.4).

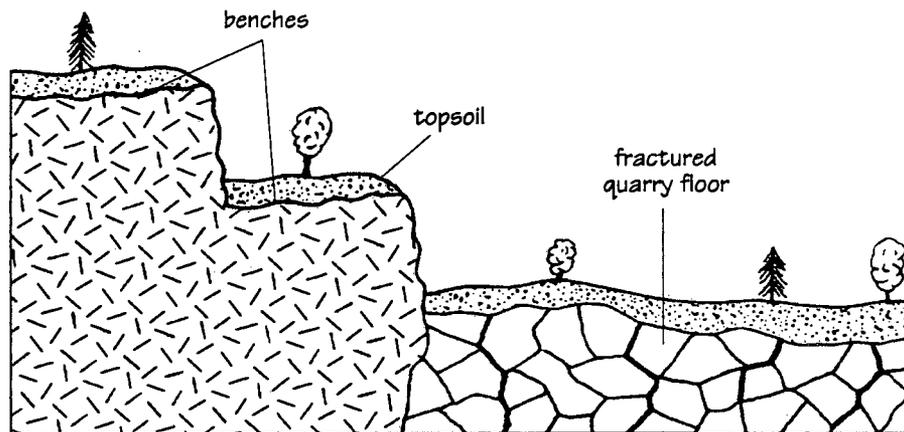
MINIMIZING OFFSITE IMPACTS

Minimizing offsite impacts from blasting is in the best interest of both neighboring landowners *and* mine operators. It can reduce litigation and negative publicity for a project. All blasting should be done by professionally trained and certified experts. Blasting techniques have improved dramatically since the days of black powder fuses and dynamite. Vibrations, noise, and fly rock can be greatly reduced when proper techniques are employed.

Causes of Damage

Vibrations from the blast may damage nearby structures and residences. A blast creates a wave that travels through rock and uncon-

Figure 5.4. Topsoil placed on benches and on a fractured quarry floor will prepare the site for revegetation.



solidated materials. When the wave arrives at nearby structures, it can cause them to vibrate. Sound waves from the blast, transmitted through the air, are usually more detectable by humans, but it is the back and forth movement of the ground wave that causes the damage, not the accompanying sound. The amplitude and intensity of the ground wave are determined by the number of pounds of explosive detonated at one time. Most problems can be avoided when the amount of explosive is minimized and the blast is properly timed.

Vibration Effects Under Various Conditions

Unconsolidated material will vibrate more strongly in response to the ground wave than will competent rock. All other factors being equal, the potential for vibration damage is greater if a structure is built on fill, sand, dirt, or other unconsolidated material than if it is built on compacted material or competent rock. The more competent the material, the less movement will occur.

The way the structure is built can also have an effect on the kind and amount of damage. A structure with a concrete slab floor usually develops more cracks than one with a perimeter foundation built on solid rock.

Pre-Blast Survey

In order to establish pre-blast conditions at nearby residences, a pre-blast survey should be performed by an outside specialist rather than by a member of the organization doing the blasting. Typically, after a blast has taken place, owners of nearby structures will find cracks, settlement, and displacement, all of which were pre-existing, but never noticed. All structures within any possible damage range must be thoroughly surveyed before any blasting is done.

The importance of a pre-blast survey of all surrounding structures cannot be overstated. The lack of a proper survey by a qualified specialist is an open invitation to lawsuits. Without a survey, the damage could be real or imagined, but an expensive lawsuit will be required to establish liability.

Use and Placement of Vibration-Measuring Equipment

The blast contractor should monitor the blasting with vibration-measuring equipment, but the equipment should be placed and the results read by a qualified independent third party. Monitoring

equipment that provides an immediate printout is generally better than equipment requiring post-blast data manipulation and interpretation because the results are available immediately and cannot be changed once recorded.

Blasting Plans and Logs

The mine operator should require a blasting plan and blasting logs. Blasting plans are prepared before the blast. Blasting logs are made on the site as each hole is primed, loaded, stemmed, wired, and connected to the circuit. Blasting logs must accurately describe the work on each hole and must be kept for 2 years after the work is completed in case they need to be referred to later.

BACKFILLING

Quarries located in populated areas should consider total or partial backfilling when it is economically feasible (Fig. 5.5). Advantages of backfilling include reducing slopes, increasing post-mining property values, and reducing safety hazards. (See Chapter 4.) In urban areas, many quarry sites are backfilled. If buildings or other structural improvements are to be placed on top of the old excavation, the backfill material must be structurally sound and stable. Dumping fill material over the highwall can also help disguise the linear benches. If overburden or waste rock is strategically placed, backfilling may be done with a short push or haul.

Fill Materials

In some quarries, operators will decide to rebuild slopes after all rock is removed by:

- concurrent backfilling using overburden mined elsewhere on the site,
- bringing in fill material from construction projects offsite, and
- retaining enough overburden or mine waste for resloping after completion of mining.

Overburden should be stored where it can be readily and economically moved into position during reclamation. Mining plans should take the backfill process into account. Operators need to be sure there is enough onsite material or identify a likely source.

If fill is accepted from construction sites, a monitoring plan should be established by the operator to prevent disposing of haz-

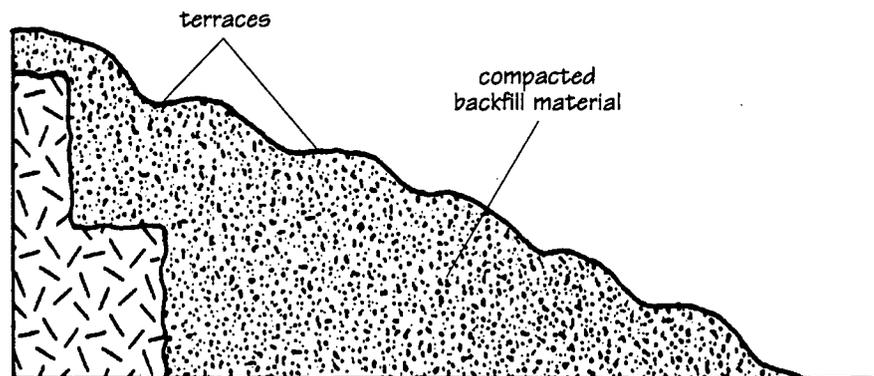


Figure 5.5. Quarry slopes that are backfilled should be compacted so that the final slope is stable; a 3H:1V angle (with terraces, if it is long) generally results in a stable slope. Topsoil should be spread over the compacted slope to make revegetation possible.

ardous or unapproved material on the site. Local permits from health departments may be necessary before importing fill.

Fill Slopes Stability and erosion control are primary concerns for slopes created by backfilling. Backfilled slopes may be prone to erosion and gully-ing if they are smooth, planar, and long. (See *Creating Natural Slopes*, p. 4.2.) As slope length and steepness increase, runoff velocity and the soil erosion also increase, and infiltration decreases. Careful location of drainages and water-control features enhances slope stability and revegetation potential (Banks and others, 1981; Washington Department of Ecology, 1992). (See Chapter 2.)

Temporary protection of bare slopes from rain or snow-melt runoff may be necessary if backfilling occurs over a long period and if establishing permanent vegetation must be delayed. Temporary protection can include covering the slope with plastic sheeting or mulches or matting and seeding with grasses. (See Chapter 2.)

A final slope angle of 2H:1V to 3H:1V is recommended. The gentler the slope, the easier soil application will be and the more quickly vegetation will be established. Backfilled slopes may require compaction to ensure stability.

DRAINING PIT FLOORS

If wetland creation is not part of the reclamation plan, pit floors can present special drainage problems. There are two basic ways to improve drainage in quarry floors: blasting and ripping.

Blasting

Impermeable pit floors of solid rock can be blasted to fracture the rock so that water can drain slowly from the site and to allow roots to penetrate (Fig. 5.4). The least expensive way to blast the pit floor

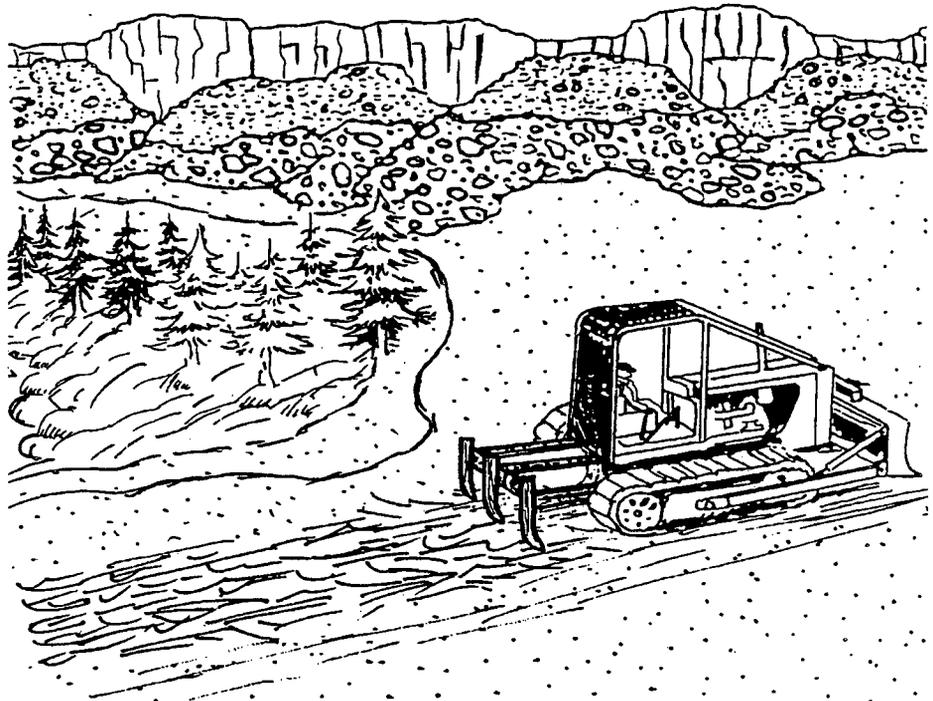


Figure 5.6. Ripping or de-compaction of pit floors is typically accomplished with rippers mounted on heavy equipment.

is to drill an extra 10 feet on the last production shot and leave some of the fractured material in place.

Ripping Ripping or decompaction is typically accomplished with rippers mounted on heavy equipment (Fig. 5.6). Rippers consist of a vertical shank or shanks that can shatter compacted or hard areas to depths of 7 feet. Before ripping or tilling compacted mine wastes or soils, at least one backhoe pit should be dug on the site to determine the thickness of the compacted zone, thus the depth of tilling. As a rule of thumb, ripper spacing should be less than the depth of ripping.

If soil for reclamation is replaced using rubber-wheeled equipment, then discing, plowing, or shallow ripping may be necessary to loosen the soil to create seedbeds and suitable substrate for ground cover or trees.

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5.8 RECLAMATION TECHNIQUES FOR QUARRIES

6 Landslides and Slope Failures

Many upland mining sites are situated in terrain that has potentially unstable slopes or is already unstable. Construction of spoil dumps, stockpiles, and mine cuts can destabilize areas that were stable prior to mining. If mines are located in potentially unstable areas, such areas should be identified before mining, and the mine plan should be developed so as to minimize risk to the environment. Common mining-related causes of landsliding are:

- removing the toe (support) of the slope,
- saturation of unstable slopes due to poor water management (such as constructing a pond on a slope),
- placing waste rock over vegetation on steep slopes causing failure as the vegetation rots,
- adding weight to an unstable slope, and
- placing weight (generally overburden) on an unstable area.

Landslides do not recognize property lines. Conditions on adjacent property may be 'causing' the slide on the mine site, and slides occurring on the mine site may damage adjacent properties. If stability is a concern, a geotechnical consultant should be involved in mine planning.

TYPES OF SLOPE FAILURES

The movement of soil and rock under the influence of gravity is called mass movement or mass wasting. Rockfalls, slides, earthflows, slumps, soil creep, raveling, and (more commonly) combinations of flow types are all forms of mass movement that can occur at mine sites.

Rockfalls

Rockfalls travel most of the distance through the air (Fig. 6.1). Movement is extremely rapid and includes free fall, tumbling, and rolling of fragments of bedrock or soil. Rockfalls may occur in a mine as pressure is released on the free face.

Slides

Slides move along one or more zones of weakness. Movement along the failure surface may be rotational, as in a slump, or translational along a more or less planar surface (Fig. 6.2).

Live tree roots contribute to holding the soil together and help tie the upper soil horizon to the subsoil. Runoff and surface erosion, when combined with a decrease in tree-root tensile strength caused by stripping vegetation and soil, have contributed to many land-

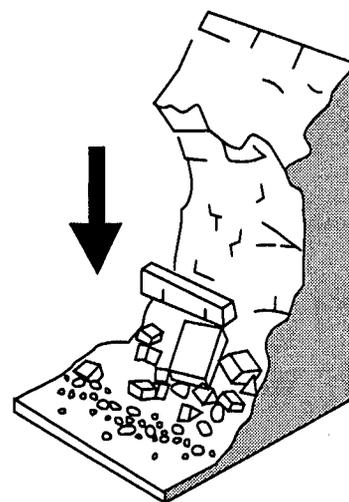
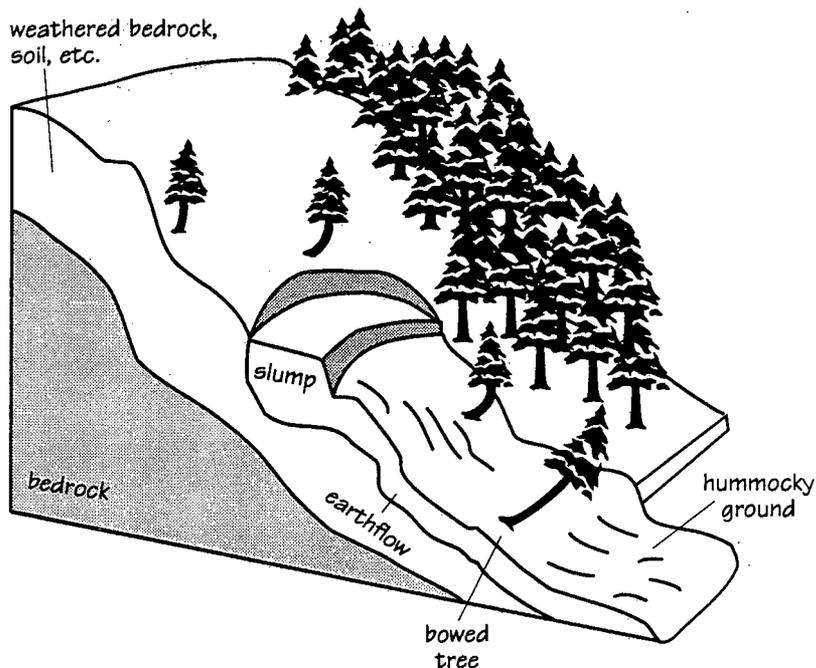


Figure 6.1. Rockfall on a steep or overhanging face. (Redrawn from Chatwin and others, 1991.)

6.2 LANDSLIDES AND SLOPE FAILURES

Figure 6.2. A complex slide called a slump-earthflow. (Modified from Chatwin and others, 1991.)



slides by removing the slope support. Scars from debris slides (shallow soil slips) may commonly be seen on steep slopes that have been stripped of vegetation. Removing the toes from steep slopes such as on talus, sand and gravel, or clay deposits can result in a landslide.

Earthflows Earthflows, composed of soil and rock, move slowly downslope as a viscous fluid. The amount and rate of movement vary according to the particle size and water content of the earthflow. Clay-rich zones are especially vulnerable to plastic flow when saturated. If enough water is present, the material can 'liquefy', causing an earthflow.

Slumps In a slump, the movement is rotational, producing a bowl-shaped failure surface. Slumps and slump-earthflows typically leave behind a steep scarp that is itself vulnerable to further slumping. Slumps also commonly occur in areas underlain by till and/or glacial lake deposits, both of which are vulnerable to failure when they are saturated.

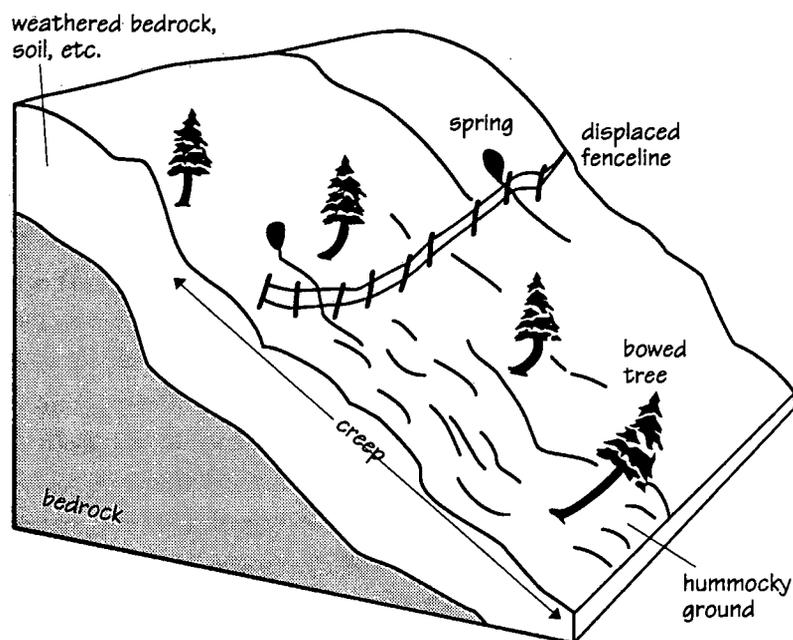
Soil Creep Soil creep is the very slow (inches per year) downslope movement of surface materials (Fig. 6.3).

Raveling Raveling is downslope movement of particles and commonly occurs on sand and gravel slopes that are too steep. Reclaimed slopes of 2H:1V to 3H:1V usually do not ravel.

ANATOMY OF A LANDSLIDE

Most landslides are combinations of several kinds of slope failure. The method of failure may be different in different parts of the slope. A landslide, in this case a slump-earthflow (Fig. 6.4), has the following parts (Varnes, 1978):

Figure 6.3. Conditions that lead to and indications of soil creep. (Modified from Chatwin and others, 1991.)



Main scarp – A steep surface separating the undisturbed ground from the slide mass, caused by the movement of slide material away from undisturbed ground. The projection of the scarp surface under the displaced material becomes the surface of the rupture.

Minor scarp – A steep surface in the displaced material produced by differential movements within the sliding mass.

Head – The upper part(s) of the slide material along the contact between the displaced material and the main scarp.

Toe – The lower margin of displaced material most distant from the main scarp.

Crown – The material that is practically undisplaced and adjacent to the highest parts of the main scarp.

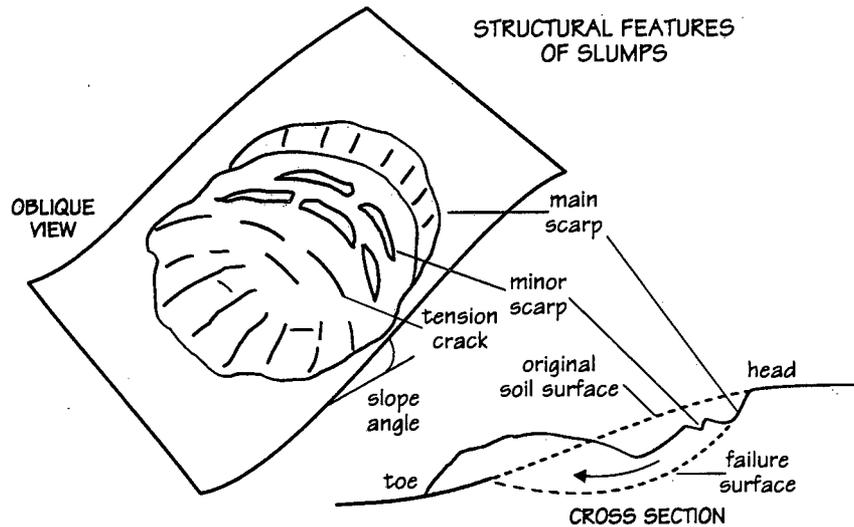
IDENTIFYING UNSTABLE SLOPE CONDITIONS

Regardless of the cause, instability can often be identified in the field through careful observation. Tension cracks, hummocky topography, springs and seeps, bowed trees, abrupt scarps, and toe bulges are all readily observable indicators.

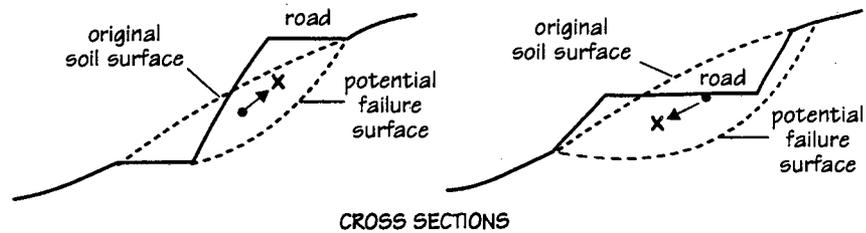
Tension Cracks

Tension cracks, also known as transverse cracks, are openings that can extend deep below the ground surface (Fig. 6.4). Tension cracks near the crest of an embankment or hillside can indicate movement of a mass of material. However, cracks may occur anywhere on the slide. They are perpendicular to the direction of movement and are typically continuous in a pattern across the width of the landslide. Tension cracks can fill with water, which lubricates the slide mass and may cause additional movement. Correction of slope failures must include preventing surface water from reaching tension cracks.

Figure 6.4. Structural features of slumps and the effect of cutting and filling on the stability of short slopes. (Redrawn from Burroughs and others, 1976.)



HOW ROAD CONSTRUCTION AFFECTS THE POTENTIAL FOR SLUMPING



• original center of gravity of soil block

X center of gravity of soil block after cut or fill has been completed

Hummocky Ground

Hummocky ground can indicate past or active slide movement. A slide mass has an irregular, undulating surface (Figs. 6.2 and 6.3).

Displaced and Distorted Trees

Vegetation, particularly trees, records the downslope movement of soil. Trees may be uprooted and may lean in a variety of directions (jackstrawed trees) as their roots are broken or moved in a rapid slide movement (Fig. 6.5). Bowed tree trunks may indicate soil creep; trees attempt to remain upright as the soil moves slowly downslope (Figs. 6.2 and 6.3).

Springs and Seeps

Ground water that collects at the contact between permeable layers that overlie relatively impermeable layers or rock strata dipping with the slope can cause instability. Carefully investigate springs, seeps, and areas of lush vegetation. Alder, horsetail, devils club, cow parsnip, and skunk cabbage typically grow in wet sites.

Scarps

Fresh scarps are a clear sign of recent slope failure (Fig. 6.4). Older scarps may be covered by vegetation and hard to identify. The presence of several scarps can indicate several active failure surfaces or movement downslope along a larger failure surface.

Toe Bulge

The toe of a slide commonly bulges out onto the more stable ground surface below the slide (Fig. 6.4). A toe bulge often gives the appearance of a mud wave displacing trees and vegetation in its path. The bulged toe should be noted in the site inventory along with the other slide features to define the size of the failed area. Removing the toe may reactivate the slide mass.

SURFACE DRAINAGE CONTROL IN UNSTABLE AREAS

The quantity and distribution of water in a slope, whether it is a slide mass, overburden, or soil stockpile, greatly influences its stability. Water saturation builds up pore pressure, which causes an increase in downhill-directed forces (Fig. 6.5). This increases the weight (increases driving force) and particle lubrication (decreases resisting forces). Slope failure can occur when more water is present in the soil than the pore spaces can accommodate.

If motion on a slide at the mine site responds directly to rainfall, then surface drainage improvements may decrease slide activity. Control of surface drainage, by itself, is seldom sufficient to stop landslides, because rainfall from outside the site can eventually show up as ground water in the slide. Surface drainage improvements are typically combined with other abatement techniques. (See Chapter 2.)

When soils, subsoils, and geologic material are excavated, drainage paths through the pore spaces are disrupted. Therefore, drainage control may be needed for constructed permanent and temporary storage or disposal piles and reclaimed slopes that are created by backfilling.

Listed below are techniques for improving slope drainage. (See Chapter 2 for specifics.) These techniques may not stop landsliding altogether, but they may prevent a slide from becoming worse:

- To improve slope stability, lower the water table by providing more drainage. Adequate drainage prevents water saturation and the build up of pore pressure.

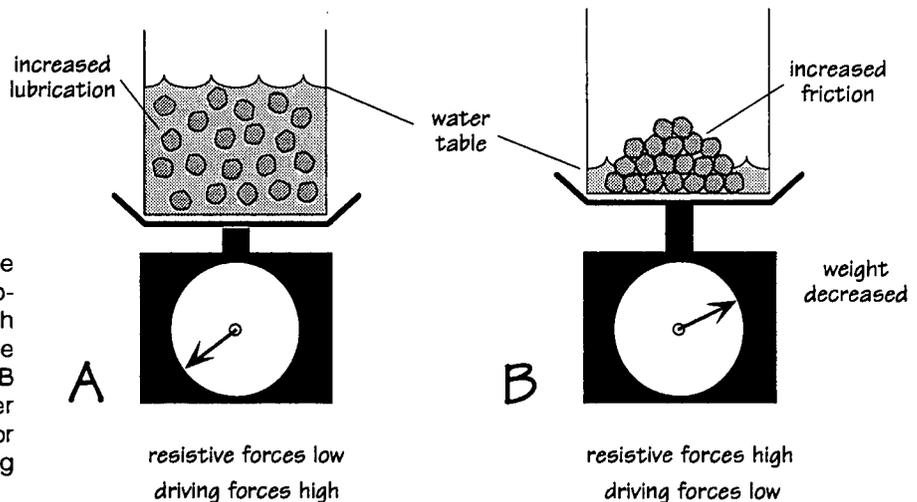
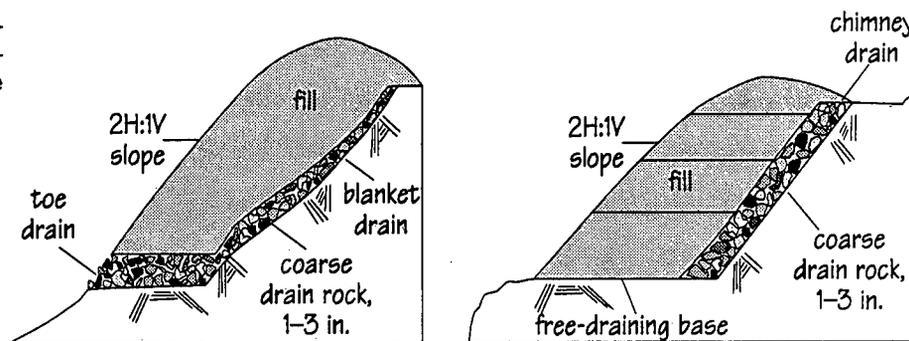


Figure 6.5. Forces acting on slide masses and large stockpiles. A represents a slide mass saturated with water. It has both low resisting force and high driving forces (weight). B represents a stabilized slope after the water table has been lowered or the water has been removed using drainage methods.

Figure 6.6. Details of toe, blanket, and chimney drain construction shown in cross section. (See also p. 2.19.)



- ☛ Berms and ditches should be built above and along the unstable slope to intercept and divert overland flow. They should be lined or sealed to prevent infiltration.
- ☛ Slopes adjacent to the slide mass should be graded to direct overland flow away from the slide area.
- ☛ The area above a slide should be crowned or sloped so that surface water is directed away from the slide and graded so water does not pond.
- ☛ Where drainage must cross an unstable slope, using a pipe should be considered.
- ☛ Avoid concentrating water on spoil dumps or natural slopes, thereby reducing their stability. Concentrated surface flows near slides should be handled in ditches lined with impermeable fabric, if necessary. (See Figs. 2.16 and 2.31.)
- ☛ If a slide area is to be regraded, the regrading should not produce a depression in the slope that could pond or concentrate water.
- ☛ If a slide is triggered, benches or cross-slope ditches should be used. They should be sloped and lined to move water away from the slide area.
- ☛ As part of grading operations, any exposed tension cracks should be sealed and compacted to prevent infiltration, then seeded to prevent erosion.

SLOPE STABILIZATION

Toe, blanket, chimney, and other types of permanent drains (Fig. 6.6) can help prevent saturation of a constructed slope. The minimum thickness of an underdrain or rock blanket should be 3 feet, because fines will eventually migrate into this zone. The drains should be thick enough to keep running freely for a long time.

Slope length and height may require construction of cross-slope drains to intercept runoff without creating gullies and erosion. Grading to break up long slopes and creating berms, furrows, and terraces will compartmentalize the runoff. The more landscape diversity that is incorporated into the final grading, the less a site will need cross-slope drains to ensure stability.

**SLOPE FAILURES
ABOVE THE MINE**

Overburden failures above mine cuts can be a problem if proper slope angles are not maintained above the rock face. If the contact between the overburden and the rock dips toward the highwall or open face and the overburden slope is near vertical or steep (1V:1H), a failure is likely. To prevent this from occurring, operators should make sure the overburden cut has a gentle slope and is well drained.

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7 Revegetation

INTRODUCTION

Mines west of the Cascades in Washington and Oregon are fairly easy to reclaim because they typically have deeper soil horizons due to abundant precipitation. Mined areas east of the Cascades are more difficult to reclaim because soils are thinner, the region is drier, and temperatures are more extreme. Therefore, successful revegetation in the eastern part of the state is more dependent on proper plant selection, appropriate timing of planting, adequate fertilization, presence of organic matter in the soil, and irrigation.

West of the Cascades, even though revegetation can be accomplished without separately salvaging and replacing the soil because of the abundant moisture, species diversity will be limited until a soil horizon rebuilds, and this may take decades. Additionally, plant vigor may quickly decline after the first planting if ample amounts of organic matter are not provided or supplemental chemical fertilizers are not added to initiate the cycle of plant growth, decomposition, and nutrient recycling. Amounts of fertilizer should be based on site-specific needs determined by soil tests.

Natural plant communities develop through a succession from pioneer species to climax species (Fig. 7.1). Pioneer species are aggressive and tend to grow rapidly to fill disturbed areas, whereas climax plant communities develop over longer periods and tend to be slower growing. Each phase in the plant succession prepares the ground for the next. Nitrogen-fixing legumes, shrubs, and trees may play a crucial role in soil reconstruction.

It is tempting, particularly with trees, to plant only climax species (for example, Douglas-fir) even if the ground is not fully prepared. However, natural communities develop slowly in a succession. Mimicking this progression during reclamation is impractical,

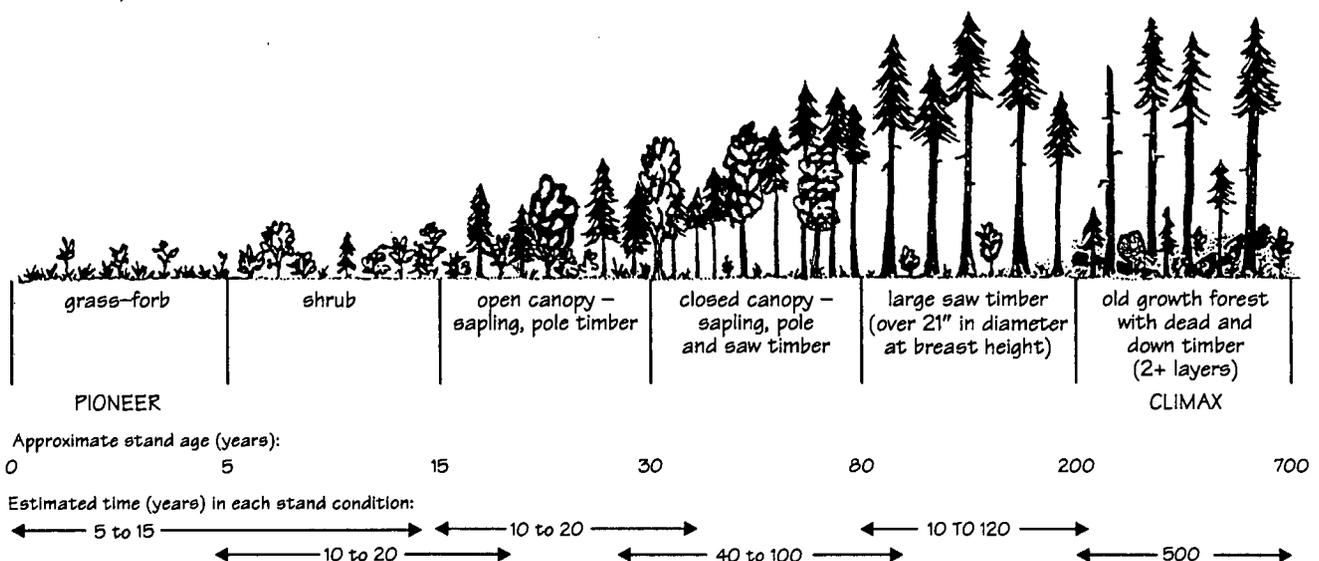


Figure 7.1. Sequence from pioneer to climax vegetation for a Douglas-fir forest after clear cutting. The same recovery process occurs naturally in mined areas. (From Brown, 1985.)

but planning a phased succession for both ground cover and trees will establish a good climax mix (Norman and Lingley, 1992).

Grasses may be appropriate as either quick pioneer soil builders under developing woodland or as climax species for rangeland. Pioneer trees will act as fast-growing nurse trees for slowly maturing forest trees that find it difficult to establish in disturbed ground or in areas with no canopy.

Revegetation is important because it:

- reduces erosion,
- reduces storm-water runoff,
- provides habitat and forage for animals,
- reduces visual and noise impacts,
- reduces reclamation liability, and
- increases the value of property by returning it to agriculture, forestry, or other beneficial use.

Note: While vegetation significantly reduces erosion, it cannot prevent slippage of a soil that is not stable due to improper placement techniques. For example, soil placed on steep slopes requires additional stabilization techniques to ensure revegetation success. (See Chapter 6.)

SPECIAL PROBLEMS AT MINE SITES

Plants need fertile soil, sunlight or protection from the sun, and water to thrive. Mining often removes fertile soil. (Salvaging and replacing soil is discussed in *The Soil Resource*, p. 3.10.) Even in the best of conditions, plant growth cannot be guaranteed immediately after mining. Mine sites generally offer harsh conditions that make it difficult to establish vegetation. Some common problems affecting revegetation are:

- high surface temperature (especially on south-facing slopes),
- steep slopes,
- poor water retention,
- lack of adequate soil,
- erosion before seedlings establish,
- only limited periods during the year suitable for seeding,
- lack of water
- poor conditions for germination,
- slopes inaccessible to equipment, and
- grazing impacts.

By being aware of these potential problems, an operator can improve the quality of reclamation and save money by being successful on the first attempt. Revegetation early in the reclamation process is critical because it may take several seasons to establish widespread healthy vegetation. For example, by planning ahead and

choosing appropriate techniques, an operator can place young trees in strategic locations to provide a significant visual screen within a few years.

SUCCESSFUL REVEGETATION STRATEGIES

Trial-and-error revegetation that relies on natural precipitation and hardier natural pioneer species (such as alder) is generally less expensive, uses less labor, and is more effective than waiting until mining is complete to plant the entire site with commercial plants. Segmental mining results in fairly small areas on which to begin this process. Test plots can be used to determine which species will be successful. Areas in which plants fail to establish can be reseeded with more appropriate vegetation (Norman and Lingley, 1992).

Steps to successful revegetation of mined land can be summarized as follows:

- ☛ *Plan before you start.* Know in advance what has to be done, but allow for modification if necessary.
- ☛ *Strip and store the topsoil, subsoil, and overburden separately.* Minimize handling and storage.
- ☛ *Strip a small area at a time.* Strip only the area that can be revegetated within a reasonable time to minimize erosion.
- ☛ *Move soil materials under dry conditions (June–September).* Wet soils are easily damaged.
- ☛ *Carefully calculate volumes of soils necessary for reclamation to ensure that sufficient amounts are retained.*
- ☛ *Reclaim the mine in segments.* Segmental reclamation allows for 'live topsoil' replacement, which often enhances revegetation.
- ☛ *Shape slopes for subsequent use.* Slopes between 40H:1V and 20H:1V are desirable for agriculture purposes. For forestry, the slopes can be steeper.
- ☛ *Replace overburden (if any), subsoil, and topsoil in the correct sequence.*
- ☛ *Eliminate compacted soil.* Where compaction has occurred, rip the mine floor as deeply as possible before reapplication of stored overburden, subsoil, and topsoil.
- ☛ *Develop a post-reclamation management program.* Choose plants that increase soil fertility and improve soil structure, such as deep-rooted nitrogen-fixing legumes, for the first plantings. Monitor progress and determine why plants did not thrive.
- ☛ *Get good advice from the experts.* Take advantage of the expertise available in various government agencies and though local farmers.
- ☛ *Be patient.* Successful revegetation may be a slow process taking several seasons or years.

CLASSES OF VEGETATION

Four basic classes of vegetation—grasses, forbs, shrubs, and trees—are important for reclamation. Forbs, which include legumes such as alfalfa, clover, and lupines, are any herbaceous plant that is not grass or grasslike. Forbs and shrubs have many similarities but differ in that shrubs have a woody stem. They will be considered together in this discussion. Many sites naturally support a mixture of two, three, or all four types of vegetation.

Grasses Grasses are either perennial or annual. Annual grasses start from seed every year, whereas perennial grasses die back but start from the same root mass each year. Annual grasses green up and establish quickly, but put most of their energy into seed production. Perennial grasses put significant energy into root development and foliage; individual plants persist for many years.

Grasses typically are shallow rooted (6 inches to 2 feet) but, because of their ability to provide complete ground cover, are effective for erosion control. Grasses provide significant nutrition to both livestock and wildlife and provide cover for small animals and birds. Newly established grasses, freshly fertilized, are a favorite food for grazing animals. Therefore, such areas should be fenced for optimum revegetation success.

Forbs and Shrubs Forbs and shrubs include everything from small wildflowers (forbs) to sagebrush plants (shrubs) that may reach 6 feet in height. They are nutritious and provide significant cover. Many plants of this class have a single taproot with a shallow fibrous root system around it. Although mature forbs and shrubs can establish significant root wads, they typically provide only minimal erosion protection for several years.

Trees Trees are generally the slowest of the three classes to establish themselves and mature. They typically have a deep, extensive root system. Evergreens or conifers (except larch) keep their leaves or needles all year long. Deciduous trees lose their leaves every fall and, compared to conifers, grow faster and add leaf litter to the ground.

SELECTING PLANTS FOR A SITE

Wherever possible, native species should be used in revegetation. Native plants often out-compete introduced species over time and are the most useful to wildlife. The vegetation surrounding a mine site can be used as a guide when selecting native species. Re-establishing native species can be greatly accelerated by using native seed mixes and locally transplanted species.

If sufficient preplanning is done, soil and native vegetation can be transferred from areas being stripped for new mining to areas in the final stage of reclamation. This approach is less expensive and often more successful than long-term soil storage. Soil hauled directly from a new mining area to a reclamation area carries with it viable seeds of native vegetation that can rapidly establish on the reclaimed area. This typically reduces the need for added seed and plant material.

Commercial sources typically sell native and non-native bare-root and container plant stock, as well as native grass seed mixtures. Bareroot stock should be planted during the winter and is typically less expensive than plants sold in containers. Generally, plants in containers have a better survival rate than bareroot plants. A plant-selection guide is given in Tables 7.1 through 7.4.

The best source of native shrubs and trees is in or near the site to be revegetated. Avoid transplanting native species from an elevation significantly higher or lower than the area in which they will be planted.

Weeds (imported or local) can render reclamation ineffective. Local extension agents can provide lists of noxious weeds and suggest methods for their control.

Information on plant availability and nurseries carrying suitable plants can be obtained from Hortus Northwest, PO Box 955, Canby, OR 97013, *Phone: 503-570-0859, Fax: 503-399-6173.*

Grasses and Legumes

Grasses and legumes are very effective at stabilizing disturbed areas because of their extensive root systems. They also increase water infiltration, contribute organic matter to the soil, and, in the case of legumes, fix atmospheric nitrogen into the soil.

In determining what mix of grasses and legumes is best for a given site, the climate, soil conditions, sun exposure, and objective of the seeding must be considered. The Oregon Department of Geology and Mineral Industries (DOGAMI), The Washington Department of Natural Resources (DNR), and the local Natural Resource Conservation Service (NRCS) offices can provide valuable information about seed mixes that are suited to various site conditions. The Washington or Oregon *Interagency Guide for Conservation and Forage Plantings* is also a useful resource for determining seed mixes. Tables 7.1 through 7.4 contain descriptions of some of the most common grasses, legumes, and woody plants.

Some grasses, such as annual rye, grow quickly, while others, such as many of the bunch grass sod-formers, grow rather slowly. Cereal grains, the same as those cultivated for food, can be very effective in establishing a rapid vegetative cover that will still allow native species to establish. Cereal grains help protect against soil erosion because they possess 50 percent more below-ground biomass (roots) than grasses.

The success of legume plantings can be greatly improved by treating the seeds with legume inoculant, available from many seed suppliers.

Forbs and Shrubs

Many forbs establish easily from seed and can be just as important as grasses and trees for reclamation. Some shrubs do well from seed, many do not. Bareroot plants, which can often be purchased inexpensively and easily from nurseries, are an effective way to estab-

lish shrubs. Young plants in containers are generally easiest to establish but are the most expensive to purchase.

Trees A variety of species suitable for revegetation projects are available in containers at nurseries. Tublings (plants grown in narrow, deep containers) may be useful on rocky areas and steep slopes. Bareroot transplants are successful for many species and are more economical to purchase than containerized plants. Nurseries can provide both tublings and bareroot stock.

SOWING SEEDS

Grasses and cover crops such as legumes are relatively easy to establish from seed. In most places, grass and legume seeds should be planted no deeper than $\frac{1}{4}$ inch. For the best chance at revegetation success, topsoil should be spread between September 15 and October 15. Seeding with grasses and legumes should be done within 3 days after final shaping (R. Shinbo, personal commun., 1995). However, if proper conditions of soil moisture and temperature are present, revegetation can also be successful at other times of the year. Proper conditions for reclamation and revegetation exist between March 1 and November 1 for sites west of the Cascades in some years. During the winter, bare slopes should be protected with mulch or other erosion-control techniques until the next seeding period.

Summer plantings should be avoided unless irrigation is planned. Fall plantings may be preferable in areas with long growing seasons, winter rains, or summer drought; they allow plants to establish themselves over the winter. Optimal planting dates will vary slightly from year to year and with weather conditions. The local county extension service can provide information on planting dates.

Seed Drills Seed drills are used extensively in agricultural applications where soil has been tilled and is free of rocks. Range drills are used in irregular terrain or on rocky soils. In arid areas with coarse-textured soils, improved success with drilling may be obtained by placing the seeds 1 inch deep.

Range drills may be available for use from some federal agencies, such as the NRCS and the Bureau of Land Management. Agricultural seed drills are commonly not suited for reclamation seeding because of the rocky soil. Neither type of drill is suitable for the rough and steep terrain found on many mine sites.

Broadcast Seeding Broadcast seeding (by hand or with a mechanical spreader for larger areas) is most commonly used for seeding small areas. Broadcast seeding without mulch application or soil covering after the seed is broadcast is typically not as effective as seed drilling.

Hydroseeding Hydroseeding can effectively convey, in one application, seed, fertilizer, and mulch onto steep slopes and other areas inaccessible to other seeding equipment. The mulch blanket retains moisture; a

tackifier or binder added to the hydromulch slurry can prevent it from eroding away.

Seedbed Preparation

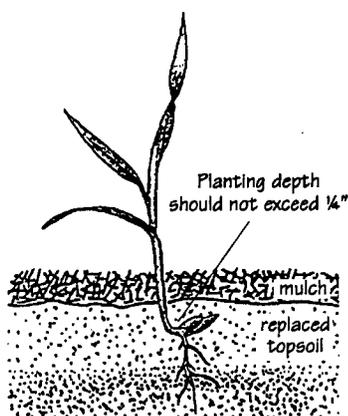


Figure 7.2. Cross section of seed germination.

Seedbed preparation establishes conditions conducive to seed germination and seedling growth. Seedbed preparation on mining sites is especially important because the heavy equipment commonly compacts the soil, which inhibits seed germination. In order for a seed to germinate and thrive, there must be contact between seed and soil, adequate moisture, and moderate soil temperature. The soil must be loose enough to allow root penetration once the seed has germinated (Fig. 7.2). A soil or mulch covering of $\frac{1}{4}$ inch moderates temperature and prevents seed loss to birds. Mulching also conserves the much-needed moisture for continued seedling development.

Depressions, small pits, and irregularities in the seedbed can greatly enhance the ability of seeds to germinate and thrive. A sheepsfoot roller, land imprinter, or bulldozer can be used to create micro-depressions. Bulldozer tracks parallel to the contours can enhance seed germination and reduce runoff (see Fig. 4.3).

Mulching

The primary purposes of mulch are to retain moisture, prevent erosion, and moderate soil temperature fluctuations. Among materials that can be used as mulch are:

- ! hay or straw,
- ! processed mint clippings,
- ! wood chips,
- ! grass clippings, and
- ! wood fiber.

Mulches can be applied with blowers, hydromulching equipment, or manually. Mulch may be anchored to prevent water or wind erosion by crimping it, adding tackifiers or binders, or by covering it with natural or synthetic netting.

Hay or straw mulch can be anchored using a modified agricultural disc implement that crimps the hay into the soil.

Logs and other woody debris, placed perpendicular to the slope in seeded areas, will help stabilize mulch and can provide valuable shade and microhabitat for the emerging seedlings.

TRANSPLANTING

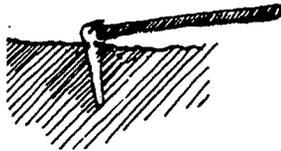
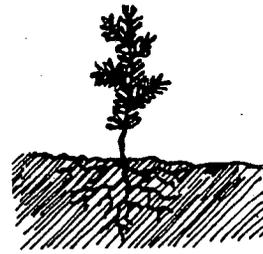
Transplanting is the technique used for relocating containerized stock, bareroot stock, or plants from elsewhere on site and planting them in another.

Planting Times

Containerized plants have an advantage over bareroot stock in that they can be successfully transplanted almost any time of year. However, transplanting should not be done during the summer unless irrigation is provided.

Eight Steps in Tree Planting

Correct

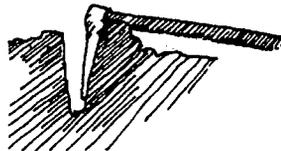


Insert hoe

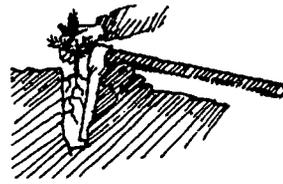


Loosen soil

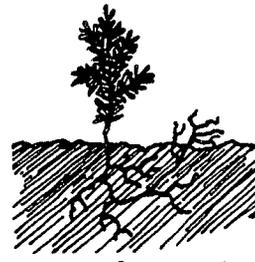
Planting Errors



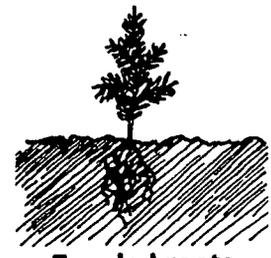
Pull (toward you)



Insert tree



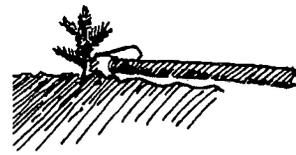
Turned up roots



Tangled roots



Cover roots



Cover to base



Rock



Air pocket



Pack soil



Correctly planted



Too shallow

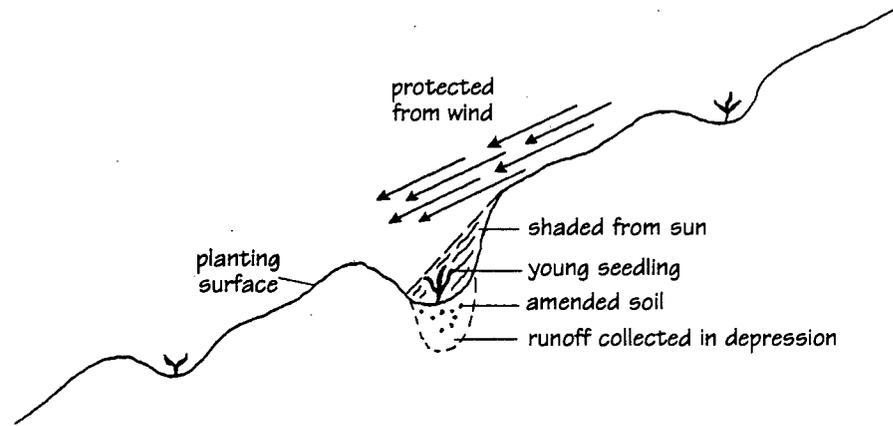


Too deep

Figure 7.3. Steps in transplanting bareroot or container plants.

Trees and shrubs should be planted while they are dormant, generally from November 1 through March 1. Bareroot stock and transplants are usually planted in the spring because the plants have to be dormant before they can be dug. Bareroot plants may not be shipped

Figure 7.4. Transplanted seedlings on a slope. Small berms on the downslope side of the planting holes help retain runoff. (Redrawn from Banks, 1981.)



from the nursery until late fall or mid-winter. Spring planting may be appropriate for bareroot stock if the site is subject to frost heaving in the late fall or winter.

Spring plantings should be done as soon as site conditions allow. Typically plants should be placed in the ground just before or just after shrubs at the site break dormancy. That can be determined by looking at buds. Buds begin to swell when the plants are 'breaking' their dormant condition.

Plants should be adequately acclimatized. This is particularly critical when the environment of the growing nursery or location is different from the planting site. Plants can be acclimatized by moving them to the site before the planting date. Bareroot materials should be kept under refrigeration or the roots should be buried in a shallow trench and kept moist until planting.

Planting Techniques

If moisture conservation is important, planting should be done immediately after digging the planting holes to reduce drying of the backfill.

When transplanting, keep the majority of the root mass intact (Fig 7.3). Even if care is taken in transplanting, some roots will break. Often the damage is to the fine roots that are essential for providing nutrients and moisture. Pruning the above-ground stem(s) reduces evapotranspiration and increases the likelihood of survival by reducing the plant's demand for nutrients and moisture.

It may be helpful to construct berms 2 to 6 inches high around the planting holes to concentrate rainfall and runoff. On sloping ground, leaving the berm open on the uphill side of a planting can be beneficial (Fig. 7.4).

Mulch will help retain moisture. However, it must be anchored to prevent erosion by water or wind. Mulch is of little use on sites that flood because the mulch washes away.

Tools Required

Choice of planting tools will depend upon the revegetation plan, the size of plant materials, and planting conditions. Shovels, picks, pry bars, posthole diggers, hand or power augers, front-end loaders, or backhoes may be needed to develop the planting site. For gathering

plant materials from the site, chainsaws, lopping and pruning shears, buck saws, mechanical tree spades, and backhoes or front-end loaders are useful. Straw or hay for mulch for moisture retention, fencing and wire for plant protection, and cages and stakes for support may also be required. Fencing or cages are highly recommended if deer, beavers, or other plant 'predators' are in the area. They appear to seek out recently established trees and shrubs.

PROPAGATING FROM CUTTINGS

The easiest and most economical method for propagation of some species of woody plants is the use of cuttings. Willows and cottonwoods are the two most common plants propagated from cuttings (Fig. 7.5). The best time to collect cuttings is while the plants are dormant, typically between November 1 and March 1. Cuttings taken near or at the planting site or from a similar elevation zone will have a good chance of surviving on the site.

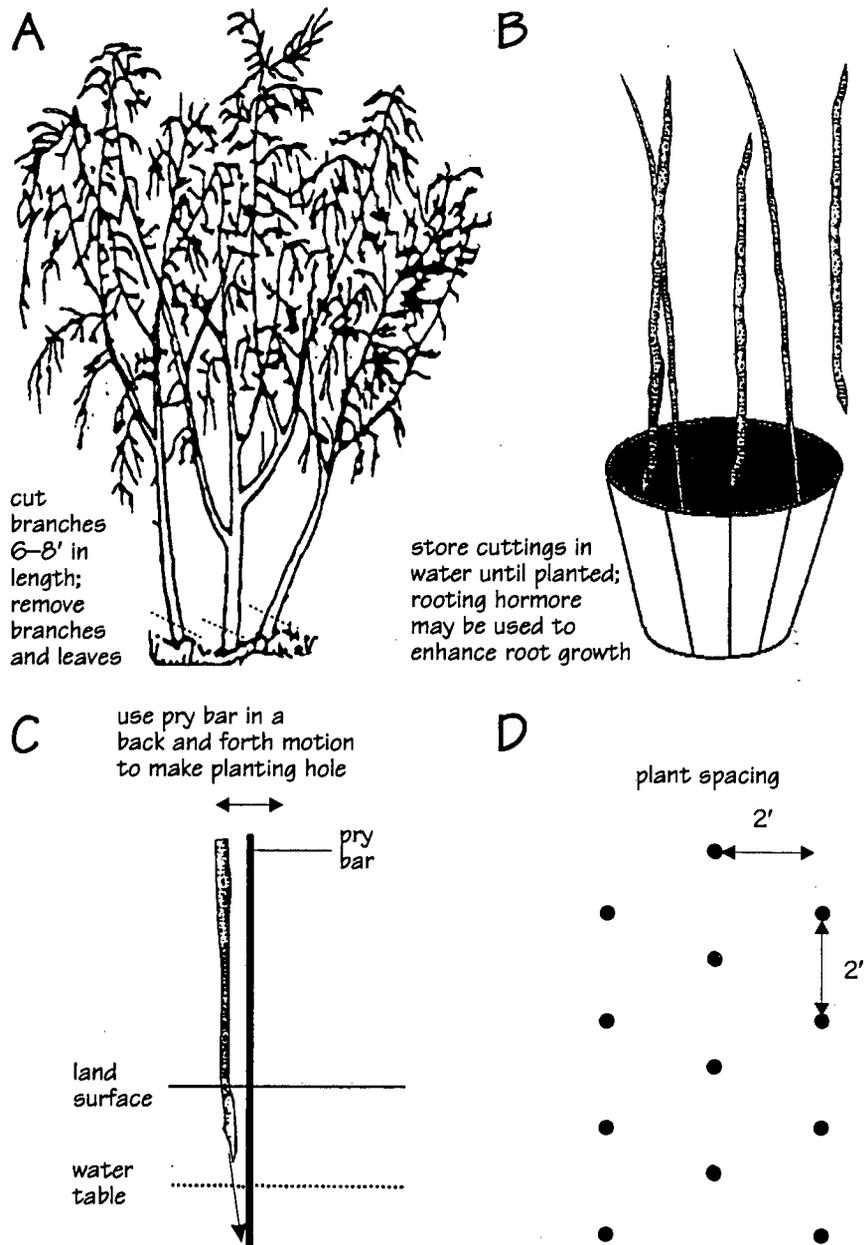


Figure 7.5. Steps in propagation by cuttings.

**Determining
Cutting Length**

Cuttings should be at least 3 feet long, but the length of the cutting depends on the planting depth required. At least two-thirds of the cutting length should be placed in the ground. The planting depth depends on the mid-summer water table and the potential for erosion in the planting area. Where erosion potential is high or the water table is deep, planting depth and cutting length should be increased. The above-ground stem should have at least three buds exposed. The minimum stem diameter for cuttings should be $\frac{3}{4}$ inch.

**Collecting
Cuttings**

Healthy-looking plants should be used. Willows are particularly susceptible to willow bore—avoid plants with burls, lumps, or scabs surrounded by smooth bark. Several years of drought conditions or other plant stresses will diminish the reserves in the plant and may affect the survival rate. Transplant stock should be selected from wetter areas. Avoid suckers (the current year's growth) because they may not contain adequate stored energy reserves. Trim off all side branches and remove the apical (top) bud; the apical bud draws too much energy and may affect survival.

**Storing
Cuttings**

If cuttings need to be stored longer than several days, they should be kept in a cooler at 24°–32°F. A mixture of 50 percent latex paint and 50 percent water can be used to mark and seal the top of the cuttings and reduce moisture loss. All cuttings should be soaked prior to planting for at least 24 hours to initiate root growth. At a minimum, the bottom third of the cutting should be submerged. The entire cutting may be soaked once the paint has dried. Rooting hormone added to the water may improve the survival rate. A diagonal cut should be made on the bottom for ease of planting and a straight cut on the top.

**Planting
Cuttings**

Cuttings can be placed either in the spring or fall, preferably when the plants are dormant. If cuttings are taken in the fall before dormancy, the leaves should be stripped. (A general rule of thumb is that cuttings should be taken in the late fall or early winter and that rooted plants should be taken in the spring.)

Cuttings must be planted with the buds facing up. Be sure to keep track of which end of the cutting is the top—a cutting planted upside down is not likely to survive.

For successful plantings, the following guidelines are suggested:

- ☛ Select cutting stock from a nearby plant source.
- ☛ Cut when plant is dormant.
- ☛ Use cutting of proper diameter and length.
- ☛ Properly store and maintain the cuttings before planting.
- ☛ Add root hormones to storage water.
- ☛ Use good planting techniques.

Optimum spacing of the cuttings will depend on the site and the purpose of the planting. To achieve good density, plant cuttings

2 feet apart in rows offset by 1 foot (Fig. 7.5D). Cuttings can be planted wiggling a pry bar or a piece of rebar back and forth to develop the planting hole (Fig. 7.5C). Critical factors are preventing damage to the bark and ensuring good contact between the cutting and the soil. Pack the soil around the cutting; air pockets around the cuttings will kill the roots. Driving the cutting directly into the ground using a sledge hammer is not recommended because it causes the cutting to split.

BIOTECHNICAL STABILIZATION

The term 'biotechnical stabilization' refers to the use of plants to revegetate and stabilize slopes and stream banks instead of engineered structures, such as gabions, retaining walls, or riprap. The planting techniques discussed above may also be used as components of a system where biotechnical methods are employed. Rock or other structures can be incorporated in the design where planting alone is not enough to stabilize an eroding bank. For a comprehensive review of this subject, the *Soil Conservation Service Engineering Field Book*, Chapter 18, Soil Bioengineering for Upland Slope Protection and Erosion Reduction, is recommended.

Brush Layering

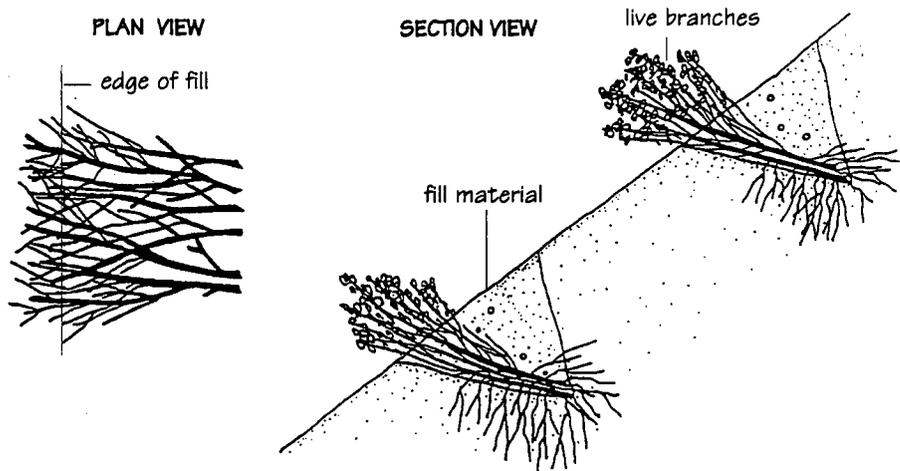
In brush layering, live woody plant materials, such as willow, cottonwood, and dogwood, are placed in layers on a slope to reinforce the soil and prevent shallow slope failures (Figs. 7.6 and 7.7). The layers also act as a living fence to trap sediment and debris. Brush layering has been successfully used to repair partial fill-slope failures, increase streambank stability, and enhance riparian vegetation. However, brush layering will not correct a deep unstable slope condition where mechanical methods of control are needed. If brush layering is used to stabilize an eroded bank, place a blanket of large rock from just above the ordinary high-water mark to just below the ordinary low-water mark.

Starting at the top of a slope, brush layering is installed by trenching along the contour and then placing the live plant materials prior to backfilling the trench (Fig. 7.6). It may be appropriate to mix species of brush in the trench. Generally the brush-layer branches should be 6 to 8 feet in length, but they can be longer. The number of contour trenches opened at any one time should be limited to prevent destabilization of the slope.

Trenches should be excavated so that three-fourths of the live plant material can be buried in the trench, leaving one-fourth of the plant above the ground surface. Once the materials are placed, the excavated soil is then pulled down into the trench to reshape the slope.

Brush layering can also be used on fill slopes. In this situation, live plant materials can be placed on successive lifts of backfill. If this method is used, grading equipment can be used for hauling and placing the vegetation (Fig. 7.7). Brush layering is less labor intensive than wattling.

Figure 7.6. Details of brush layering in trenches. Start this process from the top down. (Modified from Bellevue Storm and Surface Water Utility, 1989.)



Contour Wattling

The first recognized use of contour wattling was in the 1930s. Wattling controls erosion by stabilizing surface soils, reducing erosive runoff velocities, increasing infiltration, and trapping sediments. It can be very effective in stabilizing gullies. The bundles are placed across the gully.

Wattles are cigar-shaped bundles of live plant material, sometimes called 'live fascines'. The bundles are 8–10 inches thick and are compressed by tying with twine. The butt ends and the tops of plants are alternated and tied together, repeating this process until the necessary length is created (Fig. 7.8).

Wattles are placed in shallow trenches along the contour. On riparian sites, they can be placed diagonally to the water flow or wave action. After placement, the wattles are partially covered with soil so that approximately 10–20 percent of the bundle is exposed. Either live or dead stakes will secure the wattles on the slope.

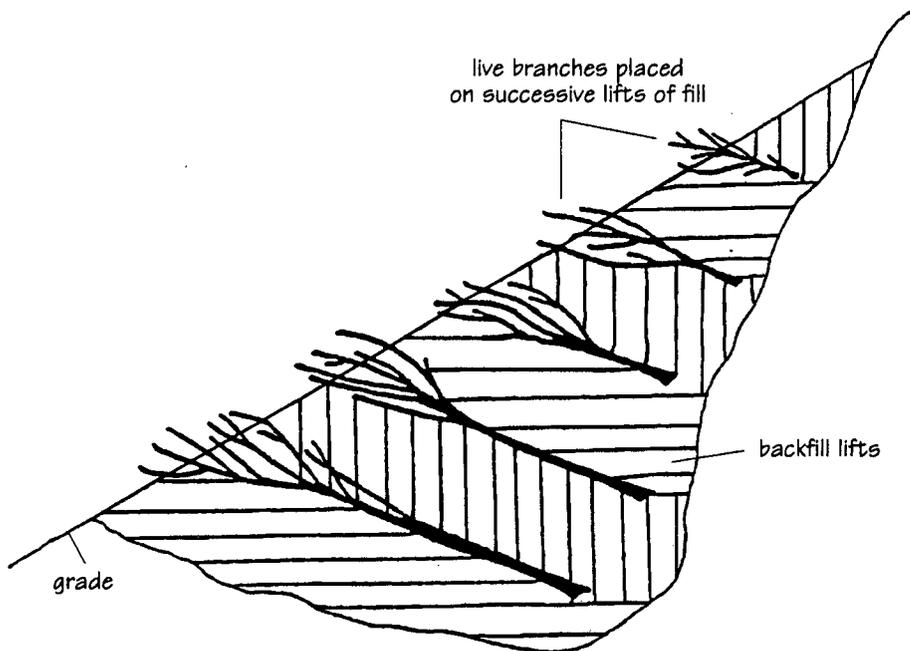
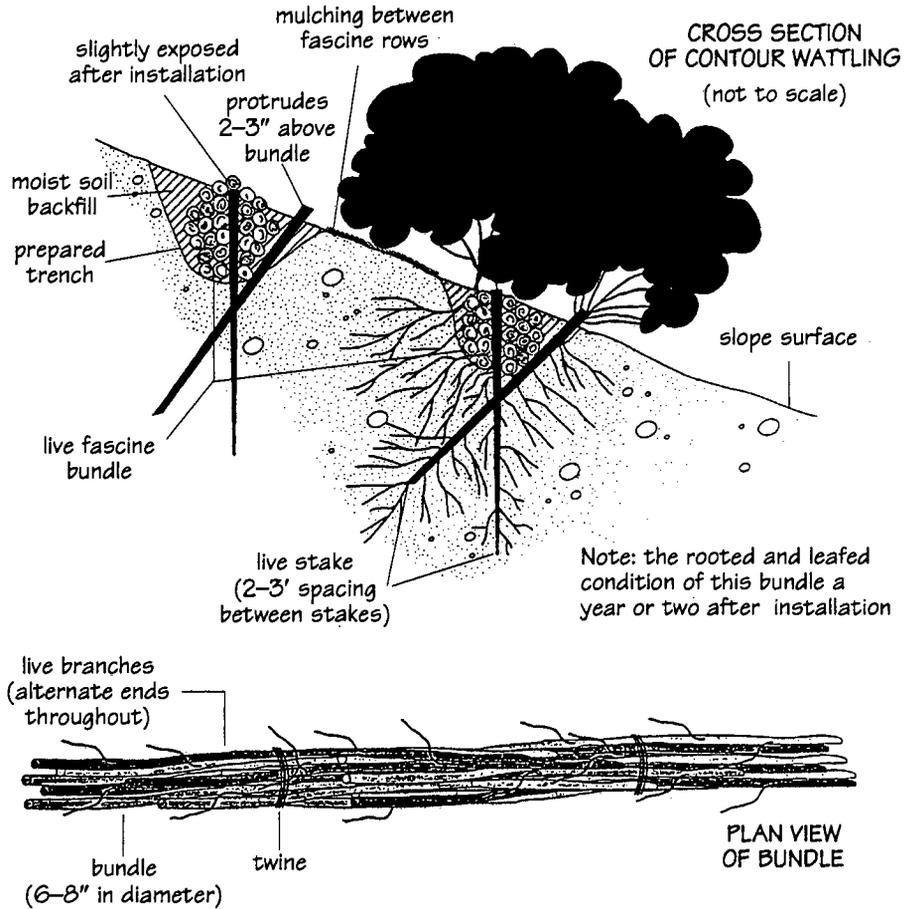


Figure 7.7. Brush layering of live plant materials on successive lifts of fill. Grading equipment can move and place the vegetation. (Modified from Bellevue Storm and Surface Water Utility, 1989.)

Figure 7.8. Wattle construction and placement. Wattles are bundles of live plant material, 6–8 inches thick, tied with twine. The butt ends and the tops are alternated and tied together, repeating this process until the necessary length is created. The bundles are then placed in shallow trenches along the contour and partially covered with soil so that about 10–20 percent of the bundle is exposed. (Modified from U.S. Soil Conservation Service, 1992.)



Woody plants that work well with this technique are willow, red-osier dogwood, and snowberry. Over time, the planted wattles may be crowded out by more dominant species.

RIPARIAN AND WETLAND AREAS

Riparian areas are those on or near the banks of streams or other bodies of water. They are the zone of direct interaction between terrestrial and aquatic environments. Wetlands are areas that are permanently wet or intermittently water covered. (See Forming Wetlands, p. 4.14.) Vegetation in both areas requires water in the rooting zone on a permanent or seasonal basis. Classification of an area as riparian or wetland is based on factors such as vegetation type, surface and subsurface hydrology, topography, and ecosystem function.

Ecological Functions

Restoring or creating vegetated riparian areas or wetlands can:

- ! increase plant species diversity for habitat reconstruction,
- ! enhance erosion control and stream bank and/or slope stabilization,
- ! help to moderate water temperatures,
- ! improve water quality by filtering sediments and other contaminants,
- ! provide food for wildlife,
- ! provide leaf litter for worms and insects,

- ! slow floodwater, and
- ! disperse floodwater.

Alluvial mining operations or those with intermittent or perennial streams in the disturbed area should plan to revegetate wetlands and riparian areas. The woody and herbaceous vegetation that grows in the riparian zone is important in maintaining the health of streams, lakes, and wetlands.

Plant Selection

Knowing which riparian species are best suited for a particular planting technique is essential for successful revegetation. Species such as willow, cottonwood, and red-osier dogwood can be propagated by cuttings, while others, such as red alder, salmonberry, snowberry, thimbleberry, Douglas' spiraea, vine maple, and Pacific ninebark, can only be propagated by transplanting the root mass with the above-ground stem. Those species that have a fibrous, spreading root system can generally be propagated by root division.

Planting riparian areas with native trees (cottonwoods, poplar, alders, willows, fir, pines, maples), grasses, legumes (lupine), and forbs can provide nesting cover and accelerate the restoration of productive habitat. Planting willow, poplar, and cottonwood cuttings is an effective method of building a root matrix and slowing erosion. (See Chapter 2.) In ponds, aquatic grasses, sedges, rushes, and tubers should be planted to provide cover and food for insects and fish. Generally, non-native species should be avoided unless rapid stabilization is required. Aggressive native species such as common cattail and Douglas' spiraea should be used cautiously, because they may crowd out other plants.

To insure good growth and survival, species should be planted in environments they are adapted to. Some species are more tolerant of constant inundation than others. For example, big leaf maple and Oregon ash should be planted high enough up the bank so that the roots are above the water table. Table 7.1 is a plant selection guide listing plant growth characteristics, requirements, and planting conditions necessary for propagation. (For more information on wetlands vegetation selection, see Vegetation, p. 4.16.)

AGRICULTURAL AND FORESTRY SUBSEQUENT USES

Often the post-mining use calls for commercial agriculture or reforestation. For those situations, the operator may want to plan reclamation with a professional forester or an extension service agent. The Oregon Departments of Forestry or Agriculture and the Washington Department of Natural Resources are other good sources of information.

Topsoil

For a mine site to be reclaimed for agriculture or forestry, topsoil must be replaced. Operators who have not saved topsoil and subsoil for reclamation will generally not be able to use the site for agriculture or forestry because topsoil replacement would be too costly.

Other conditions to avoid are excessively stony soils resulting from mixing soils and subsoils with the sand and gravel deposit,

compacted pit floors, and inadequately treated of applied topsoil and subsoil to ameliorate compaction problems. In addition, slopes steeper than 3H:1V will not be as productive land for agriculture or forestry.

Segmental reclamation and live topsoiling increase the chances of productive agricultural and forestry land after mining. Detailed knowledge of the sand and gravel deposit is also necessary. The composition of the pit floor is an important component in developing a reclamation plan. For example, if the pit floor is on impermeable or compressible silty and clayey material, severe soil compaction will occur, soil drainage will be impeded, and a perched water table causing excessive wetness will result.

Factors to Consider

From an agricultural standpoint, at least 8 inches of topsoil with suitable subsoils or a minimum of 3 feet of combined topsoil and subsoil overlying a zone saturated with water is needed for most plants during the growing season. Therefore mineral extraction should not occur below the water table. Knowledge of the hydrologic conditions of the site is necessary for reclamation to be successful.

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Table 7.1. A partial listing of appropriate native plants suitable for erosion control and slope stabilization. Water requirements: dry—once established, tolerates dry soil conditions during the growing season; moist—requires moist soil throughout the growing season; wet—tolerates saturated soil year-round; usage—relative water uptake by plant. Light requirements: full sun—requires sun throughout the day; sun/shade—requires shade for about half the day; full shade—requires shade throughout the day. Rooting characteristics: fibrous—lacks a central root, root mass composed of fibrous lateral roots; tap—with a stout, central main root; shallow, moderate, or deep refers to relative rooting depth (influenced by soil and ground-water conditions). Planting: sizes given are those that are generally found in nurseries; other sizes may also be available. (Modified from Myers Biodynamics Inc., 1993)

Scientific name common name	Form and habit	Water requirements	Light requirements	Soil	Rooting characteristics	Planting	Comments
<i>Acer circinatum</i> vine maple	deciduous shrub; does not always spread aggressively	moist	sun/shade full shade	any soil; tolerates shallow flooding during the growing season	fibrous, moderate	rooted plants to 4' tall in containers; balled and burlapped plants to 10' tall	Large specimens widely available; spreads by root and seed
<i>Alnus rubra</i> red alder	deciduous tree; seeds prolifically on bare soil	moist	full sun	any soil	fibrous, moderately deep	bareroot seedlings up to 3' tall; larger plants in containers	Fast grower in poor mineral soils; typical 40–50-yr lifespan; large limbs become brittle; provides food for birds
<i>Arctostaphylos uva-ursi</i> kinnickinick	low-growing shrub; spreads to form dense evergreen carpet	dry	full sun	any slightly acid soil	fibrous, shallow	rooted plants in containers	Widely available evergreen ground cover; tolerates salt spray
<i>Cornus stolonifera</i> or <i>Cornus sericea</i> red-osier dogwood	deciduous shrub; does not spread	moist to wet	full sun sun/shade	any soil; tolerates shallow flooding during the growing season	fibrous, shallow	rooted plants to 6' tall in containers; bareroot and cuttings 18–24" tall	Produces bright red stems
<i>Gaultheria shallon</i> salal	evergreen shrub; spreads by underground runners to form thicket	dry to moist	sun/shade Full shade	any soil; tolerates shallow flooding during the growing season	fibrous, shallow	rooted plants 4–12" tall	Widely available; difficult to establish; slow growing; tolerates salt spray
<i>Holodiscus discolor</i> ocean spray	deciduous shrub; does not always spread aggressively	dry to moist	full sun sun/shade	any soil; tolerates shallow flooding during the growing season	fibrous, moderate	rooted plants to 2' tall in containers; bareroot 6–12" tall	Produces attractive sprays of creamy white flowers; will root spread
<i>Lonicera involucrata</i> black twinberry	deciduous shrub; does not spread	moist	full sun	any soil	fibrous, shallow	rooted plants to 6' tall in containers; bareroot 18–24" tall	Produces yellow twin flowers and black twin berries; some success reported from cuttings
<i>Myrica californica</i> wax myrtle	evergreen shrub; does not spread	dry to moist	full sun sun/shade	slightly acid with organic matter	fibrous, moderate	rooted plants to 10'	Tolerates salt spray; high wildlife usage
<i>Oemleria cerasiformis</i> indian plum	deciduous shrub; spreads by underground stems to form open stands	moist	full sun sun/shade full shade	any soil	fibrous with horizontal underground runners, shallow	rooted plants to 4' in containers; bareroot 6–8' tall	Male and female flowers are on separate plants; only female flowers produce the 'plums'
<i>Physocarpus capitatus</i> Pacific ninebark	deciduous shrub; does not spread	moist	full sun sun/shade	any soil	fibrous, shallow	rooted plants to 6' tall in containers; bareroot 18–24" tall	Produces masses of tiny white flowers that change to reddish seed clumps
<i>Populus trichocarpa</i> northern black cottonwood	deciduous tree; does not spread	moist; usage high	full sun	any soil; tolerates shallow flooding during the growing season	fibrous, shallow to deep and widespread, extensive	rooted plants to 10' tall in containers; cuttings 18–24"; whips 4' tall	Fast grower in moist to saturated soils; also widely used for streambank stabilization; potential for wind throw

Table 7.1. A partial listing of appropriate native plants suitable for erosion control and slope stabilization (continued)

Scientific name common name	Form and habit	Water requirements	Light requirements	Soil	Rooting characteristics	Planting	Comments
<i>Pseudotsuga menziesii</i> Douglas-fir	coniferous tree; does not spread	dry to moist; usage moderate	full sun	any soil	tap, modified tap; shallow to deep and widespread	12-18" bareroot seedlings; larger plants in containers	Generally not considered a primary species for slope-face stabilization; high root strength but typical shallow rooting characteristics in thin coastal soils; can be planted in stands in slope crest greenbelts; good eagle and osprey perch and nest trees; potential for wind throw in thin or disturbed soils
<i>Rhamnus purshiana</i> cascara, buckthorn	deciduous tree/shrub; does not spread	moist	full sun	any soil	tap, moderately deep	rooted plants to 6' tall in containers; bareroot 18-24" tall	Shiny black berries are favored by cedar waxwings
<i>Ribes sanguineum</i> red currant	deciduous shrub; does not spread	dry to moist	full sun sun/shade	any soil	fibrous, shallow (not extensive)	rooted plants to 4' tall in containers; bareroot to 18" tall	Ornamental native; produces clusters of white to red flowers
<i>Rosa nutkana</i> Nootka rose	deciduous shrub; spreads by underground runners to form thickets	moist	full sun	any soil, prefers rich soils	fibrous, shallow (not extensive)	rooted plants to 2' tall in containers; bareroot to 18" tall; cuttings 12-18"	Thickets of spring stems create a formidable barrier; produces pink flowers followed by large red hips; tolerates salt spray
<i>Rubus parviflorus</i> thimbleberry	deciduous shrub; spreads by underground runners to form thickets	moist	full sun sun/shade	any soil	fibrous, shallow	rooted plants in containers	May be difficult to find in some native plant nurseries
<i>Rubus spectabilis</i> salmonberry	deciduous shrub; spreads by underground runners to form thickets	moist	sun/shade full shade	any soil	fibrous, shallow	rooted plants to 4' tall in containers; bareroot 6-8" tall; cuttings 18-24"	Spreads quickly once established; berries provide food for a variety of songbirds
<i>Salix hookeriana</i> Hooker willow	deciduous shrub; does not spread	moist to wet	full sun	any soil	fibrous, moderately deep	rooted plants to 6' tall in containers; bareroot and cuttings 18-24" tall; whips 4'; whips not recommended	A horticultural variety, 'Clatsop', was developed by the Soil Conservation Service for its vigor, disease resistance, and attractive foliage; salt spray tolerant
<i>Salix lasiandra</i> Pacific willow	deciduous multi-stemmed tree; does not spread	wet; usage high?	full sun	any soil; tolerates shallow flooding during the growing season	fibrous, moderately deep and widespread	rooted plants to 10' tall in containers; cuttings 18-24"; whips 4'	Fast grower in saturated or shallowly flooded areas; 25-year lifespan; large limbs become brittle
<i>Salix scouleriana</i> scouler willow	deciduous tree/shrub; does not spread	dry to moist; usage high?	full sun	any soil	fibrous, moderately deep and widespread	rooted plants to 10' tall in containers; cuttings 18-24"; whips 4'; whips not recommended	Of the willows listed here, this species tolerates the driest conditions
<i>Salix sitchensis</i> Sitka willow	deciduous tree or shrub; does not spread	moist; usage high?	full sun	any soil	fibrous, moderately deep and widespread	rooted plants to 10' tall in containers; cuttings 18-24"; whips 4'; whips not recommended	Fast grower in moist to saturated soils; widely used for streambank stabilization

Table 7.1. A partial listing of appropriate native plants suitable for erosion control and slope stabilization (*continued*)

Scientific name common name	Form and habit	Water requirements	Light requirements	Soil	Rooting characteristics	Planting	Comments
<i>Sambucus racemosa</i> red elderberry	deciduous shrub; does not spread	moist	full sun sun/shade full shade	any soil	fibrous, shallow	rooted plants to 6' tall in containers; bareroot 18-24" tall	Produces red nonedible berries; some success reported from woody cuttings
<i>Spiraea douglasii</i> Douglas' spiraea	deciduous shrub; spreads by seed and underground runners to form seed	moist to wet	full sun	any soil; tolerates shallow flooding during the growing season	fibrous, shallow	rooted plants to 6' tall in containers; bareroot and cuttings 18-24" tall	Spreads quickly and aggressively in most sites
<i>Symphoricarpus albus</i> snowberry	deciduous shrub; spreads by underground runners to form thickets	dry to moist	full sun sun/shade full shade	any soil; tolerates shallow flooding during the growing season	fibrous, shallow	rooted plants to 24" tall; bareroot 6-18" tall	Tolerates high winds and often grows on vegetated slopes overlooking salt water
<i>Vaccinium ovatum</i> evergreen huckleberry	evergreen shrub; does not spread	dry to moist	sun/shade full shade	slightly acid	fibrous, shallow	rooted plants to 2' tall in containers	Attractive, but slow-growing; difficult to establish; tolerates salt spray
native plant seed mixes	annual and perennial grass and forb mixes available	dry to wet; usage medium to high	species dependent	species dependent	fibrous, shallow	seed	Seeds of woody plants also available (success typically low); very slow to establish; avoid exotic commercial mixes; seed mixes typically used in conjunction with other vegetation plantings; typically short-term erosion control technique

Table 7.2. Plant selection guide for legumes, except for lupines—Species characteristics, adaptations, and seeding rates. (See Table 7.3 for lupines.) PLS, pure live seed. (Modified from Grassland West, 1994)

Scientific name common name	Adaptation	Minimum precipitation (inches/year)	Bloat/nonbloat	PLS pounds/acre	Seeds/pound	Varieties
<i>Astragalus cicer</i> cicer milkvetch	best on medium to clayey textures	12 to 18	NB	20 to 25	145,000	Lutana, Monarch
<i>Coronilla varia</i> crownvetch	well-drained, most soil, neutral pH	20 to 25	B	15 to 20	110,000	Emerald, Penngift, Chemung
<i>Hedysarum boreale</i> northern sweetvetch	drought-tolerant native legume	12	NB	10 to 15	30,000	Timp
<i>Lotus corniculatus</i> birdsfoot trefoil	medium to clay soils	18 to 24	NB	4 to 6	418,000	Dawn, Empire
<i>Medicago sativa</i> alfalfa	deep, well-drained soils, all textures	15 to 18	B	8 to 15	210,000	Legacy, Cimarron, Vector, Angler, Cody
<i>Melilotus alba</i> white sweetclover	drought, saline, and alkaline tolerant	12	B	10 to 15	260,000	
<i>Melilotus officinalis</i> yellow sweetclover	wide range of soils	12	B	10 to 15	260,000	Madrid
<i>Onobrychis viciaefolia</i> sainfoin	deep, well-drained soils of all textures	15 to 18	NB	35 to 45	30,000	Eski, Remont, Renumex
<i>Trifolium fragiferum</i> strawberry clover	wet, saline and alkaline tolerant; shade	15 to 18	B	5 to 15	300,000	O'Connors, Salina, Fresa
<i>Trifolium hirtum</i> rose clover	warm winter ranges, green crop	15 to 20	B	20	140,000	Hykon
<i>Trifolium hybridum</i> alsike clover	heavy silt to clay soils, alkaline sites	18 to 20	B	6 to 8	680,000	
<i>Trifolium pratense</i> red clover	heavy, fertile, well-drained soils	18 to 20	B	8 to 10	275,000	Kenland, Redland, Arlington, Mammoth
<i>Trifolium repens</i> white dutch clover	medium to clayey, shallow soils	18 to 20	B	2 to 6	850,000	
<i>Trifolium repens latum</i> ladino clover	medium to clayey, shallow soils	18 to 20	B	2 to 6	800,000	
<i>Vicia americana</i> American vetch	wide range of soils, best in meadows	18 to 20	NB	10 to 20	75,000	
<i>Vicia dasycarpa</i> wooly pod vetch	wide range of soils, best on rich loam	18 to 20	NB	35 to 40	100,000	Lana
<i>Vicia villosa</i> hairy vetch	wide range of soils, tolerates poor sandy sites	18 to 20	NB	25 to 35	20,000	

Table 7.3. Plant selection guide for lupines—Species characteristics, adaptations, and seeding rates. PLS, pure live seed. (Modified from Grassland West, 1994)

Scientific name common name	adapted range	Annual/ perennial	Color	Height (inches)	Native/ introduced	Seeding rate (PLS pounds/acre)	Seeds/pound
<i>Lupinus alpestris</i> mountain lupine	Rocky Mountains and western North America	perennial	blue	12 to 20	N	25	12,500
<i>Lupinus arizonicus</i> desert lupine	southwest deserts	annual	blue	12 to 48	N	3	135,000
<i>Lupinus caudatus</i> tailcup lupine	Rocky Mountains and western North America	perennial	blue	12 to 24	N	12	27,600
<i>Lupinus densiflorus aureus</i> golden lupine	Pacific coast	annual	yellow	24 to 36	N	35	13,500
<i>Lupinus perennis</i> wild lupine	throughout North America	perennial	purplish-blue	12 to 24	N	11	21,000
<i>Lupinus sericeus</i> silky lupine	Rocky Mountains and western North America	perennial	blue	12 to 24	N	10 to 25	12,900
<i>Lupinus succulentus</i> arroyo lupine	Pacific coast and northwestern North America	annual	blue	24 to 28	N	20	15,600
<i>Lupinus texensis</i> Texas bluebonnet	southcentral and southwestern North America	annual	blue and white	16 to 20	N	16 to 20	16,000

7.22 REVEGETATION

Table 7.4. Plants for special-use situations. PLS, pure live seed. (Modified from Grassland West, 1994. Copyright ©1994 by Grassland West. Used by permission of the publisher)

DROUGHT-TOLERANT BUNCHGRASSES						
Scientific name Common name	Cool/warm season	Minimum precip. (in./yr)	Bunch/sod former	Native/ introduced	PLS lb/acre	Planting dates
<i>Agropyron inerme</i> beardless bluebunch wheatgrass	C	8	B	N	7 to 8	spring or fall
<i>Agropyron desertorum</i> standard crested wheatgrass	C	10	B	I	6 to 8	spring or fall
<i>Agropyron elongatum</i> tall wheatgrass	C	8	B	I	6 to 8	spring or fall
<i>Agropyron sibiricum</i> Siberian wheatgrass	C	6	B	I	6 to 8	fall
<i>Agropyron spicatum</i> bluebunch wheatgrass	C	8	B	N	6 to 8	spring or fall
<i>Bouteloua certipendula</i> sideoats grama	W	8	B	N	3 to 6	spring or fall
<i>Elymus cinereus</i> Great Basin wildrye	C	12	B	N	9	spring or fall
<i>Elymus junceus</i> Russian wildrye	C	12	B	I	8 to 10	spring or fall
<i>Eragrostis curvula</i> weeping lovegrass	W	16	B	I	2	April to August 15
<i>Festuca longifolia</i> hard fescue	C	16	B	I	10	spring or fall
<i>Festuca ovina</i> sheep fescue	C	10	B	N	10	spring or fall
<i>Oryzopsis hymenoides</i> Indian ricegrass	C	9	B	N	6 to 8	spring or fall
<i>Poa nevadensis</i> Nevada bluegrass	C	10	B	N	3	spring or fall
<i>Sporobolus cryptandrus</i> sand dropseed	W	10	B	N	1	April to May 31
<i>Stipa comata</i> needle and thread	C	10	B	N	8	spring or fall
<i>Sitanion hystrix</i> bottlebrush squirreltail	C	6	B	N	8 to 10	spring or fall
DROUGHT-TOLERANT SOD-FORMING GRASSES						
<i>Agropyron dasystachyum</i> thickspike wheatgrass	C	8	S	N	6 to 8	spring or fall
<i>Agropyron intermedium</i> intermediate wheatgrass	C	14	S	I	15	spring or fall
<i>Agropyron riparium</i> streambank wheatgrass	C	8	S	N	6 to 8	spring or fall
<i>Agropyron smithii</i> western wheatgrass	C	10	S	N	10	spring or fall
<i>Agropyron trichophorum</i> pubescent wheatgrass	C	14	S	I	10 to 12	fall
<i>Bouteloua gracilis</i> blue grama	W	12	S	N	2 to 3	spring or fall
<i>Buchloe dactyloides</i> buffalograss	W	12	S	N	4 to 8	June to August 15
<i>Cynodon dactylon</i> Bermuda grass	W	10	S	I	15	April to August
<i>Festuca rubra</i> red fescue	C	18	S	I	10	spring or fall
<i>Poa compressa</i> Canada bluegrass	C	18	S	I	1 to 2	spring or fall
<i>Schizachyrium scoparium</i> little bluestem	W	14	S	N	3 to 4	spring or fall

ACID-TOLERANT GRASSES						
<i>Scientific name</i> common name	Cool/warm season	Minimum precip. (in./yr)	Bunch/sod former	Native/ introduced	PLS lb/acre	Planting dates
<i>Agrostis alba</i> redtop	C	20	S	I	1	spring or fall
<i>Agrostis palustris</i> creeping bentgrass	C	20	S	I	.5 to 1	spring or fall
<i>Agrostis tenuis</i> colonial bentgrass	C	18	S	I	2	spring or fall
<i>Alopecurus arundinaceus</i> creeping foxtail	C	25	S	I	3 to 4	spring or fall
<i>Alopecurus pratensis</i> meadow foxtail	C	25	B	I	4 to 5	spring or fall
<i>Cynodon dactylon</i> Bermuda grass	W	10	S	I	15	April to August
<i>Eragrostis curvula</i> weeping lovegrass	W	16	B	I	2	spring or fall
<i>Festuca longifolia</i> hard fescue	C	16	B	I	10	spring or fall
<i>Festuca rubra</i> red fescue	C	18	S	I	10	spring or fall
<i>Festuca rubra</i> , var. <i>commutata</i> Chewings fescue	C	18	B	I	4 to 5	spring or fall
<i>Lolium perenne</i> perennial ryegrass	C	12	B	I	25 to 35	spring or fall
<i>Panicum virgatum</i> switchgrass	W	18	S	N	5 to 8	June to August
<i>Poa compressa</i> Canada bluegrass	C	18	S	I	1 to 2	spring or fall
ALKALINE-TOLERANT GRASSES						
<i>Agropyron desertorum</i> standard crested wheatgrass	C	10	B	I	7 to 10	spring or fall
<i>Agropyron elongatum</i> tall wheatgrass	C	8	B	I	6 to 20	spring
<i>Agropyron riparium</i> streambank wheatgrass	C	8	S	N	6 to 8	spring or fall
<i>Agropyron smithii</i> western wheatgrass	C	10	S	N	10	spring or fall
<i>Agropyron trachycaulum</i> slender wheatgrass	C	16	B	N	6 to 8	fall
<i>Cynodon dactylon</i> Bermuda grass	W	10	S	I	15	April to August
<i>Distichlis stricta</i> inland saltgrass	W	8	S	N	10	June to August
<i>Elymus canadensis</i> Canada wildrye	C	12	B	N	7	spring or fall
<i>Elymus cinereus</i> Great Basin wildrye	C	8	B	N	9	spring or fall
<i>Elymus junceus</i> Russian wildrye	C	12	B	I	8 to 10	fall
<i>Lolium perenne</i> perennial ryegrass	C	12	B	I	25 to 35	spring or fall
<i>Puccinellia distans</i> alkaligrass	C	15	B	N	2 to 3	spring or fall
<i>Sporobolus airoides</i> alkali sacaton	W	6	B	N	2 to 3	July to October

7.24 REVEGETATION

GRASSES AND LEGUMES TOLERANT OF MOIST SOILS						
<i>Scientific name</i> Common name	Cool/warm season	Minimum precip. (in./yr)	Bunch/sod former	Native/ introduced	PLS lb/acre	Planting dates
<i>Agrostis alba</i> redtop	C	20	S	I	1	spring or fall
<i>Agrostis palustris</i> creeping bentgrass	C	20	S	I	.5 to 1	spring or fall
<i>Alopecurus arundinaceus</i> creeping foxtail	C	25	S	I	3 to 4	spring or fall
<i>Alopecurus pratensis</i> meadow foxtail	C	25	B	I	4 to 5	spring or fall
<i>Festuca elatior</i> meadow fescue	C	25	B	I	6	spring or fall
<i>Lolium perenne</i> perennial ryegrass	C	12	B	I	25 to 35	spring or fall
<i>Phalaris arundinacea</i> reed canarygrass	C	16	S	N	5 to 10	spring or fall
<i>Poa trivialis</i> Poa trivialis	C	25	S	I	4	spring or fall
<i>Trifolium hybridum</i> alsike clover	C	35	B	H	6 to 8	spring
COLD-TOLERANT GRASSES						
<i>Deschampia caespitosa</i> tufted hairgrass	C	20	B	N	1 to 2	spring or fall
<i>Elymus cinereus</i> Great Basin wildrye	C	12	B	N	9	spring or fall
<i>Festuca elatior</i> meadow fescue	C	25	B	I	6	spring or fall
<i>Festuca longifolia</i> hard fescue	C	16	B	I	10	spring or fall
<i>Festuca ovina</i> sheep fescue	C	10	B	N	10	spring or fall
<i>Festuca rubra</i> red fescue	C	18	S	I	10	spring or fall
<i>Festuca rubra</i> , var. <i>commutata</i> Chewings fescue	C	18	B	I	4 to 5	spring or fall
<i>Poa alpinum</i> alpine bluegrass	C	20	B	N	1	spring or fall
<i>Poa pratensis</i> Kentucky bluegrass	C	18	S	N	2 to 3	spring or fall
<i>Sitanion hystrix</i> bottlebrush squirreltail	C	6	B	N	8 to 10	spring or fall
GRASSES PROVIDING TEMPORARY COVER						
(These grasses are generally planted in the spring for temporary cover. They should not be used for permanent revegetation.)						
<i>Arrhenatherum elatius</i> tall oatgrass	<i>Hordeum vulgare</i> barley	<i>Secale cereale</i> winter rye				
<i>Avena sativa</i> oats	<i>Lolium multiflorum</i> annual ryegrass	<i>Sorghum vulgare</i> , var. <i>sudanense</i> Sudangrass				
<i>Bromus arvensis</i> field brome						

BEFORE THE BOARD OF COUNTY COMMISSIONERS
FOR MULTNOMAH COUNTY

Land Use Planning Case CU 6-96)	
SEC 18-96 Affirming and Modifying the)	FINAL ORDER
October 17, 1996 Hearings Officer Decision)	97-15

WHEREAS, this matter is before the Multnomah County Board of Commissioners as an appeal, filed by Frank M. Parisi representing Angell Bros., of the Hearing Officer's Decision in land use cases CU 6-96 and SEC 18-96; and

WHEREAS, after proper notice of a public hearing, the Board of County Commissioners accepted testimony and evidence presented at a de novo hearing on November 27, 1996, and the Board being fully advised; and

WHEREAS, the applicable site-specific requirements of the Comprehensive Plan are found in the May 1996 West Hills Reconciliation Report, Section VI-C, Resource Protection, Program to Achieve the Goal, for each Protected Resource, and

WHEREAS, the Conservation Easement between Angell Brothers, Linnton Rock Corporation, and Friends of Forest Park is the main settlement document produced during the mediation and is a critical part of the Program to Achieve the Goal for all the Goal 5 Resources in the West Hills Study Area, now therefore

IT IS HEREBY ORDERED that the Hearing Officer's decision dated October 17, 1996 in the matter of CU 6-96 and SEC 18-96 is AFFIRMED related to code sections 11.15.2053 (A)(1), 11.15.2053 (A)(2), 11.15.2053 (B), 11.15.7110 (A) - (E), 11.15.7115, 11.15.7120 (A) and (B), 11.15.7315 (A)-(D), 11.15.7325 (A), 11.15.7325 (B), 11.15.7325 (C)(1)(a), 11.15.7325 (C)(1)(b), 11.15.7325 (C)(1)(c), 11.15.7325 (C)(2), 11.15.7325 (C)(3), 11.15.7325 (C)(4)(b), 11.15.7325 (C)(4)(c); 11.15.7325 (C)(5), 11.15.7325 (C)(7), 11.15.7325 (C)(8), 11.15.7325 (C)(9), 11.15.7325 (C)(10), 11.15.7325 (C)(11), 11.15.7325 (D), 11.15.7325 (E), 11.15.7325 (F), 11.15.7325 (G), 11.15.7331 (A) and (B); AFFIRMED in part related to code section 11.15.7325 (C); OVERTURNED in part related to code section 11.15.7325 (C); and OVERTURNED related to applicable code sections, 11.15.7325 (C)(1)(d) and (e), 11.15.7325 (C)(4)(a), 11.15.7325 (C)(6), 11.15.7332, 11.15.6424 (C), 11.15.6426 (C)(4), and 11.15.6428 (E), as stated in more detail below.

IT IS FURTHER ORDERED that the Board of County Commissioners adopts the following findings and conclusions:

1. We intended to settle all disputes raised in Periodic Review proceedings regarding the County's compliance with Goal 5 as it pertains to the Angell Bros. site and the other Goal 5 resources in the West Hills Study Area through the mediation process sponsored by the Land Conservation and Development Commission. We expected the parties in that process to reach a definitive settlement and to produce a settlement agreement that could be incorporated into our Comprehensive Plan. We believe that the parties did achieve such a settlement, and embodied the settlement in a document entitled Conservation Easement, which was executed on or about August 20,

1995. We understood, at the time of adoption of the PAM designation on the Angell Bros. site, and we confirm now, that the parties to the mediation process were fully informed of the issues that were disputed and settled. We were informed and we believe that the parties drafted, exchanged and reviewed in detail, the proposed Mining Plan, and various drafts of the Conservation Easement. We find that the parties discussed and understood which lands were proposed to be mined and which lands were proposed to be preserved. We understand and we find credible the parties' statements that they walked the Angell Bros. property during the mediation process when the prospective preservation areas and mining areas were discussed, and later, when controversy arose again, to confirm the exact location of the various portions of the property described in the Mine Plan and the Conservation Easement. We find that the Applicant obtained surveys of the Angell Bros. property in good faith for the purposes of effectuating settlement, and that the Applicant had legal descriptions for all the setbacks and all the areas to be preserved prepared, which were incorporated into the Conservation Easement and the Reconciliation Report. We find that the parties drafted the Conservation Easement as the main settlement document in mediation and that recording of the Conservation Easement in the Multnomah County deed records was intended to, and will, take effect immediately upon the termination of the controversy in these proceedings, rather than, as some members of the public apparently believe, at the conclusion of mining on the site. We believe that the Conservation Easement is a legally binding document.

2. We believe and reaffirm now that the purpose of the mediation and our intent to settle this controversy would be frustrated if the settlement reached in mediation was not protected from later revision in the land use process. We find that the finality of the decision reached in mediation was relied upon in good faith by Angell Bros., the Oregon Concrete and Aggregate Producers Association, the Friends of Forest Park, the mediator (Mr. Ty Tice, retained by the Oregon State Dispute Resolution Office), the Department of Land Conservation and Development, the Land Conservation and Development Commission, and Multnomah County. We believe that the principal purpose of our Program to Achieve the Goal is to carry out the terms of the settlement reached in mediation.

3. We find that the Hearings Officer's statements in her decision, to the effect that the mediation process was something that occurred in a private setting, and that needed details to be supplied later in the conditional use process, is incorrect. We intended at the time of mediation, and now, that the mediation process would finally settle all significant details of the Resource Protection Programs in the West Hill Study area, and that the settlement document, in the form of the Conservation Easement, would incorporate with specificity all such conditions and all relevant mining conditions, so that the parties would be able to understand all the implications of settlement before agreeing to it, and that we would have the same full understanding of these documents before we determined to incorporate them into the Reconciliation Report. We find that this was actually done, as we stated on page I-4 of the Reconciliation Report: "The

results of that mediation process are presented as revisions to the Reconciliation Report in the attached document...[which was adopted on] September 7, 1995.”

4. We find that the Hearings Officer misunderstood the purpose, significance and context of the Reconciliation Report insofar as she believed that it was up to the County to evaluate whether the Reclamation Plan and Operating Plan (which was submitted to and accepted by DOGAMI) met the broad policy directives in the Reconciliation Report. In fact, the Reconciliation Report and the Reclamation and Operating Plan, together with the Conservation Easement, are part of the Program to Achieve the Goal for all the Goal 5 resources. They were developed together, during the same process. In addition, we placed into our Comprehensive Plan two strategies in Policy 16(B) (Mineral And Aggregate Resources), strategies O and P, which recognize the jurisdiction of the Department of Geology and Mineral Industries (“DOGAMI”) over mined land reclamation, and which specifically state that it is the normal policy of the County to ask DOGAMI to delay its decision on approval of a Reclamation Plan and an Operating Permit until the County has decided all issues relating to Comprehensive Plan Amendments and Conditional Use approvals. We reaffirm those strategies now. We find that in the present case, representatives from DOGAMI delayed prescribing additional conditions of its Operating Permit on the Angell Bros. site until we acted to designate with certainty the lands on which mining would occur and the lands to be preserved, and the land use conditions we would impose. We are satisfied that this process has been orderly and lawful, and that a fair and enforceable set of operating conditions, both for the land use permits and for the DOGAMI Operating Permit, have been devised.

5. We specifically intended at the time of the mediation, and intend now, to recognize the jurisdiction of DOGAMI, and we find that the Applicant has presented a proposed Reclamation Plan to DOGAMI, which DOGAMI circulated to us and to all affected public agencies and which, after suggesting revisions, DOGAMI accepted with thirteen specific conditions. We further find that statements in the Hearings Officer’s decision to the effect that a different Reclamation Plan should now be devised by the Applicant and submitted to us at a later date for further land use proceedings, would be inconsistent with the results of mediation, with DOGAMI’s review and with our Comprehensive Plan strategies as we interpret them. We heard various criticisms of the Reclamation Plan, both from the Hearings Officer and from various citizens who seemed to believe that the Plan did not involve “concurrent” or “sequential” reclamation. We believe these criticisms are erroneous. We find credible the evidence submitted by the DOGAMI representative to the effect that on a typical quarry totally concurrent reclamation is not achievable under DOGAMI’s Best Management Practices. We also find credible DOGAMI’s evidence that Angell Bros. has proposed an ambitious reclamation plan on the Angell Bros. site which would achieve concurrent reclamation to the greatest degree possible, consistent with minimizing erosion, attaining proper storm water management, and various other reclamation objectives. We agree with DOGAMI that the reforestation plan is particularly praiseworthy in that the objectives to be attained were not simply a monoculture Douglas Fir reforestation

plan, but a diversity of habitat, as suggested by the Oregon Department of Fish & Wildlife. This incorporates 80 acres of coniferous vegetation, 120 acres of deciduous forest, 40 acres of riparian wetland and 120 acres of open meadows. We find these reclamation objectives to be consistent with the broad policy directives of the Reconciliation Report and we do not dispute the technical expertise of DOGAMI in its assessment that the Reclamation Plan, if performed by the Applicant, will achieve its objectives.

6. We interpret the Reconciliation Report to specifically adopt a Program to Achieve the Goal on Pages VI-22 through VI-23. It was and is our intent, and the intent of the settling parties who have articulated their intent to us here, that the Program to Achieve the Goal incorporates the Conservation Easement, and that the Conservation Easement, in turn, incorporate the Operating and Reclamation Plan. We interpret Section VI-C of the Reconciliation Report (together with the Conservation Easement and the Operating and Reclamation Plan), to be the County's "Program to Achieve the Goal" within the meaning of Goal 5. We interpret this to be the operative "site specific program" under Goal 5, not the various discussion items or minor details that the Hearings Officer and various citizens may have focused on. We also find that our Comprehensive Plan contains two strategies in Policy 16(B) (Mineral And Aggregate Resources), namely, strategies G and M, that require site-specific Goal 5 programs (such as this one) to supersede conflicting provisions in the Zoning Code. We determine now that complying with the specific provisions in the Conservation Easement and in the Mine Plan are sufficient to establish compliance with various alternative provisions covering the same issues in the Zoning Code.

7. For all of the above reasons we find that this Conditional Use Application and this SEC Zone Application, as well as the underlying technical documents (the Operating and Reclamation Plan and the Conservation Easement) comply with the May 1996 West Hills Reconciliation Report's Program to Achieve the Goal, so far as achieving Goal 5 compliance with the following significant Goal 5 resources: scenic views in the West Hills; significant streams; Angell Bros. aggregate site; and significant wildlife habitat areas.

We thus find that the Applicant has satisfied Code Sections 11.15.7325(C), 11.15.7325 (C)(6), 11.15.6424(C), 11.15.6426(C)(4) and 11.15.6428(E).

8. We also find credible DOGAMI's and DEQ's rejection of the suggestion by the Hearings Officer that the Applicant should propose a new Reclamation Plan for later consideration in the land use process that will require mining of the site "from the top down." We find credible the critique of this suggestion by Lidstone & Anderson, DEQ Stormwater Section and DOGAMI, who have explained, among other things, that such a reclamation plan would require trespassing within the scenic buffer area (which is currently proposed to have no mining, logging or roads within it) by virtue of the 1 1/2-mile long 60-foot wide haul road that would traverse the property at a 6 1/2%

average grade, would require very significant culverts to be built, and would probably cause massive erosion and turbidity problems.

9. We therefore overturn Condition No. 15, which would have required Angell Bros. to revise its Operating and Reclamation Plan in an attempt to devise a plan that would satisfy Appendix A and the Hearings Officer's rationale. We also delete Appendix A, which purports to contain some "site specific requirements." We also find that the Hearings Officer made a number of misstatements in her decision, to the same effect as discussed above, which we also delete from the final decision in this matter, as follows:

- a. Statements in the first paragraph on page 2, regarding the reclamation approach the Applicant told the County it would implement and the "different" approach now being used.
- b. Statement on page 9 in the paragraph labeled "Finding," to the effect that "the Angell Bros. site has been determined to be an appropriate site for mining activity by the County subject to compliance with the following criteria."
- c. Statements on pages 10 through 15 comprising essentially all the text which purport to explain that the Applicant has not met its "commitments" or "promises" or burden of proving that all of the site-specific requirements have been met, or that the Mine Plan has been "changed," or that concurrent reclamation has been "abandoned," or that the "Preserves" have not been specifically located, and other points.
- d. Statements on page 21 in the second paragraph of the section labeled "Finding," to the effect that various requirements were not addressed by the Applicant.
- e. Statements on pages 25-27 regarding the failure to meet the four directives for protection of fish and wildlife habitat.
- f. Statements on page 29 in Section 3, "Phasing Program," in the paragraph labeled "Finding," to the effect that the Applicant is not relieved of requirements demonstrating compliance with relevant land use criteria.
- g. Statements on page 34 in the section labeled "Nonregulatory," to the effect that the Applicant has not shown that it will "minimize the area mined" and that the Applicant has not satisfied the conditions of the Reconciliation Report.

h. Statements on page 35 in the section labeled "Nonregulatory" in the paragraph labeled "Finding," to the effect that Applicant has not met the reclamation requirement.

i. Statements on page 37 to the effect that the delineation of boundaries of the Preserves was done in a private setting rather than in a land use proceedings, and that the North Angell Bros. Stream drainage is actually different from the pertinent area described as the Preserves in the Conservation Easement.

10. We find that the Reconciliation Report described the results of our study of streams in the West Hills Study Area, and that the Reclamation Report has been misunderstood by the Hearings Officer and by various citizens as it applies to the mediated settlement on the Angell Bros. site. We intended during mediation, and now, that only the main channel of North Angell Bros. Stream should be listed as a Significant Stream. We determined it to be "significant" within the meaning of Goal 5 only to the extent of its identified riparian area and its flows into Burlington Bottoms. We described the riparian area in the Reconciliation Report as being between 55 feet to 150 feet in width with a median width of 78 feet and we described the length of North Angell Bros. Stream as .9 miles. These boundaries encompass the only areas we intended to protect by our Program to Achieve the Goal. We do not intend our Program to Achieve the Goal to protect a "watershed."

11. The Hearings Officer apparently believed that a theoretical watershed on the order of 350 acres surrounding North Angell Bros. Stream should or could be interpreted as the focus of a Goal 5 protection program because the stream setback was referred to with the word "watershed." This interpretation is incorrect. We found then, and we now intend, that the value of the North Angell Bros. Stream for Goal 5 purposes is limited to its identified riparian area and its flows into Burlington Bottoms. The settling parties understood this. We find credible the settling parties' representations that the setback limits for mining and stream protection were established during mediation to protect riparian values and water supply values for Burlington Bottoms' water supply in two tours of the area by John Sherman and Skip Anderson. We find credible that they did not include the "tributary" that was argued about at the November 27 hearing because it was evident on the tours that it flows into an old landfill and then flows underground. It does not flow across Highway 30 and into Burlington Bottoms. The setbacks that the settling parties agreed upon were surveyed and incorporated into the Operating and Reclamation Plan and the Conservation Easement, and we ultimately incorporated these documents into the Program to Achieve the Goal in the Reconciliation Report. For all of the above reasons, we overturn and delete the Hearings Officer's Condition No. 12.

12. We find credible DOGAMI's evidence that, pursuant to Condition No. 13 of its Operating Permit, DOGAMI will inspect the site to require timely reclamation of areas that have been mined to their final configuration and that are not gong to continue to be

used for haul roads, equipment storage and the like so far as the Mine Plan is concerned. We believe, however, that it would facilitate sound County planning and compliance with County permit conditions, and would assure timely compliance with the mediation objective of expeditiously concluding mining on the site, for the County to receive copies of all Reclamation Reports generated during DOGAMI inspections. We also believe that since the County is concerned with the end use of the site and with expeditiously obtaining Western Oregon Old Growth habitat, the County should independently require the completion of reclamation on segments depicted in the Mine Plan when extraction on the segment is completed and when the segments are no longer needed for haul roads, equipment storage and the like. We therefore will impose this as a condition in our Conditional Use Permit.

13. We find that the Applicant requested expansion of its existing operating hours to twenty (20) hours a day, but withdrew this request at the Hearings Officer's hearing. The Applicant also requested a continuation of its existing hours of operation of 6 a.m. through 10 p.m. Staff initially recommended denial of the request for continuation of these operating hours on the ground that the Code Section 11.15.7325(C)(4) had been amended in Periodic Review to decrease allowable operating hours to 7 a.m. to 6 p.m., which therefore arguably prohibited the Applicant's request. We are now persuaded that this analysis is incorrect. The Code has always set operating hours of 7 a.m. through 6 p.m. We find that the Angell Bros. site has operated under Conditional Use Permits since at least 1980. All of these permits allowed operating hours of 6 a.m. through 10 p.m. Although the Code has gone through a number of revisions and renumbering, the Code has never changed these operating hours. Throughout all of Angell Bros. various permits, the shortest operating hours Angell Bros. has ever been subject to has been 6 a.m. through 10 p.m.

14. We find that staff reports for the Conditional Use Permits Angell Bros. obtained in 1990 and in 1992 have remarked upon the lack of conflicting uses in the area and the lack of complaints with respect to operating hours. We also find that during the period Angell Bros. obtained a 24-hour Emergency Permit to produce aggregate material for storm repairs last winter, there were no complaints about operations outside of the period of 7 a.m. through 6 p.m. We also find that our prior decision in the 1990 ESEE analysis in Periodic Review (which was the starting point for the ultimate decision in 1995 in the Reconciliation Report), allowed existing hours to continue for the same rationale. We find credible the Applicant's representation that the Applicant and the settling parties in mediation assumed that the hours of 6 a.m. through 10 p.m. would be continued in any approval that might be granted by us. We note that the Applicant instructed its acoustical engineers, Daly-Standlee & Associates, to do industrial noise monitoring reports on the assumption that the existing hours of operation would be continued, and that this would require compliance with DEQ nighttime noise standards. We find credible that the Applicant has purchased various pieces of heavy equipment, including two new Komatsu excavators, in order to obtain a wider margin of safety with respect to the DEQ noise standards. We find that the Applicant tested this equipment and found that it was five decibels quieter than the Link

Belt excavators previously used on the site, and that the new equipment could stay within DEQ nighttime noise limitations by a greater margin.

15. We conclude from all of the above, that the assumption of all the parties to the mediated settlement was that continuation of the existing hours of operation would be allowed, if a settlement could be reached. We find that continuing the existing hours of operation is consistent with the context and purpose of the mediation from the perspective of all of the settling parties. The Friends of Forest Park had, as one of their principal goals, achieving Western Old Growth conditions as expeditiously as possible, and in a manner that could allow Western Old Growth habitat to be protected forever. We find that one of the principal goals of Angell Bros. in the mediation was to expand the site in a manner that would allow Angell Bros. to make a reasonable profit. We find that Angell Bros.' reliance on the existing hours of operation was justified insofar as it allowed Angell Bros. to calculate production levels with existing equipment and with known costs, which thus allowed Angell Bros. to calculate its bottom line in settlement discussions.

16. We also find that reducing the operating hours from 6 a.m. through 10 p.m. to 7 a.m. through 6 p.m. would, even if it were justified, have a number of negative effects, which we wish to avoid. It would put Angell Bros.' trucks on the road during the a.m. and p.m. peak traffic hours, which would exacerbate traffic problems in the Metro area and would produce additional and unnecessary congestion for commuters. It would also mean that major public construction jobs in the area would not be able to take delivery of material from Angell Bros. before a.m. traffic peaks, which would delay completion dates for such projects and raise their costs. We find credible Angell Bros.' representation that due to the strong market demand, all of its contractor customers but five are on a 200-ton per day ration, and that reduced operating hours would exacerbate this rationing of material. We find that this would not be desirable as a matter of public policy.

17. For all of the above reasons, we interpret the Reconciliation Report, the Conservation Easement and the Mine Plan as containing the existing hours of operation of 6 a.m. through 10 p.m. and contemplating that those hours would continue for the life of the mine. We therefore overturn the first sentence of the Hearings Officer's Condition No. 7, and we set the operating hours at 6:00 a.m. through 10:00 p.m.

18. In discussions at the November 26, 1996 Hearing over reclamation requirements, Angell Bros. volunteered, and we hereby adopt as an additional condition binding upon Angell Bros., that it will:

a. purchase a testing instrument equivalent to instruments used by Daly-Standlee & Associates in their noise monitoring reports introduced by the Applicant as an Exhibit to its Application,

b. monitor noise on a monthly basis from neighboring properties, and

c. submit copies of the monthly noise monitoring results quarterly, or upon request to the Planning Director or designee. We find that this condition was volunteered by Angell Bros. and will foster good community relations as well as make a record of compliance available to the County in the event of future disputes on this point.

19. We find credible Staff testimony received at the November 27, 1996, Board Hearing, together with written comments by Chuck Henley, County Engineer, regarding traffic information required by Code Section 11.15.7325(C)(1), (d) and (e). We find that Mr. Henley has adopted a rule (see November 16 and 17 Notices) which became effective on October 31, 1996, and which prohibits "through truck traffic" on Newberry Rd. and McNamee Rd. Mr. Henley has also advised us that he has approved the Applicant's designation of Highway 30, Cornelius Pass Rd. and Skyline Blvd. as "commonly used haul routes" from the site. We find Applicant's evidence and Mr. Henley's evaluation of it credible. Mr. Henley has concluded, and we agree, that no additional Traffic Management Plan is required to satisfy Code Section 11.15.7325(C)(1). Accordingly, we overturn Hearings Officer's Condition No. 14.

20. The conditions we place on approval in these matters are required for compliance with our Site-Specific Program and are contained in Exhibit "A," attached hereto.

DATED this 13th day of February, 1997, nunc pro tunc November 27, 1996.



BOARD OF COUNTY COMMISSIONERS
FOR MULTNOMAH COUNTY, OREGON


for Beverly Stein, Chair

REVIEWED:

LAWRENCE KRESSEL, COUNTY COUNSEL
FOR MULTNOMAH COUNTY, OREGON


Sandra N. Duffy, Chief Assistant County Counsel

Exhibit "A"

CONDITIONS OF APPROVAL (CU 6-96, SEC 18-96)

The application for conditional use approval sought in this application is approved subject to compliance with the following conditions of approval:

1. Approval is for a Conditional Use Permit and SEC Permit for mineral extraction and processing on 250 acres located at Tax Lot 12, in the NW 1/4 of Section 28, 2N, 1W, Willamette Meridian; and Tax Lots 2, 6, 8 and 11 in the E 1/2 of Section 29, T2N, R1W, Willamette Meridian as proposed and conditionally approved in this application.
2. The Applicant shall record a statement with the Division of Records prior to the commencement of mining under the authority of this permit, that the land owner and its successors in interest acknowledge the rights of owners of property within the Impact Area to conduct forest operations consistent with Forest Practices Act and Rules, and to conduct farming practices.
3. This Conditional Use permit is issued for the specific use or uses specified in the application for Conditional Use approval, together with the limitations or conditions as determined by the Approval Authority in this decision.
4. Access associated with the mining of the site, including without limitation the transportation of rock and heavy equipment, shall be limited to a single point of northbound and southbound access along Highway 30 in the location shown on the Applicant's application. Further, the Applicant shall not use the easement from the mine site to McNamee Road that crosses the property at 13780 NW McNamee Road presently owned by Ray Adams for commercial hauling or mining.
5. No material (rock, clay or large quantities of dirt) which creates a safety or maintenance problem shall be tracked or discharged in any manner onto any public right-of-way. The Applicant shall maintain the storm water detention dry wells, cattleguard and paved haul road described in the application in good and functional condition throughout the life of the mining operations authorized by this permit. Further, the Applicant shall take whatever other measures are necessary to prevent the discharge of hazardous materials from trucks leaving the mine site.
6. In the event that it is determined in a judicial or quasi-judicial enforcement proceeding brought by Multnomah County against the Applicant or Owner that the Applicant's mining operation is resulting in a violation of this decision, the Applicant shall take whatever corrective actions are directed by the judicial or quasi-judicial officer who has jurisdiction over the enforcement matter, subject to Applicant's right to appeal such decision.
7. All mineral and aggregate operations shall occur between the hours of 6 AM to 10 PM. No operations are allowed on any Sunday, New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, and Christmas Day.
8. Blasting, if any, shall occur between the hours of 9:00 AM to 5:00 PM. No blasting shall be allowed on any Saturday, Sunday, New Year's Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, and Christmas Day.

9. The Applicant shall obtain approval to expand its DEQ issued Stormwater Discharge Permit to include the proposed mine expansion. The Applicant shall also furnish to the County, prior to commencing expansion of mining activities a valid DEQ Air Contamination Discharge Permit. The permits shall clearly identify the mine operations areas approved by DEQ. The Applicant shall maintain on file with Multnomah County throughout the life of the mine, copies of valid DEQ Air Contamination Discharge and Stormwater Discharge Permits. Complaints received by the Planning Department regarding air and water contamination will promptly be forwarded to DEQ as part of interagency coordination.
10. The Applicant shall comply with the June 11, 1996 Operating Permit authorized by the Department of Geology and Mineral Industries (DOGAMI) and the requirements of the Applicant's 5-year reclamation and progress report (Reclamation Report) together with any subsequent conditions imposed by DOGAMI. A copy of the Applicant's 5 year reclamation and progress report ("Reclamation Report") as required by DOGAMI shall be submitted to the County, upon acceptance or approval by DOGAMI.
11. The Applicant shall maintain compliance with DEQ noise regulations. Complaints regarding noise will be forwarded to DEQ as part of an ongoing interagency coordination effort. In the event DEQ determines its standards are not being met, the Applicant will be subject to enforcement action as determined by the County.
12. Upon final Land Use Approval of this application and prior to commencement of quarry expansion under this permit beyond the existing 114 acres, the Applicant shall record with Multnomah County Records the "Grant of Conservation Easement" between Linnton Rock, Angell Bros. and Friends of Forest Park as agreed to through mediation and acknowledged on August 21, 1996, as stated in paragraph 16 therein.
13. The Applicant may conduct blasting on the subject property so long as the proposed blasting activities shall not adversely affect the quality or quantity of groundwater within wells in the vicinity of the blasting operation.
14. The Planning Director or her/his designee shall periodically monitor the site. Site monitoring should occur within the first month of operation and continue at least four times per year. If the Reclamation Report requires more frequent monitoring, the Director shall comply with the requirements of the Report.
15. This approval is valid for the life of the mine and shall remain valid provided compliance with all conditions and laws is achieved and maintained.
16. The Applicant shall purchase an instrument for the purposes of monitoring noise, monitor noise on a monthly basis from neighboring properties in accordance with the methodology used in the Daly-Standlee & Associates reports included as Exhibits in the Application and submit copies of the monthly logs quarterly or upon request to the Planning Director or designee.
17. Reclamation of any segment of the site, as depicted in the Mine Plan, on which extraction has been completed, and which is not being utilized for roads, equipment storage, or stockpiles shall be completed within 3 years of the completion of extraction activity on that segment.