United States
Environmental Protection
Agency

EPA Region 3
Philadelphia, PA

Volume I

Table of Contents

VOLUME I

INTRODUCTION **I-1**

SECTIONA **A-1**
Elected Officials **A-2**
The Honorable Frank Pallone, Jr., United States House of Representatives A-3

Federal Agencies **A-6**
James F.Devine, United States Department of the Interior A-7
Paul Joe, Department of Health & Human Services A-14
Theresa Presser, United States Geological Survey A-14

State or Commonwealth Agencies **A-20**
Betsy Child, Tennessee Department of Environment and Conservation A-21
Donald Dott, Kentucky State Nature Preserves Commission A-23
Herbert Harper, Tennessee Historical Commission A-24
Robert Logan, Kentucky Natural Resources and Environmental Protection Cabinet, Department for Environmental Protection A-24
Aubrey McKinney, Tennessee Wildlife Resources Agency A-26
Michael Murphy, Virginia Department of Environmental Quality A-26
Paul Rothman, Kentucky Environmental and Public Protection Cabinet A-48
LaJuana Wilcher, Kentucky Environmental and Public Protection Cabinet A-49
Joanna Wilson, Virginia Department of Historic Resources A-53

Organizations **A-54**
Tina Aridas, Mountain Redbird Music A-55
James Baker, Sierra Club — Tennessee Chapter A-56
Sherman Bamford, Virginia Forest Watch A-57
Lawrence Beckerle, West Virginia State Chapter of Quail Unlimited A-59
Teri Blanton, Kentuckians for the Commonwealth A-61
Jason Bostic, Joint Coal Industries A-65
Craig Breon, Santa Clara Valley Audubon Society A-223
Michael Carey, Ohio Coal Association A-224
Greg Conrad, Interstate Mining Compact Commission A-225
Kent DesRocher, West Virginia Coal Association A-226
Randy Dettmers, Partners in Flight A-229
Mark Donham, Heartwood A-231
Jenny Dorgan, Alabama Environmental Council A-232
Ralph Dunkin, West Virginia-Western Maryland Synod of the ELCA A-232
Lawrence Emerson, Arch Coal Inc. A-233
Tom FitzGerald, Kentucky Resources Council A-297
Anthony Flaccavento, Appalachian Sustainable Development A-297
Friends of the Little Kanawha A-298
Grattan Gannon, Erris Co. LLC. A-299
Liz Garland, West Virginia Rivers Coalition A-299
Scott Gollwitzer, Appalachian Voices A-300
Bill Gorman, Mayor of Hazard, Kentucky A-301
Sandra Goss, Tennessee Citizens for Wilderness Planning A-304
James Hecker, West Virginia Highlands Conservancy and Ohio Valley Environmental Coalition A-305

VOLUME II

Catherine Holtkamp, Congregation of Divine Providence A-536
Renee Hoyos, Tennessee Clean Water Network A-536
Mary Hufford, University of Pennsylvania A-537
Carolyn Johnson, Citizens Coal Council A-542
John Jones, Alpha Natural Resources A-544
Thomas Kelly, Catholic Conference of Kentucky A-545
Kentuckians for the Commonwealth A-546
Kevin Knobloch, Union of Concerned Scientists A-552
Steve Krichbaum, Wild Virginia A-553
Frances Lamberts, League of Women Voters of Tennessee A-556
Joseph Lovett, Appalachian Center for the Economy and the Environment A-305
Meg Maguire, Scenic America A-559
Mary Mastin, Sierra Club A-560
Landon Medley, Save Our Cumberland Mountains, Inc. A-562
Vince Meleski, Wild Alabama/Wild South A-589
Amanda Moore, Appalachian Citizens Law Center, Inc. A-590
Bryan Moore, West Virginia Council of Trout Unlimited A-591
Joan Mulhern, Earthjustice et al. A-592
Diana Mullis, Potomac Valley Audubon Society A-603
Janice Nease, Coal River Mountain Watch A-604
Robbie Pentecost, Catholic Committee of Appalachia A-606

Bob Perciasepe, National Audubon Society A-607
Judith Petersen, Kentucky Waterways Alliance A-608
Bill Price, Sierra Club — Appalachian Region A-611
Andi Putman, A Lasting World A-614
Cindy Rank, West Virginia Highlands Conservancy A-615
Donald Ratliff, Enterprise Mining Company, LLC A-616
Robert Reid, Alabama Audubon Council, et al. A-617
Virginia Reynolds, Tennessee Ornithological Society, et al. A-618
Richard Seeley, Glendale-LaCrescenta Advocates A-625
Francis Slider, West Virginia Chapter of the Sierra Club A-626
Seth Shteir, San Fernando Valley Audubon Society A-626
John Snider, West Virginia Coal Association A-627
John Spahr, Virginia Society of Ornithology and August Bird Club A-629
Stephen Stewart, Seven Hills Birdwatchers A-634
Vivian Stockman, Ohio Valley Environmental Coalition A-639
Carol Stoddard, The Garden Club of America A-725
Jean Sullivan, Redbud Family Health Center A-725
Mike Tidwell, Chesapeake Climate Action Network A-726
United Mineworkers of America A-727
Charles Wakild, Progress Energy A-730
Jason Wandling, West Virginia Chapter of the National Lawyers Guild A-731
Tony Whitaker, Hazard/Perry County Chamber of Commerce A-734
Gerald Winegrad, American Bird Conservancy, et al. A-734

Citizens A-844
Michael Abraham A-845
David Brandon Absher A-845
Mark Abshire A-846
Lorraine J. Adams A-847
Knox Adler A-847
Geert Aerts A-848
Lee Agee A-848
Sandy Ahlstrom A-849
Julie Alaimo A-850
George & Frances Alderson A-850
Jonathan Alevy A-851
Deborah C. Allen A-851
Christopher Ambrose A-852
Christopher Anderson A-852
Anonymous A-853
Anonymous A-854
Anonymous A-855
Julie Arrington A-855
Gordon Aubrecht, II A-856
Harvard Ayers A-856
Janet Ayward A-857
Jim Baird A-858
Ray & Arlene Baker A-858
Isabel Balboa A-859
Jessie Ballowe A-859
Carl Banks A-860
Israel Baran A-860
Richard Baskin A-861
Susan Bechtholt A-861
Lawrence Beckerle A-862
Barbara Beer A-874
Tricia Behle A-875
Bob Bell A-876
Gordon Bell A-876
Vaughn Bell A-877
Joe Bergeron A-877
David Berkland A-878
Michael Bialas A-878
Bonnie Biddison A-879
Charles Biggs A-880
Cathie Bird A-880
Stephanie Blessing A-881
Ruth Bleuni A-882
Margaret Block A-885
Kathryn Blume A-885
Julia Bonds A-886
Douglas Boucher A-891
Brian Bowen A-892
Deborah Bowles A-893
Gayle Brabec A-893
Mary Beth Bradley A-894
Julia Brady A-894
Sandra Brady A-895

Matthew Branch A-896
Lee Bridges A-896
Dede Brown A-897
LeeAnn, George, Emily & Sarah Brown A-897
Shale Brownstein A-898
Mike Brumbaugh A-898
Mark Bruns A-899
Stephen Bull A-900
Doug Burge A-900
Mark Burger A-901
Gail Burgess A-901
Moss Burgess A-902
Linda Burkhart A-903
Judy Burris A-903
Rick Cameron A-904
Beth Campbell A-905
Ruth Campbell A-905
Pauline Canterberry A-906
Nancy Carbonara A-906
Enid Cardinal A-907
Mary Lou Carswell A-908
Jenny Casey A-908
Sidni Cassel A-909
Don Cassidy A-910
Philip Castevens A-910
Billy Caudill A-911
Herman Caudill A-911
Therma Caudill A-912
Dan Chandler A-912
Dorsey Channel A-913
John Chase A-913
T.J. Chase A-914
Louise Chawla A-914
Robert Cherry A-916
Arthur Childers A-916
Susan Cho A-917
Martin Christ A-917
Jerry Ciolino A-918
Matthew Cleveland A-918
John & Tammy Cline A-919
Sister Mary Brigid Clingman A-919
Jerry Coalgate A-920
Marlene Cole A-921
Marian Colette A-922
Michael Compton A-922
James Conroy A-923
Peggy Conroy A-924
David Cooper A-924
Kennon Copeland A-926
Ruby Corbin A-927
Jennifer Cox A-927
John Cox A-928
James Crabb A-929
Ryan Crehan A-929
Kathy Cross A-930
April & Jeff Crowe A-930
Kate Cunningham A-931
Marilynn Cuonzo A-931
Janet Dales A-932
Mick Daugherty A-932
Bongo Dave A-933
Eric Davis A-935
William Dawson A-935
Elmer & Angela Dobson A-936
B. Dominey A-937
Gail Douglas A-938
Linda Downs A-938
Waneta Dressler A-939
Phoebe Driscoll A-940
Morris Dunlop A-940
Bill Dwyer A-941
Craig Edgerton A-942
Edgar Edinger A-943
Iier Edinger A-944
Dave Edwards A-944
Robert Eggerling A-947
Susan Eggert A-947
Clara Else A-951

Susan Emberley A-951
Julie Emerson A-952
LindaLee Emrich A-952
Kathleen Enders A-953
Nancy Erps A-953
Craig Etchison A-954
Karen Eva A-955
Alice Evans A-955
Gaye Evans A-956
McNair Ezzard A-956
Pete Farino A-957
Estelle Fein A-958
Robert Fener A-958
Denise Ferguson A-959
Steve Fesenmaier A-960
Arthur Figel A-960
Patrice Fisher A-961
Gerry & Louise Fitzgerald A-961
Anthony Flaccavento A-962
Agatha (Betty) Fleming A-962
Catherine Fleischman A-963
Marsha Fishman A-963
Janet Fout A-964
Winnie Fox A-967
Luther Franklin A-968
Tim Frasine A-968
Vincent Frazzetta A-969
Suzan Frecon A-969
Barbara Fredrickson A-970
Rachel Frith A-970
Don Gaines A-971
Pash Galbavy A-972
Francis Gallagher A-972
Marie Gangwish A-973
Steven Gardner A-973
Dawn Garten A-975
Niall Gartlan A-976
Lydia Garvey A-976
Glenn Gaskill A-977
Suzanne Gayetsky A-977
Mary Gee A-978
Melissa Gee A-978
Ms. Gee A-979
Dan Geiger A-979
Andy Gelston A-980
Mike George A-981
Meagan Gibson A-982
Larry Glen A-983
Christopher Goddard A-984
Gay Goforth A-984
Crystal Good A-985
Donny Good A-985
Joanne Granzow A-986
Katherine Green A-986
Margaret Gregg A-987
Robert Gipe A-987
Karen Grubb A-988
Robert Hallick A-988
Emilie Hamilton A-989
Hann J. A-990
Karl Hanzel A-991
Alice Hardin A-991
Jerry Hardt A-992
Bill Hardy A-992
Roy Harless, Jr. A-993
Ronda Harper A-993
Mark Harris A-994
Erica Harvey A-995
Tracy Hasuga A-995
Marlon Henn A-996
Dan Hensley A-996
Robert Hensley A-997
J. Michael Herr A-997
Caroline Hice A-998
Susan Hickman A-998
Sanford Higginbotham A-999
Monica Hill A-999
Marty Hiller A-1000

Danita Hines A-1000
Robert Hiser A-1001
Paul Hodder A-1001
Sharon Hodges A-1002
Steve Hodges A-1002
Andy Hodgman A-1003
Karen Holl A-1003
Mark Homer A-1004
John Honeck A-1005
John Hopkins A-1005
Patricia Hopkins A-1006
Pierre Howard A-1006
Renee Hoyos A-1007
Patrick Huber A-1007
Barbara Hutchinson-Smith A-1008
Martha Hutson A-1009
Carole Hyre A-1009
Robert Iles A-1010
Michael Jablonski A-1010
Donnie Jackson A-1011
Gordon James A-1011
Roberta James A-1012
Phyllis Jenness A-1012
John Jodine, Jr. A-1013
Emily Johnson A-1014
Jane Johnson A-1014
John Johnson A-1015
Andrew Jones A-1015
Deborah Jones A-1017
Lora Jones A-1017
Mary Lou Jones A-1018
Tim Jones A-1019
Richard Jorgensen A-1019
Tom Joy A-1020
Edward Kadane A-1021
Ray Kamstra A-1021
Dan Kash A-1022
Barry Katzen A-1022
Erin Kazee A-1023
Robert Keiilbach A-1023
Mary Corsi Kelley A-1024
Cindy Kendrick A-1024
Oren Kennedy A-1026
Carol Anne Kilgore A-1027
Sterling Kinnell A-1028
Laura Klein A-1028
Jennifer Knaggs A-1029
Gerri Kolesar A-1029
Vanessa Kranda A-1030
Jud Kratzer A-1030
Scott Kravitz A-1031
Tom Kruzen A-1031
Glenn Kuehne A-1032
Kara Kukovich A-1032
Kenneth M. Kukovich A-1034
John L A-1035
Alexandra Lamb A-1035
Sloane Lamb A-1036
Melissa Lambert A-1037
Denise Lamobaw A-1037
Jackie Lancaster A-1038
Susan Lander A-1038
Jennifer Lantz A-1039
Tim Larrick A-1041
Jessica Lavin A-1041
Phyllis Law A-1042
F. Carey Lea A-1042
Elaine Leach A-1043
Carole Levenson A-1043
Igal Levy A-1044
Elizabeth Lewis A-1044
Norma Lewis A-1045
Tom Lewis A-1045
Betta Leyland A-1046
Eric Lillyblad A-1046
Joan Linville A-1047
Joe Linville A-1048
Nannie Linville A-1049

Curt Livingston, Sr. A-1049
Julie Longman-Pollard A-1050
Sherry Lorenz A-1050
David & Marsha Low A-1052
Benjamin Lowman A-1053
Lois Ludwig A-1053
Tom Luther A-1054
Grace Glaser-Lynch & Thomas Lynch A-1054
Ann Lynnworth A-1055
Lawrence Lyon A-1055
Malcolm MacPherson A-1056
Andy Mahler A-1056
Craig Mains A-1057
O. Mandrussow A-1058
Carli Mareneck A-1059
Peter Mareneck A-1060
Rog Marjay A-1060
Thomas Marshalek A-1061
Martin A-1061
Julia Martin A-1065
Julian Martin A-1065
Namon Martin A-1066
Rev. Mary McAnally A-1066
James McCarthy A-1067
Dora McCarty A-1067
Erika McCarty A-1068
Kerry McClure A-1069
Chelena McCoy A-1071
Harold McCurdy A-1072
Howard McFann A-1072
John McFerrin A-1073
Scott McGarrity A-1073
Carol McGeehan A-1074
M. McGeorge A-1074
Margaret McGinnis A-1075
Judith McHugh A-1075
Meagan McKay A-1076
Catherine McKenzie A-1076
Bonnie McKeown A-1077
Cathe McLaughlin A-1077
Corinna McMackin A-1078
Elizabeth McMahon A-1079
James & Carla McMillin A-1079
Janet McReynolds A-1080
Shawn Meagher A-1081
Colby Mecham A-1082
Elaine Melnick A-1083
Barbara Mendelsohn A-1083

VOLUME III

Ricardo Mendez A-1084
Barbara Menendez A-1084
Zina Merkin A-1085
Jennifer Merrick A-1085
Robert Mertz A-1086
James Mesich A-1088
Teresa Mesich A-1088
Alissa Meyer A-1089
Judy Meyer A-1090
Greg Miles A-1094
Sue Miles A-1094
Leon & Lucille Miller A-1095
Mark Miller A-1096
Mary Miller A-1097
Robin Mills A-1097
Phyllis Mingo A-1100
Georgia Miniard A-1100
Steve Mininger A-1101
Carol Mintz A-1102
Jonathan Mirgeaux A-1102
Denver Mitchell A-1103
Keith Mohn A-1109
Wm Montgomery A-1110
John Mooney A-1110
Maryhea Morelock A-1111
B. Morgan A-1112
Mark Morgan A-1112
Jeffrey Morris A-1113

Robert Moss A-1114
Robert Mueller A-1115
David Muhly A-1116
Dr. Mendi Mullett A-1117
Cory Munson A-1118
Mark Murphy A-1119
Sheldon Myers A-1119
Grace Naccarato A-1120
Susan Nadeau A-1120
Patricia Napier A-1132
Ann Nelson A-1133
Nanette Nelson A-1134
Paul Nelson A-1135
Denis Newbold A-1145
Mike Newell A-1147
Brad Newsham A-1148
Duane Nichols A-1148
Karl Norton A-1149
Jason O'Brian A-1149
Mary O'Brien A-1150
Sandra O'Hara A-1151
Peggy O'Kane A-1151
Ethel Oldham A-1152
Russell Oliver A-1152
Steven Olshewsky A-1153
Tony Oppegard A-1153
Marilyn Ortt A-1154
Clark Orwick A-1155
Amanda O'Shea A-1155
Jim Ottaviani A-1156
Judy Otto A-1157
Jon Owens A-1157
Aleta Pahl A-1158
Lori Parsley A-1158
Lynn Partington A-1159
Mary Pasti A-1160
Cynthia Patterson & Peter Schrand A-1161
Leiter Patton A-1161
Jerone Paul A-1162
K. Payne A-1162
Karen Payne A-1163
Ray Payne A-1163
Elizabeth Peelle A-1164
Joan Peoples A-1165
Dolores Perez A-1166
Candice Peters A-1166
Ian Petersen A-1167
Denise Peterson A-1168
Jan Peterson A-1168
Susan Peterson A-1169
Dean Petrich A-1169
Deborah Pettry A-1170
Amelia Pickering A-1170
Joseph & Helen Pickering A-1171
Joseph Presson A-1171
Andrew Price A-1172
Donna Price A-1173
Perrie'Lee Prouty A-1173
Sean Quinlan A-1174
Christine Rafal A-1175
Teresa Rafi A-1175
Linda Rago A-1176
Mary Ramsay A-1176
Jan Randall A-1177
Kevin Randall A-1178
M. Rauen A-1178
John Rausch A-1179
Lisa Rayburn A-1180
Eric Rechel A-1180
Patricia Reed A-1181
Linda Reeves A-1182
Dylan Reid A-1182
Richard Reis A-1183
David Reister A-1183
Jordan Reiter A-1184
John Reppun A-1185
Michelle Reynolds A-1186
James Richard A-1187

Nancy Riley A-1187
Paul Robertson A-1188
Richard Robertson A-1188
Tom Robertson A-1189
Gail Roc A-1189
Hugh Rogers A-1190
Ruth Rogers A-1190
Michael Romo A-1191
Debra Rookard A-1192
Ruth Rosenthal A-1193
June Rostan A-1194
Greg Roth A-1194
Lionel Ruberg A-1195
Stephen Rudolph A-1195
Steve Rutledge A-1196
Mark Van Ryzin A-1196
Paul Sainato A-1197
Sue Ann Salmon A-1198
Manuel Sanchez A-1198
Bennett Sawyers A-1199
Ashlee Saylor A-1199
Abraham Scarr A-1200
Paul Schaefer A-1200
Kenny Schmidt A-1201
Betty Schnaar A-1202
Dave Schuett-Homes A-1202
Rose Alma Schuler A-1203
Lance Eric Schultz A-1203
Lauren Schwartz A-1204
Bruce Scott A-1205
William Scott A-1205
Jason Scullion A-1206
Robert Seaver A-1206
Linda Sekura A-1207
Danny Sergent A-1207
Price Sewell A-1208
Dink Shackleford A-1208
Justine Sharp A-1209
Walt Sharpe A-1209
Sue Sharps A-1210
Barrett Sherwood A-1210
Susan Shriner A-1211
June Silverman A-1211
Willis Simms A-1212
Pat Simpson A-1213
Gary Skulnik A-1213
Deana Smith A-1214
Donna Smith A-1214
Ellen Smith A-1215
Eric Smith A-1215
John Smith A-1216
Jonathan Smuck A-1216
Susan Sobkoviak A-1217
Richard Soderberg A-1218
Sooner Fan A-1218
Constance Sowards A-1219
Wayne Spiggle A-1219
Daniel Spilman A-1220
Joel Spoonheim A-1220
Richard Spotts A-1221
Tom Spry A-1223
Sue Staehli A-1223
Robert Stanley A-1224
Dallas Staten A-1224
Steve Stathakis A-1225
Fitz Steele A-1225
Edward Stein A-1227
Jim Steitz A-1227
Judith Stetson A-1228
Elaine Stoltzfus A-1229
Kathryn Stone A-1229
Sally Streeter A-1230
Joseph Strobel A-1230
Jean Strong A-1231
William Sullivan A-1232
Jim Sweeney A-1233
Chetan Talwalkar A-1233
Lesley Tate A-1235

William Taylor A-1235
Darla Tewell A-1236
Dean Thayer A-1236
Rose Thompson A-1237
Derek Thornsberry A-1237
Ershel Thornsberry A-1238
Mildred Thornsberry A-1238
Barry Tonning A-1239
Phillip Tracy A-1240
Roy Trent A-1240
Phil Triolo A-1241
Martha Turnquist A-1242
Ellisa Valoe A-1242
Mary Vassalls A-1243
Corey Vernier A-1243
Sue Vernier A-1244
Jeff Waites A-1245
Judith Walker A-1245
Bruce Wallace A-1246
Patty Wallace A-1287
David Walters A-1287
Richard Walters A-1288
Barbara Walton A-1288
Rufus Wanning A-1289
Kenneth Warren A-1289
Holly Watkins A-1290
Clee Webb A-1290
Robert Welkle A-1291
Eric Wessels A-1291
Julya Westfall A-1292
Marian Weston A-1292
Julia Whiteker A-1293
Gregory Wilcox A-1293
Rachel Williams A-1294
Susan Williams A-1295
Suzanne Williams A-1296
Waimea Williams A-1296
Sara Wilts A-1297
Vickie Wolfe A-1297
Doug Wood A-1298
Ivan & Jean Woods A-1299
Tanya Woods A-1300
Anne Woodbury A-1300
Nancy Woodward A-1301
Daniel Wright A-1301
Mingjane Wu A-1302
Bryan Wyberg A-1302
Eleanor Yackel A-1303
Lynn & Chess Yellott A-1304
Geoffrey Young A-1304
Walter Young A-1305
Mary Yunker A-1306
David Zeff A-1306
Carol Zeigler A-1307

Form Letters A-1308
Amend the DEIS form letter — 4,156 signatories A-1309
American Rivers form letter — 4,227 signatories A-1309
Boone County form letter — 46 signatories A-1310
Community Visit form letter — 14 signatories A-1310
Destruction form letter — 65 signatories A-1311
Earth Justice form letter — 35,743 signatories A-1311
League of Conservation Voters form letter — 25,056 signatories A-1312
Oppose Change to Stream Buffer Zone Rule form letter — 7,168 signatories A-1313
Protect Appalachian Streams form letter — 425 signatories A-1313
Reduce Harmful Effects form letter — 4,522 signatories A-1314
Restriction form letter — 5 signatories A-1314
Save Our Environment — 297 signatories A-1315
Sierra Club post card — 953 signatories A-1316
Stop Destructive Mountaintop Removal form letter — 31 signatories A-1316
Stop Mountaintop Removal form letter — 9 signatories A-1317
Support Alternative 3 form letter — 18 signatories A-1317
Writing to Urge form letter — 360 signatories A-1318

SECTION A INDEX

Elected Officials 1
Federal Agencies 1
State or Commonwealth Agencies 1

Organizations
Order by Author 1
Order by Organization 2
Citizens 3
Form Letters 10

SECTION B B-1
Kentucky Afternoon Session B-2
Jeff Coker, facilitator, Kentucky afternoon session, opening comments B-3
Dink Shackelford, Virginia Mining Association B-6
Bill Caylor, Kentucky Coal Association B-8
Rebeca Mullins, private citizen B-10
Bennett Sawyers, private citizen B-11
Lonnie Starns, private citizen B-12
Donald Rex Napier & John Blankenship, private citizens B-12
Harlan Farler, Jr., private citizen B-13
John Ledington, private citizen B-13
Dave Mockabee, private citizen B-14
Roger Jones, private citizen B-15
Leonard W. Davis, private citizen B-16
Harry Fields, private citizen B-17
Paul David Taulbee, private citizen B-18
Keith Mohn, private citizen B-20
Larry Roberts, private citizen B-21
Lawrence Joseph, Jr., private citizen B-22
Gary Harned, private citizen B-23
Charles Reed, private citizen B-25
Carl Ramey, private citizen B-26
Bernie Faulkner, private citiezn B-27
Steve Gardner, private citizen B-29
Don Gibson, private citizen B-30
Paul Matney, private citizen B-32
Bill Gorman, mayor of Hazard B-34
Ackra Stacy, private citizen B-35
Michael Joseph & Columbus Heath, private citizens B-36
Doris Brewer, private citizen B-37
Earl Clemons, private citizen B-38
Russell Oliver, private citizen B-40
Joe Evans, private citizen B-41
Rick Johnson, private citizen B-42
David Wilder, private citizen B-43
Robbie Pentecost, Catholic Committe of Appalacia B-44
Everett Kelly, private citizen B-46
Robert Zik, TECO Coal B-46
John Rausch, Catholic Diocese of Lexington, KY B-47
Tom Wooton, private citizen B-48
David Creech, private citizen B-49
Brian Patton, Starfire Mining Co. B-50
Jimmy Jackson, UMWA and Local 5890 ..... B-52
Andy Willis, private citizen B-52
Leslie Combs, private citizen B-53
Mike Hansel, private citizen B-54
Paul Johnson, private citizen B-55
Ben Perry, private citizen B-56
Meg Moore, Kentuckians for the Commonwealth B-58
Paul Lyon, Mineral Labs, Inc. B-60

Kentucky Evening Session B-61
Jeff Coker, facilitator, Kentucky evening session, opening comments B-62
Betty M. Hagen, Kentuckians for the Commonwealth B-66
Ruth Colvin, Kentuckians for the Commonwealth B-66
Patty Wallace, Kentuckians for the Commonwealth B-67
Dan Kash, Kentuckians for the Commonwealth B-69
Randall Moon, private citizen B-69
Jessie Collins, private citizen B-70
Maynard Tetreault, private citizen B-71
Dave Cooper, Kentuckians for the Commonwealth
and the Sierra Club B-73
Joyce Wise, Kentuckians for the Commonwealth B-75
Kaseana Jones, private citizen B-76
Teri Blanton, Kentuckians for the Commonwealth B-76
Lyle Snider, Kentuckians for the Commonwealth B-78
Amanda Moore, Appalachian Citizen Law Center B-79
Ted Adams, private citizen B-81
Rocky Gay, private citizen B-84
Bruce Blair, private citizen B-85
Gregory Burnett, private citizen B-87
Lisa Conley, private citizen B-87

J.W. Bradley, Save Our Cumberland Mountains B-89
Kathy Bird, Save Our Cumberland Mountains B-90
Charles Blankenship, private citizen B-92
Doug Dorfeld, Kentuckians for the Commonwealth B-93
Michael Riley, private citizen B-94
Brent Boggs, private citizen B-96
Anthony Jones, private citizen B-96
Jim Sidwell, private citizen B-97
Levon Baker, private citizen B-98
444, private citizen B-99
Tom Jones, East Kentucky Corp. B-101
Dewey Gorman, Hazard Coal Corp. B-102
Phillip Estep, Miller Brothers Coal B-104
James Detherage, Twin Energies B-105
Denny Noble, county judge for Perry County B-105
Steve Gardner, private citizen B-106
Elisha Abner, private citizen B-108
Daniel Mongiardo, state senator for Perry, Bell, Harlan, and Leslie Counties B-110
Brandon Smith, state representative, 84th B-111
Charles Everage, B & C Trucking B-115
Bill Caylor, Kentucky Coal Association B-117
Fitz Steele, private citizen B-119
Randy Wilson, private citizen B-120
Larry Keith, private citizen B-122
Wesley Harvey, private citizen B-122
Simmy Ray Bolen, private citizen B-124

West Virginia Afternoon Session B-126
Mark Taylor, chairman, West Virginia afternoon session, opening remarks .. B-128
Bill Rainey, West Virginia Coal Association B-132
Ted Hapney, United Mine Workers of America (UMWA) B-135
Wesley Hall, private citizen B-137
Jeremy Muller, West Virginia Rivers Coalition B-138
Cindy Rank, Friends of the Little Kanawha (FOLK) B-140
Vivian Stockman, Ohio Valley Environmental Coalition (OVEC) B-142
Liz Garland, West Virginia Rivers Coalition B-144
Sandi Lucha, private citizen B-145
Frank Young, West Virginia Highlands Conservancy B-146
Wayne Coleman, private citizen B-148
Carol Warren, WV Council of Churches B-150
Jack Henry, private citizen B-152
Diana Wood, private citizen B-154
Natalie Spencer, private citizen B-157
John Metzger, private citizen B-159
Randy McMillion, private citizen B-161
Karen Keaton, private citizen B-162
Terry Brown, private citizen B-162
Doug Waldron, private citizen B-163
Mike Vines, private citizen B-164
Jeremy Fairchild, Fairchild International B-165
Andy Ashurst, private citizen B-167
Lee Barker, private citizen B-167
Larry Keith, private citizen B-169
Robert Wilkerson, private citizen B-171
Fitz Steele, private citizen B-173
Luke McCarty, private citizen B-175
William Runzon, private citizen B-178
Benny Dixon, private citizen B-179
Mike Comer, private citizen B-180
Nelson Jones, Madison Coal Supply B-181
Bob Gates, private citizen B-182
Corky Griffith, private citizen B-183
Ed Painter, private citizen B-184
Warren Hilton, private citizen B-186

West Virginia Evening Session B-189
Mark A Taylor, chairman, West Virginia evening session, opening comments B-191
Mary Ellen O'Farrell, West Virginia Envrionment Council B-196
Chris Hamilton, West Virginia Coal Association B-197
Scott Gollwitzer, private citizen B-199
Larry Emerson, Arch Coal, Inc. B-201
Bill Gorz, Earth First B-203
Nick Carter, Natural Resource Partners &
National Council of Coal Resource B-205
John R. Snider, Arch Coal, Inc. B-207
Kent DesRocher, private citizen B-209
Randall Maggard, Argus Energy B-212
Michael A. Morrison, private citizen B-213

Julia Bonds, private citizen B-214
Lawrence Beckerle, private citizen B-216
Nanette Nelson, Coal River Mountain Watch B-219
Larry Maynard, Delbarton Environmental Community Awareness Foundation ... B-222
Vivian Stockman, Ohio Valley Environmental Coalition (OVEC) B-223
Larry Gibson, private citizen B-225
Julian Martin, WV Highlands Conservancy B-226
Janet Fout, Ohio Valley Environmental Coalition (OVEC) B-229
James Maynard, private citizen B-231
Donna Price, Coal River Mountain Watch B-232
Frieda Williams, private citizen B-233
Bill Price, Sierra Club of Central Appalachia B-234
Pam Medlin, private citizen B-236
Winnie Fox, private citizen B-237
Patty Sebok, private citizen B-239
Janice Neese, Coal River Mountain Watch B-240
Chuck Wyrostok, Concerned Citizen Coalition B-242
Marian Miller, private citizen B-244
Pauline Cantebury, town of Sylvester B-246
Mel Tyrce, private citizen B-248
Bill McCabe, Citizens Coal Council B-250
Florence Twu, private citizen B-251
Abraham Mwaura, private citizen B-252
Connie Lewis, WV Environmental Council B-254
Paul Nelson, private citizen B-257
Monty Fowler, private citizen B-258
Denise Giardina, private citizen B-260
Jason Bostic, West Viriginia Coal Association B-261
John Taylor, Ohio Valley Environmental Council &
West Virginia Environmental Council B-263
Fred Sampson, private citizen B-264
Leon Miller, private citizen B-266
Blair Gardner, private citizen B-267
Elain Purkey, private citizen B-269
Sharon Murphy, private citizen B-270
Maria Pitzer, private citizen B-272
John Barrett, Appalachian Center for the Economy
and the Environment B-274
Lisa Millimet, private citizen B-277
Bill McCabe, Citizens Coal Council B-278

SECTION B INDEX

Alphabetical Order

Kentucky Afternoon Session 1
Kentucky Evening Session 1
West Virginia Afternoon Session 2
West Virginia Evening Session 2

Transcript Order

Kentucky Afternoon Session 3
Kentucky Evening Session 4
West Virginia Afternoon Session 4
West Virginia Evening Session 5

Introduction

The U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Office of Surface Mining, and West Virginia Department of Environmental Protection prepared a Draft Programmatic Environmental Impact Statement (DPEIS) on mountaintop coal mining and associated valley fills in Appalachia.

The Notice of Availability of the DPEIS for public review and comment appeared in the Federal Register dated May 30, 2003 (68FR32487). The notice announced a 90-day comment period ending August 29, 2003. The period for receipt of comments was extended 130 days to January 6, 2004 and then an additional two weeks to January 21, 2004, based on several requests from stakeholders. Comment period extensions were published in the Federal Register, announced in news releases, and noted on the agencies' web pages. Requesters for comment period extension were notified by e-mail of the extension. The public review period was scheduled to provide concerned agencies and the public an opportunity to review the DPEIS and to offer comments on its adequacy.

The Federal Register notice announced that the DPEIS was available on the Internet at http://www.epa.gov/region3/mtntop/index.htm. The other agencies maintained prominent links to the EPA website. The EPA has distributed copies to known interested parties and organizations, local agency offices, and public libraries as indicated in the document at Chapter VII: Distribution List. An EPA Region 3 toll-free EIS request telephone hotline was in operation during the comment period to allow persons to request copies of the DPEIS. Approximately 140 hard copies and 600 CDs of the DPEIS were distributed to agencies and to interested members of the public.

The Corps of Engineers led a communications team for the agencies and distributed a press release on May 29, 2003 to the Associated Press and United Press International. The news release was posted on each agency's web site. A press teleconference was held with twenty national and local media contacts. Follow-up interviews were conducted with other press contacts that could not participate. Wide national coverage of the availability of the DPEIS occurred in print and broadcast media. The news release announced the release of the DPEIS, summarized the DPEIS recommendations, provided brief background information, the libraries where the DPEIS was distributed and contact persons for additional information.

The public was invited to provide written comments during the comment period and oral comments during the two public hearings. Written comments were accepted through the mail or by placing them in a 'comment box' during the public hearings. Comments were also accepted through e-mail at: mountaintop.r3@epa.gov. The first hearing was held on July 22, 2003 at The Forum at The Hal Rogers Center, 101 Bulldog Lane, Hazard, KY 41701. The second hearing was held on July 24, 2003 at the Charleston Civic Center-Little Theater, 200 Civic Center Drive, Charleston, WV 25301. Each hearing had two sessions: the first from 2:00 p.m. to 5:00 p.m. and the second on the same day from 7:00 p.m. to 11:00 p.m. Notices of the public hearings were mailed by the Corps of Engineers to persons who mailed comments to the EPA during the NEPA scoping process.

During the public review period, 712 letters were received from individuals and organizations. One letter was received from a group of members of the United States Congress. Three letters were received from Federal agencies. Nine letters were received from state or commonwealth agencies. One hundred seventy six (176) people provided oral comments at the Public Hearings. Eighty three thousand ninety five (83,095) form letters were received. This document presents the complete text of the public comment letters and e-mails in Section A and the complete public hearing transcripts in Section B. Each of the seventeen different form letters is presented once in Section A with a notation of the number received.

Each letter, e-mail, form letter, and oral statement was reviewed and evaluated. Changes or additions to the text of the DPEIS made in response to comments are incorporated into the Final EIS through an errata sheet.

To effectively and efficiently evaluate and respond to the large number of comments, each written and oral comment was grouped into a numbered category. Paragraphs within a letter, e-mail, post card or oral statement were identified by a set of numbers that correspond to the numbered category. For example, a paragraph stating a preference for Alternative 3 was given the number 1-4.

These following categories/subcategories were assigned to paragraphs (or as needed to sentences) within comment letters, e-mails, post cards or oral statements. The notation on the comment letter is the major category number and the subcategory number, plus the second subcategory number when applicable (for example 1-1, or 5-1-2). The first four major categories do not have second subcategories. The remaining categories have subcategories and second subcategories. The notation 1-1 indicates category 1 Alternatives and an additional notation of a preference for the no action alternative. The notation 5-1-2 indicates category 5 water resources and an additional notation of surface water use as a resource, adequacy of analysis. The notation 5-5-2 indicates category 5 water resources and an additional notation of water quality, adequacy of analysis.

Major Category

Subcategory

Second subcategory

1. **Alternatives**
    1. Preference for No Action Alternative
    2. Preference for Alternative 1
    3. Preference for Alternative 2
    4. Preference for Alternative 3
    5. Disagree with all alternatives presented
    6. The Agency Preferred Alternative should be modified in a specific way
    7. Preference for an alternative considered in the EIS but not evaluated in detail
    8. Suggestion of an alternative not considered or evaluated in the EIS
    9. Opposition to MTM/VF
    10. Opposition to easing environmental regulation, including opposition to changing or eliminating the Stream Buffer Zone rule
    11. Support of MTM/VF
    12. Support of no additional regulation
    13. Other

2. **Role of the General Public**
    1. Local Citizens\communities
    2. Nationwide Citizens\Communities
    3. Specific interest groups
    4. Other

3. **Public Involvement**
   1. Adequacy/Availability of Information
   2. Outreach/Agency Communication Efforts
   3. Use of Public Involvement/Comment
   4. Public Meetings
   5. Adequacy of Public Comment Period
   6. Other

4. **Adequacy of EIS (NEPA)**
   1. Adequate
   2. Inadequate

5. **Water Resources**
   1. Surface Water Use as a Resource
   2. Groundwater Use as a Resource
   3. Riparian Areas and Wetlands
   4. Water Quantity
   5. Water Quality
   6. Watershed Condition
   7. Direct Stream Loss
   8. Other

6. **Aquatic Fauna and Flora**
   1. Non-game
   2. Game
   3. Avifauna
   4. Invertebrate and Insect
   5. Aquatic Flora
   6. Other

7. **Terrestrial Fauna and Flora**
   1. Non-game
   2. Game
   3. Avifauna
   4. Invertebrate and Insect
   5. Terrestrial Flora
   6. Other

8. **T&E, Candidate, and Species of Concern**
   1. Federal Threatened, Endangered, or Candidate
   2. Species of Concern
   3. Other

9. **Cumulative Impacts**
   1. Terrestrial Ecosystem/Habitat Composition and Function / Fragmentation and Connectivity/Deforestation
   2. Environmental Quality and Ecosystem Integrity/ Biodiversity /Environmental Values
   3. Aquatic Cumulative. Aquatic Ecosystem/Habitat Composition/Integrity
   4. Social and Economic cumulative
   5. Other

10. **Social Values**
    1. Population Parameters (i.e. number and age structure)
    2. Community / Cultural
    3. Urbanization and Development
    4. Quality of Life
    5. Public Health and safety
    6. Aesthetic Values (visual, noise, etc)
    7. Environmental Justice
    8. Other

11. **Economic Values**
    1. Employment
    2. Business Viability
    3. Private Property Values
    4. Tax Base and Payment to states
    5. Non-traditional forest products economic issues
    6. Traditional forest products economic issues
    7. Tourism and recreation economic issues
    8. Coal industry economic issues
    9. Other

12. **Government Efficiency**
    1. Permitting
    2. Other

13. **Excess Spoil Disposal**
    1. Fill Minimization
    2. Fill Stability
    3. Other

14. **Stream Habitat and Aquatic Functions**
    1. Assessing
    2. Mitigating
    3. Other

15. **Air Quality**
    1. Blasting dust and fumes
    2. Other

16. **Blasting (Excluding blasting dust and fumes)**
    1. Vibration
    2. Fly rock
    3. Other

17. **Flooding**
    1. Flooding Evaluation
    2. Fear of Flooding
    3. Other

18. **Invasive Species**
    1. Used in reclamation
    2. Increased opportunity for invasives to spread
    3. Other

19. **Reclamation**
    1. Contemporaneous reclamation
    2. Reclamation with trees
    3. Other

Secondary Subcategories

Each subcategory comment was further categorized into the following secondary subcategories. Except for subcategories under Major Categories 1-4, which have no secondary subcategories.

1. Legal
2. Adequacy of analysis or statement of impact
3. Monitoring or mitigation
4. Specific edit
5. Factual material provided to include in EIS

Section A

The public was invited to provide written comments on the Mountaintop Mining/Valley Fills in Appalachia Draft Programmatic Environmental Impact Statement during the public comment period. The Federal Register Notice of Availability dated May 30, 2003 announced a 90 day comment period ending August 29, 2003. The public comment period was subsequently extended an additional 130 days to January 6, 2004, and then an additional two weeks to January 21, 2004. These letters were made available for public review on the EPA website http://www.epa.gov/region3/mtntop/index.htm.

The written comments were reviewed and evaluated. Comments were grouped into different numbered categories. The comments are presented half size with applicable numbered categories identified adjacent to the comment. Form letters are presented once with the number of signatories.

The written comments are presented in the following order:

- **Elected Officials**
- **Federal Agencies**
- **State or Commonwealth Agencies**
- **Organizations**
- **Citizens**
  - Individual Letters
  - Form Letters

An index of a author's name and the page number where the Comments are presented is included at the end of this document. An index of organizations and the page number where comment letters are presented is included at the end of this document.

Elected Officials

Congress of the United States
Washington, DC 20515

June 19, 2003

Christine Todd Whitman, Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Ave., N.W.
Washington, D.C. 20460

Les Brownlee, Acting Assistant
Secretary of the Army (Civil Works)
108 Army Pentagon
Washington, D.C. 20310-0108

Steven A. Williams, Director
U.S. Fish and Wildlife Service
Department of the Interior
1849 C Street N.W.
Washington, D.C. 20240

Jeffery Jarrett, Director
U.S. Office of Surface Mining
Department of the Interior
1849 C Street N.W.
Washington, D.C. 20240

Dear Administrator Whitman, Acting Assistant Secretary Brownlee, Director Williams and Director Jarrett:

We are writing to express our opposition to the Mountaintop Mining/Valley Fill Draft Environmental Impact Statement (EIS) released May 29, 2003 by the Environmental Protection Agency (EPA), Army Corps of Engineers (Corps), Office of Surface Mining (OSM), U.S. Fish and Wildlife Agency (FWS), and the West Virginia Department of Environmental Protection. We ask you to reconsider the suggested "preferred alternative" contained in the Draft EIS, and to evaluate and select a more appropriate measure that would limit the environmental destruction caused by mountaintop removal coal mining that was documented in the studies accompanying the Draft EIS.

The preferred alternative advocated in the Draft EIS would attempt to combine the Surface Mining Reclamation and Control Act (SMCRA) and Clean Water Act (CWA) permitting processes, in a move that the agencies advocate as a streamlining and efficiency measure. However, many of the intended benefits of the CWA regulations would be largely undermined by this new approach, which would give the OSM a greater role in CWA permitting decisions — a responsibility and authority granted by Congress to EPA, not OSM. Given the EPA's familiarity and expertise in the CWA permitting process, it seems inefficient and unnecessary to decrease their role and transfer this responsibility to the OSM.

In addition, the "preferred alternative" directs the Corps to decide whether to require a general Nationwide Permit (NWP 21) or a more stringent individual Permit (IP) for proposed mining activities on a case-by-case basis, heavily relying upon SMCRA information provided by the applicant. The CWA, however, prohibits the granting of a NWP for actions that cause more than a minimal impact to the waters of the U.S. Given the results of the Cumulative Impact Study (CIS) performed in the course of the EIS, it is clear that mountaintop removal mining and valley fill activities individually and cumulatively *do* constitute more than minimal impacts and therefore should no longer be treated as eligible for general permits. We also understand that the preferred alternative would go so far as to eliminate the interim prohibition on using NWPs for valley fills greater than 250 acres in size that has been in effect in West Virginia since 1998. This appears to completely ignore the findings that the larger valley fills are the most environmentally harmful.

Additionally, the scientific and technical studies performed in the course of the EIS clearly demonstrate that small (e.g. 35 acre) drainage basin restriction sizes were the least damaging to terrestrial, riparian and aquatic resources within the study area. The scenarios with unconstrained drainage basin impact areas produced the largest negative effect upon the study area.

These findings regarding drainage basin size restrictions led to the inclusion of alternatives in the January 2001 Preliminary Draft EIS that compared the relative benefits and costs of limiting the maximum size of valley fills. Specifically, the Preliminary Draft detailed scenarios in which valley fill size would be capped between 0 to 75 acres or 76 to 250 acres. However, the May 29, 2003 Draft EIS contains no alternatives regarding valley fill size restrictions.

The original purpose of this programmatic EIS was to develop policies and procedures to *"minimize, to the maximum extent practicable,* the adverse environmental effects to waters of the United States and to fish and wildlife resources from mountaintop mining operations, and to environmental resources that could be affected by the size and location of fill material in valley fill sites" 68 FR 5800 (emphasis added). Yet, it appears that the primary goal of the May 29, 2003 Draft EIS was streamlining the permitting process, rather than minimizing environmental impacts. The impacts of mountaintop removal mining were proven to be significant and will not go away simply by combining the federal permitting processes, nor by weakening existing federal environmental protections.

The CIS included in the EIS states that "if mining, permitting, and mitigation trends stay the same, an additional 1000 miles of *direct* impacts could occur" in the next decade. The accompanying studies demonstrate that the harm to the region's natural resources, and the human communities and wildlife species that depend on these resources, is significant, largely irreversible, and of national consequence. For example, between 1985 and 2001, nearly 6,700 valley fills were approved in the study region, which included West Virginia, Kentucky, and parts of Virginia and Tennessee. These valley fills have already buried over 700 miles of streams and degraded water quality over a total of 1200 miles of streams -- and the studies confirm that the direct burial of stream segments is permanent. This is to say nothing of the *indirect* effects of these mining and fill activities, which would certainly exacerbate the environmental harm. Due to the immense biodiversity (riparian, terrestrial, and aquatic) of the southern Appalachian region, the biological impacts of valley fills will have a "disproportionately large impact on the total aquatic genetic diversity of the nation."

The CIS further asserts that, "based on permits issued in the last ten years and an assumption of similar permits in the next ten years, mountaintop [removal] mining has the potential to adversely impact 380,547 acres of forest in the four-state study area." This is equivalent to 594 square miles — an area equivalent to about ten cities the size of the District of Columbia. While the agencies are to be commended for preparing and releasing the CIS and the dozens of other technical, scientific and economic studies conducted as part of the Draft EIS, they fail to draw the conclusion from these reports that mountaintop removal coal mining is seriously jeopardizing the future of the Appalachian region as well as rapidly destroying natural resources of national importance.

We are most concerned that, despite the well-demonstrated need to take immediate measures to limit the destruction caused by mountaintop removal mining, the final EIS neither evaluates nor proposes measures to address the significant environmental problems raised in the CIS and other reports. Rather, the EIS evaluates primarily procedural, authority-driven changes in the agencies' permitting processes and information sharing policies. Furthermore, the Draft EIS's preferred alternative even suggests weakening existing environmental standards that apply to mountaintop removal coal mining. This is exactly the opposite response warranted by the thousands of pages of studies accompanying the EIS.

Another recommendation in the EIS is to finalize changes to the SMCRA buffer zone regulation. This rule, adopted by the Reagan Administration in 1983, prohibits surface mining disturbances within 100 feet of a perennial stream or intermittent stream, unless there is a finding that the activity will meet water quality standards and not cause adverse environmental effects on stream water quality or quantity. The proposed new rule, however, would specifically allow for the dumping of excess spoil directly into these streams, with the only requirement being that the mining companies have " minimized the creation of excess spoil to the maximum extent practicable." This rule change would effectively remove the "buffer" from the buffer zone rule to create an illegal and unwarranted exception for valley fills. This hands an advantage to coal mining companies that would continue to increase, not minimize, the harmful environmental effects of mountaintop removal mining.

We urge you to reconsider the recommendations in the Draft EIS to conform to the evidence produced by your studies. Mountaintop removal mining and the dumping of excess spoils into valley fills are incredibly destructive activities that have wreaked havoc upon an entire ecosystem, and will continue to do so without the enforcement of existing laws like the buffer zone rule and the adoption of additional limits on these practices. This Draft EIS tips the scales too heavily in favor of the coal mining industry and againstthe resources and people of the region. Accordingly, your agencies should implement procedures that, at the very least, strike the required statutory balance of environmental and mining interests.

Sincerely,

FRANK PALLONE, JR.
Member of Congress

CHRISTOPHER SHAYS
Member of Congress

WAYNE GILCHREST
Member of Congress

BARNEY FRANK
Member of Congress

TAMMY BALDWIN
Member of Congress

BETTY McCOLLUM
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Member of Congress

ELIOT ENGEL
Member of Congress

NITA LOWEY
Member of Congress

Federal Agencies

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Reston, Virginia 20192

REC'D JAN 0 9 2004

Reply Refer To:
Mail Stop 423

JAN 0 6 2004

MEMORANDUM

To: U.S. Environmental Protection Agency
Philadelphia, Pennsylvania

From: James F. Devine
Senior Advisor for Science Applications

Subject: Review of Draft Programmatic Environmental Impact Statement for the Mountaintop Coal Mining and Associated Valley Fills in Appalachia.

The U.S. Geological Survey (USGS) has reviewed the subject Draft Programmatic Environmental Impact Statement (DPEIS) and offers the following comments.

GENERAL COMMENT:

The Draft Programmatic Environmental Impact Statement does not use any USGS coal quality data. The data in USGS Professional Paper 1625-C (2001) could be helpful in evaluation of the resource.

SPECIFIC COMMENTS:

Page ES-4, Executive Summary, Chapter Technical Studies, third bullet point:

The third sentence is internally inconsistent. As written, the sentence contrasts stream storm response to "low-frequency storms" with response to "larger rainfall events;" low-frequency storms are by definition large storms. A correction that would improve the meaning of this sentence would be to change the phrase "low-frequency" to "low-intensity." The USGS recommends that the sentence be replaced with the following sentence: "During slow, soaking storms, peak unit runoff from a mined watershed generally does not exceed that from an unmined watershed; however, during highly intense summer thunderstorms, peak unit runoff from a mined watershed generally equals or exceeds that from an unmined watershed." 17-1-4

2

Page II. C-28 to II. C-29, Chapter II Alternatives; Section C Detailed Analyses of the Actions to Address Issues; Subsection 2, Government Efficiency, Sub-Issue: Consistent/Compatible Definitions for Stream Characteristics and Analyses; Subsection a., No Action Alternative; Subsection a.2, SMCRA; last sentence:

The following typographical error should be corrected as it is part of a definition: "For instance, in West Virginia, the point where the stream segment changes from ephemeral to intermittent is located by a fie) contributing to a watershed tributary." 5-8-4

Page II. C-29, Chapter II Alternatives; Section C, Detailed Analyses of the Actions to Address Issues; Subsection 2, Government Efficiency, Sub-Issue: Consistent/Compatible Definitions for Stream Characteristics and Analyses; Subsection b, Alternatives 1, 2, and 3; second paragraph:

The document states in Action 2 that "Federal and state regulatory authorities will work with… stakeholders to establish science-based methods for definition and delineation of stream characteristics…." A study addressing this point has been completed by the USGS in cooperation with the Office of Surface Mining and the U.S. Environmental Protection Agency (Paybins, 2002).

Pages III. N-1 to III. N-7, Chapter III Affected Environment And Consequences of MTM/VF; Section N. Past And Current Mining In The Study Area:

The coal production figures cited in this section end with 1998 data and should be updated to reflect more current (2000) coal production statistics (USGS, 2001). 11-8-4

Page III. O-4, Figure III. O.1 - Chapter III Affected Environment And Consequences of MTM/VF; Section O, The Scope of Remaining Surface-Minable Coal in the Study Area; Extent of Potential Mountaintop-Minable Coal:

An explanation (color legend) is needed for Figure III.O.1.

Page III. C-1 to III. C-22, Chapter III Affected Environment And Consequences of MTM/VF; Section C., Appalachian Aquatic Systems:

Overall, this section focuses too narrowly upon carbon assimilation and transport. Although these headwater processes are very important, they are not the only processes occurring in headwater streams. Processing of litter inputs is more than the sequential fragmenting and reprocessing of carbon; there are changes in the availability of nutrients, uptake, sequestration and release. The USGS recommends that the section be expanded to include discussion of the additional processes. 6-6-4

In the discussion of fish in Appalachian headwater streams, mention is made of typical cold-water species inhabiting these reaches. Some of the species mentioned are not

specifically cold-water species, but pioneer species adapted to live in ephemeral environments. This should be noted in the section.

The statement that the river system in the MTM/VF study area has a unique fisheries system, which is important in the evolution and speciation of North American freshwater fishes, needs to be clarified. It is a rather important statement and merits further discussion.

The discussion of lentic environments seems rather long, considering the relative paucity of these features in the landscape of the study area. Instead of an environment affected by MTM/VF, wetlands and ponds in the study area are much more likely an environment resulting from MTM/VF and should be discussed in more detail.

The listing of the potential benefits of ponds in the study area makes no mention of the transient nature of the benefits, as the ponds are very commonly removed at the completion of reclamation. Sediment pools made available by the removal of pond dams could result in the pulse transport of large sediment loads. These sediments are of unknown composition and may contain elevated concentrations of metals and trace elements. This topic should be further discussed in the text.

Page III.C-17, Chapter III Affected Environment and Consequences of MTM/VF; Section C, Appalachian Aquatic Systems, Subsection 2. Lentic (Non-flowing) Aquatic Systems and Wetlands, Subsection e. Ecosystem Function: 6-6-4

The statement that "This lake is anticipated to be similar to natural ponds found in the study area." is inconsistent with the statement that "...there are no natural lakes and ponds in West Virginia... [and] virtually all lentic systems in the study area have been formed by impounding flowing water systems" (page III.C-13). The USGS recommends that the statements be reconciled so the document states unambiguously whether natural ponds exist in the study area.

Page III.C-20, Chapter III Affected Environment and Consequences of MTM/VF; Section C, Appalachian Aquatic Systems, Subsection 2. Lentic (Non-flowing) Aquatic Systems and Wetlands, Subsection f. Wetlands in the Study Area:

The USGS recommends that the discussion on engineered ponds and wetlands in mined areas include information about accumulation of sediment. Most of these ponds are designed to trap sediment, which they do effectively. Because the ponds fill up with sediment, the functions they perform change through time; specifically, the function of providing fish habitat is performed less effectively by ponds filled with sediment.

The statement that "Functions of man made ponds and wetlands exist and may be considerable... [and] have their own inherent values." (p. III.C-20) seems overly broad

and vague, considering that mitigation projects for stream loss have included the "...creation of palustrine or pond-type wetlands or linear, drainage ditch-type wetlands...." (p. IV.B-9). If some measurements of ecological structure and function for these mitigation wetlands have been made and are available, then specific information should be presented in section C; and if not, the absence of such measurements should be noted.

Page III. D-1, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to the Headwater Streams from Mountaintop Mining, second paragraph:

In the description of potential impact factors, the statement is made that all eight of the impact factors are related to headwater stream function. In many instances, it appears that these factors are most strongly related to physical disturbance of the drainage basin. The USGS recommends that the statement be rewritten; if the statement is kept in its present form, it should explain, for example, how changes in downstream sedimentation are related to headwater function or downstream thermal regime.

Page III. D-3, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 1. Studies Relating to Direct and Indirect Surface Water Impacts from Mountaintop Mining and Valley Fills; Subsection b.2, Studies in the MTM/VF Study Area: 6-6-4

The study cited as USGS, 2002-Draft was released in May 2003. Please delete the USGS 2002 Draft citation and use "USGS, 2003." The full citation is given in the References section.

The USGS report did not use the "E-point, P-point" abbreviations, instead referring to "ephemeral points" and "perennial points." Referring to this study as "their "E-point, P-point study" could be confusing, even to readers familiar with the report. The USGS recommends that the "E-point, P-point" terminology be changed.

Page III. D-4, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 1. Studies Relating to Direct and Indirect Surface Water Impacts from Mountaintop Mining and Valley Fills; Subsection c., Loss of Upstream Energy from Buried Stream Reaches:

The USGS recommends that a sentence such as the following be added: "Although recognized from the beginning of the DPEIS process as an important issue, loss of energy from buried stream reaches was never studied, and therefore the DPEIS cannot directly address this issue."

5

Page III. D-5, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 1. Studies Relating to Direct and Indirect Surface Water Impacts from Mountaintop Mining and Valley Fills; Subsection d., Changes in Downstream Thermal Regime:

The USGS recommends that the paragraph clarify that the site below the valley fill was at the toe of the valley fill.

Page III. D-5, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 1, Studies Relating to Direct and Indirect Surface Water Impacts from Mountaintop Mining and Valley Fills; Subsection d., Changes in Downstream Thermal Regime, first paragraph:

The second to last sentence of this paragraph states "It is difficult to predict the possible impacts of this moderated thermal regime on the downstream aquatic communities." There is a body of literature describing the effects of thermal regimes upon invertebrate communities. Many physiological processes are temperature dependent and many key life cycle events are cued by temperature. Alteration of the thermal regimes may result in a reduction of fitness at an organismal level or alter the synchronization of invertebrate life cycles with other seasonal events. A good review of the thermal ecology of aquatic invertebrates can be found in Ward and Stanford (1982). It is interesting to note that on page III.D-14, a study by Arch Coal indicated that a moderated thermal regime may result in the early emergence of certain stonefly taxa. The USGS recommends that the paragraph be rewritten to incorporate some of the conclusions of these studies. 6-6-4

Overall, there is a lack of synthesis across topical areas. Not one of these factors has an effect entirely separate from the others. In particular, chemistry and hydrology are intimately linked, especially in their effect upon downstream reaches. Increased flow during low-flow periods can help sustain populations, but if the elevated flow is also elevated in contaminants, there is a simultaneous decrease in one stressor (low-flow) and increase in another (exposure to contaminant). The USGS recommends that the document include discussion of these interactions across all the listed factors.

Page III. D-5, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 1. Studies Relating to Direct and Indirect Surface Water Impacts from Mountaintop Mining and Valley Fills; Subsection e. Changes in Downstream Flow Regime:

The USGS suggests that two reports on the Ballard Fork gages (Messinger, 2003; Messinger and Paybins, 2003), which were produced by USGS West Virginia District as part of the EIS process, be discussed in this section. Both reports contain noteworthy

6

information on total flows, stormflow characteristics, and seasonal evapotranspiration losses.

Page III. D-7, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 1. Studies Relating to Direct and Indirect Surface Water Impacts from Mountaintop Mining and Valley Fills; Subsection f, Changes in Downstream Chemistry; Subsection f.2, Summary and Conclusions, first paragraph, second sentence:

Sulfate, total dissolved solids, hardness, specific conductance, and manganese are not cations. The USGS recommends that the word "cations" be replaced with "constituents and properties" or otherwise be rewritten.

Page III. D-9, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 1. Studies Relating to Direct and Indirect Surface Water Impacts from Mountaintop Mining and Valley Fills; Subsection h, Effects to Downstream Biota, Subsection h1, Summary of Results from Upstream-Downstream Comparison-Type Studies, second paragraph:

The USGS recommends the word "metrices" be changed to "metrics." 6-6-4

Page III. D-11, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 1. Studies Relating to Direct and Indirect Surface Water Impacts from Mountaintop Mining and Valley Fills; Subsection h4., Studies of Macroinvertebrate Communities in Stream Sites Located Downstream from Mined or Mined/Valley Filled Areas in Comparison to Reference Locations, first paragraph:

The introductory paragraph refers to a single study; however, the second sentence refers to "...these studies...." The USGS recommends that the document clarify that only one study is used.

Page III. D-15, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 1. Studies Relating to Direct and Indirect Surface Water Impacts from Mountaintop Mining and Valley Fills; Subsection i., Impacts of MTM/VF on Fish Assemblages, second paragraph:

The USGS National Water Quality Assessment fish community study (USGS 2001b) should not be characterized as extensive, because fish were only collected at a dozen sites in the coalfields and 20 sites overall.

7

Page III. D-18, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 2., Studies Relating to Mitigation Efforts for MTM/VF Impacts to Aquatic Systems; Subsection d., Limiting Factors for In-Kind Mitigation Projects:

The USGS recommends that the discussions of stream creation include additional information on watershed hydrology, such as the Variable Source Area Concept (Hewlett and Hibbert, 1967), that is, that water seeps downhill through soil until it reaches a confining layer, that streams form in saturated soil areas on the land surface, and that the area of saturated soil that contributes to streamflow is variable through time. In light of the principles of watershed hydrology, stream creation is very difficult and may not be practical, at least if only natural channel design is to be applied to ditch construction.

Page III. D-19 (third paragraph) and III. D-20 (third paragraph), Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 2., Studies Relating to Mitigation Efforts for MTM/VF Impacts to Aquatic Systems; Subsection e.1., Onsite:

Are the habitat quality indicators actually scored from 0 to 1? Or is this a typographical error? Please verify. 6-6-4

For nutrient cycling, it is well known that aquatic insects play a role in all aquatic ecosystems because all living organisms cycle nutrients. A more reasonable question that should be addressed in this section is whether nutrient cycling in such nutrient-poor systems are important to areas larger than the created wetlands.

Page III. D-21, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 2., Studies Relating to Mitigation Efforts for MTM/VF Impacts to Aquatic Systems; Subsection e.1, Onsite, top of page, lines 7-9:

The statement "However, it is not known whether the organic matter processing that occurs in created wetlands would mimic the processing found in a natural stream system." does not consider much information that is known about the nature of wetlands compared to the nature of streams. Wetlands, by their nature, trap and conserve organic matter, and function as organic matter sinks; whatever organic material wetlands retain, the material tends to be dissolved, rather than undissolved. Streams, by virtue of flowing, tend to transport organic matter (and whatever else they contain) downstream. Thus, it is unlikely that organic matter processing in created wetlands would provide processing similar to that provided by small streams. The USGS recommends that the statement be modified to emphasize these differing roles of streams and wetlands.

8

A major question in the context of mitigation is not whether constructed ponds and wetlands have functions with inherent value, but whether they have functions that provide value equal to that of the streams they replace. One of the ways this can be assessed would be by quantifying their relative effects on downstream aquatic systems through a designed Before-After, Control-Impact study. The USGS recommends that the document describe how it will be determined that the functions of the created ponds and wetlands will be equal to those of the surface water features they replace.

Page III. D-21, Chapter III Affected Environment and Consequences of MTM/VF; Section D, Impact Producing Factors to The Headwater Streams from Mountaintop Mining; Subsection 2., Studies Relating to Mitigation Efforts for MTM/VF Impacts to Aquatic Systems; Subsection e.2., Offsite, second paragraph, sixth sentence: 6-6-4

The USGS recommends that the document explain what a high water mark is and how it is determined.

Page III. E-3, Chapter III Affected Environment and Consequences of MTM/VF; Section E, Coal Mine Drainage from Surface Mining; Subsection 2, Coal Mine Drainage, second paragraph:

For clarity, USGS recommends that the term circumneutral be replaced with a more conventional way of saying that values were close to pH of 7.

Page III. E-3, Chapter III Affected Environment and Consequences of MTM/VF; Section E, Coal Mine Drainage from Surface Mining; Subsection 2, Coal Mine Drainage, Subsection a., Indicator Parameters:

The USGS recommends that the discussion of alkalinity in mine drainage place greater emphasis on the importance of reclamation and mine-drainage treatment as a significant source of increased alkalinity. Water-quality amendments used to elevate pH and precipitate Fe and Mn in mine drainage before discharging to receiving waters also increase both alkalinity and specific conductance; this should be stated in the discussion. 5-5-4

Page III. E-6 Chapter III Affected Environment and Consequences of MTM/VF; Section E, Coal Mine Drainage from Surface Mining; Subsection 2., Coal Mine Drainage, Subsection 2b., Effects of Coal Mine Drainage:

This section states that coal-mine drainage contains metals and trace elements that precipitate to the sediments of receiving streams, which consequently elevates their corresponding concentrations in the sediments. The USGS recommends that the section also stress the role of flocculants and precipitates in cementing substrates and contributing to streambed armoring.

9

Page III. H-2, Chapter III Affected Environment and Consequences of MTM/VF; Section H, Relationship of Mountaintop Mining to Groundwater Quality and Quantity, Subsection 2., Pre-mining Appalachian Groundwater Flow System; first paragraph:

Variation in permeability in consolidated bedrock is more strongly related to occurrence and density of fractures or secondary permeability as opposed to lithology differences. Consolidation of the overburden does not relate to hydranlic conductivity at depth. Hydraulic conductivity decreases with depth due to increasing confining pressures limiting fracture apertures. The USGS recommends the paragraph, and in particular the third-to-last sentence, be corrected to more clearly emphasize the importance of fractures in determining permeability.

Page III. H-3, Chapter III Affected Environment and Consequences of MTM/VF; Section H, Relationship of Mountaintop Mining to Groundwater Quality and Quantity, Subsection 3., Impacts to Groundwater Quantity from MTM/VF, Subsection a., Conceptual Model of MTM / VF, second paragraph, last sentence:

MTM does not simply eliminate the pre-mining perched aquifer. It creates an aquifer of fill at the active mine site, effectively creating a man-made perched aquifer system resting atop the valley bedrock. Additional complexity is added when fracturing of bedrock adjacent to the mine is considered. The USGS recommends the paragraph be corrected to reflect the creation of the fill aquifer at the mine site. 5-4-4

Page III. H-3, Chapter III Affected Environment and Consequences of MTM/VF; Section H, Relationship of Mountaintop Mining to Groundwater Quality and Quantity, Subsection 3., Impacts to Groundwater Quantity from MTM/VF, Subsection a., Conceptual Model of MTM / VF, third paragraph:

Valley fills do not join two aquifer systems, rather it is the creation of a new aquifer consisting of unconsolidated fill atop fractured bedrock. Flow to the premining fractured bedrock system is greatly disrupted. The USGS recommends that the paragraph emphasize that flow in the fractured bedrock after fill placement is not the same as during premining conditions.

The USGS recommends that the paragraph also mention that groundwater flow velocities in the fill are highly variable and localized and in some cases channelized; residence times of water in the fill materials also vary spatially.

10

Page III. H-3, Chapter III Affected Environment and Consequences of MTM/VF; Section H, Relationship of Mountaintop Mining to Mining to Groundwater Quality and Quantity, Subsection 3., Impacts to Groundwater Quantity from MTM/VF, Subsection b., MTM/VF Impacts to the Physical Ground Water System, first paragraph:

Hydraulic gradients are not derived from hydraulic conductivity or storativity. Rather, they are derived from head relationships established by aquifer boundary conditions. The USGS recommends the definition of hydraulic gradient in the fourth sentence of this paragraph be corrected.

Page III. H-4, Chapter III Affected Environment and Consequences of MTM/VF; Section H, Relationship of Mountaintop Mining to Mining to Groundwater Quality and Quantity, Subsection 3., Impacts to Groundwater Quantity from MTM/VF, Subsection b. MTM/VF Impacts to the Physical Ground Water System, first and second full paragraphs:

Runoff decreases in the VF site have to be weighed against the increased runoff from the active mining site. Without vegetative or soil cover, little water will infiltrate the area. The USGS recommends that the document state that total runoff from the site may be decreased, but runoff from the entire system inclusive of diversions is greater. 5-4-4

Discharge volumes cannot be applied aerially to calculate infiltration rates. The highly channelized nature of the fill and varying fill materials does not lead to spatially even distribution of infiltration. Calculating percentage of outflow attributed to precipitation assumes no interaction with fractured bedrock and accounts for no diversion of runoff. The USGS recommends that this misleading calculation be qualified or deleted.

Page III. H-5, Chapter III Affected Environment and Consequences of MTM/VF; Section H, Relationship of Mountaintop Mining to Groundwater Quality and Quantity, Subsection 3., Impacts to Groundwater Quantity from MTM/VF, Subsection b. MTM/VF Impacts to the Physical Ground Water System, first full paragraph:

Storage volumes are better represented using a range of effective porosities to account for the various lithologies. Increases in storage does not increase flow velocities. Higher velocities do not decrease hydraulic head, rather hydraulic gradients. The USGS recommends that the section be revised to reflect the above comments.

Page III. H-5, Chapter III Affected Environment and Consequences of MTM/VF; Section H, Relationship of Mountaintop Mining to Groundwater Quality and Quantity; Subsection 3., Impacts to Groundwater Quantity from MTM/VF, Subsection c., Impacts to Valley-Bottom Groundwater Recharge from MTM/VF, first paragraph:

No justification is provided for the assertion in the second sentence of this paragraph that MTM/VF impacts on valley bedrock aquifers would be limited. The justification requires proof that VF aquifers do not interact with the underlying fractured bedrock. The USGS recommends that citations justifying the conceptual models be provided, or the paragraph be rewritten to emphasize the uncertainty of the models and the possibility for interaction between the VF aquifers and the underlying bedrock. 5-4-4

Page III. H-7, Chapter III Affected Environment and Consequences of MTM/VF; Section H, Relationship of Mountaintop Mining to Groundwater Quality and Quantity, Subsection 4, Impacts to Groundwater Chemistry from MTM/VF; Subsection a., Geochemical Reactions, first full sentence: 5-5-4

The USGS recommends the sentence be reworded to emphasize that mineral concentrations in outflowing waters from fills may decrease over time but may remain at unacceptable levels.

Page III. K-38 through III. K-46, Chapter III Affected Environment and Consequences of MTM/VF; Section K., Excess Spoil Disposal, Subsection 4., Trends in Watershed Size:

Most of the comparative discussions on the data provided in this entire section are brief and cursory. The reader is left to discern differences in trends and interpretations that could give more meaning to the data. The significance of the information in the tables and figures should be provided in text. What does the information mean, and why is it important? 13-3-4

The document states that trend analysis is very useful for evaluating and predicting impacts on the environment; however, no information is provided on how the trend analysis is useful or what the impacts are specifically. The USGS recommends that this additional information be provided in this section.

Page III. K-47, Chapter III Affected Environment and Consequences of MTM/VF; Section K., Excess Spoil Disposal, Subsection 5., Trends on Stream Impact Under Fill Footprints: 5-7-4

1. The analyses in subsection 5 seem to be based on the use of data that differs from data based on impacted watershed areas upstream of a fill toe to assess the total length of direct stream. Perhaps, this should be stated explicitly in the text.

2. The reason for the choice of 30-acre watersheds used in the delineation of the synthetic stream network is not explicitly stated within section III-K, other than that the synthetic network is less subjective than the topographic map stream delineation. A discussion somewhere in this section about the accuracy of the underlying data seems necessary, given that the National Elevation Dataset data includes digital elevation models of multiple resolution and vintage.
3. The term "stream loss" was used to describe the synthetic streams that are buried by fills, but no mention is made as to whether the streams were assumed to be intermittent or perennial. This information should be provided in text.
4. No comment in this brief section alludes to trends as compared to watershed area impacted by fills; for example, although WV had only 1.73 miles of synthetic streams buried in 2001 (table III. K-8), the average watershed area impacted by a valley fill was 3 times greater (97.28 acres) than that for the 30-acre watershed. Does this suggest that 30-acre watersheds may be too dense a network? Are watershed areas under a fill actually intermittent or ephemeral? Should medians for watershed area be used in trend analysis, so as to improve information about central tendency of data? 5-7-4
5. It is not clear if the valley fill footprint data used in this analysis is the total number of fills approved or the number of fills constructed. This would seem a crucial point, as up to half of the permitted fills may not be constructed, according to information provided in section III. K-2.

Page IV. B-3, Chapter IV Environmental Consequences of the Alternatives Analyzed, Section B, Aquatic Resources, Subsection 1., Consequences Common to No Action Alternative and Alternatives 1, 2, and 3; Subsection a., Direct Stream Loss from MTM/VF, second paragraph:

The contribution of fine and coarse organic matter represents one of the most important effects of large surface mines, and should be measured or estimated, if possible. Although widely-accepted, standardized testing procedures for quantities of fine and coarse organic matter in streams may not exist in a regulatory context, regulatory methods didn't exist for some of the other impacts studied in the DPEIS process. Several classic studies (Fisher and Likens, 1973, for instance) would serve as excellent models for a defensible study for measuring this contribution of headwater streams in the study area. 6-6-4

Page IV. B-3, Chapter IV Environmental Consequences of the Alternatives Analyzed, Section B, Aquatic Resources, Subsection 1., Consequences Common to No Action Alternative and Alternatives 1, 2, and 3; Subsection a., Direct Stream Loss from MTM/VF, fifth paragraph: 6-6-4

The statement "It is also not evident to what degree reclamation and mitigation (e.g. drainage control and revegetation) offset this organic nutrient reduction." requires further explanation; is there some component of drainage control that is thought to directly offset

this loss? If so, it was not adequately discussed in this section of the DPEIS. Similarly, the statement "Existing CWA programs indirectly address these effects...." does not appear to be well supported because the programs mentioned address different effects that may or may not have ecological importance equal to that of organic-matter processing. Whether the ecological importance is equal can only be determined if organic-matter processing is measured in the study area. The USGS suggests that additional information, if available, be provided to bolster support for the noted statements. If information is not available, then this lack of information should be explicitly stated in text.

Page IV. B-5, Chapter IV Environmental Consequences of the Alternatives Analyzed, Section B. Aquatic Resources, Subsection 1, Consequences Common to No Action Alternative and Alternatives 1, 2, and 3, Subsection b., Indirect Stream Impacts, first full sentence at top of page: 6-6-4

The first full sentence may not accurately describe the intended meaning of the passage. Zinc, sodium, and sulfate concentrations would be expected to be positively correlated with fish and invertebrate impairments instead of negatively correlated. The USGS suggests that the intended meaning of the passage be verified.

Page IV. D-5, Chapter IV Environmental Consequences of the Alternatives Analyzed, Section D, Fish and Wildlife, Subsection 1, Consequences Common to No Action Alternative and Alternatives 1, 2, and 3, Subsection d., Fish Populations: 6-1-4

This section is brief and not very informative regarding mining impacts on fish populations. The USGS suggests that additional information (topic material or concepts) be provided in the section. Coverage of the topic should be similar to that provided in section b. (page IV. D-2).

Appendix C Regional Setting Supporting Information:

Page C-45, Table C-17 General Groundwater Composition of Virginia Coalfields (Hufschmidt, 1981): 5-5-4

Table C-17 is incorrect. The table with the correct groundwater composition of Virginia information (from Hufschmidt, 1981) needs to be included here.

Page C-51, Table C-19 Comparative Groundwater Quality Data for Southwestern West Virginia (Ehlke, 1982):

Table C-19 is not cited in text discussion.

Thank you for the opportunity to review and comment on this DEIS.

REFERENCES:

Black, P.E., 1991, Watershed hydrology: Prentice Hall, Englewood Cliffs, N.J., 408 pp.

Ehlke, 1982, Hydrology of Area 9, Eastern Coal Province, West Virginia: U.S. Geological Survey Open-File Report 81-803.

Fisher, S. G. and Likens, G. E., 1973. Energy flow in Bear Brook, New Hampshire: an integrative approach to stream ecosystem metabolism: Ecol. Monogr. 43(2):421-439.

Hewlett, J.D., and Hibbert, A.R., 1967, Factors affecting the response of small watersheds to precipitation in humid areas, pp. 275-290 in Sopper, W.E., and Lull, H.W., eds., Forest hydrology: Pergamon, New York.

Hufschmidt, 1981, Hydrology of Area 16, Eastern Coal Province, Virginia and Tenessee: U.S. Geological Survey Open-File Report 81-204, p. 68.

Messinger, Terence, 2003, Comparison of storm response of streams in small, unmined and valley-filled watersheds, 1999-2001, Ballard Fork, West Virginia: U.S. Geological Survey Water-Resources Investigations Report 02-4303, 22 p.

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Paybins, 2002, Flow origin, drainage area, and hydrologic characteristics for headwater streams in the mountaintop coal-mining region of southern West Virginia, 2000-01, USGS Water-Resources Investigations Report 02-4300.

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Ward, J.V., and J. A Stanford, 1982, Thermal responses in the evolutionary ecology of aquatic insects: Annual Reviews in Entomology, v. 27 p 97-117.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
and Prevention (CDC)
Atlanta GA 30333

September 2, 2003

Mr. John Forren, US EPA (3EA30)
2650 Arch Street
Philadelphia, Pennsylvania 19103

REC'D SEP 0 8 2003

Dear Mr. Forren:

We have reviewed the Mountaintop Mining/Valley Fills in Appalachia Draft Programatic Environmental Impact prepared by the U.S. Corps of Engineers, U.S. Environmental Protection Agency, U.S. fish and Wildlife Service, and the West Virginia Department of Environmental Protection. We are responding on behalf of the Department of Health and Human Services (DHHS), U.S. Public Health Service.

We believe the DEIS has identified the appropriate potential human health impacts that may result from these mining operations. If the mitigation measures described in this document are followed and enforced, there should be minimal impacts to human health. 10-5-3

Thank you for the opportunity to review and comment on this document. Please send us a copy of the Final EIS when it becomes available

Sincerely yours,

Paul Joe

Paul Joe, DO, MPH
Medical Officer
National Center for Environmental Health (F16)
Centers for Disease Control & Prevention

USGS
science for a changing world

Water Resources Division
Western Region
345 Middlefield Road, MS 435
Menlo Park, CA 94025

December 29, 2003

TO: John Forren, U.S. Environmental Protection Agency, Region 3, Philadelphia, Pennsylvania
FROM: Theresa Presser
U.S. Geological Survey, Water Resources Division, National Research Program, Menlo Park, California
SUBJECT: Technical Comments on the Draft Programmatic Environmental Impact Statement (DPEIS) on Mountaintop Coal Mining and Associated Valley Fills in Appalachia concerning Selenium Sources, Monitoring, and Prediction of Ecosystem Effects

SUMMARY

The Draft Programmatic Environmental Impact Statement (DPEIS) on Mountaintop Coal Mining and Associated Valley Fills (MTM/VF) in Appalachia is critically deficient because 1) supporting documentation failed to adequately quantify and analyze the effects of selenium on aquatic life; and 2) proposed alternatives failed to address the protection of aquatic life from potential adverse effects of selenium. Although extreme Se contamination causes death in adult organisms, the responses of greatest concern are impairment of reproductive success (e.g. failure of eggs to hatch) and teratogenesis (deformities in juveniles) in birds and fish. Streamlining the permitting process and monitoring the decline in water quality and ecological health in affected watersheds do nothing to reduce selenium concentrations or limit impacts. Proposed control measures to neutralize coal mine drainage (CMD) with alkaline addition may exacerbate the mobility of selenium and hence it's loading to the environment. All alternatives require mitigation of unavoidable impacts to waters of the United States. Proposed mitigation measures in the DPEIS, specifically sedimentation ponds and associated wetlands, likely would allow elevated selenium risk environments for birds and fish because of increased opportunities for Se biomagnification in food webs. 5-5-2

The DPEIS has left out 1) fundamental data on selenium concentrations in sediment, invertebrates, fish tissue, and bird eggs; and 2) information on dietary pathways and vulnerable predator species. These data are necessary to assess potential impacts from bioaccumulation of selenium in the areas of mountaintop mining and valley fills. However, based solely on selenium concentrations in streams and sedimentation ponds receiving discharges from valley fills, adverse ecological effects from selenium are likely to occur in the DPEIS study area. The median selenium concentration in streams at *filled* sites was approximately two-fold above the toxicity threshold for protection of aquatic life (5 µg Se/L) and concentrations at individual sites were as much as ten-fold above (Appendix D, Stream Chemistry Final Report, 4/8/02). Sediment control ponds at the base of *fills* contained some of the highest selenium concentrations (up to 42 µg Se/L).

GENERAL COMMENTS

Several components of documented field case studies may be applicable to selenium mobilization in Appalachia. In contrast to many other contaminants, sources of selenium and significant environmental damage due to selenium have been well documented (Lemly, 1985; Presser, et al., 1994; Lemly, 1997; Hamilton, 1998; Skorupa, 1998; Presser and Piper, 1998; Lemly, 2002; Seiler et 5-5-5

USGS
science for a changing world

Water Resources Division
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December 29, 2003

TO: John Forren, U.S. Environmental Protection Agency, Region 3, Philadelphia, Pennsylvania

FROM: Theresa Presser
U.S. Geological Survey, Water Resources Division, National Research Program, Menlo Park, California

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The DPEIS has left out 1) fundamental data on selenium concentrations in sediment, invertebrates, fish tissue, and bird eggs; and 2) information on dietary pathways and vulnerable predator species. These data are necessary to assess potential impacts from bioaccumulation of selenium in the areas of mountaintop mining and valley fills. However, based solely on selenium concentrations in streams and sedimentation ponds receiving discharges from valley fills, adverse ecological effects from selenium are likely to occur in the DPEIS study area. The median selenium concentration in streams at *filled* sites was approximately two-fold above the toxicity threshold for protection of aquatic life (5 µg Se/L) and concentrations at individual sites were as much as ten-fold above (Appendix D, Stream Chemistry Final Report, 4/8/02). Sediment control ponds at the base of *fills* contained some of the highest selenium concentrations (up to 42 µg Se/L).

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5-5-5

DPEIS leaves in doubt whether mining and mitigation can proceed while controlling environmental selenium concentrations within protective ranges.

The DPEIS cumulative effects analysis also may need to consider the combined effect of other environmental stressors imposed by a general decrease in water quality and ecological health in watersheds impacted by mining when evaluating selenium risk (DPEIS Appendix I). Environmental selenium data and ecological risk thresholds may be applicable as part of the proposed action to build a database (Action 12, DPEIS II C-69) to determine if a scientific basis for a cumulative-impact-threshold can be identified in the future.

A recommended selenium monitoring program would include a mass balance or budget through affected watersheds (i.e., inputs; fluxes and storage within environmental media; and outputs); food web analysis; life cycle analysis of vulnerable predators; and identification of elevated risk areas and seasons (Presser and Piper, 1998; Luoma and Presser, 2000). Studies of the documented, (DPEIS IIIC-17) well-developed, and predictable food web of pond systems and impoundments may be particularly important. Those species feeding on benthic and emergent aquatic invertebrates such as salamanders, Acadian Flycatcher, and Louisiana Waterthrush may warrant specific monitoring. Cattail wetlands suggested as mitigation to increase productivity, water quality, and biodiversity may require increased control measures and monitoring (DPEIS I-14).

Results of a comprehensive monitoring approach could be used to forecast ecological effects of selenium under an array of scenarios that could result from different resolutions of waste management issues. Effects-analysis to calculate risk would take into account not only reproduction, but also reduced growth and immuno-suppression. Source rock and waste analysis may show that some mining areas contain less selenium and that some mitigation measures have less risk in terms of mobility of selenium in food webs. Climatic and hydrologic effects and the progression of acid mine drainage may be attenuating variables.

Given below are specific technical comments and further recommendations for monitoring that may help provide a basis for understanding the biotransfer of selenium in the ecologically rich and diverse watersheds of Appalachia. Attachment 1 is a summary of background information for the DPEIS.

SPECFIC COMMENTS AND DOCUMENTATION

Water Quality, Valley Fills, and Sedimentation Ponds

The DPEIS documents that *selenium concentrations from the filled category sites were found to exceed AWQC for selenium at most (13 of 15) sites in this category*; and *the existence of selenium concentrations in excess of AWQC at most filled sites indicates a potential for impacts to the aquatic environment and possibly to higher order organisms that feed on aquatic organisms* (DPEIS Page III D-6, 7, and 10). Data mainly are given in Appendix D: 5-5-4

Appendix D, Stream Chemistry Final Report, 4/8/02
AWQC (Water Quality Criterion), 5 µg Se/L
Five watersheds in the Primary Region of Mountaintop/Valley Fill Coal Mining
Sampling period, August 2000 through February 2001
Filled category (15 sites), 66 violations at 13 sites
Range 1.5 to 49 µg Se/L
Median at un-mined sites, 1.5 µg Se/L
Median at filled sites, 11.7 µg Se/L
Appendix D, Fisheries Study, 10/02

Water chemistry analysis detected selenium in five of the eight sites in the Mud River watershed associated with valley fills (page 18).
Range 9.5 to 31.5 µg Se/L

The DPEIS (page 1-9) documents for the study areas that:

1) During 1985 to 1998 a) an average of 365 *fills*/year were constructed; and b) 5,168 acres of *fill* in 15,733 acres of watershed were approved.
2) During 1999 to 2001 a) an average of 217 *fills*/year were constructed; and b) 3,016 acres of *fill* in 26,570 acres of watershed were approved.

No other category of streams (i.e., streams in *un-mined areas* or streams in *mined areas without valley fills*) had violations of the selenium limit. 5-5-4

Sedimentation ponds for drainage from fills also were sampled as part of the *Stream Chemistry Final Report* (Figure Se-1, 24 to 42 µg Se/L), but were not illustrated as a separate category. Drainage from all valley fill areas is required to past through a sedimentation pond, and additional ponds may be on a mine site where needed to control sediment and runoff from other disturbances (DPEIS III J-7). If treatment is necessary, the sedimentation ponds are normally used as treatment basins and may be constructed in a series. Mitigation wetlands also may be constructed at the toe of *filled* areas.

Ecological Effects of Selenium

Little information and data also are given to help assess or predict selenium's current exposure and effects in the DPEIS study area or as a result of future mining activities. For example, selenium concentrations in *fill* material, sediment, invertebrates, fish tissue, bird eggs, or plants are not available.

Bioaccumulation and uptake via food is the most important route of transfer to upper trophic level species. Upper trophic level predators are more at risk than their prey, making it difficult to use traditional methods to predict risk from environmental concentrations alone. Skorupa (1998) described field case studies showing different degrees of selenium effects in a variety of wetlands and reservoirs with identified sources of selenium. An especially well documented case study exists for Belews Lake, North Carolina where selenium contamination resulted in local extinctions of most fish populations in a cooling water reservoir used to dispose of coal fly-ash (Lemly, 1985; 1997). The most well known case of selenium poisoning in a field environment is at Kesterson National Wildlife Refuge in the San Joaquin Valley, California (Presser and Ohlendorf, 1987). There, teratogenesis was widespread in populations of water birds and reproductive failure occurred in populations of fish because of agricultural drainage practices. A more recent case of acute selenium poisoning of livestock in Idaho has resulted in the death of more than 300 sheep who fed on forage grown on reclaimed waste dumps (Piper et al., 2000). Comprehensive reviews of the effects of Se in birds and fish are given in Skorupa and Ohlendorf, 1991; Heinz, 1996; USDOI, 1998; Skorupa, 1998; Lemly, 2002; Hamilton and Hoffman, 2003; Ohlendorf, 2003. 9-2-5

As noted previously, based on established guidelines and the current understanding of selenium biogeochemistry, ecological effects from selenium in areas of valley fills are likely to occur. Sedimentation ponds may be of greatest concern. Selenium-contaminated impoundments appear to present greater risks to wildlife than selenium contaminated streams and rivers (Skorupa, 1998). Protective guidelines also are calculated that establish concern for the environment at 2 µg Se/L for freshwater (USFWS and NMFS, 2000). A 2-µg Se/L criterion is in place at evaporation ponds and wetland channel in the San Joaquin Valley, California. Additionally, USEPA is redefining selenium criteria for the protection of wildlife and aquatic life to take into account exposure from food webs (USEPA, 1998).

Human Health Advisories for Selenium

A national drinking water standard of 50 µg Se/L also has been developed based on concentration of selenium. Guidelines for public health warnings based on selenium in the diet have been developed in areas of the western United States (USDOI, 1998). Advisories were issued in California when selenium concentrations in fish muscle reached or exceeded 2 µg Se/g, wet weight (6-12 µg Se/g dry weight, assuming 65-85% moisture). Consumption was not to exceed 112 grams of flesh per one- or two-week period or 20 grams of fish or bird muscle per day in addition to the regular daily intake. Children (less than age 15) and pregnant women were advised not to consume any fish or game from the posted areas. When edible tissues exceeded 5 µg Se/g on a wet weight basis, a complete ban on human consumption of fish was recommended. In the San Joaquin Valley of California, the postings are provided in several languages because a subsistence lifestyle provides the greatest risk. 10-5-5

Vegetation as Diet

In general, substantive risk to aquatic life occurs at selenium concentrations in diet > 7 µg Se/g, dry weight (USDOI, 1998; Presser et al., 2004). Marginal risk to aquatic life from diet occurs at 3 µg Se/g. Various federal and state agencies recommend less than 5 µg Se/g in terrestrial forage as an action level of regional grazing level (U.S. Forest Service and the Idaho State Veterinarian Office). The chronic toxicity range for horses and sheep starts at 5 µg Se/g in forage (Puls, 1988). 6-1-5

Sources of Selenium

Coal is a recognized source of selenium both through selenium enriched particulates from the burning of fossil fuel and fly-ash disposal in aquatic environments (Lemly, 1985; 1997; 2002). Available data on a whole-coal basis for trace elements in coal samples from West Virginia show an average selenium concentration of 4.2 µg Se/g, with a range of 2.8 to 21.3 µg Se/g (DPEIS Appendix D, *Stream Chemistry Final Report, 4/8/02;* West Virginia Geological and Economic Survey, www.wvgs.wvnet.edu). The *Stream Chemistry Report* also states that *disturbing coal and soils during mining could be expected to result in violations of the stream limit for selenium* (page 74).

This range of selenium concentrations in West Virginia coals is comparable to that in source rocks of the Coast Ranges of California, but is lower than the range occurring in phosphorites of southeast Idaho. Processing activities in these problem areas call attention to anthropogenic connections to the environment (irrigation drainage, oil refining effluents, waste shale production), in addition to surface processes (weathering, erosion, and runoff) and hydrologic factors (aridity, drainage progression), that can ultimately mediate contamination.

Shales associated with coals that are displaced at the time of mining and consequently concentrated at *fill* sites may be a source of selenium to areas downstream of valley fill construction. In general, selenium sources to the environment are linked to organic-enriched sedimentary rocks—black shales, petroleum source rocks, phosphorites (Presser et al., 2004). Their global distribution is dependent on the fundamental role of essential elements such as selenium in determining primary productivity in ancient depositional environments. Coals are included as a subset of petroleum source rocks (Klemme and Ulmishek, 1991). As illustrated by the case of phosphorites in Idaho, waste shale in comparison to ore, is more enriched in selenium (80 µg Se/g v. 50 µg Se/g) (Presser et al., 2004). 5-5-5

Examples from the San Joaquin Valley, California and waste-rock sites at phosphate mines, Idaho highlight a present-day mechanism of selenium mobility in the environment that involves exposure of organic carbon-rich rock to the oxic conditions of the atmosphere and surface and ground water. Selenium is oxidized from relatively insoluble selenide (Se^{2-}) and elemental Se^0 to soluble oxyanions, selenite (SeO_3^{2-}) and selenate (SeO_4^{2-}) under alkaline conditions (Presser, 1994; Piper et al., 2000). Organic selenium (operationally defined as organic selenide) also can exist in the dissolved phase.

Oxidizing, Alkaline Environments

Acid mine drainage is traditionally of concern in mining areas, as it is in the DPEIS study area. However, methods of controlling coal mine drainage (CMD) with alkaline addition (page III E-9) may exacerbate the mobility of selenium and hence its loading to the environment. Selenium contamination problems have been associated with oxidizing, alkaline environments since the 1940's when studies focused on the potential toxicity of seleniferous open-range plants in arid and semi-arid western states (National Research Council, 1989; Presser et al., 1994). As a result, grazing was terminated on large areas of western rangeland. In the 1980s, the sources and mechanism of contamination in the San Joaquin Valley, California served as a prototype to develop criteria for selecting study sites for the National Irrigation Water Quality Program (Presser et al., 1994; Seiler et al., 2003). Among the six criteria contributing to selenium contamination was an oxidized, alkaline environment that promotes the formation of selenate, the mobile form of selenium. 5-5-2

MONITORING RECOMMENDATIONS

1) Expand Current Selenium Monitoring

2) Forecast Selenium Effects Under an Array of Management Scenarios

Determination of a Se mass balance or budget for the DPEIS watersheds and Se cycling through the components of the watershed's ecosystems are crucial because of Se bioaccumulation. A comprehensive linked approach would include all considerations that cause systems to respond differently to Se contamination. Comparison to multi-media guidelines could be made to assess exposure and risk. Results of a comprehensive monitoring approach then could be used to forecast ecological effects of selenium under an array of scenarios that could result from different resolutions of waste management issues.

The critical media to be monitored are water, particulate material, and prey and predator tissue. Because selenium is a reproductive toxin, selenium concentrations in fish and bird eggs also provide assessments for risk management that incorporate and concentrate many confounding site variabilities. Knowledge of potentially optimal indicators (e.g., benthic invertebrates) in pond systems would be necessary to fully explore feeding relations and document predator exposure. Variables to be addressed in a linked food web approach to include: 1) hydrologic units; 2) vulnerable predators; 3) elevated risk periods; 4) suspended particulate material patterns; 5) contaminant concentrations and speciation in sources that most influence bioavailability; 6) seasonality of invertebrate food webs; 7) food assimilation capacities and reactivities; 8) life cycles of predator species that inhabit each hydrologic unit; and 9) nesting habitats. 5-5-39

3) Ensure Selenium Methodology with a 0.4 µg Se/L Detection Limit

The detection limit for the methodology used in the DPEIS stream study was noted as 3 µg Se/L (Appendix D, Stream Chemistry Final Report, 4/8/02, Table 2), but was further noted that the *estimated detection limit for Se in water using Method 200.8, Inductively Coupled Plasma-Mass Spectrometer, was around 5 µg Se/L (USEPA Methods Manual, 1983).* This methodology and detection limit (3-5 µg Se/L) may not be sufficient in view of a USEPA criterion of 5 µg Se/L and ecological effects being of concern at levels of 2 µg Se/L. Guidance provided by USEPA requires a detection limit of 0.6 µg Se/L) (*Interim Chemical/Biological Monitoring Protocol for Coal Mining Permit Application*, 11/19/00).

4) Continue Study of Selenium in Streams

Quality controls issues were resolved concerning analysis of selenium in streams. However, results from *Lab 1* were discarded mainly because of elevated levels in *Blanks*. Duplicating this study with improved methodology and detection limit for selenium may prove informative. 5-5-3

Thank you for the opportunity to provide technical comments on several aspects of selenium chemistry and exposure in the environment as they relate to the DPEIS. If you have questions or need copies of referenced documents, please do not hesitate to call (650-329-4512, tpresser@usgs.gov).

Attachments: (1)

cc: Marc A. Sylvester, USGS, WRD, Menlo Park, CA
Keith G. Kirk, USGS, WRD, Menlo Park, CA

12/29/03 Transmitted via 1) email to forren.john@epa.gov and 2) FedEx to John Forren, U.S. Environmental Protection Agency (3EA30), 1650 Arch Street, Philadelphia, PA 19103

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ATTACHMENT 1, Summary of Background Information

Location and Coal Production

The study area of the DEIS is located within the Appalachian Coalfield Region of the Appalachian Plateau physiographic province and Bituminous Coal Basin (DEIS I-5). The study area encompasses approximately 12 million acres and extends over portions of West Virginia, Kentucky, Virginia, and Tennessee. Surface coal mining production (million short tons) in the study area for 1998 was: southern West Virginia's 48.6; eastern Kentucky's 49.6; Virginia, 8.5; and Tennessee, 1.6 (DEIS III N-3 & 4). Ninety-five percent of the surface mining in southern West Virginia would be classified as MTM/VF mining as covered under this DEIS (DEIS III N-1). Estimated remaining years of surface production in West Virginia is 49 and in Kentucky is 108.

Mountaintop Removal and Valley Fills

For large scale mountaintop mining to occur and excess spoils to be generated two factors must be coincident: 1) steep terrain and 2) sufficient coal reserves located close to the tops of mountains and ridges (DEIS III A-1). Removal of rock above and between coal seams results in waste material (spoils) being placed in disposal sites adjacent to mining. Typical locations for excess spoil disposal sites are valleys, known as heads-of-hollows or headwater stream reaches (DEIS I-1). The study area covers the region where valley fills have been constructed or will be constructed in the future as a result of coal mining activities.

Ecosystems

Hydrologic conditions and geologic processes in the DEIS study area are such that most of the major rivers and tributaries east of the Mississippi River originate in the mountains of the Appalachian regions (DEIS III A-1&2). Some headwater streams are intermittent or ephemeral. Impounded water and wetlands also provide aquatic habitat in the DEIS study area (DEIS III D-1).

Ecoregions in the study area are unique because they combine characteristically northern species with their southern counterparts, and thus boast enormous richness and diversity (DEIS, III A-1). Headwater stream populations have the greatest potential for natural selection processes that may result in development of new species/subspecies.

The southern Appalachians have one of the richest salamander fauna in the world (IIIC-21). Many species of birds, such as the Cerulean Warbler, Louisiana Waterthrush, and Acadia Flycatcher, depend on large areas of relatively unbroken forest (93% forest cover, DEIS II C-62) and headwater stream habitats (IIIC-22). The DEIS study area is unique and important in the evolution and speciation of North American freshwater fishes (IV D-5). Fifty-six species of fish are present in the DEIS watersheds, with small headwater streams harboring populations with unique genetic diversity.

Impacts

A decline in water quality is predicted in areas of surface mining because of the exposure of coal and overburden materials and increasing rates of oxidation of sulfur-bearing minerals such as pyrite (DEIS III D-6 & E-1). From historic data, streams classified as *filled* had lower numbers of total species and benthic species than un-mined streams. *Actions 5* and *6* (DEIS II C-43) address evaluating effects of mining operations on chemistry and biology and refining science-based protocols for assessing ecological function, making permit decisions, and establishing mitigation requirements.

Cumulative Impacts

Landscape-scale cumulative impact studies indicate that watersheds subjected to mining drop in rank, signaling a decrease in ecological health (DEIS Appendix I). However, several alternatives restricting cumulative impacts to waters of the United States (e.g., prohibiting fills in one out of every two first order streams) were dismissed because limiting the loss of headwater streams to conserve the

health of the watershed ecosystem has not been proven (DEIS II D-6). According to the DEIS, existing data do not show that an across-the-board cumulative-impact-threshold could replace case-specific evaluations of all MTM/VF and other disturbances within a defined Cumulative Impact Area/watershed.

The DEIS proposes an action to build a database to determine if a scientific basis for a cumulative-impact-threshold can be identified in the future (*Action 12*, DEIS II C-69). Further associated actions would involve developing an interagency, interdisciplinary approach for NEPA and Clean Water Act aquatic cumulative impact assessments, including definition of the cumulative impact area for each resource of significance.

Mitigation and Compensation

All alternatives require mitigation of unavoidable impacts to waters of the United States (DEIS IV B-8). Mitigation would compensate for functions lost by filling headwater streams. These practices include stream construction or enhancement, wetland construction, riparian habitat restoration or enhancement (DEIS IV B-8). Cattail wetlands, for example, have been suggested to increase productivity, water quality, and biodiversity (DEIS I-14). Off-site compensatory projects may be necessary because of limitations to functional replacements on reclaimed mine areas.

Mitigation areas often include *fill* sites and the drainages below *fill* sites (toes of fills). Valley fills act as reservoirs and provide a reliable stream of water downstream due to increased base flow in *filled* areas (DEIS I-14). The net effect is that stream segments that were once ephemeral and that supported only sporadic benthic life before mining, now flow perennially and support benthic life throughout the year. Topsoil substitution or replacement with re-vegetation is also a part of reclamation. The top ten feet of oxidized subsoil is loosely dumped to promote rooting and tree productivity (DEIS page III J-19).

Monitoring

The *Interim Chemical/Biological Monitoring Protocol for Coal Mining Permit Application* (11/19/00), a guidance document, requires analyzing selenium to a detection limit of 0.6 µg Se/L as part of chemistry monitoring during the assessment of baseline conditions. Biological monitoring emphasizes quantitative surveys of organisms and physical habitat characterization.

State or Commonwealth Agencies

REC'D DEC 0 8 2003

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
NASHVILLE, TENNESSEE 37243-0435

PHIL BREDESEN
GOVERNOR

BETSY CHILD
COMMISSIONER

December 1, 2003

Mr. John Forren
U.S. EPA (3ES30)
1650 Arch Street
Philadelphia, PA 19103

RE: Programmatic Draft Environmental Impact Statement concerning Mountaintop Mining / Valley Fills in Appalachia

Dear Mr. Forren:

Please find enclosed the detailed comments from our technical staff to the Mountaintop Mining Programmatic DEIS. Please consider these comments as the official and complete response on behalf of the State of Tennessee.

I am writing to emphasize one point. All of the alternatives you are evaluating represent different ways of managing the interface between the federal Clean Water Act and the Surface Mining Control and Reclamation Act. In Tennessee since we do not have a state mining program, we respond to such issues guided by our state Water Quality Control Act and the federal NPDES program. From this standpoint, it has been and will continue to be the position of the Department that we do not allow disposal of spoil or fill material from coal mining in streams as defined by our state regulations. This policy will remain unaltered whether you choose the preferred alternative or go with one of the others being evaluated. Thank you for this opportunity to comment. 5-7-1

Sincerely,

Betsy L. Child (MS)
Betsy L. Child

BLC: AML

Enclosures

REC'D DEC 0 8 2003

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
Division of Water Pollution Control, Mining Section
Suite 220, State Plaza
2700 Middlebrook Pike
Knoxville, Tennessee 37921
Telephone: (865) 594-6035

November 24, 2003

Mr. John Forren
U.S. EPA (3ES30)
1650 Arch Street
Philadelphia, PA 19103

RE: Programmatic Draft Environmental Impact Statement concerning Mountaintop Mining / Valley Fills in Appalachia

Dear Mr. Forren:

The U.S. Office of Surface Mining issues and inspects Surface Mining Control and Reclamation Act permits for coal mining in Tennessee, our Division of Water Pollution Control – Mining Section is responsible for NPDES permits for discharge of treated waste water and inspection of those permitted facilities for coal and non-coal mining in Tennessee. Since coal mining is considered a primary industry by the U. S. Environmental Protection Agency, their approval as well as OSM's Mining Permit issuance is necessary prior to issuance of NPDES permits to coal facilities.

The only coal mine excess spoil fills currently authorized for the discharge of waste water in Tennessee involve the placement of fill material in locations outside waters of the state. Only when the clearly planned objective has been restoration of damaged streams have we authorized the use of waters for fill or sediment control. The fills outside waters of the state of Tennessee have most often been referred to as "head-of-hollow" fills. Fills within waters of the state of Tennessee are not currently allowed and will not be allowed in the future. 12-1-1

In Chapter 2, Alternatives, II. C. DETAILED ANALYSES OF THE ACTIONS TO ADDRESS ISSUES, the EIS makes reference to in lieu fee arrangements for stream mitigation activities. Such an arrangement has been discussed as a tool for mitigation of loss of waters of the state/U.S. as a result of federally funded highway projects. There is not an in lieu fee agreement which can be applied to mining projects in Tennessee. 5-7-3

The EIS also alludes to finalization of regulations and coordination between agencies to clarify buffer zone requirements. That clarification is sorely needed and only coordination between the various agencies will accomplish it. 12-1-2

1

Sincerely,

Paul Schmeierbach by AML

Paul Schmeierbach
Water Pollution Control, Knoxville Office

• Page 2

REC'D DEC 0 8 2003

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Division of Natural Heritage
14th Floor L&C Tower
401 Church Street
Nashville, Tennessee 37243-0447
Phone 615/532-0431 Fax 615/532-0231

DEPT OF ENV & CON
EPA COUNSEL
03 AUG 15 PM 9:01

August 4, 2003

Mr. John Forren
U. S. EPA (3ES30)
1650 Arch Street
Philadelphia, PA 19103

Dear Mr. Forren:

The Division of Natural Heritage, Tennessee Department of Environment and Conservation, appreciates the opportunity to review and provide comment on the Mountaintop Mining/Valley Fills in Appalachia Draft Programmatic Environmental Impact Statement (DEIS). The DEIS identifies a number of proposed actions to improve agency programs at the state and federal levels, which aim to enhance environmental protection and agency coordination during permit reviews under SMCRA and CWA consistent with the primary goal of minimizing adverse environmental impacts from mountaintop mining and excess spoil valley fills in Appalachia. The Tennessee Division of Natural Heritage (DNH) has reviewed the information submits the following comments for consideration.

With regard to the protection of rare, threatened, and endangered species, the DEIS described programmatic changes which would minimize adverse environmental impacts to federally listed species, however, gave inadequate mention to state-listed species. One report cited in the DEIS stated that, "surface coal mining and reclamation operations conducted in accordance with properly implemented state and Federal regulatory programs under SMCRA would not be likely to jeopardize the continued existence of listed or proposed species" (IVD-5, 6). 8-3-4

This is not necessarily absolute. One federally threatened land snail in Tennessee is limited to fewer than 12 linear miles of the Cumberland Plateau escarpment in Franklin County. Were this or similarly restricted species subjected to MTM/VF, the continued existence of that species could be jeopardized under permitted mining activities.

Additionally, the cumulative effects of MTM/VF could negatively impact other species of concern, including state listed species. In fact, many of the state listed species from the DEIS impact area are less common in Tennessee than some of the federally listed species. Conservation of these rare species will in part depend on whether they are given sufficient consideration when planning for future MTM/VF locations. The DNH requests that the DEIS give consideration to all state- listed plants and animals, regardless if such species are likely to become federally listed. 8-2-2

Among the CWA/SMCRA program improvements envisioned that could help minimize incidental takes of state and federally listed species is the development of a comprehensive baseline data collection system (ES-4). The DNH supports any and all plans that would emphasize rare species inventory and monitoring. 8-3-3

Another programmatic change, which the DNH supports and is common throughout each of the proposed alternatives, is the development of state-of-the science BMP's for reclamation techniques, revegetation species, and success measurement techniques for accomplishing post-mining land uses involving trees (ES-8, IVC-7). Regarding revegetation species, the DNH advocates planting and restoring the affected area with native trees, shrubs, forbs and warm and cool season grasses, which are compatible with hardwood reforestation. Revegetation of the area with plants listed by the Tennessee Exotic Pest Plant Council as harmful exotic plants should be prohibited. In the past, autumn olive, bicolor lespedeza, sericea lespedeza, fescue and other plants listed by the TNEPPC as invasive have been used in mine reclamation throughout this area. This has resulted in extensive degradation of native plant communities and wildlife habitat throughout the region. 18-1-3

In addition to supporting programmatic changes that emphasize inventory, monitoring, and conservation of rare species, the DNH also supports programmatic changes that would enhance ESA, CWA and SMCRA compliance. However, emphasis on compliance was not stressed in the document. The DNH feels that this is a critical part of the solution to minimizing adverse environmental impacts resulting from MTM/VF and needs to be better addressed in the EIS. 8-3-4

Thank you for the opportunity to comment on this proposal and for considering Tennessee's rare species throughout the planning of this DEIS. Should you have any questions, please do not hesitate to contact me at (615) 532-0434.

Sincerely,

Reginald G. Reeves
Director

C: Alan Leiserson

Donald S. Dott, Jr.
Director

Paul E. Patton
Governor

Commonwealth of Kentucky
Kentucky State Nature Preserves Commission
801 Schenkel Lane
Frankfort, Kentucky 40601-1403
(502) 573-2886 Voice
(502) 573-2355 Fax

November 26, 2003

Mr. John Forren, U.S. EPA (3EA30)
1650 Arch Street
Philadelphia, PA 19103

Dear Mr. Forren:

This letter serves as comment by the Kentucky State Nature Preserves Commission concerning the Draft Environmental Impact Statement for the reduction of adverse environmental impacts of mountaintop mining operations and excess spoil valley areas in Appalachia.

The Commission has three major concerns with the environmental impacts resulting from this method of coal mining extraction. First is the loss and fragmentation of a significant area of relatively mature, upland forest communities. This impact has the most potential to directly impact several endangered and threatened species including Indiana bat (*Myotis sodalis* – USFWS Endangered) and Cerulean warbler (*Dendroica cerulea* – USFWS Species of Management Concern). Second is the loss of perennial "blue line" and ephemeral headwater stream segments through the use of the upper portions of ravines for placement of spoil material. Third is the negative impact to water quality of streams downstream from these activities. The Commission believes that adoption of the Preferred Alternative (Alternative 2) will serve to reduce these impacts and we are in support of its implementation. 8-1-2 8-2-2 5-7-2 1-3

Thank you for the opportunity to comment on the Draft EIS at this time. Please feel free to contact me if any further comment is desired.

Cordially,

Donald S. Dott, Jr.
Director

Education Pays

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Herbert Harper, Tennessee Historical Commission

REC'D JUN 30 2003

TENNESSEE HISTORICAL COMMISSION
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
2941 LEBANON ROAD
NASHVILLE, TN 37243-0442
(615) 532-1550

June 20, 2003

Mr. John Forren
U.S. EPA (3EA30)
1650 Arch Street
Philadelphia, Pennsylvania 19103

RE: EPA, DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT, MINING/VALLEY FILLS IN APPALACHIA, UNINCORPORATED, MULTI COUNTY

Dear Mr. Forren:

At your request, our office has reviewed the above-referenced Draft Programmatic Environmental Impact Statement in accordance with regulations codified at 36 CFR 800 (Federal Register, December 12, 2000, 77698-77739). We concur that the proposed program has the potential to affect historic properties. In accordance with the document, all Tennessee projects undertaken within the proposed program must be submitted to our office for review and comment. 10-2-1

Questions and comments regarding project review may be addressed to Jennifer M. Barnett, 615-741-1588, ext. 17.

Your cooperation is appreciated.

Sincerely,

Herbert L. Harper
Executive Director and
Deputy State Historic
Preservation Officer

HLH/jmb

Robert Logan, Kentucky Natural Resources and Environmental Protection Cabinet, Department for Environmental Protection

REC'D SEP 15 2003

HENRY C. LIST
SECRETARY

PAUL E. PATTON
GOVERNOR

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
ROBERT W. LOGAN
COMMISSIONER
FRANKFORT OFFICE PARK
14 REILLY RD
FRANKFORT KY 40601

September 9, 2003

John Forren
US EPA (3ES30)
1650 Arch St.
Philadelphia, PA 19103

Dear Mr. Forren:

The Kentucky Department for Environmental Protection would like to offer the following comment concerning the Summary of Proposed Alternatives contained in your mountaintop removal Environmental Impact Statement (EIS) document.

In your upcoming deliberations on how to modify current SMCRA and Clean Water Act (CWA) permitting of stream loss due to coal mining waste disposal sites, please keep in mind that normally the states have a role in the 404 permitting process under Section 401 of the CWA. In the case of Kentucky, state legislation passed in 1994 has limited the role of the state 401 program in regulating stream loss covered under Nationwide 404 permit #21.

While this agency did not request and does not agree with the language contained in KRS 224.16-070 (attached), we are compelled to abide by it. In order for Kentucky to resume its 401 involvement in the processing of nationwide 21 permits, KRS 224.16-070 must be changed. To accomplish this, the Environmental Protection Agency (EPA) will need to incorporate this issue into its programmatic discussions with the coal industry on possible changes to the existing 404 permitting process. 5-7-1

Sincerely,

Robert W. Logan
Commissioner

RWL:mw

Attachment

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APPENDIX I

224.16-070 Water quality certifications for surface coal mining operations for applicants eligible for Nationwide Permit 21 or 26.

(1) This section shall apply to the cabinet's issuance, waiver, or denial of water quality certifications for surface coal mining operations, as defined in KRS 350.010, if:

(a) The applicant for the water quality certification has applied to the cabinet for a permit in accordance with KRS Chapter 350 and the administrative regulations promulgated pursuant thereto;

(b) The applicant for the water quality certification is eligible for Nationwide Permit 21 or 26 issued in accordance with 33 U.S.C. 1344 and 33 C.F.R. Part 330, Appendix A;

(c) The applicant's surface coal mining operation will not impact waters of the Commonwealth designated by the cabinet in its water quality standards as outstanding state or national resource waters or as cold water aquatic habitat; and

(d) The applicant's surface coal mining operation will not impact waters of the Commonwealth which are wetlands one (1) acre or more in size.

(2) If the watershed above the toe of the farthest downstream permanent structure authorized pursuant to Nationwide Permit 21 or 26 is less than four hundred eighty (480) acres for the surface coal mining operation meeting the criteria of subsection (1) of this section, the cabinet shall issue a water quality certification containing only the standard conditions set out in paragraphs (a) to (e) of this subsection.

(a) All earthwork operations shall be carried out so that sediment runoff and soil erosion to waters of the Commonwealth are controlled and minimized. Best management practices for water pollution control shall be used by the surface coal mining operation.

(b) Heavy equipment, such as bulldozers, backhoes, and draglines, shall not be used or operated within waters of the Commonwealth outside of the boundaries of a permanent structure, unless that use cannot be avoided. If use of heavy equipment within waters of the Commonwealth outside the boundaries of a permanent structure is unavoidable, then the work shall be performed so as to minimize resuspension of sediments and disturbance to substrates, banks, or riparian vegetation.

(c) Measures shall be taken to prevent and to control spills of fuels, lubricants, and other materials from entering waters of the Commonwealth.

(d) Any fill or riprap shall be of a composition that shall not cause violations of water quality standards by adversely affecting the biological, chemical, or physical properties of waters of the Commonwealth. If riprap is used, it shall be of a weight and size that bank stress or slump conditions shall not occur.

(e) Removal of riparian vegetation outside the boundaries of a permanent structure shall be minimized.

(3)(a) If the watershed above the toe of the farthest downstream permanent structure authorized pursuant to Nationwide Permit 21 or 26 is greater than or equal to four hundred eighty (480) acres for the surface coal mining operation meeting the criteria of subsection (1) of this section, the cabinet may require a water quality certification containing conditions in addition to those standard conditions identified in subsection (2) of this section for the purpose of protecting water quality.

(b) The water quality certification may require mitigation at a maximum ratio of one (1) acre of mitigation area for every one (1) acre of permanent loss of waters of the

Commonwealth on the permitted area, except for waters of the Commonwealth isolated as a result of the permanent structure.

(c) For waters of the Commonwealth isolated as a result of a permanent structure, the maximum mitigation ratio shall be five-tenths (0.5) acre of mitigation area for every one (1) acre of those isolated waters.

(d) The cabinet shall accept mitigation on the permitted area, mitigation off the permitted area, mitigation banking of waters of the Commonwealth, or any combination thereof, or any other mitigation measure acceptable to the cabinet.

(e) Upon completion of all mitigation work required by the water quality certification required by this subsection, the surface coal mining operation shall obtain a certification from a registered professional engineer that all mitigation work has been completed in accordance with the conditions of the water quality certification. The surface coal mining operation shall promptly submit the professional engineer's certification to the cabinet. The cabinet shall promptly review the certification and provide to the surface coal mining operation written notice that all mitigation work has been successfully completed, or that further mitigation work is necessary to meet the conditions imposed by the water quality certification.

(4) The cabinet shall not require a water quality certification for a road crossing on the permitted area impacting less than two hundred (200) linear feet of waters of the Commonwealth.

(5) The cabinet shall confer with representatives of the surface coal mining industry and representatives of environmental organizations with an interest in water quality in developing a manual of approvable options for mitigation on permitted areas, mitigation off permitted areas, mitigation involving banking of waters of the Commonwealth, and removal of temporary sediment structures at surface coal mining operations as a mitigation option.

(6)(a) The cabinet shall have ten (10) working days to make a determination that an application for a water quality certification is administratively complete or to notify the applicant of specific deficiencies.

(b) The cabinet shall have forty (40) working days to review an administratively complete application for a water quality certification, to issue or waive that certification, or to deny that certification with specific deficiencies identified, and to notify the applicant of the final determination. If the cabinet has not notified the applicant of its final determination within forty (40) days of receiving an administratively complete application, the water quality certification shall be deemed waived.

(7) Nothing in this section shall be construed as abrogating the cabinet's ability to require water quality certifications for surface coal mining operations that do not meet the criteria of subsection (1) of this section.

TENNESSEE WILDLIFE RESOURCES AGENCY

ELLINGTON AGRICULTURAL CENTER
P. O. BOX 40747
NASHVILLE, TENNESSEE 37204

REC'D SEP 0 2 2003

August 18, 2003

RECEIVED
AUG 2 2 2003
Office of the Comptroller

RECEIVED
AUG 2 5 2003
Office of Watersheds
EPA Region III

U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103

Re: Draft Environmental Impact Statement
Mountaintop Mining/Valley Fills
Appalachia

Dear EPA:

The Tennessee Wildlife Resources Agency provides the following comments and recommendations on the programmatic DEIS.

- Placement of spoil material in waters of the state of Tennessee or in such a manner as to adversely impact waters of the state is a violation of both the Tennessee Water Quality Control Act and the Wildlife Code (Tennessee Code Annotated). 5-7-1
- Current requirements for buffer zones around streams are grossly inadequate for mountainous terrain. The minimum riparian protection zone for coal mining should be 200 feet on either side of Appalachian mountain streams.
- Remining and reclamation of abandoned mine lands should be required as mitigation for all surface mining activity. 19-3-3
- Reclamation for surface mine impacts on Appalachian and Cumberland Mountain hardwood forest must include compensatory mitigation and/or reforestation. 19-2-3
- This document does not further protection or conservation of aquatic resources and exhibits near total disregard for the spirit, intent, and letter of federal water pollution law. 4-2

Sincerely,

Aubrey D. McKinney, Chief
Environmental Services Division

ADM:bg

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COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
Street address: 629 East Main Street, Richmond, Virginia 23219
Mailing address: P.O. Box 10009, Richmond, Virginia 23240
Fax (804) 698-4500 TDD (804) 698-4021
www.deq.state.va.us

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

Robert G. Burnley
Director
(804) 698-4000
1-800-592-5482

December 24, 2003

Mr. John Forren
U.S. Environmental Protection Agency
Mail Stop 3EA30
1650 Arch Street
Philadelphia, Pennsylvania 19103

RE: Draft Programmatic Environmental Impact Statement, Mountaintop Mining/
Valley Fills in Appalachia
DEQ-03-106F

Dear Mr. Forren:

The Commonwealth of Virginia has completed its review of the above-referenced document. The Department of Environmental Quality (DEQ) is responsible for coordinating Virginia's review of federal environmental documents and responding to appropriate federal officials on behalf of the Commonwealth. The following agencies and localities joined in this review:

Department of Environmental Quality
Department of Game and Inland Fisheries
Department of Agriculture and Consumer Services
Department of Conservation and Recreation
Department of Health
Marine Resources Commission
Department of Mines, Minerals, and Energy
Buchanan County
Lee County
Wise County.

In addition, the following agencies, planning district commissions, and localities were invited to comment:

Department of Historic Resources
Department of Forestry

Lenowisco Planning District Commission
Cumberland Plateau Planning District Commission
Russell County
Scott County
Tazewell County.

Project Description

The Environmental Protection Agency, the Army Corps of Engineers, and two agencies of the Department of the Interior (Fish and Wildlife Service and Office of Surface Mining) joined with the West Virginia Department of Environmental Protection to consider new or revised program guidance, policies, and regulations to minimize adverse environmental effects of mountaintop mining and valley fill (hereinafter "MTM/VF") operations within the Appalachian study areas in West Virginia, Virginia, Kentucky, and Tennessee. (In Virginia, these include the six counties listed above.)

As stated in the Draft Programmatic Environmental Impact Statement (hereinafter "Draft EIS"), the removal of overburden (rock above coal seams) and interburden (rock between coal seams) during mountaintop surface mining results in excess spoil, because the rock will not fit back into the mining pit. The excess spoil is placed in disposal sites. Typical locations for these are valleys, also known as heads-of-hollows or uppermost (headwater) stream reaches. The spoil is placed in engineered earth and rock structures known as excess spoil disposal areas, or valley fills (page I-1).

According to the Draft EIS, the study area was chosen because it includes watersheds where excess spoil fills, otherwise known as valley fills, have been constructed or are likely to be constructed in the future (page I-5, section E).

The Draft EIS describes and analyzes a no-action alternative, which is maintenance of the present regulatory programs and processes, and three action alternatives. The summary pages present these alternatives in some detail; highlights follow (pages ES-5 through ES-8):

- *Action Alternative 1*: Initial determination by the Army Corps of Engineers, through the individual permit process pursuant to section 404 of the federal Clean Water Act, of the size, number, and location of valley fills in waters of the United States and reliance on the Corps by the Office of Surface Mining (Department of the Interior) and other regulatory agencies; reliance in the other direction in the case of individual permits; Corps as lead agency for Endangered Species Act consultation; other regulatory programs defer to Corps on Section 404 approval. In this alternative, the Corps would accomplish appropriate National Environmental Policy Act analysis, determining whether an Environmental Assessment or an Environmental Impact Statement is required.

- *Action Alternative 2 (preferred alternative)*: Cooperative determination of size, number, and location of valley fills allowed in waters of the United States; Office of Surface Mining rules would make the stream buffer zone more consistent with the Clean Water Act and Surface Mining Control and Reclamation Act; excess spoil rules would be modified to provide for minimization and alternatives analysis, similar to the Section 404(b)(1) Guidelines. The Corps would make decisions on nationwide versus individual permits, and accomplish NEPA review of individual permits. With regard to Nationwide No. 21 permits, the surface mining agency (in Virginia's case, the Department of Mines, Minerals, and Energy) would take the lead on Endangered Species Act coordination. As with Alternative 1, the Corps would accomplish appropriate National Environmental Policy Act analysis, determining whether an Environmental Assessment or an Environmental Impact Statement is required.

- *Action Alternative 3*: The Corps would begin processing mountaintop mining and valley fills as Nationwide No. 21 permits and few projects would require individual permits. The surface mining agency would take the primary role of joint application review. The Corps would base its Clean Water Act authorizations largely on the surface mining review, adding off-site mitigation. Federal agencies (the Office of Surface Mining Reclamation and Enforcement) and state agencies with regulatory authority would develop guidance for consistent definitions, refine the uniform protocols for assessing ecological function and making permit decisions, and undertake other activities related to the regulation of mountaintop surface mining.

General Comments on the Draft EIS

According to the Department of Mines, Minerals, and Energy (DMME), the Draft EIS presents information, and is based on analysis, not equally applicable or relevant to the states affected by the proposed or alternative regulatory program. Specifically, the Draft EIS recommends a federal mandate, binding on Virginia that stems from conditions and a legal agreement in West Virginia (Draft EIS, pages I-8 and I-9). The Draft EIS should not assume that the processes agreed to with West Virginia are also necessary in other states, or that Virginia, at least, would follow them (enclosed DMME comments, page 4). 1-6

Similarly, the Draft EIS makes assertions that do not take Virginia conditions into account. For example, it dismisses wetlands created by mining as non-jurisdictional (Draft EIS, page ES-4), overlooking the fact that in Virginia, isolated wetlands are regulated and protected under state law (*Virginia Code* section 62.1-44.15:5) unless they are determined to be small and of limited ecological value. DMME states that for this 5-3-4

reason, any conclusions based on the assumption that such wetlands are not regulated would be unfounded (DMME comments, page 1). The Draft EIS also refers to a number of stream studies in assessing environmental consequences of the proposed program (Chapter IV); however, none of these studies took place in Virginia, and the resulting findings may not apply here (DMME comments, pages 9-10). 5-3-1

DMME's overall conclusion is that the Draft EIS process should be stopped in favor of selecting a "true no-action alternative" that leaves the existing regulatory program in place (DMME comments, page 1). 1-1 If the EIS process is not stopped, then Alternative 3 should be adopted. DMME disagrees with some of the information presented in the Draft EIS. 1-4 Detailed comments from DMME are enclosed. (See also "Environmental Impacts and Mitigation," items 2 and 5, below.)

Environmental Impacts and Mitigation

1. Natural Heritage Resources. The Virginia Department of Conservation and Recreation (DCR) functions to preserve and protect the Commonwealth's environment and advocate the wise use of its scenic, cultural, recreational, and natural heritage resources. "Natural heritage resources" are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, significant geologic formations, and similar features of scientific interest.

The southern Appalachian mountains were identified, by the Nature Conservancy in 2000, as one of the six biodiversity hot spots for species rarity and richness in the United States. This designation was generally based on the rich freshwater fauna (especially fish and mussels) found in this area, which are dependent on the region's rivers and streams (Stein, *et al*, 2000). The Upper Tennessee River drainage in Virginia, including the Clinch, Holsten, and Powell Rivers, supports a very diverse assemblage of fish and mussels, including many species that are globally rare and critically imperiled. Mining operations in a significant portion of the Appalachian coalfields of extreme southwestern Virginia are conducted in and near the uppermost (headwater) stream reaches of the Tennessee River drainage. DCR states that the placement of excess spoil from mining operations in valleys, or head-of-hollows, in these watersheds, could potentially impact downstream fish and mussel populations (as well as other aquatic organisms.) 8-2-2

While DCR expresses concern for the aquatic resources downstream of the mining operation, DCR also recognizes the benefits associated with reclamation activities associated with abandoned mined lands and reconnection of cut-off headwater streams to their lower reaches. DMME reports that 70-80% of areas currently being mined in Virginia are previously mined lands (DMME comments, pg. 12.)

The Department of Conservation and Recreation's Biotics Data System documents that a number of listed endangered and threatened species can be found in the proposed mountaintop mining area. Specifically, according to the listings and abbreviations provided by DCR (enclosed), there are nine (9) species listed as endangered by the federal government and sixteen (16) species listed as endangered by the state government. 8-1-5

The Virginia Department of Agriculture and Consumer Services, which has jurisdiction over state-listed endangered or threatened plant and insect species, acknowledges that the Department of Mines, Minerals and Energy, the regulatory authority in Virginia under the Surface Mining Control and Reclamation Act, will continue to consult with the Fish and Wildlife Service and appropriate state agencies regarding federally- and state-listed endangered and threatened species.

2. Wetlands and Water Quality. DEQ's Water Division agrees that federal and state regulations, policies, and guidance relative to MTM/VF activities should be consistently and fairly applied. The preferred alternative identifies an interim impact threshold of 250 acres. DEQ's Water Division recommends establishment of some reasonable threshold limit for valley fills (such as a certain linear footage of stream impacts) that is protective of the environment by reducing impacts to surface waters from mining activities. Because many valley fill activities occur in headwaters of first-order streams, the activities may have far-reaching implications for downstream water quality. DEQ's Water Division indicates that appropriate technical studies should continue to be conducted before the authorization of any valley fill. These studies should include such subjects as: 5-3-5

- fish assemblages present
- benthic macro-invertebrates
- threatened and endangered species, particularly freshwater mussels (see item 1, above)
- stream geomorphology.

The results of technical studies should be used as a baseline to enable avoidance or minimization of impacts to the aquatic community (as required by Section 404(b)(1) of the Clean Water Act as well as by state law), and to determine the appropriate compensation for unavoidable impacts.

Unavoidable water quality impacts from valley fills will require a Virginia Water Protection Permit from DEQ, and may require a Virginia Pollutant Discharge Elimination System (VPDES) permit for construction. Point source discharges, if any, may require a VPDES discharge permit. See "Regulatory and Coordination Needs," item 1, below. 5-5-5

DEQ's Water Division states that, based upon information provided in the wetland technical report, wetland impacts associated with valley fill activities will be minimal, because wetlands are not found in significant abundance in steep-slope terrain. Most wetlands occurring in these areas are associated with riparian buffers along streams, streams, and some plateau areas. Accordingly, the most significant impacts on aquatic resources from MTM/VF activities will be loss of stream habitat and riparian areas.

Besides direct loss of stream habitat, secondary impacts should be evaluated prior to authorization of valley fills. Technical studies to assess potential secondary impacts should include:

- observable and measurable changes to the downstream geomorphology of the stream;
- degradation of downstream habitat from sediment transport;
- flow rates; and
- changes in water chemistry, including:
  - temperature
  - pH
  - dissolved oxygen
  - conductivity
  - total dissolved solids
  - alkalinity
  - calcium hardness
  - ammonia
  - nitrate
  - phosphate.

Compensation for unavoidable impacts should also take secondary impacts into account.

5-3-5

According to the Department of Mines, Minerals, and Energy (DMME), the EIS concludes that wetlands created by mining are not generally of high quality, and non-jurisdictional from the standpoint of Section 404 regulation under the Clean Water Act (Draft EIS, page ES-4). Also, streams mentioned by name in the EIS do not include any in Virginia, so conclusions relative to Virginia streams may not be valid (DMME comments, page 9). The same is true, according to DMME, for a number of studies described in the EIS (Appendix D), including those on wetland resources on steep slopes in West Virginia, headwater stream values, a benthic survey in Kentucky, and an ecological assessment in West Virginia (DMME comments, page 10). On the other hand, as the DCR indicates, a Virginia study did show negative impacts to the benthic community, consistent with the Kentucky results (enclosed DCR comments, dated December 23, 2003, page 2, item 4).

3. Water Supply. According to the Virginia Department of Health's Office of Drinking Water, there are a limited number of water intakes that would be affected by MTM/VF activities. Known intakes include Pennington Gap, St. Paul, Wise County Public Service Authority, and possibly Richlands. Other water treatment plant sources are small mountaintop reservoirs, or larger reservoirs like Pound Lake or Flannagan Reservoir.

The Department of Health's Office of Drinking Water should be given opportunity to comment on applications for any VPDES permits for valley fills, so as to review them for water supply impacts.

5-1-1

In addition, MTM/VF activities proposed in a watershed within 5 miles of a water supply intake should be announced to the Office of Drinking Water and to the waterworks owner. The Office of Drinking Water assumes that runoff ponds and silt fences will be required to contain runoff in order to protect stream water quality.

4. Wildlife Resources Management. Under *Virginia Code* Title 29.1, the Department of Game and Inland Fisheries (DGIF) is the primary wildlife and freshwater fish management agency in the Commonwealth. DGIF has full law enforcement and regulatory jurisdiction over all wildlife resources, inclusive of state and federally endangered or threatened species, but excluding listed insects. The agency maintains a comprehensive system of databases of wildlife resources that is available through the Agency's site at www.dgif.state.va.us, in the "Wildlife" section from the link to "Wildlife Information Online." DGIF determines likely impacts on fish and wildlife resources and habitats, and recommends appropriate measures to avoid, reduce, or compensate for those impacts. For more information on the Wildlife Information Online Service, the proponents may contact DGIF (Kathy Quindlen Graham, telephone (804) 367-9717).

7-2-2

The Department of Game and Inland Fisheries is concerned primarily with potential impacts to endangered and threatened species, trout waters, and other terrestrial and aquatic resources. The existing programs provide for the Department's review of, and comments on, mountaintop mining and valley fills. Provided that this coordination continues, the Department of Game and Inland Fisheries concurs with the recommendation by the Department of Mines, Minerals, and Energy that the EIS process be abandoned (see next item).

6-2-2

5. State-level Management Concerns.

(a) Department of Mines, Minerals, and Energy. The Department of Mines, Minerals, and Energy (DMME) and the Department of Game and Inland Fisheries prefer the current management system of existing programs administered by DMME, the Army Corps of Engineers, and the Environmental Protection Agency. DMME opposes the

1-12

preferred alternative, recommending instead that the EIS process be ended (see the enclosed DMME comments, page 1). 1-12

As mentioned above (see "General Comments..."), DMME indicates that the Draft EIS is predicated on conditions in the coal fields of West Virginia, and that some of its recommendations on the future of the regulatory program are based on a settlement agreement with West Virginia. These conditions differ in Virginia and other states, and the agreement with West Virginia may not be relevant to or needed in Virginia or other states (DMME comments, page 4).

(b) DEQ's Southwest Regional Office. DEQ's Southwest Regional Office indicated that the Norfolk District of the Army Corps of Engineers ("Corps") regulates coal mining activities mainly through the Nationwide Permit No. 21 (NWP-21) for Surface Coal Mining. DEQ does not issue separate Virginia Water Protection Permits for coal mining activities that qualify for the NWP-21. Projects that exceed the NWP-21 threshold are permitted under the DMME's NPDES permit program using guidelines established in the Virginia Water Protection Program.

DEQ's Southwest Regional Office recommends several approaches that might contribute to more effective review of coal mining activities. These include the following. 12-1-5

- Incorporate requirements for minimization of impacts and alternatives analysis for excess spoil disposal into Surface Mining Control and Reclamation Act (SMCRA) permit authorization. Such rule-making would be more consistent with Clean Water Act section 404(b)(1) guidelines and allow agencies to work together instead of trying, sometimes at cross-purposes, to fulfill guidelines separately.
- Develop of advanced identification of disposal sites (ADID) and watersheds unsuitable for fill could encourage alternative valley fill solutions from the beginning of the project. The ADID designation would give permittees a better idea of the viability of a project before their resources are committed.
- Continue rule-making relative to the stream buffer zone rule and excess spoil disposal.

6. Local Comments. Buchanan, Lee, and Wise Counties indicated no comments on the document, and Wise County indicated no objection to the preferred alternative. As indicated above, Russell, Scott, and Tazewell Counties were invited to comment.

Regulatory and Coordination Needs

1. Water Quality Regulation. As mentioned above, valley fill activities may require a Virginia Water Protection Permit and a VPDES permit for construction. The Virginia Water Permit program is administered by DEQ's Southwest Regional Office. VPDES (NPDES) permits for coal mining operations are administered by DMME. As indicated above, Virginia Water Protection Permits are not issued for coal mining activities that qualify for the Nationwide Permit No. 21, which is issued by the Army Corps of Engineers. For information on DMME's NPDES permit program, the Department of Mines, Minerals, and Energy (Steve Walz, telephone (804) 692-3211) may be contacted. Questions on other water permits may be addressed to DEQ's Water Division (Ellen Gilinsky, telephone (804) 698-4375) or DEQ's Southwest Regional Office (Allen Newman, telephone ((276) 676-4804).

2. Subaqueous Bed Encroachment. The Virginia Marine Resources Commission has permit jurisdiction over any encroachments in, on, or over the beds of the rivers, streams, and creeks that are the property of the Commonwealth, pursuant to *Virginia Code* section 28.2-1200 et seq. Accordingly, if any portion of MTM/VF activities involves any encroachments channelward of ordinary high water along natural rivers and streams, a permit may be required from the Commission. Questions on this requirement may be addressed to the Commission (Randy Owen, telephone (757) 247-2200). 12-1-5

3. Water Supply. As mentioned above ("Environmental Impacts and Mitigation," item 3), the Virginia Department of Health's Office of Drinking Water (Alan Weber, telephone (804) 371-2883) should be given opportunity to comment on (1) any MTM/VF activities that are proposed within 5 miles of a water supply intake and (2) any applications for VPDES permits for valley fills.

Review Process

We are grateful for the extension of the comment deadline from August 29, 2003 to January 4, 2004. The added time enabled Virginia agencies to have an extended discussion of the regulatory program and exchange views regarding the proposed changes therein. The Department of Mines, Minerals, and Energy provided extensive comments, which are enclosed. 3-5

Mr. John Forren
Page 10

Thank you for the opportunity to review the Draft EIS. The detailed comments of the reviewing agencies are enclosed.

Sincerely,

Michael P. Murphy, Director
Division of Environmental Enhancement

Enclosures

cc: Derral Jones, DCR
Keith R. Tignor, DACS
Alan D. Weber, VDH
Ellen Gilinsky, DEQ-Water
Alan J. Newman, DEQ-SWRO
Randall Owen, MRC
Brian D. Moyer, DGIF
Ethel R. Eaton, DHR
Steven Walz, DMME
Gerald P. Wilkes, DMME
J. Michael Foreman, DOF
Andrew Chafin, Cumberland Plateau PDC
Ronald C. Flanary, Lenowisco PDC
W. J. Caudill, Jr., Buchanan County
D. Dane Poe, Lee County
Edward L. Sealover, Wise County
James Gillespie, Russell County
John Strutner, Scott County
James Spencer, Tazewell County
Karen L. Mayne, USFWS
J. Robert Hume, ACOE
Ellie L. Irons, DEQ-OEIR

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

Joseph H. Maroon
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

203 Governor Street
Richmond, Virginia 23219-2010
(804) 786-6124

MEMORANDUM

Date: 23 December 2003

To: Charles H. Ellis, III, Virginia Department of Environmental Quality

From: Derral Jones, Planning Bureau Manager

Subject: DEQ#03-106F: Mountain Top Mining/Valley Fills in Appalachia

The Department of Conservation and Recreation (DCR) functions to preserve and protect the environment of the Commonwealth of Virginia and advocate the wise use of its scenic, cultural, recreation and natural heritage resources. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, state unique or exemplary natural communities, significant geologic formations and similar features of scientific interest.

The southern Appalachians were identified as one of the six biodiversity hot spots for species rarity and richness in the United States in 2000 by The Nature Conservancy and NatureServe. This designation was generally based on the rich freshwater fauna (especially fish and mussels) found in this area, which is dependent on the region's rivers and streams (Stein et al., 2000). The Upper Tennessee River drainage in Virginia, including the Clinch, Holston, and Powell rivers, supports a very diverse assemblage of fish and mussels, including many species that are globally rare and critically imperiled. Mining operations in a significant portion of the Appalachian coalfields of extreme southwestern Virginia are conducted in and near the uppermost (headwater) stream reaches of the Tennessee River drainage. The placement of excess spoil from mining operations in valleys, or head-of-hollows, in these watersheds, could potentially impact downstream fish and mussel populations (as well as other aquatic organisms). 8-2-5

In reference to the Department of Mines, Minerals and Energy comments on Mountaintop Mining/Valley Fills in Appalachia Draft Programmatic Environmental Impact Statement, DCR would like to provide the following comments:

1) On page 5, Chapter III.D –Impact Producing Factors to Headwater Streams from Mountaintop Mining, DMME stated that drainage structures associated with mining can provide benefits that could offset aquatic impacts. The study entitled Ecotoxicological Evaluation of Hollow Fill Drainages in Low Order Streams in the Appalachian 6-6-4

Conserving Virginia's Natural and Recreational Resources

Mountains of Virginia and West Virginia by Timothy Merricks concluded that settling ponds would enhance collector filterer populations. The study by Timothy Merricks, although it may be scientifically sound, should not be regarded as the definitive study on the impacts of hollow fill mining in Virginia. Rather, it is the first of many needed studies on this topic. Merricks' study was of short duration (2 years), limited geographic scope (only a few of his study sites were actually in Virginia; others were in West Virginia), and confined to the upper reaches of each watershed. It did not address issues such as the long-term impacts of hollow fill mining, catastrophic events, potential impacts to aquatic biota farther downstream in the watershed, or evaluate a diverse array of study site conditions. 6-6-4

2) On page 6, Chapter III. F-Appalachian Forest Communities DMME states that 85 % of reclaimed mined lands in the study area are returned to forests and most are returned to the approximate original contour including re-establishing drainage patterns. DCR recognizes the benefit of reforestation activities on abandoned mined lands associated with the mountaintop mining process. According to DCR staff, the forests may be restored, however the forest type and cover will be different due to limited soils and forest age difference. 7-5-4

3) On page 9, in reference to page IV.B-1 section titled Consequences Common to the No Action Alternatives and Alternatives 1,2, and 3. DMME stated these alternatives as well as the no action alternative should take into account the headwaters streams are replaced with diversion ditches and drainage systems in and around fills. According to Dr. Roble, these altered systems are very unlikely to support the same biological communities as undisturbed headwater streams. This was also stated by Dr. Bruce Wallace, University of Georgia, at the Headwater Streams Symposium (Mountaintop Mining/Valley Fills in Appalachia-Draft Programmatic Environmental Impact Statement CD). DCR recognizes the benefit associated with reclamation activities associated with abandoned mined lands and reconnection of cut-off headwater streams. 6-6-4

4) On page 10, DMME stated the Kentucky Mountaintop mining benthic maroinvertebrate survey has limited usefulness because it is specific to four counties and limited duration of the study. DMME also stated the conclusion from the Kentucky study that mountaintop mining and valley fill negatively impacted benthic health did not match the Virginia study (Ecotoxicological Evaluation of Hollow Fill Drainages in Low Order Streams in the Appalachian Mountains of Virginia and West Virginia). However, according to Dr. Steve Roble the survey sites listed below in the VA study and overall survey results did show a negative impact to the benthic community. 6-4-4

   A. A Middle Creek, VA site associated with a recent hollow fill had reduced total species richness, reduced EPT richness and lower % EPT in 1 of 2 years at a recent hollow fill. Hollow fill sites in this drainage that lacked holding or settling ponds had reduced clam growth rates.
   B. South Fork of Pound River (SFPR) and Powell River sites with hollow fills had decreased benthic macroinvertebrate richness vs. reference sites
   C. Overall elevated metal (Al, Cu) levels in hollow fill drainages, especially in the absence of settling ponds.
   D. Some hollow fill streams were acutely toxic to test organisms
   E. Hollow fill drainages were characterized by a more tolerant biotic community (lower total species richness, lower EPT richness, lower % EPT and elevated Chironomidae populations) than reference streams or sites below settling ponds. 6-4-4

Thank you for the opportunity to comment on these draft comments.

Ellis,Charles

From: Rene Hypes [srhypes@dcr.state.va.us]
Sent: Thursday, December 18, 2003 5:40 PM
To: Ellis,Charles
Cc: J. Chris Ludwig; Steve Robie; Synthia Waymack; Thomas Smith
Subject: Natural Heritage Resources List -Mountaintop Mining

MountaintopMiningTableDEQ.xls

Charlie,

Ellis requested I send you a list of the natural heritage resources for the proposed mountaintop mining area by 12/19. I drew the project boundaries from the large scale map included in the EIS to generate the natural heritage resources list. I have attached the list which may be modified if better boundaries are identified for the project area. Please let me know if you need any additional information. As I mentioned to Ellis we are meeting with DMME on Monday(12/19) by conference call to further discuss this project.

Take Care and Have A Nice Holiday!

S. Rene' Hypes
Project Review Coordinator
DCR-DNH
217 Governor Street
Richmond, Virginia 23219
804-371-2708 (phone)
804-371-2674 (fax)
srhypes@dcr.state.va.us <mailto:srhypes@dcr.state.va.us>

1

Aquatic Natural Heritage Resources within the Proposed Study Area for Mountaintop Mining

Common Name	Scientific Name	Federal Status	State Status	Global Rank	State Rank	Fws_soc
Tennessee Clubshell	Pleurobema oviforme			G3	S2S3	
Tennessee Pigtoe	Fusconaia barnesiana		SC	G2G3	S2S3	SOC
Gilt Darter	Percina evides			G4	S2	
Swannanoa Darter	Etheostoma swannanoa			G4	S2	
Oyster Mussel	Epioblasma capsaeformis	LE	LE	G1	S1	
Dusky Darter	Percina sciera			G5	S1S2	
Tennessee Pigtoe	Fusconaia barnesiana		SC	G2G3	S2S3	SOC
Golden Darter	Etheostoma denoncourti		LT	G2	S1	SOC
Tennessee Heelsplitter	Lasmigona holstonia		LE	G3	S1	
Brown Supercoil	Paravitrea septadens		LT	G1	S1	SOC
Black Sculpin	Cottus baileyi			G4Q	S2	
Tan Riffleshell	Epioblasma florentina walkeri	LE	LE	G1T1	S1	
	Mussel concentration site			GNR	SNR	
Fine-rayed Pigtoe	Fusconaia cuneolus	LE	LE	G1	S1	
Slabside Pearlymussel	Lexingtonia dolabelloides	C	LT	G2	S2	
Onyx Rockcanail	Leptoxis praerosa			G5	S1S3	
Fragile Papershell	Leptodea fragilis		LT	G5	S2	
Spiny Riversnail	Io fluvialis		LT	G2	S2	SOC
Hellbender	Cryptobranchus alleganiensis		SC	G3G4	S2S3	
Black Sandshell	Ligumia recta		LT	G5	S2	
Sheepnose	Plethobasus cyphyus		LT	G3	S1	
Black Sculpin	Cottus baileyi			G4Q	S2	
Deertoe	Truncilla truncata		LE	G5	SH	
Rough Rabbits Foot	Quadrula cylindrica strigillata	LE	LE	G3T2	S2	
Purple Bean	Villosa perpurpurea	LE	LE	G1	S1	
Slabside Pearlymussel	Lexingtonia dolabelloidea	C	LT	G2	S2	
Shiny Pigtoe	Fusconaia cor		LE	G1	S1	SOC
Little-winged Pearlymussel	Pegias fabula	LE	LE	G1	S1	
River Redhorse	Moxostoma carinatum		SC	G4	S2S3	
Cinch Sculpin	Cottus sp. 4			G1G2	S1S2	SOC
Blotchside Logperch	Percina burtoni		SC	G2	S1	SOC
Bluebreast Darter	Etheostoma camurum		SC	G4	S2	
Channel Darter	Percina copelandi		SC	G4	S2	
Spiny Softshell	Apalone spinifera			G5	S2	
Tennessee Dace	Phoxinus tennesseensis		LE	G3	S1	
Green-faced Clubtail	Gomphus viridifrons			G3	S2	

8-3-5

Aquatic Natural Heritage Resources within the Proposed Study Area for Mountaintop Mining

Stonecat	Noturus flavus		SC	G5	S2	
Fluted Kidneyshell	Ptychobranchus subtentum	C		G2G3	S2	
Snuffbox	Epioblasma triquetra		LE	G3	S1	
Fanshell	Cyprogenia stegaria	LE	LE	G1	S1	
Pimple Back	Quadrula pustulosa		LT	G5	S2	
Cumberland Combshell	Epioblasma brevidens	LE	LE	G1	S1	
Appalachian Monkeyface	Quadrula sparsa	LE	LE	G1	S1	
Elktoe	Alasmidonta marginata		SC	G4	S2	
Slippershell Mussel	Alasmidonta viridis		LE	G4G5	S1	
Spectacle Case	Cumberlandia monodonta		LE	G2G3	S1	SOC
Mudpuppy	Necturus maculosus			G5	S2	

Definition of Abbreviations Used on Natural Heritage Resource Lists of the Virginia Department of Conservation and Recreation

Natural Heritage Ranks

The following ranks are used by the Virginia Department of Conservation and Recreation to set protection priorities for natural heritage resources. Natural Heritage Resources, or "NHR's," are rare plant and animal species, rare and exemplary natural communities, and significant geologic features. The primary criterion for ranking NHR's is the number of populations or occurrences, i.e. the number of known distinct localities. Also of great importance is the number of individuals in existence at each locality or, if a highly mobile organism (e.g., sea turtles, many birds, and butterflies), the total number of individuals. Other considerations may include the quality of the occurrences, the number of protected occurrences, and threats. However, the emphasis remains on the number of populations or occurrences such that ranks will be an index of known biological rarity.

S1 Extremely rare; usually 5 or fewer populations or occurrences in the state; or may be a few remaining individuals; often especially vulnerable to extirpation.

S2 Very rare; usually between 5 and 20 populations or occurrences; or with many individuals in fewer occurrences; often susceptible to becoming extirpated.

S3 Rare to uncommon; usually between 20 and 100 populations or occurrences; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances.

S4 Common; usually >100 populations or occurrences, but may be fewer with many large populations; may be restricted to only a portion of the state; usually not susceptible to immediate threats.

S5 Very common; demonstrably secure under present conditions.

SA Accidental in the state.

S#B Breeding status of an organism within the state.

SH Historically known from the state, but not verified for an extended period, usually > 15 years; this rank is used primarily when inventory has been attempted recently.

S#N Non-breeding status within the state. Usually applied to winter resident species.

SU Status uncertain, often because of low search effort or cryptic nature of the element.

SX Apparently extirpated from the state.

SZ Long distance migrant whose occurrences during migration are too irregular, transitory and/or dispersed to be reliably identified, mapped and protected.

Global ranks are similar, but refer to a species' rarity throughout its total range. Global ranks are denoted with a "G" followed by a character. Note that GA and GN are not used and GX means apparently extinct. A "Q" in a rank indicates that a taxonomic question concerning that species exists. Ranks for subspecies are denoted with a "T". The global and state ranks combined (e.g. G2/S1) give an instant grasp of a species' known rarity.

These ranks should not be interpreted as legal designations.

Federal Legal Status

The Division of Natural Heritage uses the standard abbreviations for Federal endangerment developed by the U.S. Fish and Wildlife Service, Division of Endangered Species and Habitat Conservation.

LE Listed Endangered - threatened with extinction throughout all or a significant portion of its range
LT Listed Threatened - likely to become endangered in the foreseeable future
PE Proposed Endangered
PT Proposed Threatened
C Candidate - enough information is available to propose for listing, but listing is precluded by other pending proposals of higher priority
SOC Species of Concern -- species that merit special concern (not a regulatory category)
NF No federal legal status

E(S/A) Treat as endangered because of similarity of appearance
T(S/A) Treat as threatened because of similarity of appearance

State Legal Status

The Division of Natural Heritage uses similar abbreviations for State endangerment.

LE Listed Endangered
LT Listed Threatened
C Candidate
SC Special Concern -- animals that merit special concern according to VDGIF (not a regulatory category)
NS No state legal status

PE Proposed Endangered
PT Proposed Threatened

Definition of Abbreviations Used on Natural Heritage Resource Lists
of the
Virginia Department of Conservation and Recreation

Conservation Site Ranks

Brank is a rating of the significance of the conservation site based on presence and number of natural heritage resources; on a scale of 1-5, 1 being most significant:

B1 - Outstanding significance
B2 - Very high significance
B3 - High significance
B4 - Moderate significance
B5 - of General Biodiversity significance

For information on the laws pertaining to threatened or endangered species, contact:
U.S. Fish and Wildlife Service for all FEDERALLY listed species
Department of Agriculture and Consumer Services Plant Protection Bureau for STATE listed plants and insects
Department of Game and Inland Fisheries for all other STATE listed animals

Literature Cited

Stein, B.A, L. S. Kuther and J.S. Adams. 2000. Precious Heritage; The Status of Biodiversity in the United States. Oxford University Press. Pp. 173 & 190-191.

RECEIVED

JUL 10 2003

DEQ-Office of Environmental Impact Review

COMMONWEALTH of VIRGINIA

W. Taylor Murphy, Jr.
Secretary of Natural Resources

DEPARTMENT OF ENVIRONMENTAL QUALITY

Street Address: 355 Deadmore Street, Abingdon, Virginia 24210
Mailing Address: P.O. Box 1688, Abingdon, Virginia 24212-1688
Fax: (276) 676-4899
www.deq.state.va.us

Robert G. Burnley
Director

Michael D. Overstreet
Regional Director
(276) 676-4800

July 7, 2003

Mr. Charles H. Ellis III
Department of Environmental Quality
Office of Environmental Impact Review
629 East Main Street, Sixth Floor
Richmond, VA 23219

Re: EPA Mountaintop Mining/Valley Fills in Appalachia Environmental Impact Review

Dear Mr. Ellis:

The Department of Environmental Quality (DEQ) Southwest Regional Office received the subject CD on June 17, 2003. The Southwest Regional Office is responsible for implementing regulatory air, water and waste programs in thirteen of Virginia's southwestern most counties. Of these thirteen counties, Lee, Wise, Buchanan, Dickenson, Tazewell and portions of Scott and Russell Counties are located in the Virginia portion of Appalachia where coal mining takes place.

The Norfolk District of Corps of Engineers, regulates coal mining activities mainly through the Nationwide Permit Number 21 (NWP 21) for Surface Coal Mining. Virginia DEQ does not issue separate Virginia Water Protection Permits for coal mining activities that qualify for the NWP 21. By mutual agreement, projects that exceed thresholds for NWP 21, are permitted under the Department of Mines, Minerals and Energy NPDES permit program using guidelines established in the Virginia Water Protection Program. This EIR discusses some issues that these programs work through with each Coal Permit application. With this background in mind, we would like to offer the following comments. 12-1-5

Table II.B-2 Distinctions Among MTM/VF EIS Alternatives, highlights the different focus of each of the permit programs and points to the changes that should be implemented so that a more straight forward review can be accomplished by all parties. For instance, SMCRA permit authorization should incorporate requirements for minimization and alternatives analysis for excess spoil disposal. Rule-making that is more consistent with the Clean Water Act Section 404(b)(1) guidelines would allow agencies to work together instead of trying to fulfill guidelines at cross-purposes. Development of advanced identification of disposal sites (ADID), watersheds generally unsuitable for fill, could encourage alternative valley fill solutions from the beginning of the project. Designation of ADID sites would give the permittee a better idea of the viability of a project before resources are committed. Another action is to continue rulemaking relative to the stream buffer zone rule and excess spoil disposal. 12-1-4

Other actions proposed by the alternatives are consistent with Virginia and Norfolk District Corps of Engineers discussions on how to protect the environment. Develop guidance policies or rule making for consistent definitions of stream characteristics as well as field methods for delineating those characteristics. Refine the uniform, science-based protocols for assessing ecological function, and refine and calibrate the stream assessment protocol to assess stream conditions and to determine mitigation requirements. Assess aquatic ecosystem restoration and mitigation methods. Develop guidelines identifying state of the science BMPs for selecting appropriate growth media, reclamation techniques, revegetation species, and success measurement techniques for post mining land uses involving trees. 1-3

In Chapter III, page 18 of 22, mitigation recommendations minor those of Virginia programs. That is, "replacement of a mined for filled stream by restoration or creation of a similar type of stream would be more in keeping with this policy [in-kind compensatory mitigation] than would replacing stream systems with palustrine wetland systems." Recognition of the functional values of streams and that these values are not replaced by a wetland system is a critical component in valley fill projects.

Thank you for the opportunity to comment on this document. The studies and recommendations of this report should help to further both the science and policies in relation to mountaintop mining and valley fill projects.

Sincerely,

Allen J. Newman, P.E.
Water Permit Manager

If you cannot meet the deadline, please notify CHARLIE ELLIS at 804/698-4488 prior to the date given. Arrangements will be made to extend the date for your review if possible. An agency will not be considered to have reviewed a document if no comments are received (or contact is made) within the period specified.

REVIEW INSTRUCTIONS:

A. Please review the document carefully. If the proposal has been reviewed earlier (i.e. if the document is a federal Final EIS or a state supplement), please consider whether your earlier comments have been adequately addressed.

B. Prepare your agency's comments in a form which would be acceptable for responding directly to a project proponent agency.

C. Use your agency stationery or the space below for your comments. IF YOU USE THE SPACE BELOW, THE FORM MUST BE SIGNED AND DATED.

Please return your comments to:

MR.CHARLES H. ELLIS III
DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL IMPACT REVIEW
629 EAST MAIN STREET, SIXTH FLOOR
RICHMOND, VA 23219
FAX #804/698-4319

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DEQ-Office of Environmental Impact Review

CHARLES H. ELLIS III
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

Statements in the project document concerning endangered species were reviewed and compared to available information. As required in the draft MTM/VF, the SMRCA regulatory authority will continue to consult with U.S. Fish and Wildlife Service and appropriate state agencies regarding federal- and state-listed endangered and threatened species. No additional comments are necessary in reference to endangered plant and insect species regarding this project.

(signed) (Keith R. Tignor) (date) August 13, 2003
(title) Endangered Species Coordinator
(agency) VDACS, Office of Plant and Pest Service

PROJECT # 03-106F 8/98

If you cannot meet the deadline, please notify CHARLIE ELLIS at 804/698-4488 prior to the date given. Arrangements will be made to extend the date for your review if possible. An agency will not be considered to have reviewed a document if no comments are received (or contact is made) within the period specified.

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DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL IMPACT REVIEW
629 EAST MAIN STREET, SIXTH FLOOR
RICHMOND, VA 23219
FAX #804/698-4319

CHARLES H. ELLIS III
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

See attached.

(signed) Alan D. Weber (date) 8-12-03
(title)
(agency) VDH

PROJECT # 03-106F 8/98

Subject: Mountaintop Mining/Valley fills CD
Date: Wed, 06 Aug 2003 11:08:36 -0400
From: Mike Dishman <mdishman@vdh.state.va.us>
To: Jerry Peaks <gpeaks@vdh.state.va.us>
CC: "Puckett,Richard" <rpuckett@vdh.state.va.us>,
"Henderson,Dean" <dhenderson@vdh.state.va.us>

You sent us a CD on the subject and asked us to comment. We have very few stream intakes that would even potentially be impacted: Pennington Gap, St. Paul, Wise County PSA, maybe Richlands. The other WTP sources are small mountain top reservoirs or large reservoirs like Pound lake or Flannagan. Our comments are:

1. The report seems to propose VPDES permits for any valley fills. Our comment would be that ODW should review these applications for water supply impacts.

2. Mountaintop mining/valley fill proposed in a watershed within 5 miles of an intake should at least be announced to ODW and the waterworks owner. We assume that runoff ponds and silt fences will be required to contain runoff, in which case the streams should be adequately protected as far as water supply requirements go.

If you were looking for more, let me know.

Mike Dishman, P.E. <mdishman@vdh.state.va.us>
Deputy Field Director
Virginia Department of Health
Office of Drinking Water

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Office of Environmental Impact Review

Memorandum

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER DIVISION
Larry G. Lawson, P.E., Director

To: **Charlie Ellis**
Environmental Program Planner

From: Ellen Gilinsky, Ph. D, PWS
VWP Permit Program Manager

Date: August 7, 2003

Subject: **Mountaintop Mining/Valley Fill Draft EIS**
EPA
Project Number 03-106F

Mountaintop mining considers all types of surface coal mining (mountaintop removal, contour, area, etc.) in the steep terrain of the central Appalachian coalfields. Removal of overburden and interburden (rock above and between coal seams, respectively) during mountaintop mining / valley fills (MTM/VF) operations results in generation of excess spoil, because the broken rock will not all fit back into the mining pit. The excess spoil must be placed in disposal sites adjacent to the mining pits in order to allow for efficient and economical coal extraction. Typical locations for excess spoil disposal sites are valleys, also known as heads-of-hollows or uppermost (headwater) stream reaches. The usual method of disposing of this excess spoil is to place it in engineered earthen and rock structures known as excess spoil disposal areas or colloquially known as head-of-hollow fills, hollow fills or valley fills.

The U.S. Army Corps of Engineers (COE) and the U.S. Environmental Protection Agency (EPA) share responsibility for implementing different portions of the Clean Water Act (CWA). The COE has the principal authority to regulate the placement of fills into waters of the U.S. under CWA Section 404 while EPA maintains oversight authority. The EPA Office of Surface Mining (OSM) is responsible for the national administration of the Surface Mining Control and Reclamation Act (SMCRA), and has delegated this authority to states in the EIS study area except Tennessee. Delegation of SMCRA authority occurs when states assume primacy for regulating surface coal mining and reclamation by adopting statutes and regulations no less effective than the Federal counterparts.

The COE, EPA, and the OSM propose to establish an integrated surface coal mining regulatory program in steep slope Appalachia. The objective of the coordinated program improvements considered by this EIS is consistent application of the CWA and the SMCRA to improve the regulatory process and effect better environmental protection for MTM/VF operations. To effect this integrated regulatory program, the COE, EPA, and OSM would amend their policies, guidance, procedures, or regulations as necessary. These amendments would result in MTM/VF operations that avoid, minimize, or mitigate, to the maximum extent practicable, significant adverse impacts to the waters of the U.S. and prevent material damage to water resources outside the permit area; would streamline the permitting process; and would coordinate the agencies'

07/24/2003 15:33 7572478062 VMRC HM PAGE 02/04

If you cannot meet the deadline, please notify CHARLIE ELLIS at 804/698-4488 prior to the date given. Arrangements will be made to extend the date for your review if possible. An agency will not be considered to have reviewed a document if no comments are received (or contact is made) within the period specified.

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C. Use your agency stationery or the space below for your comments. IF YOU USE THE SPACE BELOW, THE FORM MUST BE SIGNED AND DATED.

Please return your comments to:

MR.CHARLES H. ELLIS III
DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL IMPACT REVIEW
629 EAST MAIN STREET, SIXTH FLOOR
RICHMOND, VA 23219
FAX #804/698-4319

CHARLES H. ELLIS III
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

Please be advised that the Marine Resources Commission, pursuant to Section 28.2-1200 et seq of the Code of Virginia, has jurisdiction over any encroachments in, on, or over the beds of the bays, ocean, rivers, streams, or creeks which are the property of the Commonwealth. Accordingly, if any portion of the subject project involves any encroachment channelward of ordinary high water along natural rivers and streams, a permit may be required from our agency. Thank you for the opportunity to comment.

(signed) [illegible] (date) 7-24-03
(title) ENVIRONMENTAL ENGINEER
(agency) VMRC

PROJECT # 03-106F 8/98

If you cannot meet the deadline, please notify CHARLIE ELLIS at 804/698-4488 prior to the date given. Arrangements will be made to extend the date for your review if possible. An agency will not be considered to have reviewed a document if no comments are received (or contact is made) within the period specified.

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Please return your comments to:

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DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF ENVIRONMENTAL IMPACT REVIEW
629 EAST MAIN STREET, SIXTH FLOOR
RICHMOND, VA 23219
FAX #804/698-4319

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CHARLES H. ELLIS III
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

I have reviewed the draft EIS. While I have no substantive comments to offer, at the same time I have no objectives to Alternative 2, the preferred alternative.

(signed) [illegible] (date) July 18, 2003
(title) County Administrator
(agency) Wise County

PROJECT # 03-106F 8/98

FAX

DEPARTMENT OF ENVIRONMENTAL QUALITY

OFFICE OF ENVIRONMENTAL IMPACT REVIEW

TO: William Caudill

Office: Buchanan County

FAX: (276) 935-4479

RE: Comments on EIS Review

DATE: August 12, 2003

FROM: Charlie Ellis
Dept. of Environmental Quality
Office of Environmental Impact Review
629 East Main Street, 6th Floor
Richmond, VA 23219
Lephone (804) 698-4488

FAX NUMBER: 804/698-4319

TOTAL # OF PAGES INCLUDING COVER: 1

COMMENTS:

Mr. Caudill - I need your comments, if any, on the CD version of the Draft Programmatic Environmental Impact Statement on Mountaintop Mining and Valley Fills in Appalachia (DEQ-03-106F). Thank you.

Charlie Ellis

8-12-03 IF YOU DO NOT RECEIVE ALL PAGES, PLEASE NOTIFY THE SENDER

To: Mr. Ellis

From: W. J. Caudill

Dear Sir:

I have no comments on the Draft Programmatic Environmental Impact Statement on Mountaintop Mining and Valley fills in Appalachia.

AUG-11-03 MON 11:11 PM W J CAUDILL FAX:1540 935 4479 PAGE 1

If you cannot meet the deadline, please notify CHARLIE ELLIS at 804/698-4488 prior to the date given. Arrangements will be made to extend the date for your review if possible. An agency will not be considered to have reviewed a document if no comments are received (or contact is made) within the period specified.

REVIEW INSTRUCTIONS:

A. Please review the document carefully. If the proposal has been reviewed earlier (i.e. if the document is a federal Final EIS or a state supplement), please consider whether your earlier comments have been adequately addressed.

B. Prepare your agency's comments in a form which would be acceptable for responding directly to a project proponent agency.

C. Use your agency stationery or the space below for your comments. IF YOU USE THE SPACE BELOW, THE FORM MUST BE SIGNED AND DATED.

Please return your comments to:

MR.CHARLES H. ELLIS III
DEPARTMENT OF ENVIRONMENTAL QUALITY
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629 EAST MAIN STREET, SIXTH FLOOR
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CHARLES H. ELLIS III
ENVIRONMENTAL PROGRAM PLANNER

COMMENTS

None

(signed) D. Dan Poe (date) 8/11/03

(title) County Administrator

(agency) Lee County

PROJECT # 03-106F 8/98

Department of Mines, Minerals and Energy Comments on Mountaintop Mining/Valley Fills in Appalachia Draft Programmatic Environmental Impact Statement

The Department of Mines, Minerals and Energy (DMME) offers the following comments on the Mountaintop Mining/Valley Fills in Appalachia Draft Programmatic Environmental Impact Statement (EIS). DMME finds that the draft EIS report regularly reflects use of incomplete or inaccurate data. This raises considerable credibility problems with any conclusions drawn from this information. Correcting these problems would take years and substantial budgets. DMME believes the public health and safety will be better protected if the draft programmatic EIS process is ended at this stage and a true no-action alternative is selected. This option would have the existing SMCRA, EPA, and COE programs regulate coal-mining operations as they currently do. This option recognizes that there has been considerable change in the regulatory programs since this EIS process was started that are sufficient to address the problems that lead to the programmatic EIS. 1-12

This differs from the No Action alternative described in the report that proposes actions that differ from the current regulatory practice. For example, current practice does not require SMCRA or EPA programmatic decisions to defer to COE 404 decisions. A true no-action alternative would allow the three regulatory programs to coordinate actions and not set up a single lead program.

DMME also has reviewed the draft EIS and offers the following specific comments.

Executive Summary

General Comment

The authors present this as a Mountaintop Mining/Valley Fill EIS. It should be noted upfront that it addresses much more than mountaintop mining and valley fills. For example, since the EIS began the U.S. Army Corps of Engineers (COE) has revised its procedures and now does not distinguish between fill and backfill. Any recommendations adopted as a result of the EIS would apply to any mining, backfilling and filling operations anywhere in the United States. Since the COE also does not distinguish between coal mining fill operations and other types of fills, any changes to the federal rules implemented as a result of this EIS would also apply to non-mining activities such as infrastructure construction activities, highway construction, etc. 13-3-4

Technical Studies

In the list of technical study conclusions, 7th bullet, page ES-4, the EIS concludes that wetlands created by mining are not generally of high quality. No technical studies were done in Virginia to review these types of wetlands. The EPA and COE dismiss these wetlands out of hand as being non-jurisdictional. The EIS fails to note that in Virginia, isolated wetlands are regulated and protected under state law § 62.1-44.15:5 unless they are determined to be a small isolated wetland of minimal ecological value. Therefore, conclusions in the EIS that are based on the assumption that the wetlands would not be regulated in Virginia are unfounded. 5-3-4

In the list of technical study conclusions, last bullet, page ES-4, the phrase "The extraction of coal reserves in the study area could be substantially impacted if fills are restricted to small watersheds" should be changed to "would be substantially impacted". The EIS Mountaintop Technical Team reviewed plans on 11 sites and concluded that there would be a 90.9% reduction in mineable coal. 13-1-4

The above mentioned plan review is the only actual site-specific study in the EIS. Additionally, the Phase I and II, Economic Studies are seriously flawed models as discussed at the October 17, 2002 EIS Economic Meeting in Charleston, WV. Therefore, many parts of this draft EIS are not supported by accurate, fact-based studies. Conclusions drawn in the EIS, and any actions taken in response to these conclusions, may be considered arbitrary and capricious. Any actions taken as a result of this EIS would need to be justified by separate, accurate, fact-based studies and not rely on the information in the draft EIS. 11-9-2

Environmental and Process Benefits

On page ES-8, the No Action Alternative, as well as elsewhere in the EIS, is inaccurately characterized. A true No Action Alternative presents no changes. This is not the case with coal mining regulation. Since 1998 the SMCRA, EPA and COE programs (particularly the COE's requirements) have been changing and continue to change. For example, the COE has informed the Virginia DMME that it intends to develop standard operating procedures to try to achieve some consistency between COE districts. In addition in Virginia the COE and the Nature Conservancy are developing an MOU for an In-Lieu Fee Program for mitigation of stream impact. West Virginia has implemented new state specific laws and regulations that change mining rules in West Virginia but not in other states in the study area. As such it is impossible for the EIS to accurately describe the first option as a No Action Alternative. This option should be recharacterized as an option that would continue the existing SMCRA, EPA, and COE regulatory programs, including past and ongoing amendments to the processes.

1st full paragraph, page ES-9, the reference to the 250-acre limit in West Virginia states that use of the 250-acre limit has reduced the number of valley fills. This statement fails to note that restricting fills to watersheds less than 250 acres resulted in numerous instances of many more fills being proposed in order to stay below the 250-acre threshold. Instead of 3 or 4 large fills a dozen or more smaller fills were proposed. The implication that the 250-acre limit helped reduce the number of fills cannot be supported. 12-2-4

In the next to last paragraph, page ES-10, the EIS states that an MOA would be developed under Alternatives 1, 2 and 3. The EIS does not discuss the difficulty in establishing and implementing such an MOA. It has been the experience of Virginia DMME that obtaining such an MOA is very difficult.

- Approximately three years ago, DMME approached the Norfolk District COE about developing an MOA. The COE declined to enter into discussions on development of an MOA.
- DMME tried unsuccessfully to enter into an MOA with the Virginia Field Office of the U.S. Fish and Wildlife Service (USFWS). The USFWS tried to make all DMME

permitting actions federal undertakings through language in the MOA. This would have lead to a USFWS takeover the state's role in permits involving T&E species on mine sites. When the USFWS was unable to get DMME to agree to this approach they declined to continue working on an MOA.

- The 1996 "Formal Section 7 Biological Opinion and Conference Report on Surface Coal Mining and Reclamation Operations Under the Surface Mining Control and Reclamation Act of 1977" spells out the process to be used for consultation between state SMCRA agencies such as DMME and USFWS. USFWS staff in Virginia do not follow its guidance.

Until the federal agencies show acceptance of existing agreements and flexibility in drafting new agreements that will meet the needs of all parties, the MOA approach is likely to fail and any alternative relying on use of MOAs is questionable.

Actions and Alternatives
In the list of cooperative efforts by the "federal and/or state agencies", 5th bullet, page ES-7, the COE is currently requiring post mitigation monitoring for a period of five years. Under SMCRA areas that are remined are eligible for bond release after two years. The two-year liability period was put into place as an incentive for remining and reclaiming abandoned mined lands (AML). To require all SMCRA permits to implement the five year monitoring and liability period would be counter productive. EPA has documentation that remining and reclaiming AML areas will improve water quality. Any cooperative effort between the agencies should give deference to remining activities as required by the 1992 Energy Policy Act and the Rahall Amendment to the Clean Water Act, and not uniformly incorporate existing COE standards across the whole SMCRA program. 12-2-4

In the list of "OSM and/or state SMCRA regulatory authorities" efforts, 4th bullet, page ES-8, the EIS proposes "if legislative authority is established by Congress or the states, require reclamation with trees as the postmining landuse." The EIS steering committee was advised several times that this is not feasible. Due to multiple mineral and surface ownership issues, and the fact that many permit applicants do not own the surface but rather have a non exclusive right of entry to mine the coal and reclaim the area. The control over the type of vegetation to be replaced will remain primarily with the surface landowner. The EIS is not authorized to intrude into private ownership rights as suggested here. While in Virginia over 85% of mined land is reclaimed to forested use, some Virginia landowners wish to have hayland and pasture as a postmining land use. These sites are actively managed by the landowners and are productive hayland pastures. This recommendation should be removed from the EIS.

Chapter I – Purpose and Need
I.A Introduction
On Page I-1, the EIS goes beyond the true definition of "mountaintop mining". The EIS defines the term "mountaintop" as the "summit of the mountain". In reality, the draft EIS addresses all area from the valley floor to the summit. ("Surface coal mining occurring on mountaintops, ridges, and other steep slopes…). The use of the term "mountaintop mining" in the draft EIS should be changed to reflect the broad effect of actions proposed in the draft EIS.

The EIS classifies fills as "valley fills", ignoring the existence of other types of fills such as bench fills and side hill fills. (See also note I. E. – where excess spoil fills, otherwise known as valley fills" - and I. F, 1 on page I-5 – chronology may be misleading if reference to valley fills is also encompassing other types of excess spoil disposal areas.) The EIS should accurately characterize the types of fills it is addressing. Without this characterization, any requirements implemented as a result of this EIS could perversely affect the use of these other types of fills. For example, there are significant environmental benefits from utilizing pre-existing benches for the placement of excess soil - eliminating miles of pre-Act abandoned highwalls.

The EIS was initiated and developed by the federal agencies in partnership with West Virginia. West Virginia was a signatory to the Settlement Agreement; the other primacy states were not. The Introduction section should recognize that the other Appalachian states were not formal parties to this EIS and that the recommendations in the EIS may not be appropriate in these other states.

I.B Proposed Action and I.C Purpose of the EIS 12-2-4
The EIS recommends the OSM, EPA and COE establish a uniform federal mandate in the Appalachian coalfields. This was developed primarily on conditions in West Virginia. The EIS does not recognize the unique differences in the types of coal mining operations in Virginia (and other Appalachian states) as compared to conditions in West Virginia. If the EIS process is continued, the EIS should be revised to reflect the differing conditions among the Appalachian states.

I.D Need for Proposed Action
On page I-3 the opening paragraph states that impacts in the study area are at least as significant as impacts in other areas, and that the measures to address the impacts in the study area would be adequate for other areas. This one-size-fits-all approach does not recognize that the impacts from coal mining are significantly less in some areas and that the proposed measures in the draft EIS are greater than is needed in these areas.

On page I-8, the draft EIS discusses the Bragg 1998 Settlement. This settlement agreement was signed by the federal agencies and West Virginia relative to MTM/VF. However, Virginia and other primacy states in the Appalachian coalfields were not signatories to such and are not bound by the terms and conditions of the agreement. This EIS assumes that the federal agencies, via oversight, would compel other state compliance as a condition of maintaining their regulatory programs. (Note Page I-9 – "to aid in the objective of increased scrutiny of permits.") The federal agencies should not unilaterally implement a voluntary consent agreement in non-signatory states. The draft EIS should not assume that the processes agreed to in the consent agreement are needed in the other states or would be done. 1-6

The 2000-2003 Chronology –states that, "Following the permitting changes instituted pursuant to the *Bragg* settlement agreement and other unrelated factors, the average number of fills/year approved in the EIS study area declined…." The EIS did not note that the decline was due in part to the COE's moratorium on issuing 404 or NWP 21 permits - which resulted in a tremendous backlog of permit applications in West Virginia & thus less fill approvals. Any assumption that the permitting changes instituted pursuant to the Bragg settlement agreement has 13-2-4

a positive effect on the number of approved fills per year may not be supported by the actual conditions in the West Virginia regulatory program. 13-2-4

Chapter II
Summary of Alternatives
The EIS process should be ended at this point and the OSM, EPA, and COE programs should be continued as they are in effect today. The action alternatives cannot be supported by the record in the draft EIS. Many of the studies used to develop the EIS are flawed. Conclusions are based on either incorrect or limited data. It would be prohibitively expensive and timely to fix these problems sufficiently to support any action alternative. If the EIS process is not stopped, then the federal agencies should adopt Alternative 3. This would recognize the unique expertise of SMCRA agencies in evaluating the effects of mining operations on the environment, and lead to a more efficient and effective outcome than the other alternatives. 1-4

There are some specific problems with items in Chapter II as outlined below.

On page II.B- in section 3a, there is a regulatory process benefits discussion concerning a joint application form. The EIS concludes that use of common data elements in a joint application form could result in more efficient analytical approaches among agencies. DMME is concerned about the administrative difficulty and costs of developing one joint application form. Different agencies use various software and data capture systems. All electronic permitting systems used by state and federal agencies would have to be compatible to achieve the intended results. This may cause major system modifications for some and use of new systems for others. The draft EIS does not account for the cost or effort needed to harmonize these systems. Such cost may negate the benefits of a consolidation effort. 12-2-4

On page II B-15 b, under Distinguishing Process Benefits, the EIS discusses use of a coordinated regulatory review. This would be efficient only as long as each agency completed reviews in a timely manner. For example, if federal agencies could not meet state regulatory review schedules, state regulatory agencies would be left with a backlog waiting for comments from other agencies. In Virginia, federal agencies have not been able to meet state processing guidelines. The EIS should account for the cost of this type of delay.

Chapter III
Chapter III.C – Appalachian Aquatic Systems
There are errors in grammar, spacing, and organization throughout the draft EIS. Chapter 3 Part C contains several. Generally, the report is fragmented and difficult to follow. Problems with the presentation of material in the EIS, including Chapter 3 Part C, bring into question the reliability of much of the information and conclusions in the report.

Chapter III.D - Impact Producing Factors to Headwater Streams from Mountaintop Mining
Chapter III, Part D states that it has not been determined if drainage structures associated with mining can provide benefits that could offset aquatic impacts. However, study has shown that ponds do provide such benefits. A Virginia Tech graduate study titled Ecotoxicological Evaluation of Hollow Fill Drainages in Low Order Streams in the Appalachian Mountains of 6-6-4

Virginia and West Virginia by Timothy Merricks with Dr. Donald Cherry concludes that settling ponds input organic enrichment that enhance collector filterer populations, including benthic macroinvertebrates and *in situ* test clams. 6-6-4

Chapter III, Part D, page III.D contains the statement that further evaluation of stream chemistry and further investigation into the linkage between stream chemistry and stream biotic community structure and function are needed. Virginia's Department of Mines, Minerals, and Energy (DMME), through its contractor Map Tech, Inc, has completed two Total Maximum Daily Load (TMDLs) studies that utilize a regression analyses methodology to correlate stream water chemistry and biological health. The work shows linkages between general benthic health scores and a combination of chemical stressors, as well as a particular pollutant and a specific benthic metric. 5-5-5

Chapter III.E – Coal Mine Drainage from Surface Mining
On page III.E-2 of part 2, the definition of Coal Mine Drainage (CMD) as drainage from surface mining that causes water quality problems is unusable. This definition could include drainage from most mined lands through out the study area. Yet Table III.E-1 (page III.E-7) indicates that only 10 CMD sites are identified for all of Kentucky and only 26 CMD sites are identified in Virginia. The Virginia number is from Virginia's AMD inventory and represents long-term pollution discharges. Also, the number of active permits shown in Virginia is incorrect. The 26 sites in Virginia represent all long-term pollution discharges in Virginia from active and non-active sites. 5-5-4

On page III.E-6 in the first paragraph of Part 2 (b), the narrative seems to use CMD and acid mine drainage (AMD) interchangeably. These terms are not interchangeable and should not be used as such.

The draft EIS indicates on page III.E-13 that Virginia is actively working with the EPA in pursuing a regulation change to the Clean Water Act (CWA) for discharges from coal remining sites. Virginia is currently not pursuing a CWA regulation change. EPA promulgated the remining rule January 23, 2002.

Chapter III.F – Appalachian Forest Communities
Page III.F-12 characterizes reclaimed mined lands in the study area as, "... often limited in topographic relief, devoid of flowing water, and most commonly dominated by erosion-controlling, herbaceous communities". This characterization is not accurate for reclaimed mined lands in Southwest Virginia. Eighty-five percent of reclaimed mined lands in Virginia are returned to forests. Most reclaimed mined lands in Virginia are returned to the approximate original contour including re-establishing drainage patterns. 7-6-4

Many of the generalizations made about the study area do not or should not apply to Virginia's coalfields. It is clear that many of the referenced studies included in the Appendix and narrative in Chapter 3 do not include Virginia. It's unclear and, most readers/reviewers will probably be unsure, if Virginia's seven coalfield counties were part of the area actually studies for the EIS.

Chapter III.K.2 - Trends in Valley Fills
Page III.K-36, section d. Virginia Valley Fill Size Trends, the data for Virginia is misleading. During the period of 1998 to 2002, Virginia did not distinguish between backfill and excess spoil designations for multiple seam mining. Spoil placed above the lowest coal seam mined was deemed to be excess spoil if there was a valley fill at that location below the lowest coal seam mined. This resulted in an overstatement of the footprint of valley fills during that period. *Beginning in 2002, only excess spoil placed below the lowest coal seam mined on steep slopes* was determined to be valley fills as this is the actual definition of excess spoil. Spoil placed above the lowest coal seam mined is now defined as backfill. Therefore, the statements in this section that characterize the total and average valley fill acreage in Virginia are larger than actual, and should not be used. 13-3-4

Chapter III. L - Mine Feasibility Evaluation and Planning
General Considerations:
Page III.L-3 In section c, "Reclamation Bonding" the last full paragraph reads in part "Complete release of reclamation bonds on a given area typically requires five years after completion of reclamation,". This section should also note that areas that are remined are eligible for bond release in two years. 12-2-4

Chapter III. M - Coal Distribution and Markets
Page III.M-7, the last paragraph appears to be inaccurate. Virginia has more than 52 mines and West Virginia certainly has more than 35. It is unclear if this is meant to be the number of surface mines or the combined total of surface and underground mines. In addition VA DMME is incorrectly cited as the source of the information on Kentucky mines or production. DMME did not provide this information. 11-8-4

Chapter III.P – Demographic Conditions
The descriptions of demographics, economic conditions, and historic & archaeological resources do not accurately portray Virginia's coalfields. Some statements could lead one to believe that the writers were not sure of the location of Virginia's coalfields. Examples include placing the Blue Ridge Parkway in Virginia's coalfields and using the Thunderbird Paleo-Indian site in Virginia's Shenandoah Valley as an example of local archaeological resources. The study identifies tourist attractions in Kentucky, West Virginia, and Pennsylvania, but says that none of the Virginia study area counties are tourism destinations. Many examples of tourist attractions equivalent to the ones identified for the other states exist within Virginia's coal counties – like state parks & national forests. The report's errors and failure to highlight known Virginia tourist attractions indicate that the writers were not familiar with the area. These errors add to the lack of credibility of the draft EIS. 10-2-4

Chapter III.Q - Economic Conditions
The socio-economic studies on community impacts do not adequately address the effects that loss of coal-mining jobs would have on communities in the Appalachian coalfields. The EIS should also look at past studies or perhaps do new studies on communities impacted by the loss of or significant reductions in mining. A classic example to study would be communities that were developed by mining companies such as Lynch, KY. When the U.S. Steel mining operation was sold to Arch, the community suffered significant impacts. It had previously been 11-9-2

7

supported almost entirely by the company, U.S. Steel, with even the basic infrastructure being maintained by the company. With the purchase by Arch the community had to start providing this support and maintenance itself.

When communities suffer near or complete loss of mining, a marked change in the demographics of the community eventually occurs. With the loss of the economic base that once supported the community, a loss of younger community members occurs as they leave to find employment in other areas. Eventually the community winds up with an unusually high number of vacant houses - people are unable to sell the houses since the real estate market usually plummets in these areas. The population of the community consists of a majority of elderly retired persons on fixed incomes. The tax base is impacted to such a degree that the community can no longer maintain the infrastructure required for a community, schools, water, sewer, etc. It often takes large infusions of grant money to keep the community intact; even then the demographics do not change. Dante and Trammel are two such communities in Virginia and it is certain that there are many in West Virginia in the same position.

The EIS should address the impact any decrease in mining would have on the federal Abandoned Mined Land (ANL) program and the UMWA Combined Benefit Funds when looking at the potential loss of mining as the result of the EIS alternative. The AML fund receives its revenue from the coal mined by companies, currently at a rate of $ 0.35/ton for surface mined coal. The AML fund is used in part to fund water projects to communities whose water supplies were previously impacted from AML mining. States can use up to 30% of their AML allocation to fund these water projects. Virginia funds two water projects a year from the AML grant. The socio-economic impacts of the loss of all or part of this community water project funding must be considered. The UMWA Combined Benefit Fund receives significant funding from the AML trust fund to make up short falls from company contributions. Reductions in AML fees paid, as the result of restricting mining must be considered. The socio-economic impact of the impact to the UMWA Combined Benefit Fund must be considered. When considering this impact it must be recognized that many if not most of these pensioners live in the communities discussed in the previous paragraphs. 11-9-2

The EIS should consider that significant reductions or loss of the AML fees would also have a significant impact on future land reclamation. State AML programs fund land reclamation construction projects that protect the public health and safety. The socio-economic impact of not having funding to address public safety and health hazards to coal field residents should be addressed.

States are depending upon remining operations to be part of the TMDL implementation plans in the coalfield areas. AML programs lack sufficient funds to reclaim low priority environmental problems (environmental problems are not high priority projects under the AML program) such as what would be included in TMDL implementation plans. Some states also have received approval to use up to 10% of their AML funding on AML acid mine drainage (AMD) projects. This AMD corrective activity would be impacted with the loss of funding from the AML program.

8

These socio-economic impacts to coal field residents from reductions in coal mining must be considered in the EIS.

Chapter III.V – Relationship of Surface Mining and Air Quality
The draft EIS states that Black Lung is a condition prevalent in coal mine workers who have worked in underground coal mines for a period of eight years or longer. The report includes six pages discussing the impacts of black lung on the residents of the study area. This information has little to do with the consequences of MTM/VF, other than if coal mining shifts from surface mining to underground mining. This irrelevant information should be deleted from the report. 15-2-4

Chapter IV
Environmental Consequences
The last paragraph on Page IV.A-3 is misleading to the reader. The author of the document describes a condition of a mine site not having a post mining land use of forestry that may take hundreds of years to revert to forestry. There are sites that are reclaimed as hayland/pasture. The land usable for farming in the coalfield counties of southwestern Virginia is very small. Post mining land uses of hayland/pasture are welcomed and are used by landowners. The report should not imply that forestry is the only desirable use of reclaimed mine land. 19-3-4

The page IV.B-1 section titled Consequences Common to the No Action Alternatives and Alternatives 1, 2, and 3 should take into account the headwater streams that are replaced with diversion ditches and drainage systems in and around fills. In addition headwater streams disrupted or severed by prior mining activities are often reconnected to lower stream reaches when the highwalls on abandoned mined land are remined and backfilled. 5-7-4

On page IV.B-4, the third paragraph discusses the potential release of toxic materials into the environment by mining operations. Studies in Virginia have not shown any toxic waters from valley fills. Also, water quality standards are monitored on a regular basis by DMLR inspection staff for compliance with water quality standards. 5-5-4

None of the stream studies referenced in this document were conducted in Virginia. Therefore, conclusions regarding streams may not be valid for Virginia.

Page IV.F-1 section Energy, Natural, or Depletable Resource Requirements fails to mention that one of the requirements of SMRCA is to maximize coal recovery. The EIS authors should recognize this statutory mandate when evaluating alternatives.

The language on page IV.G-3 gives readers the impression that mountain top mining is displacing local communities. There is no evidence of this in Virginia. In Virginia, people in these coal camps were leaving the area long before mountain top mining began to be practiced. The coal companies that constructed these camps have long since shut down and left these camps to deteriorate. With no sewer systems or public water systems, residents began leaving. With no jobs any longer available, children graduating from schools left the area for work. Mountain top mining did not create this condition. Additionally, any actions taken as a result of this EIS that restrict future mining would further harm local economies and hasten the decline of these communities. These consequences should be recognized in the EIS. 10-2-4

9

Appendix D – Aquatic
General Comment
Many of the studies cited do not address Virginia. Virginia conditions, both on the ground conditions and the effectiveness of Virginia's coal surface mining regulatory program, differ from West Virginia and Kentucky. Conclusions based on these studies may not be applicable in Virginia. Notes on specific studies follow. 6-6-2

A Review of Wetland Resources in the Steep Slope Terrain of West Virginia
No Virginia study information included. 5-3-2

The Value of Headwater Streams: Results of a Workshop, State College, Pennsylvania, April 13, 1999
No Virginia study information included. It should be noted in the EIS that remining of AML areas would often reconnect headwater streams to lower reaches. These streams were originally disrupted by AML mining activities. The headwaters empty onto the AML bench, then flow down the bench, eventually flowing over the bench at a low point by passing the lower reach of the stream. By remining and backfilling the AML highwalls these streams can be re-connected. 6-6-2

A Survey of the Conditions of Streams in the Primary Region of Mountaintop Mining Valley Fill Coal Mining
Streams assessed during the study that contained residential development were the most impaired. Because several stressors, including mining activities and residential development could cause the observed impairments, no specific conclusions were reached. Although issues regarding conditions in sediment control ditches associated with fill construction are identified, very little useful data was provided to characterize conditions in those structures.

Kentucky Mountaintop Mining Benthic Macroinvertebrate Survey
The study has very limited usefulness because it was specific to only four Kentucky counties and samples were collected just a single time at twelve stream sites in May of 2000. The study's conclusions that mountain top mining and valley fill (MTM/VF) construction negatively impacts benthic health do not match similar study results from Virginia. See the research report "Ecotoxicological Evaluation of Hollow Fill Drainages in Low Order Streams in the Appalachian Mountains of Virginia and West Virginia" by Timothy Merricks with Dr. Donald Cherry. Also, the last paragraph of the study report indicates that the impacts to benthic health from MTM/VF activities relate to deforestation. Forest is the most common post-mining land use in Virginia. This differs from Kentucky reclamation practices and therefore the conclusions of this report do not seem applicable to Virginia. 6-4-2

Ecological Assessment of Streams in the Coal Mining Region of West Virginia Using Data Collected by the U. S. EPA and Environmental Consulting Firms
As with the Kentucky report, the study has limited usefulness because in was specific to West Virginia. Seasonal data was collected from five West Virginia watersheds. No Virginia study information was included. The study's conclusions that mountain top mining and valley fill (MTM/VF) construction negatively impacts benthic health do not necessarily match similar study results from Virginia and West Virginia. The research report "Ecotoxicological Evaluation

10

of Hollow Fill Drainages in Low Order Streams in the Appalachian Mountains of Virginia and West Virginia" by Timothy Merricks with Dr. Donald Cherry do not support this conclusion.

A Survey of the Water Quality of Streams in the Primary Region of Mountaintop/Valley Fill Coal Mining 5-5-2
No Virginia study information included. The same five West Virginia watersheds were used for the chemical water quality survey as for the ecological survey.

A Survey of Eight Major Aquatic Insect Orders Associated with Small Headwater Streams Subject to Valley Fills from Mountaintop Mining 6-4-4
On page 3 of this study, no indication if any of the streams sampled had been adversely impacted by past mining, logging, or other activities.

Flow Origin, Drainage Area, and Hydrologic Characteristics for Headwater Streams in the Mountaintop Coal-Mining Region of Southern West Virginia, 2000-01 5-4-2
The areas in this report are limited to southern West Virginia. No Virginia information is included.

Appendix E – Terrestrial
General Comment
Regional experts were not used for these studies. Experts outside the study area were used. No studies were conducted in Virginia. Refer to Appendix G comment concerning the article by the Society of American Foresters. Handel's report has no mention of amount of trees being planting by landowners today. Handel also noted that the studies were short in duration. Conclusions should not be drawn when insufficient information is obtained to back the conclusions.

Handel Terrestrial Report
"Trees that were obvious parts of an implemented planting program (determined by plantation spacing and diameter at breast height) were not included in the counts, as these did not naturally arrive on the sites and are not part of any invasion process. Any offspring produced by planted individuals were included in the data, however. We were not interested in survival of the planted trees, as all planted species we encountered are either forestry created hybrids or non-native and in fact illegal to plant in many states. Data were entered on computer databases for further study." This statement in the Handel report is an example of the types of flawed information the EIS contains. Handel references a study by Karen Holl that concluded, "The research reviewed above showed plant communities on mine sites reclaimed within the past 30 years developed into ecosystems that resemble the native hardwood forests. Although all species in surrounding forests were not found on the mined sites, the reclaimed-mine forests are still very young relative to the native hardwood forests which had developed over much longer time periods. Research has shown that reclamation practices have a dramatic influence on the rate of forested ecosystem recovery on unmanaged reclaimed mine sites, and on their long-term productivity and economic value. Practices that encourage ecosystem recovery are compatible with and complementary to those that may be used to establish commercially viable, productive hardwood forests on reclaimed mine sites." Handel described the Holl paper as follows. "An in-press article by Holl (2002) shows the potential for reinvasion and recovery on reclaimed surface mined lands. It is extremely important to note that, like the Skousen article, her study was comprised of pre-law 7-5-2

sites dating back to 1962 reclamations. She does not report how many of the 15 sites were post-law (post 1977), but her three age classes for the mines are 1962-1967, 1972-1977, and 1980-1987. Also, the mines in that report are small ¼ hectare parcels, not comparable to the large mountaintop removal areas subject to this study. The Holl study sites, only 62.5 x 40m in size, examined areas very close to seed sources, within "5-50 m from unmined forests." When Virginia Tech was asked to respond to this assertion by Handel, DMME received the following reply. "Karen (Holl) did look at larger pre-law mines, but her actual study plots are what are being sized out here. He (Handel) should be nervous because he completely mis-represented her work after she talked with him about it and offered to assist him in the interpretation." The use of experts not familiar with the region leads to these type of mistakes. Handel presumes that all mines are of the scale of large mountaintop removal operations several thousand acres in size. That is not the case in Virginia. 7-5-2

Edge Bird Populations
No studies were conducted in Virginia where the typical permit size is smaller than sites used in the study. Therefore, the conclusions in the report may not be applicable to Virginia.

Page 2 of the study gives the reader the impression that all surface mines leaves huge tracts of grasslands. This is not true in Virginia. More than 85% of all mined land in Virginia is returned to forestland. 7-3-2

Vertebrate Study
This study focuses only on grasslands. The author of this report should note that not all reclaimed mine sites have a post mining land use of hayland/pasture (grasslands). No studies were conducted on mine sites in Virginia that have been reclaimed to forestry. Therefore, the conclusions may not be applicable to Virginia lands. 7-1-2

Appendix G
Mountaintop EIS Technical Report
On page 1 of the Executive Summary second paragraph states that 14 sites that were chosen for this study were all located in West Virginia. No sites in Virginia were part of this study.

On page 1 of the report under the heading of Methodology, the report indicates that there were differences between the sites chosen because of different geographic and geologic settings. There are also differences from the areas in Virginia as well. Virginia does not have the multiple coal seams availsble that allows for mining mountaintop removal operations like those in West Virginia. 11-8-2

Page 2 under the heading of Conclusion, it is noted that the lower end of the ephemeral stream are very high in the valley thus restricting the amount of fill that could be placed in the fill. According to Virginia estimates, approximately 70%-80% of area currently being mined is previously mined land. In these cases, the ephemeral stream has been buried or disrupted by being cut through by mining. This report does not take into account the impacts to stream from past mining.

Land Use Assessment
This is a West Virginia Study. No other states are mentioned as being included in this study area. Therefore the data and conclusions may not be appropriate to Virginia.

Table 7on page 13, under the heading of Current Mining Permits Methods and Results, only lists land uses that could be easily identified. The report should include areas that have been reclaimed and post-mining land uses implemented. Also, table 4 does not include land uses such as residential, commercial or industrial.

The last paragraph on page 17 and the first paragraph on page 18 are either stated wrong or are misleading. State and Federal governments (SMCRA authority) do not have control over post-mining land uses. SMCRA authorities are charged with approval and monitoring implementation of the post-mining land use. SMRCA authorities do not control landowner rights or local zoning requirements. Landowners and local zoning and planning agencies control what post-mining land use changes are selected. SMCRA only requires that the site has an equal or higher post-mining land use.

Page 31 paragraph 2 under Land Use Planning and Decision Making for Specific Mine Sites states that, "land use decision-making is generally focused on identifying site-specific rather the regional development potentials". This is not always the case. A regional development authority that actively considers regional development potential serves the Virginia coalfield region.

This EIS does not reflect the following facts listed in a publication on the Internet by the Society of American Foresters (http://www.safnet.org/aboutforestry/facts.cfm), reads: 10-3-2

- There are a total of 247 billion trees above 1" diameter in the US on all lands, according to the last forest inventory.
- The science of forestry was established in the United States at the turn of the century, at a time when vast areas of forests had been cut down with little thought of the future. Foresters have done a magnificent job in restoring America's forests. Our forests now grow nearly four times more wood each year than in 1920.
- There are 747 million acres of forestland in the United States, about 71% as much as there was in 1630.
- America's forests are owned by private individuals (54%), public agencies (37%), and private industries (9%).
- Each year about 1.4 billion tree seedlings are planted – roughly four million a day – more than making up for those that are harvested. If you include naturally regenerated trees the net growth exceeds the harvesting by 33% due to good forest management.
- The average American uses about 749 pounds of paper every year and 95% of the houses built are done so using wood. That means that the average person uses the equivalent of a 100-foot high, 16 inches in diameter tree each year for their wood and paper needs.
- Parks, wildlife refuges, and other preserves span 166 million acres of the nation's total land mass; and the National Wilderness Preservation System covers an additional 104 million acres – a total of 270 million acres set aside for parks, refuges, or wilderness areas.
- The forest industry ranks among the top 10 employers in 40 of the 50 states.

- About 45 percent of the paper consumed in the United States is recovered for recycling. Recycled paper, however, is not "pure" so it must contain some new wood fiber for strength.
- Three well-placed mature trees around a house can cut air-conditioning costs by 10-50 percent, while trees and other landscaping can increase property value by 5-10 percent.
- One mature tree absorbs approximately 13 pounds of carbon dioxide a year. For every ton of wood a forest grows, it removes 1.47 tons of carbon dioxide and replaces it with 1.07 tons of oxygen.
- Today, the United States has about the same amount of land covered by trees (or slightly less) as it did in 1907.
- Species such as whitetail deer, wild turkeys, and wood ducks were almost extinct at the turn of the century. Wildlife conservation and habitat enhancement has resulted in flourishing populations of these and other species we now take almost for granted. Now, foresters are working with other professionals to improve habitats and ensure survival of other wildlife species. 10-3-2
- Until the 1920s, forests were generally logged and abandoned. Now, across the country an average of 1.7 billion seedlings are planted annually. That translates into 6 seedlings planted for every tree harvested. In addition, billions of additional seedlings are regenerated naturally.

This information contradicts studies within the Draft EIS that deal with forestry and the extent of tree planting. The Draft EIS states that huge tracts of forestlands are being converted to grasslands. These conflicts should be reconciled in the EIS.

Phase I and II Economics Study
The Phase I study of potential reduction in mining from actions taken as a result of the EIS used a technically incorrect model based on West Virginia terrain. The results of this model were then used to project reductions into Virginia. The results of this projection were then used to project economic effects in Virginia. These economic projections should not be used as they are based on projections made from an inaccurate technical model.

Additionally, the January 2003 Hill and Associates report, page 1, states that coal from deep mines will grow and make up the lost tonnage because of valley fill restrictions. Deep mining will not replace coal that cannot be mined under this proposed EIS. Any restrictions developed as a result of this EIS will affect deep mines as well as surface mines. It would be as difficult to permit new slurry impoundments or existing slurry impoundments expansions as it would be to permit new surface mines. The EIS recommendations will apply equally to these structures as they would to valley fills. The EIS should account for this impact. 11-8-2

<u>Appendix H</u>
General Comment
These studies are not necessarily representative of conditions on Virginia. Almost all surface mining in Virginia involves remining in some way. This typically takes the form of AML highwalls being second cut and AML highwalls backfilled with excess spoil. Some permits have no valley fills as 100% of the spoil can be disposed of on AML benches. No studies have been done for the EIS to document these issues in Virginia and as such the EIS cannot purport to represent conditions in Virginia.

Appendix K
Final Report of the Joint OSM Special Study on Drainage Control (Dec., 1999) – conducted in Kentucky
Report findings – "no corroborating evidence to support allegation that surface mining operations had an adverse impact on the flooding potential for citizens and residences downstream, when DSMRE's hydrologic policies and procedures were followed." In Virginia no instances of mining related flooding other than from AML sites or blowouts from underground mines have been documented. While no Virginia sites are addressed in this study, DMME's experience supports the findings from Kentucky. 17-1-2

15

Comments on Mountaintop Mining/Valley Fills in Appalachia Draft Programmatic Environmental Impact Statement

The Kentucky Environmental and Public Protection Cabinet (Cabinet) is the newly established agency with regulatory responsibilities for the program areas that are the subject of the Draft Mountaintop Mining/Valley Fills in Appalachia Programmatic Environmental Impact Statement. The Cabinet hereby requests that it be afforded an additional three (3) weeks to provide its comments. Those policymakers responsible for the provision of the comments were installed in the last two (2) weeks. They have not had the opportunity to review the issues due to the recency of their appointments and the reorganization of the agencies with programmatic responsibility and, therefore seek this extension of time. 3-5

REC'D JAN 2 6 2004

Ernie Fletcher
Governor

LaJuana S. Wilcher
Secretary

Commonwealth of Kentucky
Environmental and Public Protection Cabinet
Office of the Secretary
Capital Plaza Tower
Frankfort, Kentucky 40601

January 21, 2004

Mr. John Forren
US EPA (3ES30)
1650 Arch Street
Philadelphia, PA 19103

RE: Draft Programmatic Environmental Impact Statement

Dear Mr. Forren:

The Kentucky Environmental and Public Protection Cabinet (EPPC) welcomes the opportunity to submit comments on the Draft Programmatic Environmental Impact Statement (EIS) on mountaintop mining/valley fills prepared by the U.S. Army Corps of Engineers (COE), the U.S. Environmental Protection Agency, the U.S. Department of Interior's Office of Surface Mining and Fish and Wildlife Service and the West Virginia Department of Environmental Protection. EPPC is a new state agency created by executive order of Governor Ernie Fletcher entered on December 23, 2003, and is charged with responsibility for regulation of the environment and the protection of Kentucky's natural resources, among other things. EPPC's responsibilities include administration of state programs implementing the federal Clean Water Act (CWA) and the Surface Mining Control and Reclamation Act (SMCRA).

EPPC is aware that its predecessor agencies in Kentucky have participated in a very limited manner in the development of the draft EIS that is under consideration. The unfortunate result is that the draft EIS does not fully reflect Kentucky's experiences in the regulation of mountaintop removal and valley fill mining activities or their impact on Kentucky's environment. EPPC pledges its full cooperation and greater participation in the federal agencies' future efforts to address this important issue.

The Fletcher administration is committed to the development of Kentucky's abundant mineral resources while protecting the state's natural environment. It would be difficult to conceive of a situation where such a balance of interests would be more appropriate than in the formulation of a workable approach to the regulation of mountaintop removal and valley fill mining activities. The viability of Kentucky's mining industry, an important part of our economic future, hinges upon the continued ability of the coal mining industry to conduct mining operations under reasonable regulatory constraints. On the other hand, Kentucky's

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environmental future hinges upon the ability of government to ensure that this activity is conducted in a manner that minimizes adverse environmental effects and protects our aquatic resources and critical ecosystems. As a result, the successful completion of the objectives of this draft EIS is a matter of highest priority to EPPC.

EPPC believes that federal and state agencies involved in the regulation of mountaintop mining/valley fills should seek to accomplish two goals: to coordinate and expedite the review of applications to conduct mining activities, and to minimize the number, size and impacts of valley fills. EPPC is of the opinion that several of the alternatives considered in the draft EIS have the potential, if properly implemented, to help accomplish those goals. Accordingly, EPPC has no objection to the federal agencies' recommended alternative but strongly encourages consideration of the specific suggestions set forth below.

- **States should be encouraged to administer elements of the Section 404 permit program and adequate funding should be made available for implementation.**

Many of the procedural delays in the issuance of CWA Section 404 permits for coal-related activities could be minimized if states were encouraged to administer elements of the program under state programmatic general permits. In order for states to undertake such obligations, it would be necessary for federal agencies to provide a source of funding for such activities. Such federally-funded state activity could play a major role in the expedited permit review procedures contemplated under Alternative 2 of the draft EIS. 12-1-1

- **Clear and concise definitions and procedures should be developed and uniformly applied.**

A recurring issue has been the definition utilized by the COE for the determination of its jurisdiction over headwater streams in applications for CWA Section 404 permits for coal-related activities. Kentucky is encompassed in four different COE districts and the jurisdictional definitions vary from district-to-district. The development and application of uniform definitions for all COE districts would eliminate uncertainty on the part of state water pollution control agencies and regulated entities. Additionally, this action would provide a standard point of reference for determinations as to jurisdictional waters and provide clear and consistent guidance as to the point in streams at which nationwide permits may be utilized and as to the point at which individual COE permits must be obtained. 1-6

- **Conflict resolution procedures should be developed to resolve interagency disputes in a timely manner.**

Federal and state agencies should establish effective procedures for the resolution of inter-agency conflicts that arise during the administration of the programs that govern coal-related activities. For example, such procedures would be an essential program element if the COE utilizes state programmatic general permits to encourage state assumption of part of the administrative burdens of the CWA Section 404 permit program for coal-related activities.

- **Procedures for rendering final determinations should be developed that accommodate state administration of elements of the Section 404 permit program.**

Under the CWA Section 404 permit program disagreements between the COE and the Environmental Protection Agency are resolved by elevating the issue to the administrative heads of the two agencies for consideration with final resolution pursuant to CWA Section 404(c). Additional procedures for rendering final determinations should be developed to accommodate state administration of elements of the program pursuant to state programmatic general permits. 1-6

In addition to the comments outlined above, EPPC has identified a number of technical issues raised by the draft EIS that should be resolved prior to finalization of the document. These technical issues are discussed in the Technical Attachment to this letter.

EPPC respectfully requests your careful consideration of the comments set forth above.

Sincerely,

LaJuana S. Wilcher by
LaJuana S. Wilcher
Secretary

Attachment

TECHNICAL ATTACHMENT

A. Economic impacts to coalfield communities

The socio-economic studies do not accurately address the effect the loss of coal-mining jobs would have on the Appalachian coalfield communities or the effect mining activities may have on the development of the tourism industry. The Kentucky coal industry directly and indirectly employs over 56,000 and is a $3.15 billion industry (Kentucky Coal Council). Clearly, the coal industry has a dramatic influence on individual coal counties. Miners in Martin County represent nearly 30% of the workforce and over $41 million in wages, representing over 48% of the total county wages with an additional $1.8 million of coal severance taxes returned to the county. In Pike County, miners represented 15% of the workforce, with $182 million paid in wages and $3.3 million returned in coal severance taxes. 11-9-2

B. The "No Action Alternative" is improperly characterized

The "No Action Alternative" should be revised to acknowledge the many changes that have occurred in SMCRA and COE regulatory programs since the EIS was started. Since 1998 the SMCRA, EPA and COE programs (particularly the SMCRA and COE requirements) have been, and continue, to change. For example, in 2000 the COE Louisville Regional office advised the Kentucky Department for Surface Mining Reclamation and Enforcement (DSMRE) that it would develop regional conditions for CWA 404 NWP 21 authorizations. Because of these COE conditions, the DSMRE began developing or modifying a number of policies relative to: the permitting and mitigation of stream impacts (RAM #134); the construction of durable rock fills (RAM #135); inspection requirements for fills (Directive 36 – Division of Field Services). In addition, the COE and the KY Division of Water (DOW) have entered into an agreement that provides for an In-Lieu Fee Program for mitigation of stream impact. If these revisions are not made, "No Action Alternative" should be modified to describe the regulatory programs, policies and coordination processes, as they existed in 1998. 12-2-2

C. Remining/bond liability period

On page ES-7 (fifth item), the COE requires post mitigation monitoring for a period of five years. EPA has documented that "remining" of pre-SMCRA mined areas will improve water quality in associated watersheds. OSM and Kentucky have enacted statutes providing for a two-year liability period, in lieu of the normal five-year period, for remined areas in order to encourage these beneficial activities. The absolute five-year period required by the COE would constitute a disincentive to the industry to undertake mining operations in these areas that would otherwise be left in their present degraded condition. 1-6

D. Definition of Mountaintop Mining

The draft EIS, Page I-1, extends beyond the true definition of "mountaintop mining". The draft EIS defines the term "mountaintop" as the "summit of the mountain". 1-6

However, the draft EIS is applicable to all types of surface coal mining (mountaintop removal, area, contour, etc.) in the steep terrain of the Appalachian coalfield. This would effectively include mining activity from the valley floor to the summit. ("Surface coal mining occurring on mountaintops, ridges, and other steep slopes…). Thus the use of the term "mountaintop mining" in the draft EIS should be changed to properly recognize the broader impacts associated with the actions proposed in the draft EIS. 1-6

E. Does not recognize different fill types

The draft EIS portrays all excess spoil fills as "valley fills". However, there are several different types of fills, characterized by elevation in the hollow, location and geometric configuration. The common types of fills are:

1. Valley fills – these structures are located in the valley floor and they cover or are adjacent to intermittent or perennial streams and, therefore, have the potential to constitute the greatest impact to the environment.
2. Hollow fills and head-of-hollow fills – these structures are located at mid and upper elevations in the hollow and would primarily affect intermittent and ephemeral stream reaches.
3. Side hill fills – these structures are small fills located in the ephemeral reaches or sub-watersheds of intermittent streams. 13-3-2
4. Bench fills – these fills are confined to existing mine benches, left as a result of mining prior to the enactment of SMCRA. They normally affect only ephemeral portions of streams above the mine bench. These fills often result in the elimination of pre-SMCRA highwalls, therefore, reducing threats to the safety of the public and wildlife utilizing these areas.

Without the above characterization, the application of the conclusions of the draft EIS in a broad manner may unnecessarily affect the utilization of some types of fills which can provide a benefit to the public and the environment without the associated impacts of the more invasive true "valley fills".

F. Recognizing the differences that exist from state to state

The draft EIS recommends OSM, EPA and COE establish a uniform federal mandate regarding "mountaintop mining" and AOC requirements. This recommendation was based primarily on mining methods and topographical conditions existing in the state of West Virginia. However, mining methods and conditions often differ dramatically in Kentucky.

In West Virginia, there are greater elevation differentials from valley floors to uppermost coal seams, resulting in larger excess spoil disposal areas and much larger plateaus with AOC variances. These conditions are infrequent in Kentucky. 1-6

Permitted areas in West Virginia tend to be larger, in that the rights to potential mining areas are held by large mineral holding companies. In Kentucky, permits are smaller due to many private landowner parcels.

G. Kentucky was not a signatory to the Settlement Agreement

The draft EIS discusses the Bragg 1998 Settlement on page I-8. The four federal agencies and the West Virginia DEP signed the MTM/VF settlement agreement. However, Kentucky and other primacy states in the Appalachian coalfields were not signatories to the settlement agreement and are not bound by its terms and conditions. This draft EIS assumes that the federal agencies, via oversight, would compel other states to comply as a condition of maintaining their regulatory programs. (Note Page I-9 – "to aid in the objective of increased scrutiny of permits.") The federal agencies should not unilaterally implement a voluntary consent agreement in non-signatory states. 1-6

H. Reduction in fills – as a result of regulatory uncertainty instead of improved coordination

The 2000-2003 Chronology –states that, "Following the permitting changes instituted pursuant to the *Bragg* settlement agreement and other unrelated factors, the average number of fills/year approved in the EIS study area declined…." The draft EIS failed to recognize that the decline was due, in part, to the COE's moratorium on issuing 404 or NWP 21 permits. This hesitancy resulted in a tremendous backlog of permit applications in Corps' Huntington Regional office so fewer fill permits were approved. The portrayal that the permitting changes instituted pursuant to the Bragg settlement agreement has reduced the number of approved fills per year may be somewhat misleading. 13-2-4

I. Aquatic Studies – do not accurately represent Kentucky streams

Although Kentucky concurs with (and uses) the EPA aquatic sampling protocols performed in West Virginia and Kentucky stream studies, Kentucky sampling locations were inappropriate as they do not truly reflect "mined" watersheds and reference streams. Data collected for the mined watersheds included impacts from logging, agriculture, residences and public roads as the sampling locations were a considerable distance from the mining operations. Sampling locations immediately below (downstream) of a mined area would identify the true impacts of the mining activity. Sampling sites for reference reach streams were located in extremely remote and restricted areas far removed from other industrial/commercial and public impacts. Similarly, sampling locations for an unmined area should be located at higher elevations, upstream of any non-mining impacts. Therefore, the selection of these streams does not represent typical unmined/mined watersheds in Eastern Kentucky. The second stream study conducted targeted selected species in perennial streams ("permanent headwaters"). The majority of mining operations in Eastern Kentucky affect ephemeral portions of streams. 6-4-2

J. Appalachian forest community – studies do not represent Kentucky streams Reforestation Initiatives

Page III.F-12 of the draft EIS characterizes reclaimed mine lands in the study area as, "… often limited in topographic relief, devoid of flowing water, and most commonly 7-6-4

dominated by erosion-controlling, herbaceous communities". This characterization fails to recognize the efforts of Kentucky's Reforestation initiative (RAM # 124) and the accompanying long-term benefits. The DSMRE started promoting reforestation as the post mining land use of choice in 1997. In cooperation with the University of Kentucky, a number of research areas have been developed that are providing great insight to the potential forest communities that can be established in the eastern Kentucky coalfields if reclamation practices are modified. Though the revegetation standards don't compel the establishment of all the different native species in the forest, the coal industry is required to satisfy diversity by establishing a number of different tree, shrub and ground cover species. Further, the grading practices advocated by this agency for reforestation will provide for invasion and natural succession. The "Kentucky Reforestation Initiative" is highly regarded by other state and federal surface mining programs, and is the standard by which other states model their own reforestation programs. 7-6-4

K. Valley fill trends

The information contained in the valley fill trends indicates that a significant number of fills have been approved for construction in the eastern Kentucky coalfields. We believe that the data in this section is somewhat misleading. In part, this is due to the confusion over the intermittent stream definition and similar confusion over the stream buffer zone. As a result of limiting fills to upper stream reaches, a larger number of smaller fills have resulted. OSM records reveal that most of the fills in Kentucky are small. As of September 2000, 4421 fills have been permitted since 1985. These approved fills are located: 81% in watersheds < 75 acres; 14% in watersheds 76-250 acres; 5% in watersheds > 250 acres. 13-3-4

L. Maximizing coal recovery is a regulatory requirement

In the list of technical study conclusions, page ES-4, last bullet, the statement that "The extraction of coal reserves in the study area **could** be substantially impacted if fills are restricted to small watersheds" should be changed to "**would** be substantially impacted". The EIS Mountaintop Technical Team reviewed plans on 11 WV sites and concluded the reduction of available fill volume resulted in a significant reduction in the coal reserves recovered. The original plans for the 11 sites reviewed would have produced 186 million tons of coal. By restricting the fills to the ephemeral streams, the total recovery is 16.8 million tons. That would be a 90.9% reduction in mineable coal. If the West Virginia study were extrapolated to the Appalachian coalfield as a whole, similar reductions in resource recovery would be anticipated in eastern Kentucky. However, federal and state requirements (SMCRA Section 102(f) and (k); 405 KAR 16:010 Section 2) mandate the conduct of mining operations so as to maximize the utilization and conservation of coal reserves, while minimizing the impact of those operations. Kentucky has taken steps to promote this issue through our "Remining Initiative" (RAM # 129). This program supports the recovery of remaining coal reserves on old pre-SMCRA mine sites, and also provides for the proper reclamation of these areas after remining. 13-1-4

M. Postmining land use options/landowner participation

Page IV.A-3, the last paragraph is somewhat misleading. The author describes the condition of a mine site not having been reclaimed to a post mining land use of forestry, and explains that it may take hundreds of years to revert to forestry. There are many sites that are reclaimed to hay land/pasture in accordance with the desires of the landowners. Landowners who manage their property as hay land and pasture intentionally inhibit the natural succession and the development of a forest. The report improperly implies that forest is the only desirable PMLU for reclaimed mine land. 19-3-4

REC'D OCT 2 3 2003

COMMONWEALTH of VIRGINIA

Department of Historic Resources

W. Tayloe Murphy, Jr.
Secretary of Natural Resources

2801 Kensington Avenue, Richmond, Virginia 23221

Kathleen S. Kilpatrick
Director

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October 20, 2003

Mr. John Forren
US EPA (3EA30)
1650 Arch Street
Philadelphia, PA 19103

Re: Draft Programmatic Environmental Impact Statement
DHR File # 2003-0789

Dear Mr. Forren:

We have received materials for review of the above referenced project. It is our understanding that the Army Corps of Engineers, the US Environmental Protection Agency, the Office of Surface Mining, the US Fish and Wildlife Service, and the West Virginia Department of Environmental Protection are preparing this document to assist in minimizing the adverse environmental effects of mountaintop mining in Appalachia.

As stated in Section III.S-1, Section 106 of the National Historic Preservation Act of 1966, as amended, requires federal agencies to consider the effects of their undertakings upon historic and prehistoric resources. An undertaking is defined as "...any project, activity or program funded in whole or in part under either the direct or indirect jurisdiction of a Federal agency" (36CFR800.16(y)). 36 CFR 800, the regulations under which Section 106 review is implemented, requires that the review process be completed prior to issuance of said funding, permits or licenses. We recommend that this action be initiated as early as possible in the planning process so that our office may best assist you in identifying and addressing potential impacts to these resources. We ask that, prior to initiating consultation with our office, the Federal agency or it's designated contractor perform a search of our archives to identify historic and prehistoric resources that may be affected by the project. For more information on this process please access our website at http://state.vipnet.org/dhr/review. 10-2-1

Regarding statements made in Section IV.G-2, coordination with the SHPO should be approached from a procedural standpoint, rather than from the assumption that consultation will result in a determination of adverse effect and a single form of mitigation. It is the

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10 Courthouse Avenue
Petersburg, VA 23803
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Capital Region Office
2801 Kensington Ave.
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Tel: (804) 367-2323
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Portsmouth Region Office
612 Court Street, 3rd Floor
Portsmouth, VA 23704
Tel: (757) 396-6707
Fax: (757) 396-6712

Roanoke Region Office
1030 Penmar Ave., SE
Roanoke, VA 24013
Tel: (540) 857-7585
Fax: (540) 857-7588

Winchester Region Office
107 N. Kent Street, Suite 203
Winchester, VA 22601
Tel: (540) 722-3427
Fax: (540) 722-7536

agency's responsibility to work with the SHPO to not only identify the scope of the project and any known cultural resources or resource potential within that scope, but to evaluate alternatives that may assist in avoiding adverse affects to significant cultural resources (36CFR800.6). Mitigation is the approach taken when other options have been determined infeasible. 10-2-1

We look forward to working with the above referenced agencies both in completion of this useful document and in review of applicable projects in the future. If you have any questions about the Section 106 review process or our comments, please call me at (804) 367-2323, Ext. 140.

Sincerely,

Joanna Wilson

Joanna Wilson, Archaeologist
Office of Review and Compliance

Organizations

AUG 18 2003 — -- RECD

MOUNTAIN REDBIRD MUSIC

August 11, 2003

Mr. John Forren
US EPA
1650 Arch Street
Philadelphia, PA 19130

Dear Mr. Forren:

I am writing to you to voice my strong belief that Mountaintop Removal should be stopped.

Mountaintop Removal is destroying the "skyline" of America. The magnificent Appalachian Mountains that reach to the sky are among the world's oldest mountains, and we are allowing them to be destroyed. 1-9

Along with the leveling of our majestic natural skyline, streams are being destroyed and drinking water is being contaminated. The blasting is damaging the surrounding homes, causing air pollution, destroying hardwood forests and wildlife habitats.

Mountaintop Removal defies the Executive Order regarding Environmental Justice for low-income people. 10-7-2

There is nothing good about it. No good comes of it. Please stop it.

I am taking my 12-year-old son next week on a trip from our home in Brooklyn, New York, to see the beautiful Appalachian Mountains. I am saddened by the thought that the possibility exists that when he is a parent he will not be able to do the same for his children.

Yours truly,

Tina Aridas

TINA ARIDAS
MOUNTAIN REDBIRD MUSIC
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718-965-8490 ● 917-514-5364 ● TINA@JAMESREAMS.COM
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If There Were Nothing To Mine

by T.Aridas/J.Reams, BMI ©2002 Mountain Redbird Music
718-965-8490 info@jamesreams.com

They tunneled deep into the hills of my county
The mules and the ponies went blind underground
The men and the boys got sick from the coal dust
A deadly affliction for pennies a pound

If God had not put coal in these mountains
If there had been nothing but rock, dirt and trees
My Daddy'd be walking these hills in the springtime
Not living a hard death of black lung disease

Now dynamite blasts off the tops of these mountains
And big machines carve out the coal from the seams
They flatten the hills and fill up the valleys
And turn into black pools God's pure mountain streams

If God had not put coal in these mountains
If He had blessed them with nothing to mine
The hilltops would offer their green domes to Heaven
Crowned with pink rosebay and blackberry vines

The strip mines that take off the tops of these mountains
Leave scars that won't heal and make God turn his eyes
They level the hilltops that once reached toward Heaven
A mighty green skyline now humble in size

As God looks down at coal mining counties
At what has been done to this blessed land
I wonder if He ever wishes He never
Put coal in these mountains and gave them to man

SIERRA CLUB
FOUNDED 1892

Tennessee Chapter

Sierra Club – Water Sentinels Program

P.O. Box 111094, Memphis, TN 38111

January 3, 2004

Mr. John Forren
U.S. EPA (3EA30), 1650 Arch Street
Philadelphia, PA 19103

RE: Draft Programmatic Environmental Impact Statement (DEIS) on Mountain Top Mining-Valley Fill (MTM-VF) in the Appalachian region of the eastern United States.

Dear Mr. Forren,

Please accept these comments on behalf of the Water Sentinels Program of the Tennessee Chapter of the Sierra Club.

I am writing these comments because of concerns for the environmental degradation of the forests, the ephemeral and headwater streams, as well as the perennial streams that will be adversely affected as a result of MTM-VF activities in Kentucky, West Virginia, Virginia and Tennessee or throughout the Appalachian coal-fields. The experience so far in Tennessee with the Zeb Mountain Mine, just one mountain top mine (here called "cross-ridge" mining, but I believe essentially the same as mountaintop removal) cannot be accomplished without devastating destruction of affected ephemeral and headwater streams, as well as the perennial streams.

These mountain top mining operations are massive projects that strip many acres of forest as a first step. The DEIS lists that over 380,000 acres of mature forest will be destroyed by MTM-VF over the next ten years. This loss will destroy wildlife habitat and fragment more habitats. These forests are among the most biologically diverse in the world and are home to such wildlife as the Cerulean Warbler, a species that has been petitioned for listing under the Endangered Species Act. 8-1-2

The DEIS recognizes the value of headwater streams to a river ecosystem. As stated by *Doppelt, et al 1993*, ". "Even where inaccessible to fish, these headwater streams provide high levels of water quality and quantity, sediment control, nutrients and wood debris for downstream reaches of the watershed. Intermittent and ephemeral headwater streams therefore are often largely responsible for maintaining the quality of downstream riverine processes and habitat for considerable distances."

Yet, the following quote indicates that the DEIS recognizes that the dangers of valley fills and the potential offsetting values of sediment basins need further study. "Filling or mining stream areas even in very small watersheds has the potential to impact aquatic communities some of which may be high quality or potentially support unique aquatic species."

To supposedly minimize the discharge of mud, silt and sediment into the downstream waters, the mining company installs man-made sedimentation ponds to capture this sediment. This DEIS assumes that these sedimentation ponds will be of great value in protecting downstream waters. Personal experience and observation reveal that most ponds, no matter how well constructed cannot handle the sheer volume of runoff and that the ponds will "short circuit" and discharge levels of mud, silt and sediment into the streams that will adversely affect fish and aquatic life. I am not alone in making these observations. According to the Stormwater Center, "… few (sediment basins) are probably capable of consistently removing 70% of the incoming sediment, much less the 95 to 99% removal that is typically assumed," and measures to increase the solids trapping efficiency of sediment basins are rarely incorporated into the design (Stormwater Center 2003). Stormwater Center (2003). "Improving the Trap Efficiency of Sediment Basins." Technical Note #84, Watershed Protection Techniques. 2(3): 434-439 (http://www.stormwatercenter.net)

The DEIS states at III-D-4, "It has not been determined if drainage structure connected with mining can provide some benefit."

The DEIS also states at III-D-7, "Further evaluation of stream chemistry and further investigation into the linkage between stream chemistry and stream biotic community and structure are needed." 8-1-2

At III-D-8, the DEIS states, "While these studies illustrate that mining and valley fills may alter the sediment composition of streams, it is not known if this change may impact functions of streams downstream or how long those impacts may last. Assessment of stream sediment characteristics should be included in any further evaluations or monitoring program for streams downstream from mining and valley fills."

Section III-D-11 clarifies the issue further, "…potential impacts from valley fills to stream chemistry and possible alterations to stream geomorpholgy were discussed as areas of further need for investigation."

At the Zeb Mountain site in Tennessee, after only a few months of mining (at a mine with a 10-year life span), total suspended solids readings in a major stream (which is home of the federally threatened fish the Blackside Dace) have already been consistently more than ten times the permit limits.

We can do better than strip the forests off of mountain peaks and destroy and fragment wildlife habitat. We can do better than rip the mountain apart to mine a small seam of coal, and filling the valleys with overburden and destroying ephemeral and headwater streams in the process. We can do better to not send mud and silt pollution into larger streams and destroy fish and aquatic life. We can do a lot better than "restoring a mountain" to its original contours, remembering that it will take at least several human lifetimes or longer for the forests to renew themselves. It is better for humans to use non-polluting energy generation systems such as wind and solar power; which will spare wildlife habitat, and protect streams, for our families, for our future.

I submit that because further studies are needed, this Draft Environmental Impact Statement is incomplete. I suggest on behalf of the Water Sentinels Program of the Tennessee Chapter of the Sierra Club, that the Draft Environmental Impact Statement must be re-done with additional studies on forest health and water quality. The public must also be involved in these studies at all levels of DEIS development. In addition, until there is a final EIS, these mining practices need to cease and desist immediately. 9-2-2

On behalf of the Water Sentinels Program of the Tennessee Chapter-Sierra Club, I appreciate the chance to comment on this Draft Environmental Impact Statement.

Respectfully Submitted,

James H. Baker – Project Leader-Tennessee Water Sentinels

c. Mr. Gary Bowers – Tennessee Chapter Conservation Chair
Mr. Don Richardson – Tennessee Chapter Vice-Conservation Chair
Mr. Axel Ringe – Tennessee Chapter Water Quality Chair
Mr. Scott Dye – Director, Sierra Club Water Sentinels Program
Mr. Charles A. Rond – Chickasaw Group Chair
Dr. Allan Lummus – Chickasaw Group Conservation Chair
File

Tennessee Chapter-Sierra Club
http://tennessee.sierraclub.org
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3

100% Tree Free Paper

----- Forwarded by David Rider/R3/USEPA/US on 01/23/2004 09:23 AM -----

Sherman Bamford
<bamford@rev.net> To: R3 Mountaintop@EPA
cc: bamford@rev.net
01/21/2004 07:21 PM Subject: Mountaintop Removal DEIS comments

Sherman Bamford
Virginia Forest Watch
P.O. Box 3102
Roanoke, Va. 24015-1102
Bamford@rev.net

January 21, 2004

Mr. John Forren
U.S. EPA (3EA30)
1650 Arch Street Philadelphia, PA 19103
mountaintop.r3@epa.gov

The following are comments submitted on behalf of Virginia Forest Watch and myself regarding the DEIS for mountaintop removal, valley fills, clean water, habitat, and associated issues. Virginia Forest Watch (VAFW) is a grass-roots based coalition of individuals and environmental groups whose mission is to maintain and restore the natural ecology and biodiversity of woodlands across Virginia through education and citizen participation. Many members of this coalition live, work, and enjoy the natural amenities of the western Virginia area, and face the devastating impacts of mountaintop removal.

Mountaintop removal/valley fill significantly affects western Virginia and many of our neighboring states in the Appalachian chain: "The geographic focus of this study involves approximately 12 million acres, encompassing most of eastern Kentucky, southern West Virginia, western Virginia, and scattered areas of eastern Tennessee. The study area contains about 59,000 miles of streams. Some of the streams flow all year, some flow part of the year, and some flow only briefly after a rainstorm or snow melt. Most of the streams discussed in this EIS are considered headwater streams. Headwater streams are generally important ecologically because they contain not only 9-2-2

diverse invertebrate assemblages, but some unique aquatic species. Headwater streams also provide organic energy that is critical to fish and other aquatic species throughout an entire river.

Ecologically, the study area is valuable because of its rich plant life and because it is a suitable habitat for diverse populations of migratory songbirds, mammals, and amphibians." (executive summary for the DEIS - underlining for emphasis). The practice has serious, centuries-long impacts on watersheds, forests, and wildlife habitat that we are fighting to protect, and that our neighbors are fighting to protect in nearby states. We believe that mountaintop removal operations/ valley fills are one of the top threats to ecosystems in the Appalachian Mountains. 9-2-2

We are concerned that given the inadequate range of alternatives in the draft EIS on mountaintop removal, it appears likely that the EPA would not strengthen protection of our mountains and valleys in Virginia and other states, but would weaken those protections. Adequate streamside buffers would not be retained, dumping of toxins would be tolerated, drinking water would be tainted, and many people would lose the hunting and fishing areas they love. Please establish the strong measures that are needed to retain our natural heritage for future generations. 1-5 1-10

We are concerned that:
- over 1200 miles of streams have been damaged or destroyed by mountaintop removal

- direct impacts to streams would be greatly lessened by reducing the size of the valley fills where mining wastes are dumped on top of streams

- the total of past, present and estimated future forest losses is 1.4 million acres

- forest losses in West Virginia have the potential of directly impacting as many as 244 vertebrate wildlife species. Mountaintop removal in other states could affect many more species. 1-5

- even if hardwood forests can be reestablished in mined areas, which is unproven and unlikely, there will be a drastically different ecosystem from pre-mining forest conditions for generations, if not thousands of years

- without new limits on mountaintop removal, an additional 350 square miles of mountains, streams, and forests will be flattened and destroyed by mountaintop removal mining

- Streams are smothered by the millions of tons of waste rock and debris produced by mountaintop removal. One hundred thousand acres of wildlife habitat have been destroyed. And generations-old communities have been and continue to be forced to move from their homes because of mountaintop removal mining.

- According to government reports from the U.S. Fish & Wildlife Service as well as the EPA, mountaintop removal mining has devastated bird, fish, and other wildlife habitat in Appalachia and obliterated more than 1,000 miles of streams in West Virginia and Kentucky. Virginia and Tennessee are threatened as well.

- In Virginia, tributaries of the Clinch, Powell, and Holston Rivers are some of the most diverse rivers in North America in terms of mussel, fish, and other aquatic species diversity. According to a report commissioned by the American Fisheries Society, 71.7% of all freshwater mussel taxa in the U.S. and Canada are "considered endangered, threatened or of special concern." (Williams et al, Fisheries Vol. 18, No. 9) Mussels are highly sensitive to sedimentation and contaminants. (Intro. to mollusks section, Neves, Virginia's Endangered Species, Terwilliger, ed., Virginias Endangered Species, McDonald and Woodward Publishing, 1991). These and other watersheds to the west and north (eg, Pound River, Russell Fork, Levisa Fork, and other watersheds) also offer spectacular mixed mesophytic forests, whitewater and canoeing recreation, black bear habitat, Indiana bat habitat, cerulean warbler habitat, other songbird habitat, salamander habitat, and interior forest habitat. Mountaintop removal would have serious impacts on these watersheds and quality of life in them. 5-6-2

-Cerulean warblers, for example, are bearing the brunt of habitat destruction from mountaintop removal and from other habitat destruction: the warblers' key breeding area overlaps Appalachian coalfields, and their population has plummeted 70 percent since 1966. 8-1-2

- Watersheds exist in Virginia are vulnerable to high water events. For example, in July 2001, devastating flooding occurred in the heavily logged and roaded Big Stony Creek watershed, killing one person and wreaking havoc on property owners. Although mountaintop removal was not a factor in this watershed, mountaintop removal has the potential to exacerbate impacts in other watersheds where the practice occurs - whenever flooding and high water events occur. 17-1-2

- The immediate and long-term environmental effects of mountaintop removal coal mining are severe and irreversible, according to recently released studies accompanying a draft Environmental Impact Statement (EIS). Hundreds of miles of streams have been buried, hundreds of square miles of forested mountains flattened, 10-2-2

and generations-old communities of coalfield residents have been forced from their homes by this extremely destructive mining practice. 10-2-2

According to the draft Environmental Impact Statement (EIS) on mountaintop removal coal mining, the environmental effects of mountaintop removal are widespread, devastating, and permanent. Yet the draft EIS proposes no restrictions on the size of valley fills that bury streams, no limits on the number of acres of forest that can be destroyed, no protections for imperiled wildlife, and no safeguards for the communities of people that depend on the region's natural resources for themselves and future generations. 1-7

We do not understand why the "preferred alternative" for addressing the enormous problems caused by mountaintop removal coal mining is to weaken existing environmental protections. The draft EIS proposes streamlining the permitting process, allowing mountaintop removal and associated valley fills to continue at an accelerated rate. The draft EIS also suggests doing away with a surface mining rule that makes it illegal for mining activities to disturb areas within 100 feet of streams unless it can be proven that streams will not be harmed. This "preferred alternative" ignores the administration's own studies detailing the devastation caused by mountaintop removal coal mining, including: 1-10

You must consider alternatives that reduce the environmental impacts of mountaintop removal and then implement measures to protect natural resources and communities in Appalachia, such as restrictions on the size of valley fills to reduce the destruction of streams, forests, wildlife and communities. 1-5

As the draft EIS would not lessen the devastation or significantly improve the environmental protections from the impact of mountaintop removal mining, the agencies to withdraw this draft EIS and start all over again or at the very least, make substantial changes before issuing a final EIS .

Thank you for considering our comments.

Sincerely yours,

Sherman Bamford
Virginia Forest Watch

----- Forwarded by David Rider/R3/USEPA/US on 01/23/2004 09:22 AM -----

Lawrence Beckerle <lawrencebeckerle@yahoo.com> 01/21/2004 04:34 PM
To: R3 Mountaintop@EPA
cc:
Subject: Comments on EIS

January 21, 2004
Further comments on mountaintop mining EIS
By Lawrence T. Beckerle

VALLEY FILLS
Mining companies are only allowed to use two designs in West Virginia: All material for chimney core valley fill must pass the slate durability test End dump valley fills must be at least 80 percent durable rock through out the entire valley fill.

It would make more sense to have such requirements for just the face of valley fills where stability is a concern. Instead DEP requires that such requirements be met through out the entire length of the valley fill. By forcing coal companies to go to such extremes, regulatory agencies have caused some remarkable conditions. The valley fills are exceptionally well aerated, so oxidation of fill material proceeds at an unusually rapid rate. The release of iron, manganese and selenium is thus also quite rapid. Conversely the reduction of these minerals is minimized, so the release of these minerals into discharge waters is much higher than what would otherwise occur. It is thus a good example of this fundamental truth: When regulatory agencies take things to extremes, more environmental problems are created. 13-3-1

ORGANICS
The regulatory emphasis on perennial grasses to meet the requirement for permanent cover has resulted in a hostile environment for many native plants and animals. It has also resulted in a decline of soil improving crop type plants. Reseeding annuals provide permanent cover. (Example: crimson clover provides a permanent cover and acts as a good nurse crop for native plants. It allows warm season natives to quickly overtake it, usually within 18 months from when the native seeds germinate.) Perennial forbs provide permanent cover. Each should be recognized by regulatory agencies as providing permanent cover. In addition a pure stand of native blackberry and/or raspberry vines should be recognized as providing permanent cover. 19-3-1

High Nitrogen Organics Example: A farmer can apply treated sewage sludge to a pasture field and "it's no big deal". But if a coal operator wants to apply sewage sludge to a surface mine, the regulatory requirements are prohibitive. Such misguided actions forfeit the chance to use organics to reduce the amount of oxygen that causes

sulfur, iron, manganese and selenium to be released from mined areas. It also forfeits a chance to feed sulfur-reducing bacteria, which help to reverse acid mine water production and lead to a cleaning of water by precipitating out various metals. So even though my research in 1972 and the research of others have proven the advantages of using treated sludge on surface mines, the regulatory extremes make it impractical for coal operators to productively use this kind of material.

Organics Deficient In Nitrogen Example: "Sawdust" Has been shown to reduce surface runoff rates, increase the productivity of the land, and to reduce acid mine drainage. (Reports also suggest this includes a lowering of selenium.) Decay of sawdust uses as much oxygen as if one were to use it for fuel. Plus the other enhancements of soil life absorb even more oxygen. However regulatory requirements for use of permanent grass for permanent cover make "sawdust" type materials unattractive for coal operators. Typically sawdust is applied through the summer months. Early summer applications are planted to cowpeas, soybeans or other large seeded legume. Before 50 percent leaf drop of the cowpeas or soybeans, crimson clover (and perhaps some cereal rye) plus a perennial clover (white Dutch or red clover) are sown. In about February there is another sowing of either white Dutch or red clover (called a "frost seeding", because freezing and thawing works the seed into the ground.) While these plantings are usually quite lush, it is 18 months to two years from the first seeding before perennial grass can be grown. Thus the fact that regulatory agencies only recognize permanent cover with the establishment of perennial grass puts a bonding release penalty against those who establish other forms of perennial cover and thus virtually prohibits the use of organics such as sawdust to make topsoil. 19-3-1

NATIVE PLANTS AND ANIMALS

Excessive competition prevents the establishment of native plants. While there has been attention in recent years about how the use of overly competitive grasses prevents the establishment of trees, there has been little attention about how excessive competition prevents the establishment of native forbs and shrubs.

In prior comments I detailed how the regulatory rule preferences results in mined lands that are excessively dry, and further prevent the establishment of vernal pools and ephemeral pools so necessary to the breeding of several salamanders, toads, frogs, and crayfish. This also prevents the establishment of plants like Nutrush (Scleria triglomerata). Nutrush produces a seed (with the appearance of polished white ceramic) that is relished by Bobwhite quail and other seed eating birds.

A few examples of native plants that are put at a severe disadvantage by current rules: Partridge pea is a reseeding native annual that is quite effective at revegetating disturbed sites when competition is limited. This native and others like it are seldom seen on strip mines reclaimed since 1977.

Blackberry thickets where old canes cover the ground are not found on mined land reclaimed since 1977. (Such thickets are necessary for bobwhite quail to find adequate protection from house cats and other nighttime predators.)

Bayberry, Carolina bush pea, orange puccoon, prairie acacia, Quercus illicifolia, several of the native bushclovers will spread by root sprouts and/or otherwise form groundcovers into open areas where grass competition is absent.

All these plants are important to the winter survival of animals with needs similar to Bobwhite quail. Normally 60 to 80 percent of wild populations of Bobwhite perish each winter. So the absence of these plants frequently leads to the extinction of bobwhite quail populations. Bobwhite quail were present in all counties of West Virginia before 1977 (and frequently found on old surface mines). After 27 years of SMCRA Bobwhite quail are absent from about 90 percent of West Virginia (and are only found on a couple of these surface mines where exceptional efforts have been made to support quail). Other factors have been involved, but extremist interpretations of SMCRA have also been a major contributor to the decline of bobwhite quail and other birds that have similar habitat requirements.

Instead of being an example what to do to establish native plants (and what to do help restore populations of native animals that are in trouble) current mined land reclamation practices must so comply with bureaucratic cookbook style regulations (which are often a reaction to the latest lawsuit by radicals rather than the intent of SMCRA) that they are generally among the best examples of what not to do. 19-3-1

Bobwhite quail need a mosaic of habitat types. To achieve this mosaic there must be allowances for a number of plantings plans to fit different weather conditions, aspect, slope and other variables. There must be fair allowances for nurse cropping and relay cropping techniques.

Seeds must fall on bare ground or on vegetative litter where quail can find them. Seeds that fall into thick tough grass sods are a good food source for rodents that also chew off shrub and tree seedlings, but not for ground feeding birds such as bobwhite quail.

The regulatory intolerance for reasonable amounts of bare ground in areas with little or no erosion hazard often results in a lack of suitable areas for birds to dust themselves. Dusting is necessary for birds to rid themselves of parasites. Without adequate dusting, their health declines making vulnerable to disease and predators.

Lawrence T. Beckerle, Chairman
West Virginia State Chapter of Quail Unlimited

Nurse cropping: a nurse crop modifies the soil surface enough that more tender seedlings are able to establish in a soil surface environment that otherwise would be too harsh for them. Crimson clover is an ideal nurse crop, since it begins to decline in May as soil temperatures begin to reach 70 degrees (the temperature at which most native warm season plants germinate.)

Relay cropping: Sometimes a succession of plants is required to make the soil suitable for some perennials, for example: One might sow crimson clover, doveweed (Croton spp.) and partridge pea in August to early fall of 2004. (The Crimson clover would germinate usually within a week. Most of the partridge pea would germinate in March 2005 and most of the doveweed would germinate in May 2005.) Mealy bean, milk pea, and pink bean could be sown into the crimson clover stand in early May 2005. (Some of those seeds would germinate in May and some would not germinate until May 2006.) If soil nitrogen had been severely limiting then one would not plant American beakgrain, prairie dropseed, sacaton, smooth or circular paspalum grass until May 2006 (Many of these seeds would germinate immediately. Some would not germinate until May 2007. If any crimson clover were left, it would generally cease to be part of the stand by the end of summer 2006.) Permanent cover is maintained through this succession of plants, but the regulatory agencies currently penalize anyone using such a plant establishment method. Yet this method is most advantages to Bobwhite quail and to establishing many native plants. When will the regulatory agencies recognize the need for this and other wildlife friendly plant establishment methods?

Fences: As an educational tool I would like to see a fence built along the contour that more or less separates at least some of the areas with slopes less than 25 % slope from those with slopes greater than 25%. Openings in the sire fence should not be less than 2 inches wide by 2.5 inches tall to permit the passage of Bobwhite quail and allow them to distance themselves from predators too large to pass through the wire.

19-3-1

Kentuckians For The Commonwealth

P.O. Box 1450 London, Kentucky 40743 606-878-2161

January 3, 2004

John Forren
U.S. EPA (3ES30)
1650 Arch Street
Philadelphia, PA 19103

REC'D JAN 0 9 2004

Dear Mr. Forren:

On behalf of Kentuckians For The Commonwealth, I am writing to express our deep opposition to the recommendations contained in the draft EIS on mountaintop mining.

KFTC is a grassroots social justice organization with more than 2,000 members statewide. For more than 22 years we have worked to build citizen leadership and organize low-income communities to improve the quality of life in Kentucky. Our history is rooted in the struggle for justice in the Appalachian coalfields. In the early 1980s, KFTC initiated, fought for and won an unmined minerals tax so that corporations who hold most of the wealth in this region must contribute to the development of local communities. We fought for and won a constitutional amendment that prohibits coal companies from strip mining against the wishes of landowners. Together with our allies, we have worked to strengthen and protect state and federal laws governing water quality and coal mining. And we have worked with thousands of individuals and scores of communities over the past two decades to protect homes and the environment, hold companies accountable, and win meaningful enforcement of mining laws.

Personally and organizationally, we oppose mountaintop removal mining and valley fills. A common sense reading of the Clean Water Act and Surface Mining Laws not only allows but *requires* the government to prohibit the use of valley fills and mountaintop removal. These practices are immoral and illegal and should be stopped.

Let me be very clear why we oppose the conclusions reached in the EIS document:

1. The recommendations are a sham and a shame. They betray the original purpose of the EIS.

The stated purpose of this document was:

> *"To evaluate options for improving agency programs under the Clean Water Act (CWA), Surface Mining Control and Reclamation Act (SMCRA) and Endangered Species Act (ESA) that will contribute to reducing the adverse environmental impacts of mountaintop removal operations and excess spoil valley fills in Appalachia."*

The EIS report was originally requested by coalfield citizens and environmental supporters in order to identify ways to better protect our land, water and people. Indeed, the studies contained within this 5,000-page document show that the damage caused by mountaintop removal mining is more widespread and severe than previously known.

1

Yet the report was hijacked by the coal industry and its cronies within the Bush administration. Rather than addressing the serious harm caused by mountaintop removal mining, its recommendations focus on issues of "government efficiency" and the need to "provide a basis for more predictable business and mine planning decisions." Based on an internal memo from the office of Deputy Secretary of the Interior (and a former coal industry lobbyist), it is clear that the Bush Administration seized this opportunity to aid the coal industry at the expense of local communities and the environment. The draft report is loaded with ways to gut existing water protections and make it easier for the industry to continue with its full-scale assault on our communities, environment, and hope for the future.

2. The report ignores its own findings.

KFTC welcomes the scientific studies that document the widespread and irreversible damage the coal industry is doing to our state and region. We've known and experienced these problems in Kentucky for too long. Mountaintop removal and valley fills bury and destroy important headwater streams, destroy biologically rich forest and stream ecosystems, damage drinking water sources used by millions of people, cause frequent and severe flooding, and wreck the quality of life in mountain communities.

Yet the three alternatives proposed would do nothing to end or minimize this destruction. All three so-called alternatives will increase the ease and rate of destruction and make MTR an even more attractive option for the coal industry. 1-5

Below are a few examples of the environmental damage documented, and then ignored, within the EIS.

- 724 miles of streams across the Central Appalachian region were buried by valley fills between 1985 and 2001 (many more miles have been permitted but not yet buried);
- an additional 1,200 miles of streams have already been impacted by valley fills;
- selenium was found only in those coalfield streams below valley fills (selenium is a metalloid that, according to the EPA, "can be highly toxic to aquatic life even at relatively low concentrations");
- aquatic life forms downstream of valley fills are being harmed or killed;
- without additional restrictions, a total of 2,200 square miles of Appalachian forests (6.8 percent) would be eliminated by 2012 by large-scale mining operations (this is an area that would encompass Floyd, Knott, Leslie, Letcher, Perry and most of Harlan counties in eastern Kentucky; or Hopkins, Daviess, Union, Muhlenberg and Webster counties in western Kentucky);
- without additional environmental restrictions, mountaintop removal mining will destroy an additional 600 square miles of land and 1000 miles of streams in the next decade.

1-9

3. The report mentions, and then immediately rejects, any proposals that would restrict the ability of the coal industry to bury Appalachian streams under valley fills —in other words any proposal that would require the coal industry to obey the law.

The EIS fails to give meaningful consideration to any options that would reduce the destruction to water, land, public welfare and the quality of life in local communities. Some worthy ideas that received no consideration were: 1-7

- Enforcing the Clean Water Act, which prohibits the dumping of waste in streams.
- Restricting valley fills to certain types of streams.
- Restricting the size of allowable valley fills from more than 250 acres to just 35 acres.
- Setting an upper limit on the total number or percentage of streams allowed to be impacted.
- Labeling the streams in the region as "high value," which would kick-in other parts of the Clean Water Act that could restrict the use of valley fills.
- Using the anti-degradation rules of the Clean Water Act to prohibit the use of valley fills.

2

The report dismisses most of these options out-of-hand, claiming there is not enough "science" to support them. It is hard to imagine what additional scientific evidence is needed to demonstrate that burying hundreds of miles of Appalachian headwater streams, eliminating thousands of square miles of forests, and leveling the oldest mountains in the world causes irreparable harm and should be stopped.

And if the science is not enough, just open your eyes and use your common sense.

The report also rejects size limits on valley fills because the "economic study results were determined to have limitations and were not suited for establishing alternatives." In truth, the government's economic studies showed that even the strictest size limit would have a minimal economic impact on the economy and jobs. 1-7

We oppose all three of the so-called alternatives contained with the EIS report.

KFTC opposes Alternatives #1, 2 or 3 contained within the EIS report. None of these options will protect our water. None of these options will protect our communities. None of these options will shape a better future for Kentucky or the region. They are a sham and a shame. They do nothing to address the real problems of our region. Rather, they will only make it easier for the coal industry to seek and obtain permits to continue with the total destruction of our land, water and people. 1-5

It is notable that all three alternatives, even the one called "status quo" would weaken existing water protections. All three options call for the elimination of the stream buffer zone rule that has been in existence for 25 years. This rule, known as SMCRA regulation 30 CFR 816.57, prohibits mining activity within 100 feet of intermittent and perennial streams. Using the EIS process to eliminate this protection is cynical and outrageous behavior. KFTC believes this rule should be strictly enforced for valley fills and in all other cases. 1-10

KFTC also strongly opposes the report's support for a rule change enacted one year ago by the Bush administration which changed the definition of "fill" in order to allow the Corps of Engineers to grant permits for valley fills under the Clean Water Act. We believe that valley fills created in the process of mining for the disposal of mining waste are a clear violation of the CWA. 13-3-2

In conclusion, we believe that the Draft EIS document is a shameful gift to the coal industry and a betrayal of our Appalachian communities. I urge the government to reject the three alternatives offered in this document and go back to the drawing board. Give meaningful consideration to options that would protect our water, forests and land from further destruction. Support the meaningful enforcement of existing laws. Reject efforts to shred and weaken water protections. Have the courage to do what is right, and in the process help us create a better future in Kentucky and throughout the Appalachian region. 1-5

Sincerely,

Teri Blanton

Teri Blanton
Chairperson
Kentuckians For The Commonwealth

3

----- Forwarded by David Rider/R3/USEPA/US on 01/08/2004 11:30 AM -----

KFTC
<info@kftc.org> To: R3 Mountaintop@EPA
cc:
01/06/2004 01:05 PM Subject: MTR EIS comments

Kentuckians For The Commonwealth
P.O. Box 1450
London, Kentucky 40743
606-878-2161

January 3, 2004

John Forren
U.S. EPA (3ES30)
1650 Arch Street
Philadelphia, PA 19103

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1. The recommendations are a sham and a shame. They betray the original purpose of the EIS.

The stated purpose of this document was:

"To evaluate options for improving agency programs under the Clean Water Act (CWA), Surface Mining Control and Reclamation Act (SMCRA) and Endangered Species Act (ESA) that will contribute to reducing the adverse environmental impacts of mountaintop removal operations and excess spoil valley fills in Appalachia."

The EIS report was originally requested by coalfield citizens and environmental supporters in order to identify ways to better protect our land, water and people. Indeed, the studies contained within this 5,000-page document show that the damage caused by mountaintop removal mining is more widespread and severe than previously known.

Yet the report was hijacked by the coal industry and its cronies within the Bush administration. Rather than addressing the serious harm caused by mountaintop removal mining, its recommendations focus on issues of "government efficiency" and the need to "provide a basis for more predictable business and mine planning decisions." Based on an internal memo from the office of Deputy Secretary of the Interior (and a former coal industry lobbyist), it is clear that the Bush Administration seized this opportunity to aid the coal industry at the expense of local communities and the environment. The draft report is loaded with ways to gut existing water protections and make it easier for the industry to continue with its full-scale assault on our communities, environment, and hope for the future.

2. The report ignores its own findings.

KFTC welcomes the scientific studies that document the widespread and irreversible damage the coal industry is doing to our state and region. We've known and experienced these problems in Kentucky for too long. Mountaintop removal and valley fills bury and destroy important

headwater streams, destroy biologically rich forest and stream ecosystems, damage drinking water sources used by millions of people, cause frequent and severe flooding, and wreck the quality of life in mountain communities.

Yet the three alternatives proposed would do nothing to end or minimize this destruction. All three so-called alternatives will increase the ease and rate of destruction and make MTR an even more attractive option for the coal industry. 1-5

Below are a few examples of the environmental damage documented, and then ignored, within the EIS.

ÿ 724 miles of streams across the Central Appalachian region were buried by valley fills between 1985 and 2001 (many more miles have been permitted but not yet buried);
ÿ an additional 1,200 miles of streams have already been impacted by valley fills;
ÿ selenium was found only in those coalfield streams below valley fills (selenium is a metalloid that, according to the EPA, "can be highly toxic to aquatic life even at relatively low concentrations"); 1-9
ÿ aquatic life forms downstream of valley fills are being harmed or killed;
ÿ without additional restrictions, a total of 2,200 square miles of Appalachian forests (6.8 percent) would be eliminated by 2012 by large-scale mining operations (this is an area that would encompass Floyd, Knott, Leslie, Letcher, Perry and most of Harlan counties in eastern Kentucky; or Hopkins, Daviess, Union, Muhlenberg and Webster counties in western Kentucky);
ÿ without additional environmental restrictions, mountaintop removal mining will destroy an additional 600 square miles of land and 1000 miles of streams in the next decade.

3. The report mentions, and then immediately rejects, any proposals that would restrict the ability of the coal industry to bury Appalachian streams under valley fills (in other words any proposal that would require the coal industry to obey the law.

The EIS fails to give meaningful consideration to any options that would reduce the destruction to water, land, public welfare and the quality of life in local communities. Some worthy ideas that received no consideration were: 1-7
ß Enforcing the Clean Water Act, which prohibits the dumping of waste in streams.
ß Restricting valley fills to certain types of streams.
ß Restricting the size of allowable valley fills from more than 250 acres to just 35 acres.
ß Setting an upper limit on the total number or percentage of streams allowed to be impacted.
ß Labeling the streams in the region as "high value," which would kick-in other parts of the Clean Water Act that could restrict the use of valley fills.
ß Using the anti-degradation rules of the Clean Water Act to prohibit the use of valley fills.

The report dismisses most of these options out-of-hand, claiming there is not enough "science" to support them. It is hard to imagine what additional scientific evidence is needed to demonstrate that burying hundreds of miles of Appalachian headwater streams, eliminating thousands of square miles of forests, and leveling the oldest mountains in the world causes irreparable harm and should be stopped. 1-7

And if the science is not enough, just open your eyes and use your common sense.
The report also rejects size limits on valley fills because the "economic study results were determined to have limitations and were not suited for establishing alternatives." In truth, the government's economic studies showed that even the strictest size limit would have a minimal economic impact on the economy and jobs.

We oppose all three of the so-called alternatives contained with the EIS report.

KFTC opposes Alternatives #1, 2 or 3 contained within the EIS report. None of these options will protect our water. None of these options will protect our communities. None of these options will shape a better future for Kentucky or the region. They are a sham and a shame. They do nothing to address the real problems of our region. Rather, they will only make it easier for the coal industry to seek and obtain permits to continue with the total destruction of our land, water and people. 1-5

It is notable that all three alternatives, even the one called "status quo" would weaken existing water protections. All three options call for the elimination of the stream buffer zone rule that has been in existence for 25 years. This rule, known as SMCRA regulation 30 CFR 816.57, prohibits mining activity within 100 feet of intermittent and perennial streams. Using the EIS process to eliminate this protection is cynical and outrageous behavior. KFTC believes this rule should be strictly enforced for valley fills and in all other cases. 1-10

KFTC also strongly opposes the report's support for a rule change 13-3-2

enacted one year ago by the Bush administration which changed the definition of "fill" in order to allow the Corps of Engineers to grant permits for valley fills under the Clean Water Act. We believe that valley fills created in the process of mining for the disposal of mining waste are a clear violation of the CWA. 13-3-2

In conclusion, we believe that the Draft EIS document is a shameful gift to the coal industry and a betrayal of our Appalachian communities. I urge the government to reject the three alternatives offered in this document and go back to the drawing board. Give meaningful consideration to options that would protect our water, forests and land from further destruction. Support the meaningful enforcement of existing laws. Reject efforts to shred and weaken water protections. Have the courage to do what is right, and in the process help us create a better future in Kentucky and throughout the Appalachian region. 1-5

Sincerely,

Teri Blanton
Chairperson
Kentuckians For The Commonwealth

January 6, 2004

Mr. John Forren
U.S. EPA (3EA30)
1650 Arch Street
Philadelphia, PA 19103
mountaintop.r3@epa.gov

RE: Joint Coal Industry Comments on the Mountaintop Mining/Valley Fill Draft Environmental Impact Statement

Dear Mr. Forren:

Coal Operators and Associates, the Kentucky Coal Association, the National Mining Association , the Ohio Coal Association, and the West Virginia Coal Association appreciate the opportunity to share our views on this Draft Environmental Impact Statement (EIS) on Mountaintop Mining and Valley Fills (hereinafter, "MTM") in Central Appalachia. This issue is extremely important to our members because many of them utilize coal extraction methods that require the construction of head of hollow fills and valley fills in their coal mining operations in the study area. As recognized by the EIS, MTM operations are generally the most economical and efficient forms of surface mining in this area. EIS III I-1.

Using valley and head of hollow fills in this region is absolutely necessary, because when mining is conducted in steep slope areas such as Appalachia, the volume of the spoil material is significantly greater than the volume of the

1

overburden excavated from its original geological location.[1] This is true whether the mining methods are mountaintop mining, contour mining, or even, in many instances, when creating the necessary surface area to begin and support an underground mine. Consequently, the excess spoil must be placed in valley and head of hollow fills. MTM is a major factor in coal production in this area, and accounts for ¼ to 1/3 of Appalachian coal production, and about 95% of the surface mining in West Virginia. EIS III I-23; III N-1. A brief description of the signatory trade associations to these comments follows.

Coal Operators & Associates, Inc. (COA) is a trade association that represents nearly 300 member companies involved in the ownership, leasing, mining, transportation and preparation of coal in Eastern Kentucky; or, supply goods and/or services to the coal mining industry. Our members mine by both surface and underground mining methods and represent the majority of coal mined in Eastern Kentucky.

The Kentucky Coal Association (KCA) is a non-profit corporation whose membership includes large and small, surface and underground coal operators in both the eastern and western Kentucky coal fields. KCA's membership also

[1] The volume of spoil is greater than the overburden that is excavated because the material swells by as much as 25% when it is removed. *See Bragg v. Robertson*, 248 F.3d 275, 286 (4th Cir. 2001), cert. denied, 122 S.Ct. 920 (2002); *See also Illinois South Project, Inc. v. Hodel*, 884 F. 2d 1286, 1292 (7th Cir. 1988)(recognizing that overburden from mining may swell in the range of 15-40% depending on how compact it was in its natural state).

includes a wide range of businesses associated with the coal industry. The KCA seeks to promote the best interests of the Kentucky coal industry.

The National Mining Association (NMA) is a national trade association that includes the producers of most of the nation's coal, metals, industrial and agricultural minerals; the manufacturers of mining and mineral processing machinery, equipment and supplies; and the engineering and consulting firms, financial institutions and other firms serving the mining industry.

The Ohio Coal Association is a non-profit trade association that is dedicated to representing Ohio's underground and surface coal mining production. Today, the Association represents close to FORTY coal producing companies and over FIFTY Associate Members, which include suppliers and consultants to the mining industry, coal sales agents and brokers and allied industries. As a united front, the Ohio Coal Association is committed to advancing the development and utilization of Ohio coal as an abundant, economic and environmentally sound energy source.

The West Virginia Coal Association (WVCA) is a State coal trade association representing the interests of companies engaged in the extraction of coal in the State of West Virginia. WVCA's producing members account for 98% of the Mountain State's underground and surface coal production. WVCA also represents 250 associate members that supply an array of services to the mining industry in West Virginia. These associate members include permitting

consultants, engineering firms, mining equipment manufacturers, coal transportation companies, coal consumers and land and mineral holding companies. WVCA's primary goal is promoting the continued viability of the West Virginia coal industry by supporting and facilitating environmentally responsible coal removal and processing through reasonable, equitable, and achievable State and Federal policy and regulation.

Our comments are divided into several sections that will convey our views. First, we will provide some background information on the statutory and regulatory framework for mining in general and MTM in particular, under which our members operate. Second, we provide extensive general comments on the EIS. This section explains how the EIS shows that MTM has minimal individual and cumulative effects on the environment, highlights some of the significant positive aspects of MTM, and discusses its programmatic nature. The document will demonstrate that, based on the evidence in the EIS record, the best alternative to select would be Alternative III, including an explanation of why Nationwide Permits (NWP) under Clean Water Act (CWA) Section 404 are appropriate in most cases for coal mining operations including mountaintop mining, and why individual permits are normally not appropriate in most MTM situations. Next, our comments analyze all 17 action items contained in the EIS. Third, we provide a section of specific comments on aquatic, terrestrial, and community impacts of MTM.

1-4

I. Background

a. Mining in General, and MTM in Particular, is Very Heavily and Closely Regulated, but is also Expressly Sanctioned by Federal Law

Mining is one of the most heavily regulated industries in American history. There are several statutes that specifically regulate mining, and many other general laws that are applicable to mining operations. Just some of the most significant Federal laws include the Surface Mining Control and Reclamation Act (SMCRA), the Clean Water Act (CWA), the Clean Air Act (CAA), the Endangered Species Act (ESA), and the Mine Safety and Health Act. In addition to all of these laws, and the thousands of pages of Federal rules in the Code of Federal Regulations pursuant to these laws that are designed to protect the environment and the public, there are hundreds of State laws that regulate mining.

There are also several provisions in these laws and regulations that apply even tougher standards for some of the activities that take place at MTM operations. Although the law sets tough standards for operators mining in these areas, the indisputable logical corollary to this is that Congress has specifically sanctioned MTM by enacting these provisions. Some of these provisions include SMCRA sections 515(b)(3)(requiring restoration of approximate original contour); 515(b)(22)(governing excess spoil placement); and 515(c)(2) and (3)(expressly

discussing MTM techniques). *See also* Office of Surface Mining (OSM) regulations at 30 C.F.R. 785.14 (MTM); 30 C.F.R. Part 824 (MTM); 30 C.F.R. § 780.29 (stream channel diversions); 30 C.F.R. 816.57 (Stream Buffer Zone Rule); 30 C.F.R. § 816.72 (Disposal of Excess Spoil in Valley Fills); 30 C.F.R. § 816.151(d)(5)(relocation of natural stream channels). The EIS itself recognizes that "Congress acknowledged the necessity of valley fill construction in streams [in SMCRA § 515(b)(22)]." EIS II D-2.

OSM regulations also recognize the necessity of mining in or near streams. 30 C.F.R. § 816.43 expressly allows and regulates the diversion of streams. MTM and mining in or near streams is presumed necessary and valid by Congress and the regulatory agencies, such as the OSM, so long as adverse effects to offsite areas are minimized. There are additional protections in the law for areas that are designated as unsuitable for mining. In extraordinary circumstances, States may designate specific areas in § 522(a)-(d) of SMCRA, if the evidence in the record supports such findings by the State government. *See also* 30 C.F.R. §§ 761-764.

Given all of these statutory and regulatory requirements that must be met, mining operations produce volumes of analyses and plans before they are issued a permit to build a mine. During this process, the public is provided with numerous opportunities to provide input and comment on the permit application, and may object to the regulatory authority. 30 U.S.C. §§ 1263-1264. Even after the permit

is issued, Federal and State laws provide for regular monthly and quarterly inspections of surface coal mining operations to ensure their compliance with applicable laws, regulations, mine plans, and their permit conditions. 30 C.F.R. Part 842; 30 C.F.R.§ 840.11. In addition, mines are subject to inspection following any citizen complaint giving rise to a concern that a violation of SMCRA or regulations has occurred. 30 C.F.R. § 842.12.

The CWA, like SMCRA, is also crystal clear that valley fill construction for excess spoil placement is permissible under Federal and State law. Environmental groups have repeatedly tried and failed to convince appellate courts that MTM is somehow illegal based on misguided interpretations of the CWA, SMCRA, and their implementing regulations. However, the 4th Circuit Court of Appeals has clearly held that such a view of the law is wrong because: (1) EPA's and COE's interpretation of "fill material," which expressly included coal mining overburden placement in waters of the U.S. (including the streams at issue in the EIS), was a reasonable interpretation of the CWA; and (2) SMCRA anticipates that excess spoil from MTM "could and would" be placed in waters of the U.S.[2] 5-7-1

As the EIS correctly notes, both the CWA and SMCRA recognize that incursions and disturbances of streams are frequently unavoidable. EIS II C-30. Congress, the administrative agencies, and the courts all recognize that Federal

law anticipates that excess spoil will be placed in streams. **The real question is not whether MTM or excess spoil placement is permissible, but rather how to regulate it.** Therefore, the question is not what happens to the stream segment that is filled, but whether the downstream impacts or impacts to areas outside the permit area are so significant that they cannot be avoided or satisfactorily mitigated. With this background and this issue in mind, we next turn to an examination of MTM, how it has been analyzed over the years, and what this most recent EIS teaches us about MTM.

5-7-3

b. MTM/VFs have been Studied for Decades, and those Studies Have Consistently Demonstrated that they Are Acceptable Mining Methods

As demonstrated above, Congress was well aware of MTM/VF techniques when it enacted the SMCRA legislation, and recognized the legitimacy of these practices through Federal law. MTM/VF practices have been extensively studied and analyzed since that time as well. For example, in 1979, EPA authored a report concluding that MTM is actually environmentally desirable, and that head of hollow fills can reduce adverse environmental impacts. EPA concluded[3] that:

[2] *See Kentuckians for the Commonwealth v. Rivenburgh*, 317 F. 3d. 425, 443 (4th Cir. 2003).
[3] *Environmental Assessment of Surface Mining Methods: Head-of-Hollow Fill and Mountaintop Removal, Interagency Energy/Environment R&D Program Report* (hereinafter: "*EPA EA of Surface Mining Methods*"), U.S. EPA (July 1979) p. 6.

(1) Mountaintop removal mining is an environmentally desirable surface mining technique in the steep sloped terrain of southwestern West Virginia and eastern Kentucky when conducted in compliance with existing reclamation criteria; and

(2) Head-of-hollow fill reclamation can reduce environmental impacts occasionally associated with other reclamation practices such as contour regrading in steep terrain or downslope spoil casting. Specifically, these improvements are realized in erosion and sedimentation control, spoil stabilization, revegetation success and land use potential.

5-5-5

In 1989, the Department of Interior prepared a report to Congress on mountaintop mining. This report found that OSM and other Federal agencies are committed to studying the environmental impacts of MTM thoroughly. One of the key studies[4] attached to the Congressional report, the WV Governor's Report, found that "numerous regulatory programs are in place to assure protection of State water quality," and also found "…no significant evidence of widespread or routine violations of State and Federal water quality standards…" *See WV Governor's Report* at ENV9-10. It concluded that, "On balance…the positive

[4] "*State of West Virginia Governor's Task Force on Mountaintop Mining and Related Practices*," (December 1998)(hereinafter "WV Governor's Report").

impacts of mountaintop removal mining can outweigh the negative impacts." *See Id.* at People-7. 5-5-5

The current EIS contains an additional 30 studies on MTM/VF, and continues the trend of careful and continuous study, evaluation, and improvement of MTM/VF practices. A summary and analysis of the contents of this latest comprehensive analysis of MTM/VF is explained below.

II. General Comments on the EIS

a. The EIS Demonstrates that in Most Areas of Concern, MTM Does Not Raise Significant Issues

Inspector Gregory:

"Is there any other point to which you would wish to draw my attention?"

Holmes: "To the curious incident of the dog in the night-time."

"The dog did nothing in the night-time."

"That was the curious incident," remarked Sherlock Holmes.

From "The Adventure of Silver Blaze" by Arthur Conan Doyle

i. Overall Impacts of MTM

The EIS commissioned 30 comprehensive scientific studies over a span of four years to determine the impact of MTM on the study area, which includes parts of four different States in Appalachia. Based on this information, it is clear that the overall impact of MTM on the study area is not significantly adverse. For example, studies found that despite the size of these MTM operations, about 98% of the streams in the study are not directly impacted by MTM. EIS III D-2. Only slightly more than 1% of streams are actually filled, and many of those "streams[5]" consist of areas that either flow only intermittently for part of the year, or are dry channels that contain water only immediately after a rainstorm[6]. The EIS acknowledges that its estimates of potential future stream losses are overstated because they do not take into account avoidance, minimization, and mitigation already required by the 2002 Nationwide Permit (NWP) 21. EIS IV B-3. Such estimates are probably even more inflated, given that changes to the status quo made by any of the three Alternatives would improve environmental protection and better coordinate the CWA and SMCRA. EIS II B-1. The studies also found that even when aggregating all MTM activity over the past decade, about 97% of the study area was undisturbed by MTM. EIS II C-62. Finally, the evidence shows that MTM has been decreasing, both in numbers and in average size in recent years. EIS II C-5.

[5] Regulatory agencies, such as the COE, define "streams" much more broadly than the general public does. More common definitions of the term say it includes only "A body of *running* water;" or "a steady current of a fluid." (emphasis added) *See* American Heritage Dictionary, 2nd Edition.
[6] In Kentucky and Virginia, many of the fills are not valley fills but rather head of hollow fills impacting only stretches of ephemeral streams.

In addition to the fact that these overall impacts are minimal, one must recognize that "...surface mining is a temporary use of the land and, with proper mining and reclamation techniques, the land is not irretrievable for a variety of future land uses." EIS IV F-1. Therefore, many of the impacts listed above, such as forest fragmentation will ultimately be a temporary phenomena.

ii. Specific Impacts of MTM Found Insignificant

1. Air Quality Impacts

The EIS found that air quality concerns were not an issue with MTM. MTM has not been considered a major source of air pollution since it does not meet the criteria for major source air quality permits under Title V of the CAA. EIS III V-3. Moreover, except for ozone, monitoring stations reported good air quality for all criteria air pollutants. EIS III V-1. OSM regulations already specifically require an air pollution control plan. 30 C.F.R. § 780.15. 15-2-1

In addition, the Mine Safety and Health Administration (MSHA), maintains separate air monitoring requirements for mining operations to protect mine workers, and has established enforceable exposure limits for respirable coal dust. EIS III V-4 MSHA regulations also require every mine to submit a ventilation

system and methane and dust control plan every six months. *Id.* Finally, MSHA is required by statute to make surprise inspections of every surface mine in the United States at least twice each year. 30 U.S.C. § 813(a). 15-2-1

2. Impacts to Land, Blasting, Stability, Scenery, and Forest Cover Are Insignificant

The studies found that land use is not a significant issue because "existing regulatory controls are adequate to address the issue." EIS II A-7. Likewise, blasting is not considered a significant issue with MTM because the studies concluded that "existing regulatory controls provide adequate protections from coal mining related blasting impacts on public safety and structures including wells." EIS II A-6. The EIS found that stability of valley fills is not a significant issue because there were "very low occurrences of stability failures, and those identified failures were generally minor in nature and posed no risk to public safety." EIS II A-8. Finally, the EIS found that scenery and culturally significant landscapes have statutory and regulatory controls that are adequate to address the issue. *Id.*

The EIS explains that only 3.4% of the forested land in the study area was changed to grassland by surface mining[7] over the past ten years (in WV, Valley

[7] For example, the EIS predicts that if MTM continues at its current rate, there may be a potential loss of up to 3.4% of the salamander population in the study area. EIS Appendix I at 92-93. Although we do not necessary concede that losses would be this dramatic, even if the estimate is correct, the EIS predicts that

Fills (VF) account for only 0.7% of forest loss). EIS Appendix I at V. Therefore, MTM does not have a significant adverse effect on forest cover, particularly when one considers that some of this land will be reforested through reclamation, which will be further facilitated by pending changes in OSM rules to encourage tree planning. Statistics from the EIS show that there is actually more forest cover today than there was in 1950.[8] EIS III R-2. In addition, this land will eventually revert to forest through natural succession. EIS IV A-4.

The EIS concludes that "...impacts to soils from MTM/VF are not irreversible and that over time, soils similar to those that existed prior to mining are likely to be re-established on reclaimed mine sites." EIS IV C-7. In addition, providing grassland areas and edge habitat in this region will have positive environmental benefits for many species that require diverse habitats to flourish. EIS Appendix I at 15. Fragmented forests have more edge habitat, and the creation of more edge habitat often corresponds to an increase in local species diversity as "edge" species are attracted to the region. EIS Appendix I at 43.

3. Exotic and Invasive Species are not Invading; Threatened and Endangered Species are not Threatened

there would still be an abundant salamander population of over 35 billion in the study area—or about 100 salamanders for every man, woman, and child in the United States.

[8] This trend is continuing. Data from the U.S. Forest Service indicates that the average cubic feet of forest growth exceeds the average annual rate of forest loss for ALL states in the region. EIS IV C-2.

The studies found no evidence that MTM has contributed to the spread of invasive and exotic species in Southern WV. EIS III F-16; Handel 2001. Nor is there a significant issue regarding the Endangered Species Act (ESA). The biological opinion issued in 1986 states that "...surface coal mining conducted in accordance with properly implemented State and Federal regulatory programs under SMCRA would not be likely to jeopardize the continued existence of listed or proposed species, or result in the destruction or adverse modification of designated or proposed critical habitats." EIS IV D-5. Another EIS study says that "...ample forest will remain in the West Virginia portion of the study area to maintain relatively high PEC[9] scores, [but] impacts to many forest interior bird species are likely to occur." EIS Appendix I at 90. Finally, the EIS notes that "there are no significant differences among the No Action Alternative and Alternatives I, II, and III in terms of their ability to protect [threatened and endangered] species." EIS IV D-7.

4. Water Issues are not Significant

The EIS found that flooding due to MTM is not a significant concern. The EIS found that downstream flooding potential is not significantly increased by existing mining practices so long as approved drainage control plans are properly

[9] PEC stands for potential ecological condition, and is a value calculated to determine the ecological health of a defined landscape scale, usually a watershed level, but this cumulative impact study did so on a State

applied. EIS IV I-7; Appendix H. In addition, "...valley fills do not seem to be causing excessive sediment deposition on the first and second order streams." EIS III D-8. "...[T]he substrate characteristics of the filled, filled/residential, and mined classes were not substantially different from the unmined class." EIS III D-13. In other words, the EIS found no significant sediment problem that could be attributed to MTM. Finally, "the EIS studies did not conclude that impacts documented below MTM/VF operations cause or contribute to significant degradation of waters of the U.S." EIS II D-9.

The EIS suggests that changes in water chemistry downstream from MTM operations are cause for concern. EIS III D-7. First, with respect to USEPA's water chemistry data, the USEPA identified problems with the quality assurance/quality control (QA/QC) implemented during the collection and analysis of the water chemistry data, causing all the water chemistry data to be called into question.[10] Assuming these QA/QC issues do not change the overall conclusion that significant differences exist between the filled and unmined sites and between the filled/residential and unmined sites, supplemental studies conducted in conjunction with the MTM/VF EIS studies conclude that neither the changes in the biological community, nor changes in water chemistry in the filled sites appear to have significant adverse impacts on the stream function with respect to

5-5-2

by State level. According to the EIS, PEC is an effective measure of biologic integrity. EIS Appendix I at 17.

downstream segments. Instead, these studies found sites influenced by mining continue to support abundant populations with representatives of all the functional feeding groups and stream function does not appear compromised at these sites.[11]

Second, the evidence does not show a clear impact on the study streams by the mountaintop mining/valley fill activities. To the contrary, the data establishes that MTM/VF activities result in changes in water chemistry and biological communities typical of any large scale development project, e.g. road construction or residential development. Such changes in community structure are more likely the result of changes in temperature regimes, typical whenever ponds, dams or municipal discharges are present. *Id.* Therefore, it is fair to say that any statement in the EIS attributing a cause and effect to a single activity where others such as temperature or ponds which provide a different food source are playing a role must be considered with caution. In addition, it should also be noted that USEPA reported studies compare a mined site on a third, fourth or fifth order stream with an unmined site on a first or second order stream. No unmined sites were selected on third, fourth or fifth order streams. Changes in water chemistry and biological communities between first or second order streams and third or fourth order streams are expected. USEPA failed to consider changes associated with

5-5-2

[10] These problems are discussed in the report "A Survey of the Water Quality of Streams in the Primary Region of Mountaintop/Valley Fill Coal Mining" (April 8, 2002).
[11] Arch Coal Supplemental MTR/VF EIS Study Report, April 2002.

increasing stream order in data interpretation and presentation to the public. This flaw in the data must be addressed in the Final EIS.

Finally, concerns about elevated selenium at test sites are minimized when considered in light of the latest scientific data on aquatic toxicity of selenium. EPA's current nationally recommended chronic criterion for selenium (5ug/l in the water column) and 20 ug/l acute criterion have been adopted by many States and utilized in water quality standards programs. However, based upon the latest scientific knowledge on selenium toxicity, EPA made a decision to update the acute and chronic criteria for selenium and published, in March 2002, a draft selenium criteria document.[12] EPA's draft document proposes a revised freshwater acute criterion (185 *ug/l*) in the water column and 7.9 ug/g (dry weight) in fish tissue that is considerably higher than the current national criterion. It is important to note that in some geographic areas in the study area background levels of total Se exceed 20 ppb, yet no acute toxic effects are observed. Therefore, the levels of concern expressed in the EIS studies become much less significant when considered pursuant to the agency's proposed revised criteria. 5-5-2

The EIS found that "Overall, the abundance of macroinvertebrates was found to be similar in upstream and downstream stations or to be slightly higher in 6-4-2

[12] See *Draft Aquatic Life Water Quality Criteria for Selenium 2002*. EPA Contract No. 68-C6-0036 (March 2002 Draft).

downstream stations. EIS III D-9. This strongly suggests that MTM operations are not having an adverse impact on downstream water quality. Likewise, the studies note that: "Biological conditions in the mined sites generally represented very good conditions, although a few sites did score in the good and poor range." EIS III D-12. This strongly suggests that MTM can be conducted with minimal effects on the environment, provided that appropriate mitigation techniques are applied. 6-4-2

Environmentalists have alleged that all of the above areas are at severe risk due to MTM. As explained above and in the EIS, the scientific data from the 30 comprehensive studies does not support the environmentalists' alarmist predictions. At the end of the day, the EIS observed that: "Watershed impacts directly attributable to mining and fills could not be distinguished from impacts due to other types of human activity." EIS II C-74. As Sherlock Holmes observed, the "dog that didn't bark" is a clue in and of itself.

b. The EIS Demonstrates that MTM has Numerous Positive Benefits that Suggest it Should be Permitted

i. MTM has Provided Environmental Benefits

MTM has resulted in improvements in water quality in several areas. Studies commissioned by the EIS have found that MTM resulted in improvements

in pH, iron, and manganese levels downstream. EIS III D-7. As the EIS notes, "the Appalachian coalfields provide almost limitless opportunities for watershed improvement." EIS IV B-9. Such opportunities are presented both in the form of remining operations, which can greatly improve water quality and improve public safety be removing highwalls, as well as mitigation conducted as part of the MTM process.

Runoff and groundwater are stored in valley fills. EIS IV B-4. Valley fills hold approximately 7 times more water as their pre-mining counterparts. EIS III H-4. This water is slowly released downstream, increasing base flows, lowering peak discharges, and moderating water temperatures. EIS IV B-6. An increase in base flow may eliminate intermittent flow, improving an intermittent stream to a perennial stream.

MTM activity also creates ponds. The EIS recognizes that functions of man made ponds exist and may be considerable, and may tend to limit the effect of disturbances on the downstream watersheds. EIS III C-18 & 20; Wallace B. in EPA et al. March 20, 2000. Wetland areas are being created at reclaimed mine sites. It is anticipated that wetland acreage has actually increased as a result of these steep slope [MTM] activities. EIS III D-19. These newly created wetland habitats, in conjunction with results from other mining reclamation efforts, have created habitat, such as grasslands, edge habitat, and scattered ponds that are

important for game species such as wild turkey, bobwhite quail, ruffed grouse, and white tailed deer. EIS III F-11. Some forest edge and grassland species (certain reptiles, birds, mammals, raptors, etc.) are positively impacted by the terrestrial habitat diversity created by MTM. EIS II C-75. The EIS documents that there has been an increase in the abundance of edge and grassland bird species at reclaimed MTM sites. EIS III F-7.[13]

ii. MTM has Provided Economic and Social Benefits

MTM has provided immeasurable economic and social benefits to one of the poorest regions of the United States. These mines provide high paying jobs, economic activity for other businesses, taxes for governments and schools, roads (EIS III J-2), and land that, in certain cases, can be used for commercial development.

The population in the study region is exceptionally poor. According to the Census, over 1/3 of the residents in 24 counties in the study area are below the poverty level. EIS III P-2. What the study area lacks in personal income, it makes up for in natural resources. The area contains over 28.5 billion tons of coal. EIS ES-2 MTM/VF operations are generally the most economical and efficient forms of surface mining in steep slope Appalachia and provide for the highest possible

[13] See also Wood and Edwards, 2001; Canterbury 2001.

recovery of multiple coal seams. EIS III I-1. Such operations may be able to mine as many as 18 seams. EIS III J-1. At current rates of coal production, this area could produce coal for the next 100 years.

One of the many benefits of these MTM operations are the high paying jobs and taxes created by the activity. Mining made up more than 10% of employment in a number of the study area counties. EIS III Q-5. Impacts are even greater in certain regions of the study area. Whereas MTM operations account for about ¼ to 1/3 of Appalachian coal production, in southern West Virginia, about 95% of the surface mining is done by the MTM method. Such impacts are also reflected in the tax revenues of these areas. For example, in West Virginia, 90% of the severance taxes come from coal. EIS III Q-10. Surface mining is particularly important to the economies of Boone, Logan, and Mingo counties. EIS III Q-13.

iii. Unnecessary Limitations on MTM Will Cause Both Economic and Environmental Harm

Unnecessary limitations on MTM in the study area would have significant adverse consequences, for the economy, the people of the region, government, and the environment. The EIS recognizes that if mining costs increase too greatly in the study area, mining employment would drop and tax revenue from coal would decline. Other studies have found that prohibiting valley fills in West Virginia would cause State tax revenues to decline by as much as $168 million annually,

plus an additional $83 million drop in County tax collections.[14] Commensurate school closings, and diminished State and government services would occur. EIS IV I-2. The EIS also recognized comments in the record stating that local governments depend on revenues and taxes in order to provide police and fire protection, ambulance service, and education. EIS I-20. Impacts to the private sector would be even greater, resulting in the loss of over 15,000 jobs and a $2.4 billion decrease in economic output in West Virginia. *See* Marshall Study, cited *supra*. The EIS does not offer any significant economic activity that would replace MTM if it were lost.

Moreover, "if coal in the study area is rendered economically unrecoverable, it may never be mined…" EIS IV F-1. This would be contrary to what is best for the environment, because it would waste natural resources and require coal to be mined somewhere else that may not involve the most economical and efficient form of surface mining that does not provide for the highest possible recovery of multiple coal seams. EIS III I-1. As early as 1979, EPA has stated that MTM may be preferable to other forms of mining, such as contour mining: "Mountaintop removal may serve as an excellent alternative to contour mining in these mountainous areas primarily because of the potential for reduced environmental impact, improved reclamation, increase land value,

[14] *See "The Fiscal Implications of Judicially Imposed Surface Mining Restrictions in West Virginia,"* Marshall University Center for Business and Economic Research, (February 2001).

expanded land use potential and total resource recovery." *EPA EA of Surface Mining Methods* at p. 25. In addition, the Marshall study also found that mining firms would be "extraordinarily unlikely" to replace lost MTM tonnage with additional coal mined underground. Indeed, a policy that did not maximize utilization of our coal resources would actually violate OSM's regulations, which provide that surface mining activities must be conducted to maximize the utilization and conservation of the coal so that reaffecting the land in the future is minimized. *See* 30 C.F.R. § 816.59.

Finally, the EIS fails to address impacts to national security if the amount of coal reserves noted elsewhere in this document are excluded from recovery. There is no consideration for this Administration's National Energy Strategy, aimed at securing energy independence for the United States. This strategy relies heavily on the continued use of this nation's abundant coal resources as a low-cost and reliable source of energy.

c. The EIS is Programmatic in Nature

The agreement to prepare the EIS is contained in a settlement agreement that resolved Federal claims in the case of *Bragg v. Robertson*, 54 F.Supp. 2d 653 (S.D. WV 1999). The stated purpose of the EIS is:

> "...to consider developing agency policies, guidance, and coordinated agency decision-making processes to minimize, to the maximum extent practicable, the adverse environmental effects to waters of the United States and to fish and wildlife resources affected by mountaintop mining operations, and to environmental resources that could be affected by the size and location of excess spoil disposal sites in valley fills."

64 Fed. Reg. 5778 (February 5, 1999).

The EIS is not specific to any particular action, but rather is a "Programmatic EIS" in that it evaluates broad Federal actions such as the adoption of new or revised agency program guidance, policies, or regulations. An EIS is not itself "final agency action" subject to judicial review. Standing alone, it does not establish any rights, obligations, or other legal consequences.[15] A programmatic EIS is essentially procedural in nature and not substantive. In the future, policies will be finalized and rules promulgated based on information and analysis contained in the EIS, but the EIS itself does not change any current laws or regulations. Future actions proposed as an outgrowth of this EIS may require independent or supplemental NEPA analysis.

[15] *See Bennett v. Spear*, 520 U.S. 154, 177 (1997).

The EIS has done exactly what it is supposed to have done—it has considered various policies, guidance, and coordinated agency decision-making processes to minimize the impacts of MTM to the extent practicable. Accordingly, in the framework of this programmatic EIS, we turn now to a discussion of Alternative III, and why we believe that it should be selected as the best Alternative in the Final EIS.

d. Alternative III is Preferable

Although the EIS states that "the alternatives were developed with the objective that each would satisfy the requirements of the CWA and SMCRA," EIS II B-1, and each would likewise "improve environmental protection and better coordinate implementation of the CWA and SMCRA..." *Id.*, Alternative III is the most preferable alternative for the following reasons.

i. Alternative III Will Produce the Best Decisions, Which Will Improve the Environment 1-4

The EIS correctly observes that: "[Alternative III] would provide clear environmental performance targets for industry, stakeholders, and regulators based on combined analyses of SMCRA and CWA performance standards, a better basis for decisions and findings by SMCRA regulators, and an improved ability for States, with more knowledge about environmental resources within their borders,

local conditions, etc., to set priorities for mitigation." *Id.* The EIS also recognizes that the U.S. Army Corps of Engineers (COE) does not have staff with mining engineering background as OSM does, and that CWA § 404 minimization alternative analyses involve a knowledge of mine planning theory and practice, as well as operational feasibility to determine if all practicable alternatives have been considered. EIS IV I-17. Therefore, Alternative III is the most logical choice because the Federal regulatory personnel with the best knowledge about the subject will more frequently be in a lead role in making environmental decisions.

ii. Coordination will Also Yield Better Decisionmaking 1-4

Alternative III is based on a joint permit application that will provide for concurrent review, which will result in better decisionmaking. It will enhance the coordinated regulatory processes by serving as the platform for evaluation of compliance with SMCRA and CWA Sections 401, 402, and 404 programs. EIS II C-22. Although a single permit application would be used, each agency would remain responsible for ensuring that all statutory and regulatory responsibilities in SMCRA and the CWA are met, further enhancing environmental protections. A memorandum of agreement (MOA) and field operating procedures (FOP) will further enhance coordination and decisionmaking. EIS II C-25-26.

SMCRA requires that Federal and State agencies, such as OSM, State regulatory authorities, and the COE, coordinate implementation of their programs and cooperate "to the greatest extent possible" in order to minimize duplication, delays, and conflict. 30 U.S.C. §§ 1211(c)(12) & 1292(c); 30 C.F.R. § 773.5. The CWA likewise mandates the agencies minimize duplication.[16] Alternative III is clearly the best option to fulfill this statutory mandate, because it would minimize duplication by promoting "a single lead agency with coal mining regulatory expertise for permitting and a framework for efficient, environmentally responsible production of energy resources." EIS II B-15. Requiring both an individual permit (IP) and a SMCRA review would be duplicative and inefficient, unless it is determined necessary by the COE in a particular situation, and justified by the particular circumstances. 1-4

iii. Alternative III Correctly Presumes the NWPs are Appropriate in Most Cases

Data from the EIS demonstrates that the vast majority of MTM operations are currently authorized pursuant to NWP 21. For example, in West Virginia from 1990-2002, 81 NWPs have been issued for MTM operations, versus only 5 individual permits (IP). EIS II C-46. The COE has been independently applying the statutory requirements of the CWA over this time, and has concluded 94% of the time that NWPs are appropriate. Environmental organizations have repeatedly challenged approval of these permits, and have repeatedly lost their claims in Federal courts.[17] Therefore, it is apparent that Alternative III is the most appropriate alternative, because it establishes the regulatory paradigm that will most often produce the correct decision.

[16] 33 U.S.C. § 1303(a); 33 C.F.R. § 322.2(f)(2); *See also WV Governor's Report* at ES-4 ("[COE, FWS, OSM & EPA] should be encouraged…to cooperate in resolving outstanding mountaintop removal issues.").

iv. Balancing Environmental, Economic, and Technical Considerations

Alternatives are considered not only with regard to their impact on the environment, but also on technical and economic factors. For example, one of the primary purposes of SMCRA is to "assure that the coal supply essential to the Nation's energy requirements and to its economic and social well being is provided and strike a balance between protection of the environment…and the Nation's need for coal as an essential source of energy." 30 U.S.C. § 1202(f). Agencies are required to follow all Congressional mandates, including those in SMCRA and other laws. Since the comprehensive analysis concluded that: "the environmental benefits of the three alternatives are very similar," EIS II B-13, the agencies should select Alternative III because it is the best alternative that also fulfills other statutory mandates by minimizing the adverse impacts to the 1-4

[17] *See Bragg v. Robertson, 72 F. Supp. 2d 642, 658 (S.D. W. VA 1999); vacated, Bragg v. West Virginia Coal Association, 248 F.3d 275 (2001); cert. denied, 122 S.Ct. 920 (2002); See also Kentuckians for the Commonwealth v. Rivenburgh*, 317 F. 3d. 425 (4th Cir. 2003).

economy. This approach is also consistent with NEPA and regulations by the Council on Environmental Quality (CEQ), which allow agencies to consider economic and technical issues: "An agency may discuss preferences among alternatives based on relevant factors, including economic and technical considerations and agency statutory missions." 40 C.F.R. § 1505.2(b); 42 U.S.C. § 4332(B).

v. Why NWPs are Appropriate for MTM

1. COE Asserts that NWP are Appropriate for MTM

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The COE reauthorizes its nationwide permits (NWPs) every five years. In all of its previous actions, and particularly in its most recent reauthorization, the COE clearly stated that NWP 21 is appropriate for MTM: "...this [NWP 21] permit is designed for use by mountaintop mining operations as well as other surface coal mining activities. 67 Fed. Reg. 2042 (January 15, 2002). The COE also states that "...valley fills may be pursued under the current regulations." *Id.* at 2039. The COE, through NWP 21, ensures that surface coal mining activities do not cause more than minimal adverse effects to the aquatic environment after considering mitigation. *Id.*

The COE believes that NWP are appropriate and useful for expediting the processing of permits provided there is adequate compensatory mitigation. Id at

2043. The COE found that proposed projects under NWP 21 are generally located at the upper limits of the watersheds and are therefore not interfering with aquatic species migration. *Id.* Moreover, the COE is ensuring that such projects are avoiding and minimizing impacts to the extent practicable and providing adequate mitigation, especially in the form of enhancement or rehabilitation of existing streams through stabilizing old mined sites to reduce sedimentation and acidic water releases. Such activities can result in substantial improvement in downstream water quality and aquatic habitat within a watershed. *Id.* These findings are consistent with those of the EIS, which found that Appalachian coalfields provide almost limitless opportunities for watershed improvement. EIS IV B-9. The EIS also agrees that mitigation could not only offset, but enhance aquatic resources. *Id.* Finally, the COE recognizes that coal mining is different than many other activities authorized under NWPs, because coal mining projects are thoroughly reviewed for environmental impacts under several other authorities. *Id.* at 2042.

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2. There are many protections built into the NWP framework

There are many protections available under NWP 21 to ensure protection of aquatic resources. Such protections are always evolving and improving, as necessary. For example, just last year, the COE made two changes to NWP 21. First, the COE now requires a specific written determination by the District

Engineer (DE), on a case-by-case basis, that the proposed activity complies with the terms and conditions of this NWP, and that adverse effects to the aquatic environment are minimal both individually and cumulatively, after consideration of any required mitigation before any project can be authorized. 67 Fed. Reg. 2038. Second, the COE clarified specifically in the NWP 21 that the agency will require mitigation when evaluating surface coal mining activities in accordance with General Condition 19. The COE also will now address direct and indirect effects to the aquatic environment from the regulated discharge of fill material in its § 404 review.

Furthermore, under Alternative III, the COE retains discretion to (1) require an individual permit if the adverse individual or cumulative effects on the aquatic environment will be more than minimal after mitigation; (2) add regional conditions on a watershed, regional, or geographic basis; or (3) suspend, modify, or revoke authorizations under a NWP. NWPs do not authorize any activity that is likely to jeopardize the continued existence of a threatened or endangered species as listed or proposed for listing under the ESA, or to destroy or adversely affect the designated critical habitat of such species. Not only does the COE have substantial discretion to regulate NWPs, but EPA is also authorized to veto any § 404 permit. EIS II C-8; CWA § 404(c).

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vi. IPs Are Duplicative and Unnecessary in Most Cases Because SMCRA Provides Comprehensive Information on all Aspects of Mining for Use by COE in § 404 Reviews

The COE, pursuant to CWA § 404, is limited to regulating the placement of fill material in waters of the United States, and the scope of its analysis is limited to impacts on aquatic resources. However, SMCRA provides much broader coverage through several statutory and regulatory provisions, through which OSM protects fish, wildlife, and the hydrologic balance. Indeed, that is why NWP 21 is the only "programmatic" Nationwide Permit—that is, a general permit directly tied to another environmental regulatory program that already comprehensively regulates the authorized activities. As the COE has repeatedly found, SMCRA adequately addresses environmental concerns and provides similar protections for aquatic resources as the § 404 program requirements. [18] The language of NWP 21 has always tied the authorization directly to those activities that are "authorized by [OSM] or States with approved programs under Title V or [SMCRA]." *See* 51 Fed. Reg. 41026, 41256 (November 13, 1986); 67 Fed. Reg. 2020, 2081 (January 15, 2002). A number of these SMCRA protections are discussed below.

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SMCRA § 515(b)(10) requires operators to "minimize the disturbances to the prevailing hydrologic balance at the mine site and in associated offsite areas and to the quality and quantity of water in surface and ground water systems…"

[18] *See* 56 Fed. Reg. 14598, 14604 (April 10, 1991); 56 Fed. Reg. 59110, 59124 (November 22, 1991).

In addition, § 515(b)(24) provides that operators must minimize disturbances and adverse impacts of operations on fish, wildlife, and related environmental values to the extent possible using best technology currently available (BTCA).

For permit applications, SMCRA also requires information on maps, mining plans, watersheds, climatological factors, geological information regarding overburden strata, coal seams, aquifers, the water table, spoil, topsoil, blasting, natural drainways, and chemical analyses. 30 U.S.C. § 1257(b). Further information is required for the mine's reclamation plan. 30 U.S.C. § 1258.

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In addition, SMCRA § 507(b)(11) requires a determination of the probable hydrologic consequences of the mining and reclamation operations, both on and off the mine site. This section results in information collected on the hydrologic regime, quantity and quality of water in surface and underground water systems, information on dissolved and suspended solids, and such other data as required to assess the probable cumulative impacts (set forth in a Cumulative Hydrologic Impact Analysis, or "CHIA"). *See also* 30 C.F.R. § 780.21.

All of this information is available to the COE to assist in making its required determinations pursuant to its authority under CWA § 404. Because SMCRA provides such comprehensive information regarding the mine, and because Alternative III provides numerous avenues for coordination between

OSM and COE, it would be unnecessary, duplicative, and contrary to Congressional intent to require lengthy individual permits as the norm, as is likely under Alternative I. Moreover, courts have observed that they will not uphold presumptions, such as Alternative I, that are counterfactual.[19]

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vii. OSM Will Promulgate Rules to Fill any Regulatory Gaps

OSM will issue rulemakings (Action 3.3 and Action 7) and an MOA to ensure that any gaps, including § 404 data collection, impact prediction, and alternative analysis, including avoidance and minimization are addressed. EIS II C-23. These actions include amending the "stream buffer zone" rule and the OSM regulations on the placement of excess spoil. We strongly support these regulatory changes by OSM that are more fully explained in Section II(e)(iii) & (vii) of our comments, *supra*.

e. Discussion of Specific EIS Action Items (EIS II C)

The EIS proposes seventeen specific action items. Our comments on these Action items are provided below.

[19] *NMA v. Babbitt*, 172 F.3d 906, 913 (D.C. Cir. 1999)(we do not see how a counterfactual procedural device could be justified even as a matter of policy); *See Allentown Mack Sales & Serv., Inc. v. NLRB, 522 U.S. 359, 118 S. Ct. 818, 828, 139 L. Ed. 2d 797 (1998).*

i. Action Item 1: Regulatory Alternatives

As explained in great detail in Section II(d). of our comments, we strongly support Action 1.3, commonly referred to as "Alternative III." 1-4

ii. Action Item 2: Consistent Stream Definitions

We support this action. Like the definition of "fill material" that was clarified by the COE and EPA in 2000, creating consistent definitions of streams would be beneficial so that the same definitions would apply to various regulatory programs. This would lead to greater efficiency, better coordination, and consequently better environmental analysis, decisionmaking, and consistency among the various programs. 1-13

iii. Action Item 3: Clarification of the Stream Buffer Zone Rule

We strongly support this action.

SMCRA has never mentioned, let alone mandated, a requirement that there needs to be a "buffer zone" around a stream. Quite the contrary, SMCRA is

replete with references to mining near, under, and/or through streams. Instead of prohibiting stream disturbance altogether, the law requires an effort to minimize adverse effects *outside the permit area and downstream*. *See, e.g.* SMCRA §§ 515(b)(10(B)(i)(prevent to the extent possible using BTCA additional contributions of suspended solids to streamflow or runoff outside the permit area); 515(b)(22)(D)(allowing disposal in springs, natural water courses or wet weather seeps as long as drains are constructed); 516(b)(9)(B)(focusing on limiting additional contribution of suspended solids to streamflow outside the permit area); 516(b)(11)(minimize, to the extent possible using BTCA disturbances & adverse impacts of operations on fish & wildlife); 516(c)(allowing mining under perennial streams, except where imminent danger to human inhabitants exists). Congress reiterated its concerns in SMCRA's legislative history, which emphasized that Congress was not primarily concerned with the footprint of MTM VFs, but rather with the downstream impact, both in terms of safety to populations and the environment. *See* Senate Report No. 95-128, 1st Session, p. 83.

The original purpose of the stream buffer zone (SBZ) rule was to protect a stream from sediment bearing water flowing from the disturbed area. See 44 Fed. Reg. 30619 (May 25, 1979). This purpose confirms the fact that the rule was never meant to apply to valley fills in the first place. Instead, it was directed at mining near a stream. As OSM recognized in its 1983 rule, "It is impossible to conduct surface mining operations without disturbing a number of minor natural

streams, including some which contain biota." 48 Fed. Reg. 30313 (June 30, 1983).

The CWA, as well as OSM regulations, provide ample protection for streams. CWA § 404 permits provides extensive protection, including mitigation requirements that are beyond that required by SMCRA. In addition, almost a dozen other SMCRA regulations provide protection for the hydrologic balance and fish & wildlife.[20] The SBZ rule is therefore not only redundant, but worse, its vague language has resulted in unnecessary and costly litigation, permit delays, and uncertainty in the SMCRA regulatory programs. Therefore, this rule needs to be eliminated, or at the very least, properly clarified.

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iv. Action Item 4: Advanced Identification Designation (ADID)

We strongly oppose this action. This action is unnecessary and duplicative, because authority already exists under SMCRA to designate areas that are unsuitable for mining. 30 U.S.C. § 1272. These SMCRA provisions are specifically designed for mining, and are more appropriate for use with MTM operations than is an unrelated provision meant to be applied in other contexts. Moreover, both the CWA and SMCRA require agencies to minimize duplication.

[20] *See, e.g.* 30 C.F.R. §§ 816.41–43; 816.45; 816.72; 816.97; 816.150(b)(5); 816.150(d)(1) & (d)(2); 816.151(c)(2); and 816.151(d)(5).

30 U.S.C. § 1292(c) & 1303(a); 33 U.S.C. § 1211(c)(12); 33 C.F.R. § 322.2(f)(2). Such duplicative action is also contrary to the purpose of the EIS, which calls for coordinated agency action.

In addition, ADID regulations have historically been used only for specific geographic locations and not applied to a general class of particular stream segments or water resources. EIS II C-36. ADID designation only occurs following exhaustive site-specific data collection and analysis, and thorough public participation. *Id.* Without these site-specific efforts for each headwater stream, an ADID designation for a broad category of streams would be arbitrary. EIS II D-7.

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v. Action 5: Development of New Water Quality Standards

The CWA requires States to review water quality standards (wqs) at least once every 3 years. 33 U.S.C. § 1313(c)(1). The Associations support efforts by States to review and revise wqs as appropriate to ensure they are attainable and that they are based upon the latest scientific knowledge. EPA recognizes that there are a number of factors, water quality and non-water quality, that affect the attainment of the biological integrity of a particular water body, including the amount of human activity resulting in permitted and non-permitted discharges, and

the type and extent of hydrologic modifications.[21] For example, some recent literature suggests the full restoration of natural aquatic life communities may not be feasible in small watersheds with heavily urbanized areas. *Id.* at 23. Likewise, the same may be true for certain water bodies where natural background conditions or irretrievable human-induced conditions prevent attainment. As such, EPA recommends States consider developing a system of tiered aquatic life uses and subcategories which define reasonably attainable biological communities for the impacted areas. Once a refined designated use system is developed, individual water bodies may be assigned refined designated uses, as appropriate, and wqs and water quality criteria (wqc) may be revised accordingly. Such revisions are subject to EPA review and approval and require an appropriate scientific, technical or economic justification for the change. The Associations believe, particularly in light of new scientific evidence suggesting the current national water quality criteria for selenium may be over-protective, that States should undertake a meaningful review of current standards and use designations where credible evidence supports a reanalysis, e.g. such as standard for selenium.

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vi. Action 6: Refine Ecological Function Protocols

[21] See EPA Guidance: Coordinating CSO Long-Term Planning With Water Quality Standards Reviews, July 31, 2001.

We support the use of appropriately crafted protocols to assist in determining the effects of MTM operations on ecology. However, such protocols must be based on real evidence and sound science, and not arbitrary numbers created just for the sake of having a threshold limit.

vii. Action 7: Rulemaking on Excess Spoil

We support this rulemaking effort by OSM. We agree that the permit applicant should demonstrate, to the satisfaction of the regulatory authority, that the volume of excess spoil is no more than necessary and that the location and configuration of excess spoil fills will result in the least environmental impact after considering alternative sites and designs. However, consistent with SMCRA § 515(b)(24), the second requirement should be required only *to the extent possible, using BTCA*, since this limitation was imposed by Congress.

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viii. Action 8: BMP manual for stream protocol and mitigation

We support this action.

ix. Action 9: Refine and Calibrate Stream Assessment Protocols

We support this action. The protocols should continue to be improved and calibrated as new data becomes available.

x. Action 10: Incorporate Mitigation/Compensation Monitoring Plans into SMCRA/NPDES inspection schedules. Coordinate SMCRA and CWA requirements to establish financial liability to ensure that reclamation and compensatory mitigation projects are completed successfully.

We do not understand this action. This action seems to combine and confuse concepts that do not belong together. For example, NPDES does not relate to mitigation. Likewise, there is no bonding under the CWA; rather, bonding is required only under SMCRA, and only for reclamation. NMA filed comments with OSM last year on proposed changes to its bonding regulations. The comments explained that bonds are set to cover certain activities, and cannot be broadened after the fact. There is a serious problem with the availability of reclamation bonds for the mining industry. Also, heaping too much liability on the system risks additional forfeitures, which can ultimately make the overall problem worse. We are not aware of any COE regulations requiring bonding for mitigation associated with NWPs. Therefore, the agencies must be extremely careful in implementing this action.

We cannot provide further comments without more specifics on exactly what is being proposed in this action.

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xi. Action 11: Apply Stream Assessment Protocols to Determine On Site Mitigation Requirements

The SMCRA regulatory authority should apply the stream assessment protocols to determine on site mitigation requirements so long as the protocols are realistic and produce realistic assessments. However, certain protocols that have been developed so far are of questionable reliability. For example, the Louisville Protocol has not undergone extensive peer review or public comment, and may contain errors.[22] In addition, permittees should receive credit for SMCRA reclamation towards mitigation requirements.

xii. Action 12: Creation of a Dynamic GIS Database for evaluating and Tracking Aquatic Cumulative Impacts

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We support the gathering of additional data to better evaluate and track the cumulative impacts on aquatics. However, we do not agree that such information should be used to establish a "bright line" cumulative impact threshold for feasible CWA § 404 MTM permits. The evidence in the EIS uniformly suggests that such a bright line is inappropriate because there are too many site specific factors, and therefore, the creation of such a line would be arbitrary and capricious. Moreover, the EIS itself found that smaller watershed sizes, by increasing the number of fills

[22] *See* Joint Industry Specific Comments.

constructed, could result in *greater* cumulative impacts, reductions in coal reserves and increases in utility costs. EIS II C-73.

xiii. Action 13: BMP Manual for Growth Media & Reclamation with Trees

We support this action. Studies have shown that changes in reclamation techniques, coupled with modifications to OSM regulations could greatly improve the ability to grow trees on reclaimed land. Moreover, the EIS recognizes that "...impacts to soils from MTM/VF are not irreversible and that over time, soils similar to those that existed prior to mining are likely to be re-established on reclaimed mine sites." EIS IV C-7. Such techniques, if properly applied, can actually be less expensive than current practices. This is an area where OSM rulemaking could make a significant contribution to minimizing the impact of MTM operations by removing existing impediments to planting trees.

1-13

xiv. Action 14: Congressional Mandate to Grow Trees

We strongly oppose this action. A one-size-fits-all mandate such as this was not put into SMCRA by Congress in the first place because they recognized that OSM, States, and permittees needed flexibility to address site specific conditions that are most appropriate for the area. Moreover, most surface rights are not owned by mining companies, and therefore permittees cannot normally

force landowners to accept forest cover as the post mining land use. If such an amendment were made to SMCRA, it would remove a big stick from the surface property owners' bundle of rights, and cause takings lawsuits. It would unnecessarily eliminate flexibility that is built into current law. Finally, forcing States to do this may also violate the 10th Amendment to the Constitution. This is an unnecessary and bad idea.

xv. Action 15: Evaluate and Coordinate Dust/Blasting Programs and Develop BMP Manual

The creation of a BMP manual may merit further consideration. However, we oppose the regulatory actions because the EIS shows that "dust and fume emissions from blasting pose no potential health problems outside the permit area. Visible and measurable fugitive dust rarely migrated more than 1000 feet from the actual blast." EIS II C-84. Air quality control plans are already required as part of the SMCRA permit. *See* 30 C.F.R. § 780.15. In addition, MSHA also regulates explosives and blasting. *See* 30 C.F.R. §§ 77.1300-1304.

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xvi. Action 16: Flooding Guidelines

We support the concept of non-mandatory guidelines to assist operators in minimizing the potential for off-site flooding, to the extent that guidelines are reasonable. However, we would not support mandatory flooding regulation

because the EIS does not support such action. It found that: (1) the predicted increases in peak flow did not cause flows to leave the banks of the stream channel; and (2) flooding was caused by mine sites that were not following or maintaining their approved drainage control plans. EIS II C-87. This evidence demonstrates that more regulations are not necessary or productive, but rather, the focus should be better compliance with existing rules and regulations at a few operations.

xvii. Action 17: Program Changes to Comply with the ESA

As noted above, the most recent biological opinion issued by FWS says that: "...surface coal mining conducted in accordance with properly implemented State and Federal regulatory programs under SMCRA would not be likely to jeopardize the continued existence of listed or proposed species, or result in the destruction or adverse modification of designated or proposed critical habitats." In addition, the EIS says that: "there are no significant differences among the No Action Alternative and Alternatives I, II, and III in terms of their ability to protect [threatened and endangered] species." EIS IV D-7. Endangered species issues can be adequately addressed on a permit-by-permit basis under existing 1-13

regulations. Neither a CWA 404 permit nor a SMCRA permit will be issued if it will result in violations of the ESA.[23] 1-13

The following section of the comments will provide detailed comments on specific sections of the EIS.

III. Specific Comments on the MTM EIS

Page II.C-30

The extent to which valley fills reduce energy (organic carbon) resources that may be used by downstream aquatic communities is not well known.

Scientific research has demonstrated that no-net reduction in energy transport or energy availability has occurred. For example, the United States Geological Survey, as part of the National Water Quality Assessment Program, conducted a survey of fish communities to assess biological responses to certain stressors, with an emphasis on mining. Published in 2001, the study found that streams associated with large scale surface mining activity (including one of the streams analyzed in both the EIS benthic and chemistry reports) had high scores in terms of both sensitive individuals and total fish counts: 6-8-4

[23] 33 U.S.C. § 1344(c); 30 C.F.R. § 780.16; 30 C.F.R. § 816.97(b).

Among the Kanawha River streams, Clear Fork at Whitesville, Kelley's Creek at Cedar Grove and Laurel Creek at Hacker Valley ranked among the best sites in several species composition metrics.[24]

If valley fill construction or other mining-related disturbance was impacting the amount of energy available to downstream reaches, according to the positions advocated by participants in the *Value of Headwater Streams Workshop* (EIS Appendix D), a corresponding reduction in fish populations would occur below valley fills. As noted under the same section of the EIS, *"Macroinvertebrate recovery appears to be facilitated provided sufficient food sources and aquatic habitats are available."* The results of the USGS fish survey and the findings of the EIS Cumulative Impact Study (CIS) demonstrate that sufficient energy exists and will continue to exist to provide input for these watersheds and to sustain aquatic function in the downstream reaches of the watershed.

6-8-4

Page II.C-36, Actions 4.1 and 4.2 **Designate Areas Generally Unsuitable for Disposal Referred to as Advanced Identification of Disposal Areas**

Application of this §404 regulatory tool to mining in Central Appalachia would be redundant. Each of the factors identified as part of the ADID process are currently addressed and/or facilitated by other regulatory programs. For instance, premining baseline water quality data is collected and submitted as part of the

[24] U.S. Geological Survey. *Fish Communities and Their Relation to Environmental Factors in the Kanawha River Basin, West Virginia, Virginia, and North Carolina 1997-1998.* 2001

SMCRA and NPDES applications. The public participation avenues that are stressed in the ADID description are an integral part of the SMCRA, §401 and §402 permitting processes. While permit-specific legal challenges are not a matter of routine in the study area, the SMCRA process certainly provides the option of administrative challenge (to an appeals board) and legal challenges to the appropriate state court.

As noted by the COE in earlier rulemaking actions regarding NWP 21, the mining related dredge and fill permits are one of the only permits in the §404 program that are subject to extensive, independent environmental analysis [25]. Mining operations are subject to extensive SMCRA permitting requirements and NPDES requirements. Depending on the activity, other agencies such as the federal Mine Safety and Health Administration can be involved in permitting actions. All these existing environmental programs are subject to federal oversight: OSM in the SMCRA process and EPA in the NPDES process.

6-8-4

In summary, the ADID process would only add to an already comprehensive, expensive and time consuming regulatory process associated mine permitting actions.

Page II.C-37 **Stream Impairment**

Studies indicate that aquatic communities downstream of surface coal mining operations and valley fills may be impaired.
(emphasis added)

[25] 56 Fed. Reg. 14598, 14606 (April 10, 1991) "SMCRA provides similar protections for aquatic resources as the § 404 program requirements." See also 56 Fed. Reg. 59110, 59124 (November 22, 1991). COE again acknowledges that § 404 and SMCRA protect the same resources.

Scientific research conducted for this EIS and by mining companies in conjunction with the EIS does not support this statement. The most significant change observed below valley fills was a shift in the benthic community towards more filter-feeding organisms and a reduction in mayfly population. This shift may or may not be directly attributable to valley fill construction or mining activity. OSM found similar community shifts with a distinct reduction in mayfly populations downstream of mining without valley fills:

> **A study was...conducted by OSM on the cumulative off-site impacts from a large area mine in southeastern Ohio over a twelve year period. The location of the study was on the Central Ohio Coal Company (COCCO) property where a dragline was used...Although this study was not in the EIS study area it was included to show how mining activities without valley fills can impact water quality. The chemical analysis of the impacted streams indicated similarly elevated levels of hardness, sulfates, conductivity...**
>
> **Comparative surveys of macro invertebrates...indicate similar results to those in the filled and filled/residential class sites of the MTM/VF studies (i.e.; elevated conductivity, sulfates, hardness and a decline in pollution sensitive species)...It is particularly noteworthy that none of the macro inveterate samples...showed any significant numbers or kinds of mayflies.**
> **EIS III.D-7.**

6-8-4

Since the OSM study cited above was in connection with mining that did not involve valley fills, similar results can be expected with any earth disturbing activity, mining or otherwise.

Neither the decline of the mayfly population or the shift towards filter-feeding organisms impacts stream function downstream. The USGS fish survey found that streams below valley fill and surface mine disturbance supported healthy and diverse fish populations, indicating that sufficient energy exists below filled areas.

> *Total fish species downstream of some filled sites were lower than mined and reference sites. However, fisheries sampling was limited by drought conditions during the study period and the sample populations may not be statistically representative.*

The Associations believe that statements regarding fish impairment are incorrect. As noted above, results of the Fish Report are questionable, and of little value. The USGS fish survey conducted in the same region as the EIS Fish Report found some of the healthiest fish populations downstream of areas subject to large scale mining and valley fill activities. As noted in the subsequent paragraph:

6-8-4

> *The sample size and monitoring periods conducted for the EIS were not considered sufficient to establish firm cause and effect relationships between individual pollutants and the decline in particular macro invertebrate populations. Impairment could not be correlated with the number of fills, their size, age, or construction method.*

When viewed in conjunction with the USGS fisheries report previously cited in our comments it is clear that valley fills and other mining activities are having no adverse affect on the downstream fish communities. The failure of the EIS to state the obvious is a serious flaw and should be addressed in the final EIS.

Page II.C-44, third paragraph under Action 6:

An example of biomonitoring to assess baseline stream health using macro invertebrate data is the West Virginia Stream Condition Index, which was used in some of the aquatic studies conducted for this EIS.

Application of the WV SCI to the southern coalfields of West Virginia is inappropriate. This assessment method was developed using data collected across the State, but an undue emphasis was placed on information collected in the central and northern regions. The conditions in these other regions are quite different that those that exist within the primary region of MTM/VF which rests in the southern portion of the State. A more region specific assessment would account for the natural conditions evident in the West Virginia portion of the study area Further, the results of the WV SCI have been incorrectly interpreted to assign "impairment" to several streams.

Finally, it is inappropriate to conclude that changes are the result of valley fills. For example, OSM's evaluation of a large scale surface mine in Ohio, the Central Ohio Coal Company Study (OSM COCCo. Study) documented similar benthic changes below mining disturbance that did not include valley fill construction. Mayfly taxa were virtually non-existent in this study as well. Because of generally flat terrain of the mined area, OSM COCCo. Study could be characterized as an evaluation of excavation rather than mining, so similar impacts to the mayfly taxa should be expected below any activity that fractures rock and disturbs the soil.

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Page II.C-51, NWPs Discussion:

On January 15, 2003 the COE reissued all of its NWPs. Those permits generally identified upper limit thresholds for NWP applicability of each identified activity. In considering the need for thresholds for NWP 21, the COE determined that there was currently no scientific basis for a programmatic threshold. Additionally, the COE believes the coal mining is different from activities authorized under other NWPs in that coal mining projects are reviewed for environmental impacts under other federal authorities.

As noted in this section of the EIS narrative, coal mining is subject to extensive and detailed environmental analyses through the state or federal SMCRA, NPDES and 401 water quality certification programs. Any potential environmental impacts of mining are identified and addressed prior to the issuance of the SMCRA and NPDES permits. These existing permit reviews which occur independent of the §404 permitting process are sufficient to insure that "no more than minimal" impacts will result from the proposed mining operation.

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However, the COE made the commitment to re-evaluate the possibility of an upper threshold for NWP 21 after this EIS is completed.

The existence of the SMCRA and NPDES permitting programs, coupled with data collected through the EIS technical studies and other scientific research support a final decision by the COE to assume that all §404 permit applications are eligible for authorization under NWP 21 as advocated under alternative three, and that an upper threshold is not required. Specific evidence to support this approach and alternative are presented under our General Comments.

Page II.C-52, Compensatory Mitigation, General Comment:

The COE encourages applicants to perform compensatory mitigation projects in conjunction with mining operations;

A permanent conservation easement is required for mitigation and coal mine companies frequently do not own the property they are mining.

Requiring permanent conservation easements works at odds with encouraging on-site mitigation performed as part of the reclamation of a mined area and improperly extends the COE's influence beyond its statutory jurisdiction. As the statements cited above acknowledge, coal companies usually do not own the land on which they are mining. Instead, the mining companies lease the right to extract the mineral and the surface of the area reverts back to its owners once extraction and reclamation are completed. Because of this unique land ownership arrangement, the ability of the mine operator to obtain property and execute conservation easements is extremely limited, if not impossible. Unlike other development activities that impact wetlands and require §404 permits, mining is only a temporary land use. Whereas highway, infrastructure and building construction are permanent activities, mining only occurs in an area for a relatively short time. Any mitigation project undertaken for these permanent activities lends itself better to perpetual easements, since property is usually purchased by the permittee in conjunction with these permanent land uses and maintained in perpetuity as simply an extension of that project. Other natural resource extraction activities often coexist with mining, with timbering and natural gas production being the most prevalent activities. These activities, like coal

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extraction, are temporary and are usually facilitated through leases, not ownership. Conservation easements could potentially complicate these other extraction activities thereby reducing the land's overall value and presenting a takings situation.

A conservation easement forecloses the possibility of future use or development and eliminates the private property rights retained by the landowner

As with many other particulars to the "wetlands" mitigation requirements it is clear that mining and the temporary nature of coal extraction was never considered in the development of this requirement.

Imposition of a conservation easement is unneeded and duplicative. Any future activity that could impact jurisdictional waters would require §404 authorization from the COE.

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Page II.C-73, last paragraph, Establishing Cumulative Impact Thresholds:

Based on the fact that there have been 5 individual permit applications compared to the 81 projects approved under NWP 21 in West Virginia, it appears that applicants are designing the majority of MTM/VF proposals to stay below the 250-acre minimal impact threshold and thereby avoid the IP process.

This statement is presented without any explanation as to the effects of the interim 250-acre NWP/IP permit threshold. Operations in West Virginia redesigned to fall under the 250-acre reduced projected employment and production numbers. A particular operation in Nicholas County West Virginia was redesigned by the permittee to reduce valley fill configurations in order to fall below the 250-acre

watershed restriction. The project's planned recoverable coal reserves were lowered from 25 million tons to 8 million tons.[26]

The EIS technical studies found similar results, which are summarized on page IV.I-3:

> **The economics studies show a direct correlation between fill size and shifts in production due to increased mining costs. The Hill & Associates sensitivity analysis projected reserve reductions of 22 and 45% as well as cost increases of around 8 and 14% when all fills are restricted to 250- and 75 acre watersheds respectively.**
>
> **The Hill & Associates studies generally concluded that smaller fills necessitate less complete extraction but more rapid depletion of the surface mineable reserve base with different equipment types...**

The effects of the 250-acre threshold require more explanation in the EIS as the reader is left with the impression that the limit is impact-free, which it clearly is not: reserve bases are being reduced and the projected life of particular mine sites are being diminished with coincident reductions in employment, state tax collections etc.

Page II.C-45, Fill Minimization, General Comment

The entire discussion of fill minimization in this section overlooks a critical controlling factor in the location and development of mining operations. Coal mining occurs where the coal resource exists. Unlike other land disturbance activities that potentially impact jurisdictional waters, alternatives to filling are

[26] *Bragg v. Robertson*. Civil Action 2:98-636 U.S. District Court for the Southern District of West Virginia.

1-13

generally not available to the coal industry. As noted in the Mining Technology section of the EIS, all disturbance for surface or underground mining in the region will result in the generation of spoil. AOC reclamation returns most of this spoil to the mined area, but because of the "swell" factor of fractured overburden, not all the spoil, even under an AOC scenario can be returned to the mined area

Page II.C-47

> *Compensatory mitigation for unavoidable impacts is required by the CWA for both general and individual permits. The amount and type of compensatory mitigation required are determined by the functional assessment of the waters impacted by a specific project; i.e. higher quality streams require more mitigation than lower quality streams. The functions of streams lost through filling can require substantial mitigation as compensation. Consequently, mitigation to replace and restore aquatic functions can be a costly endeavor. Therefore, the cost of mitigation can serve as an incentive to minimize valley fills in aquatic habitats.*

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Assuming that exorbitant mitigation requirements will result in fill minimization is a false impression. First, any disturbance, mining or otherwise, in the steep slopes of Central Appalachia will result in the generation of excess spoil. For mined areas, existing SMCRA requirements mandate these areas be restored to AOC unless an alternative land use is justified by the applicant. Even if AOC reclamation occurs based on the swell factor of the interburden and overburden some fill material MUST be placed in a valley fill regardless of mitigation requirements:

> **The primary reason for using valley fills is that the excavation of overburden results in a greater volume of**

Avadavit of William B. Raney.

> **material than was present on the mine site before mining. When bedrock is broken up forming spoil, void spaces are left between the individual rock fragments, causing them to occupy a greater volume than the original, unbroken rock. This expansion is referred to as swell and typically represents a volume increase of about 40 percent. Compaction of the spoil during backfilling partially offsets swell as the rock fragments are squeezed together by the weight of the overlying material, but this shrinkage factor will not completely return the spoil to its solid...volume.**
>
> **Particularly on steep-sloped mine sites, the excess spoil generated by the swell factor cannot be completely backfilled on the mine bench with the construction of potentially unstable slopes or substantial deviation from AOC**
> EIS III.K-3.

The EIS economics technical studies demonstrated that the physical and economic recoverability of a given coal reserve is directly tied to available valley fill opportunities:

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> **The economics studies show a direct correlation between fill size and shifts in production due to increased mining costs.**
> EIS IV.I-3.

So, rather than encouraging fill minimization and stream avoidance, draconian mitigation requirements will only increase the cost of mining and act as a de facto programmatic barrier to mining activity in the region, much like the specific watershed acreage restrictions considered but ultimately rejected for inclusion in the EIS.

Another result of excessive mitigation requirements is to discourage post-mining land development. Though lack of suitable, stable land remains a chronic

economic and social problem throughout the study area, mitigation requirements and costs will discourage these post-mining developments.

Site specific conditions may exist that permit the operator to further minimize fill placement beyond the existing AOC requirements if suitable adjacent, attainable areas such as AML benches exist, but the incentive to use these areas is provided in the 404(b)(1) analysis and would be identified in the SMCRA permitting process absent any increased mitigation costs.

Page II. C-52, Compensatory Mitigation, General Comment:

As the EIS properly notes, environmental conditions in the study area provide ample mitigation opportunities:

> *The Appalachian coalfields provide almost limitless opportunities for watershed improvement, following almost 100 years of abandoned mine land (AML) problems. Mine drainage pollution, eroding spoil on the down slope, clogged stream channels, abandoned highwalls and coal refuse areas, and other orphan land problems exceed the capacity of the SMCRA AML Trust Fund. Many of the problems are such low priority that it is unlikely that the AML program will ever address them.*

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Acid mine drainage and other stream impacts such as eroding spoil or coal refuse emanating from AML sites is by far the most serious and common water quality problem in the study area. A cursory glance at the 303(d) list of any of the states within the Central Appalachian region reveals hundreds if not thousands of streams identified as impaired from these impacts. The above-cited paragraph is also correct by observing that few, if any of these problems will be alleviated by the current AML program established under SMCRA, where impacts posing

threats to health and safety receive the most attention and funding. While the AML fund may not provide for timely reclamation of sites impacting water quality in the study area it provides an excellent structure to facilitate reclamation and remediation of these areas through mitigation.

Except for Tennessee, all the states currently have an AML program that has been delegated to the state regulatory authority. These state AML programs use allocations from the federal AML fund to complete reclamation of identified pre-SMCRA disturbance. Using this existing structure, operators seeking 404 authorization for valley fill construction would, in cooperation with the state AML agency, identify an AML site(s) that is adversely impacting water quality. The operator would then work with the AML agency to alleviate these impacts. Mitigation credit would be assessed based on the overall improvement to water quality and habitat.

Approaching mitigation from this more practical standpoint will have a substantially greater improvement on the environmental health of the area than will in-kind replacement of headwater streams for several reasons. First, the scopes of potential impacts are not of a severe magnitude. Headwater streams will continue to comprise roughly 60% of total stream length in Central Appalachia and the area will maintain sufficient PEC scores. Second, structures constructed in accordance with SMCRA mandated mining and reclamation standards can serve as onsite mitigation. Research has demonstrated that these SMCRA provide unique habitats (through wetlands) that do no exist in the study area. Third and

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most important, improving or preserving the energy transported from headwaters to the downstream system means nothing if other stressors such as AMD and excessive sedimentation impair or eliminate the aquatic habitat. In other words, mitigation efforts that restore, preserve or enhance the energy transport from mined areas means nothing if there are no macroinvertebrates alive downstream to consume this energy. This approach to mitigation is best viewed as a "watershed" approach that results in an overall net environmental benefit.

Similar environmental benefits will be seen from other water quality improvements that can be implemented through mitigation. The second most prevalent water quality problem in the study area results from the lack of public infrastructure. Failing or nonexistent wastewater treatment systems contribute to stream degradation in the region as do crude road crossings, stream bank erosion caused by repeated flooding and residential stream encroachment. Again, using the watershed approach to mitigation, it makes little sense to enhance the energy transport of the mined area through enhanced SMCRA structures or preservation of headwater reaches only to have this energy flow to a downstream area that is severely impacted by fecal coli form, or from another stressor resulting from the lack of infrastructure.

The correction of pre-existing water quality stressors coupled with vast mitigation potential of mining-created wetlands, ponds and side drains make the study area a "gold mine" of mitigation possibilities, and <u>the final EIS should recognize and promote these "nontraditional" mitigation measures.</u>

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Page II.C-53, COE Stream Assessment Protocol, General Comment:

The Louisville Stream Assessment Protocol is mentioned throughout this section. Use of a functional assessment may indeed facilitate mitigation decisions, but the value or applicability of the Louisville Protocol is not as established as the discussion in this section presents it to be. Unlike the EPA RBP, the Louisville Protocol has not undergone an extensive peer review or public comment. The Louisville Protocol is based on an earlier study conducted by the Kentucky Division of Water, so any errors made in this proceeding endeavor will be amplified by application of the Louisville Protocol. Serious questions exist regarding the inclusion/exclusion of particular benthic metrics in the document that may unfairly skew the assessment and the documents' heavy reliance on conductivity.

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II. D-1, Alternatives Considered but Not Carried Forward in This EIS, General Comment, entire section:

Both SMCRA and the CWA clearly contemplate fill construction in streams, as noted in our introductory comments. Each of the various specific fill restrictions presented in this section ignores this basic, underlying premise: Mining and valley fill construction is legal and with recent court decisions its legality is crystal clear. Two specific legal challenges have targeted surface mining in Appalachia specifically. *Section I, Purpose and Need* provides a cursory glance at these recent judicial assaults that sought to undue Congressional statutory intent and decades of regulatory interpretation by the very agencies that have prepared this EIS. The

first, styled as *Bragg v.Robertson* was centered on the SBZ of OSM and a similar provision found in West Virginia's state surface mining program. The District Court in this action chose to accept the plaintiff's tortured reading of federal and state mining law that construed the SBZ to prohibit valley fill construction in intermittent and perennial streams. The *Bragg* decision was reversed by the U.S. Court of Appeals for the Fourth Circuit on federalism and jurisdictional questions. A subsequent action was filed in the same Court, this time challenging the COE's interpretation of the CWA to permit valley fill construction under §404. The same District Court this time held, despite years of interpretation to the contrary, that mining spoil was "waste" under the CWA and could not be permitted pursuant to §404. In the decision, the District Court went so far as to dismiss a pending EPA-COE rulemaking that would finally end the confusion surrounding mining spoil and place it firmly within the jurisdiction of the COE as "fill material". This decision too was appealed to the Fourth Circuit and again the Appeals Court reversed. In this case there was no overriding question of jurisdiction and the Appeals Court spoke directly to the legality of surface mining in the context of both SMCRA and the CWA:

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> **While SMCRA does not define "fill material", its "excess spoil material," 30 U.S.C. section 1265(b)(22), is defined in the SMCRA regulations as material placed "in a location other than the mined-out area."...And, regardless of whether the fill has a beneficial primary purpose, SMCRA does not prohibit the discharge of surface coal mining excess spoil in waters of the United States.**

> **Indeed, it is beyond dispute that SMCRA recognizes the possibility of placing excess spoil material in waters of the United States...**
> **It is apparent that SMCRA anticipates the possibility that excess spoil material could and would be placed in waters of the United States...**[27]

The Appeals Court decisions in *Bragg* and *KFTC* ,which predate the release of this EIS, have properly recognized Congressional intent and sustained years of regulatory implementation. Consequently, any such alternative contemplated by the agencies seeking to ban valley fills would require a statutory change and reach far beyond the programmatic scope of this EIS.

The watershed specific fill restrictions explained in this section ignore the scale and scope of current and anticipated mining activity in the region and appear to assume that mining and valley fill construction activities were affecting vast regions of the study area, while in fact that is not the case. The CIS has determined, using liberal estimates, that mining and valley fill activity could potentially impact 4.10% of the streams in the study area. The same study found that the dominant land use of the area will continue to be dense, unmanaged forest over: 87.5% of the study area is forecast to remain unchanged when all disturbances including mining are considered. Assuming a worst-case scenario of mining disturbance (no renewed emphasis on reforestation and fill minimization) the same study found that the area would maintain adequate PEC scores to support healthy and abundant terrestrial and aquatic life. So, even absent the scientific

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evidence showing the minimal/beneficial effects of mining, the minute scale of disturbance would not justify the sweeping changes and restrictions contemplated under this section.

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Page III.C-3, Energy Sources and Plant Communities:

> *Headwater energy sources are important, not only to invertebrates and vertebrates in upper reaches of the watershed, but excess organic carbon is subsequently utilized by life forms in all stream orders down gradient. Since streams have a unidirectional flow, downstream areas are also dependent on upstream areas for portions of their energy.*

This statement leaves the impression that energy can only be supplied by headwater streams. Research conducted by the coal industry in conjunction with the EIS indicates ponds and wetlands constructed during the mine reclamation provide similar, adequate sources of downstream energy:

6-6-4

> **The streams with valley fills have a sediment retention pond located typically in the most upstream reaches of the stream just below the fill area. These ponds carry out a similar function for the upstream reaches of the streams. In the ponds, biological communities are established which are dependent on algal growth, not leaf litter, as a food source. The algae and detrital material flowing from the ponds act as the food source for the downstream communities.**[28]

In addition, upon completion of the reclamation process, vegetation will have returned to the area, replacing the coveted "aquatic-terrestrial interface". Further,

[27] *Kentuckians for the Commonwealth v. Rivenburgh*, 317F.3d. 425 (4th Cir. 2003).
[28] Arch Coal Supplemental MTR/VF EIS Study Report, April 2002

fisheries research conducted below mining impacted watersheds indicates that healthy and diverse fish populations are thriving. According to the River Continuum Concept that is postulated as the true value of headwater streams, one must assume that sufficient energy input is occurring in the stream to support these downstream communities.

Page III.C-5, Organic Matter Processing, general comment, entire section:

The entire discussion presented in this section is devoted to an explanation of the River Continuum Concept (RCC). This theory suggests the health of an entire river ecosystem is associated with organic energy that is processed in headwater stream reaches and subsequently transported downstream. The RCC forms the basis for many of statements made in the EIS regarding the possible effects of valley fill construction in headwater streams. 6-6-4

The RCC may be inapplicable to the steep-sloped terrain and stream systems of Central Appalachia for several reasons. First, the RCC assumes a pristine environment, which is certainly not the case in the study region:

> **The Appalachian coalfields provide almost limitless opportunities for watershed improvement, following almost 100 years of abandoned mine land (AML) problems. Mine drainage pollution, eroding spoil on the down slope, clogged stream channels, abandoned highwalls and coal refuse areas, and other orphan land problems exceed the capacity of the SMCRA AML Trust Fund. Many of the problems are such low priority that it is unlikely that the AML program will ever address them. EIS page_____**

Second, the RCC assumes that extreme headwater stream reaches provide the only opportunity for energy inputs to the river system through the aquatic-terrestrial

interface that occurs in forested headwater streams. This is not the case in the study area. Research conducted by mining companies confirms that energy inputs continue in mining watersheds regardless of the level of impact in associated headwater areas because most of the streams below mining areas are forested: 6-6-4

> **The cumulative impact study found that over 80% of first to third order streams in the EIS study area are surrounding by forest.** EIS III.D-18.

III.D-1, Loss of Linear Stream Length from Filling and Mining Activities Associated with Fills, General Comment

The findings of the EIS technical studies which are referenced in this section further illustrate the need for the agencies to view potential impacts of mountaintop mining in terms of scope and scale. Only 2.05% of the total stream miles have been directly impacted by valley fill construction and mining activities, and projected future impacts will total only 4.10% of the total stream miles within the region. Absent the renewed emphasis placed by the agencies on mitigation, with a preference for on-site, in-kind mitigation, mining will not result in the mass elimination of headwater streams. As the coal industry, SRAs and the COE implement new mitigation techniques in accordance with the recommendations of the EIS, it likely that the stream segments directly impacted by mining will be more than offset by either stream/wetlands creation during reclamation and/or water quality improvement projects undertaken by operators. 5-7-4

Page III.D-2, Loss of Biota under Fill Foot Print or from Mined Areas,

General Comment:

The Associations do not dispute that the biota present within the fill footprint are lost once fill construction has been completed. Based on the results of the CIS, the benthic organisms common in headwater streams that are subject to fill activity are by no means in danger in the study area. With a mere 4.10% of the streams in the study area projected to be impacted by mining operations, sufficient habitat for these macro invertebrates will continue to exist in the study area. The concern for the biota of these streams should not focus on the minute fraction impacted directly by fill construction, but the ability of reclamation and mitigation to replace the function of these benthic species in the overall aquatic system. EIS Appendix D, *Value of Headwater Streams* concludes that the single most important feature of the biota of headwater streams is to provide energy input to support the health of the streams down gradient of the headwater areas. Subsequent technical research has demonstrated that sufficient energy inputs continue to exist below filled areas. 6-1-4

These studies are summarized on page III.D-9 of the EIS:

> **Overall the abundance of macro invertebrates was found to be similar in upstream and downstream stations or to be slightly higher in downstream stations.**

Other industry sponsored research supports this conclusion:

> **Increased abundance at the filled sites, as compared to the unmined sites and the presence of a similar shredder community indicates that sufficient food is available to support a benthic community and that downstream communities are likely receiving particulate organic material from these more upstream segments.**[29]

This conclusion is confirmed by the USGS Fisheries Study that found some of the healthiest fish populations in watersheds associated with large scale surface mining and valley fill construction.

In summary, it is reasonable to assume that the energy processing and transport will continue. . Mountaintop mining will potentially impact only 4.10% of the total stream miles in the study area, 60% of which are first order headwater streams, dispelling any myth that mining and valley fills are eradicating all headwater streams. Benthic research has demonstrated that abundance remains high below fills and that the ponds and wetlands created during reclamation are providing their own energy inputs to the stream reaches. The USGS fisheries survey confirms the benthic research, finding that heavily surface mined watersheds supported healthy and diverse fish populations. 6-1-4

Page III.D-5, Changes in Downstream Chemistry:

> *Comparisons to AWQC were performed with a subset of the total data set as explained in USEPA (2002a). Selenium concentrations from the filled category exceeded AWQC for selenium at most (13 of 15) sites in this category.* 5-5-4

Finding selenium concentrations above the suggested criteria can be expected given the overall background levels of selenium present in the native soils of the

[29] Arch Coal Supplemental MTR/VF EIS Study Report, April 2002

area. Similar concentrations can be expected below any land disturbing activity in the region:

> **...we see that in the region of MTM/VF mining, the coals can contain an average of 4ppm of selenium, normal soils can average 0.2ppm and the allowable limits are 5 ug/L (0.005 ppm). Disturbing coal and soils during MTM/VF could be expected to result in violations of the stream limit for selenium** [30]

> *While improvements in pH, iron and manganese were seen , median concentrations of sulfates among all sites increased from 38 mg/L to 56 mg/L in the north and, and from 46 mg/L to 77 mg/L in the south.*

The presence of sulfate, as noted in the narrative, is indicative of disturbance, not necessarily mining induced disturbance . This conclusion is confirmed by the presence of similar sulfate levels below a large scale mining operation in Ohio that did not involve fill construction.

5-5-4

> *In the USEPA (2002a) stream chemistry study, selenium was found to exceed AWQC at Filled sites only and was found to exceed AWQC at most filled sites included in the study.*

As noted in previous comments, selenium is inherent in the soils and coal of the region.

> *The existence of selenium concentrations in excess of AWQC at most of the filled sites indicates a potential for impacts to the aquatic environment and possibly to higher order organisms that feed on aquatic organisms.*

[30] U.S. Environmental Protection Agency. *A survey of the Water Quality of Streams in the Primary Region of Mountaintop/ Valley Fill Coal Mining.* 2002.

This statement is misplaced given the level of understanding relative to selenium impacts and technical research that found healthy aquatic communities in watersheds exceeding the suggested water quality criteria for selenium.

The EIS chemistry study, from which the above cited EIS narratives are drawn, mentions the effects of selenium based on research conducted by Lemely in lotic (non-flowing) habitats, specifically a large pond with extended water retention times. This is a vastly different situation than what exists in the headwater streams of Central Appalachia. Therefore is incorrect to extend the results of the Lemely studies to this EIS.

EPA is currently in the process of revising the suggested water quality standard for selenium. In February 2002 the agency published a draft of these revisions. Among the conclusions and observations included in the draft document are several that are relevant to this EIS and the assertion that detectable selenium concentrations in the water column are indicative of negative impacts.

5-5-4

> **Since the issuance of the 1987 chronic criterion of 5ug/L, considerable information has come forth regarding the route of exposure of selenium to aquatic organisms. Studies have shown that diet is the primary route of exposure that controls chronic toxicity to fish.**
>
> **...diet controls selenium chronic toxicity in the environment and water-only exposures require unrealistic aqueous concentrations in order to elicit a chronic response...**
> ***...a water-based criterion is not appropriate for selenium* because diet is being the most important route of exposure for chronic toxicity.**

> **If the organisms are provided with an uncontaminated diet, then *exceedingly high water concentrations, possibly above the acute criterion, are needed to elicit effects…***
>
> **Sediment has also been proposed as a medium upon which to base the selenium chronic criterion, but because of the patchiness of selenium in sediment and an insufficient amount of data to support a casual link between concentrations of selenium in sediment and the chronic effects observed in fish, a sediment-based criterion was not selected.** [31]

Considering the findings of EPA in the draft revised selenium criteria, that water column concentrations of selenium are not correlated to toxicity in fish and that the natural background of selenium present in the soils of the study area, it is clear that application of the current suggested water quality criteria for selenium should be reconsidered.

5-5-4

The USGS fisheries survey supports both EPA's revised selenium water quality criterion and clearly demonstrates that selenium concentrations in the study area have not impacted the aquatic community in the study area. The EIS chemistry study found detectable levels of selenium on sampling sites within the Clear Fork Watershed:

Site	Selenium Concentration
MT-62	2.8 ug/L
MT-64	13.0 ug/L

Despite these concentrations, the USGS Fisheries Study concluded:

[31] See generally *Draft Aquatic Life Water Quality Criteria for Selenium 2002*, EPA Contract No. 68-C6-0036 (March 2002 Draft).

> **Clear Fork at Whitesville…had good scores in most of the four proportional metrics;**
>
> **Among Kanawha River sites, Clear Fork at Whitesville…scored among the best sites in several structural metrics…**
>
> **Among Kanawha River streams, Clear Fork at Whitesville…ranked among the best sites in several species composition metrics.**[32]

Given the current status of the selenium water quality criteria, the natural background levels of selenium present in the soils of the region and the inability of the EIS studies and other technical research to correlate impairment to any specific parameter verbiage inferring impacts from selenium should be deleted from the final EIS. Thus, the best approach to possible water-quality induced impacts is presented in the final paragraph of the summary and conclusions section:

5-5-4

> **Further evaluation of stream chemistry and further investigation into the linkage between stream chemistry and stream biotic community structure and function are needed to address existing data gaps.**

Page III.D-7, Changes in Downstream Sedimentation (Bed Characteristics)

> *… the mean substrate size class was found to be very similar between unmined, filled, filled residential and mined EIS class sites.*

5-6-4

Data summarized in this section demonstrates that the sediment control requirements of SMCRA are functioning and preventing offsite impairment.

Page III.D-8, Effects to Downstream Biota

[32] U.S. Geological Survey. *Fish Communities and Their Relation to Environmental Factors in the Kanawha River Basin, West Virginia, Virginia, and North Carolina 1997-1998.* 2001

h.1. Summary of Results from Upstream-Downstream Comparison Type Studies

> *Overall, the abundance of macro-invertebrates was found to be similar in upstream and downstream stations or to be slightly higher in downstream stations.*
>
> *The largest difference seen between upstream and downstream locations was the change in proportion of sensitive groups.*

The results of these studies demonstrate that valley fill construction and mining activity are not having an adverse impact on streams. A mere shift in community structure does not constitute degradation, especially if sufficient energy remains for transport downstream. According to the results of these studies, streams with mining activity in their headwaters are still carrying out the primary function of pristine headwater reaches.

h.2. Results of Comparison of Pre-mining Biotic Conditions to Post-mining Aquatic Communities

> *The authors of this report stated that a qualitative comparison of current to past results suggests that the aquatic macro invertebrate community has undergone a shift to a more tolerant, less sensitive community. Changes in the downstream station were similar to those seen at the upstream station for abundance and taxa richness. However, the diversity and evenness of the downstream macro invertebrate communities decreased...and the proportion of tolerant organisms increased notably...*

The studies cited in this section analyzed mining and disturbance, not necessarily valley fill construction:

> *These studies did not specifically address the presence of or potential impacts from valley fills.*

This ongoing project confirms the results of other studies referenced or included in this EIS. As in the OSM COCCo Study, a shift was observed in the downstream benthic community that appears commensurate with disturbance of the native rock and soils. This shift cannot be termed impairment however, unless the downstream reaches of the watershed are failing to receive adequate energy inputs. Other studies have confirmed that sufficient energy is being provided by mining-related structures and that no net-reduction in watershed productivity and diversity has occurred.

h.3. Results of A Multivariate Analysis Study on Benthic Invertebrate Communities and Their Responses to Selected Environmental Factors

> Coal mining appeared to influence invertebrate communities through two factors...

5-6-4

h.4. Studies of Macro invertebrate Communities in Stream Sites Located Downstream from Mined/Valley Filled Areas in Comparison to Reference Locations

> *Biological conditions in the unmined sites generally represented a gradient of conditions from good to very good, based on the WV DEP SCI scores...*

The wide variability of the scores on the unmined reference streams demonstrates a known fact that is mysteriously absent from the discussions in the draft EIS. Headwater streams are extremely unstable systems in their natural condition as they rely primarily on rain-induced runoff to sustain life and contribute to the synergy of the aquatic ecosystem:

> One[unmined] site scored in the high-end of the fair range in the summer of 1999, one site scored in the poor range in the fall of 1999, and one site scored in the high-end of the fair range in the winter of 2000.

> *Biological conditions in the filled sites generally represented a gradient of conditions from poor to very good...However, over a third of the time, filled sites scored in the good or very good range over the five seasons.*

This statement is probably the most important contained in the EIS and it deserves more attention and focus. Readily apparent is the reality that filled streams are supporting the aquatic processes that receive so much attention as the source of life throughout the stream system. In a region that suffers from multiple water quality stressors such as AML drainage, lack of infrastructure and failing wastewater treatment systems, the effects of valley fill construction appear negligible.

> *The authors believe water quality explains the wide gradient in the biological conditions at the filled sites.*

The OSM COCCo. Study documented increased conductivity below mining that did not involve valley fill construction, demonstrating that increased conductivity should be expected with any human development (mining, residential or highway construction) or natural disturbance (land slides). Again, the background natural conditions of the area appear to make such situations unavoidable. Any development or improvements that are going to occur in the region are going to involve land disturbance- earth and rock will be excavated, and fills will likely be

5-6-4

built whether it is for mining, roads, schools, housing etc. Based on the research presented in this EIS, all of these activities will be expected to have similar increases in conductivity. Since the inherent geological and topographic features of the area are such that excavation and fill construction is required in connection with development and mining, the question should not be if conductivity is increased, but what effect conductivity has had on the stream system as a whole. In our comments on other sections of the EIS, the Associations have presented the results of studies conducted for the EIS, by coal operators in conjunction with the EIS , independent of the EIS but within the study area and outside of the study area but related to the subject at issue. The bulk of this research documents a ***shift*** in the biologic community below ***disturbance***. There is some question as to how directly this shift can be correlated to particular water column parameters including conductivity:

5-6-4

> **Differences between the benthic macro invertebrate communities in the unmined and filled sites were evident in metrics involving the mayfly population which decreased below the fill sites. Stoneflies were prevalent in these sites, however, indicating that water quality may not be the limiting factor for the absent mayflies as they are both sensitive taxa** [33]

Whatever the cause, it is overly apparent that this change does not correlate to impairment. In fact, by supplying a more constant source of energy to the stream below (though wetland and pond construction), mining may improve the health of the watershed.

Biological conditions in the filled and filled/residential classes were substantially different from the conditions in the unmined class and were impaired relative to conditions in the unmined class, based on the WV SCI scores.

From the results of the EPA Streams study and other related research, it is apparent that the aquatic communities were **different** among the classes, but not impaired:

> **Overall, the filled sites are only significantly different from the unmined sites with respect to the percentage of the population comprised of mayflies.**[34]

As noted in our earlier comments, ponds and wetlands are constructed during the mining process to control sediment and in some instance attenuate flow. These wetlands and ponds influence the composition of the benthic community:

> **Changes in the benthic macro invertebrate community structure below impoundments are well documented...These changes may result from flow constancy, organic loading , temperature changes or a combination of factors...mayflies and stoneflies are often eliminated below impoundments.**[35]

The elimination of the mayfly taxa CANNOT be linked to impairment as the EIS narrative attempts to do:

> **Below the filled sites, the sensitive EPT taxa still comprised an average of 50% of the population.**
> **Also of interest below the fills is the presence of a shredder community very similar to the unmined reference streams...The similar communities in the filled and unmined streams indicate that the downstream reaches of the streams are being supplied**

[33] Arch Coal Supplemental MTR/VF EIS Study Report, April 2002
[34] Arch Coal Supplemental MTR/VF EIS Study Report, April 2002
[35] ibid

5-6-4

> **with coarse and fine organic material which are the major contribution of headwater reaches described in the river continuum theory.**[36]

The cited EIS statement should include a qualifier regarding the stream size sampled in the study. Generally, all of the streams sampled below valley fills were larger streams than those sampled in the unmined/reference class. The unmined reference sites were located on first and second order streams while the filled sites were located on third, fourth and fifth order streams. Changes in the composition of the aquatic community are expected as stream order increases .

Page III.D-15, Impacts of MTM/VF on Fish Assemblages

> *The USGS (2001b) found that stream size and zoogeography masked any potential water quality effects of land use on species composition and relative abundance of fish communities in the area.*

5-6-4

This statement appears to be a weak attempt at explaining away the findings of the USGS fisheries survey. The specific results of this study are enormously important to this EIS. This study determined that one of the healthiest fish communities existed at Whitesville, on the Clear Fork tributary to the Coal River. It is a well-known fact that this watershed has been heavily mined, with most recent extraction occurring in the form of surface mining with valley fills. The EIS Chemistry study found detectable levels of selenium within the watershed, yet the USGS Fisheries Report observes a healthy and diverse fish population.

[36] ibid

The USGS Fisheries Report also designated streams as impaired that were associated with mining activity. However, both of the watersheds are more correctly identified as areas of **historical** mining. Both of these watersheds have identified sources of serious AMD and sedimentation impacts from pre-SMCRA activities.

Page III.D-15:

> *For example, fish collected from one lake downstream of an extensive mining complex in West Virginia were found to contain selenium concentrations much higher than would be expected to occur naturally, indicating that the selenium associated with mining operations occurs in a form that is biologically available for uptake into the food chain (U.S. FWS, unpublished data).*

This reference is entirely inappropriate and should be deleted from the final EIS. First, there is no place for unpublished, un reviewed data in a document of record such as this EIS. Second, "concentrations much higher than would be expected to occur naturally" contradicts assertions made in the EIS chemistry study which recognized that the natural background levels of selenium in the soil, overburden and coal approach the limit established by the current water quality criterion implemented in West Virginia. Third, as this is unpublished data, other possible sources selenium such as non-mining land disturbance cannot be identified. 5-6-4

Page III.D-17 Studies Relating to Mitigation Efforts for MTM/VF Impacts to Aquatic Systems

> *Past efforts at compensatory mitigation have not achieved a condition of no net loss of stream area or functions.*

This statement is unqualified, conflicts with subsequent statements made under the same narrative section and should be deleted from the final EIS. A similar prevarication is repeated in the fist paragraph on page III.D-21. Our comments address both statements.

Mining companies have routinely created structures as part of the SMCRA mining and reclamation plan that serve to offset the loss of headwater streams from fill construction. At the same time however, these companies also satisfied the existing COE mitigation requirements imposed by the respective states and not characterized these structures as "mitigation" projects. 5-3-4

In the EIS technical study *A Review of Wetland Resources in the Steep Slope Terrain of West Virginia*, EPA found that few traditional wetlands existed prior to the initiation of surface mining and areas that had no surface mining had no wetlands:

> **...the percentage of vegetated wetlands (PF,PEM,PSS designations) existing in these watersheds is extremely low, representing less than 1/10 of 1% of the watershed in all cases. The majority of the NWI wetlands in these watersheds appear in most cases to be sediment ponds associated with mined sites.**

Other statements in this technical study strive at discounting the value of these created areas by declaring them "unvegetated" wetlands. However, as cited previously in our comments regarding stream function and the biologic condition

of streams affected by mining, these wetlands and ponds are providing similar, if not superior energy input to the watershed, eliminating any reduction from the headwater streams impacted directly by construction of valley fills. The EPA review of wetlands goes on to state that isolated wetlands created within the mined area can be enhanced to further supplement and therefore "mitigate" the loss of headwater stream reaches:

> **...opportunities do appear to exist for the creation of functioning wetland systems on mined sites. Planned wetlands, if incorporated into the restoration design, can provide valuable functions by enhancing sediment stabilization, water quality improvement, and wildlife habitat on mined sites.**

With respect to habitat creation, further enhancements may be possible but EIS terrestrial studies have shown that mining-created wetlands are indeed increasing the wildlife diversity of the study area and that several terrestrial species not traditionally associated with the Central Appalachian region have been observed utilizing mining wetlands.

5-3-4

Research conducted by mining companies in conjunction with the EIS have also documented the unique and beneficial habitat provided by mining created wetlands, the results of which are summarized in this section of the EIS:

> **When comparing total abundances and taxa between the ponds, the study found that two of the ponds contained large total abundances of aquatic insects and a desirable number of taxa.**[37]

[37] Pen Coal Corporation-REI Consultants. An Evaluation of the Aquatic Habitat Provided By Sediment Control Ponds and Other Aquatic Enhancement Structures Located on Mine Permitted Areas in Southern West Virginia. 1999

Similar conclusions can be regarding the conveyance ditches or "groin" ditches created on valley fills:

> **During the development of this EIS, technical representatives from OSM and from West Virginia have suggested that groin ditches constructed along the edges of fills may represent an opportunity for the in-kind replacement of streams with an intermittent or perennial flow regime. To date, no drainage structures observed appear to have successfully developed into a functioning headwater stream. EIS III.D-18.**

As noted in our preceding comments, reconstructing headwater streams historically never the goal of these structures. Instead, their design and construction was intended to satisfy the hydrologic requirements of SMCRA and to preserve/assure the stability of the valley fill. These functions must remain the primary objective of the ditches, as they are obviously working (no pattern of fill instability identified by the EIS technical studies). However, if these areas could be enhanced as described in this section and continue to assure the stability of the fill area this opportunity should not be ignored, since it would essentially equate to double the length of the original headwater impacted by the valley fill placement. The renewed emphasis on mitigation that has emerged from preparation of the EIS and permeates all the suggested alternative actions must acknowledge the ability of these SMCRA structures to serve as mitigation and the alternatives should include the direction to develop a BMP manual for further enhancing the values that can be provided by these structures.

5-3-4

Other historical, state mitigation measures focused on stream restoration through water quality improvement. As earlier sections of the EIS recognize, the study

area provides limitless opportunities for mitigation through the remediation of existing water quality stressors such as AMD discharges and installation of public waste water treatment systems. For brevity, we will not repeat extensive comments on this subject made in previous paragraphs, but only observe that state imposed and COE accepted "remediation mitigation" goes further towards satisfying the overall objectives of the CWA than does the current focus on headwater stream creation/ preservation.

In 2001 the National Research Council (NRC) released a comprehensive report regarding the s §404 dredge and fill program titled *Compensating for Wetland Losses Under the Clean Water Act.* In this review, the NRC provided 10 guidelines for implementing the mitigation requirements of the §404 program. Chief among these suggestions was a focus on restoration over creation. State mitigation programs, particularly in West Virginia, favored these types of projects. In the case of public waste water system installation, these mitigation efforts provided another immeasurable benefit: community improvement through infrastructure installation. As the socio-economic sections of the EIS acknowledge, the overwhelmingly majority of the study area is extremely rural and extremely small, isolated communities abound. The likelihood of publicly-funded improvement projects being developed in these areas, absent facilitation through coal mine mitigation, is slim to none.

Past mitigation practices that encouraged and accepted wetlands and water quality remediation either through AMD elimination or community infrastructure

5-3-4

improvement should not be summarily dismissed by the draft EIS as cited statement attempts to do and the current mitigation initiatives underway cannot ignore the benefits of this "remediation mitigation".

5-3-4

IV. ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES ANALZED

B. AQUATIC RESOURCES

Page IV.B-2, last paragraph:

> *... the length of stream buried by mining or valley fills displaces the biomass and proportionate amount of energy provided by fine and coarse particulate material leaving a particular reach of headwater stream.*

This fact in unarguable, however there is no indication that sufficient biomass and energy inputs do not occur in the stream reaches below the filled areas.[38] Further as we have identified in previous comments on other sections of the EIS, wetlands and ponds created during the mining process adequately offset this direct loss. The scientific research used to support these comments also indicates that by providing a more constant flow of energy input, these ponds and wetlands may provide superior contributions to the synergy of the stream system below. Since the ponds at the toes of valley fills are constructed commensurate with mining activity, any reduction in energy inputs would only be temporary in nature.

5-6-4

> *Consequently, leaf litter exclusion as a result of MTM/VF may affect productivity downstream due to this terrestrial aquatic relationship.*

There is no argument that valley fill placement eliminates the aquatic-terrestrial interface that exists within the fill footprint area. However, EIS technical studies have determined that some 80% of the streams in the study area are forested, indicating that substantial aquatic-terrestrial zones exists downstream of the headwater reaches that can be directly impacted by fill construction.[39] Further, most of the stream miles in the study area (60%) are headwater streams. Given the minute scale of current and potential mining impacts, adequate aquatic-terrestrial interface areas will continue to exist.

Page IV.B-3

> *The No Action Alternative and action alternatives will not eliminate the loss of stream segments and reduction in organic matter transported downstream. In the absence of standardized testing and research, it is not clear to what extent this direct stream loss indirectly affects downstream aquatic life.*

5-6-4

This statement incorrectly assumes that some reduction the energy transported downstream has occurred despite scientific evidence to the contrary. Similar fallacious statements in preceding sections of the EIS were addressed in detail in our comments on those sections. However, to be complete we will summarize these comments here. The EIS technical studies found a wide range of conditions below valley fills, suggesting that stream health is preserved below fills:

> **Biological conditions in the filled sites generally represented a gradient of conditions from poor to very good...however, over a third of the time, filled sites scored in the good or very good range.**[40]

As we have noted in detail in our comments on other sections of the EIS, the EPA benthic study referenced above did not account for or acknowledge the influence of stream order on benthic populations. Benthic assemblages are expected to be different from 1st and 2nd order streams that are ephemeral and intermittent in nature as were the unmined reference sites opposed to the filled sites in the study which were generally located on 3rd order streams that flowed constantly, possibly as a result of valley fill hydrology.

Industry supported research referenced extensively in our earlier comments has determined that the presence of ponds and wetlands at the toes of fills may provide superior energy inputs through the creation of an aquatic community that processes algae, coupled with increased and constant flow created by fill hydrology.

5-6-4

> *It is also not evident to what degree reclamation and mitigation (e.g., drainage control and re vegetation) offset this reduction*

As with the previous section, this statement assumes that a reduction has occurred in areas of fill construction and our comments above are applicable here as well. As to the ability of mitigation to replace any possible reduction, the industry sponsored research and EIS technical studies suggest that stream reaches below

[38] U.S. Fish and Wildlife Service, *The Value of Headwater Streams: Results of a Workshop*. 1999, EIS Appendix D.
[39] Ibid.

[40] U.S. Environmental Protection Agency. A Survey of the Condition of Streams in the Primary Region of Mountaintop Mining/Valley Fill Coal Mining. 2000.

the filled areas as well as ponds, wetlands and drainage ditches constructed as part of the mining process can continue to supply adequate, energy downstream.

Page IV.B-4

> *Stream chemistry showed increased mineralization and a shift in macro invertebrate assemblages from pollution intolerant species to pollution tolerant species.*

The degree to which this increased mineralization affects the downstream aquatic community is unknown given the findings of the EIS technical studies and other scientific research indicating the presence of healthy aquatic communities below mined and filled areas. Further, use of the terms "pollution-tolerant" and "pollution-intolerant" fall far short of properly characterizing the conditions in mined and filled areas given the results of similar research and the influence of such variables as stream order.

5-6-4

Page IV.B-5

> *The Aquatic Impacts Statistical Report indicated that ecological characteristics of productivity and habitat are easily disrupted in headwater streams ... the analysis indicated that biological integrity is hampered by mining activity and that unmined sites have higher biotic integrity with more taxa and more sensitive taxa.*

This statement is misleading, patently false and should be deleted from the final EIS. The referenced results of the Statistical Report are suspect. The authors of the study excluded industry-submitted data indicating healthy stream populations, arbitrarily dismissing it as "non representative" of the study area. The Statistical Report emphasized perceived impacts from mining and fill construction while

discounting or dismissing the lack of differences between the filled and unmined reference streams.

> *Selenium and zinc were negatively correlated with the WV SCI.*

Concerns regarding the applicability of the WV SCI to the southern West Virginia region of the study area have been presented in comments on other sections of the draft EIS.

> *The strongest association with water chemistry suggested that zinc, sodium, and sulfate concentrations were negatively correlated with fish and macro invertebrate impairments*

The value of this statement, aside from presenting inflammatory verbiage, is further questionable given the caveat presented in the Statistical Analysis with regard to fish communities:

5-6-4

> *... these correlations do not imply a causal relationship between the water quality parameters and fish community condition.*

Subsequent statements in the EIS narrative correctly note that the statistical results are far from conclusive and by no means support the sweeping proclamations made in the above cited portions of the EIS:

> **However, the study also concluded that insufficient data existed to determine the temporal nature of the impact or the distance downstream that the impacts persists. Due to the limited scope of the studies performed by the EIS no correlation could be made of downstream impacts with the age, number, and size of mining disturbances and fills, nor could data differentiate impacts of mining, fills or other human activity in a watershed. EIS IV.B-5.**

Also worth noting is that the Statistical Report did not correlate selenium elevations to fish community impacts as the Fisheries Report attempted to do, casting further doubts on the validity of both studies.

The Associations maintain that the balance of EIS technical research has identified a shift in benthic communities, a shift that can be attributed to a number of factors and a shift that is by no means disadvantageous. Similar shifts were found below mining related disturbance that did not involve valley fill activities at a site outside of the EIS study region suggesting that similar results can be expected below any disturbance within the general Appalachian region.

5-6-4

> *Constructing wetlands is a possible mitigation measure for impacts to headwater streams.*

The positive benefits provided by mining created wetlands have been identified in technical studies and summarized in comments on other sections of the draft EIS narrative.

> *Other human development activities, such as logging and other types of excavation, also pose potential threats to the nutrient cycling function, sedimentation, and other physical, chemical, and biological impacts to headwater streams in the EIS study area. However, the permanent nature of filling discussed under direct loss, as compared to the more temporary impacts from forestry suggest that MTM/VF impacts of headwater stream systems may have a longer-term impact on this system, although data do not currently suggest the duration of these impacts.*

This statement fails to consider the scope and scale of potential mining impacts and suffers a flaw that is unfortunately common in this draft EIS: an overbearing concern with the functions provided by headwater streams.

The CIS study has determined that 59,000 miles of streams exist within the study area and that 60% of these streams are headwater areas. The same study estimated that 1.23% of the streams have been impacted by past and current mining and valley fill activity and that 4.10% of the total stream miles could potentially be impacted by future mining. These results confirm that mining is affecting a relatively minute fraction of the total streams within the study area.

Threats, or more properly stressors to watersheds in the study area are well documented. On page IV.B-9 for example, the EIS acknowledges that the Central Appalachian coalfields provide almost limitless opportunities for watershed improvement. These narrative sections concur with an EPA study initiative that predates the draft EIS:

5-6-4

> **In general, the biological assessment results appear to indicate these are poor water quality streams prior to the impact of mining operations and valley fills.** [41]

Given the reality of stream conditions in the region, the focus on the functions of headwater streams seems misplaced. As confirmed by certain sections of this EIS, the streams of the region are impaired by a variety of stressors unrelated to current mining. Therefore the function of the headwater stream (energy input) may be

worthless if the downstream reaches of the watershed are impaired because of other impacts. As we have noted in our earlier comments regarding mitigation, the environmental condition of the study area could have been markedly improved had the massive amount of resources and attention directed by anti-mining groups and the agencies at MTM/VF impacts to headwater streams had been focused on the remediation of existing water quality problems of the region.

Page IV.B-10

> *As a result of all alternatives involving mitigation, there will be a strong disincentive for the applicant to disturb stream segments.*

This statement assumes that practical alternatives to valley fill construction exist for the mining industry and ignores the substantial amount of information collected by the EIS and summarized in the mining technology sections of the document. Because of the very nature of the topography and geology of the study area, the native rock and soil excavated to facilitate mining (both surface and underground) will "swell" and not all of it can be returned to the mined area even under the most rigorous application of SMCRA's AOC mandate. Consequently, some of this excavated material MUST be placed in a valley fill. A "strong disincentive for the applicant to disturb stream segments" already exists through compliance with SMCRA imposed AOC requirements and the 404(b)(1) guidelines of the CWA programs of the COE and EPA. The reality of increased

5-6-4

[41] U.S. Environmental Protection Agency. *Analysis of Valley Fill Impacts Using Macroinvertebrates.* Draft Final Report. 1998.

and what appears to be punitive mitigation requirements will not result in further minimized fills, it will only add yet another economic constraint on the ability to mine coal in this region, since other sections of the EIS narrative and the EIS mine engineering technical studies confirm that the physical and economic recoverability of coal reserves is directly correlated to the amount of fill space available. Another unfortunate result of punitive mitigation measures will be seen in post-mining land use development. The EIS has correctly observed that the lack of stable, flat land remains a substantial barrier to the economic diversification and social stabilization of the region. MTM/VF offers the unique opportunity to create such flat and stable areas at no public cost. However, any area suitable for development will need to be flat, require a variance from the AOC requirements of SMCRA and possibly place more fill material in stream segments. The punitive and overly restrictive mitigation measures contemplated in the EIS such as conservation easements will discourage these types of developments despite a clear and proven economic and social need for their creation. In short, these mitigation measures are more akin to penalizing the citizens and governments of the study area by complicating the private property rights of landowners in the area, frustrating efforts to diversify the economy while at the same time limiting the viability of the coal industry.

Accordingly, the final EIS should focus not on the ability of mitigation to discourage fill placement as fill minimization is already addressed not only through SMCRA but the 404(b)(1) guidelines

5-6-4

Page IV.D-5 d. fish populations, general comment, entire section:

As with other sections of the EIS, the statements in this section fail to account for the scale and scope of mining impacts. If headwater streams are indeed hotbeds of evolution, according the EPA CIS analysis only 4.10% of the streams in the study have or could be affected by mining. Considering that headwater streams comprise the largest portion of the region's streams at 60% of the total stream miles, sufficient areas will remain intact for the occurrence of "natural selection process that may result in the development of new species/subspecies". Regarding the results of the EIS Fisheries Study, the Associations maintain that this study cannot be relied upon to deduce MTM/VF impacts. The study was extremely limited in scope and compared to patently different areas (New River and eastern Kentucky). The USGS Fisheries Survey found two of the healthiest fish populations in the area studied in watersheds associated with large scale surface mining and valley fill construction. 6-1-4

a. Terrestrial

II. C.

Deforestation (page II.C.-75)

General Comment 7-5-4

Any possible impacts from mining activities must be considered in terms of scope. As paragraphs in this section note, technical studies conducted as part of this EIS

have found that the dominant land use of the area is forestland with 92% of the area being densely forested. Mining has disturbed only about 3% of the region. The same study determined that mining, in conjunction with all human disturbances, would only affect about 11% of the area. Therefore, a large-scale elimination of forested areas is not going to occur in the region. Further, a renewed emphasis is being placed on tree growth as a result of this EIS. Considering that mining offers the opportunity to create soils that are superior to native soils and that tree growth on reclaimed mines is possible if traditional SMCRA imposed barriers to reforestation are addressed, the potential impact estimates are likely liberal and forecast a much greater decrease than will actually occur. 7-5-4

Page II.C-76, first paragraph:

> *Post Mining Land Uses without trees were historically perceived to be easier to achieve and less costly, as well as result in a shorter liability period for release of performance bonds.*

This statement fails to consider all the factors that influence the selection of a PMLU, such agency and community preference and regulatory achievability. As noted in the next paragraph, the reason that reclamation with trees is not more widespread is mainly attributable to SMCRA regulation and requirements related to erosion control and stability. 19-2-4

Page II.C-76, last paragraph.

It is possible other economic incentives could encourage reforestation.

A reference to mitigation should be added to this discussion. As noted elsewhere in the EIS and its appendices, the value of headwater streams subject to valley fill construction is the terrestrial-aquatic interface. Any reforestation initiative that is coupled to a stream restoration/mitigation project would further replace this function. Accordingly, reforestation should be considered when assessing required mitigation, as noted by the first paragraph under section a.1, CWA Program on page II.C-7:

> **The protection and/or restoration of forested riparian habitat as part of aquatic resource enhancement may result in mitigation credit by the COE for CWA section 404 permits.**

19-2-4

Page II.C-83, Action 14, general comment, entire paragraph:

> *Action 14: If Legislative authority is established by Congress or the states, the SMCRA regulatory authorities will require reclamation with trees as the post mining land use.*

Advocating such an action is unwise. As noted in our previous comments, no evidence exists that mining activities will result in massive deforestation of the region. The CIS determined that mining and all other human disturbances will only impact about 11% of the existing forested areas within the study area. Assuming the worst case scenario, that all future mining would result in the replacement of dense forest with other habitats the region will remain 87.5 % forest land.

A programmatic tree growth mandate imposed through Congressional edict would remove the opportunities for mining to create alternative land uses and conditions. Suitable land for development remains one of the greatest social and economic barriers in the region. Mining offers a unique opportunity to improve the usability of lands that are otherwise steeply sloped and undeveloped with little or no additional cost. Economic diversification and social stabilization (by relocating flood prone communities) are real possibilities only if alternative post-mining land uses, other than reforestation, are preserved in the regulatory program. 19-2-4

Page II.C-90, Section 11, Threatened and Endangered Species, General Comment, Entire Section:

As noted in our previous comments, the statements and assumptions fail to consider the scope of the activities in question. The CIS determined that mining affects only a small portion of the study area, which will remain dominated by densely forested areas. The same technical study found that headwater streams comprise 60% of all streams in the region and that mining has the potential to impact only 4.10% of these streams. In preparing the BO, the agencies MUST consider these factors. It is very apparent that neither mining nor any human activity is going to result in massive elimination of existing fish and wildlife habitat. 8-1-4

The EIS terrestrial studies failed to show that current mining and reclamation practices were adversely impacting existing wildlife assemblages. In fact several species thought to be rare and declining in the study region were actually found in

reclaimed areas. For example, the edge effect created by mining disturbance was determined to be a habitat for Cerulean Warblers.

To be adequate, the BO must also consider the positive effects of mining-created habitats for certain species of wildlife. The terrestrial technical studies found several species on reclaimed mined lands that were rare in the study area. Several of these unexpected species are also targeted for conservation efforts. However, at least one of the technical studies went to great lengths to ignore these terrestrial gains. The same mistakes cannot be repeated in the BO if it is to adequately protect T&E species. 8-1-4

Page III.B-11 Last three paragraphs concerning topsoil:

The statements and observations made in these paragraphs imply that topsoil is the most important factor in establishing tree growth. It is common knowledge that the native topsoils of the area are remarkably thin and subject to "wasting" or being destroyed or lost during any efforts to collect and stockpile them for later use. Such statements conflict with EIS technical studies, research conducted independent of the EIS and even statements made in subsequent paragraphs of the narrative. 7-6-4

EIS technical studies have proven that soils created during mining can be of greater value than the existing native soils. An overreaching historical observation that has been confirmed by studies conducted outside of the EIS is that proscriptive SMCRA regulations regarding compaction are the chief detractors to

reforestation on mined areas. As noted in the following paragraphs of the EIS narrative:

> **Prior to the passage of SMCRA, most surface-mined land in the east and Midwest was reclaimed with trees. The quality and productivity of these lands varied, but, in general, reforestation was successful and commercially valuable forests were created. With the implementation of SMCRA-based rules and regulations, the percentage of land reclaimed forest dropped significantly. The rules, as typically interpreted and enforced, resulted in intensely graded landscapes with erosion control provided by herbaceous vegetation. In this post SMCRA environment, reforestation was difficult and productivity of those lands was disappointing.** 7-6-4
>
> **Deep rocky soils with the appropriate chemical composition can be produced through mining and reclamation, and will support forests that are more productive than those supported by the thin natural soils typical of the Appalachian Mountains. EIS III.B-12.**

Page III.F-7, second paragraph:

> *This change in habitat has resulted in a shift in the distribution of birds throughout southern West Virginia* with an increase in the abundance of edge and grassland species at reclaimed mine sites.

While the technical studies do indicate that edge and grassland species are occurring on reclaimed mine sites, it is entirely inappropriate to extrapolate these results into the conclusion that a "shift" has occurred throughout southern West Virginia. As noted in our previous comments, the Cumulative Impact Study DOES NOT indicate that past, current or future mining will eliminate or substantially reduce existing forest cover. West Virginia and the majority of the region will remain dominated by dense forest cover. Further, both the Woods and Edwards 7-3-4

research and the Canterbury research has documented the occurrence of forest interior species in the forest edge habitats created by mining activity, including the presence of species that are of conservation concern. This statement also conflicts with subsequent paragraphs in the EIS narrative:

> **Eighty-four of 92 "probable" or "confirmed" breeding birds, based on data presented by Buckalew and Hall (1994) in the West Virginia Breeding Bird Atlas were confirmed at mountaintop mining sites in southern West Virginia in 1999 and 2000 (Woods and Edwards). The eight species identified by Woods and Edwards (2001) are not associated with habitats associated with mountaintop mining sites (residential and urban habitats).** EIS III.F-7.

The presence of 84 of the 92 expected species clearly does not indicate a "shift" in the bird community. The Associations suggest that the statement referring to a "shift" in the bird community be deleted since it is unsupported. 7-3-4

Page III.F-7, fourth paragraph under Birds section:

> *Species richness and abundance of songbirds is higher in shrub/pole habitats of mountaintop mining sites than in grasslands, fragmented forest, and intact forest habitats (Woods and Edwards, 2001).*

Page III F-7, fifth paragraph under Birds section:

> *Mountaintop Mining sites are known to support at least ten grassland and shrub bird species not previously listed in the WV BBA (Woods and Edwards). Grassland birds are declining throughout much of the United States. Three grassland species listed as "rare" in West Virginia are known to occupy mountaintop mining sites in southern West Virginia.*

Based on the above referenced statements and the underlying technical research, it is apparent that current mountaintop mining and reclamation practices are creating

habitats that foster terrestrial diversity. EPA's CIS results indicate dense forest will remain the dominant land use of both West Virginia and the region. Unlike the forest habitat, which dominates the study area, grasslands/shrub habitats are rare in West Virginia. This data leads to a logical conclusion that the diversity created by these mining produced habitats far outweighs the site-specific declines observed in the forest-interior species.

> *In general, species richness and abundance are expected to be greatest from diverse habitats like the shrub/pole communities and lowest in the least diverse habitats like grasslands.*

While this statement may be factually correct, it implies bias since intact or dense forest can be expected to be equally less diverse as the grassland areas.

> *It is possible that some of the grassland bird populations on mountaintop mining sites reclaimed with herbaceous cover are existing as "sinks". "Sink populations are maintained by immigration because death rates exceed birth rates.* 7-3-4

This statement is unsupported by the technical research, especially considering the conclusions regarding available breeding habitats for the grasshopper sparrows which are summarized in subsequent sentences in the same narrative paragraph. Further, since the largest habitat of the area is dense forest cover and grasslands is one of smallest, where would the birds be migrating?

Page III.F-8, second paragraph:

> *Some argue that mountaintop mining has the potential to negatively impact many forest songbirds, in particular neotropical migrants, through direct loss and fragmentation of mature forest habitats. Forest interior species... have significantly higher populations (at least one year of the two-*

year study) in intact forests than fragmented forests. Furthermore, cerulean warblers... are more likely to be found in a forested area as distance from a mine increases. These data suggest that forest-interior species are negatively impacted by mountaintop mining through direct loss of forest habitat and fragmentation of the terrestrial environment.

7-3-4

The data presented in the EIS technical studies DO NOT support such a conclusion. Higher populations of forest interior species in intact forests versus fragmented forest in one year of a two year study are far from conclusive.

Page III.F-9 Mammals section

Small mammal species richness does not differ between grassland, shrub/pole, fragmented forest, and intact forest habitats from mountaintop mining sites in southern West Virginia. Small mammal species abundance tends to be greater in grassland and shrub/pole than in fragmented and intact forest habitats.
Of a possible 58 species expected to occur in the study area, 41 were encountered.
The 41 species included 12 salamander species, 10 toad and frog species, 3 lizard species, 13 snake species, and 3 turtle species.

7-1-4

This statement provides even further evidence that mining and current reclamation practices create valuable habitat in the study area that results in mammal diversity as opposed to the dominant land cover of dense forest .

Mountaintop mining results in greater soil disturbance than forest clearing so a longer time may be required for recovery of salamander populations.

While recovery of the salamander populations on mountaintop mining areas may be slower when compared to rates associated with other disturbance, the most important fact is that salamanders do frequent the habitats created by current reclamation.

Page III.F-9 through F-10, Interior Forest Habitat and Area Sensitive Species

Interior forest habitats are relatively rare and easily lost.

This may be a true statement nationally, but is simply not the case in the study area. As previously cited, the CIS found the study area will remain 87.5 percent forested if all future mining impacts are combined with all human disturbances. The CIS also assumes a worst case scenario for mining by assuming that all reclamation areas will be returned to grasslands and no renewed emphasis on tree reclamation will take place.

Studies conducted at reclaimed mountaintop mining sites in southern West Virginia have yielded forest interior bird species in shrub/pole and fragmented forest habitats as well as intact forest habitats. However, the abundance of forest interior bird species was significantly lower in fragmented forests than intact forest suggesting a detrimental impact.

7-6-4

The presence of these traditional forest interior species in the edges and shrub/pole habitats created by the reclamation process do not support the conclusion that forest fragmentation is negatively impacting these species in the study area. The next statement, that interior species were significantly lower in fragmented forest, is not supported by the Woods and Edwards Report. A lower abundance was found for only six of the forest interior species. Six species out of 47 clearly does not support the conclusion that detrimental impact is occurring.

Page III.F-11, second paragraph under Deforestation

It follows that deforestation of large portions of the Appalachians through mountaintop mining is a significant concern from the standpoint forest-dwelling wildlife, in particular, forest interior species.

This statement conflicts with the findings of the CIS and the terrestrial technical studies. The CIS found that abundant habitat will continue to exist in the region even when mining disturbance is assumed to have the greatest impact (no reforestation) and mining is considered along with all other human activities. According to the CIS, the area will remain 87.5% forested. The Woods and Edwards terrestrial technical study found that forest-interior species were present in the fragmented forest area created by mining. As noted in a subsequent paragraph in this same section, a majority of species have the same abundance in the fragmented forest as the intact forest:

> **Furthermore, with the exception of a few rare species, the densities of songbirds on grassland and shrub/pole mountaintop mining sites was similar to that reported in other studies indicating the quality of habitat and availability of resources is similar to the other sites. EIS III.F-11.**

In other words, mining has created habitat favored by these traditionally forest interior species.

> *The above findings provide evidence that mountaintop mining practices provide favorable conditions for some species. However, these advantages may not surpass the disadvantages these practices have on the sustainability of plants and wildlife in the region.*

The technical studies do not indicate that mining and reclamation practices have a disadvantageous effect on plants and wildlife in the region. First, greater growth

7-1-4

rates of trees and plants have been demonstrated to be technically feasible if the traditional SMCRA barrier of over compaction is addressed. Second, the CIS determined that future mining and other disturbances will not result in a dramatic shift in the existing land cover of the region, with 87.5% of the study projected to remain dense forest cover. With regards to wildlife, the technical studies have shown that traditional forest-dependent species are present on reclaimed areas and that grassland and shrub/pole habitat species not associated with study area are also present on reclaimed areas. At worst, mining and reclamation is increasing the biodiversity of the area.

7-1-4

Page III.F-12, first full paragraph, general comment:

The EIS has already acknowledged that existing rules and regulations imposed by SMCRA are the biggest factor preventing reforestation. With the renewed emphasis on reforestation and tree growth that will result from the EIS alternatives, it is reasonable to assume that tree reclamation will increase in the study area. However, if tree reclamation was not advocated in the EIS alternatives, scientific research indicates that these grassland and shrub/pole habitats are supporting a healthy and diverse terrestrial community with species of both forest-interior and grasslands being recorded on reclaimed areas. The CIS has found that neither mining nor any other human activity will result in a massive conversion of the study area from dense forest to another land cover indicator.

7-5-4

Page IV.C-5, first paragraph:

There are also indirect effects related to removal of forest associated with mining. Studies have shown that trees help remove certain elements from our air and sequester them. This process is known as "carbon sequestration."

According to the tables summarized on the pages preceding this paragraph, all the states within the study area will remain dominated by forest cover and continue to provide the valuable carbon sequestration function. Further the U.S. Forest Service's Forest Inventory and Analysis indicates that the average annual cubic feet of forest growth exceeds the average annual rate of forest loss for all states in the region.[42] This information is summarized on page IV.C-2:

> **data, based on the forest census in West Virginia (1989), Virginia (1992), and Tennessee (1999), shows that the average annual cubic feet of forest growth exceeds the cubic feet of forest loss by 10 million cubic feet in Virginia, 241million cubic feet in Tennessee and 257 million cubic feet in West Virginia.**

These growth to loss ratios will increase as new reforestation efforts are implemented by OSM and state regulatory authorities to encourage tree growth on mined areas. Therefore, it is apparent that the carbon sequestration ability of the region will persist and even improve.

Page II.C-87, Flooding, General Comment, entire section:

This section summarizes various site-specific technical evaluations of the flooding potential of surface mining and associated valley fills. Collectively, the results of these various studies lead to one conclusion:

[42] Data for similar cut/growth ratios was not available for Kentucky.

> **...the study findings generally support a conclusion that downstream flooding potential is not significantly increased by existing mining practices so long as approved drainage control plans are properly applied. EIS IV.I-7.**

Any possible increased flow potential from mined and/or filled areas are site-specific issues that must be addressed on a permit-by-permit basis. Because of the wide variability in results where flow increases where detected, no programmatic or endemic conclusions can be drawn, as this section correctly notes:

> **Studies prepared as part of this EIS and other available literature indicates that peak runoff increase or decrease below mining can occur. Site-specific analysis is required based on many factors...**
>
> **It is difficult to generalize mining impacts on runoff. Due to site conditions, increases in peak runoff may not cause or contribute to flooding.** 17-3-4

Other sections of the EIS note that the study area is naturally prone to flooding given the topographic characteristics of the region:

> **The rugged terrain of this region is generally characterized by steep mountain slopes, confined river valleys and narrow ridge tops. EIS III.A-1.**
>
> **Because of the topography and terrain in steep-sloped Appalachia, flooding occurs in severe weather conditions. Draft EIS IV.H-1.**

Repeated, severe flooding has plagued certain areas within the study region for centuries, certainly before the advent of surface mining. The stark reality is that topographic influences lead the area to be more prone to flooding events . These same influences forced residential, infrastructure, transportation and commercial

development into documented floodplain areas. On page III.R-5, the EIS presents the results of the Land Use technical study confirming these observations:

> **The steep slopes and narrow, flood-prone valleys have limited the availability of land parcels suited for large scale development.**

Despite these observed restrictions, development and residential construction as a matter of practicality has occurred in these flood-prone areas, subjecting residents to repeated and unfortunate flooding.

Surface mining provides a unique, no public cost opportunity to alleviate some of these conditions by providing flat, stable land that is far elevated from the "narrow, flood prone valleys" that possess most of residential settlements in the study area. Historically, periods of government attention were focused on relocating flood prone communities to reclaimed, non-AOC surface mined areas. Unfortunately, what would otherwise serve as a tool of stabilization both economically and socially- massive relocation of these areas- has never been succinctly expressed or implemented and emerging environmental restrictions such as excessive mitigation requirements and fill minimization mandates may bar this from ever occurring.

Page III.G-3, General Comment, Peak Flow Study:

The Associations generally agree with the conclusions of the Peak Flow Study, **insofar as the results highlight the need for site-specific permit analysis** as the

17-3-4

decreases and increases in flow indicated by the various models differed for each area analyzed.

The OSM-COE studies presented in this section underscore the reality that an increase in flow does not translate into an increased flood potential. Based on the results of the OSM-COE models, even the highest peak flows indicated by the studies did not cause a rise in water levels that would exceed channel capacities and lead to flooding downstream under the 10 and 100 year scenarios modeled for these areas:

> **...the predicted increases in peak flow would not have caused flooding on the banks outside the receiving stream channel. EIS III.G-4.**

> **...increases in peak flow did not cause a rise in water level overtopping the receiving stream channels. EIS III.G-6.**

17-3-4

Even though the water levels predicted by these site-specific analysis increased compared to pre-mining conditions, **these increases DID NOT result in or cause flooding.** As noted on page III.G-6 of this section:

> **Flooding typically occurs only when water levels exceed channel capacities and spread across the floodplain where residential settlements may occur.**

Additionally, as runoff travels farther downstream, any increases in flow become less discernible. Thus, the downstream impact from any possible runoff increase in the headwater areas becomes less pronounced the farther removed a location is from the disturbed area:

> **The influence of changes in the headwater areas will decreases as the point of analysis is moved farther downstream.**

EIS III.G-6.

In terms of results, the actual data from the various studies are only partially presented in Appendix H. While the HEC-HMS computer model data appears in each of the 10 studies, the SEDCAD 4 modeling data presented in the chart on page III.G-5 does not. The SEDCAD 4 models returned results similar to the HEC-HMS, but predictions of peak flow were significantly different under certain conditions. Without the opportunity to review the SEDCAD 4 data in detail, the Associations are without sufficient information to offer specific comments. Unless the supporting data is provided, the SEDCAD 4 results should be removed from the final EIS.

17-3-4

Page III.G-7, Fill Hydrology Study:

The technical study summarized here, *Comparison of Storm Response of Streams in Small, Unmined and Valley-Filled Watersheds* (Appendix H draft EIS) determined that the mined and filled watershed exhibited higher peak flows than the non-mined "control" watershed when rainfall exceeded 1 inch per hour. This veracity of this finding is compromised by the location of the sampling station on the filled watershed. On page seven of the technical study, the USGS indicates that the measurement point for the filled stream was located between the toe of the valley fill and the sediment pond, thereby excluding any possible flow attenuations provided by the sediment pond.

> *During most storms however, peak flow from the unmined watershed exceeded peak from the filled watershed.*

This finding comports with other observations and technical research that generally found sustained base flow and lower peak flows in mined areas results from the hydrologic characteristics of backfilled spoil and valley fills:

> **Creation of valley fill aquifers change the hydrology of streams receiving baseflow from valley fill aquifers by diverting a greater percentage of precipitation into the fill allowing water to be released at a much slower and less intense rate compared to normal storm-induced stream hydrographs. EIS III.H-9.**

On page 20, the authors of the technical study properly observe that:

> **Rainfall-runoff relations on altered landscapes are site specific and reclamation practices that affect storm response may vary among mines.**

This statement further supports the Associations' position that no programmatic conclusions can be drawn with respect to mining and/or valley fill influences on flooding potential.

17-3-4

Page III.G-7, July 2001 Floods Study:

Titled *Comparison of Peak Discharges Among Sites With and Without Valley Fills for the July 8-9 Flood in the Headwaters of Clear Fork, Coal River Basin, Mountaintop Coal-Mining Region, Southern West Virginia*, this study attempted to determine whether mining had any adverse impact in the July 8-9 severe flooding event experienced across central and southern West Virginia including the Clear Fork area.

The basic premise of this study- that there was equal rainfall among the six analyzed basins proved to be incorrect. The flood recurrence intervals (and

therefore rainfall amounts) in the six basins were unequal, compromising any possible conclusions, since a watershed receiving more rainfall is going to exhibit higher runoff than one receiving less rainfall.

Given the confounding factors that have compromised the basic assumptions of the study, the Associations believe the Report offers little of real value and its reference should be deleted from the final EIS.

Page III.G-8, Citizen Complaint Study:

A review of the underlying citizen complaints that support this section confirms past assertions made by the mining industry with respect to flooding: The areas where mining occurs are naturally prone to flooding and provided that the approved drainage control plan is followed and the drainage control system is functioning per regulatory requirements, mining has no adverse impact on either flooding potential or the severity of flooding. Despite 126 complaints in West Virginia from 1995-1999, only **eight** of these complaints resulted in enforcement actions related to drainage control structures. Similar results were found in a review of Kentucky (35 investigations, **five** enforcement actions) and Virginia (three investigations, no enforcement actions) SRA records.

Page III.G-8, Other Studies:

This section presents the results of two state specific studies undertaken in response to specific severe flooding events. This first, *Runoff Analysis of Seng, Scrabble, and Sycamore Creek* was conducted by the West Virginia SRA. The

17-3-4

summarized results of this study confirm the general conclusions of the draft EIS and the suggested alternatives related to flooding potential: Mining can influence the degree of runoff, but the extent to which a decrease or increase may have reduced or increased flooding potential is site specific. The West Virginia coal industry was intimately involved in the preparation and review of this study as one of several stakeholders on the Flooding Advisory Committee, and feels compelled to identify in further detail the findings of this review:

1. Mining may either have a positive or negative effect on total runoff and that effect appears dependent upon the extent to which the original, steep-sloped flood prone terrain and topography of the mined is restored through the reclamation process.
2. In all three of the mined watersheds, the effects of documented, increased flows were relatively small.
3. The rain event of the study period was so intense that flooding would have occurred absent any possible influences from mining activity.
4. No programmatic conclusions was reached in the study regarding runoff increase or decreases attributable to mining activity, as this would require "long-term investigation and analyses , including an investigation of every reach of stream" in the relevant watersheds.

Unlike the West Virginia undertaking, very little information is provided in the EIS with respect to the Kentucky initiative, *Joint OSM-DSMRE Special Study Report on Drainage Control*. This is unfortunate, as the most pertinent conclusion

17-3-4

of this study is one that deserves prominent replication in the EIS because it serves to confirm the results of the other technical research and the ultimate conclusion reached in the draft EIS with respect to this issue:

> **Factual results garnered from the study indicate that the majority of the alleged downstream flooding problems were more a result of localized, extremely heavy precipitation events that led to flash flooding, which would have occurred with or without the mining operations being present.** [43]

17-3-4

III.I-1, Overview of Appalachian Region Coal Mining Methods

> *National industry trends have favored surface mining over underground mining in recent decades, driven by the advent of very large earthmoving equipment, and surface mining now accounts for the majority of nationwide coal production.*

The shift in coal production methods from underground mining to surface mining can be attributed to events that occurred independent of the availability of large equipment. Relatively large scale surface mining has occurred for decades in coal producing regions other than the study area, where surface mining is generally a recent phenomenon that can be attributed to shifting coal markets. In the anthracite fields of Pennsylvania, the lignite regions of Texas and the coal fields of the Midwest large scale surface mining has a history dating back to before the 1950's. By 1971, the amount of coal produced from surface mines exceeded the amount produced from underground mines nationally. Since then, surface mines have accounted for an increasing percentage of the nation's coal production with

[43] *Joint OSM-DSMRE Special Study Report on Drainage Control*, 1999.

much of the increase occurring at western surface mines and in particular mines developed in ~~of~~ the Powder River Basin:

> **Much of the increased coal production in the United States...is from large open pit mines in the western region.**[44]

The coals seams and overburden characteristics in this region make underground mining difficult if not impossible. Unlike coal regions in the southwest, midwest and eastern United States, overburden to coal ratios in the Powder River Basin are extremely low. What overburden material that does exist is unconsolidated, "weak" material better characterized as "soil":

> **...the coal lands of the Western region are underlain by flat lying or gently dipping beds of lignite or sub bituminous coal. Some of the seams of sub bituminous coal are 70 feet thick or more and lie at relatively shallow depths; overburden ratios commonly are 1:1 or less. Thus most of the coal produced in this region is from large surface mines in such seams.**[45]

The second driving force behind a movement towards surface mining can generally be seen in the Central Appalachian study area. With the passage of the 1990 amendments to the CAA, a substantial market was created for steam coal that could satisfy new emission mandates. The coal seams and reserves in Central Appalachia developed as a result of this market demand lend themselves better to surface mining than to underground mining for a number of reasons, including the cost benefits realized from larger surface mining equipment. Prior to passage of the 1990 amendments to the CAA, mining in the study region was largely linked

[44] U.S. Department of the Interior Office of Surface Mining: *Environmental Impact Statement, Revisions to Permanent Regulatory Program*, 1983.
[45] Ibid.

to metallurgical coal production. These seams are better accessed by underground mining methods as they are deeper in the geologic column than seams associated with steam coal production. Historically, steam coal production in Appalachia was concentrated in the Pittsburgh seam in northern West Virginia and associated more with longwall underground mining. Commensurate with the increased demand for "compliance" stream coal was a precipitous drop in the demand for metallurgical coal production. Reduced domestic coke production, a result of decreased raw steel production and increasingly restrictive emission standards for coke ovens has drastically lowered demand for metallurgical coal.

> *The term "mountaintop mining" used in this EIS encompasses three different kinds of surface mining operations (contour mining, area mining, and mountaintop removal mining) that create valley fills.*

The final EIS should be revised to more fully acknowledge the potential affects the various policy options under consideration will have upon underground coal mining operations. On page III.K-15of the EIS, the agencies identified 719 valley fills that were permitted for underground mines. As this statistic reflects, underground mines in this steep sloped area also require the construction of valley fills. These fills facilitate creation of a flat, level bench that allows access to the coal seam and permits construction of underground support facilities such as ventilation fans, raw coal belts and stockpile areas, bathhouses and electrical installations such as battery charging stations. These benches also serve as "staging areas" for the underground mining operation where supplies are stockpiled and equipment is serviced. Past interim regulatory initiatives such as

13-3-4

the 250-acre watershed restriction on valley fills have applied to fills constructed for underground mining, as will the alternatives considered in this EIS. To provide a true picture of mining in the region and likely results of the various alternatives, underground mining must be included in this and other descriptions contained in the final EIS.

13-3-4

Page III.I-2

> *Current technology achieves nearly the highest possible recovery of the coal reserves beneath a typical tract of Appalachian land; however, this is neither always economically feasible nor acceptable from an environmental standpoint.*

Mining in general and surface mining in particular is one of the most heavily regulated industrial activities in the nation. Several major environmental statutes have jurisdiction over coal extraction, including a single environmental program that was developed by Congress specifically for coal mining. If mining was "not acceptable from an environmental standpoint", the vast statutes and regulations and the various federal and state agencies that regulate this activity would not allow a mining permit to be issued. In fact, this EIS confirms the viability of these existing regulatory programs in that no more than temporary, minimal impacts could be linked to surface mining in the region. A more proper statement would be "not acceptable to some", as this EIS can be attributed not only to misguided litigation but hyperbole surrounding mining and valley fills and exaggerations regarding the scope and scale of these activities within the study area.

Page III.I-3, Underground Mining Methods

Although not directly related to the focus of this EIS on surface mining valley fill impacts, underground mines are part of the overall coal industry within the study area...

The statement above repeats a very serious error already cited by the Associations: the failure to associate underground mining with valley fill construction. This statement also fails to acknowledge to interrelationship of surface mining to underground mining. Many underground mines exist solely to provide blending stock for coal produced through surface mining methods as part of large mining complex much like the one described on page III.I-26. Since surface mined coal is generally of a better quality than coal mined using underground methods (because rock partings and other impurities present in the coal seam can be removed in the pit), many underground mines could not produce a marketable product unless blended with a surface mined product. 13-3-4

Page III.I-26 Mountaintop Mining Complexes, general comment, entire section:

This section provides fairly accurate description of current mining and coal processing practices in the Central Appalachian region, with one exception. As with other sections of the EIS, it neglects to mention the interrelationship of underground mining to surface mining. As we have stated previously, raw or unprocessed coal produced by both methods of mining is usually needed to produce a marketable "clean" product that meets the emission and volatile requirements of the customer. Should any either source of raw coal be eliminated,

the ability of the "complex" to provide a greater range of clean coal suitable for a number of applications and customers is reduced:

> **Many deep mines are co-dependent on related surface mines for quality blending requirements and even economic averaging arrangements. Eliminating or reducing the surface mining has direct impact on the viability of the deep mining in these instances.** [46]

III.K-1, Excess Spoil Disposal

There is also concern regarding long-term fill stability

This statement is misleading and it should either be removed from the final EIS or revised to reflect the findings of the EIS Valley Fill Stability technical study. "Concern regarding valley fill stability" was indeed raised during the scoping process of the EIS, although the majority of these public comments appeared to mistake valley fills for coal refuse impoundments. Nevertheless, from these "scoping concerns", OSM initiated a through and comprehensive review of valley fills constructed in the study area to assess any potential stability problems. This technical report concluded: 13-2-4

> **A review and analysis of the data indicates that valley fill instability is neither commonplace nor widespread. Only 22 known cases of instability occurred (all during the mining and reclamation phase) out of more than 4,000 fills constructed in the past eighteen years.** [47]

The results of this technical review led the agencies to conclude that no programmatic action needed to emerge from this EIS. The above referenced

[46] *EIS Appendix H: Final Report, Coordinated Review of Mountaintop Mining/ Valley Fill EIS Economics Studies, pages 8-9.*

[47] U.S. Department of the Interior Office of Surface Mining. *Long-Term Stability of Valley Fills, Final Report.* Appendix A of the Draft EIS.

statement should be revised to more clearly reflect the conclusions of the technical review.

Page III.K-2:

> *In the late 1970's and early 1980's the durable rock fill method became the predominate excess spoil disposal technique due to the cost efficiencies of the technique.*

As a general matter this statement is correct, but it should be expanded to include safety considerations and the implications for direct stream loss.

Cost considerations drove development of this spoil placement method but other considerations also influenced the move towards durable rock fill construction such as truck haulage. On page IV.I-8, the EIS describes the operational effects of increased backfilling. Similar conclusions could be drawn regarding conventional lift construction with the added dimension of operator safety. Haulage trucks would be transporting spoil down grade on steep roads. Not only would equipment endure increased physical wear in terms of brakes and other essential systems, but instances of haulage accidents could be expected to increase. Conventional lift construction also assures maximum disturbance to the permitted footprint area. Durable rock fills provide the operator with the flexibility to respond to unforeseen geologic conditions and economic factors by discontinuing fill placement and reducing the direct impacts to streams. In convential lift construction, the entire footprint area is constructed during installation of the initial lift.

13-3-4

Page III.K-10, c. Valley Fill Stability

> *There has been anecdotal evidence that valley fill instability (landslides or land slips on fills) are neither commonplace nor widespread; and, that properly constructed valley fills are well-engineered and stable structures.*
>
> *The EIS Steering Committee chartered a study of fill stability to corroborate perception with empirical information.*

The remainder of this section fails to confirm that the technical study corroborated the anecdotal information, even though it was stated goal of the evaluation:

> **A review and analysis of the data indicates that slope movements in valley fills are neither commonplace nor widespread. As of the completion of this study in November 2000, only 20 occurrences of valley fill instability are recorded out of more than 4,000 fills constructed in the past 23 years. While these instances of fill instability might have been "major" as regards the cost of re-engineering and corrective action to mitigate the mass movement, the consequences were not loss of life or significant property damage.**[48]

13-2-4

The technical study also serves to dispel the notion that isolated movement of material on the face of a valley fill equates to "failure" and that the results would not be similar to the effects of the 1972 failure of an un-engineered coal refuse dam at Buffalo Creek, West Virginia:

> **...catastrophic impacts over a great distance down valley...should not occur. An unstable valley fill would not be expected to impact distant areas because:**
>
> **-[Unlike the pre-SMCRA coal dam at Buffalo Creek] fill designs build in a substantial, long-term factor of safety against instability and have specific drainage control measures.**

[48] Ibid.

-No large quantity of water should be present in properly designed valley fills to lubricate the fill material into a flowing mass that could transport for any great distance. The regulations prohibit ponds on fills or fills impounding water behind them. Even improperly designed fills should have minimal impounding potential.[49]

Despite the overwhelming conclusion of the technical study that valley fills are stable structures, the EIS narrative is misleading, as the results of the technical study are never firmly presented in relationship to first paragraph regarding anecdotal evidence. 13-2-4

Page III.K-2:

In the late 1970's and early 1980's the durable rock fill method became the predominate excess spoil disposal technique due to the cost efficiencies of the technique.

As a general matter this statement is correct, but it should be expanded to include safety considerations and the implications for direct stream loss.

Cost considerations drove development of this spoil placement method but other considerations also influenced the move towards durable rock fill construction such as truck haulage. On page IV.I-8, the EIS describes the operational effects of increased backfilling. Similar conclusions could be drawn regarding conventional lift construction with added the dimension of operator safety. Haulage trucks would be transporting spoil down grade on steep roads. Not only would equipment suffer increased physical wear in terms of brakes and other essential systems, but instances of haulage accidents could be expected to increase. 13-3-4

[49] Ibid.

Conventional lift construction also assures that maximum impact to downstream areas. Durable rock fills provide the operator with the flexibility to respond to unforeseen geologic conditions and economic factors by discontinuing fill placement and reducing the direct impacts to streams. In conventional lift construction, the entire footprint area is constructed during installation of the initial lift. 13-3-4

Page IV.F-1, Energy, Natural, or Depeletable Resource Requirements

The three action alternatives and the No Action Alternative may also provide significant environmental benefit if mitigation proves infeasible in certain locations, causing no mining to occur.

This statement, as worded is very misleading, ignores the results of the EIS technical studies and should be removed from the final EIS. Inclusion of such a statement assumes that mining and valley fill construction activities have resulted in more than minimal impacts on the environment of the region. This is simply not true. As we have noted throughout our other comments regarding the environmental concerns associated with mining in this area, it is clear that mining and valley fill activities have not, nor will they ever have more than minimal impacts on the environmental and social resources of the study area. What environmental effects have been documented can be characterized as improvements (wildlife diversity has increased, more stable sources of downstream energy have been established, flat, stable, useable land can be created). Absent voluminous studies and data to affirm this position with respect 5-6-4

to individual environmental and social issues, past, current and future mining will only affect a relatively small portion of the Central Appalachian landscape, communities, and streams.

Significant environmental benefit will most certainly never occur in areas where mitigation efforts could have alleviated existing degraded streams through any number of water quality and habitat improvements. These existing environmental detriments, identified elsewhere in the EIS present far greater threats to the overall environmental health and stability of the region than does surface mining and valley fill construction. These existing stressors affect a far greater scale of the region that surface mining has or is forecast to affect, and the environmental degradation associated with such stressors as AML-AMD discharges is far more serious than the loss of a headwater stream.

> *Some limited number of reserves may be recoverable by underground mining or a combination of contour and auger/highwall mining.*

This statement too requires revision to be accurate. One of the pervading mistruths regarding surface mining is that other extraction methods allow removal of the same coal resource. The reality is that most seams currently being mined using surface mining and valley fill extraction methods cannot be recovered using underground mining. The seams are either physically too thin, the overburden too unconsolidated to allow for safe mining or the reserve so isolated or small that underground extraction is either impossible or hopelessly uneconomic.

5-6-4

This statement also fails to acknowledge the dependence of underground mining on valley fill construction. Assuming that the environmental restrictions envisioned under all the EIS alternatives will apply equally to all mining related fill construction (as they have in the past), in the limited situations where an expansion of underground extraction can replace lost surface mine production, this expansion will be constrained by the same restrictions that may ultimately make surface mining implausible:

> **...It is an egregious mistake to ignore impacts of valley limitations on deep mines, especially new ones. First, many deep mines are co-dependent on related surface mines for quality blending requirements and even economic averaging arrangements. Eliminating or reducing the surface mining has a direct impact on the viability of deep mining in these instances. Second, the typical reject rate in Central Appalachia from a wash plant associated with a deep mine is about 50%. Thus, for every one ton of coal mined, one ton of refuse is placed in a valley fill or related impoundment. In fact, the valley fills associated with wash plant refuse are generally among the larger valley fills associated with coal mining (with generally larger watershed) but are fewer in number than surface mining valley fills. Third, the construction of a new deep mine involves other valley fill issues. Often, a new deep mine is accompanied by a new wash plant with a new valley fill for refuse. Plus, in order to "face up" the entrances to the new deep mine, a new valley fill for the mine entrance is typically needed.[50]**

With respect to underground mining, a proper characterization would be "it is unlikely that underground mining can replace surface mining in the extraction these reserves."

[50] EIS Appendix H: Final Report, Coordinated Review of Mountaintop Mining/ Valley Fill EIS Economics Studies..

The second component of this statement, "...a combination of contour and auger/highwall mining" is simply absurd and it ignores the underlying fact behind the entire EIS: The Central Appalachian study region is steep-sloped and any excavation for underground mine development, any variation of surface mining or any other human development activity will result in the generation of spoil that cannot be safely placed anywhere but in a fill. Because of the very nature of the native terrain, with rare exceptions, "fill-less" mining or disturbance is simply not possible. Very isolated opportunities may exist for the placement of generated spoil on adjacent flat areas such as AML benches:

> **Abandoned mine benches, reclaimed mine sites or active mining areas may accommodate some volume of excess spoil...**
> EIS IV.I-2

However, these occurrences would be so rare and dependent on such a wide range of factors that they deserve no mention as a reasonable alternative to valley fill construction. No substantial amount of coal could ever be produced from an operation that was dependent such an area for spoil placement.

Any reference to these two surface mining techniques should be deleted from this statement.

> *...resources in U.S. coal basins within or outside of Appalachia and in other countries exist to offset lost reserves from the study area, if market conditions change for regulatory or other reasons.*

Fortunately, the U.S. has been blessed with an abundant reserve base of recoverable coal resources to feed the energy needs of an expanding and evolving

society. However, not all of these coal resources are equal, and for the agencies preparing this EIS to assume that lost Central Appalachian production can simply be replaced from other regions is a serious error. Coal mined in Central Appalachia represents some the highest quality coal found anywhere in the world. Because it is low in constituents targeted by emission legislation yet high enough in heating properties to satisfy utility input requirements, it may be the most valuable coal in existence. Other regions, particularly the Power River Basin and southwest, produce coal that is generally superior as far as emission standards are concerned. However, resources from these areas fall far short in comparing to the heating properties of coal from the study region.

This EIS has made no effort to analyze the available capacity of the Powder River Basin, both in terms of coal production and more importantly transportation, to assume the burden of energy production should policy and regulation sterilize the substantial coal resources of Central Appalachia.

As for the other regions of Appalachia and the Mid-West, the continued marketability of coal from this region is hampered by emission standards enacted as part of the CAA. As we have noted in our other comments, it was the imposition of these restrictions that ultimately spurred development of the resources being extracted using surface mining and valley fill methods.

Further, there is no domestic substitute source for the metallurgical coal produced in this region. Once the production of industrial and metallurgical coal is lost to Central Appalachia, it is lost to the U.S. compelling reliance on imported coal or

imported finished coke- A truly regretful situation. Reliance on foreign resources can be tolerated where domestic sources are finite or nonexistent (as with petroleum) but in the case of coal, the U.S. has ample reserves, a highly trained, well-compensated workforce and developed infrastructure to facilitate coal extraction. At the same time, mature regulatory programs exist to assure minimal environmental and social impacts of coal mining. Thus, there is simply no palatable excuse, given the minimal effects of mining, for misplaced environmental policy to drive dependence on foreign resources.

> *... economic impacts resulting from decreased coal mining could be locally significant.*

11-9-4

This is a gross understatement and one that requires revision to be accurate. A more proper characterization would be "profound". At the request of the West Virginia legislature, Marshall University conducted an analysis of the economic effects of a severe restriction on surface mining within the state. Published in 2000 this study determined that the economic results of restricting surface mining equated to the effects of the Great Depression: widespread economic and social and devastation and dislocation.[51]

G. Cultural, Historic, and Visual Resources, general comment, entire section:

Central Appalachia is indeed an area of rich culture and history worthy of protecting. However, as the Associations have noted previously, mining will

[51] Marshall University Center for Business and Economic Research. *Coal Production Forecasts and Economic Impact Simulations in Southern West Virginia: A Special Report to the West Virginia Senate Finance Committee*. 2000.

never occur on a scale large enough to eliminate or even substantially impact these values. Localized impacts can, and will occur, but existing regulatory mechanisms exits to protect the resources in these areas. As for community displacement, again localized occurrences are possible, but because of the small scale of mining activity, instances of displacement are no more likely than community displacement in the same region or other areas from publicly funded projects such as flood control and road construction.

H. Social Conditions, general comment, entire section:

The Central Appalachian region faces many social and economic challenges that is without dispute. However, the description of these conditions characterizes these challenges as relatively recent phenomena and leaves the uninitiated with the impression that they are attributable to mining. For decades government programs such as the Appalachian Regional Commission have sought to enhance the social and economic conditions of the study area. Despite all these positive influences such as aggressive highway construction, problems persist:

10-2-4

> **Income statistics from the 1980 and 1990 Censuses indicate that the study area, as a whole, has a starkly lower income than the individual states.**
>
> **Census statistics for 1980 and 1990 depict a poverty problem throughout most of the EIS study area.**
>
> **In twenty-four of the study area counties, over one in every three residents was estimated to live below the poverty level.**
> **EIS IV.H-1.**

These demographic realities further stress the economic and social importance of the coal industry. Coal mining activity creates substantial economic activity through high-paying wages for coal miners and demand for goods and service related directly to coal extraction. The ripple effect of this activity is tremendous and mining is the *only* economic driving force in a majority of the study area:

> **The establishment of a new mine or the expansion of an existing one affects both the economy of the local community where the mine is located and the economy of communities far removed from the mine site. This is because the United States has a highly interdependent economy. What happens in the mining industry eventually impacts many other industries. This is referred to as the ripple or multiplier effect. Recent studies...using an input-output model indicates that the multiplier effect for a new mine is several times the magnitude of production, income and employment of the mine itself. It is estimated that a one dollar increase in coal production stimulates a total of $6.30 of production throughout the economy.**
>
> **Likewise, the creation of one full job in a new or expanded mining operation stimulates the creation of a total of 11 other jobs elsewhere in the economy. As expected, personal income also increases but not in proportion to employment. For every dollar increase in personal income associated with coal mining activity, there is a $4.83 increases in personal income elsewhere in the economy.**[52]

Just as it stimulates economic growth and earnings, the coal industry provides the social infrastructure for much of the region through taxes. The draft EIS summarizes the taxes collected on the coal industry beginning on page III.Q-9.

[52] U.S. Department of the Interior Office of Surface Mining. *Draft Environmental Impact Statement, Valid Existing Rights*, 1995.

In short, the substantial economic activity created by mining in the region serves to alleviate these existing social problems, and coupled with the opportunities provided by post-mining land use development, offers tangible expectancy for a stable, diversified post-coal economy:

> **Most leaders are also keenly aware that its coal resources are its best sources for leverage of investments needed to build an economy that can flourish after the inevitable decline of coal mining.** EIS IV.h-2.

I. Economic Role of Coal in the Economy

> *As long as coal is required to supply a dominant portion of local and national energy needs, the ability to extract low sulfur coal reserves efficiently and cost effectively will occur somewhere in the nation (or the world) to meet energy demands and clean air standards.*

This statement is key to understanding the effect that increased restrictions will have on the energy security of the nation, particularly the regions and industries that have historically relied on coal supplies from Central Appalachia. Given the current energy needs of the nation, utility, industrial, metallurgical or otherwise, lost production from the study area will replaced by coal from other regions or foreign sources. As we noted previously, the ability of other coal regions in the U.S. to replace this lost production is limited for several reasons. First, the low sulfur coal produced in the west has substantially lower heating values than similar low sulfur Central Appalachian coal. Second, coal from other regions such as the mid-west and northern Appalachia is high in constituents targeted by clean air

legislation. Finally, a substantial portion of production from the study area is used for steel making other industrial applications that demand specific heating, fusion and chemical compositions that can only be found domestically in Central Appalachian coal. Hence it is possible, if not likely that lost production from the study area will be replaced by coal from foreign sources further reducing the energy independence of the nation.

> *Higher mining costs due, in part, to environmental compliance... will result in coal supplies originating from coal basins outside the EIS study area where compliance can occur.*

This statement unfairly conveys the impression that compliance within the study area has not occurred. This is simply not the case, as the EIS demonstrates. The only issue that has been identified is related to new mitigation requirements imposed by revisions to the COE's general permit program and the constantly evolving interpretation of these mitigation requirements by the various COE districts:

11-8-4

> **Increased environmental costs...have not been a constant factor in environmental compliance in the study until the 2002 renewal of NWP 21. EIS IV.I-2.**

As we have noted in our previous comments on other sections of the EIS, application of these new requirements, particularly conservation easements, to the study area is inappropriate and may not be the most environmentally beneficial measures for the region. This statement should be revised in the final EIS to properly reflect this reality.

In instances where coal traditionally supplied from Central Appalachia is replaced by foreign sources, no "environmental compliance can occur" because the agencies have failed to export the vast environmental controls imposed in the study region to foreign coal basins. The statement should be revised to reflect the knowledge that displaced production will likely be supplanted at least in part by coal from other regions of the world that lack the environmental controls of the U.S.

> *New capital will be required to "ret-tool" in order to conduct more contour/auger mining to reduce valley fill sizes, lower mitigation costs and still meet coal market demand.*

As with other sections of the EIS, this statement incorrectly leaves the reader with the impression that these particular mining methods are conducted without valley fill construction and that they are mutually exclusive production methods. Since they are activities that require excavation in the steep-slopes of the study area, these two mining methods by definition will result in valley fill construction. Further, as the EIS notes on page III.I-26, these surface extraction methods usually occur in conjunction with underground and other surface mining developments. All of these mining methods are usually necessary to produce marketable coal:

11-8-4

> **Many mines rely on blending the products of different surface mines or a combination of surface and underground coal to conform to supply contracts for particular coal quality. Also, transportation and coal preparation costs associated with smaller and underground mines are sometimes related to the proximity of larger mines with existing infrastructure. If the infrastructure is not available, new smaller mines may not be practical.** EIS IV.I-4.

A proper revision would delete reference to these two mining methods and associate "re-tooling" costs to the smaller equipment associated with reduced operations and reduced recoverable coal reserves.

...Declines in surface mining production typically result in some amount of commensurate increases in underground production and employment.

This statement requires revision to accurately portray the realities of mining and the anticipated results of new, restrictive environmental policy. As we noted previously the effects of the alternatives contemplated in the EIS will affect underground mining, either directly through valley fill constraints or indirectly by reducing surface mined coal that is blended with underground production to produce a saleable product. Consequently, a short-term increase in underground mining employment may result from a decline in surface mining production, but given the interrelationship of mining methods, any increase will be short-lived. A reduction in surface mining employment will eventually equate to a reduction in all mining employment as the effects of surface mining restrictions are extended to underground mining. The cited statement should be revised in the final EIS to properly reflect this relationship.

11-8-4

It is reasonable to assume that required mitigation costs (i.e., to offset valley fills) will result in future MTM designs with reduced valley fill sizes.

This statement requires revision to properly frame increased mitigation costs within the context of other regulatory requirements imposed by SMCRA and

CWA. As we have noted previously in our comments, maximum fill minimization is already achieved through application of SMCRA's AOC requirement and compliance with the CWA's section 404(b)(1) guidelines. Since there is simply no other way to facilitate coal removal by any extraction method absent the existence of a valley fill, increased mitigation costs will act as punitive measure for unavoidable direct impacts and could unfairly hinder post-mining land uses in a region in serious need of flat developable land. A Revised Version of the sentence would properly acknowledge that operations assure fill minimization by satisfying the AOC mandate of SMCRA and the 404(b)(1) analysis of the CWA. Any further fill reduction that occurs will result from mitigation costs reducing the economic or practical viability of the operation.

11-8-4

The Hill & Associates sensitivity analysis projected....

The Hill & Associates (H&A) work summarized in the EIS provides only a "vision" of what will happen to the mining industry if valley fills are restricted directly (watershed specific prohibition on fills) or indirectly (increased mitigation requirements reducing the viability of a mining operation). The results of the H&A work produced very conservative estimates of the possible effects of fill restrictions because of certain restraints inherent in the model(s).

The H&A analysis relied on another EIS technical study conducted by Resource Technologies Corp. (RTC) known as the "Phase I" economics study, which used macro-GIS models to estimate the amount of available coal recoverable if valley

fills were limited to certain specific watershed acreage. The validity of this analysis is questionable, as the cover sheet to Appendix H notes:

> **Valley fill locations used in the study exceeded the watershed size thresholds established by the study (i.e. fills were placed in watersheds greater than the scenario limits). The Phase I study fill locations were inconsistent with basic engineering principles and typical mining practice to locate fills in valleys as opposed to on hillsides.**
>
> **Further, the phase I study relied on consideration of future mining based on areas where past mining had not occurred. A number of the potential mining sites utilized in the Phase I analysis have subsequently been determined to have been mined, consequently overestimating the available future resources for the Phase I scenarios. The study attempted to take into account mining engineering considerations such as overburden ratios, the volume of resource block, topography, etc., to assess resource recovery feasibility. However, the computer model was not designed, nor did the data exist, to account for every critical mining engineering factor, such as coal quality, mineral and surface ownership conflicts, and other very site-specific elements.**
>
> **The Steering Committee consequently found that the site-specific results of the Phase I Economics study have limitations and should not be relied on to be representative of potential future mining and fill areas...with respect to production change estimates.**
>
> **Despite the study limitations, the computer modeling clearly indicates a trend related to reduction in available valley fill storage and the amount of reserves recoverable. The study illustrates, from a regional perspective, that restricting valley fills to small watersheds would commensurately restrict mining feasibility and minimizes full resource utilization.**

The H&A work, or "Phase II" of the economics analysis, relied on flawed inputs from the Phase I study:

11-8-4

> **Because the Phase II Economic Study used the results if the Phase I Economic Study, the [phase II] study results also have limitations.**

In addition to receiving flawed data from the initial analysis, the H&A work also failed to properly account for the increased mining costs associated with smaller fills:

> **In the original Phase II study, no adjustments in costs were made to reflect changes in material handling and haulage methods resulting from fill restrictions. The costs were also not adjusted to reflect the reality that fill restrictions would likely necessitate a change from large mining equipment to smaller equipment. A shift from fewer larger fills to many smaller fills would require construction costs for additional sediment ponds-not part of the initial Phase II assumptions. Finally, the initial modeling runs in the Phase II Economic Study did not project an increase [in] the required return on investment (ROI) capital, which is estimated to be as high as 20%.**

11-8-4

The serious limitations in the initial Phase II study lead the agencies to commission H&A to conduct a "sensitivity analysis" to more accurately reflect the reality of mine economics:

> **The EIS Steering Committee sanctioned a sensitivity study by Hill and Associates to evaluate these limitations. The sensitivity study was designed to determine how the results of the initial Phase II study would change if a different set of Phase I assumptions and inputs were used. Modeling inputs, drawn from mining experience were used to indicate the direction and the magnitude of Phase II study output change resulting from adjusted sensitivity inputs.**
>
> **The sensitivity runs confirmed earlier results indicating that coal production was sensitive to lower reserve recovery because of smaller fills. Production decreased by approximately 20 percent over the initial study results. The price of coal was somewhat sensitive to the model assumptions adjustments, reflected by**

approximately $2.00 more per ton under the most restrictive scenario over the base scenario. This impact is double that of the original Phase II run for the same scenario.

In summary, the EIS economics studies used super-presumptive models that overestimated recoverable reserves, failed to account for the interrelationship of surface and underground mining and underestimated the economic results. 11-8-4

Chapter 1 - Introduction and Motivation

If there is any single element that defines the bounds of a regional economy, it is the intensity of the interrelationships that inexorably bind the economic fate of one group to the well-being of all others. Thus, as policy-makers ponder the potential impacts of reduced coal production in West Virginia's southwestern counties, there is a clear understanding that the foreseeable decline in coal-related economic activity will very quickly affect the nature and magnitude of all other commercial activity within the region. This conclusion is hardly in need of validation by the academic community. Coal mines and miners' pay define the southern coal field region of the State.

Most of those concerned also understand that the markets in which West Virginia's coal is sold are changing rapidly. Increasingly stringent domestic and international air quality standards are reflected in the increasing demand for low sulfur western coal and in measurable declines in at least some of the coal produced east of the Mississippi River. Increased production in Columbia and Australia has brought new and voracious competition to international fuel markets and the on-going restructuring of the US electric utility industry appears to favor natural gas over coal as a fuel source. These economic forces have already had readily observable impacts on the fiscal vitality of West Virginia's coal producers.[1]

Finally, pending court rulings that further restrict surface mining methods will place additional economic pressure on coal producers and the communities they help to sustain. While many question the dire claims proffered by the mining community with regard to mountaintop mining, the vast sums that mining companies have spent to protect this practice stand as unshakable testimony to the importance West Virginia's mining industry places on mountaintop mining. Even the mining industry's most ardent detractors must realize that mining management would have preferred to distribute these monies as profits and would have, indeed, done so if not for the belief that protecting the controversial form of surface mining is essential to their future prosperity.

[1] For example, Arch Coal Inc. experienced a 166.1% decrease in earnings growth over the last 60 months. (Source: Zacks Investment Research, http://za.zacks.com/advisor).

While many understand the challenges facing the State's coal producing region, few have attempted to quantify the degree to which increased competition and additional surface mining restrictions will affect the level of coal production or the broader regional economy. It is within this context and in response to a request from West Virginia Senate Finance Committee Chair Oshel Craigo, that Marshall University's Center for Business and Economic Research is attempting to provide the first glimpse of what the future may hold for West Virginia's southwestern coal producing counties. Readers should note that the following analysis is not intended to provide the sort of comprehensive information necessary to a formal cost-benefit analysis. Specifically, we do not seek to estimate the magnitude of any environmental costs within the region nor do we attempt to value the extent to which some regional residents are negatively impacted by coal mining operations.[2] Instead, the current analysis is strictly focused on foreseeable changes in coal production and the ways in which these changes may be expected to affect regional commerce, employment, and incomes in the near future.

The remainder of the current study is organized into five sections and a set of appendices. The first of these, Chapter 2, is an examination of the historical role of coal production within the study region. Chapter 3 details the current economics of coal production, including the impact of increased international competition, more strict air quality standards, and the potential impacts of electric utility restructuring. Within Chapter 4, we develop a county-level model for forecasting the supply of and demand for coal. In addition to a baseline forecast, this Chapter contains two alternative scenarios that depict varying regulatory outcomes. Chapter 5 extends the variations in coal production forecasted under each scenario to broader economic impacts within each study region county. Finally, we provide concluding comments in Chapter 6. Appendix A contains county level data, while Appendices B and C explain and demonstrate the models and estimation techniques used in the study.

[2] West Virginia University's Bureau for Business and Economic Research is currently working in conjunction with the U.S. Environmental Protection Agency to conduct a long-run, comprehensive economic analysis within the Environmental Impact Statement process.

Chapter 2 - The Study Region, Coal Production, & Regional Economy

2.1 Study Region Definition

The study region, pictured in Figure 2.1, is comprised of Boone, Fayette, Kanawha, Logan, McDowell, Mingo, Nicholas, Raleigh, and Wyoming counties. This study region was established based on a number of criteria. First, these contiguous counties provide a rough outline of West Virginia's southern coal fields. Second, this regional definition includes counties with largely homogeneous economies and coal reserves. Were we to extend the analysis to include northern coal producing counties, it would be necessary to account for the measurably different economic conditions observed in those counties, as well as the vastly different characteristics of the coal mined within that region. Finally, the study region was defined based on the historical (and current) dominance of coal production within the region's nine counties. Current population, personal income, and employment data for these counties is summarized in Table 2.1. These data indicate that as late as 1998 (the last year for which data are currently available) coal production directly represented an overwhelming portion (over 18%) of the economic activity within the study region.

Figure 2.1
The Study Region

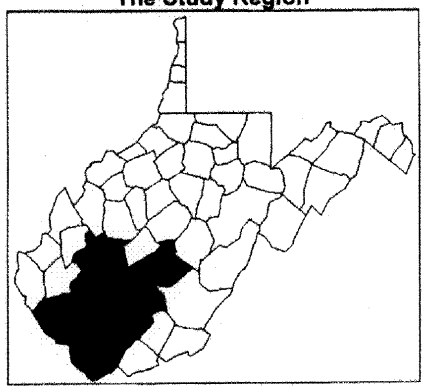


Table 2.1
The Study Region, 1998

	Population	Per-Capita Income	Total Employment	Direct Coal-Related Employment	Percentage of Coal-Related Employment
Boone	26,347	$17,735	9,436	3,116	33.0%
Fayette	48,566	$15,961	16,540	625	3.8%
Kanawha	203,195	$24,489	134,345	2,296	1.7%
Logan	41,294	$16,383	15,682	1,902	12.1%
McDowell	30,558	$13,482	7,213	908	12.6%
Mingo	32,475	$15,923	11,189	2,713	24.2%
Nicholas	27,580	$14,743	10,508	593	5.6%
Raleigh	78,970	$18,421	36,612	1,836	5.0%
Wyoming	27,662	$13,816	7,214	1,329	18.4%

2.2 A Brief Historical Context

Bituminous coal underlies more than two-thirds of West Virginia. These coal deposits are divided by a geological "hinge line" into northern and southern fields. Generally, coal mined in the southern fields has a higher heating value and lower sulfur content than northern West Virginia coal. Historically, however, the development of the State's coal industry first occurred in the north.[3]

While coal production in "western Virginia" dates to the early 19th century, development of the southern West Virginia coal fields did not begin until after the Civil War. The Flat Top-Pocahontas Field, located primarily in Mercer and McDowell counties, first shipped coal in 1883 and grew quickly from that time. Smaller operations within the area were consolidated into larger companies and the Pocahontas Fuel Company, organized in 1907, soon dominated McDowell County production.

Many of the southern coal fields, such as the Kanawha, New River, Winding Gulf, Logan and Greenbrier, owed their success to the development of the Norfolk Southern and Chesapeake & Ohio Railways. As the railway expanded into the region, coal was more easily marketed and the southern coal fields prospered. The Logan field, lying in Logan and Wyoming counties, did

[3] See US Energy Information Administration, State Coal Profiles, Washington, DC, 1998.

not open until 1904, when the railway finally reached that area. Once opened, Logan soon became the State's largest coal producing county.

Over the years, mining techniques and equipment have varied considerably. Early on, progress in mechanization was slow. Nonetheless, by 1890 electric coal cutting, loading, and hauling machines were in wide use. Beginning in the middle 1930s, mechanization moved forward even more rapidly, as shuttle cars, long trains, conveyor belts, and a variety of other equipment came into common use. Large-scale surface mining did not begin until 1913, but with the development of large earth moving equipment and draglines, the overburden could be removed more efficiently, so in recent years surface mining has become a major method of mining coal within the study region. Technological advancements, increasing concerns for health, and rising workers' compensation costs have lead to mine safety improvements.

2.3 Coal Production and the Study Region Economy

Table 2.3A provides estimates of coal production, employment, and mine-mouth prices from 1980 through 1998. Section 3 describes the largely exogenous market forces that have lead to variations in these outcomes. However, it is clear, even without these explanations, that the economic well-being of the study region has been directly tied to the magnitude of coal production. Table 2.3B provides an intertemporal glance at the relationship between the study region's coal production, populations, and incomes. When the demand for the study region's coal has been relatively strong (as in the 1970's), the regional economy was able to support a population of 611,175 in 1979, with an average real per-capital income of $13,797. In contrast, when the demand for the region's coal has been slack (as in the middle 1980's), incomes changed marginally while population fell measurably. During this latter period, region population declined by 12.8 percent in the decade from 1979 to 1989.

The study region is currently home to over 515,000 persons, who comprise roughly 200,000 households. Virtually every measure of economic well-being reflects the damage done by a 15 years of sustained out-migration. The 1999 unemployment rate, weighted by a county population of 8.3 percent was more than twice the national average of 4.1 percent and 125 percent of the West Virginia average of 6.6 percent. The average regional per-capita income of $16,772 is only 87.17 percent of the national average. Home values within the study region

average only $38,700, while the State-wide figure is $47,600. And finally, in some counties the high school non-completion rate for those over 25 is substantially greater than 50 percent[4].

Table 2.3A

Year	Regional Coal Production (Tons x 1,000)	Real Mine-Mouth Price / Ton (92 $)	Direct Mining Employment	Tons per Mining Employee (Tons x 1,000)
1980	60,317	$46.00	40,391	1.493
1987	60,228	$35.08	19,813	3.040
1992	84,119	$28.15	18,657	4.509
1993	78,339	$26.88	14,021	5.587
1994	87,288	$26.14	15,153	5.760
1995	87,552	$25.26	15,073	5.809
1996	91,989	$24.23	14,017	6.563
% Change	53%	-47%	-65%	439%

Indeed, eight of the nine study region counties have been classified as "distressed" by the Appalachian Regional Commission.[5] There are those who would blame coal producers for these negative economic outcomes. To do so would, however, be largely unfair. Instead, the economic conditions within the study region reflect a lack of economic diversity coupled with the significant volatility observed in fuel markets. Figure 2.3 depicts real coal prices over a period of nearly 120 years. This figure reveals two important points. Over the long-run inflation-adjusted coal prices have proven remarkably stable. In the short-run, however, coal prices have been remarkably volatile.

While economic conditions within the study region generally lag behind those observed within the remainder of the State, there are indications that at least some study region counties have become less reliant on coal-based economic activities. Certainly, Kanawha County, with its diversity of manufacturing, service sector, and governmental activities, is less susceptible to

[4] U.S. Census Bureau, 1990 Census.

[5] These substandard economic conditions are reflected in other negative outcomes. For example, the widely dispersed population and lagging economic conditions have made it difficult for the region's residents to obtain adequate health care. As a result, health attainment within a number of study region counties ranks among the lowest in the nation. Appalachian Regional Commission Distressed Counties, FY 2000.

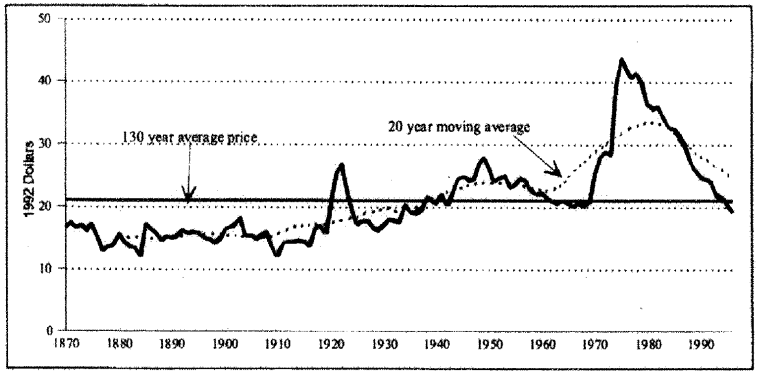
coal-related economic disruptions. Moreover, both Fayette and Raleigh Counties have enjoyed a measurable increase in tourist-related economic activity over the past decade. Indeed, since 1994, the number of tourism-related establishments and jobs in these two counties have both grown at an annual rate of over 20 percent.[6]

Table 2.3B

Year	Regional Coal Production (Tons x 1,000)	Real Mine-Mouth Price / Ton, WV Coal (92 $)	Regional Population	Average Regional Per-Capita Income (92 $)
1970	-	$28.67	557,238	$10,419
1971	-	$33.05	563,817	$10,834
1972	-	$34.61	569,593	$11,845
1973	-	$36.69	570,666	$12,187
1974	-	$61.61	569,551	$12,279
1975	-	$76.54	581,358	$13,003
1976	-	$74.27	594,416	$13,326
1977	-	$71.84	604,190	$13,552
1978	-	$71.33	609,506	$13,841
1979	-	$67.14	611,175	$13,797
1980	73,948	$59.39	608,400	$13,699
1981	69,590	$58.73	606,979	$13,279
1982	74,468	$54.84	605,500	$13,472
1983	64,857	$49.94	602,329	$12,614
1984	73,293	$46.15	593,899	$13,016
1985	76,619	$43.64	584,673	$12,973
1986	81,172	$39.56	574,445	$13,153
1987	83,728	$36.00	562,124	$13,059
1988	89,420	$33.47	546,257	$13,170
1989	93,870	$32.46	532,660	$13,216
1990	110,021	$30.72	524,998	$13,704
1991	109,060	$29.48	524,551	$13,852
1992	107,278	$28.15	524,838	$14,206
1993	92,860	$26.78	525,694	$14,132
1994	108,902	$25.96	523,698	$14,417
1995	112,616	$25.02	522,573	$14,433
1996	117,871	$22.11	520,353	$14,504
1997	120,666	$23.29	516,647	$14,662
1998	116,208	-	513,022	-

[6] This figure is based on the growth of employment and establishments within the categories of lodging, restaurants, and recreational establishments within the county. U.S. Bureau of the Census, County Business Patterns 1994-1998.

Figure 2.3
Long Run Bituminous Coal Prices in West Virginia, 1992 Constant Dollars



Chapter 3 - The Economics of the Coal Industry

Historically, coal and other related fuel markets have exhibited a significant degree of short-run volatility which has translated into instability and a paucity of economic development within those study region counties that rely heavily on coal production[7]. As West Virginia enters the 21st century, there is no indication that this pattern of instability or volatility will abate. To the contrary, a number of new pressures have emerged that make the course of coal production within the study region less, rather than more, certain. Among the issues affecting the State's coal industry are increased international and domestic competition, uncertain international petroleum prices, electric utility restructuring, and new environmental regulations. These affect both the production and consumption of West Virginia coal[8]. Within the remainder of this chapter, we carefully evaluate how each of these sources of instability may be expected to affect the study region's coal producers. The chapter also attempts to dispel various myths regarding production costs and alternative production techniques that cloud the debate surrounding further regulatory intervention and its impact on coal production.

3.1 The Demand for Study Region Coal

Like most raw materials, the demand for coal produced within the study region is derived from the demand for the products that coal is used to create and the technologies available for producing these "downstream" goods or services. Within the current context, this "derived demand" implies that the willingness to pay for study region coal depends on the demand for electricity and steel products, as well as the availability and pricing of other fuel substitutes. This includes coal from other regions, natural gas, and fuel oil, and generating and steel producing technologies. Changes in any of these other factors can materially affect the demand for coal produced in southern West Virginia. The demand for study region coal is further complicated, since bituminous coal is sold in commodity markets that recognize qualitative differences in

[7] Specifically, the volatility of regional economic activity within the study region has served to weaken investment, hindering economic growth relative to other regions.

[8] The 1990 Clean Air Act Amendments (CAAA), which became effective January 1, 2000, outline stricter sulfur emission reduction requirements of Phase II.

sulfur dioxide, ash, moisture, and Btu content.[9] Metallurgical coal users and utilities that face few air quality compliance issues may be attracted to the relatively high Btu content of study region coal, while other electricity users may favor the low sulfur content and relatively low transportation costs of western coal, even though most such coal has a significantly lower Btu content.[10]

As the opening paragraph of this chapter indicates, a number of evolving forces will potentially impact the volume of coal produced within the study region over coming decades. With the exception of environmental restrictions on surface mining practices, these emerging forces represent demand-side changes that are effecting consumers' willingness to pay for study region coal.

3.1.1 Clean Air Standards and the Demand for Study Region Coal

The *U.S. Environmental Protection Agency's* implementation of the 1990 amendments to the *Clean Air Act* have increasingly restricted electric utility emissions of a variety of pollutants. These pollutants include sulfur dioxide, nitrogen oxides, and particulate matter. Coal burning utilities generally have four options or strategies available for compliance with these standards – (1) high-emission facilities can be retired; (2) high-emission facilities can be retrofitted to burn low-sulfur coal, a low-sulfur/high sulfur coal mix, or an alternative fuel; (3) high-emission facilities can be modified to include scrubber equipment that reduces the volume of pollutants emitted from the burn of high-sulfur coal; or (4) operators of high-emissions facilities can acquire (either internally or through purchase) emissions credits that will allow the facility to legally exceed the applicable emission standards.

[9] The British Thermal Unit (Btu) is the most common measure of heat producing capacity. It reflects the amount of heat required to raise the temperature of one pound of pure water by one degree Fahrenheit.

[10] The complexity of coal markets is, perhaps, highlighted by the diversity of coal products available in the western United States. Powder River Basin (PRB) coal from Montana and Wyoming is of the low sulfur, low Btu variety noted in the text. However, the low sulfur coal produced in Colorado, Utah, and British Columbia has a consistently higher Btu content. However, the non-PRB western coal does not routinely compete in eastern fuel markets because moving it through the Rocky Mountains requires relatively high expenditures for transportation.

Some compliance strategies allow electricity producers to continue the use of study region coal, while other strategies preclude this use[11]. However, just as emission standards have made southern Appalachian coal less desirable for some customers, the same regulations have caused other users to substitute study region coal for Illinois basin and northern Appalachian coal that has an appreciably higher sulfur content. Thus, it is difficult to assess the current net effect of clean air standards on the demand for study region coal.

If there is one clear outcome associated with more stringent air quality standards, it is the growth in popularity of Powder River Basin (PRB) coal mined in Wyoming and Montana.[12] PRB coal is mined at a cost of roughly $4.50 per ton and can be transported into the Illinois and Ohio River Basins at rates that result in delivered prices that are comparable to the mine-mouth price of study region coal.[13] The difference, of course, is that the low Btu content of PRB coal means that much more coal must be burned to achieve the same power generation. To date, it appears that PRB coal is primarily displacing Illinois Basin coal, but the same qualities that make western coal attractive to users in Illinois and Indiana may eventually sway utilities further east.[14]

Air quality issues are also leading many utilities to substitute natural gas for coal as a generating fuel. Tampa Electric Company (TECO) recently announced plans to convert all coal-fired generating facilities to natural gas within the next two years and Ontario Hydro is rumored to be contemplating similar changes. Both utilities have historically consumed West Virginia Coal.

[11] The purchase of sulfur dioxide permits cellars for continued burning of study region coal without retrofitting plants with emissions curtailing technologies.

[12] Historically, the relatively high costs of mining and transporting eastern coal allowed PRB coal to compete in markets west of the Mississippi River. Relative declines in transportation costs from the Powder River Basin during the 1990's moved the east-west boundary between eastern and western coal dominance further east into the Illinois and Ohio River basins. More recently, however, the continued eastern expansion of western coal appears to owe to the effects of more stringent clean air standards, rather than any further decline in relative transport rates.

[13] The Energy Information Administration Coal Industry Annual 1998 reports a real mine price (1992$) of $4.80. However, anecdotal evidence suggests that Powder River Basin coal costs have lowered since 1998.

[14] For a discussion of the expanded use of PRB coal, see Energy Information Administration. While there is no evidence at this point to support our contention, the authors suspect that the attractiveness of using PRB coal as a compliance strategy is enhanced by the knowledge that this strategy will be effective for the foreseeable future, whereas alternative strategies – for example blending – may cease to be effective if standards are raised further.

3.1.2 International Competition and the Demand for Study Region Coal

Table 3.1 summarizes West Virginia coal exports between 1993 and 1997. On average, exports accounted for roughly 25% of all sales during that period.[15] Tables 3.2 and 3.3 provide additional information on the export destinations of the State's coal production. These data, in combination with additional anecdotal data, tell a clear story of increased international competition.

Table 3.1

Year	WV Sales to Domestic Users (x 1,000)	WV Sales to International Users (x 1,000)	Total WV Sales (x 1,000)	Percentage of Export Sales
1993	102.7	33.2	135.9	24.43%
1994	122.8	36.2	159.0	22.77%
1995	120.9	44.3	165.2	26.82%
1996	127.2	42.0	169.2	24.82%
1997	133.8	38.4	172.2	22.30%

The majority of West Virginia's coal exports (47% in 1997) are bound for European destinations. However, throughout the period of record, European nations have been purchasing less coal from West Virginia and more from other exporting nations, such as Columbia.[16] Columbian coal is even making inroads into US domestic markets. Unpublished sources suggest that Alabama Power, beginning in 2001, plans to import more than four million tons of Columbia coal over the Port of Mobile.

The second largest importer of West Virginia coal (23% in 1997) is Canada. Of the coal shipped to Canadian users, roughly one-third is purchased by Ontario Hydro, with the remainder going to other generating and industrial users. During the 1993-1997 period, annual Canadian use of West Virginia coal grew by 2.9 million tons (71%). This growth clearly helped offset

[15] Energy Information Administration data do not allow the segregation of study region exports from other West Virginia exports.

[16] The decline in European coal purchases would appear greater still if the 112 percent increase in West Virginia exports to Romania are excluded from calculations.

export losses to other international customers. It is important to note, however, that the growth in Canadian usage reflects a one-time increase in Ontario Hydro's consumption that resulted from the utility's need to rapidly replace generating capacity lost with the unplanned shutdown of nuclear facilities.[17]

Increased low sulfur, high Btu Australian coal production is also placing additional competitive pressures on West Virginia exports. In 1996, Australia embarked on a program designed to increase coal production by approximately 5 percent annually through 2002.[18] This increased production is principally aimed at Asian markets which accounted for roughly 11 percent of West Virginia exports in 1997.[19] However, there are secondary effects arising from the Australian expansion. Anecdotal information suggests that Australian coal has displaced a significant amount of low-sulfur, high-Btu coal mined in British Columbia. As British Columbian producers seek alternative markets, it may well affect West Virginia's ability to export coal to eastern Canada.

[17] It is worth noting that one issue that has arisen in the proposed railroad merger between Burlington Northern - Santa Fe and the Canadian National - Illinois Central is the degree to which a combined system would allow for the more efficient transport of Powder River Basin coal to eastern Canada customers. If this merger is allowed, it could place additional competitive pressure on West Virginia coal exports.

[18] See "Australian Coal Supply: Risks and Prospects to 2002," *Australian Commodities*, Vol. 4, No. 2, June 1997, pp. 214-26.

[19] *Ibid.*

Table 3.2
West Virginia Coal Exports

Destination Country	1993 Tons (x 1,000)	1994 Tons (x 1,000)	1995 Tons (x 1,000)	1996 Tons (x 1,000)	1997 Tons (x 1,000)
Argentina	132	35	----	----	----
Belgium	1,396	1,302	1,175	1,261	822
Brazil	2,496	4,109	4,329	4,247	3,927
Bulgaria	644	1,571	1,360	1,152	1,008
Canada	4,071	5,605	5,759	6,907	6,956
Chile	----	----	----	43	----
China	141	284	355	353	188
Croatia	63	----	----	----	----
Egypt	601	593	714	303	807
Finland	212	375	683	507	324
France	2,864	3,514	3,594	2,859	2,286
Germany	286	382	254	584	419
India	----	----	----	11	----
Italy	3,111	2,927	2,873	2,361	2,084
Japan	2,260	2,148	3,222	2,062	2,585
Korea	318	523	1,013	1,050	829
Mexico	----	----	----	----	25
Netherlands	2,014	1,717	1,523	1,223	1,977
Nigeria	43	----	----	----	----
Portugal	151	----	33	164	118
Romania	820	925	1,623	1,315	1,737
South Africa	577	771	946	947	706
Spain	1,071	1,255	1,084	818	681
Sweden	603	866	1,352	882	857
Turkey	1,370	1,468	1,560	1,643	1,295
United Kingdom	1,261	1,212	1,182	1,024	897
Total	29,498	31,582	34,634	31,716	30,528

Table 3.3
West Virginia Coal Exports

Destination Country	1993 % of Total Exports	1994 % of Total Exports	1995 % of Total Exports	1996 % of Total Exports	1997 % of Total Exports
Argentina	0.50%	0.11%	---	---	---
Belgium	5.27%	4.12%	3.39%	3.98%	2.69%
Brazil	9.42%	13.01%	12.50%	13.39%	12.86%
Bulgaria	2.43%	4.97%	3.93%	3.63%	3.30%
Canada	15.36%	17.75%	16.63%	21.78%	22.79%
Chile	---	---	---	0.14%	---
China	0.53%	0.90%	1.03%	1.11%	0.62%
Croatia	0.24%	---	---	---	---
Egypt	2.27%	1.88%	2.06%	0.96%	2.64%
Finland	0.80%	1.19%	1.97%	1.60%	1.06%
France	10.81%	11.13%	10.38%	9.01%	7.49%
Germany	1.08%	1.21%	0.73%	1.84%	1.37%
India	---	---	---	0.03%	---
Italy	11.74%	9.27%	8.30%	7.44%	6.83%
Japan	8.53%	6.80%	9.30%	6.50%	8.47%
Korea	1.20%	1.66%	2.92%	3.31%	2.72%
Mexico	---	---	---	---	0.08%
Netherlands	7.60%	5.44%	4.40%	3.86%	6.48%
Nigeria	0.16%	---	---	---	---
Portugal	0.57%	---	0.10%	0.52%	0.39%
Romania	3.09%	2.93%	4.69%	4.15%	5.69%
South Africa	2.18%	2.44%	2.73%	2.99%	2.31%
Spain	4.04%	3.97%	3.13%	2.58%	2.23%
Sweden	2.28%	2.74%	3.90%	2.78%	2.81%
Turkey	5.17%	4.65%	4.50%	5.18%	4.24%
United Kingdom	4.76%	3.84%	3.41%	3.23%	2.94%
Total	100%	100%	100%	100%	100%

3.1.3 The Potential Impacts of Electric Utility Restructuring

As of December 1, 1999, 12 states enacted restructuring legislation, six states had comprehensive regulatory orders issued, and seven states had legislation/orders pending.[20] The status of these regulatory reforms is summarized in Table 3.4. This electric utility industry

[20] FL and SD have no significant ongoing activity. TX allows competitive wholesale wheeling, as authorized by SB 373, 1995. CA, MA, and NH have regulatory orders and legislation in place. See "Challenges of Electric Power

restructuring is predicted, in the long-run, to measurably impact the markets in which study region coal is bought and sold in a number of important ways. According to the *U.S. Department of Energy's Energy Information Administration*, electric utility deregulation will simultaneously place downward pressure on coal prices, favor the use of natural gas – even in base-load generation, reduce or eliminate long-term contracts for coal, and introduce greater levels of uncertainty for coal producers.[21]

For two reasons, the full implications of electric utility restructuring on study region coal production will not be apparent for several years. First, under most restructuring scenarios, states will retain residual regulatory powers. Moreover, any federal regulatory restructuring will take considerable time to reach fruition, so that competition and its effects on fuel markets will emerge gradually. Second, existing coal-fired plants – particularly those already adapted to meet more stringent air quality standards – are likely to remain in use until these assets can be efficiently retired. Any premature retirement of coal-fired facilities will leave the utilities "stranded" with the capital costs of those facilities. The ability of utilities to recover such costs is uncertain.[22]

Industry Restructuring for Fuel Suppliers," U.S. Department of Energy, Energy Information Administration, DOE/EIA-0623, September, 1998.

[21] *Ibid.*

[22] The treatment of "stranded costs" – capital costs that are unrecoverable due to the transition from regulation to competition – remains as a complex issue within the topic of electric utility restructuring. Certainly, while most states' restructuring plans provide some relief in this area, it is to the utility's advantage to minimize the value of such costs. Moreover, the costs of investments made during an era when restructuring is foreseeable may be *completely* vulnerable.

Table 3.4
Electricity Restructuring

Restructuring Legislation Enacted	Comprehensive Regulatory Order Issued	Legislation/ Orders Pending	Commission or Legislative Investigation Ongoing	
CA	AZ	AK	AL	NE
CN	MD	DE	AR	NM
IL	MI	KY	CO	NC
ME	NJ	MO	GA	ND
MT	NY	OH	HI	OR
NV	VT	SC	ID	TN
NH		WV	IN	TX
OK			IO	UT
PA			KS	WA
RI			LA	WI
VA			MN	WY
			MS	
			District of Columbia	

3.2 The Cost Structure of Study Region Coal Producers

Changing demands will not act in isolation to affect changes in study region coal production levels within the study region. Instead, it is the interaction of changing demands with cost-dependent supply conditions that will ultimately determine the region's economic outcomes. With the exception of pending additional restrictions on surface mining methods, the future structure of study region mining costs is largely devoid of any public policy influence. Instead, it is the mining interests who will decide how and where coal may be efficiently produced.

3.2.2 Capital, Labor, and Labor Productivity

The structure of coal mining has changed dramatically since the widespread introduction of the continuous miner in the 1950's. The once labor intensive production process has been replaced by the use of capital assets that resulted in a precipitous decline in mining employment. The southern West Virginia coal fields primarily employ long-wall and continuous miner technologies. The productivity gains resulting from these techniques are reflected in the significant increase in output per worker (see Table 2.3A).

Many have concluded that the decline in employment is strictly attributable to the growth in surface mining – mining that now accounts for roughly one-third of all West Virginia production. Indeed, State-wide underground mining employment fell from 45,000 in 1980 to 16,000 in 1996, while surface mining's share of State output increased from 21 percent to 33 percent. However, the conclusion that surface mining is at the root of employment declines largely ignores two critical facts.

First, without regard to surface operations, the productivity of underground miners increased dramatically over the 1980-1996 period. In 1980, 45,000 underground miners produced roughly 96 million tons of coal – about 2,100 tons per worker. In 1996 16,000 underground miners, only one-third of those employed in 1980, produced more than 112 million tons of coal, or approximately 7,000 tons per employee. Thus, it appears that improvements in underground mining productivity are more responsible for declines in mining employment than the continuing emergence of surface mining. Finally, it is worth observing that surface mining employment also declined. In 1980, there were 7,500 West Virginians employed in surface mining operations. By 1996, their number had fallen to 4,118, due to strong productivity growth.

In considering the future costs of regional producers, it is reasonable to examine any potential inter-firm variations that might make it possible for some sellers to respond more effectively than others to changing demand conditions. If such variations exist, they are more than likely the result of accidents of geography rather than any structural differences between firms. Indeed, the productivity-enhancing technologies noted above appear to spread rapidly across producers, so that it is unlikely that large scale inter-firm cost differences are attributable to equipment use. Similarly, there may be modest differences between the productivity of unionized and non-union mining operations, but these differences are also likely tied to geography-dictated mining methods rather than actual productivity differences[23]. In the end, variations in the costs incurred by mining firms are dictated primarily by the disaggregated spatial nature of the natural resource they extract. Simply put, in coal mining, geology plays a

[23] In 1997 firms east of the Mississippi River produced 3.89 short tons of coal per miner per hour compared to firms west of Mississippi River, who produced 16.04 short tons of coal per miner per hour. 1997 Productivity Data, Energy Information Administration.

critical role in determining the overall costs of production. Though new cost-reducing technologies will continue to emerge, firms have remarkably little control over their individual production costs.

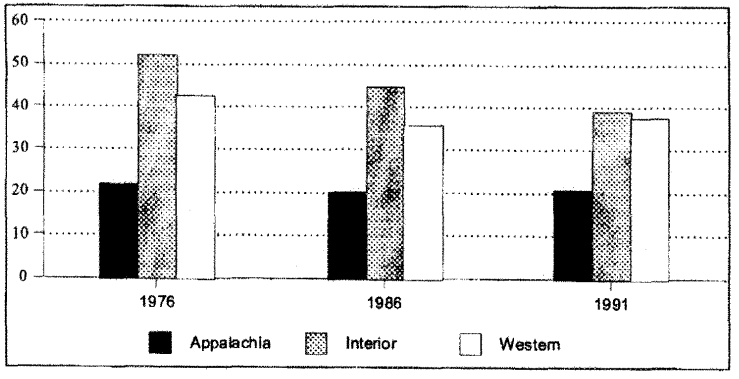
3.2.3 The Issues of Scale and Scope Economies

The conclusion that regional coal producers have only minimal control over production costs differs from the typical case in which firms may affect unit costs by pursuing different scales of production. However, the current analysis of the regional production process directly supports the contention that firms are not able to improve productive efficiency by increasing the scale of their operations. This issue is empirically modeled and further described in Appendix C. In many ways, this outcome relates to the distinction between "plant level" and "firm level" scale economies. In many instances, firms can reduce unit costs by making individual plants bigger. In the case of regional mining operations, however, the "plant" is the mine property which, absent regulatory constraint, is limited in size by the geography and geology of coal reserves. As a consequence, the only additional scale economies available to regional producers are the "firm" level savings that might come from averaging administrative and overhead costs over the output from a number of consolidated mining operations."[24]

Based on this discussion, the relevant question is whether or not there are significant potential cost savings attainable through the consolidation of regional coal producers. While the evidence is limited, the answer to this question would appear to be "No". Figure 3.1 depicts the four firm concentration ratio (the percentage of market output produced by the largest four producers) for Appalachian coal producers, other interior coal producers, and mining operations in the western US from 1970 forward. Certainly, Appalachian coal producers have had the incentive to reduce costs in any way possible, yet the level of concentration has remained constant. One implication of this relatively static concentration ratio is that attainable cost reductions through consolidation are minimal at best.

[24] This conclusion that available scale economies are firm level in nature appears to be largely shared by the Energy Information Administration (EIA). In its evaluation of the probable impacts of electric utility restructuring, the EIA suggests capturing scale economies through consolidations may be important. However, it also suggests that the source of available economies is limited to lowering per-unit overhead costs and by, "[increasing] producer's negotiating power to deal with larger generating and transportation counterparts." See "Challenges of Electric Power Industry Restructuring for Fuel Suppliers," Ch. 1, p. 6. U.S. Department of Energy, Energy Information Administration, DOE/EIA-0623, September, 1998.

Figure 3.1
Share of Regional Coal Production by Four Largest Producers in Region



The potential savings from the capture of firm level economies are illustrated in Figure 3.2. Within this figure, mine-level Average Total Costs are depicted by ATC_0. The ability to lower these average costs by expanding the mine size is, however, constrained by the geography and geology of the mining region. It is impossible to move downward along this curve beyond the quantity denoted as Q_{MX}. Any additional cost savings can only be achieved by lowering average overhead and administrative costs by averaging these expenditures across additional output from other mining facilities. Doing so would result in a new mine-specific Average Total Cost curve represented in the figure as ATC_1.

Figure 3.2

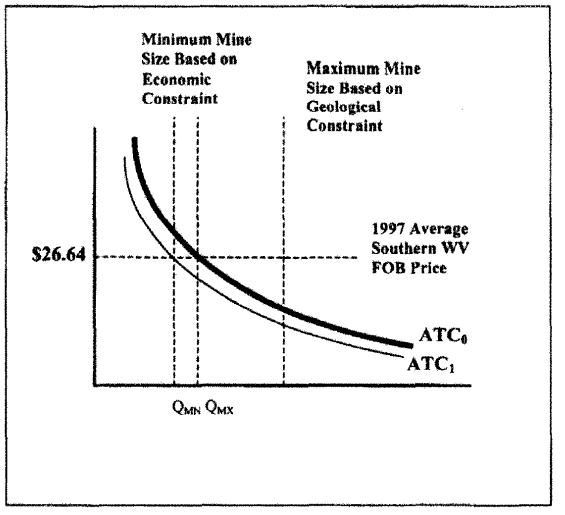


Figure 3.2 can also be used to illustrate the "scope" economies that exist between underground and surface operations. Economies of scope exist when a product can be made more cheaply when it is produced, in combination with one or more other products. For example, many have argued that electricity can be produced more cheaply when generating activities are combined with electricity distribution.[25] In the case of coal, underground and surface mining operations may exist independently of one another – even at separate locations, yet the delivered cost of each output can be made lower by the production of the other. This outcome is the result of scale economies in the blending and transportation of coal. Output quantities from both underground and surface mines are routinely combined in blending operations and the blended coal is routinely shipped as a single product. Both unit blending and transport costs are lowered

[25] Kaserman, David L.; Mayo, John W. "The Measurement of Vertical Economies and the Efficient Structure of the Electric Utility Industry." Journal of Industrial Economics; v39 n5 September 1991, pp. 483-502.

by additional quantities – quantities that are only made possible by combining the output from distinct surface and underground operation.[26] Within Figure 3.2, ATC_0 may be viewed as the Average Total Cost curve for an underground surface operation in the absence of a companion facility of the other sort. ATC_1, then, reflects the operation's Average Total Cost when the companion production facility is in operation. The implications of these scope economies are fully discussed in Appendix C. However, the results of the current analysis suggest that study region counties that have a relatively balanced mix of mining methods enjoy strong scope economies. The critical implication of this finding is that the loss of mines of either type may actually *increase* the costs of producing coal by the alternative method.

3.2.4 Additional Environmental Restrictions And Production Costs

The introduction to this chapter notes that most of the foreseeable changes that may affect regional coal production are demand-side in nature. The one major exception is the implementation of judicial decisions that may substantially reduce the size of certain surface mining operations. Figure 3.3 continues the same graphical construct in order to demonstrate the potential impacts of these additional restrictions on study region mining costs.

The judicial ruling in question – known as the "Haden decision" – is likely to have two impacts on the costs of *some* coal producers.[27] First, by limiting the locations in which valleys may be filled with the overburden from mountaintop mining, the Haden decision is likely to reduce the size of many surface operations or eliminate some entirely. The impact of this restriction on producer costs is depicted by a movement along ATC_0, in association with a reduction in quantity from Q_{MX} to Q_H.

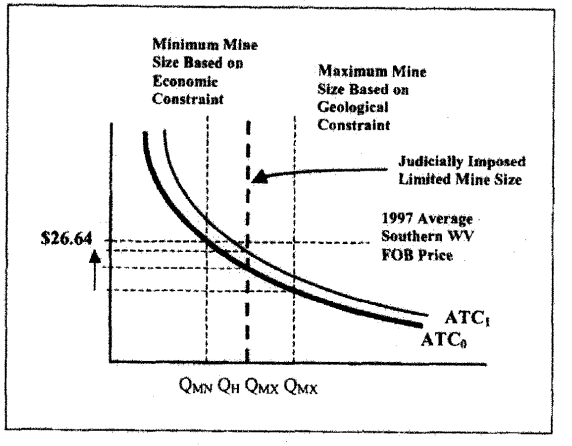
The second potential impact of the Haden decision on production costs owes to the additional uncertainty this decision introduces. Economic decisions regarding continued production hinge on the short-run and long-run profitability of this production. To the extent that

[26] Study region coal producers have acknowledged the relationship between quantity and average blending costs, but have been unwilling to quantify this relationship.. The relationship between shipment quantity and transportation rates is, however, well documented. See for Example, Mark L. Burton, "Railroad Deregulation, Carriet Behavior and Shipper Response: A Disaggregated Analysis," *Journal of Regulatory Economics*, Vol. 5, No. 4, December, 1993, pp. 417-34.

[27] Patricia Bragg, et al, Plaintiffs, vs. Colonel Dana Robertson, et al, Defendants. Civil Action 2:98-0636, U.S. District Court for Southern West Virginia, Charleston Division.

the Haden decision clouds assessments of this profitability, it may reduce investment, limiting future production capacity and causing future costs to rise. Within Figure 3.3, the additional uncertainty is reflected by a movement from ATC_0 to ATC_1.

Figure 3.3



3.3 Coal Pricing and Future Producer Profitability

The preceding two sections outline the ways in which ongoing changes are likely to affect the demand for and supply of study region coal. Chapter 4 quantifies these impacts in order to predict the overall economic impact on study region counties. Still, even in advance of these forecasts, it is possible to evaluate the qualitative effects of the foreseeable changes in West Virginia coal output quantities. Absent the Haden decision, the reduced demand for study region coal should result in a continued decline in mine-mouth prices and a measurable decline in output quantities. If the Haden decision is upheld, production costs at some mines will increase. These cost increases will further exacerbate the problems of regional producers by making it

unprofitable to mine coal that is only marginally profitable under current conditions. Ultimately some producers may not survive this process. Whether firms are publicly owned or held privately, the long-run response to sustained negative firm profits is the same – market exit.

There is already evidence that the uncertain future facing regional coal producers is affecting economic outcomes and the fiscal health of regional coal producers. After reaching an all-time high of over 180 million tons in 1997, West Virginia coal production has declined over the past two years. Industry estimates suggest that 1999 totals may be as low as 162 million tons, a reduction of roughly 10 percent. While a two year output decline certainly does not constitute evidence of a long-run trend, it is consistent with the expected impacts of changing demand conditions.

It is also likely that effects of changing demands have been slowed somewhat by the existence of long-term contracts between producers and utilities made popular by uncertain supplies and rising fuel prices during the 1970's. Now, however, most West Virginia coal is sold via short-term contracts, so that the market for the study region's output is, in many ways, similar to a spot market, with only a smaller subset sold through long-term, fixed-price contracts.[28] The recent decline in spot market or short-term coal prices has made long-term contracts less attractive to customers, so that long-term contract volumes continue to fall.[29] Anecdotal evidence, as well as discussions with industry representatives, suggests that the last of the long-term contracts will have expired by 2003. This transition to short-term market pricing has interjected additional uncertainty into the transaction process and amplified the competitive pressure facing regional producers.

[28] The long-run, fixed price contracts were popular with consumers during the 1970's and early 1980's, as nominal prices soared, concurrent with oil shortages.

[29] This is also the suggestion that long-term contracts are becoming less popular with electricity generators as they prepare for electric utility restructuring, "Challenges of Electric Power Industry Restructuring for Fuel Suppliers. Energy Information Administration".

Chapter 4 - Forecast Model & History

4.1 The Forecast Model & Simulations

Energy demand and the supply of fossil fuels are among the most heavily forecasted economic outcomes. These forecasts are typically of three types: consumer and industrial demand for electricity, geologic assessments of remaining reserves, and price forecasts of extracted fossil fuels. The forecasting efforts of the *Department of Energy's Energy Information Administration* provide detailed long-term assessments of the latter two, while a number of regional forecasting centers, as well as the *U.S. Geological Survey*, project the United States' extractable fossil fuel reserves. Similar international agencies and foreign governments also undertake these types of forecasts. These forecasts are critical to both individual firms, and state and federal planners in developing their own inventories and revenue assessments. An additional level of forecasting is available from academic sources, especially journals dedicated to energy research and forecasting method. However, these models often seek to illustrate a specific issue or methods and are therefore not typically of immediate value to a forecaster interested in a generalized prediction model from which simulations can be constructed.

Forecasting techniques involve the use of a purely statistical method (the time series approach), a structural model that evaluates causation, or a combination of these techniques. The model we have used here is the final type, a structural-time series model. We have selected this forecasting tool for a variety of reasons. The most important of these is the need to simulate policy changes and trends in other variables (e.g. electricity demand) on the quantity of coal produced in West Virginia. This purpose recommends a structural model that also captures historical information and relationships.

Use of a structural time series model for a short-run forecast and simulation is quite common. Indeed, it is the preferred method for this type of industry specific forecast.[30] However, this model differs from most existing coal models because it projects regional coal production from a supply and demand model. We were unable to identify any similar regional production forecast and simulation model within the economics literature. This study is unique in that

[30] For a more detailed explanation, see Appendix B. For a non-technical discussion of this technique, see Kennedy [1994]. For a technical treatment, see Granger [1989].

respect and offers an important tool for economic and fiscal planning in West Virginia. The model employed in this study incorporates the major supply and demand issues identified in Chapter 3 in order to evaluate the total effect of each on production of coal in the State. The data and variables selected for this estimation are derived primarily from data collected from the *Energy Information Administration* and the *U.S. Department of the Census*.[31] The full model is outlined in a technical form in Appendix B. This appendix describes the mathematical derivation of the model, the data, and the assumptions that were employed in its construction. In general, the model evaluates the quantity of southern West Virginia coal produced as a function of quality, end use demand, price, imports and exports of coal, the price of capital equipment, the price of labor, a technology trend and the county level industry structure (the number and share of surface and underground mines). See Table 4.1.

Table 4.1
Model Variables

Variable	Supply	Demand	Statistical Significance at the 5% level
Btu content	✓	✓	✓
Electricity Demand		✓	✓
Price per Btu unit	✓	✓	✓
Total Imports		✓	✓
Total Exports		✓	✓
Technology Variable	✓		✓
Interest Rate on Capital	✓		✓
Wages Paid to Miners	✓		✓
Underground Share	✓		✓ (for some counties)
Total Surface Mines	✓		✓ (for some counties)
Time Trend (autoregression)	✓	✓	✓ (for some counties)

As intended, this model proved to be especially effective in short run forecasting. In order to test this, we conducted an in-sample evaluation. This was accomplished by calibrating or estimating the model on data from 1980 through 1998, the latest data available at the time (March 2000). The 1999 levels of coal production were then forecast. Upon the release of the

[31]EIA data from *Monthly Energy Update*, various issues, Census Data from the *Regional Economic Information System*, 1997.

official 1999 coal production figures by the *Office of Miner Heath, Safety and Training* in April 2000, the forecast and actual values were compared.[32] The model performed well, under-predicting the 1999 regional totals by only 1.06 percent. This suggests that the model is useful in forecasting short-run regional coal production. Due to the limited data length and the general study motivation, we have not attempted to perform long-run forecast evaluations [33]

The satisfactory performance of this model permits the construction of a baseline forecast and two simulations. The baseline forecast illustrates the expected change in output without considering currently pending regulatory changes (primarily the Haden Decision). The two simulations involve evaluating the impacts of a phase-in of the surface mining restrictions contained within the Haden Decision and the simulation of an immediate curtailment of valley fill (effectively ending surface mining). In this context, the baseline forecast should be viewed as the production ceiling, while the restrictive Haden Decision simulation represents the production floor. There were an unlimited choice of potential simulation scenarios available. These were selected to simply provide a reasonable upper and lower bound on production levels to assist in local planning. The actual impact of the Haden Decision, especially in the technical restrictions on valley fill, are well outside the scope of this study. The predictions of each of these three scenarios are employed in a local impact analysis in each of the counties. The impact on the region, and the results of each forecast and simulation, will be outlined in Chapter 5.

4.2 The Baseline Forecast

The baseline forecast involved a shift in the real Btu quality price of West Virginia coal consistent with the previous three year history, and a change in regional exports consistent with the previous three years. All other variables remained unchanged, making the baseline forecast the expected output levels absent regulatory changes or market fluctuations that are not part of recent history. Changes in the *economies of scope* of production from our production function (Appendix C), were added to this forecast model. This resulted in minimal adjustments to the

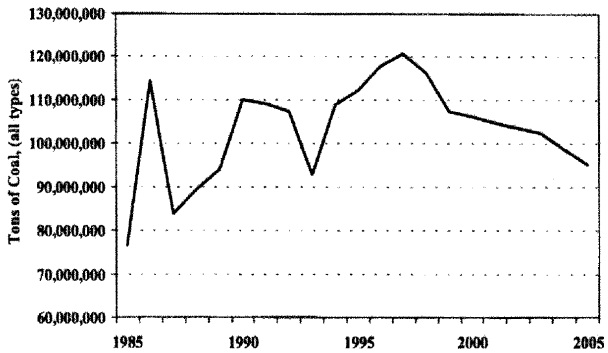
[32]The OMHST data is available on their world wide web site, www.msha.gov. These data were obtained directly from the OMHST, as extracted from their CADE19xx.exe data files. A reliable secondary source is the *West Virginia Coal Association*.

[33]There appears to have been a structural break (a cointegration break) in the early 1980's production trend that presents serious theoretical challenges to forecasting models that incorporate observations prior to that period.

baseline forecast, since the mild change in the total output did not affect the counties' production economies of scope.

The baseline coal forecast for 2000 predicts a regional output decline of just over 7.1 percent, or just under 7.3 million short tons of coal. The direct dollar value of this decline, in coal only, is roughly $170 million. This baseline estimate is very consistent with the 1999 annual production decline of roughly 7.9 percent[34]. See Figure 4.2. The implication of these results is that, even ignoring potential additional restrictions on surface mining, the market forces described in Chapter 3 continue to erode regional coal production.

Figure 4.2
Total Regional Coal Production (Baseline Forecast)

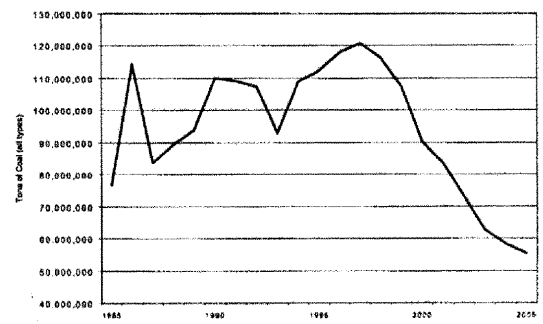


4.3 Phase In of The Haden Decision

An interpretation of the Haden Decision that restricts permitting of *new* valley fill generated our first alternative simulation. Under this scenario, mines that are currently operating, and have engaged in valley fill under permits may continue to produce. However, new mine permits that include valley fill allowances will not be issued. In practice, this virtually precludes further surface mining. There is no indication that, given the current economic climate, surface mining, on a significant scale, can continue without valley fill.

As a result, when currently permitted seams are mined to exhaustion and cease operations, surface mining will migrate from the region. This migration should occur at roughly the rate at which firms mine coal seams to the point where they cannot recover their production costs. This would be approximately the average life of a seam of coal under production. This study has not identified existing research establishing the average seam life in southern West Virginia. In order to provide a conservative estimate of this impact, we selected an average seam life of seven years, and assumed that all currently producing seams were newly permitted.[35] We then phased-in the impact of valley fill restrictions over a seven year period. This simulation should closely mirror the impact of mine closings resulting from the currently pending litigation already observed (e.g. the Daltex Mine). This scenario also includes the impact of the *economies of scope* issues on underground mining, whereby decreased surface mining imposes a higher cost on underground mining through its related production technologies (primarily in transport and processing), and hence will impact the level of production. The simulation results generated from the model project an output decline of roughly 16 million tons, with a value of $386 million, see Figure 4.3.

Figure 4.3
Total Regional Coal Production (Haden Decision Phase-In)



[34] Indeed, our county level baseline forecasts were very consistent with the *Beckley-Bluefield Region Outlook: 1999 – 2004* released in May, 2000 by WVU's Bureau of Business and Economic Research. In particular, the high growth in Raleigh, and sluggish growth in McDowell they predict coincided closely with this study's results.

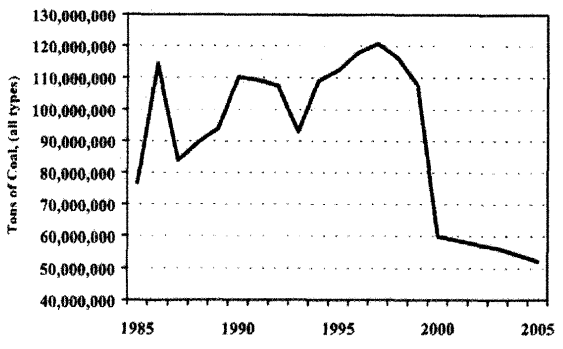
[35] The selection of seven years was made following several unscientific discussions regarding the average life of a seam of coal. We feel the seven year period overestimates the lifespan of a coal seam, especially since we assumed all were originally permitted in 2000.

4.4 The Restrictive Haden Decision – A More Severe Case

The application of the Haden Decision's interpretation of the *Clean Water Act* is currently under appeal and will likely continue in litigation and/or arbitration for some time to come. The final resolution of mining and permitting practices is unforeseeable. However, to provide a lower bound to production, an extremely restrictive interpretation of the Haden Decision was employed in which all surface mining is forced to immediately cease. Remarkably, this is not the most potentially restrictive interpretation of this decision that could have been used. Here, we only simulate declines in surface mining production. It must be noted, however, that underground mines (and a variety of other types of construction in the region) also deposit spoil into valleys. Therefore, this scenario, though providing the lower bound to regional coal production in this study, is not as restrictive as it might have been.

Forecast estimates based on the restrictive Haden scenario suggest that an immediate cessation of surface mining would result in production declines of 47.5 million tons, with a first-year value of $1.093 billion. See Figure 4.4. This decline reflects not only lost surface production, but also some modest amount of lost underground production due to an inability to capture available economies of scope.

Figure 4.4
Total Regional Coal Production (Restrictive Haden Decision)



4.5 Short Run Price Effects of Reduced Study Region Production

The study region currently supplies roughly 10 percent of the nation's steam coal. If the Haden Decision is upheld, we estimate that as much as 50 percent of that production could be lost in a relatively short time period.[36] Mining industry advocates have suggested that this sudden reduction in coal supplies could lead to significantly higher fuel and electricity prices. Under such a scenario, currently unprofitable underground and (surviving) surface operations could become financially viable for a short period of time, so that study estimates of reduced regional output would be, to some degree, overstated. We do not, however, find this argument compelling and have not treated it with the current analysis. We have exercised this judgement for a number of reasons.

First, the movement from long-term contract to spot markets for coal means that utilities are already accustomed to searching for low-priced coal. Indeed, by the time the Haden Decision is implemented, we strongly suspect that most users of West Virginia coal will have developed contingencies that allow them to move easily to a reasonably competitive alternative market source.[37] This supposition is further strengthened by the fact that air quality standards are already forcing some utilities to begin the shift away from West Virginia coal. Secondly, to the extent that lost *economies of scope* affect underground mining costs, currently marginal underground operations may become far less feasible, even at mine-mouth prices that are made somewhat higher by lost surface production. Finally, given the intensity of competition in fuel and electricity markets, as well as the vast array of alternative fuel sources, it is likely that any variation in coal prices attributable to lost surface production in West Virginia will be very transitory in nature, so that the economic impacts detailed in Chapter 5 might be momentarily delayed, but in no way forestalled.

[36] In 1999, the study region produced roughly 120,000,000 tons of the 942,000,000 tons demanded for the generation of electricity. The end use statistics are not disaggregated sufficiently to note final destination of the study region coal. Nationwide, roughly 90 percent of domestic coal is used for power generation. Though the study area production of coking coal is higher proportionately than the national average, the difference does not substantially effect this estimate. Data obtained from EIA, *Freme and Hong, U.S. Coal Supply and Demand: 1999 Review*. Proportions calculated by CBER.

[37] There is evidence that the railroad industry is already contemplating how the Haden Decision will affect the demand for coal transport (see *Traffic World*, November 15, 1999, pg. 19).

4.6 Summary

This chapter presents the non-technical outline of our forecasting and simulation model. The technical model and estimation techniques are provided in Appendix B. The technical exposition of the production function model appears in Appendix C. The baseline forecast and simulations used to drive the economic impact analysis that follows also appear in this chapter . The strong forecast model performance suggests it is an appropriate tool for developing short run predictions, yielding results that provide a solid basis for regional impact analyses.

The inclusion of *economies of scope* within the analysis and the role these economies play in producing accurate forecast results is particularly important. To some, these outcomes may seem counter-intuitive. However, the estimation results clearly demonstrate that any supposition that underground mining will fill the void of curtailed surface mining is incorrect. Quite to the contrary, the empirical analysis suggests that reduced surface volumes will increase the cost of coal mined underground within most study region counties. .

Chapter 5 - Total Regional Impact

5.1 The Impact Analysis

The impact of the baseline forecast, the Haden Decision phase-in, and restrictive Haden Decision simulation were performed using the econometric models outlined in Chapter 4, and Appendixes B and C. The reduction in coal production under each scenario was used to generate estimates of industry income declines and these foregone incomes were, in turn, used to predict study region economic impacts. The local impact analysis performed using the IMPLAN simulation software, produced by MIG, Inc. This commercial software employs *Regional Impact Multipliers II* (RIMS II), collected by the *U.S. Bureau of Labor Statistics*. These multipliers quantify the regional flow of goods and services associated with each of the industries and all households in the region. For example, the RIMS II multipliers capture the local goods and services such as engineering services, transport, and fuel used by the coal producers. Similarly, the multipliers capture the coal industry employees' consumer goods purchases. Thus, the displacement of production and the incumbent loss of employee income is included within all calculations, and its impact on the regional economy is tallied by the IMPLAN software. This is the most commonly used and widely accepted method of analyzing local economic impacts. In this study, we present our estimate of the baseline forecast and the two study area simulations. Appendix A outlines the individual county-level impacts. Given that inter-county variations in impacts are sizable, the reader is encouraged to carefully consider these findings.

5.2 The Baseline Forecast

As outlined in Chapter 4, the total regional output decline in the baseline forecast for 2000 resulted in a regional output decline of just over 7.1 percent, or just under 7.3 million short tons of coal. The direct dollar value of this decline, in coal only, will be roughly $170 million in 2000. This baseline estimate is very consistent with the 1999 annual production decline of roughly 7.9 percent. The economic impact of this baseline forecast for year 2000, representing a roughly seven percent *reduction* in output, is illustrated in Table 5.2.

The analysis does not account for the full range of fiscal impacts that might be expected under this scenario. As noted, the loss of commercial activity is likely to spawn changes in both

the demand for public services and the tax revenues collected. The (uncertain) rate of demand and revenue changes will affect the fiscal balance of the State and its individual counties. The loss of public employees resulting from a lower demand for school, public safety and administrative services will, in some part, balance the loss of tax revenues. The speed at which this occurs complicates a one year analysis, but does not forestall the final impact. We do anticipate a loss of commercial activity reducing public sector employment by 341 jobs. The direct loss of Severance Taxes to the State is estimated at roughly $8,367,000 under this scenario. Of this amount, we estimate that $6.28 million is the direct county share.

Table 5.2
Baseline Impact

Industry	Employment	Wages	Output
Agriculture	7	$68,180	$124,930
Mining	810	39,902,000	214,544,000
Construction	51	1,766,000	3,821,000
Manufacturing	16	443,700	1,827,000
TCPU	69	2,686,000	9,401,000
Trade	369	6,225,000	14,233,000
FIRE	52	981,400	8,307,000
Services	262	5,951,000	12,066,000
Other	10	78,620	78,630
Total	-1,646	-$58,101,900	-$264,402,560

***Note: columns may not sum due to independent rounding.* TCPU is Transportation, Communications and Public Utilities. FIRE is Finance, Insurance and Real Estate.**

5.3 The Haden Decision Phase-In

The first alternative simulation estimates the effect of new seam permit stoppage. Based on the methodology outlined in Chapter 4, we estimate this prohibition would result in output reductions of roughly 14 percent annually. The simulation results this model generates project an output decline of roughly 16 million tons, with a first-year value of $386 million. The economic impact of this phased-in simulation for year 2000 is depicted in Table 5.3. The projections only account for first year reductions in coal output. Given no abatement in the production effects of restricted permits, this scenario predicts continuing declines in coal outputs and escalating economic impacts in each subsequent year.

Table 5.3
Haden Decision Phase-In Impact

Industry	Employment	Wages	Output
Agriculture	16	$155,000	$294,000
Mining	1,564	78,907,000	493,459,000
Construction	129	4,431,000	10,274,000
Manufacturing	41	1,456,000	7,115,000
TCPU	167	7,019,000	24,091,000
Trade	812	13,830,000	31,915,000
FIRE	140	2,964,000	21,863,000
Services	676	16,240,000	31,146,000
Other	30	226,000	226,000
Total	-3,575	-$125,228,000	-$620,383,000

***Note: columns may not sum due to independent rounding.* TCPU is Transportation, Communications and Public Utilities. FIRE is Finance, Insurance and Real Estate.**

Under this scenario, we forecast the first-year loss of an additional 922 public sector jobs and a decline in State Severance Tax revenues of roughly $19.24 million, of which $14.43 million is the direct county share.

5.4 The Restrictive Haden Decision

The third simulation generated within this analysis is based on a scenario where all surface mining is immediately eliminated by Judge Haden's interpretation of the *Clean Water Act*. In this scenario, the loss of surface mining is compounded by a decline in underground mining in selected counties. Here, we estimate the restrictive Haden Decision will result in a coal production decline of 47.5 million tons, with a value of $1.093 billion. The economic impact of this phase-in simulation for year 2000 is outlined in Table 5.4. These figures reflect a dramatic, rapid loss in employment, wages, and output across the region.

Table 5.4
Restrictive Haden Decision Impact

Industry	Employment	Wages	Output
Agriculture	43	$182,021	$781,000
Mining	5,091	202,482,163	1,407,626,000
Construction	376	7,152,149	28,283,000
Manufacturing	115	1,606,054	19,796,000
TCPU	467	13,105,143	68,155,000
Trade	2,174	25,707,644	85,320,000
FIRE	388	4,257,164	60,982,000
Services	1,889	26,059,724	86,911,702
Other	89	429,026	7,539,000
Total	-10,632	-$280,981,088	-$1,765,393,702

Note: columns may not sum due to independent rounding. **TCPU is Transportation, Communications and Public Utilities. FIRE is Finance, Insurance and Real Estate.**

The third scenario offers the most dramatic commercial impact. Here, we anticipate the loss of an additional 2,612 public sector employees. Likewise, the expected State Severance Tax collections are forecasted to decline by roughly $54.89 million, of which $41.17 million comprise the counties' direct share.

Chapter 6 - Concluding Remarks

The preceding analysis yields a number of very important conclusions for West Virginia policy-makers. First, even if the Haden decision is not upheld, the near-term economic future of the State's southern coal producing region is unsure. Changes in both domestic and international markets for fuel owing to electric utility restructuring, stricter clean air standards, and increased international competition will almost certainly continue to place downward pressures on the price of West Virginia coal. These pressures are likely to result in lower output quantities and may ultimately lead some producers to exit the region. If the baseline forecast presented in Chapter 4 is correct, planners may encounter a 7 percent reduction in coal-related employment within the study region over the coming year. This reduction will, in turn, lead to a $58 million reduction in regional incomes and a $264 million reduction in overall regional economic activity. Outcomes in subsequent years are similar.

If the Haden decision is upheld, regional production will be further reduced. The actual magnitude and intertemporal course of these reductions is very difficult to predict. The foregoing analysis considers two scenarios that are both within the realm of reason. In the first of these scenarios, surface mining is gradually reduced, as currently permitted mines are retired and no new surface permits are granted. Even under this restricted scenario, the economic effects on the counties that comprise the study region are likely to be devastating. Total regional employment is predicted to decline by 4.3 percent, while overall regional economic activity is predicted to decline by $620 million within the first year. The economic impacts observed under the extreme scenario, in which the Haden decision leads to the immediate curtailment of surface mining, are even more extreme. A sudden cessation in surface mining is predicted to cost the study region more than 10,500 jobs, $281 million in incomes, and $1.8 billion in total economic activity.

Clearly, even the economic disruptions predicted under the baseline scenario are likely to demand policy responses on the part of both the State and local governments. In the very near term, reduced production, combined with falling prices, will diminish State Severance Tax collections. Indeed, current estimates suggest that severance tax collections are already falling at

a rate that may approach 13 percent for the current fiscal year.[38] Likewise, the predicted reduction in coal production will likely lead to a reduction in a number of other State funding sources including, but not limited to, corporate net income tax collections, business franchise tax collections, personal income tax collections, and revenues from the collection of State sales taxes. To the extent that additional restrictions on surface mining methods further reduce regional coal production, the near-term strains on State revenue sources will be even more pronounced. Moreover, if the short-run trends predicted under the three scenarios considered here continue over even a few years, property values within the study region are likely to be negatively affected, so that local governments' ability to generate funds through property taxes will also be constrained.

Just as State policy-makers are likely to face declines in coal-related revenues, the short-run demand for State services is likely to increase. Almost certainly, a sustained decline in coal production will lead to the out-migration of study region residents, but this exodus is likely to occur with a lag as regional residents attempt to weather declining economic conditions before exiting the region. Thus, State and local governments may expect increased claims for unemployment benefits, Medicaid benefits, and other forms of public assistance. The magnitude of the short-run increase in the demand for governmental services will directly reflect the degree to which coal-related economic activity is reduced. Even if reduced coal production does ultimately reduce the demand for government-provided services by reducing local populations, reacting to these reduced demands may present a number of challenges to policy-makers. Absent the current population base, it may be necessary to further consolidate the provision of educational, social, law enforcement, and medical services. Such consolidations are rarely accomplished with ease.

The reader is urged to recall the short-run nature of the current analysis. The very near-term vantage adopted here largely obscures two points that are routine issues within more comprehensive discussions of the link between coal production and the economic viability of the study region. First, many may argue that the rather dire economic predictions proffered here fail to consider the potential replacement of coal-related economic activity with alternative

[38] Because the State's severance tax is levied against gross receipts, the effect of reduced production on collected revenues is compounded by the impact of falling regional coal prices. The 13 percent figure is based on information obtained through the West Virginia Department of Tax and Revenue.

commerce. This is, in fact, true. Countless State and regional employees and policy-makers quietly and tirelessly endeavor to bring new non-coal economic activity to the study region and, at least in some study region counties, these efforts are yielding some successes. The growth of tourism in Fayette and Raleigh Counties described in Chapter 2, is a poignant example. Still, the task of bringing a vibrant, broad-based economy to a region that faces so many challenges cannot be accomplished with great speed. Thus, while current development efforts may eventually yield tangible and laudable results, it is our judgement that these efforts will provide little shelter for the region's current residents.

The second argument that is routinely encountered during discussions of the coal industry suggests that the more stringent regulation of surface mining activities will only hasten what is likely to be the same long-run outcome. It is argued that the increased competition in fuel markets documented here, when combined with the steady reduction in economically mineable reserves, points to a "West Virginia without coal" under any circumstance. We have neither the desire, nor the ability, to refute such claims. There are, however, two associated points that deserve equal treatment.

First, dramatic swings in the prosperity of coal producers and coal producing communities are more the exception than the rule. One need only contrast the almost manic coal production of the 1970's with the industries slump during the 1980's to understand this point. Thus, to pin predictions of significant long-run reductions in coal production on currently observable economic circumstances is, at best, perilous. Easily conceivable events, such as prolonged disruptions in international petroleum or coal production or the development of more efficient coal gassification processes, could, once again, renew the importance of West Virginia's coal reserves within domestic and international fuel markets.

Perhaps more importantly, even if all roads do lead to permanent and diminished role of coal production within the West Virginia economy, some roads are likely to be much bumpier than others. Given that our principal concern is the short-run economic consequences of various policies on the coal producing counties in the study region, we must conclude that a more gradual transition away from a coal-centered economy would be far less disruptive than a rapidly accelerated cessation in production.

In conclusion, the evidence developed within the current study implies that the coal producing region of West Virginia is likely to face significant challenges over the coming few years – challenges that will severely tax the energy and tenacity of the region's inhabitants, as well as the wisdom and resourcefulness of its leaders. However, there is nothing within these results that indicates helplessness. To the contrary, the variations in the predicted outcomes across populations, commercial sectors, and policy alternatives suggests that there are good choices to be made and bad choices to be avoided. This realization, in turn, obligates each of us to continue to investigate, discuss, and search for the most productive policy course.

Joint Statement Of

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And

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June 6, 2002

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1. Introduction

In 1999, Charles Haden, Federal District Judge for southern West Virginia entered a decision that would have substantially limited the placement of valley fills in connection with surface coal mining within the State.[1] At that time, surface operations accounted for roughly 30 percent of West Virginia's total coal production. Consequently, economic concerns prompted numerous policy discussions in a variety of venues, including the State's legislature.

In March of 2000, West Virginia State Senator Oshel Craigo requested that Marshall University's Center for Business and Economic Research (CBER) undertake an investigation designed to identify the probable economic impacts of Judge Haden's decision on West Virginia's southern coal producing counties. The resulting analysis, titled *Coal Production Forecasts and Economic Simulations in Southern West Virginia: A Special Report to the West Virginia Finance Committee*, was released in June of 2000 and is included here as attachment A. This study found that, depending on the form of judicial implementation, the Haden decision could reduce economic activity within the nine-county study region by as much as eight percent in the immediate future.

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*** The positions and opinions expressed in this statement are strictly those of its authors and do not necessarily reflect the positions or opinions of the Lewis College of Business, Marshall University, or the State of West Virginia.

[1] We are not attorneys and, therefore, are completely unqualified to comment on the legal appropriateness of Judge Haden's decision..

The June 2000 CBER report sparked immediate concerns regarding potential fiscal outcomes related to reduced coal production. Consequently, the West Virginia Legislature commissioned a second CBER study designed to estimate more comprehensive State-wide economic impacts of reduced surface mining, as well as associated fiscal outcomes. This second report titled, *The Fiscal Implications of Judicially Imposed Surface Mining Restrictions in West Virginia*, was released in February of 2001 (Included here as Attachment B). The study found that annual State tax revenues would decline by as much as $168 million under a scenario in which Judge Haden's decision was phased in over a seven year period. County tax collections would have fallen by $83 million annually under the same scenario.[2]

While Judge Haden's original decision was overturned by the US Fourth Circuit, his subsequent rulings in other litigation have, again, threatened to restrict the use of valley fills in connection with surface coal mining. Consequently, policy-makers are likely to revisit questions surrounding the economic and fiscal effects of potential reductions in West Virginia coal production. Within this context, the purpose of our current statement is threefold. First, we wish to review our earlier analyses, highlighting salient points regarding both methodology and outcomes. Second, we hope to summarize both the nature and magnitude of economic and demographic changes that may distinguish the current setting from the period in which the earlier analyses were conducted. Finally, to the extent possible we will attempt to assess the degree to which the earlier results remain valid.

2. *Summary of Earlier Methods and Findings*

The Analytical process was comprised of four distinct steps. The first step involved creating baseline coal production forecasts and translating Judge Haden's ruling into probable coal production impacts.[3] We accomplished the latter task through repeated and prolonged consultation with officials from West Virginia's Department of Environmental Protection (DEP), mining engineers from Marshall University's College of College of Information Technology and Engineering, and officials from the US Office of Surface mining (OSM). Ultimately, we elected to pursue a scenario in which DEP would issue no new permits for surface mine sites, but under which existing surface mines could continue to operate so long as valid permits remain in force.[4]

The second analytical step involved empirically relating surface mining to underground operations. In doing so we established that surface and underground mining exhibit what economists refer to as *economies of scope*. That is to say, underground operating costs are made

[2] Importantly, coal related State and County revenues also fell under the baseline scenario. This reflects moderate (13%) declines in State-wide coal production even in the absence of Judge Haden's decision.

[3] CBER estimated county-specific baseline forecasts. In the aggregate, however, our State-level production forecasts were nearly identical to those produced by Regional Economic Models, Inc. (REMI).

[4] This treatment suggests that the prohibition on valley fills in perennial and intermittent stream beds would ultimately eliminate opportunities for surface mining. Detractors argued that this approach was too extreme. However, evidence suggests that any remaining surface production would be minimal.

lower by the presence of surface mining. Thus, the elimination of surface operations would make a small percentage of the State's underground operations unprofitable.

Next, we translated policy-related reductions in coal production into county-specific economic impacts through the use of regional simulation software.[5] Finally, estimated fiscal impacts were derived from the projected economic impacts based on methods developed in earlier CBER studies.[6]

Estimated State-wide economic and fiscal impacts of a phased-in elimination of surface mining in West Virginia at year five are summarized in Table 1. County-specific impacts are provided in the original study documents. Forecast reductions in coal production under the

Table 1
Summary of Earlier Findings

Impact Area	*Annual Policy-Induced Differential*	*Percentage of State Total*[7]
Change in Coal Production (tons)	-41,100,000	24.29%
Chang in Employment (All Sectors)	-15,579	2.86%
Change in Labor Income (All Sectors)	-$689,100,000	5.40%
Change in Output (All Sectors)	-$2,460,000,000	4.10%
Coal Severance Tax Revenues	-59,921,000	30.63%
Property Tax Revenues (All Sources)	-59,107,000	n/a
Sales and Use Tax Revenues	-19,985,000	2.34%
Personal Income Tax Revenues	-20,191,000	2.53%
Corporate Net Income Tax Revenues	-5,513,000	3.43%
Business Franchise Tax	-3,651,000	4.03%
Total - All State Taxes	**-168,368,000**	n/a
School Funding Impacts	-21,800,000	n/a
Other County-Level Impacts	-60,800,000	n/a
Total County-Level Revenue Impacts	**-82,600,000**	n/a

[5] County-level impacts were generated through the use of IMPLAN, a software product produced by MIG, Inc., Stillwater, Minnesota.

[6] See *The Projected Economic Impacts of the Governor's Fair Tax Plan: Revised Preliminary Estimates*, West Virginia Department of Tax and Revenue / Center for Business and Economic Research, January, 1999.

[7] Coal production, employment and income totals are based on year 2000 values. Tax revenue percentages are based on 1997 tax collections.

baseline conditions suggest that increased domestic and international competition, in conjunction with increasingly strict air quality standards will continue to erode West Virginia's share in many fuel markets. However, increased restrictions on surface mining methods could bring about considerable economic and fiscal hardship for the State. The $2.5 billion projected decline in output represents a roughly four percent reduction in State-wide economic activity.

While the potential State-wide economic impacts are significant, the possible disruptions in coal-dependent counties are far more severe. For example, the 1,061 projected reduction in jobs associated with reduced mining activity in Boone County, represents 12.5 percent of that county's civilian labor force. County-specific fiscal impacts may also be extreme. Many poorer coal producing counties rely heavily on Severance Tax revenues as a source of operating funds.[8] As Table 1 indicates, reductions in property tax revenues would also make it more difficult for all West Virginia counties to fund public school operations.[9] To the extent that county governments might find it difficult to provide even the most basic public services, they would almost certainly expect State assistance regardless of whether or not the necessary State funds are available.

3. *Misconceptions Regarding the Production of and Markets for Coal*

One common hypothesis in the face of potential reductions in surface coal production is that mining firms will replace lost tonnage with additional coal mined underground. We find this outcome extraordinarily unlikely. First, if additional quantities of underground coal could be mined profitably given current market conditions, mining companies would be doing so. Thus, if mining companies are to replace lost surface quantities with underground coal, one of two things must occur. Either the cost of mining underground coal must go down as surface mining disappears or the mine-mouth price of underground coal must increase as surface coal production is eliminated.

That underground production costs would decline as surface operations are eliminated is virtually impossible. As the June 2000 CBER report describes (p. 21), the evidence is that *economies of scope* exist between underground and surface operations. Thus, eliminating surface operations would cause underground production costs to go up not down.

The second scenario in which underground production increases as surface production declines is one in which the mine-mouth price of underground coal is greater than what is currently observed. Again, this is highly unlikely. The long-run trend in real coal prices is unmistakably downward. Moreover West Virginia's annual surface production of roughly 36 million tons is less than four percent of the total US production, so that it is unlikely that the

[8] As Table 1 indicates, the State's Severance Tax is a State tax. However, 75 percent of Severance Tax revenues are eventually returned to the county in which they were generated.

[9] While property taxes are levied at the county level, they are redistributed by the State based on an enrollment-based funding formula. Thus, if property tax collections diminish in coal producing counties, it will affect the financial viability of the education system in every West Virginia county.

withdrawal of that coal from the supply-side of US-served markets will lead to any abatement in the long-run price trend.[10]

4. *Coal and the West Virginia Economy since 1999*

The two CBER studies summarized in Section 2 were based on economic and coal industry data through 1999. One of the primary tasks we presently face is the identification of any structural changes that may call into doubt the current validity of results based on less than current data.

Nationally, there have been a number of important occurrences between 1999 and the present. A decade-long economic expansion gave way to a modest recession. Petroleum and national gas prices spiked during the first half of 2001, and painful experiences in California slowed the national trend toward electric utility restructuring.[11]

Taking each of these occurrences in turn, the national economic slowdown has had a relatively benign impact on the West Virginia. During the rapid expansion of the 1990's, West Virginia saw only very modest economic growth. However, as the national economy has cooled, employment, incomes, and output in West Virginia have continued to grow at very moderate rates. This pattern has been reflected in similarly tepid, but positive growth rates for State tax revenues which are expected to increase again during the current fiscal year by three to four percent. The rapid increase in petroleum and natural gas prices during 2001 had a predictable effect on the mine-mouth price of coal sold in spot markets. For a brief period, spot market coal prices were nearly double the $23 per ton value that had been relatively constant over the past few years. However, just as spot market coal prices tracked upward moving petroleum prices, coal prices have followed other fuel prices downward as they approach sustainable long-run levels.[12] Finally, events in California have noticeably slowed the national trend toward electric utility restructuring. This trend was largely viewed as favoring natural gas as a generating fuel source.[13] Thus, the demand for coal has been steadier than might have, otherwise, been

[10] It is also unlikely that even short-run price increase would lead to increased underground production. In 2001, when spot market prices nearly doubled, underground production increased by only one percent. Coal producers simply will not undertake the investment necessary to respond to transient price increases in any sort of meaningful way.

[11] In addition to the occurrences noted in the main body of the text, we also considered whether or not mining in West Virginia had been effected by the US decision not to sign the Kyoto Protocol, litigation by eastern states aimed at lowering midwestern emissions, and the scheduled increase in NOX standards scheduled under the 1990 amendments to the Clean Air Act. We could, however, identify no immediate impacts.

[12] Part of the strength in State revenue collects is attributable to the swell in Severance Tax collects resulting from higher coal prices. This burst in revenues as crested and the stream Severance Tax payments is returning to more typical levels.

[13] See *Challenges of Electric Power Industry Restructuring for Fuel Suppliers*, US Department of Energy, Energy Information Administration, Washington, DC, September, 1998.

predicted. Nonetheless, in West Virginia, both of the two new generating projects currently in the planning stages are gas fired.

Coal production and employment values are provided in Table 2. The period between 1999 and the present generally consistent with already observed trends in which overall production is relatively stable in the range of 175 million tons a year, surface mining's share of total output is increasing, and mining industry employment is on the decline. Additionally, in all but one year the absolute magnitude of underground coal mined in West Virginia has declined.

Table 2
Coal Production and Employment

Year	*Mining Employment*	*Surface Share of Total Production*	*Total Production (Tons)*
1996	20,038	31.57%	174,008,217
1997	17,806	31.18%	181,914,000
1998	18,201	30.31%	180,794,012
1999	14,854	32.57%	169,206,834
2000	14,254	35.41%	169,370,602
2001	15,729	36.82%	175,052,857

Generally, in the southern West Virginia counties where most of the State's coal is mined, economic conditions were abysmal in 1999 and they are more so today.[14] Table 3 compares incomes in the nine southern coal field counties to State and national averages. This is only one measure of the extreme economic distress evident within these counties. As economic theory would suggest the paucity of economic opportunities in this region has induced a reluctant out-migration of many of the region's inhabitants. Newly released 2000 census figures indicate that, overall, the region's population declined by 6.5% between 1990 and 2000. In the last two years, the economic conditions within the region have been made worse by extensive flooding that destroyed many rural communities in both June of 2001 and April of 2002.

In summary, coal production within West Virginia between 1999 and the present has been bolstered to some small extent by the spike in petroleum and natural gas prices and by a slowing in the trend toward electric utility restructuring. These two factors contributed to the observed largely constant levels of production (as opposed the very modest predicted decline). Coal producers continue to improve productivity and the surface share of total coal production continues to increase. The West Virginia economy, while not sharing in the boom of the 1990's,

[14] In truth, the southern coal field region is not as homogeneous as it appears. In particular, the eastern counties of Raleigh, Fayette, and Nicholas exhibit less economic distress largely due to the growing presence of tourism activities. Also, as noted, Kanawha County is home to Charleston, the State capitol. Conversely, Boone, Logan, McDowell, Mingo, and Wyoming couties are in desperate economic condition.

Table 3
Incomes in Southern Coal Producing Counties

County	*Annual Household Income*	*Deviation from State Average*	*Deviation from National Average*
Boone*	26,808	-624	-10,197
Fayettel	23,528	-3,904	-13,477
Kanawha	32,456	5,024	-4,549
Logan*	24,600	-2,832	-12,405
McDowell*	18,582	-8,850	-18,423
Mingo*	24,642	-2,790	-12,363
Nicholas*	25,872	-1,560	-11,133
Raleigh*	27,864	432	-9,141
Wyoming*	23,994	-3,438	-13,011

*** Indicates the county has been identified as "Distressed" by the Appalachian Regional Commission**

has remained largely insolated from the recent economic downturn, instead exhibiting a barely perceptible, but positive level of growth. Meanwhile, economic conditions within the State's coal producing region continue to deteriorate measurably. All told, conditions in 2002 differ little from those observe in 1999. Thus, the current reference to the earlier CBER analyses seems entirely prudent.

5. The Effect of the Recent Haden Decision

The economic and fiscal effects of the recent judicial decision prohibiting the placement of valley fills is entirely dependent on how this decision is interpreted and implemented. If, as West Virginia's Department of Environmental Protection (DEP) suggests, the prohibition only is applicable to fills that do not have functions in post-mine use plans, then the economic impacts will likely be less than those predicted by the earlier CBER studies. The current DEP interpretation is certainly different from Department's assessment in 2000 when we were conducting the initial analyses. Alternatively, if Judge Haden's ruling, in fact, prohibits all future valley fills in perennial and intermittent streams, it will effectively end surface mining in West Virginia, so that the earlier CBER predictions will again be valid. Finally, if the same standards are applied the fills used to create prep plant impoundments, underground mining will also be significantly effected and the CBER analyses contains predictions of economic and fiscal outcomes that are probably too optimistic.[15] Without knowing more about the form and extent of the decision's implementation, we simply cannot judge which scenario is the most likely.

[15] CBER's 2000 and 2001 analyses were harshly criticized by coal producers because we did not include the potential impacts of restricting the valley fills associated with underground mining. However, our decision to exclude these potential impacts was based on the fact that there had been no legal attempt to apply the same standard to prep plant impoundments.

It is important to realize that Judge Haden's decisions are probably already impacting the West Virginia economy. As our June 2000 report (pp. 22-23) explains, the tremendous uncertainty created by current circumstances is not without effect. Both surface and underground mines are productive assets with lives that are often measured in decades. Coal producers are understandably hesitant to make such investments when there is a question of whether or not regulatory restrictions will prohibit these assets' use. Even if producers could be induced to make new investments, the uncertainty would increase the necessary return, leading in turn, to higher production costs – an outcome that is really not tenable given the highly competitive nature of fuel markets. While we have engaged in no formal assessment of mining investment, there is certainly ample anecdotal evidence to support the suggestion that regulatory uncertainty has dampened mining industry investment in West Virginia.

6. Summary Remarks

The extreme emotion that surrounds the policy debate over mining practices has lead to a number of equally extreme statements that are not supportable by fact. For example, some have claimed that prohibitions that end surface mining will actually help the economies of West Virginia's coal field counties by opening them for increased tourist-related commerce. This, we believe, is absurd. In those areas of the region where tourist activities are present and growing, mining and tourism seem to coexist with little difficulty.[16] In the remainder of the region there is little or nothing to attract tourists, so that the point is moot. On the other extreme, some have claimed that prohibitions that end surface mining in West Virginia would create a national energy crisis by leading to markedly higher coal prices. Again, surface production in the State accounts for less than four percent of domestic production. The loss of this tonnage over multi-year period would be entirely unremarkable as far as fuel markets are concerned. Even if Judge Haden's decision is extended to surface mining operations in Kentucky and Virginia, our conclusion remains the same – the impact of the decision is a substantial local and regional issue it is not a national issue. The ruling likely does not have national implications, so long as it does not effect the industry's ability to place fills in association with underground mining operations.[17]

The West Virginia economy is still dependent on coal as a major source of commercial activity. The loss of surface coal production would create State-wide economic hardships at a time when there is very little surplus available to remedy new distress. Moreover, the impacts on individual coal-producing counties could be extreme. There is no chance that underground production will increase to offset the loss of surface production and there are virtually no alternative commercial opportunities. Many of the region's counties are places where few people lived before mining and where only a relatively few people will live if mining ceases. This is not conjecture. One need only look at the breathtaking correlation between mining employment and population that is evident over the past century.

[16] For a discussion of tourism growth in Fayette, and Raleigh County, West Virginia, see *Feasibility Study for the Thurmond, Glen Jean & Great New River Railroad*, Center for Business and Economic Research, Marshall University, February 2000.

[17] Total surface production in eastern Kentucky, Virginia, and West Virginia accounts for just over 11 percent of total cost production in the US. Combined surface and underground production from these states represents roughly 30 percent of the US total.

Our earlier studies address only the economic and fiscal impacts of further restrictions on surface mining activities and we stand firm in our belief that our assessment was and is valid. There are, however, other economic issues that have gone largely unexplored. Almost certainly mining generates environmental and other social impacts that should rightfully be measured and included in a comprehensive accounting of the benefits and costs associated with mining activities.[18] Only a thorough and balanced review of *all* economic outcomes can provide policy-makers with the information they need to make appropriate decisions for West Virginia. We hope such analyses will be forthcoming.

Respectfully submitted June 6, 2002,

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[18] While the general public perception is that these social or "external" impacts are negative. This is not always the case. There are certainly instances in which post-mine-use planning has been combined with more general land-use planning to create new economic and recreational opportunities.

Draft

Aquatic Life Water Quality Criteria for

Selenium

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NOTICES

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Table of Contents

Introduction 1
Chemical and Physical Properties 1
Sources of Selenium to Aquatic Systems 2
Narrow Margin Between Sufficiency and Toxicity 3
Selenium Document Information 4

Acute Toxicity of Selenite 6
Acute Toxicity of Se(IV) to Freshwater Animals 6
Se(IV) Freshwater Final Acute Value Determination 8
Acute Toxicity of Se(IV) to Saltwater Animals 9
Se(IV) Saltwater Final Acute Value Determination 11

Acute Toxicity of Selenate 12
Acute Toxicity of Se(VI) to Freshwater Animals 12
Sulfate-dependent Toxicity of Selenate 16
Se(VI) Freshwater Final Acute Value Determination 16
Acute Toxicity of Se(VI) to Saltwater Animals 16
Se(VI) Saltwater Final Acute Value Determination 16
Comparison of Selenite and Selenate Acute Toxicity 16

Review and Analysis of Chronic Data 43
Selection of Medium for Expressing Chronic Criterion 43
Calculation of Chronic Values 46
Evaluation of Freshwater Chronic Data for Each Species 48
Formulation of the Final Chronic Value (FCV) for Selenium 58
FCV Relative to Natural Background Levels of Selenium in Fish 60

National Criteria 66

Implementation 66

References Ref-1

Appendices
A. Toxicity of Selenium to Aquatic Plants A-1
B. Bioconcentration and Bioaccumulation of Selenium B-1
C. Environmental Factors Affecting Selenium Toxicity and Bioaccumulation C-1
D. Site-specific Considerations D-1
E. Other Data E-1
F. Unused Data F-1
G. Data Used in Regression Analysis of Selenium in Whole-body Fish Tissue with Selenium in Muscle, Ovary and Liver Tissue G-1
H. Summaries of Chronic Studies Considered for FCV Derivation H-1
I. Selenium in Tissue Monitoring Samples I-1

List of Tables

1a. Acute Toxicity of Selenium to Freshwater Animals 16
1b. Acute Toxicity of Selenium to Saltwater Animals 28
2a. Ranked Freshwater Genus Mean Acute Values 31
2b. Ranked Saltwater Genus Mean Acute Values 35
3a Ratios of Freshwater Species Mean Acute Values for Selenite and Selenate 37
3b. Ratios of Saltwater Species Mean Acute Values for Selenite and Selenate 39
4. Freshwater Chronic Values from Acceptable Tests 63

List of Figures

1. Ranked summary of selenite GMAVs (freshwater) 40
2. Ranked summary of selenite GMAVs (saltwater) 41
3. Ranked summary of selenate GMAVs (freshwater) 42
4. Linear regression of selenium concentrations in all tissues (whole-body) against concentrations in muscle, ovary and liver tissues. 45
5. Reductions in survival, growth or other responses of organisms sis modeled as a sigmoid function of increasing concentrations of selenium 47
6. Cumulative distribution of selenium (whole-body, µg/g dw) in 591 fish samples from 112 sites across the United States 62

Introduction

This document provides guidance to States and Tribes authorized to establish water quality standards under the Clean Water Act (CWA) to protect aquatic life from toxic effects of selenium. Under the CWA, States and Tribes are to establish water quality standards to protect designated uses. While this document constitutes the U.S. Environmental Protection Agency's (U.S. EPA) scientific recommendations regarding ambient concentrations of selenium, this document does not substitute for the CWA or U.S. EPA's regulations; nor is it a regulation itself. Thus, it cannot impose legally binding requirements on the U.S. EPA, States, Tribes or the regulated community, and might not apply to a particular situation based upon the circumstances. Interested parties are free to raise questions and objections about the substance of this guidance and the appropriateness of the application of this guidance to a particular situation. State and Tribal decision-makers retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance when appropriate. The U.S. EPA may change this guidance in the future.

For selenium this document establishes water quality criteria for protection of aquatic life. Under Section 304(a) of the CWA, U.S. EPA is to periodically revise water quality criteria to accurately reflect the latest scientific knowledge. Toward this end, a U.S. EPA-sponsored Peer Consultation Workshop on Selenium Aquatic Toxicity and Bioaccumulation on May 27-28, 1998 brought together experts in selenium research to discuss issues related to the chronic criterion for selenium. As a result of findings from the workshop and the fact that a substantial body of literature on the chronic toxicity of selenium has accumulated since the 1987 document was published, U.S. EPA has decided to update the acute and chronic criteria for selenium.

The criteria presented herein supersede all previous national aquatic life water quality criteria for selenium (U.S. EPA 1976, 1980a, 1987a, 1995).

Chemical and Physical Properties

Water quality criteria are being derived for total selenium measured as selenite-Se plus selenate-Se, but a variety of forms of selenium can occur in water and tissue. Three oxidation states (selenide = II, selenite = IV, and selenate = VI) can exist simultaneously in aerobic surface water at pH = 6.5 to 9.0. In natural surface waters, inorganic selenite and selenate dominate and exist primarily in the dissolved state. A fourth oxidation state (elemental = 0) exists in sediment, but is insoluble in water. In laboratory studies, Tokunaga et al. (1997) observed the reduction of Se(VI) in the water column to Se(0) in the sediments.

Thompson-Eagle and Frankenberger (1990) observed the volatilization of selenium from pond water. Chemical conversion from one oxidation state to another often proceeds at such a slow rate in aerobic surface water that thermodynamic considerations do not determine the relative concentrations of the oxidation states. Thus, although selenium(VI) is thermodynamically favored in oxygenated alkaline water, substantial concentrations of both selenium(II) and selenium(IV) are not uncommon (U.S. EPA 1987a).

In living organisms, selenides can also exist as organic molecules. Inorganic forms of selenium are converted by plants to L-selenomethionine, several free amino acids and volatile organoselenium compounds. Organisms can also oxidize elemental selenium to selenium(IV) (U.S. EPA 1987a), reduce selenium(VI) to selenium(IV) (Fujita et al. 1997; Losi and Frankenberger 1997; USEPA 1987a), produce gaseous dimethyl selenide and dimethyl diselenide (U.S. EPA 1987a), volatilize selenium (Azaizeh et al. 1997; Zhang and Moore 1996), methylate selenium (microbial methylation) to volatile $(CH_3)_2Se$ (Flury et al. 1997), and reduce selenium(IV) and selenium(VI) to selenium (II) and incorporate it into amino acids and proteins, such as selenomethionine (Gao and Tanji 1995; Hu et al. 1996; Oyamada et al. 1991; U.S. EPA 1987a). A substantial portion of selenium in surface waters may exist in organoselenium forms or complexes.

Sources of Selenium to Aquatic Systems

Selenium occurs in many soil types and enters ground and surface waters through natural weathering process such as erosion, leaching and runoff. The national average concentration of selenium in uncontaminated surface waters ranges from 0.1 to 0.4 µg Se/L (Maier and Knight 1993). Elevated levels of selenium occur in surface waters when substantial quantities of selenium enter surface waters from both natural and anthropogenic sources. It is abundant in the drier soils of North America from the Great Plains to the Pacific Ocean. Some ground waters in California, Colorado, Kansas, Oklahoma, South Dakota and Wyoming contain elevated concentrations of selenium due to weathering of and leaching from rocks and soils. Ecological impacts have been observed where selenium is concentrated through irrigation practices in areas with seleniferous soils. Selenium also occurs in sulfide deposits of copper, lead, mercury, silver and zinc and can be released during the mining and smelting of these ores. In addition, selenium occurs in high concentrations in coal and fuel oil and is emitted in flue gas and in fly ash during combustion. Some selenium then enters surface waters in drainage from fly-ash ponds and in runoff from fly-ash deposits on land. Notable examples of systems that have been affected by selenium originating from coal ash include Belews Lake, North Carolina where 16 of the 20 species originally

present were eliminated within a few years after discharge began, and Hyco Reservoir, North Carolina where selenium toxicity was associated with fish larval mortality (Gillespie and Baumann 1986).

Narrow Margin Between Sufficiency and Toxicity

Of all the priority and non-priority pollutants, selenium has the narrowest range of what is beneficial for biota and what is detrimental. Selenium is an essential element required as a mineral cofactor in the manufacture of glutathione peroxidase, an anti-oxidant enzyme that neutralizes the damaging (oxidizing) hydrogen peroxide. Aquatic and terrestrial organisms require 0.5 µg/g dry weight (dw) of selenium in their diet to sustain metabolic processes, whereas concentrations of selenium that are only an order of magnitude greater than the required level have been shown to be toxic to fish. Selenium deficiency has been found to affect humans (U.S. EPA 1987a), sheep and cattle (U.S. EPA 1987a), deer (Oliver et al. 1990) fish (Thorarinsson et al. 1994; Wang and Lovell 1997; Wilson et al. 1997; U.S. EPA 1987a), aquatic invertebrates (Audas et al. 1995; Caffrey 1989; Cooney et al. 1992; Cowgill 1987; Cowgill and Milazzo 1989; Elendt 1990; Elendt and Bais 1990; Harrison et al. 1988; Hyne et al. 1993; Keating and Caffrey 1989; Larsen and Bjerregaard 1995; Lim and Akiyama 1995; Lindstrom 1991; U.S. EPA 1987a; Winner 1989; Winner and Whitford 1987), and algae (Doucette et al. 1987; Keller et al. 1987; Price 1987; Price et al. 1987; Thompson and Hosja 1996; U.S. EPA 1987a; Wehr and Brown 1985).

Selenium has been shown to mitigate the toxic effects of arsenic, cadmium, copper, inorganic and organic mercury, silver, ofloxacin, methyl parathion and the herbicide paraquat to biota in both aquatic and terrestrial environments (Bjerregaard 1988a, b; Cuvin and Furness 1988; Ding et al. 1988; Krizkova et al. 1996; Malarvizhi and Usharani 1994; Micallef and Tyler 1987; Patel et al. 1988; Paulsson and Lundbergh 1991; Pelletier 1986b, 1988; Phillips et al. 1987; Ramakrishna et al. 1988; Rouleau et al. 1992; Salte et al. 1988; Siegel et al. 1991; Szilagyi et al. 1993; U.S. EPA 1987a). Selenium pretreatment resulted in reduced effects in 128-hr old, but not 6-hr old, embryos of *Oryzias latipes* from cadmium and mercury, whereas prior exposure to selenium did not affect the sensitivity of white suckers to cadmium (U.S. EPA 1987a). In contrast, Birge et al. and Huckabee and Griffith reported that selenium and mercury acted synergistically in producing toxic effects to fish embryos (U.S. EPA 1987a). Selenium is reported to reduce the uptake of mercury by some aquatic species (Southworth et al. 1994; U.S. EPA 1987a), to have no effect on uptake of mercury by a mussel, and to increase the uptake of mercury by mammals and some fish (U.S. EPA 1987a). Selenium augmented accumulation of cadmium in some tissues of the shore crab, *Carcinus maenas* (U.S. EPA 1987a). The available data do not show whether

the various inorganic and organic compounds and oxidation states of selenium are equally effective sources of selenium as a trace nutrient, or as reducing the toxic effects of various pollutants.

Selenium Document Information

All concentrations reported herein are expressed as selenium, not as the chemical tested. Although Se(VI) is expected to be the predominant oxidation state at chemical equilibrium in oxygenated alkaline waters, the rate of conversion of Se(IV) to Se(VI) seems to be slow in most natural waters. Therefore, it was assumed that when Se(IV) was introduced into stock or test solutions, it would persist as the predominate state throughout the test, even if no analyses specific for the Se(IV) oxidation state were performed. Similarly, it was assumed that when Se(VI) was introduced into stock or test solutions, it would persist as the predominant state throughout the test, even if no analyses specific for Se(VI) were performed.

An understanding of the "Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses" (Stephan et al. 1985), hereinafter referred to as the Guidelines, and the response to public comments (U.S. EPA 1985a) is helpful for understanding the derivation of the acute criteria for selenium. Briefly, the Guidelines procedure involves the following steps: (1) Acute toxicity test data is gathered from all suitably conducted studies. Data are to be available for species in a minimum of eight families representing a diverse assemblage of taxa. (2) The Final Acute Value (FAV) is derived by extrapolation or interpolation to a hypothetical genus more sensitive than 95 percent of a diverse assemblage of taxa. The FAV, which represents an LC_{50} or EC_{50}, is divided by two in order to obtain an acute criterion protective of nearly all individuals in such a genus. (3) Chronic toxicity test data (longer-term survival, growth, or reproduction) are needed for at least three taxa. Most often the chronic criterion is set by determining an appropriate acute-chronic ratio (the ratio of acutely toxic concentrations to the chronically toxic concentrations) and applying that ratio to the FAV from the previous step. (4) When necessary, the acute and/or chronic criterion may be lowered to protect critically important species.

The chronic criteria procedure explicitly set forth in the Guidelines (Step 3 above) is not well suited to bioaccumulative contaminants for which diet is the primary route of aquatic life exposure. Consequently, that procedure was not used for deriving the chronic criterion for selenium either in the original 1987 criteria document or in this update. Rather, to accord with other provisions of the Guidelines, it was necessary to apply what the Guidelines refer to as "appropriate modifications" of the

procedures in order to obtain a criterion "consistent with sound scientific evidence", as will be described in a later section.

Results of such intermediate calculations as recalculated LC_{50}s and Species Mean Acute Values are given to four significant figures to prevent roundoff error in subsequent calculations, not to reflect the precision of the value. The latest comprehensive literature search for information for this document was conducted in August 2001; some more recent information was included.

The body of this document contains only the information on acute and chronic toxicity of selenium that is relevant to the derivation of the acute and chronic criteria. Supporting information on the toxicity and bioaccumulation of selenium, and the data that were reviewed and not used in deriving the criteria are provided in the appendix and include: toxicity to aquatic plants (Appendix A); bioconcentration and bioaccumulation (Appendix B); environmental factors affecting selenium toxicity and bioaccumulation (Appendix C); site-specific considerations (Appendix D); other data (Appendix E); unused data (Appendix F); regression analysis (Appendix G); chronic data summaries (Appendix H); and tissue monitoring data (Appendix I).

Acute Toxicity of Selenite

Data that may be used, according to the Guidelines, in the derivation of Final Acute Values for selenite are presented in Tables 1a and 1b. The following text presents a brief overview of the acceptable data obtained for selenite, followed by a discussion of the more sensitive and commercially and recreationally important species. A ranking of the relative sensitivity of selenite to selenate for each genera is listed in Tables 2a and 2b.

Acute Toxicity of Se(IV) to Freshwater Animals

Acceptable data on the acute effects of selenite in freshwater are available for 14 species of invertebrates and 20 species of fish (Table 1a). These 34 species satisfy the eight family provision specified in the Guidelines. Invertebrates are both the most sensitive and the most tolerant freshwater species to selenite with Species Mean Acute Values (SMAV) ranging from 440 µg/L for the crustacean, *Ceriodaphnia dubia*, to 203,000 µg/L for the leech, *Nephelopsis obscura*. The selenite SMAVs for fishes range from 1,783 µg/L for the striped bass, *Morone saxatilis*, to 35,000 µg/L for the common carp, *Cyprinus carpio*. The following text presents a species-by-species discussion of the eight most sensitive genera, plus all commercially and recreationally important species.

Hyalella (amphipod)

The most sensitive freshwater genus is the amphipod, *Hyalella*, with a Genus Mean Acute Value (GMAV) of 461.4 µg Se/L. The GMAV is derived from five 96-hr acute flow-through measured tests where the LC_{50} values ranged from 340 to 670 µg Se/L (GLEC 1998; Halter et al. 1980). A sixth test conducted under non flow-through conditions is also listed in Table 1a (Brasher and Ogle 1993), but the Guidelines recommend using flow-through measured data in preference to static or renewal data.

Ceriodaphnia (cladoceran)

The second most sensitive freshwater genus is *Ceriodaphnia*, with a GMAV of <515.3 µg Se/L that is derived from the geometric mean of the *C. affinis* (<603.6 µg Se/L) and *C. dubia* (440 µg Se/L) SMAVs. Four static unmeasured 48-hr studies are available for *C. affinis* where the LC_{50} values ranged from <480 to 720 µg Se/L (Owsley 1984; Owsley and McCauley 1986). The one available *C. dubia* acute study was conducted by GLEC (1999) that exposed <24-hr old neonates to sodium selenite for 48 hours under flow-through measured conditions. The resultant 48-hr LC_{50} value was 440 µg Se/L, which is the most sensitive SMAV for selenite in the database.

Daphnia (cladoceran)

The eleven available acute values are used to calculate the *Daphnia magna* SMAV of 905.3 µg Se/L (acute LC_{50} values ranged from 215 to 3,020 µg Se/L), but only one flow-through measured acute LC_{50} test value of 1,987 µg Se/L is used for the for *D. pulex* SMAV (a second static measured test conducted by Reading (1979) is listed, but not used to calculate the SMAV) . The resultant GMAV of 1,341 µg Se/L for *Daphnia* is the third most sensitive for selenite.

Hydra

The fourth most sensitive freshwater genus is *Hydra*, with a GMAV of 1,700 µg Se/L. The GMAV is derived from the one available static-measured test conducted by Brooke et al. (1985).

Morone (striped bass)

Two 96-hr static unmeasured tests are available for the striped bass, *Morone saxatilis*, and the LC_{50} values were 1,325 and 2,400 µg Se/L (Palawski et al. 1985). The geometric mean of the two values yield the GMAV of 1,783 µg Se/L.

Pimephales (fathead minnow)

A total of 16 fathead minnow acute studies are presented in Table 1a, but only the eight flow-through measured LC_{50} values are used to derive the GMAV of 2,209 µg Se/L. The eight flow-through LC_{50} values ranged from 620 to 5,200 µg Se/L (Cardwell et al. 1976a,b; GLEC 1998; Kimball manuscript).

Gammarus (amphipod)

The seventh most sensitive freshwater genus is *Gammarus*, with a GMAV of 3,489 µg Se/L that is derived from the geometric mean of five flow-through measured studies (GLEC 1998, 1999) where the LC_{50} values ranged from 1,800 to 10,950 µg Se/L. Two static measured acute studies were conduced by Brooke et al. (1985) and Brooke (1987), but as recommended by the Guidelines, were not used to calculate the SMAV for this species.

Jordanella (flagfish)

The eighth most sensitive freshwater genus is *Jordanella*, with a GMAV of 6,500 µg Se/L. The GMAV is derived from the one available 96-hr flow-through measured test conducted by Cardwell et al. (1976a,b) that exposed *Jordanella floridae* to selenium dioxide.

Oncorhynchus (salmonid)

The GMAV of 10,580 µg Se/L for the commercially important salmonid *Oncorhynchus* is derived from the geometric mean of the coho salmon (O. *kisutch*; 7,240 µg Se/L), chinook salmon (*O. tshawytscha*; 15,596 µg Se/L) and rainbow trout (*O. mykiss*; 10,488 µg Se/L) SMAVs. Three static unmeasured 96-hr studies are used to calculate the coho salmon SMAV where the LC_{50} values ranged from 3,578 to 13,600 µg Se/L (Hamilton and Buhl 1990b; Buhl and Hamilton 1991). A fourth coho salmon LC_{50} value is available for an acute test initiated with the tolerant alevin life stage (Buhl and Hamilton 1991), but based on Guideline recommendations this value is not used when data are available from a more sensitive life stage.

Six acute chinook salmon static unmeasured 96-hr acute studies conducted with the more sensitive post-alevin life stage of the fish are used to determine the 15,596 µg Se/L SMAV for the species and the LC_{50} values ranged from 8,150 to 23,400 µg Se/L (Hamilton and Buhl 1990b). The two acute studies conducted with the tolerant eyed egg and alevin life stages by the same authors are not used in the SMAV determination as recommended by the Guidelines. Hamilton and Buhl (1990b) noted that chinook salmon fry were consistently more sensitive than either the embryos or alevin to selenite.

A total of seven rainbow trout acute studies are presented in Table 1a, but only the two flow-through measured LC_{50} values are used to derive the SMAV of 10,488 µg Se/L as recommended by the Guidelines. The two 96-hr flow-through test LC_{50} values are 8,800 and 12,500 µg Se/L (Goettl and Davies 1976; Hodson et al. 1980). As with the coho and chinook salmon, the alevin life stage was less sensitive to selenite.

Lepomis (bluegill)

The GMAV of 28,500 µg Se/L for the recreationally important bluegill sunfish, *Lepomis macrochirus*, is derived from the 96-hr flow-through measured test conducted by Cardwell et al. (1976a,b). The static measured acute study conduced by Brooke et al. (1985) was not used to calculate the SMAV for this species, as recommended by the Guidelines.

Se(IV) Freshwater Final Acute Value Determination

Freshwater Species Mean Acute Values (Table 1a) were calculated as geometric means of the available acute values for selenite, and Genus Mean Acute Values (Table 2a) were then calculated as geometric means of the Species Mean Acute Values. Of the 28 genera for which freshwater mean acute values are

available, the most sensitive genus, *Hyalella*, is 440 times more sensitive than the most tolerant, *Nephelopsis*. The range of sensitivities of the four most sensitive genera spans a factor of 3.7. The freshwater Final Acute Value (FAV), representing the most sensitive 5th percentile genus, is calculated to be 514.9 µg/L for selenite using the procedure described in the Guidelines and the Genus Mean Acute Values in Table 2a. The Final Acute Value is higher than the lowest Species Mean Acute Value (Figure 1).

Acute Toxicity of Se(IV) to Saltwater Animals

Acute toxicity data that can be used to derive a saltwater criterion for selenite are available for 10 species of invertebrates and eight species of fish that are resident in North America (Table 1b). These 18 species satisfy the eight family provision specified in the Guidelines. The range of SMAVs for saltwater invertebrates extends from 255 µg Se/L for juveniles of the bay scallop, *Argopecten irradians* (Nelson et al. 1988) to greater than 10,000 µg Se/L for embryos of the blue mussel, *Mytilus edulis* (Martin et al. 1981) and embryos of the Pacific oyster, *Crassostrea gigas* (Glickstein 1978; Martin et al. 1981). The range of SMAVs for fish is slightly wider than that for invertebrates, extending from 599 µg Se/L for larvae of the haddock, *Melanogrammus aeglefinus*, to 17,350 µg Se/L for adults of the fourspine stickleback, *Apeltes quadracus* (Cardin 1986). No consistent relationship was detected between life stage of invertebrates or fish and their sensitivity to selenite, and few data are available concerning the influence of temperature or salinity on the toxicity of selenite to saltwater animals. Acute tests with the copepod, *Acartia tonsa*, at 5 and 10°C gave similar results (Lussier 1986). The following text presents a species-by-species discussion of the eight most sensitive genera, plus all commercially and recreationally important species. The genera sensitivity ranking is listed in Table 2b.

Argopecten (bay scallop)

The most sensitive saltwater genus is *Argopecten*, with a GMAV of 255 µg Se/L. The GMAV is derived from the one available bay scallop (*Argopecten irradians)* static-renewal unmeasured test conducted by Nelson et al. (1988) at a salinity of 25 g/kg.

Melanogrammus (haddock)

The second most sensitive saltwater genus is *Melanogrammus*, with a GMAV of 599 µg Se/L. The GMAV is derived from the one available haddock (*Melanogrammus aeglefinus*) static unmeasured test conducted by Cardin (1986) at a salinity of 30 g/kg.

Cancer (dungeness crab)

The third most sensitive saltwater genus is *Cancer*, with a GMAV of 1,040 µg Se/L. The GMAV is derived from the one available static unmeasured test conducted by Glickstein (1978) that exposed *Cancer magister* to selenium oxide at a salinity of 33.8 g/kg.

Penaeus (brown shrimp)

The fourth most sensitive saltwater genus is *Penaeus*, with a GMAV of 1,200 µg Se/L. The GMAV is derived from the one available static unmeasured test conducted by Ward et al. (1981) that exposed *Penaeus aztecus* to sodium selenite at a salinity of 30 g/kg.

Acartia (copepod)

The fifth most sensitive saltwater genus is *Acartia*, with a GMAV of 1,331 µg Se/L that is derived from the geometric mean of the *A. clausi* (2,110 µg Se/L) and *A. tonsa* (839 µg Se/L) SMAVs. Each of the SMAVs is derived from one static unmeasured acute test conducted by Lussier (1986) that exposed each species to selenious acid at a salinity of 30 g/kg.

Americamysis (Mysidopsis) (mysid)

The GMAV of 1,500 µg Se/L for the mysid *Americamysis* (formerly *Mysidopsis*) is derived from the one *Americamysis bahia* 96-hr flow-through measured test conducted by Ward et al. (1981). The static unmeasured acute study conduced by U.S. EPA (1978) was not used to calculate the SMAV for this species as recommended by the Guidelines. The flow-through measured test was conducted with selenious acid at a salinity of 15-20 g/kg.

Spisula (surf clam)

The seventh most sensitive saltwater genus is *Spisula*, with a GMAV of 1,900 µg Se/L. The GMAV is derived from the one available static-renewal unmeasured test conducted by Nelson et al. (1988) that exposed *Spisula solidissima* to sodium selenite at a salinity of 25 g/kg.

Morone (striped bass)

Five 96-hr static unmeasured tests are available for the striped bass, *Morone saxatilis*, and the LC_{50} values ranged from 1,550 to 3,900 µg Se/L (Chapman 1992; Palawski et al. 1985). The geometric mean of the five values yielded the GMAV of 3,036 µg Se/L. All the tests were conducted with sodium selenite at a salinity of 1-5 g/kg.

Paralichthys (summer flounder)

The GMAV of 3,497 µg Se/L for the commercially important summer flounder, *Paralichthys dentatus*, is derived from one 96-hr static unmeasured acute test conducted by Cardin (1986) that exposed embryos to selenious acid at a salinity of 30.2 g/kg.

Callinectes (blue crab)

The GMAV of 4,600 µg Se/L for the commercially important blue crab, *Callinectes sapidus*, is derived from one static unmeasured acute test conducted by Ward et al. (1981) that exposed juveniles to sodium selenite at a salinity of 30 g/kg.

Crassostrea (Pacific oyster)

Two static unmeasured tests are available for the commercially important Pacific oyster, *Crassostrea gigas*, and the LC_{50} values were both >10,000 µg Se/L (Glickstein 1978; Martin et al. 1981). The geometric mean of the two values yielded the GMAV of >10,000 µg Se/L. The tests were conducted with selenium oxide and sodium selenite at a salinity of 33.8 g/kg.

Mytilus (blue mussel)

The GMAV for the commercially important blue mussel, *Mytilus edulis*, is also >10,000 µg Se/L, and is derived from the one static unmeasured acute test conducted by Martin et al. (1981) that exposed embryos to selenium oxide at a salinity of 33.8 g/kg.

Pseudopleuronectes (winter flounder)

The GMAV of 14,649 µg Se/L for the commercially important winter flounder, *Pseudopleuronectes americanus*, is derived from two 96-hr static unmeasured acute tests conducted by Cardin (1986) that exposed larvae to selenious acid at a salinity of 28-30 g/kg.

Se(IV) Saltwater Final Acute Value Determination

Of the 17 genera for which saltwater mean acute values are available for selenite (Table 2b), the most sensitive genus, *Argopectin*, is 68 times more sensitive than the most tolerant, *Apeltes*. The sensitivities of the four most sensitive genera differ by a factor of 4.7, and these four include three invertebrates and one fish, of which an invertebrate is the most sensitive of the four. The saltwater Final Acute Value, representing the most sensitive 5th percentile genus, is 253.4 µg/L for selenite, which is slightly lower than the lowest Species Mean Acute Value (Figure 2).

Acute Toxicity of Selenate

Data that may be used, according to the Guidelines, in the derivation of Final Acute Values for selenate are presented in Tables 1a and 1b. The following text presents a brief overview of the acceptable data obtained for selenate, and includes a discussion of the more sensitive and important species. The genera sensitivity ranking is listed in Tables 2a and 2b.

Acute Toxicity of Se(VI) to Freshwater Animals

Acceptable data on the acute effects of selenate in freshwater are available for 12 invertebrate species and 11 species of fish (Table 1a). These 23 species satisfy the eight family provision of the Guidelines. Invertebrates are both the most sensitive and the most tolerant freshwater species to selenate with SMAVs ranging from 246 µg/L for the crustacean, *Daphnia pulicaria*, to 442,000 µg/L for the leech, *Nephelopsis obscura*. The selenate SMAVs for fishes range from 12,282 µg/L for the fathead minnow, *Pimephales promelas*, to 66,000 µg/L for channel catfish, *Ictalurus punctatus*. The following text presents a species-by-species discussion of the eight most sensitive genera, plus all commercially and recreationally important species.

Ceriodaphnia (cladoceran)

The most sensitive freshwater genus is the cladeceran, *Ceriodaphnia*, with a GMAV of 376 µg Se/L. The GMAV is derived from one 48-hr acute flow-through measured test (GLEC 1999). Two additional tests conducted under non flow-through conditions is also listed in Table 1a (Brix et al. 2001a,b), but the Guidelines recommend using flow-through measured data in preference to static or renewal data.

Daphnia (cladoceran)

The second most sensitive freshwater genus is *Daphnia*, with a GMAV of 926.8 µg Se/L that is derived from the geometric mean of the *D. magna* (2,118 µg Se/L), *D. pulex* (1,528 µg Se/L) and *D. pulicaria* (246 µg Se/L) SMAVs. Five static and one static-renewal measured 48-hr studies are available for *D. magna* where the LC_{50} values ranged from 570 to 5,300 µg Se/L (Boyum 1984; Brooke et al. 1985; Dunbar et al. 1983; Ingersol et al. 1990; Maier et al. 1993).

The *D. pulex* SMAV of 1,528 µg Se/L is based on the 48-hr flow-through measured test conducted by GLEC (1999) that exposed <24-hr old neonates to sodium selenate. Two static measured tests conducted by Brix et al. (2001a,b), are not used to calculate the SMAV as recommend by the Guidelines.

The one available *D. pulicaria* acute study was conducted by Boyum (1984) that exposed neonates to sodium selenate for 48 hours under static measured conditions. The resultant 48-hr LC_{50} value was 246 µg Se/L, which is the most sensitive SMAV for selenate in the database.

Hyalella (amphipod)

The third most sensitive freshwater genus is the amphipod, *Hyalella*, with a GMAV of 2,073 µg Se/L. The GMAV is derived from four 96-hr acute flow-through measured tests where the LC_{50} values ranged from 1,350 to 3,580 µg Se/L (GLEC 1998). Three tests conducted under non flow-through conditions are also listed in Table 1a (Adams 1976; Brasher and Ogle 1993; Brix et al. 2001a,b), but are not used to calculate the SMAV as recommended by the Guidelines.

Gammarus (amphipod)

The fourth most sensitive freshwater genus is *Gammarus*, with a GMAV of 2,741 µg Se/L that is derived from the geometric mean of the *G. lacustris* (3,054 µg Se/L) and *G. pseudolimnaeus* (2,460 µg Se/L) SMAVs. The static measured acute test conduced by Brix et al. (2001a) is the only LC_{50} value available for *G. lacustris*.

The *G. pseudolimnaeus* SMAV of 2,460 µg Se/L is based on five 96-hr flow-through measured tests conducted by GLEC (1998, 1999). Two static measured acute studies were conduced by Brooke et al. (1985) and Brooke (1987), but as recommended by the Guidelines, were not used to calculate the SMAV for this species.

Hydra

The fifth most sensitive freshwater genus is *Hydra*, with a GMAV of 7,300 µg Se/L. The GMAV is derived from the one available static-measured test conducted by Brooke et al. (1985).

Pimephales (fathead minnow)

A total of nine fathead minnow acute studies are presented in Table 1a, but only the five flow-through measured LC_{50} values are used to derive the GMAV of 12,282 µg Se/L. The five flow-through LC_{50} values ranged from 5,500 to 42,100 µg Se/L (Spehar 1986; GLEC 1998). The four static tests are not used to calculate the SMAV as recommended by the Guidelines.

Xyrauchen (razorback sucker)

Six 96-hr static unmeasured tests are available for the razorback sucker, *Xyrauchen texanus*, and the LC_{50} values ranged from 7,620 to 20,064 µg Se/L (Buhl and Hamilton 1996; Hamilton 1995; Hamilton and Buhl 1997a). The geometric mean of the six values yield the GMAV of 13,211 µg Se/L.

Paratanyarsus (midge)

The eighth most sensitive freshwater genus is *Paratanyarsus* with a GMAV of 20,000 µg Se/L. The GMAV is derived from the one available static-measured test conducted with *Paratanyarsus parthenogeneticus* by Brooke et al. (1985).

Oncorhynchus (salmonid)

The GMAV of 56,493 µg Se/L for the commercially important salmonid *Oncorhynchus* is derived from the geometric mean of the coho salmon (*O. kisutch*; 33,972 µg Se/L), chinook salmon (*O. tshawytscha*; 112,918 µg Se/L) and rainbow trout (*O. mykiss*; 47,000 µg Se/L) SMAVs. Three static unmeasured 96-hr studies are used to calculate the coho salmon SMAV where the LC_{50} values ranged from 30,932 to 39,000 µg Se/L (Buhl and Hamilton 1991; Hamilton and Buhl 1990b). A fourth coho salmon LC_{50} value is available for an acute test initiated with the tolerant alevin life stage (Buhl and Hamilton 1991), but based on Guideline recommendations this value is not used when data are available from a more sensitive life stage.

Five acute chinook salmon static unmeasured 96-hr acute studies conducted with the more sensitive life stage of the fish are used to determine the 112,918 µg Se/L SMAV for the species with LC_{50} values ranging from 62,900 to 180,000 µg Se/L (Hamilton and Buhl 1990b). The two acute studies conducted with the tolerant eyed egg and alevin life stages by the same authors are not used in the SMAV determination as recommended by the Guidelines.

A total of four rainbow trout acute studies are presented in Table 1a, but only the one flow-through measured LC_{50} value is used to derive the SMAV of 47,000 µg Se/L (Spehar 1986) as recommended by the Guidelines.

Lepomis (bluegill)

The GMAV of 63,000 µg Se/L for the recreationally important bluegill sunfish, *Lepomis macrochirus*, is derived from the 96-hr static measured test conducted by Brooke et al. (1985) that exposed juvenile bluegill to sodium selenate.

Ictalurus (channel catfish)

The GMAV of 66,000 µg Se/L for the commercially important channel catfish, *Ictalurus punctatus*, is derived from the 96-hr static measured test conducted by Brooke et al. (1985) that exposed juvenile catfish to sodium selenate.

Sulfate-dependent Toxicity of Selenate

The toxicity of a number of metals (e.g., copper and cadmium) to aquatic organisms is related to the concentration of hardness in the water. The toxicity of these metals to many different aquatic species has been shown to decrease as the hardness concentration increases. A similar relationship also has been recognized between selenate and dissolved sulfate (a similar relationship is not evident between selenite and sulfate or between either form of selenium and hardness). The studies reviewed in this document indicate that, as the concentration of sulfate increases, the acute toxicity of selenate is reduced (less toxic). Selenate acute toxicity tests conducted at different levels of dissolved sulfate are available with *C. dubia, D. magna, H. azteca, G. pseudolimnaeus*, chinook salmon and fathead minnows (Table 1a). These data indicate that, in general, selenate is more toxic to these species in low sulfate water than in higher sulfate water.

The natural logarithm of selenate acute values was a linear function of the natural logarithm of sulfate concentrations. Regression analysis revealed significant, positive slopes for five of six species that had acute values precisely determined. Taxa with acute values estimated as greater or less than a given threshold were excluded from the analysis. However, the sulfate adjustment was not here incorporated into the water quality criterion for the following reasons. (1) Variation in sulfate concentration did not have a similar effect on the selenate acute value of all species. Analysis of covariance (Zar 1984) revealed that slopes of regression lines projecting selenate acute values as a function of sulfate concentrations (see Stephan et al. 1985) were significantly different among taxa ($F_{5,45} = 5.06$, $P < 0.02$). Slopes ranged from 0.19 (*Hyalella azteca*) to 0.87 (chinook salmon). (2) The influence of sulfate is sufficiently mild, and the acute criterion sufficiently high compared to chronically toxic concentrations, that it was not clear that the additional complexity of a sulfate formula would have any significance in

regulatory applications. (3) If a total selenium criterion were implemented based on the selenate FAV adjusted for the sulfate concentration, then the selenium limit would not adequately protect aquatic organisms when selenite is the predominant form of selenium and sulfate concentrations are high.

Se(VI) Freshwater Final Acute Value Determination

Of the 18 freshwater genera for which mean acute values are available for selenate, the most sensitive, *Ceriodaphnia*, is 1,176 times more sensitive than the most tolerant, *Nephelopsis*. The range of sensitivities of the four most sensitive genera, all invertebrates, spans a factor of 7.3. This is comparatively high variability among taxa. The freshwater Final Acute Value, representing the most sensitive 5th percentile genus, was calculated to be 369.6 µg/L for selenate. This Final Acute Value is lower than the acute value of the most sensitive freshwater species (Figure 3).

Acute Toxicity of Se(VI) to Saltwater Animals

The only species with which acute tests have been conducted on selenate in salt water is the striped bass (Table 1b). Klauda (1985a, b) obtained 96-hr selenate LC_{50} values of 9,790 and 85,840 µg/L using flow-through measured methodology with prolarvae and juvenile striped bass, respectively. In static unmeasured tests, Chapman (1992) determined selenate 96-hr LC_{50} values that ranged from 23,700 to 29,000 µg/L using 24 to 32 day posthatch striped bass larvae. The more sensitive prolarvae life stage test conducted under flow-through conditions is used to yield the SMAV and GMAV of 9,790 µg Se/L for the striped bass.

Se(VI) Saltwater Final Acute Value Determination

The one saltwater species available for selenate does not satisfy the eight family provision specified in the Guidelines. Therefore, a saltwater Final Acute Value for selenate cannot be determined.

Comparison of Selenite and Selenate Acute Toxicity

Species Mean Acute Values have been determined for both selenite and selenate with 20 freshwater species (Table 3a) and one saltwater species (Table 3b). Of these 21 species, 17 are more sensitive to Se(IV). Nevertheless, of the remaining four species that more sensitive to Se(VI), three are in the sensitive portion of the Table 3a distribution. Although most of the Se(VI) acute values are higher than those for Se(IV), the FAV for Se(VI) ends up below the FAV for Se(IV) because the lowest Se(VI) acute

value, that for *Ceriodaphnia dubia*, is lower than any acute value for Se(IV), and fewer species have been tested for Se(VI), causing its FAV to be extrapolated below its lowest acute value.

Table 1a. Acute Toxicity of Selenium to Freshwater Animals

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
FRESHWATER SPECIES						
Selenite						
Hydra (adult), *Hydra sp.*	S, M	Sodium selenite	-	**1,700**	1,700	Brooke et al. 1985
Worm, *Tubifex tubifex*	R, U	Sodium selenite	245	**7,710**	7,710	Khangarot 1991
Leech (adult), *Nephelopsis obscura*	S, M	Sodium selenite	49.8	**203,000**	203,000	Brooke et al. 1985
Snail (adult), *Aplexa hypnorum*	S, M	Sodium selenite	50.6	**53,000**	-	Brooke et al. 1985
Snail (adult), *Aplexa hypnorum*	S, M	Sodium selenite	49.8	**23,000**	34,914	Brooke et al. 1985
Snail, *Physa sp.*	S, U	Sodium selenite	45.7	**24,100**	24,100	Reading 1979
Cladoceran (<24 hr), *Ceriodaphnia dubia*	F, M	Sodium selenite	127 (sulfate=25)	**440**	440	GLEC 1999
Cladoceran (<24 hr), *Ceriodaphnia affinis*	S, U	Sodium selenite	100.8	**600**	-	Owsley 1984; Owsley and McCauley 1986
Cladoceran (36-60 hr), *Ceriodaphnia affinis*	S, U	Sodium selenite	100.8	**720**	-	Owsley 1984
Cladoceran (84-108 hr), *Ceriodaphnia affinis*	S, U	Sodium selenite	100.8	**640**	-	Owsley 1984
Cladoceran (72-120 hr), *Ceriodaphnia affinis*	S, U	Sodium selenite	100.8	**<480**	<603.6	Owsley 1984
Cladoceran, *Daphnia magna*	S, U	Sodium selenite	214	**2,500**	-	Bringmann and Kuhn 1959a
Cladoceran, *Daphnia magna*	S, U	Selenious acid[c]	72	**430**	-	LeBlanc 1980
Cladoceran, *Daphnia magna*	S, M	Sodium selenite	129.5	**1,100**	-	Dunbar et al. 1983
Cladoceran, *Daphnia magna*	S, M	Sodium selenite	138	**450**	-	Boyum 1984

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Cladoceran (<24 hr), *Daphnia magna*	S, U	Sodium selenite	-	**215**	-	Adams and Heidolph 1985
Cladoceran (<24 hr), *Daphnia magna*	S, U	Sodium selenite	40	**870**	-	Mayer and Ellersieck 1986
Cladoceran (<24 hr), *Daphnia magna*	S, U	Sodium selenite	280	**2,370**	-	Mayer and Ellersieck 1986
Cladoceran, *Daphnia magna*	S, M	Sodium selenite	45.5	**700**	-	Ingersoll et al. 1990
Cladoceran, *Daphnia magna*	S, M	Sodium selenite	136	**3,020**	-	Ingersoll et al. 1990
Cladoceran (<24 hr), *Daphnia magna*	R, M	Sodium selenite	80-100	**550**	-	Maier et al. 1993
Cladoceran, *Daphnia magna*	S, M	Selenious acid	220[d]	**1,220**	905.3	Kimball, Manuscript
Cladoceran, *Daphnia pulex*	S, M	Sodium selenite	46.4	3,870	-	Reading 1979; Reading and Buikema 1983
Cladoceran (<24 hr), *Daphnia pulex*	F, M	Sodium selenite	128 (sulfate=25)	**1,987**	1,987	GLEC 1999
Amphipod (adult), *Gammarus pseudolimnaeus*	S, M	Sodium selenite	48.3	4,300	-	Brooke et al. 1985
Amphipod (adult), *Gammarus pseudolimnaeus*	S, M	Sodium selenite	53.6	1,700	-	Brooke 1987
Amphipod, *Gammarus pseudolimnaeus*	F, M	Sodium selenite	139 (sulfate=24)	**2,260**	--	GLEC 1998
Amphipod, *Gammarus pseudolimnaeus*	F, M	Sodium selenite	137 (sulfate=138)	**3,130**	--	GLEC 1998
Amphipod, *Gammarus pseudolimnaeus*	F, M	Sodium selenite	144 (sulfate=326)	**1,800**	--	GLEC 1998
Amphipod, *Gammarus pseudolimnaeus*	F, M	Sodium selenite	138 (sulfate=758)	**3,710**	--	GLEC 1998
Amphipod (adult), *Gammarus pseudolimnaeus*	F, M	Sodium selenite	128 (sulfate=25)	**10,950**	3,489	GLEC 1999

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Amphipod (2 mm length), *Hyalella azteca*	R, M	Sodium selenite	133	420	-	Brasher and Ogle 1993
Amphipod, *Hyalella azteca*	F, M	Sodium selenite	329	**340**	-	Halter et al. 1980
Amphipod, *Hyalella azteca*	F, M	Sodium selenite	132 (sulfate=64)	**670**	--	GLEC 1998
Amphipod, *Hyalella azteca*	F, M	Sodium selenite	132 (sulfate=138)	**<350**	--	GLEC 1998
Amphipod, *Hyalella azteca*	F, M	Sodium selenite	138 (sulfate=359)	**<460**	--	GLEC 1998
Amphipod, *Hyalella azteca*	F, M	Sodium selenite	138 (sulfate=642)	**570**	461.4	GLEC 1998
Midge (4th instar), *Chironomus decorus*	R, M	Sodium selenite	85	**48,200**	48,200	Maier and Knight 1993
Midge, *Chironomus plumosus*	S, U	Sodium selenite	39	**24,150**	-	Mayer and Ellersieck 1986
Midge, *Chironomus plumosus*	S, U	Sodium selenite	280	**27,850**	25,934	Mayer and Ellersieck 1986
Midge, *Tanytarsus dissimilis*	F, M	Selenium dioxide	48.0	**42,500**	42,500	Call et al. 1983
Coho salmon (0.5 g), *Oncorhynchus kisutch*	S, U	Sodium selenite	211	**7,800**	-	Hamilton and Buhl 1990b
Coho salmon (2.6 g), *Oncorhynchus kisutch*	S, U	Sodium selenite	333	**13,600**	-	Hamilton and Buhl 1990b
Coho salmon (alevin), *Oncorhynchus kisutch*	S, U	Sodium selenite	41	35,560[f]	-	Buhl and Hamilton 1991
Coho salmon (juvenile), *Oncorhynchus kisutch*	S, U	Sodium selenite	41	**3,578**	7,240	Buhl and Hamilton 1991
Chinook salmon (0.7 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenite	211	**14,800**	-	Hamilton and Buhl 1990b
Chinook salmon (0.5 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenite	211	**13,000**	-	Hamilton and Buhl 1990b
Chinook salmon (1.6 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenite	333	**23,100**	-	Hamilton and Buhl 1990b
Chinook salmon (1.6 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenite	333	**23,400**	-	Hamilton and Buhl 1990b

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Chinook salmon (eyed egg), *Oncorhynchus tshawytscha*	S, U	Sodium selenite	41.7	>348,320[f]	-	Hamilton and Buhl 1990b
Chinook salmon (alevin), *Oncorhynchus tshawytscha*	S, U	Sodium selenite	41.7	64,690[f]	-	Hamilton and Buhl 1990b
Chinook salmon (0.31 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenite	41.7	**16,980**	-	Hamilton and Buhl 1990b
Chinook salmon (0.46 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenite	41.7	**8,150**	15,596	Hamilton and Buhl 1990b
Rainbow trout, *Oncorhynchus mykiss*	S, U	Sodium selenite	330	4,500	-	Adams 1976
Rainbow trout, *Oncorhynchus mykiss*	S, U	Sodium selenite	330	4,200	-	Adams 1976
Rainbow trout, *Oncorhynchus mykiss*	S, U	Sodium selenite	272	1,800	-	Hunn et al. 1987
Rainbow trout (alevin), *Oncorhynchus mykiss*	S, U	Sodium selenite	41	118,000	-	Buhl and Hamilton 1991
Rainbow trout (juvenile), *Oncorhynchus mykiss*	S, U	Sodium selenite	41	9,000	-	Buhl and Hamilton 1991
Rainbow trout, *Oncorhynchus mykiss*	F, M	Sodium selenite	30	**12,500**	-	Goettl and Davies 1976
Rainbow trout, *Oncorhynchus mykiss*	F, M	Sodium selenite	135	**8,800**	10,488	Hodson et al. 1980
Brook trout (adult), *Salvelinus fontinalis*	F, M	Selenium dioxide	157	**10,200**	10,200	Cardwell et al. 1976a,b
Arctic grayling (alevin), *Thymallus arcticus*	S, U	Sodium selenite	41	34,732[f]	-	Buhl and Hamilton 1991
Arctic grayling (juvenile), *Thymallus arcticus*	S, U	Sodium selenite	41	**15,675**	15,675	Buhl and Hamilton 1991
Goldfish, *Carassius auratus*	F, M	Selenium dioxide	157	**26,100**	26,100	Cardwell et al. 1976a,b
Common carp, *Cyprinus carpio*	R, U	-	-	**35,000**	35,000	Sato et al. 1980

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Golden shiner, *Notemigonus crysoleucas*	F, M	Sodium selenite	72.2	**11,200**	11,200	Hartwell et al. 1989
Fathead minnow, *Pimephales promelas*	S, U	Sodium selenite	312 (13°C)	10,500	-	Adams 1976
Fathead minnow, *Pimephales promelas*	S, U	Sodium selenite	312 (13°C)	11,300	-	Adams 1976
Fathead minnow, *Pimephales promelas*	S, U	Sodium selenite	303 (20°C)	6,000	-	Adams 1976
Fathead minnow, *Pimephales promelas*	S, U	Sodium selenite	303 (20°C)	7,400	-	Adams 1976
Fathead minnow, *Pimephales promelas*	S, U	Sodium selenite	292 (25°C)	3,400	-	Adams 1976
Fathead minnow, *Pimephales promelas*	S, U	Sodium selenite	292 (25°C)	2,200	-	Adams 1976
Fathead minnow (30 days), *Pimephales promelas*	S, M	Sodium selenite	51.1	1,700	-	Brooke et al. 1985
Fathead minnow (juvenile), *Pimephales promelas*	S, U	Sodium selenite	40	7,760	-	Mayer and Ellersieck 1986
Fathead minnow (fry), *Pimephales promelas*	F, M	Selenium dioxide	157	**2,100**	-	Cardwell et al. 1976a,b
Fathead minnow (juvenile), *Pimephales promelas*	F, M	Selenium dioxide	157	**5,200**	-	Cardwell et al. 1976a,b
Fathead minnow, *Pimephales promelas*	F, M	Sodium selenite	131 (sulfate=24)	**3,670**	--	GLEC 1998
Fathead minnow, *Pimephales promelas*	F, M	Sodium selenite	131 (sulfate=160)	**2,920**	--	GLEC 1998
Fathead minnow, *Pimephales promelas*	F, M	Sodium selenite	145 (sulfate=214)	**3,390**	--	GLEC 1998
Fathead minnow, *Pimephales promelas*	F, M	Sodium selenite	140 (sulfate=870)	**2,380**	-	GLEC 1998
Fathead minnow, *Pimephales promelas*	F, M	Selenious acid	220[d]	**620**	-	Kimball, Manuscript
Fathead minnow, *Pimephales promelas*	F, M	Selenious acid	220[d]	**970**	2,209	Kimball, Manuscript
Colorado squawfish (fry), *Ptychocheilus lucius*	S, U	Sodium selenite	197	**6,398**	-	Hamilton 1995

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Colorado squawfish (0.4-1.1 g juvenile), *Ptychocheilus lucius*	S, U	Sodium selenite	197	**16,452**	-	Hamilton 1995
Colorado squawfish (1.7 g juvenile), *Ptychocheilus lucius*	S, U	Sodium selenite	197	**14,624**	-	Hamilton 1995
Colorado squawfish (larva), *Ptychocheilus lucius*	S, U	Sodium selenite	199	**7,960**	-	Buhl and Hamilton 1996
Colorado squawfish (juvenile), *Ptychocheilus lucius*	S, U	Sodium selenite	199	**17,350**	-	Buhl and Hamilton 1996
Colorado squawfish (0.024-0.047 g), *Ptychocheilus lucius*	S, U	Sodium selenite	144	**20,700**	12,801	Hamilton and Buhl 1997a
Bonytail (fry), *Gila elegans*	S, U	Sodium selenite	197	**8,680**	-	Hamilton 1995
Bonytail (1.1 g juvenile), *Gila elegans*	S, U	Sodium selenite	197	**7,769**	-	Hamilton 1995
Bonytail (2.6 g juvenile), *Gila elegans*	S, U	Sodium selenite	197	**6,855**	-	Hamilton 1995
Bonytail (larva), *Gila elegans*	S, U	Sodium selenite	199	**14,490**	-	Buhl and Hamilton 1996
Bonytail (juvenile), *Gila elegans*	S, U	Sodium selenite	199	**12,870**	9,708	Buhl and Hamilton 1996
Razorback sucker (fry), *Xyrauchen texanus*	S, U	Sodium selenite	197	**6,855**	-	Hamilton 1995
Razorback sucker (0.9 g juvenile), *Xyrauchen texanus*	S, U	Sodium selenite	197	**4,067**	-	Hamilton 1995
Razorback sucker (2.0 g juvenile), *Xyrauchen texanus*	S, U	Sodium selenite	197	**7,312**	-	Hamilton 1995
Razorback sucker (larva), *Xyrauchen texanus*	S, U	Sodium selenite	199	**10,450**	-	Buhl and Hamilton 1996
Razorback sucker (juvenile), *Xyrauchen texanus*	S, U	Sodium selenite	199	**8,520**	-	Buhl and Hamilton 1996
Razorback sucker (0.006-0.042 g), *Xyrauchen texanus*	S, U	Sodium selenite	144	**11,300**	7,679	Hamilton and Buhl 1997a

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
White sucker, *Catostomus commersoni*	F, M	Sodium selenite	10.2	**29,000**	-	Klaverkamp et al. 1983a
White sucker, *Catostomus commersoni*	F, M	Sodium selenite	18	**31,400**	30,176	Duncan and Klaverkamp 1983
Flannelmouth sucker (12-13 days), *Catostomus latipinnis*	S, U	Sodium selenite	144	**19,100**	19,100	Hamilton and Buhl 1997b
Striped bass (63 days), *Morone saxatilis*	S, U	Sodium selenite	40	**1,325**	-	Palawski et al. 1985
Striped bass (63 days), *Morone saxatilis*	S, U	Sodium selenite	285	**2,400**	1,783	Palawski et al. 1985
Channel catfish (juvenile), *Ictalurus punctatus*	S, M	Sodium selenite	49.8	16,000	-	Brooke et al. 1985
Channel catfish (juvenile), *Ictalurus punctatus*	S, U	Sodium selenite	41	4,110	-	Mayer and Ellersieck 1986
Channel catfish, *Ictalurus punctatus*	F, M	Selenium dioxide	157	**13,600**	13,600	Cardwell et al. 1976a,b
Flagfish, *Jordanella floridae*	F, M	Selenium dioxide	157	**6,500**	6,500	Cardwell et al. 1976a,b
Mosquitofish, *Gambusia affinis*	S, U	Sodium selenite	45.7	**12,600**	12,600	Reading 1979
Bluegill (juvenile), *Lepomis macrochirus*	S, M	Sodium selenite	50.5	12,000	-	Brooke et al. 1985
Bluegill, *Lepomis macrochirus*	F, M	Selenium dioxide	157	**28,500**	28,500	Cardwell et al. 1976a,b
Yellow perch, *Perca flavescens*	F, M	Sodium selenite	10.2	**11,700**[a]	11,700	Klaverkamp et al. 1983a
		Selenate				
Hydra (adult), *Hydra sp.*	S, M	Sodium selenate	53.6	**7,300**	7,300	Brooke et al. 1985
Leech (adult), *Nephelopsis obscura*	S, M	Sodium selenate	49.3	**442,000**	442,000	Brooke et al. 1985
Snail, *Aplexa hypnorum*	S, M	Sodium selenate	51.0	**193,000**	193,000	Brooke et al. 1985
Cladoceran (<24 hr), *Ceriodaphnia dubia*	S, M	Sodium selenate	52 (sulfate=52)	1,969	--	Brix et al. 2001a,b
Cladoceran (<24 hr), *Ceriodaphnia dubia*	S, M	Sodium selenate	52 (sulfate=55)	1,864	--	Brix et al. 2001a,b

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Cladoceran (<24 hr), *Ceriodaphnia dubia*	F, M	Sodium selenate	127 (sulfate=25)	**376**	376	GLEC 1999
Cladoceran, *Daphnia magna*	S, M	Sodium selenate	129.5	**5,300**	-	Dunbar et al. 1983
Cladoceran, *Daphnia magna*	S, M	Sodium selenate	138	**1,010**	-	Boyum 1984
Cladoceran, *Daphnia magna*	S, M	Sodium selenate	48.1	**570**	-	Brooke et al. 1985
Cladoceran, *Daphnia magna*	S, M	Sodium selenate	45.5	**2,560**	-	Ingersoll et al. 1990
Cladoceran, *Daphnia magna*	S, M	Sodium selenate	136	**4,070**	-	Ingersoll et al. 1990
Cladoceran (<24 hr), *Daphnia magna*	R, M	Sodium selenate	80-100	**2,840**	2,118	Maier et al. 1993
Cladoceran (<24 hr), *Daphnia pulex*	S, M	Sodium selenate	52 (sulfate=52)	10,123	--	Brix et al. 2001a,b
Cladoceran (<24 hr), *Daphnia pulex*	S, M	Sodium selenate	52 (sulfate=55)	8,111	--	Brix et al. 2001a,b
Cladoceran (<24 hr), *Daphnia pulex*	F, M	Sodium selenate	147 (sulfate=25)	**1,528**	1,528	GLEC 1999
Cladoceran, *Daphnia pulicaria*	S, M	Sodium selenate	138	**246**	246	Boyum 1984
Amphipod (8-12 mm), *Gammarus lacustris*	S, M	Sodium selenate	116 (sulfate=120)	**3,054**	3,054	Brix et al. 2001a,b
Amphipod (adult), *Gammarus pseudolimnaeus*	S, M	Sodium selenate	46.1	75	-	Brooke et al. 1985
Amphipod (adult), *Gammarus pseudolimnaeus*	S, M	Sodium selenate	51.0	57	-	Brooke 1987
Amphipod, *Gammarus pseudolimnaeus*	F, M	Sodium selenate	139 (sulfate=25)	**1,180**	-	GLEC 1998
Amphipod, *Gammarus pseudolimnaeus*	F, M	Sodium selenate	132 (sulfate=125)	**2,870**	--	GLEC 1998
Amphipod, *Gammarus pseudolimnaeus*	F, M	Sodium selenate	137 (sulfate=367)	**3,710**	-	GLEC 1998

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Amphipod, *Gammarus pseudolimnaeus*	F, M	Sodium selenate	134 (sulfate=635)	**3,270**	-	GLEC 1998
Amphipod (adult), *Gammarus pseudolimnaeus*	F, M	Sodium selenate	131 (sulfate=25)	**2,191**	2,460	GLEC 1999
Amphipod, *Hyalella azteca*	F, U	Sodium selenate	336.8	760	-	Adams 1976
Amphipod (2 mm length), *Hyalella azteca*	R, M	Sodium selenate	133	1,031	-	Brasher and Ogle 1993
Amphipod (7-10 days), *Hyalella azteca*	S, M	Sodium selenate	52 (sulfate=55)	1,428	--	Brix et al. 2001a,b
Amphipod, *Hyalella azteca*	F, M	Sodium selenate	143 (sulfate=40)	**2,480**	--	GLEC 1998
Amphipod, *Hyalella azteca*	F, M	Sodium selenate	132 (sulfate=125)	**1,350**	--	GLEC 1998
Amphipod, *Hyalella azteca*	F, M	Sodium selenate	137 (sulfate=367)	**1,540**	--	GLEC 1998
Amphipod, *Hyalella azteca*	F, M	Sodium selenate	133 (sulfate=822)	**3,580**	2,073	GLEC 1998
Midge (4th instar), *Chironomus decorus*	R, M	Sodium selenate	85	**23,700**	23,700	Maier and Knight 1993
Midge (3rd instar), *Paratanytarsus parthenogeneticus*	S, M	Sodium selenate	49.4	**20,000**	20,000	Brooke et al. 1985
Coho salmon (0.5 g), *Oncorhynchus kisutch*	S, U	Sodium selenate	211	**32,500**	-	Hamilton and Buhl 1990b
Coho salmon (1.7 g), *Oncorhynchus kisutch*	S, U	Sodium selenate	333	**39,000**	-	Hamilton and Buhl 1990b
Coho salmon (alevin), *Oncorhynchus kisutch*	S, U	Sodium selenate	41	158,422[f]	-	Buhl and Hamilton 1991
Coho salmon (juvenile), *Oncorhynchus kisutch*	S, U	Sodium selenate	41	**30,932**	33,972	Buhl and Hamilton 1991
Chinook salmon (0.7 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenate	211	**121,000**	-	Hamilton and Buhl 1990b

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Chinook salmon (0.5 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenate	211	**100,000**	-	Hamilton and Buhl 1990b
Chinook salmon (1.6 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenate	333	**180,000**	-	Hamilton and Buhl 1990b
Chinook salmon (1.6 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenate	333	**134,000**	-	Hamilton and Buhl 1990b
Chinook salmon (eyed egg), *Oncorhynchus tshawytscha*	S, U	Sodium selenate	41.7	>552,000[f]	-	Hamilton and Buhl 1990b
Chinook salmon (alevin), *Oncorhynchus tshawytscha*	S, U	Sodium selenate	41.7	>176,640[f]	-	Hamilton and Buhl 1990b
Chinook salmon (0.31 g), *Oncorhynchus tshawytscha*	S, U	Sodium selenate	41.7	**62,900**	112,918	Hamilton and Buhl 1990b
Rainbow trout (juvenile), *Oncorhynchus mykiss*	S, M	Sodium selenate	51.0	24,000	-	Brooke et al. 1985
Rainbow trout (alevin), *Oncorhynchus mykiss*	S, U	Sodium selenate	41	196,460	-	Buhl and Hamilton 1991
Rainbow trout (juvenile), *Oncorhynchus mykiss*	S, U	Sodium selenate	41	13,501	-	Buhl and Hamilton 1991
Rainbow trout, *Oncorhynchus mykiss*	F, M	Sodium selenate	45	**47,000**	47,000	Spehar 1986
Arctic grayling (alevin), *Thymallus arcticus*	S, U	Sodium selenate	41	**41,800**	-	Buhl and Hamilton 1991
Arctic grayling (juvenile), *Thymallus arcticus*	S, U	Sodium selenate	41	**75,240**	56,081	Buhl and Hamilton 1991
Fathead minnow, *Pimephales promeles*	S, U	Sodium selenate	323	11,800	-	Adams 1976

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Fathead minnow, *Pimephales promeles*	S, U	Sodium selenate	323	11,000	-	Adams 1976
Fathead minnow, *Pimephales promeles*	S, U	Sodium selenate	323	12,500	-	Adams 1976
Fathead minnow (juvenile), *Pimephales promelas*	S, M	Sodium selenate	47.9	2,300	-	Brooke et al. 1985
Fathead minnow, *Pimephales promelas*	F, M	Sodium selenate	46	**5,500**	-	Spehar 1986
Fathead minnow, *Pimephales promelas*	F, M	Sodium selenate	136 (sulfate=24)	**6,210**	-	GLEC 1998
Fathead minnow, *Pimephales promelas*	F, M	Sodium selenate	127 (sulfate=160)	**10,800**	-	GLEC 1998
Fathead minnow, *Pimephales promelas*	F, M	Sodium selenate	131 (sulfate=474)	**18,000**	-	GLEC 1998
Fathead minnow, *Pimephales promelas*	F, M	Sodium selenate	147 (sulfate=906)	**42,100**	12,282	GLEC 1998
Colorado squawfish (fry), *Ptychocheilus lucius*	S, U	Sodium selenate	197	**27,588**	-	Hamilton 1995
Colorado squawfish (0.4-1.1 g juvenile), *Ptychocheilus lucius*	S, U	Sodium selenate	197	**119,548**	-	Hamilton 1995
Colorado squawfish (1.7 g juvenile), *Ptychocheilus lucius*	S, U	Sodium selenate	197	**138,358**	-	Hamilton 1995
Colorado squawfish (larva), *Ptychocheilus lucius*	S, U	Sodium selenate	199	**13,580**	-	Buhl and Hamilton 1996
Colorado squawfish (juvenile), *Ptychocheilus lucius*	S, U	Sodium selenate	199	**42,780**	-	Buhl and Hamilton 1996
Colorado squawfish (0.024-0.047 g), *Ptychocheilus lucius*	S, U	Sodium selenate	144	**88,000**	53,454	Hamilton and Buhl 1997a
Bonytail (fry), *Gila elegans*	S, U	Sodium selenate	197	**22,990**	-	Hamilton 1995
Bonytail (1.1 g juvenile), *Gila elegans*	S, U	Sodium selenate	197	**102,828**	-	Hamilton 1995

Table 1a. Acute Toxicity of Selenium to Freshwater Animals (continued).

Species	Method[a]	Chemical	Hardness (mg/L as $CaCO_3$)	LC50 or EC50 (µg/L)[b]	Species Mean Acute Value (µg/L)	Reference
Bonytail (2.6 g juvenile), *Gila elegans*	S, U	Sodium selenate	197	**90,706**	-	Hamilton 1995
Bonytail (larva), *Gila elegans*	S, U	Sodium selenate	199	**14,570**	-	Buhl and Hamilton 1996
Bonytail (juvenile), *Gila elegans*	S, U	Sodium selenate	199	**24,010**	37,586	Buhl and Hamilton 1996
Razorback sucker (fry), *Xyrauchen texanus*	S, U	Sodium selenate	197	**20,064**	-	Hamilton 1995
Razorback sucker (0.9 g juvenile), *Xyrauchen texanus*	S, U	Sodium selenate	197	**15,048**	-	Hamilton 1995
Razorback sucker (2.0 g juvenile), *Xyrauchen texanus*	S, U	Sodium selenate	197	**10,450**	-	Hamilton 1995
Razorback sucker (larva), *Xyrauchen texanus*	S, U	Sodium selenate	199	**13,910**	-	Buhl and Hamilton 1996
Razorback sucker (juvenile), *Xyrauchen texanus*	S, U	Sodium selenate	199	**7,620**	-	Buhl and Hamilton 1996
Razorback sucker (0.006-0.042 g), *Xyrauchen texanus*	S, U	Sodium selenate	144	**15,900**	13,211	Hamilton and Buhl 1997a
Flannelmouth sucker (12-13 days), *Catostomus latipinnis*	S, U	Sodium selenate	144	**26,900**	26,900	Hamilton and Buhl 1997b
Channel catfish (juvenile), *Ictalurus punctatus*	S, M	Sodium selenate	51.0	**66,000**	66,000	Brooke et al. 1985
Bluegill (juvenile), *Lepomis macrochirus*	S, M	Sodium selenate	50.4	**63,000**	63,000	Brooke et al. 1985

[a] S = static; R = renewal; F = flow-through; M = measured; U = unmeasured.
[b] Concentration of selenium, not the chemical. **Note:** The values underlined in this column were used to calculate the SMAV for the respective species.
[c] Reported by Barrows et al. (1980) in work performed in the same laboratory under the same contract.
[d] From Smith et al. (1976).
[e] Calculated from regression equation.
[f] Not used in calculation of Species Mean Acute Value because data are available for a more sensitive life stage.