Interim
Record of Decision (ROD) Amendment, Upper Basin of the Coeur d'Alene River

Bunker Hill Mining
and Metallurgical Complex
Superfund Site

Part 3 Section 4.0
Responses to Individual Comments

United States
Environmental Protection
Agency Region 10

August 2012

Responses to Individual Comments

This section presents EPA's responses to individual comments received on the Proposed Plan. EPA received comments in various forms including letters, emails, and oral testimony at community meetings. The comments and EPA's responses are organized into the following attachments (the attachments are provided in electronic format):

- **Attachment A**: Index of Commenters and Responses
- **Attachment B**: Master Comment List
- **Attachment C**: Responses to Federal Agency Comments
- **Attachment D**: Responses to State Agency Comments
- **Attachment E**: Responses to Native American Tribe Comments
- **Attachment F**: Responses to Local Jurisdiction Comments
- **Attachment G**: Responses to Local Community/Special Interest Organization Comments
- **Attachment H**: Responses to Business Comments
- **Attachment I**: Responses to Individual Comments

Attachment A presents an Index of all comments sorted in two methods. First, all commenters are listed alphabetically by the last name of the person or the organization providing the comments. It provides the locations (Attachment and page number) of the comments and EPA's responses. Second, all comment are listed alphabetically/numerically by the comment number, along with the locations of the comments and responses.

Many comments address similar issues. In these cases, the response for a given issue is provided once. Responses to later comments on the same issue refer to the master comment list where this response is provided. These responses are referred to as "master comment responses" and are found in Attachment B. When using Attachment B, the user may find that the referenced response addresses more issues than he or she raised. In these cases, it is expected that the user will be able to identify those parts of the referenced response that apply. In other cases, a comment may raise multiple issues. In such cases, the user may be referred to several master comment responses for a complete response to all issues raised. An overview of the issues raised and EPA's responses is provided in Part 3, Section 3.0, Responsiveness Summary.

In Attachments C through I, the comments and responses are sorted alphabetically by the last name of the commenter. Each comment letter, email, and oral testimony comment was assigned a unique identification number (e.g., 1365213). Each comment was assigned a unique comment number (e.g., LJ36-1). Many commenters submitted more than one comment letter. In these cases, a separate identification number and comment number were assigned for each set of comments. This approach helped EPA ensure that all comments were addressed.

In Attachments C through I, an image of the original comment is shown on the left side of the page and includes EPA's delineation. The right side of the page presents EPA's response to that comment.

A number of commenters' names were illegible, and these commenters are listed as "Unknown." EPA has included their comments in Attachment I and has responded to the comments where possible.

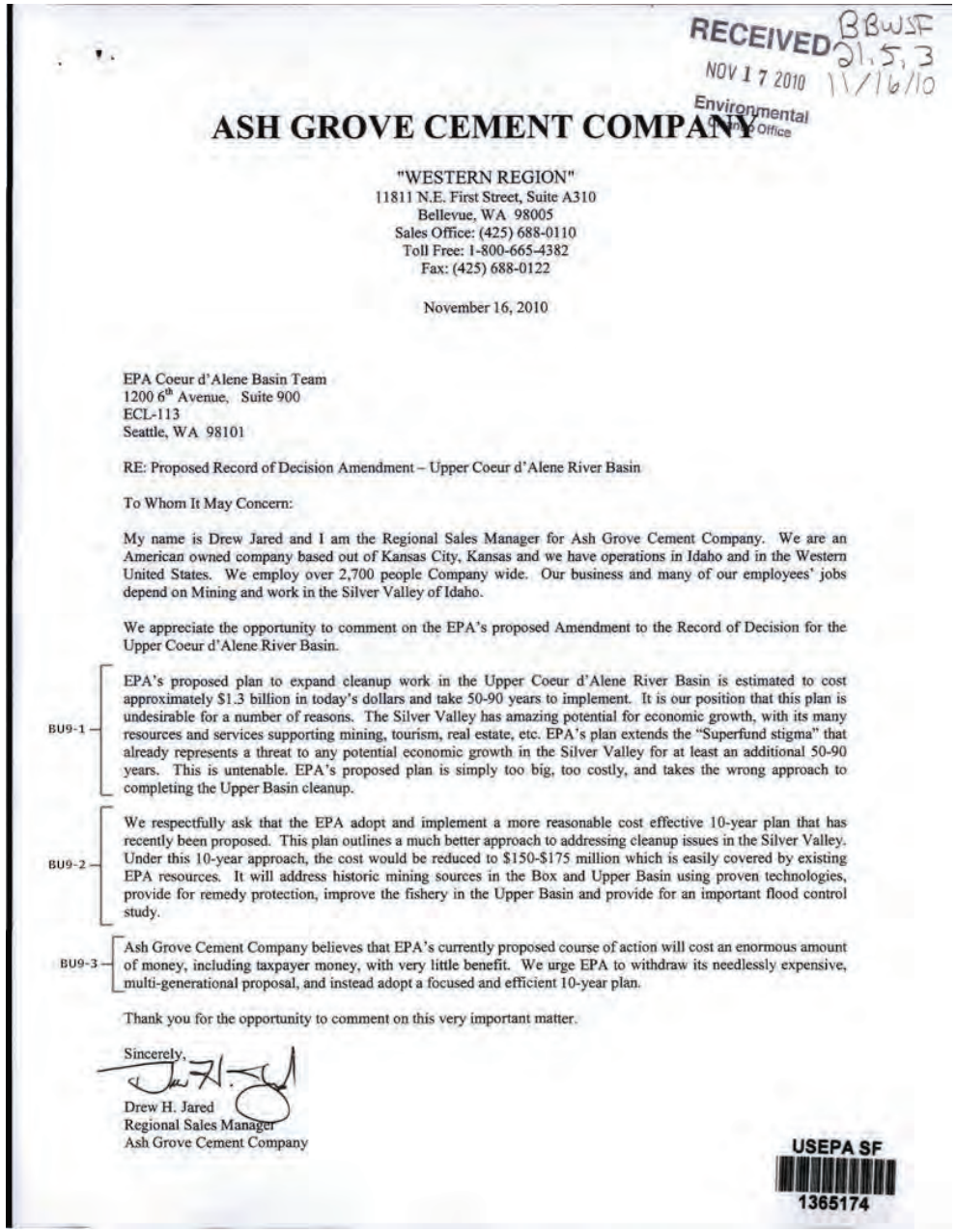
As provided in the CERCLA statute, Section 117(b), EPA is only responsible for providing responses to each of the "significant" comments, criticisms, and new data. Comments not meeting this statutory criterion have nonetheless been recorded in this section, and responses have been provided to the extent possible.

ATTACHMENT H

Responses to Business Comments

Contents

Ash Grove Cement Company, BU9, Letter 1365174



RECEIVED BBWSF 21.5.3
NOV 17 2010 11/16/10
Environmental Protection Agency Office

ASH GROVE CEMENT COMPANY

"WESTERN REGION"
11811 N.E. First Street, Suite A310
Bellevue, WA 98005
Sales Office: (425) 688-0110
Toll Free: 1-800-665-4382
Fax: (425) 688-0122

November 16, 2010

EPA Coeur d'Alene Basin Team
1200 6th Avenue, Suite 900
ECL-113
Seattle, WA 98101

RE: Proposed Record of Decision Amendment – Upper Coeur d'Alene River Basin

To Whom It May Concern:

My name is Drew Jared and I am the Regional Sales Manager for Ash Grove Cement Company. We are an American owned company based out of Kansas City, Kansas and we have operations in Idaho and in the Western United States. We employ over 2,700 people Company wide. Our business and many of our employees' jobs depend on Mining and work in the Silver Valley of Idaho.

We appreciate the opportunity to comment on the EPA's proposed Amendment to the Record of Decision for the Upper Coeur d'Alene River Basin.

BU9-1 EPA's proposed plan to expand cleanup work in the Upper Coeur d'Alene River Basin is estimated to cost approximately $1.3 billion in today's dollars and take 50-90 years to implement. It is our position that this plan is undesirable for a number of reasons. The Silver Valley has amazing potential for economic growth, with its many resources and services supporting mining, tourism, real estate, etc. EPA's plan extends the "Superfund stigma" that already represents a threat to any potential economic growth in the Silver Valley for at least an additional 50-90 years. This is untenable. EPA's proposed plan is simply too big, too costly, and takes the wrong approach to completing the Upper Basin cleanup.

BU9-2 We respectfully ask that the EPA adopt and implement a more reasonable cost effective 10-year plan that has recently been proposed. This plan outlines a much better approach to addressing cleanup issues in the Silver Valley. Under this 10-year approach, the cost would be reduced to $150-$175 million which is easily covered by existing EPA resources. It will address historic mining sources in the Box and Upper Basin using proven technologies, provide for remedy protection, improve the fishery in the Upper Basin and provide for an important flood control study.

BU9-3 Ash Grove Cement Company believes that EPA's currently proposed course of action will cost an enormous amount of money, including taxpayer money, with very little benefit. We urge EPA to withdraw its needlessly expensive, multi-generational proposal, and instead adopt a focused and efficient 10-year plan.

Thank you for the opportunity to comment on this very important matter.

Sincerely,

Drew H. Jared
Regional Sales Manager
Ash Grove Cement Company

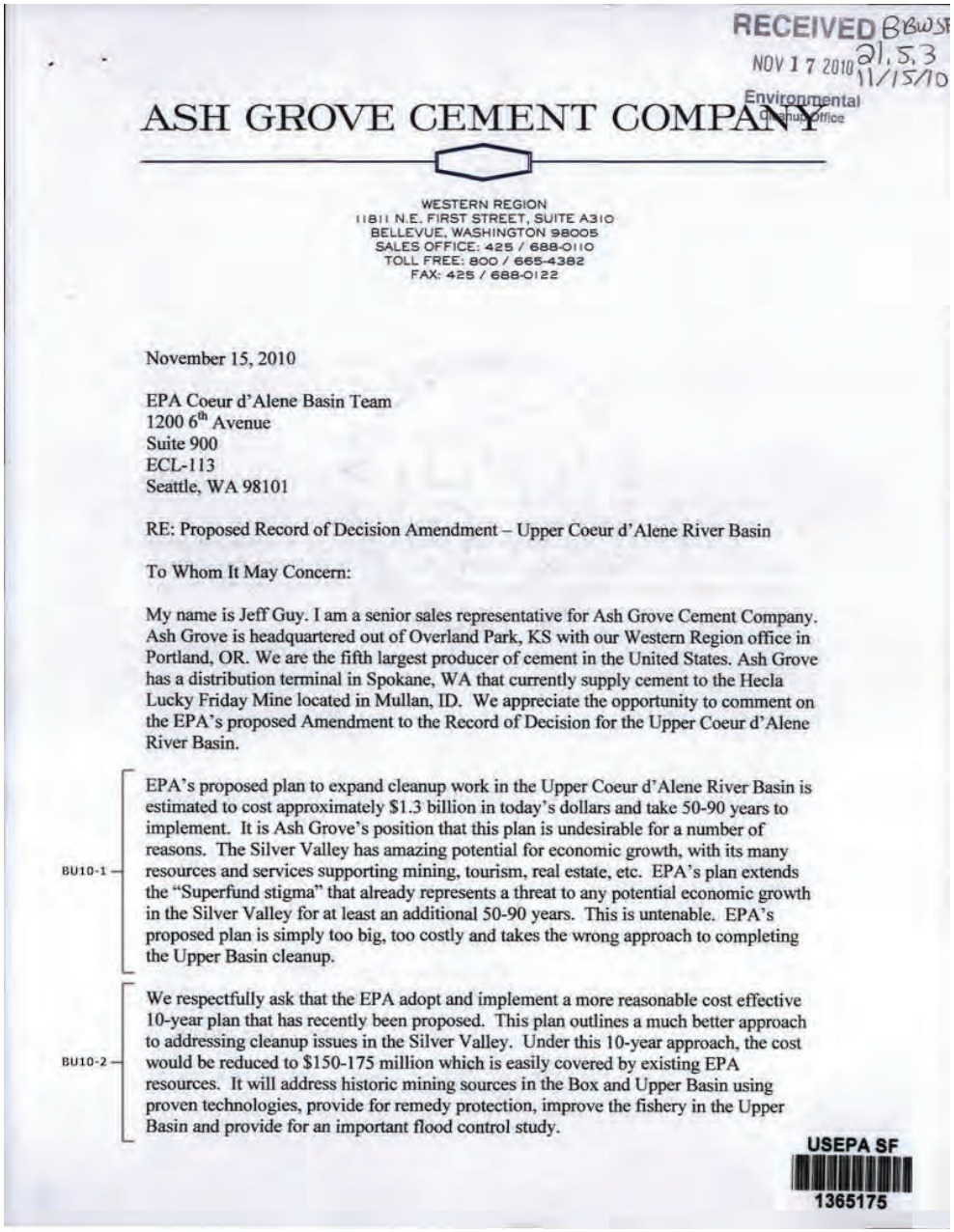
USEPA SF
1365174

Response to comment BU9-1
See response to Comment No. I474-1.

Response to comment BU9-2
See response to Comment No. I474-2.

Response to comment BU9-3
See response to Comment No. I474-3.

Ash Grove Cement Company, BU10, Letter 1365175



RECEIVED BBWST
NOV 17 2010 21,5,3 11/15/10
Environmental Cleanup Office

ASH GROVE CEMENT COMPANY

WESTERN REGION
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TOLL FREE: 800 / 665-4382
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November 15, 2010

EPA Coeur d'Alene Basin Team
1200 6th Avenue
Suite 900
ECL-113
Seattle, WA 98101

RE: Proposed Record of Decision Amendment – Upper Coeur d'Alene River Basin

To Whom It May Concern:

My name is Jeff Guy. I am a senior sales representative for Ash Grove Cement Company. Ash Grove is headquartered out of Overland Park, KS with our Western Region office in Portland, OR. We are the fifth largest producer of cement in the United States. Ash Grove has a distribution terminal in Spokane, WA that currently supply cement to the Hecla Lucky Friday Mine located in Mullan, ID. We appreciate the opportunity to comment on the EPA's proposed Amendment to the Record of Decision for the Upper Coeur d'Alene River Basin.

BU10-1 EPA's proposed plan to expand cleanup work in the Upper Coeur d'Alene River Basin is estimated to cost approximately $1.3 billion in today's dollars and take 50-90 years to implement. It is Ash Grove's position that this plan is undesirable for a number of reasons. The Silver Valley has amazing potential for economic growth, with its many resources and services supporting mining, tourism, real estate, etc. EPA's plan extends the "Superfund stigma" that already represents a threat to any potential economic growth in the Silver Valley for at least an additional 50-90 years. This is untenable. EPA's proposed plan is simply too big, too costly and takes the wrong approach to completing the Upper Basin cleanup.

BU10-2 We respectfully ask that the EPA adopt and implement a more reasonable cost effective 10-year plan that has recently been proposed. This plan outlines a much better approach to addressing cleanup issues in the Silver Valley. Under this 10-year approach, the cost would be reduced to $150-175 million which is easily covered by existing EPA resources. It will address historic mining sources in the Box and Upper Basin using proven technologies, provide for remedy protection, improve the fishery in the Upper Basin and provide for an important flood control study.

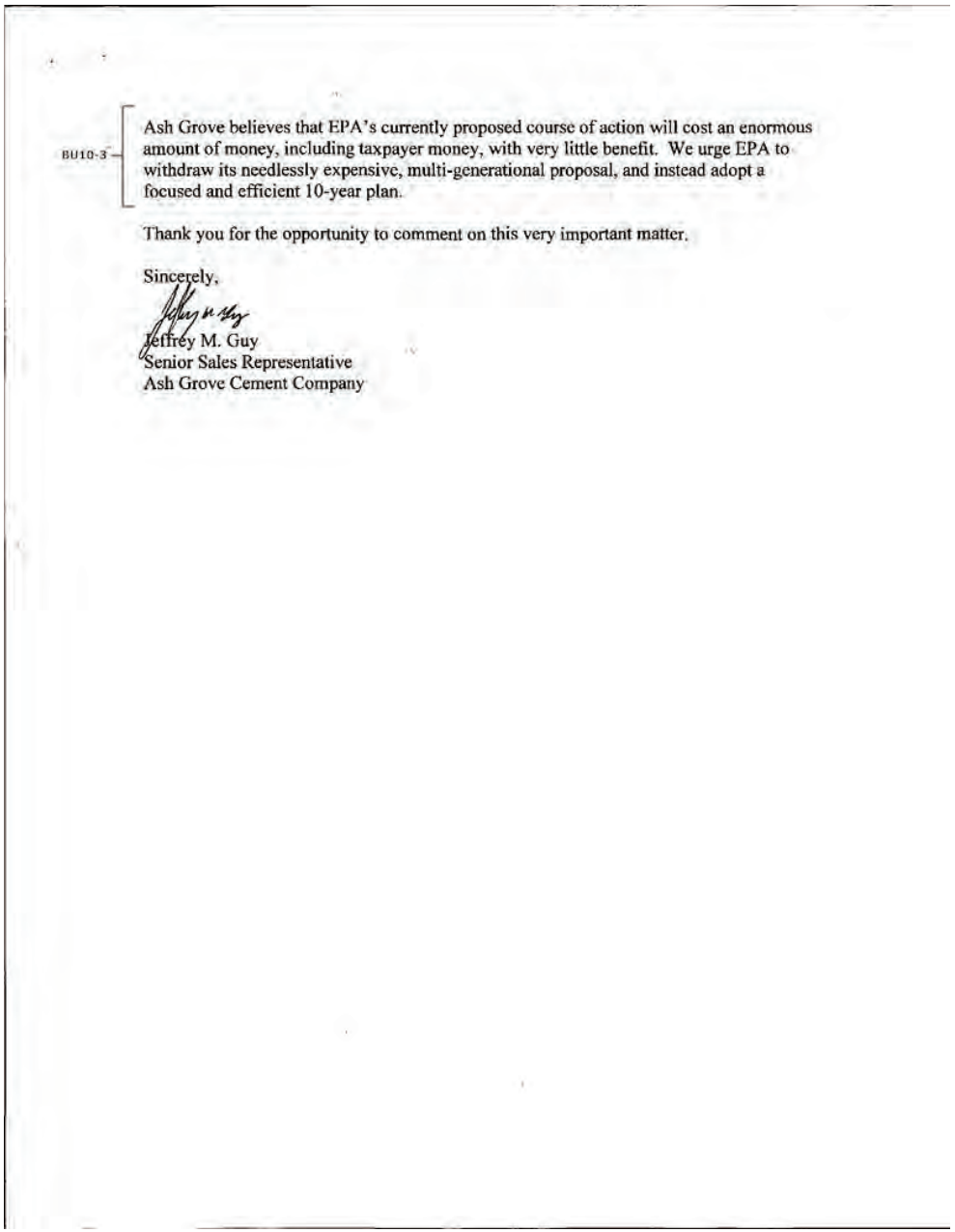
USEPA SF
1365175

Response to comment BU10-1

See response to Comment No. I474-1.

Response to comment BU10-2

See response to Comment No. I474-2.



BU10-3 Ash Grove believes that EPA's currently proposed course of action will cost an enormous amount of money, including taxpayer money, with very little benefit. We urge EPA to withdraw its needlessly expensive, multi-generational proposal, and instead adopt a focused and efficient 10-year plan.

Thank you for the opportunity to comment on this very important matter.

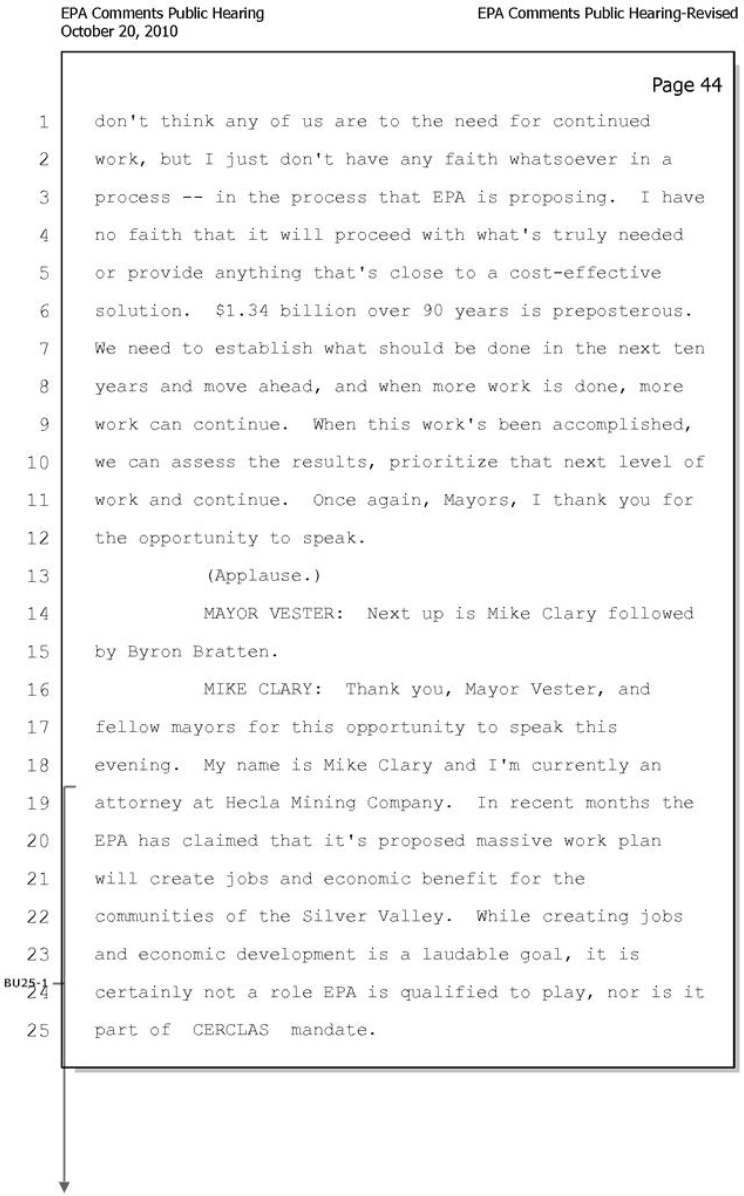
Sincerely,

Jeffrey M. Guy
Senior Sales Representative
Ash Grove Cement Company

Response to comment BU10-3

See response to Comment No. I474-3.

Attorney for Hecla Mining Company (Clary, Mike), BU25, Letter 619651-17



EPA Comments Public Hearing
October 20, 2010

EPA Comments Public Hearing-Revised

Page 44

don't think any of us are to the need for continued work, but I just don't have any faith whatsoever in a process -- in the process that EPA is proposing. I have no faith that it will proceed with what's truly needed or provide anything that's close to a cost-effective solution. $1.34 billion over 90 years is preposterous. We need to establish what should be done in the next ten years and move ahead, and when more work is done, more work can continue. When this work's been accomplished, we can assess the results, prioritize that next level of work and continue. Once again, Mayors, I thank you for the opportunity to speak.

(Applause.)

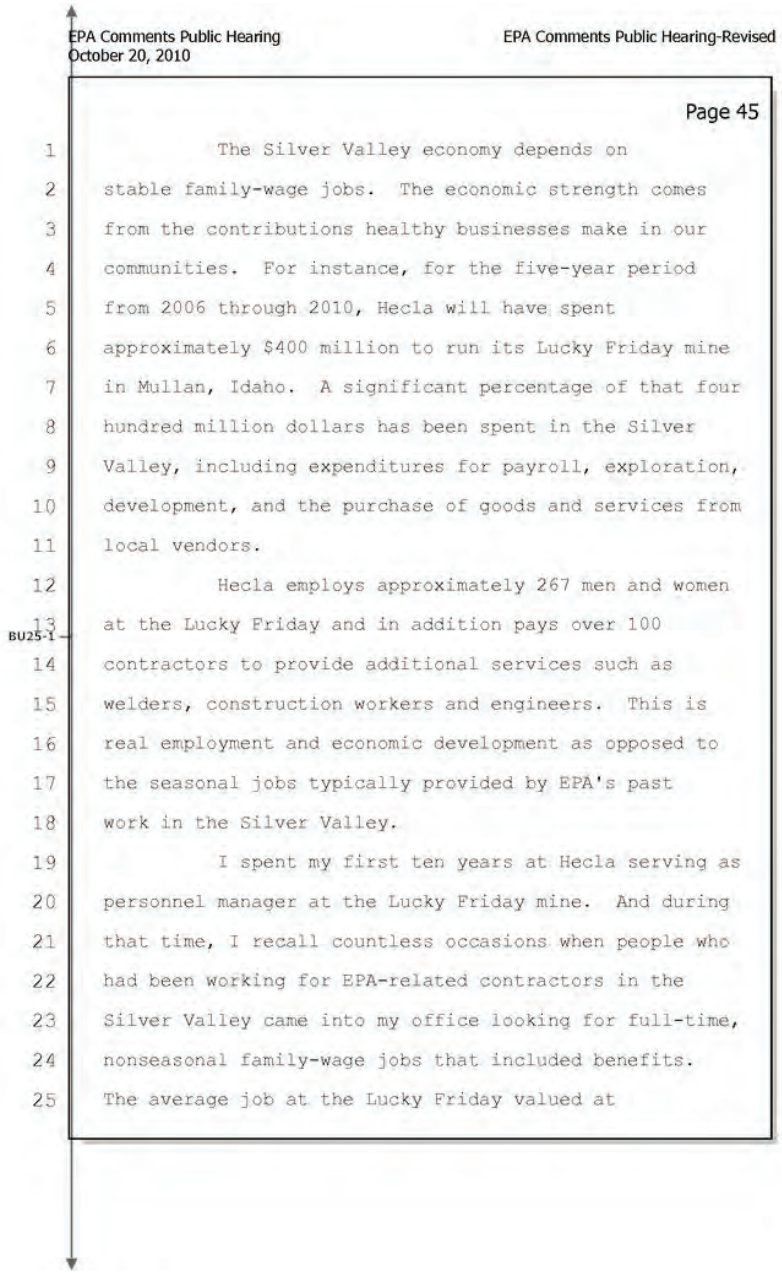
MAYOR VESTER: Next up is Mike Clary followed by Byron Bratten.

MIKE CLARY: Thank you, Mayor Vester, and fellow mayors for this opportunity to speak this evening. My name is Mike Clary and I'm currently an attorney at Hecla Mining Company. In recent months the EPA has claimed that it's proposed massive work plan will create jobs and economic benefit for the communities of the Silver Valley. While creating jobs and economic development is a laudable goal, it is certainly not a role EPA is qualified to play, nor is it part of CERCLAS mandate.

BU25-1

Response to comment BU25-1

It is true that job creation is not part of EPA's mandate. However, if jobs are created through decisions and actions implemented by EPA, this is a positive aspect of the cleanup for the local economy and one that should be considered in the evaluation of the Preferred Alternative.



EPA Comments Public Hearing
October 20, 2010

EPA Comments Public Hearing-Revised

Page 45

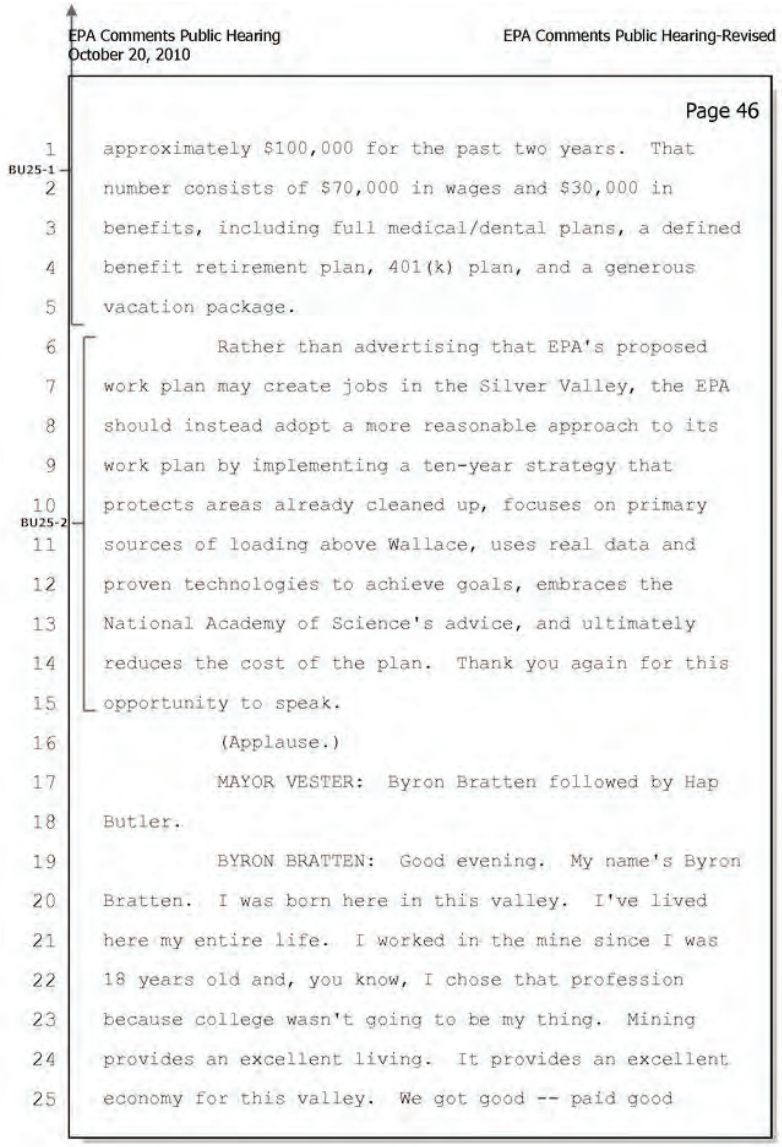
The Silver Valley economy depends on stable family-wage jobs. The economic strength comes from the contributions healthy businesses make in our communities. For instance, for the five-year period from 2006 through 2010, Hecla will have spent approximately $400 million to run its Lucky Friday mine in Mullan, Idaho. A significant percentage of that four hundred million dollars has been spent in the Silver Valley, including expenditures for payroll, exploration, development, and the purchase of goods and services from local vendors.

Hecla employs approximately 267 men and women at the Lucky Friday and in addition pays over 100 contractors to provide additional services such as welders, construction workers and engineers. This is real employment and economic development as opposed to the seasonal jobs typically provided by EPA's past work in the Silver Valley.

I spent my first ten years at Hecla serving as personnel manager at the Lucky Friday mine. And during that time, I recall countless occasions when people who had been working for EPA-related contractors in the Silver Valley came into my office looking for full-time, nonseasonal family-wage jobs that included benefits. The average job at the Lucky Friday valued at

BU25-1

No comments



EPA Comments Public Hearing
October 20, 2010

EPA Comments Public Hearing-Revised

Page 46

approximately $100,000 for the past two years. That
BU25-1
number consists of $70,000 in wages and $30,000 in benefits, including full medical/dental plans, a defined benefit retirement plan, 401(k) plan, and a generous vacation package.

Rather than advertising that EPA's proposed work plan may create jobs in the Silver Valley, the EPA should instead adopt a more reasonable approach to its work plan by implementing a ten-year strategy that protects areas already cleaned up, focuses on primary
BU25-2
sources of loading above Wallace, uses real data and proven technologies to achieve goals, embraces the National Academy of Science's advice, and ultimately reduces the cost of the plan. Thank you again for this opportunity to speak.

(Applause.)

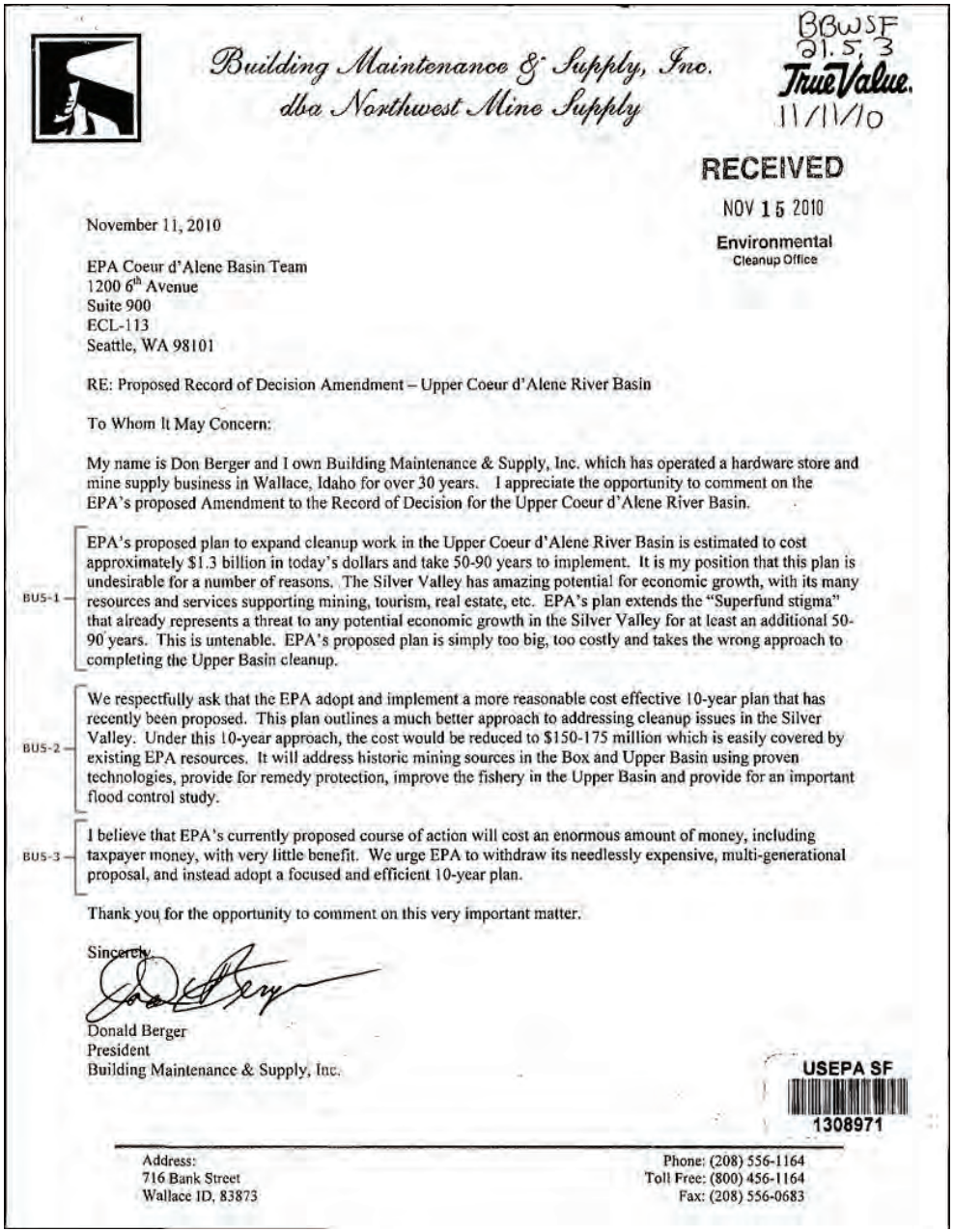
MAYOR VESTER: Byron Bratten followed by Hap Butler.

BYRON BRATTEN: Good evening. My name's Byron Bratten. I was born here in this valley. I've lived here my entire life. I worked in the mine since I was 18 years old and, you know, I chose that profession because college wasn't going to be my thing. Mining provides an excellent living. It provides an excellent economy for this valley. We got good -- paid good

Response to comment BU25-2

See response to Comment No. I474-2.

Building Maintenance & Supply Inc., BU5, Letter 1308971



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Building Maintenance & Supply, Inc.
dba Northwest Mine Supply

True Value.

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Cleanup Office

November 11, 2010

EPA Coeur d'Alene Basin Team
1200 6th Avenue
Suite 900
ECL-113
Seattle, WA 98101

RE: Proposed Record of Decision Amendment – Upper Coeur d'Alene River Basin

To Whom It May Concern:

My name is Don Berger and I own Building Maintenance & Supply, Inc. which has operated a hardware store and mine supply business in Wallace, Idaho for over 30 years. I appreciate the opportunity to comment on the EPA's proposed Amendment to the Record of Decision for the Upper Coeur d'Alene River Basin.

BU5-1 — EPA's proposed plan to expand cleanup work in the Upper Coeur d'Alene River Basin is estimated to cost approximately $1.3 billion in today's dollars and take 50-90 years to implement. It is my position that this plan is undesirable for a number of reasons. The Silver Valley has amazing potential for economic growth, with its many resources and services supporting mining, tourism, real estate, etc. EPA's plan extends the "Superfund stigma" that already represents a threat to any potential economic growth in the Silver Valley for at least an additional 50-90 years. This is untenable. EPA's proposed plan is simply too big, too costly and takes the wrong approach to completing the Upper Basin cleanup.

BU5-2 — We respectfully ask that the EPA adopt and implement a more reasonable cost effective 10-year plan that has recently been proposed. This plan outlines a much better approach to addressing cleanup issues in the Silver Valley. Under this 10-year approach, the cost would be reduced to $150-175 million which is easily covered by existing EPA resources. It will address historic mining sources in the Box and Upper Basin using proven technologies, provide for remedy protection, improve the fishery in the Upper Basin and provide for an important flood control study.

BU5-3 — I believe that EPA's currently proposed course of action will cost an enormous amount of money, including taxpayer money, with very little benefit. We urge EPA to withdraw its needlessly expensive, multi-generational proposal, and instead adopt a focused and efficient 10-year plan.

Thank you for the opportunity to comment on this very important matter.

Sincerely,

Donald Berger
President
Building Maintenance & Supply, Inc.

USEPA SF
1308971

Address:
716 Bank Street
Wallace ID, 83873

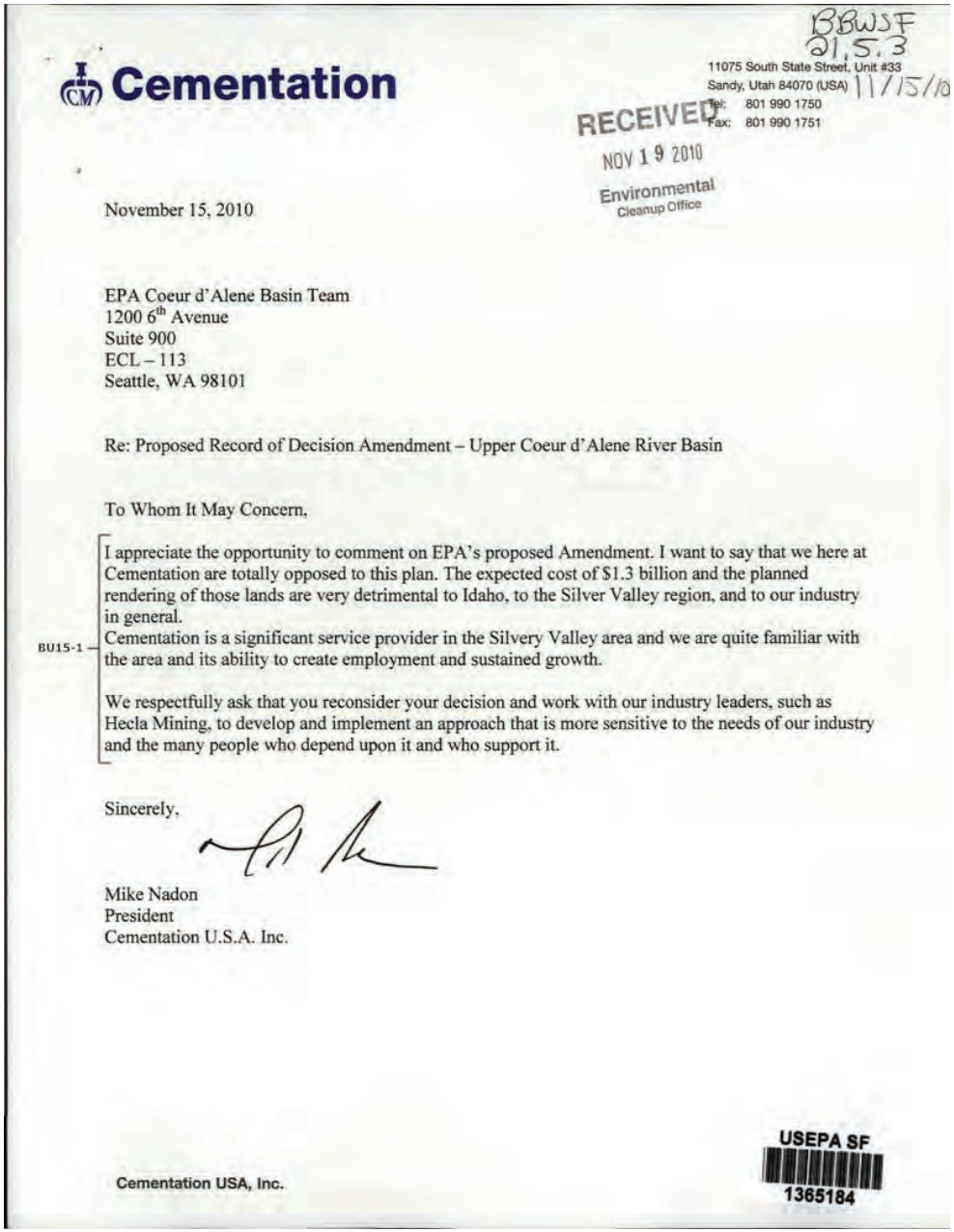
Phone: (208) 556-1164
Toll Free: (800) 456-1164
Fax: (208) 556-0683

Response to comment BU5-1
See response to Comment No. I474-1.

Response to comment BU5-2
See response to Comment No. I474-2.

Response to comment BU5-3
See response to Comment No. I474-3.

Cementation, BU15, Letter 1365184



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21.5.3

Cementation

11075 South State Street, Unit #33
Sandy, Utah 84070 (USA)
Tel: 801 990 1750
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Cleanup Office

November 15, 2010

EPA Coeur d'Alene Basin Team
1200 6th Avenue
Suite 900
ECL – 113
Seattle, WA 98101

Re: Proposed Record of Decision Amendment – Upper Coeur d'Alene River Basin

To Whom It May Concern,

BU15-1 I appreciate the opportunity to comment on EPA's proposed Amendment. I want to say that we here at Cementation are totally opposed to this plan. The expected cost of $1.3 billion and the planned rendering of those lands are very detrimental to Idaho, to the Silver Valley region, and to our industry in general.
Cementation is a significant service provider in the Silvery Valley area and we are quite familiar with the area and its ability to create employment and sustained growth.

We respectfully ask that you reconsider your decision and work with our industry leaders, such as Hecla Mining, to develop and implement an approach that is more sensitive to the needs of our industry and the many people who depend upon it and who support it.

Sincerely,

Mike Nadon
President
Cementation U.S.A. Inc.

Cementation USA, Inc.

USEPA SF
1365184

Response to comment BU15-1

See responses to Comments I474-1 and I58-5.

Century 21, BU14, Letter 1365181

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Century 21
Silver Heritage Realty
517 Bunker Avenue
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www.c21silverheritage.com

November 15, 2010

US EPA
Cd"A Basin Team
1200 6th Avenue, Suite 900
ECL-113
Seattle, WA 98101

To Whom It May Concern:

BU14-1 As an owner of a real estate brokerage and a resident of the Silver Valley, I am deeply concerned about your proposed Upper Coeur d'Alene Basin Cleanup Plan. To expand the plan 50-90 years seems ludicrous. To impose this additional stigma to the Silver Valley will most definitely be detrimental to the citizens and businesses of the valley. From what I understand, when the initial ROD was done, permanent remedies for the issues at hand were not explored. EPA looked at a quick fix to resolve the blood lead issue and that was not meant to be a permanent fix.

I have dealt with mortgage companies who refuse to loan in a Superfund Site. Others will not loan in the Superfund Site if the property tested high for contaminants but has yet to be remediated.

BU14-2 As a real estate broker, one of the issues I face almost daily, is the flood designation in the Silver Valley. Many of our buyers require the use of Rural Development funds for financing. Rural Development will not loan in a flood designation. Many other buyers avoid properties in the flood zone due to the additional insurance required. Adding $50 - $100 per month to their mortgage payments just for flood insurance often disqualifies them for the loan.

BU14-3 The clean up within the "box" allowed lenders to have some certainty but still does not give the community or lenders a long term fix. If localized flooding hits our area and the levees in Kellogg fail, the entire amount of money spent on the cleanup will have been wasted. In the scope of the money planned to be spent for the upcoming decades, it would seem spending 10 million or so would be prudent to *preserve* the hundreds of millions already spent in the "box". The City of Smelterville would also benefit from the work on the Kellogg levees as the flood plain designation could be removed from their community. If the levee system in the Kellogg area was resolved, the real estate market could benefit greatly and save existing and future home owners thousands of dollars in additional insurance premiums.

Sincerely,

Karen Hulstrom

Karen Hulstrom, Broker

cc: Senator Mike Crapo
Senator James Risch
Senator Joyce Broadsword
Representative Walt Minnick
Representative Mike Simpson
Representative Mary Lou Shepherd
Representative R.J. Harwood
John Eaton, Idaho Association of Realtors®

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1365181

Response to comment BU14-1

See responses to Comment Nos. I474-1, I54-2, and I58-1.

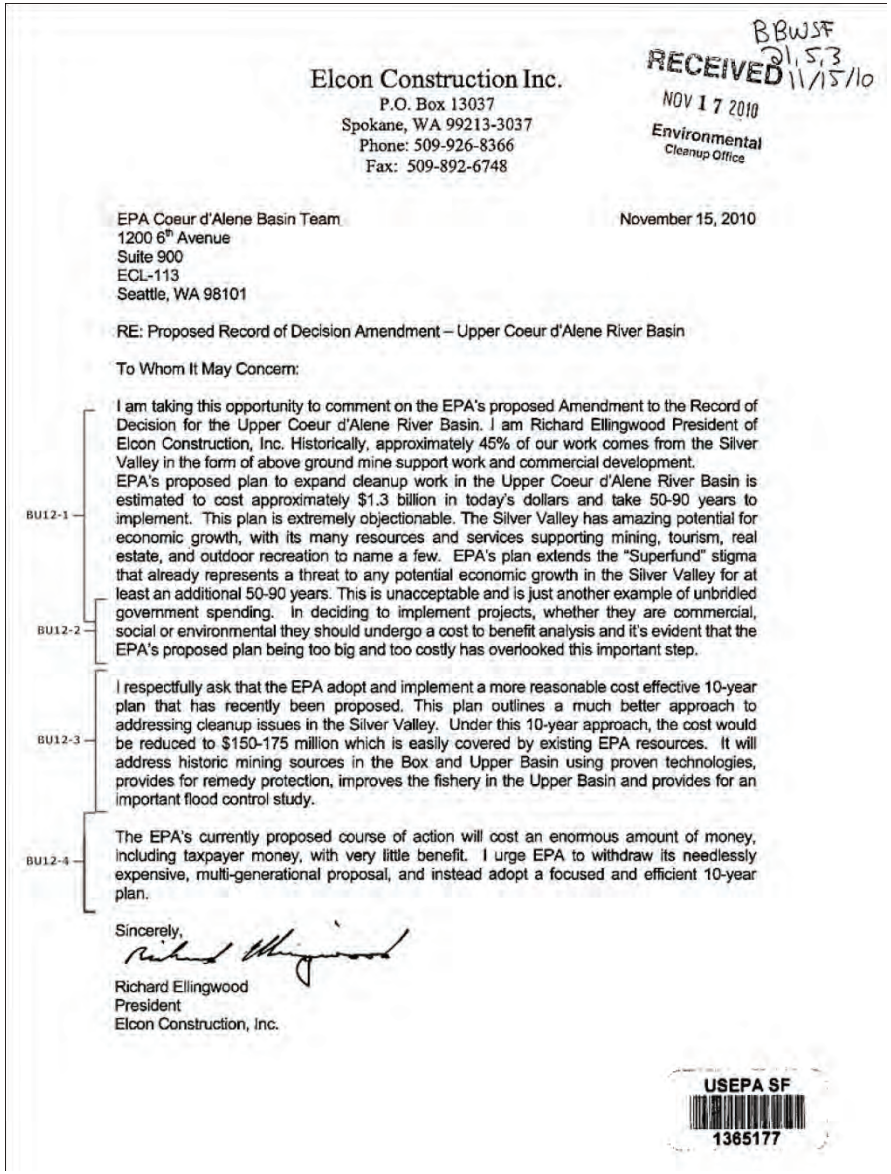
Response to comment BU14-2

EPA understands that local communities are concerned about flood insurance requirements and development restrictions associated with updated Flood Insurance Rate Maps (FIRMs). CERCLA requires that EPA's contribution to flood control work must have a direct connection to the CERCLA remedy. The inclusion of remedy protection projects in the Upper Basin Selected Remedy is an example of EPA and IDEQ working with local communities to identify flood control projects directly tied to the existing Selected Human Health Remedies for OUs 1, 2, and 3. For additional information, see response to Comment No. LJ36-3.

Response to comment BU14-3

EPA is eager to ensure the long-term performance of the Selected Human Health Remedies and understands that local communities are concerned about flood insurance requirements and development restrictions associated with updated Flood Insurance Rate Maps (FIRMs). EPA is therefore committed to working with local, state, and federal entities with an interest in SFCDR flood issues and, consistent with EPA's authority, to help craft solutions. EPA can and will contribute to efforts to understand SFCDR flooding and, if these efforts identify actions that will meet Superfund remedy requirements, EPA will define and select these activities in future decision documents. CERCLA requires that EPA's contribution to flood control work must have a direct connection to the CERCLA remedy.

Elcon Construction Inc., BU12, Letter 1365177



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Environmental Cleanup Office

Elcon Construction Inc.
P.O. Box 13037
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EPA Coeur d'Alene Basin Team
1200 6th Avenue
Suite 900
ECL-113
Seattle, WA 98101

November 15, 2010

RE: Proposed Record of Decision Amendment – Upper Coeur d'Alene River Basin

To Whom It May Concern:

I am taking this opportunity to comment on the EPA's proposed Amendment to the Record of Decision for the Upper Coeur d'Alene River Basin. I am Richard Ellingwood President of Elcon Construction, Inc. Historically, approximately 45% of our work comes from the Silver Valley in the form of above ground mine support work and commercial development.

BU12-1 EPA's proposed plan to expand cleanup work in the Upper Coeur d'Alene River Basin is estimated to cost approximately $1.3 billion in today's dollars and take 50-90 years to implement. This plan is extremely objectionable. The Silver Valley has amazing potential for economic growth, with its many resources and services supporting mining, tourism, real estate, and outdoor recreation to name a few. EPA's plan extends the "Superfund" stigma that already represents a threat to any potential economic growth in the Silver Valley for at least an additional 50-90 years. This is unacceptable and is just another example of unbridled government spending.

BU12-2 In deciding to implement projects, whether they are commercial, social or environmental they should undergo a cost to benefit analysis and it's evident that the EPA's proposed plan being too big and too costly has overlooked this important step.

BU12-3 I respectfully ask that the EPA adopt and implement a more reasonable cost effective 10-year plan that has recently been proposed. This plan outlines a much better approach to addressing cleanup issues in the Silver Valley. Under this 10-year approach, the cost would be reduced to $150-175 million which is easily covered by existing EPA resources. It will address historic mining sources in the Box and Upper Basin using proven technologies, provides for remedy protection, improves the fishery in the Upper Basin and provides for an important flood control study.

BU12-4 The EPA's currently proposed course of action will cost an enormous amount of money, including taxpayer money, with very little benefit. I urge EPA to withdraw its needlessly expensive, multi-generational proposal, and instead adopt a focused and efficient 10-year plan.

Sincerely,

Richard Ellingwood
President
Elcon Construction, Inc.

USEPA SF
1365177

Response to comment BU12-1

See responses to Comment Nos. I58-1, I58-2, and I54-2.

Response to comment BU12-2

See responses to Comment Nos. I58-1 and I58-2.

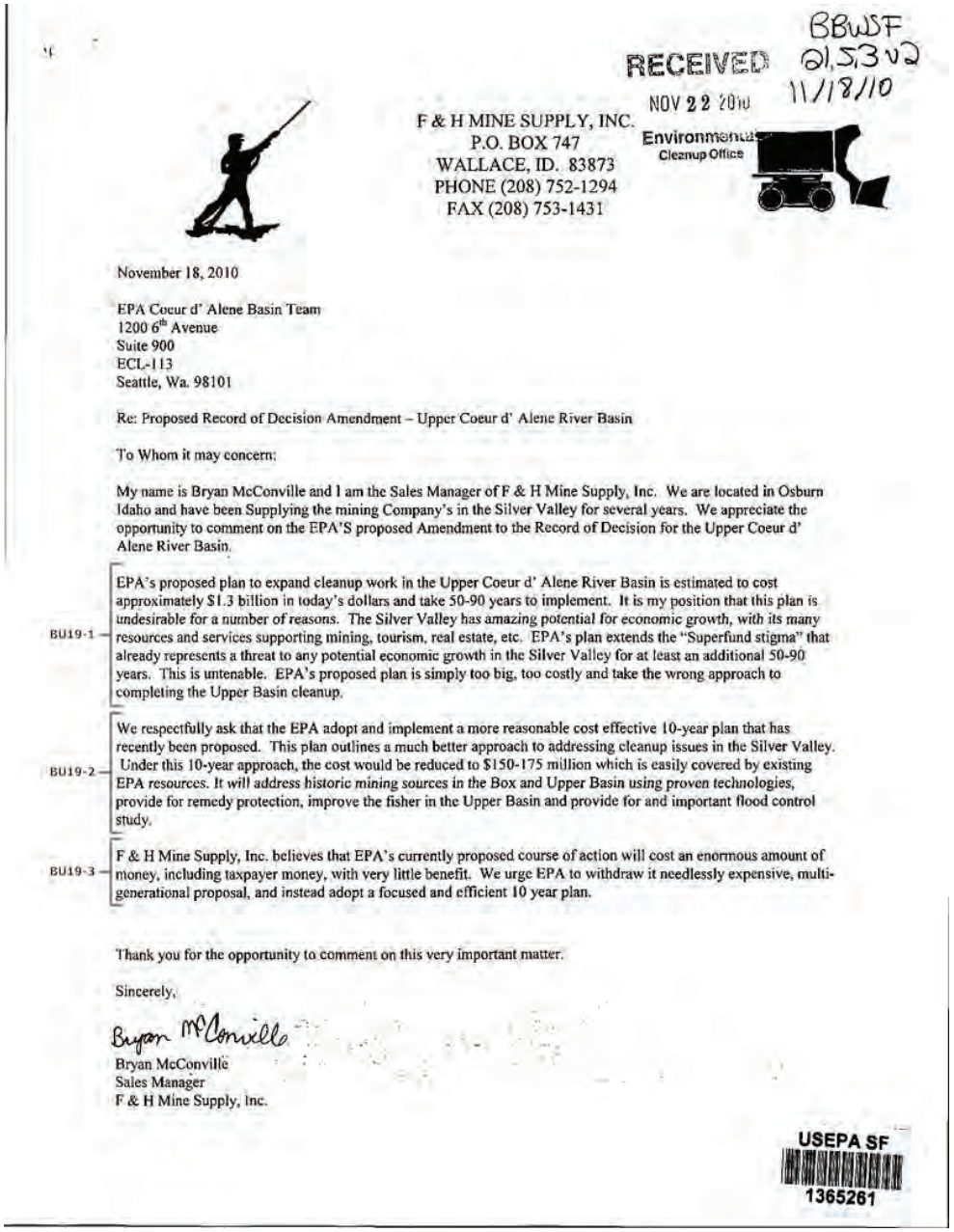
Response to comment BU12-3

See response to Comment I474-2.

Response to comment BU12-4

See responses to Comment Nos. I58-2 and I474-2.

F & H Mine Supply, Inc., BU19, Letter 1365261



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F & H MINE SUPPLY, INC.
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WALLACE, ID. 83873
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November 18, 2010

EPA Coeur d' Alene Basin Team
1200 6th Avenue
Suite 900
ECL-113
Seattle, Wa. 98101

Re: Proposed Record of Decision Amendment – Upper Coeur d' Alene River Basin

To Whom it may concern:

My name is Bryan McConville and I am the Sales Manager of F & H Mine Supply, Inc. We are located in Osburn Idaho and have been Supplying the mining Company's in the Silver Valley for several years. We appreciate the opportunity to comment on the EPA'S proposed Amendment to the Record of Decision for the Upper Coeur d' Alene River Basin.

BU19-1 EPA's proposed plan to expand cleanup work in the Upper Coeur d' Alene River Basin is estimated to cost approximately $1.3 billion in today's dollars and take 50-90 years to implement. It is my position that this plan is undesirable for a number of reasons. The Silver Valley has amazing potential for economic growth, with its many resources and services supporting mining, tourism, real estate, etc. EPA's plan extends the "Superfund stigma" that already represents a threat to any potential economic growth in the Silver Valley for at least an additional 50-90 years. This is untenable. EPA's proposed plan is simply too big, too costly and take the wrong approach to completing the Upper Basin cleanup.

BU19-2 We respectfully ask that the EPA adopt and implement a more reasonable cost effective 10-year plan that has recently been proposed. This plan outlines a much better approach to addressing cleanup issues in the Silver Valley. Under this 10-year approach, the cost would be reduced to $150-175 million which is easily covered by existing EPA resources. It will address historic mining sources in the Box and Upper Basin using proven technologies, provide for remedy protection, improve the fisher in the Upper Basin and provide for and important flood control study.

BU19-3 F & H Mine Supply, Inc. believes that EPA's currently proposed course of action will cost an enormous amount of money, including taxpayer money, with very little benefit. We urge EPA to withdraw it needlessly expensive, multi-generational proposal, and instead adopt a focused and efficient 10 year plan.

Thank you for the opportunity to comment on this very important matter.

Sincerely,

Bryan McConville

Bryan McConville
Sales Manager
F & H Mine Supply, Inc.

USEPA SF
1365261

Response to comment BU19-1

See response to Comment No. I474-1.

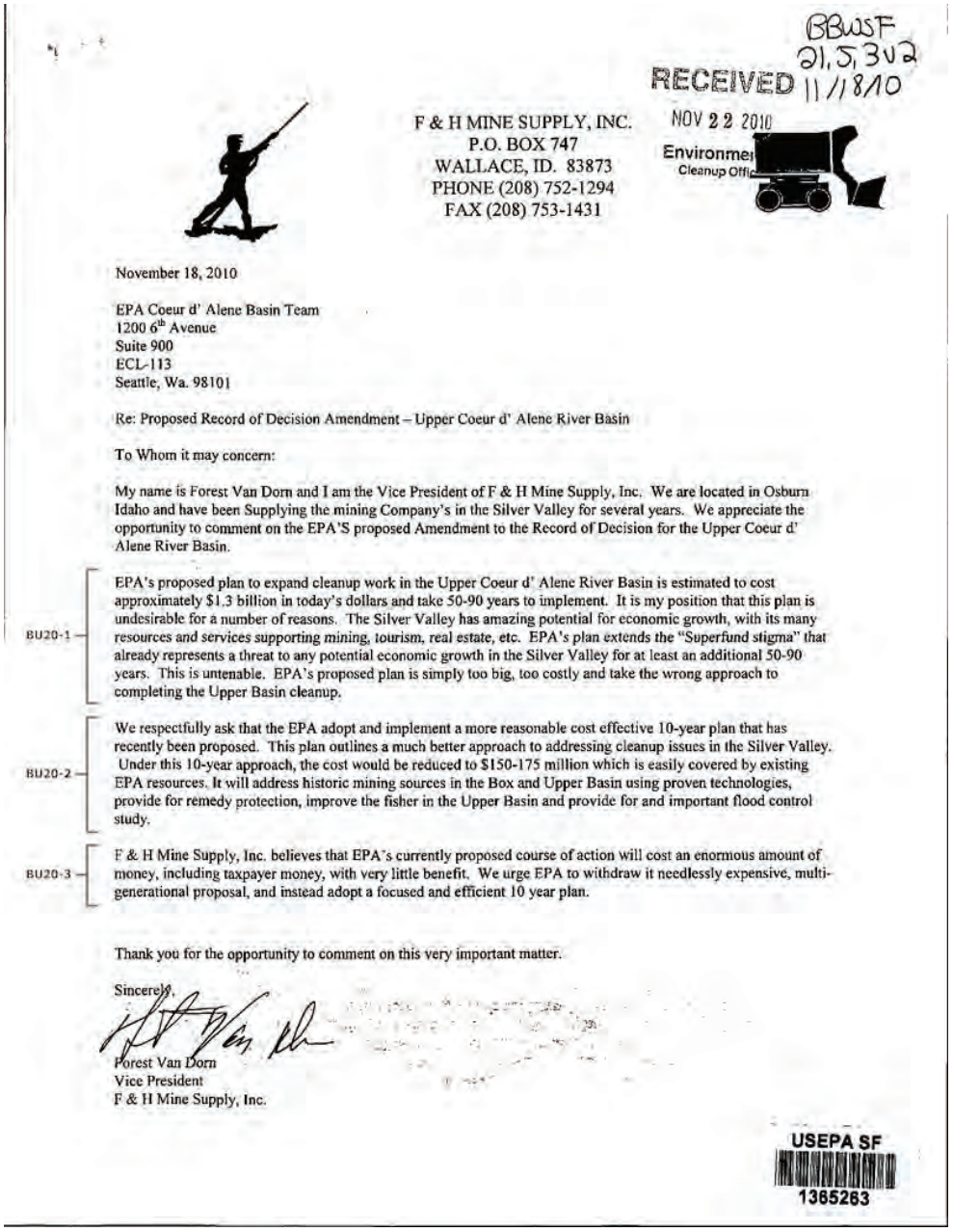
Response to comment BU19-2

See response to Comment No. I474-2.

Response to comment BU19-3

See response to Comment No. I474-3.

F & H Mine Supply, Inc., BU20, Letter 1365263



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F & H MINE SUPPLY, INC.
P.O. BOX 747
WALLACE, ID. 83873
PHONE (208) 752-1294
FAX (208) 753-1431

November 18, 2010

EPA Coeur d' Alene Basin Team
1200 6th Avenue
Suite 900
ECL-113
Seattle, Wa. 98101

Re: Proposed Record of Decision Amendment – Upper Coeur d' Alene River Basin

To Whom it may concern:

My name is Forest Van Dorn and I am the Vice President of F & H Mine Supply, Inc. We are located in Osburn Idaho and have been Supplying the mining Company's in the Silver Valley for several years. We appreciate the opportunity to comment on the EPA'S proposed Amendment to the Record of Decision for the Upper Coeur d' Alene River Basin.

BU20-1 — EPA's proposed plan to expand cleanup work in the Upper Coeur d' Alene River Basin is estimated to cost approximately $1.3 billion in today's dollars and take 50-90 years to implement. It is my position that this plan is undesirable for a number of reasons. The Silver Valley has amazing potential for economic growth, with its many resources and services supporting mining, tourism, real estate, etc. EPA's plan extends the "Superfund stigma" that already represents a threat to any potential economic growth in the Silver Valley for at least an additional 50-90 years. This is untenable. EPA's proposed plan is simply too big, too costly and take the wrong approach to completing the Upper Basin cleanup.

BU20-2 — We respectfully ask that the EPA adopt and implement a more reasonable cost effective 10-year plan that has recently been proposed. This plan outlines a much better approach to addressing cleanup issues in the Silver Valley. Under this 10-year approach, the cost would be reduced to $150-175 million which is easily covered by existing EPA resources. It will address historic mining sources in the Box and Upper Basin using proven technologies, provide for remedy protection, improve the fisher in the Upper Basin and provide for and important flood control study.

BU20-3 — F & H Mine Supply, Inc. believes that EPA's currently proposed course of action will cost an enormous amount of money, including taxpayer money, with very little benefit. We urge EPA to withdraw it needlessly expensive, multi-generational proposal, and instead adopt a focused and efficient 10 year plan.

Thank you for the opportunity to comment on this very important matter.

Sincerely,

Forest Van Dorn
Vice President
F & H Mine Supply, Inc.

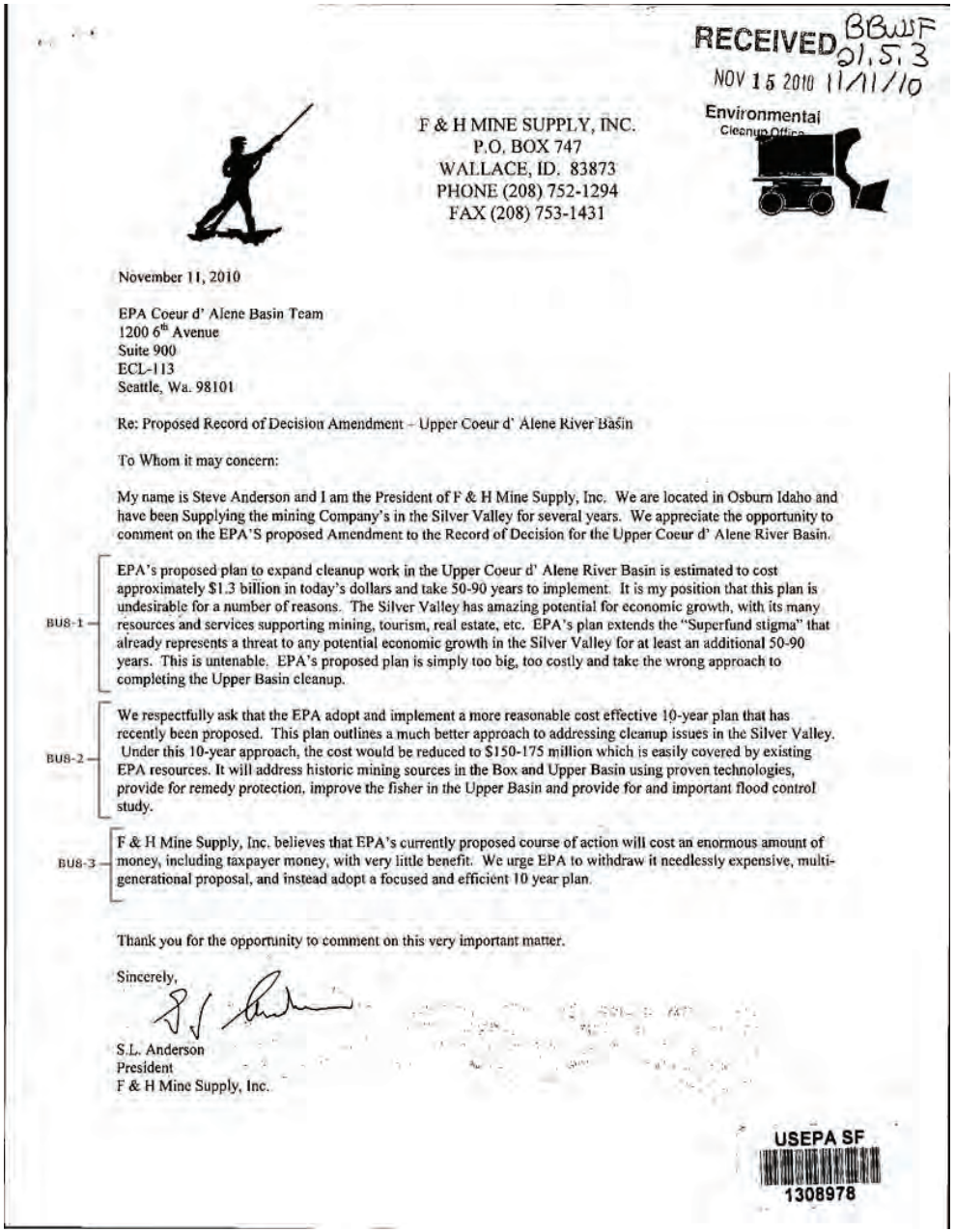
USEPA SF
1365263

Response to comment BU20-1
See response to Comment No. I474-1.

Response to comment BU20-2
See response to Comment No. I474-2.

Response to comment BU20-3
See response to Comment No. I474-3.

F&H Mine Supply Inc., BU8, Letter 1308978



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Environmental Cleanup Office

F & H MINE SUPPLY, INC.
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November 11, 2010

EPA Coeur d' Alene Basin Team
1200 6th Avenue
Suite 900
ECL-113
Seattle, Wa. 98101

Re: Proposed Record of Decision Amendment – Upper Coeur d' Alene River Basin

To Whom it may concern:

My name is Steve Anderson and I am the President of F & H Mine Supply, Inc. We are located in Osburn Idaho and have been Supplying the mining Company's in the Silver Valley for several years. We appreciate the opportunity to comment on the EPA'S proposed Amendment to the Record of Decision for the Upper Coeur d' Alene River Basin.

BU8-1 EPA's proposed plan to expand cleanup work in the Upper Coeur d' Alene River Basin is estimated to cost approximately $1.3 billion in today's dollars and take 50-90 years to implement. It is my position that this plan is undesirable for a number of reasons. The Silver Valley has amazing potential for economic growth, with its many resources and services supporting mining, tourism, real estate, etc. EPA's plan extends the "Superfund stigma" that already represents a threat to any potential economic growth in the Silver Valley for at least an additional 50-90 years. This is untenable. EPA's proposed plan is simply too big, too costly and take the wrong approach to completing the Upper Basin cleanup.

BU8-2 We respectfully ask that the EPA adopt and implement a more reasonable cost effective 10-year plan that has recently been proposed. This plan outlines a much better approach to addressing cleanup issues in the Silver Valley. Under this 10-year approach, the cost would be reduced to $150-175 million which is easily covered by existing EPA resources. It will address historic mining sources in the Box and Upper Basin using proven technologies, provide for remedy protection, improve the fisher in the Upper Basin and provide for and important flood control study.

BU8-3 F & H Mine Supply, Inc. believes that EPA's currently proposed course of action will cost an enormous amount of money, including taxpayer money, with very little benefit. We urge EPA to withdraw it needlessly expensive, multi-generational proposal, and instead adopt a focused and efficient 10 year plan.

Thank you for the opportunity to comment on this very important matter.

Sincerely,

S.L. Anderson
President
F & H Mine Supply, Inc.

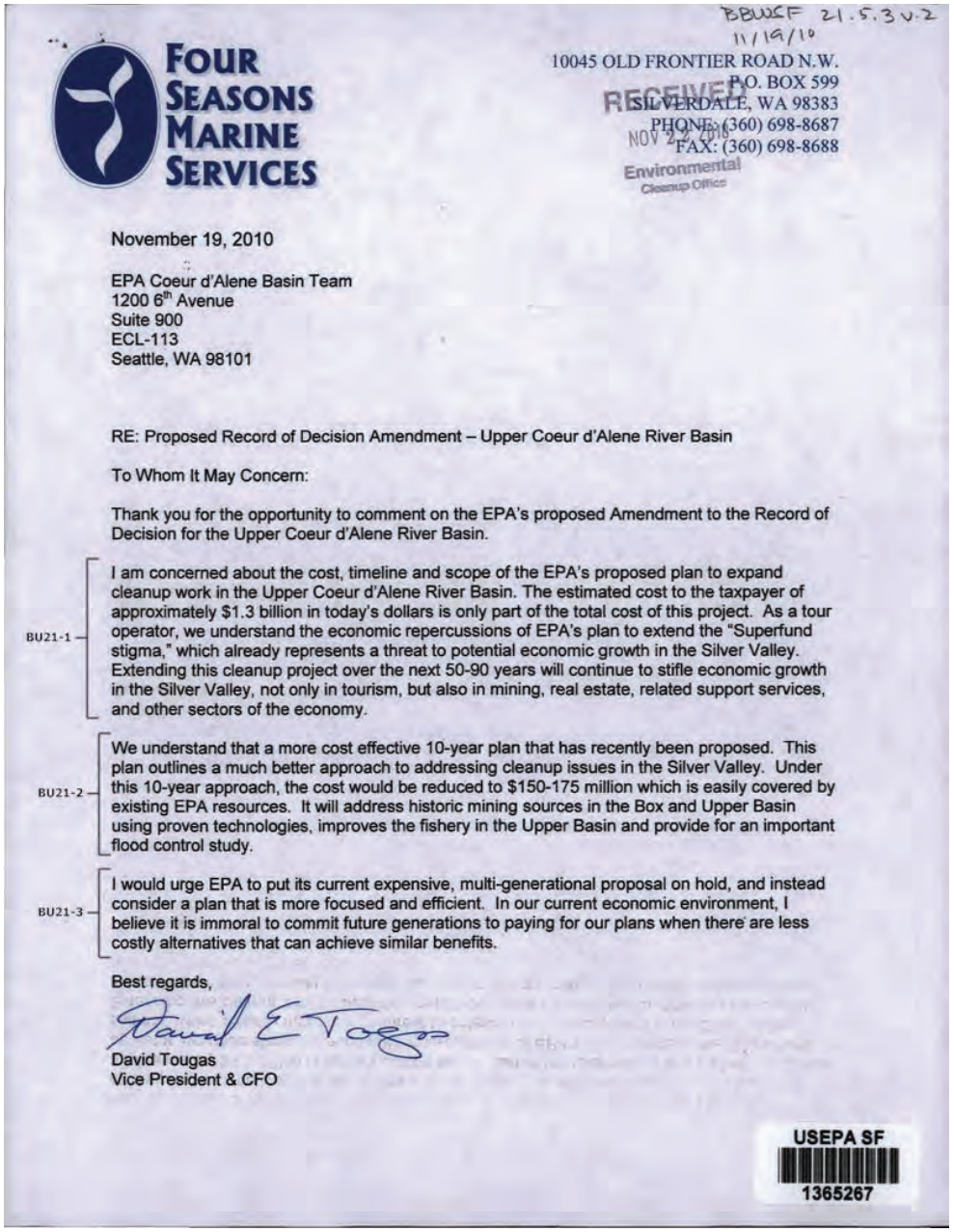
USEPA SF
1308978

Response to comment BU8-1
See response to Comment No. I474-1.

Response to comment BU8-2
See response to Comment No. I474-2.

Response to comment BU8-3
See response to Comment No. I474-3.

Four Seasons Marine Services, BU21, Letter 1365267



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Environmental
Cleanup Office

November 19, 2010

EPA Coeur d'Alene Basin Team
1200 6th Avenue
Suite 900
ECL-113
Seattle, WA 98101

RE: Proposed Record of Decision Amendment – Upper Coeur d'Alene River Basin

To Whom It May Concern:

Thank you for the opportunity to comment on the EPA's proposed Amendment to the Record of Decision for the Upper Coeur d'Alene River Basin.

BU21-1 I am concerned about the cost, timeline and scope of the EPA's proposed plan to expand cleanup work in the Upper Coeur d'Alene River Basin. The estimated cost to the taxpayer of approximately $1.3 billion in today's dollars is only part of the total cost of this project. As a tour operator, we understand the economic repercussions of EPA's plan to extend the "Superfund stigma," which already represents a threat to potential economic growth in the Silver Valley. Extending this cleanup project over the next 50-90 years will continue to stifle economic growth in the Silver Valley, not only in tourism, but also in mining, real estate, related support services, and other sectors of the economy.

BU21-2 We understand that a more cost effective 10-year plan that has recently been proposed. This plan outlines a much better approach to addressing cleanup issues in the Silver Valley. Under this 10-year approach, the cost would be reduced to $150-175 million which is easily covered by existing EPA resources. It will address historic mining sources in the Box and Upper Basin using proven technologies, improves the fishery in the Upper Basin and provide for an important flood control study.

BU21-3 I would urge EPA to put its current expensive, multi-generational proposal on hold, and instead consider a plan that is more focused and efficient. In our current economic environment, I believe it is immoral to commit future generations to paying for our plans when there are less costly alternatives that can achieve similar benefits.

Best regards,

David E Tougas

David Tougas
Vice President & CFO

USEPA SF
1365267

Response to comment BU21-1

See response to Comment No. I474-1.

Response to comment BU21-2

See response to Comment No. I474-2.

Response to comment BU21-3

See response to Comment No. I474-3.

Hecla Mining Company (submitted by Temkin Wielga & Hardt LLP), BU36, Letter 618795

No comments

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November 23, 2010

FILED ELECTRONICALLY (Letter and Attachments)
AND VIA OVERNIGHT DELIVERY (Letter, Attachments and Disks 1-3)[1]

CDA Basin Team
US EPA, Region X
1200 6th Avenue, Suite 900
ECL-113
Seattle, WA 98101

Re: Comments on July 12, 2010 Proposed Plan Amendment for the Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site ("Proposed Plan Amendment" or "Proposed Plan")

Ladies and Gentlemen:

These comments are being submitted for inclusion in the Bunker Hill Upper Basin ROD Amendment Administrative Record File on behalf of Hecla Limited and Hecla Mining Company (collectively "Hecla"), in response to the U.S. Environmental Protection Agency ("EPA") request for comments on the referenced ROD Amendment and the supporting July 2010 Final Draft Focused Feasibility Study ("July 2010 FFS").[2]

This letter consolidates the submittal, on Hecla's behalf, of four sets of technical comments -- from Formation Environmental, LLC ("Formation"), Dr. Edmund Crouch of Cambridge Environmental Inc., Dr. Arthur Riese of EnSci, Inc., and Mr. Sidney Garland of Bechtel Jacobs Company, LLC. The Formation comments are enclosed with this letter on Disk

[1] We originally planned to hand-deliver this letter, the attachments and the accompanying disks. Weather conditions in Seattle today dictate this alternative approach.
[2] In submitting these comments, Hecla is not conceding that judicial review of EPA's remedy selection is limited to the administrative record developed by EPA to support its records of decision. It is Hecla's position that EPA's remedy selection exercises in the Coeur d'Alene Basin raise complicated technical issues and that key documents and information are omitted from, or erroneously characterized in, the administrative record, such that, for these and other reasons, judicial review beyond the administrative record is warranted.

618795

No comments

1. Other materials referenced in this letter are enclosed on Disk 2. Disk 2 also includes Defendants' Phase II Expert Reports in the pending federal court CERCLA litigation, No. 96-0122-N-EJL, plus relevant Phase II affidavits and declarations. Disk 3 includes: Public Opinion materials, Economic Information, 10-Year Plan Comparisons and Miscellaneous Record Submittals. A11 of this material should be added to the administrative record for EPA's Proposed Plan Amendment.

We also believe that the Defendants' Phase I expert reports in No. 96-0122-N-EJL and the Defendants' comments on the 2002 Interim Record of Decision ("IROD"), plus the documents leading up to it, are in the Administrative Record associated with the IROD and, therefore are included in the Administrative Record for this ROD Amendment. If this is not the case, it is Hecla's intent, by this reference, to add to the Administrative Record for this ROD Amendment, these earlier reports and also the Phase I trial transcript and exhibits as relevant to site conditions in the Coeur d'Alene Basin and the issues raised in Hecla's review of the Proposed Plan.[3]

This letter first introduces the technical comments prepared for Hecla by Formation, Dr. Crouch, Dr. Riese, and Mr. Garland. Each set of comments identifies fundamental flaws in EPA's decision-making that have led it to a Proposed Plan that is technically unsupportable, arbitrary and capricious, not supported by the Administrative Record, as required by the "CERCLA" or "Superfund" statute, 42 USC § 9601, *et seq.*, as amended. The Proposed Plan is also not consistent with the National Contingency Plan ("NCP"), 40 C.F.R. Part 300 *et seq.*[4] *See*, in particular, 42 U.S.C. § 113(j). In addition, EPA has not demonstrated that much of its proposed Upper Basin remedy is implementable or, even where it may be implementable, that the proposed cleanup activities will be effective or protective, as required by CERCLA. Certain particularly helpful graphics, including some from the technical comments, are specifically referenced in this letter, with hard-copies included in Attachment A to this letter, for ease of reference.

This letter next addresses the key legal deficiencies in EPA's planning process and the legal implications of EPA's failure to demonstrate, as required by the NCP, that its preferred alternative meets cleanup standards or "ARARs,"[5] and can be effectively implemented at a reasonable cost. Additionally, among other things, the July 2010 FFS, in its comparison of alternatives, fails to serve as the necessary functional equivalent to an Environmental Impact Statement ("EIS") under the National Environmental Policy Act.

This letter closes with a request that EPA reconsider its next steps in the Basin and take a hard look at the 10-Year Plan being offered as an alternative to EPA's mammoth proposal. This Plan, or at least a plan along these lines, has been endorsed by all of the Silver Valley cities,

[3] There is a serious question related to the propriety of EPA apparently establishing a new administrative record for this ROD Amendment, separate and apart from the administrative record of the ROD being amended. This question is addressed, *infra*, at p. 16.
[4] Consistency with the NCP is not part of the legal test for a remedy challenge. It does, however, impact EPA's cost recovery. *See* 42 U.S.C. § 113(j). The NCP is factored into this discussion because of EPA's response cost claim in the pending Phase II federal court litigation.
[5] ARARs are "applicable or relevant and appropriate" cleanup standards under CERCLA § 121. The critical cleanup standard for this discussion is the site-specific ambient water quality criteria for zinc in surface water.

2

Idaho's political leadership, Idaho's business community and various editorial boards.[6] Inexplicably, EPA has been equally clear, before the comment period is even over, that EPA has pre-determined that a 10-Year Plan is patently unacceptable.

1. EPA's Proposed Plan is Technically Indefensible

a. Formation.

As EPA is well aware, Formation personnel have decades of experience successfully designing and implementing remedial actions in the Coeur d'Alene Basin. They have spent more time than just about anyone else on the ground in the Basin, evaluating and addressing site conditions, particularly in the Upper Basin. With all this valuable experience and history, Hecla asked Formation to compare the accuracy of EPA's understanding of site conditions, as explained in the July 2010 FFS and the Proposed Plan, to actual on the ground site conditions. Formation also was asked to evaluate EPA's own evaluation in the July 2010 FFS and the Proposed Plan of the effectiveness, implementability and cost of EPA's proposal. The unprecedented groundwater collection and treatment system EPA is proposing seemed particularly problematic. Among other things, it has EPA, for very little gain relative to zinc concentrations in the South Fork, ripping up the Silver Valley for decades to construct 60 miles of sub-surface piping infrastructure and stream lining at least 10 miles of river between Wallace and Elizabeth Park with plastic and heavy rip-rap.

The critical flaw in EPA's Proposed Plan is the erroneous assumption in the predictive analysis model that the volume of mine waste and zinc loading to the Coeur d'Alene system are directly proportional. As explained in Formation's comments and others as well, this assumption biases EPA's remedy selection process to favor large, expensive remedies, involving significant material relocation, like Alternative 3+. It is this flaw in the predictive analysis that leads to the disparities illustrated in Attachment 1 between where water quality is impacted (the size of the red dots in Attachment 1 correlate to the extent that the zinc water quality standard is exceeded), and where and how much money EPA plans to spend in each segment of the Upper Basin. Thus, for example, EPA proposes to spend $215 million for water quality improvements in the South Fork above Wallace, even though Attachment 1 documents that water quality in this stream segment meets the chemical cleanup goal for zinc at most locations and also supports a healthy fishery.

BU36-1

There is a similar flaw with the comparison between water quality impacts and proposed expenditures in the South Fork between Wallace and Elizabeth Park. Water quality is acceptable in this stretch as well. Yet, EPA proposes to spend most of the $642 million targeted for this reach of the South Fork on an unprecedented groundwater collection and treatment system. This proposal has huge feasibility and implementability uncertainties and could actually dry up much of Canyon Creek during low flows, as illustrated in Attachment 2. The proposed groundwater

[6] Public opposition to EPA's Proposed Plan has been pronounced and widespread. *See* Public Opinion Materials and Attachment 8. Nor are the State financial assurances in place that will be required under CERCLA § 104(c) to fully fund the Proposed Plan. *See also* National Remedy Review Board ("NRRB") 5/12/10 Memorandum, p. 4.

3

Response to comment BU36-1

The comment seeks to summarize the individual comments of Formation Environmental on behalf of Hecla. Rather than respond to the commenter's attempt to summarize, EPA has addressed the Formation comments in detail. See response to Formation Environmental comments in Document No. BU45.

remedy outside the "Box" makes no sense relative to cost and cost-effectiveness.[7] *See* Attachment 3.

The Formation comments detail the following conclusions: (1) the Predictive Analysis model EPA is relying on to evaluate site conditions incorrectly predicts actual site conditions and is not reliable; (2) there are multiple, important requirements that EPA has not addressed in the July 2010 FFS or the Proposed Plan, or with the public, related to the feasibility, implementability and cost of its Proposed Plan, particularly as to the massive, $560 million groundwater pipe and treat proposal; and (3) that what EPA has done is not what the NAS told them to do. EPA's proposal is also inconsistent with the NCP, which quite clearly requires accurate site characterization and cost-effective selection of remedies with a high likelihood of success. The NCP also does not allow EPA to defer evaluation of critical design concepts and associated impacts to a promised, post-remedy consideration. *See generally* 40 C.F.R. § 300.430.

The Formation comments also lay out the details of the 10-Year Plan alternative. This Plan is an updated version of key components of the Upper Basin remedy that were detailed in the Mining Companies' Plan evaluated in the 2002 IROD. The Formation comments explain how, back in 2002, using its now discredited Predictive Analysis model or "PA," EPA improperly screened out the Mining Companies Plan (#6) and the State of Idaho's Plan (#5) as final remedies for either the Upper Basin or the Lower Basin, on grounds that Alternatives 5 and 6 were less protective and would take longer to achieve cleanup standards (ARARs) than preferred Alternatives 3 and 4. Once EPA did that, and failed to carry either alternative forward to its current decision-making, it biased its remedy selection in favor of two, almost identical, astronomically expensive options, now denominated Alternatives 3+ and 4+, where the only key difference between the two options, for purposes of this discussion, is how many millions of yards of material get disturbed and relocated. There is absolutely no meaningful difference in approach between these two alternatives for decision-makers and the public to compare and balance, as there would be if Alternatives 5 or 6 were still in the mix. The upshot is that the public has not been given the opportunity to evaluate a meaningful choice, although the NCP and guidance clearly requires that there be meaningful differences between alternatives to highlight the different trade-offs among different alternatives and to support sound decision-making. *See, e.g.*, "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final (October 1988), p. 1-9. *See also* 40 C.F.R. § 300.430 (e)(3).[8]

BU36-1

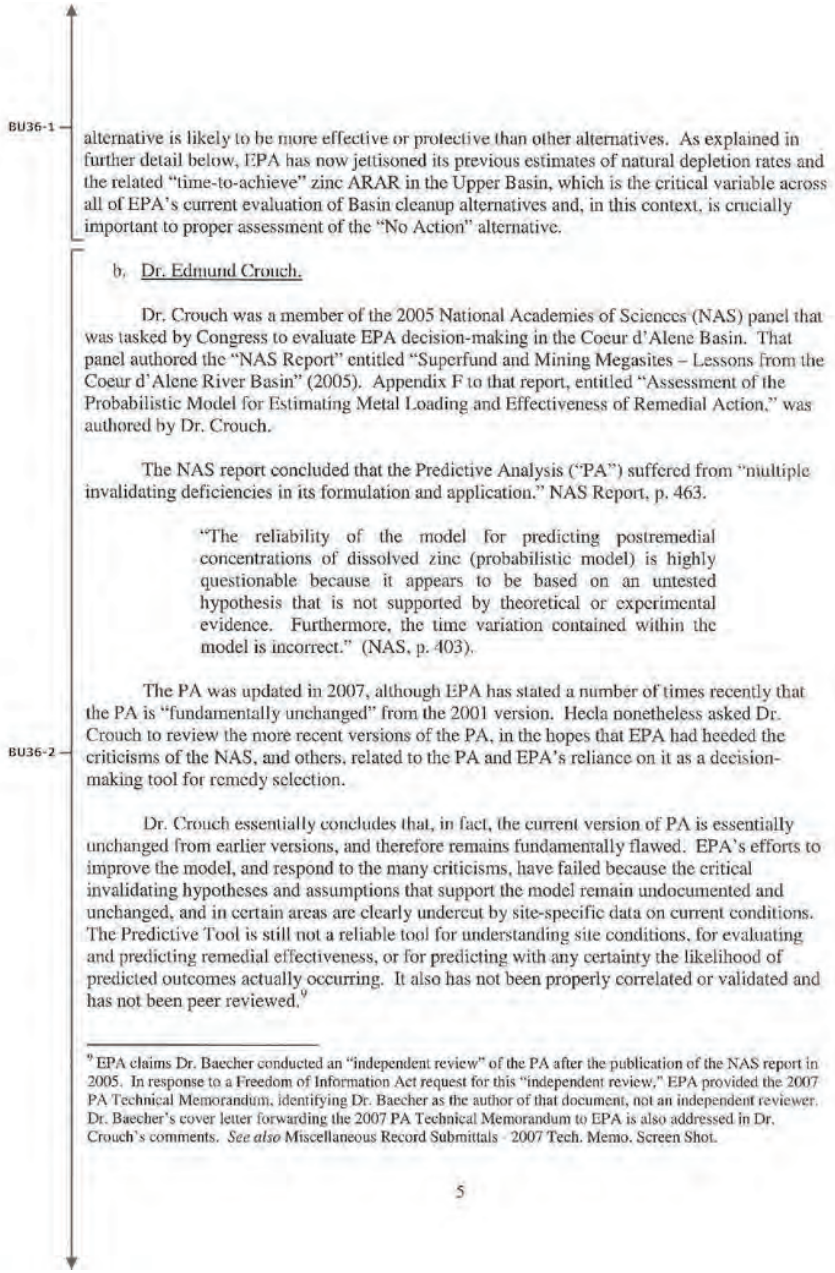
Moreover, the Formation comments, along with Hecla's other technical comments highlight that EPA has not demonstrated in the July 2010 FFS or the Proposed Plan that its preferred

[7] EPA Circular # 6 "Water Treatment: A Smart Way to Address Contamination," claims that "Water treatment provides the biggest reduction in water contamination per dollar spent than any other single action in the Proposed Plan," citing, as its example, groundwater collection and treatment in the Box. As Attachment 3 documents, EPA's statement as to cost-effectiveness is true for the Box. As illustrated in Attachment 3, the cost-effectiveness of EPA's groundwater proposal diminishes dramatically from there.

[8] In addition, 40 C.F.R. § 300.430 (e)(4) provides, "For groundwater response actions, the lead agency shall develop a limited number of remedial alternatives that attain site-specific remediation levels within different restoration time periods utilizing one or more different technologies." The groundwater remedies included in Alternative 3+ and 4+ use the same technologies, no site-specific remediation levels are defined and no performance measures or standards for the groundwater remedies are included in the July 2010 FFS or the Proposed Plan.

4

No comments



BU36-1

alternative is likely to be more effective or protective than other alternatives. As explained in further detail below, EPA has now jettisoned its previous estimates of natural depletion rates and the related "time-to-achieve" zinc ARAR in the Upper Basin, which is the critical variable across all of EPA's current evaluation of Basin cleanup alternatives and, in this context, is crucially important to proper assessment of the "No Action" alternative.

b. Dr. Edmund Crouch.

Dr. Crouch was a member of the 2005 National Academies of Sciences (NAS) panel that was tasked by Congress to evaluate EPA decision-making in the Coeur d'Alene Basin. That panel authored the "NAS Report" entitled "Superfund and Mining Megasites – Lessons from the Coeur d'Alene River Basin" (2005). Appendix F to that report, entitled "Assessment of the Probabilistic Model for Estimating Metal Loading and Effectiveness of Remedial Action," was authored by Dr. Crouch.

The NAS report concluded that the Predictive Analysis ("PA") suffered from "multiple invalidating deficiencies in its formulation and application." NAS Report, p. 463.

> "The reliability of the model for predicting postremedial concentrations of dissolved zinc (probabilistic model) is highly questionable because it appears to be based on an untested hypothesis that is not supported by theoretical or experimental evidence. Furthermore, the time variation contained within the model is incorrect." (NAS, p. 403).

The PA was updated in 2007, although EPA has stated a number of times recently that the PA is "fundamentally unchanged" from the 2001 version. Hecla nonetheless asked Dr. Crouch to review the more recent versions of the PA, in the hopes that EPA had heeded the criticisms of the NAS, and others, related to the PA and EPA's reliance on it as a decision-making tool for remedy selection.

BU36-2

Dr. Crouch essentially concludes that, in fact, the current version of PA is essentially unchanged from earlier versions, and therefore remains fundamentally flawed. EPA's efforts to improve the model, and respond to the many criticisms, have failed because the critical invalidating hypotheses and assumptions that support the model remain undocumented and unchanged, and in certain areas are clearly undercut by site-specific data on current conditions. The Predictive Tool is still not a reliable tool for understanding site conditions, for evaluating and predicting remedial effectiveness, or for predicting with any certainty the likelihood of predicted outcomes actually occurring. It also has not been properly correlated or validated and has not been peer reviewed.[9]

[9] EPA claims Dr. Baecher conducted an "independent review" of the PA after the publication of the NAS report in 2005. In response to a Freedom of Information Act request for this "independent review," EPA provided the 2007 PA Technical Memorandum, identifying Dr. Baecher as the author of that document, not an independent reviewer. Dr. Baecher's cover letter forwarding the 2007 PA Technical Memorandum to EPA is also addressed in Dr. Crouch's comments. *See also* Miscellaneous Record Submittals - 2007 Tech. Memo. Screen Shot.

5

Response to comment BU36-2

The comment seeks to summarize the individual comments of Dr. Edmund Crouch on behalf of Hecla. Rather than respond to the commenter's attempt to summarize, EPA has addressed Dr. Crouch's comments in detail. See response to Dr. Crouch's comments in Document BU48.

BU36-2

EPA continued insistence on utilizing the PA to support cleanup decision-making in the CDA Basin is inexplicable and arbitrary.

c. Dr. Arthur Riese.

A key recommendation of the NAS Report was for EPA to develop a better understanding of the significance of groundwater loading to surface water as a key component of zinc concentrations in the Upper South Fork and particularly in the South Fork through the Box. In this area, groundwater loading interacting with mine waste under the Central Impoundment Area is a long-recognized problem, going back to the initial Box OU #2 RI and FS's in the early 1990s. In response, and to support the current, proposed ROD Amendment, EPA developed a groundwater flow model to evaluate surface and groundwater interactions along the South Fork and to predict the likely effectiveness of EPA's proposed groundwater collection and treatment system.

Hecla asked Dr. Riese, an experienced hydrogeologist and geochemist with significant mine site evaluation and cleanup experience, to assess the reliability of EPA's groundwater model and its ability to predict the likely effectiveness of EPA's proposed groundwater remedy. In the course of his review, Dr. Riese identified a number of other key errors, omissions and arbitrary conclusions in EPA's decision-making process that further undercut EPA's remedy decision-making in the Upper Basin and the record supporting that decision-making.

On the groundwater model, Dr. Riese concludes,

BU36-3

- The groundwater model is by definition and construction a flow model. It is not a metals fate and transport model that is capable of simulating metals transport or geochemical reactions, including dissolution, precipitation, speciation, adsorption, or even dilution. The model is not designed to or useful for simulating metals loading between groundwater and surface waters.
- The model as developed and calibrated is not a reliable tool for estimating variations in groundwater surface water interactions along the river and therefore is not reliable for estimating loads of dissolved metals associated with these interactions.
- The model cannot be applied to reliably define or distinguish the performance of remedial actions or predicting reductions in metals loads at any level of detail along the reaches of the SFCDR and its tributaries. It is not a sound or reliable tool to address remedial effectiveness or to support remedy decision-making.

6

Response to comment BU36-3

The comment seeks to summarize the individual comments of Dr. Arthur Riese on behalf of Hecla. Rather than respond to the commenter's attempt to summarize, EPA has addressed Dr. Riese's comments in detail. See response to Dr. Riese's comments in Document No. BU49.

- The groundwater model results purportedly are "integrated" into the Predictive Analysis (PA). The PA has been roundly criticized. Integrating the groundwater model results into the PA, however this was accomplished, does not improve the PA but only compounds the PA's flaws.

- There is no reasoned basis for selecting most of the remedial work that EPA is proposing to undertake, at enormous cost, with no evidence that what is proposed is likely to be effective or protective; and the negative impacts appear severe.

Otherwise, as to the proposed groundwater remedy, Dr. Riese concludes that the costs and impacts associated with EPA's proposal have not been properly evaluated, or at least key components of EPA's evaluation are not explained, and Dr. Riese documents that EPA's proposal is unprecedented and is not cost-effective. *See* Attachment 3 and Dr. Riese's Affidavit at ¶ 72-73 and Table 3.

In addition, Dr. Riese addresses in detail the curious situation with EPA's natural depletion estimates and "time-to-achieve" analysis. As noted earlier, the NAS was particularly critical of how the PA predicted remedial success (and therefore, in NCP terms, "protectiveness") over time. EPA nonetheless continued to rely on the PA's time predictions, through publication of the Initial Draft FFS in February 2010. Between February 2010 and July 2010, after 10 years of spirited defense of its treatment of natural depletion and its time-to-achieve predictions, *see, e.g.*, C. Vita's 2005 "Errors of Fact" response to the NAS,[10] EPA suddenly abandoned its time-to-achieve estimates, claiming there was too much uncertainty to know with any likelihood or approximation whether it will take decades, centuries or longer to achieve the cleanup objective for the South Fork and the River, even after spending $1.3 billion, assuming of course the remedy can be effectively implemented. The legal implications of this development for EPA's remedy selection process are addressed in Section 2 of this letter. The practical implication is that, with the PA stripped of its time-to-achieve component, EPA is left with a predictive model that claims to predict effectiveness, but no longer can defensibly answer the equally critical, highly interrelated question of "when."

BU36-3

Dr. Riese's focus, of course, was on the technical questions associated with EPA's about face on "time-to-achieve." Dr. Riese thought it would be interesting to take a close look at EPA's last set of time projections before it abandoned the time-to-achieve question. What Dr. Riese found, as detailed in his comments, is that EPA's last time-to-achieve analysis before it abandoned the PA's time components, demonstrates that there is a high likelihood that the No Action alternative, which EPA summarily dismisses, could, within a reasonable amount of time (e.g., 50 years), be just as effective as Alternative 3+, with its enormous $1.34 billion price tag. *See* Attachments 4 and 5. (Dr. Crouch in his comments also discusses how this could be the case). Dr. Riese also determined that, in eliminating any time-to-achieve consideration from its

[10] Dr. Crouch's response to the 2005 Vita document is included here as a Miscellaneous Record Submittal. It was also established in Dr. Vita's May 24, 2005 deposition in the federal court litigation, that Dr. Vita lacks the background to qualify as an expert on predictive analysis. *See, e.g.*, Miscellaneous Record Submittals – Vita Deposition Excerpts. It is also Dr. Vita who defends the PA as "a blend of science, **art**, and professional practice." Miscellaneous Record Submittals - Vita, Errors of Fact (2005) (emphasis added).

7

No comments

BU36-3

analysis in the FFS and Proposed Plan, EPA has biased its remedy evaluation against the No Action alternative, even though it and EPA's preferred remedy both rely on natural depletion to succeed. With that bias removed, Dr. Riese demonstrates (using EPA's own numbers) that, 50 years post construction, the No Action alternative could be just as close to meeting ARARs as Alternative 3+. *See* Attachment 5.

Dr. Riese does not suggest that the "No Action" alternative is the right remedy for the Upper Basin. But, given all the many flaws in the groundwater model and other aspects of EPA's analysis, Dr. Riese does conclude, "EPA should re-consider the effectiveness of all the alternatives (including those already screened out), and without handicapping the No Action option, before making a final decision on the Proposed Plan." The bottom line is that EPA's groundwater model, like the PA, is flawed and unreliable and cannot support remedy decision-making in the Basin related to groundwater remediation.

d. Sidney Garland.

EPA seeks to justify the scope of its proposed remedy and explain away all of the uncertainties about its effectiveness, by reference to an "Implementation Plan"[11] to be provided to the public when the ROD is issued, but apparently not before.[12] EPA also endorses what it calls "Adaptive Management" to, over time, reprioritize remedial actions over the 275 square miles of the Upper Basin and the many decades EPA's preferred remedy would be under construction.

In 2005, the NAS questioned EPA's commitment to and understanding of adaptive management as reflected in the 2002 IROD. The NAS stated, for example, that "EPA does not fully understand or is not properly implementing the principles of adaptive management." NAS, p. 354. The NAS urged EPA "to improve its adaptive management approach in several key respects." *See, e.g.*, NAS, pp. 12, 403. The NAS also cautioned EPA that "it is unrealistic to develop comprehensive remedial schemes and assess their effectiveness *a priori*." NAS, p. 3.

BU36-4

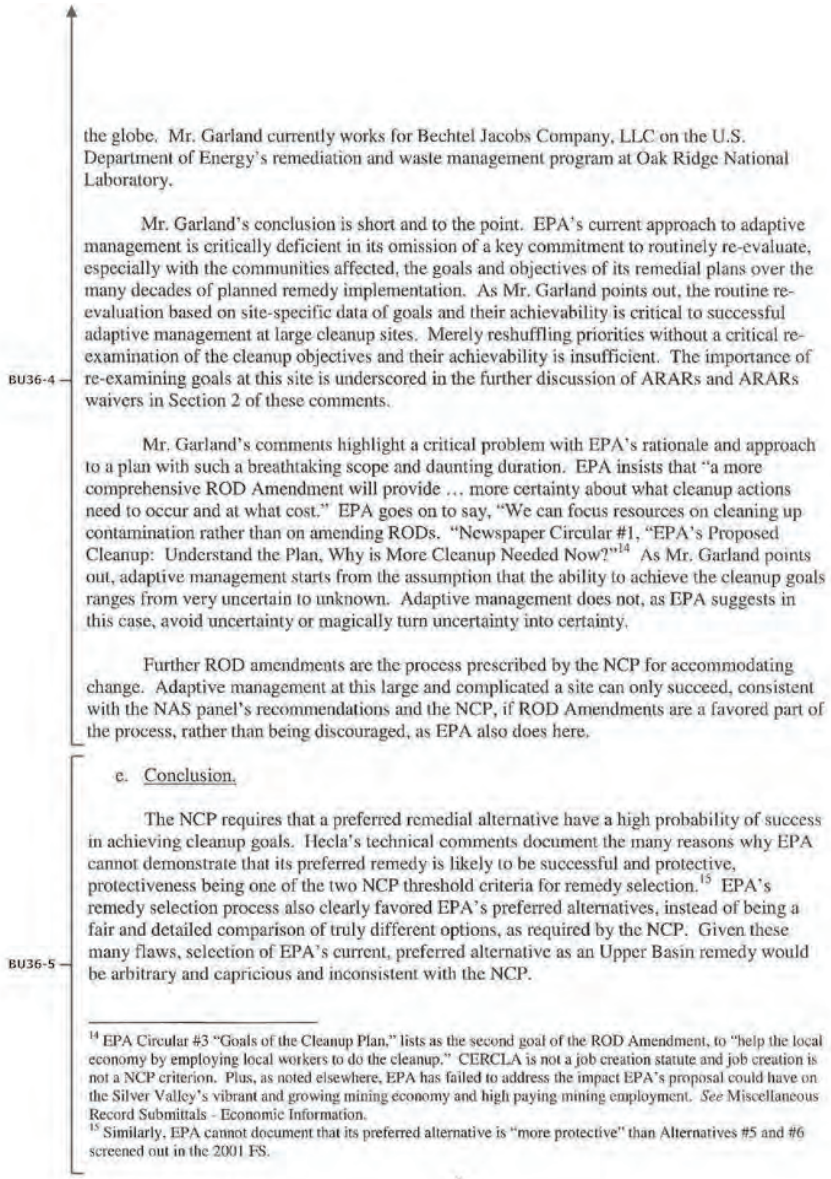
Because it seemed that EPA's new proposal was precisely the comprehensive *a priori* scheme the NAS cautioned against, Hecla asked Mr. Sid Garland, who was a member of the 2003 panel tasked by the NAS to study adaptive management at CERCLA sites,[13] to review EPA's 2010 FFS and the Proposed Plan, plus a few related documents, including EPA's 2010 Adaptive Management Plan, to determine whether EPA's current approach to adaptive management is responsive to the NAS criticism. Mr. Garland is a professional engineer with 35 years experience in managing large-scale engineering design and construction projects all over

[11] The NCP does not allow critical aspects of a feasibility study's comparison of alternatives to be left to a post-remedy decision implementation plan. In fact, the NCP does not mention "Implementation Plans" as a vehicle for NCP-compliant remedy implementation.
[12] The National Remedy Review Board recommended that EPA at least identify near-term remedial priorities in the ROD. NRRB 5/12/10 Memorandum, p. 3. EPA's last draft Implementation Plan Scenario for 2010 – 2015 includes substantial funding to begin construction of EPA's massive groundwater collection and treatment scheme.
[13] The 2003 NAS report on adaptive management is entitled "Environmental Cleanup at Navy Facilities: Adaptive Site Management." A copy is included with these comments at Miscellaneous Record Submittals. The 2005 NAS report contrasts with disfavor EPA's approach to adaptive management in the 2002 IROD, as compared with the approach endorsed by the 2003 NAS panel.

8

Response to comment BU36-4

The comment seeks to summarize the individual comments of Sidney Garland on behalf of Hecla. Rather than respond to the commenter's attempt to summarize, EPA has addressed Sidney Garland's comments in detail. See response to Sidney Garland's comments in Document No. BU50.



the globe. Mr. Garland currently works for Bechtel Jacobs Company, LLC on the U.S. Department of Energy's remediation and waste management program at Oak Ridge National Laboratory.

Mr. Garland's conclusion is short and to the point. EPA's current approach to adaptive management is critically deficient in its omission of a key commitment to routinely re-evaluate, especially with the communities affected, the goals and objectives of its remedial plans over the many decades of planned remedy implementation. As Mr. Garland points out, the routine re-evaluation based on site-specific data of goals and their achievability is critical to successful adaptive management at large cleanup sites. Merely reshuffling priorities without a critical re-examination of the cleanup objectives and their achievability is insufficient. The importance of re-examining goals at this site is underscored in the further discussion of ARARs and ARARs waivers in Section 2 of these comments.

BU36-4

Mr. Garland's comments highlight a critical problem with EPA's rationale and approach to a plan with such a breathtaking scope and daunting duration. EPA insists that "a more comprehensive ROD Amendment will provide … more certainty about what cleanup actions need to occur and at what cost." EPA goes on to say, "We can focus resources on cleaning up contamination rather than on amending RODs. "Newspaper Circular #1, "EPA's Proposed Cleanup: Understand the Plan, Why is More Cleanup Needed Now?"[14] As Mr. Garland points out, adaptive management starts from the assumption that the ability to achieve the cleanup goals ranges from very uncertain to unknown. Adaptive management does not, as EPA suggests in this case, avoid uncertainty or magically turn uncertainty into certainty.

Further ROD amendments are the process prescribed by the NCP for accommodating change. Adaptive management at this large and complicated a site can only succeed, consistent with the NAS panel's recommendations and the NCP, if ROD Amendments are a favored part of the process, rather than being discouraged, as EPA also does here.

c. Conclusion.

The NCP requires that a preferred remedial alternative have a high probability of success in achieving cleanup goals. Hecla's technical comments document the many reasons why EPA cannot demonstrate that its preferred remedy is likely to be successful and protective, protectiveness being one of the two NCP threshold criteria for remedy selection.[15] EPA's remedy selection process also clearly favored EPA's preferred alternatives, instead of being a fair and detailed comparison of truly different options, as required by the NCP. Given these many flaws, selection of EPA's current, preferred alternative as an Upper Basin remedy would be arbitrary and capricious and inconsistent with the NCP.

BU36-5

[14] EPA Circular #3 "Goals of the Cleanup Plan," lists as the second goal of the ROD Amendment, to "help the local economy by employing local workers to do the cleanup." CERCLA is not a job creation statute and job creation is not a NCP criterion. Plus, as noted elsewhere, EPA has failed to address the impact EPA's proposal could have on the Silver Valley's vibrant and growing mining economy and high paying mining employment. *See* Miscellaneous Record Submittals - Economic Information.

[15] Similarly, EPA cannot document that its preferred alternative is "more protective" than Alternatives #5 and #6 screened out in the 2001 FS.

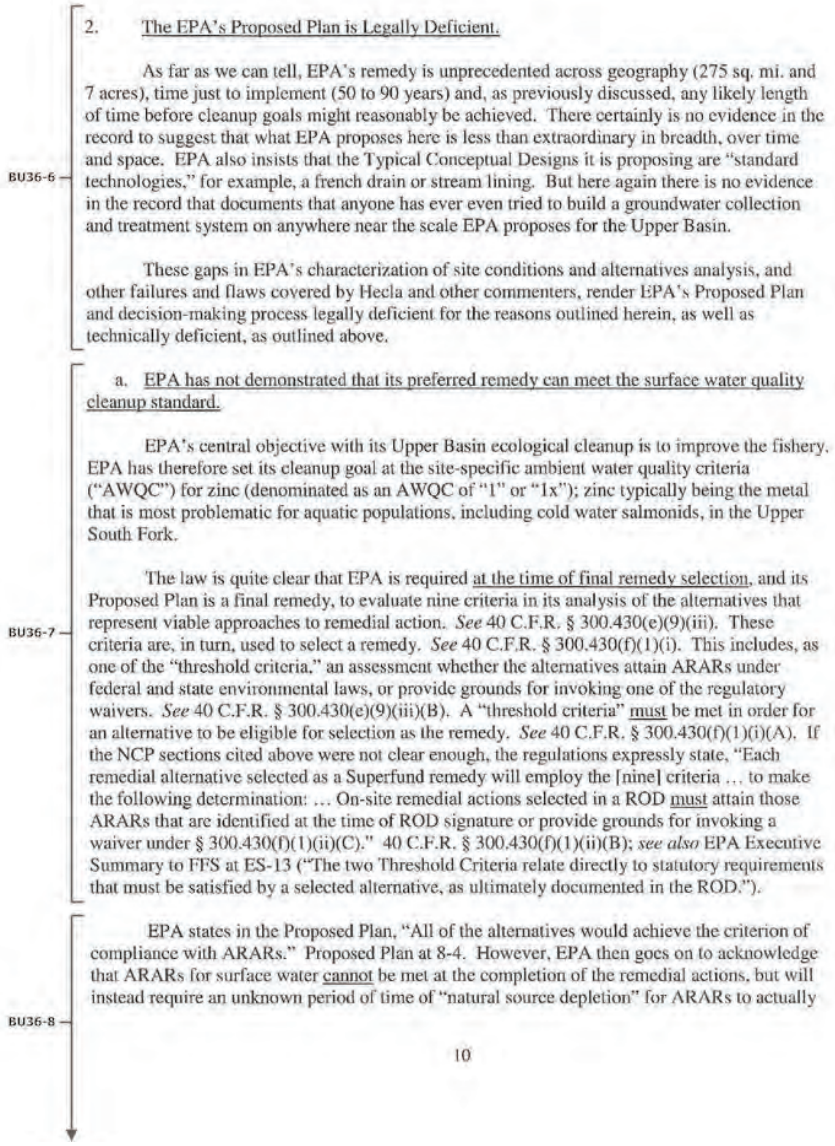
9

Response to comment BU36-5

As an initial matter, the comment misstates the standard of review that CERCLA establishes for decisions EPA makes when selecting a response action. EPA's determinations that a remedial action will attain applicable or relevant and appropriate requirements (ARARs) and protect human health and the environment is not subject to a high probability of success standard. Instead, CERCLA requires that such EPA determinations are subject to an arbitrary and capricious standard. EPA's determinations were not arbitrary and capricious.

EPA disagrees with the commenter's conclusion that EPA cannot demonstrate "that its preferred alternative is likely to be successful and protective." The National Oil and Hazardous Substances Pollution Contingency Plan-compliant analysis performed by EPA demonstrates the exact opposite. The selected remedial actions are intended to address risks to human health and the environment such that the post-remedial environment will be protective of human health and the environment. Furthermore, as described in the ROD Amendment, EPA has decided to take an interim, not final, action. As concluded in the ROD Amendment, Part 2, Section 13.0, the Selected Remedy satisfies CERCLA's protectiveness criteria as applied to an interim remedy. Consistent with 40 Code of Federal Regulations (CFR) 300.430(a)(ii)(B) and 40 CFR 300.430(f)(1)(ii)(C)(1), the Selected Remedy, an interim action, is neither inconsistent with nor precludes implementation of a final remedy that will attain applicable or relevant and appropriate requirements (ARARs). The final remedy will be identified in subsequent decision documents. The level of protectiveness provided by an interim remedy is evaluated by the scope of its actions. Accordingly, the Selected Remedy, by its nature, need not be as protective as the final remedy is required to be under the statute. The Selected Remedy is designed to provide significant improvements to surface water and groundwater, and to significantly reduce risks posed to human health and the environment within the Upper Basin. Thus, the level of protection that the Selected Remedy will provide is commensurate to the scope of the Selected Remedy, and the Selected Remedy is deemed to be sufficiently protective in the context of its scope, even though it does not, by itself, meet the statutory protectiveness standard that a final remedy would meet.

Second, the comment concludes that the remedy selection process clearly favored EPA's Preferred Alternative as identified in the Proposed Plan (EPA, 2010, *Proposed Plan, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site*), and was arbitrary and capricious and not National Oil and Hazardous Substances Pollution Contingency Plan (NCP)-consistent. Again, EPA takes exception to these conclusions. EPA took no preconceived opinion of which remedial approach would carry through to the Selected Remedy; instead EPA used the iterative process required by the NCP to evaluate remedial alternatives and subsequently select a remedy. This process is well documented in the ROD Amendment and in the administrative record that supports the ROD Amendment.



2. The EPA's Proposed Plan is Legally Deficient.

As far as we can tell, EPA's remedy is unprecedented across geography (275 sq. mi. and 7 acres), time just to implement (50 to 90 years) and, as previously discussed, any likely length of time before cleanup goals might reasonably be achieved. There certainly is no evidence in the record to suggest that what EPA proposes here is less than extraordinary in breadth, over time and space. EPA also insists that the Typical Conceptual Designs it is proposing are "standard technologies," for example, a french drain or stream lining. But here again there is no evidence in the record that documents that anyone has ever even tried to build a groundwater collection and treatment system on anywhere near the scale EPA proposes for the Upper Basin.

BU36-6

These gaps in EPA's characterization of site conditions and alternatives analysis, and other failures and flaws covered by Hecla and other commenters, render EPA's Proposed Plan and decision-making process legally deficient for the reasons outlined herein, as well as technically deficient, as outlined above.

a. EPA has not demonstrated that its preferred remedy can meet the surface water quality cleanup standard.

EPA's central objective with its Upper Basin ecological cleanup is to improve the fishery. EPA has therefore set its cleanup goal at the site-specific ambient water quality criteria ("AWQC") for zinc (denominated as an AWQC of "1" or "1x"); zinc typically being the metal that is most problematic for aquatic populations, including cold water salmonids, in the Upper South Fork.

The law is quite clear that EPA is required at the time of final remedy selection, and its Proposed Plan is a final remedy, to evaluate nine criteria in its analysis of the alternatives that represent viable approaches to remedial action. *See* 40 C.F.R. § 300.430(e)(9)(iii). These criteria are, in turn, used to select a remedy. *See* 40 C.F.R. § 300.430(f)(1)(i). This includes, as one of the "threshold criteria," an assessment whether the alternatives attain ARARs under federal and state environmental laws, or provide grounds for invoking one of the regulatory waivers. *See* 40 C.F.R. § 300.430(e)(9)(iii)(B). A "threshold criteria" must be met in order for an alternative to be eligible for selection as the remedy. *See* 40 C.F.R. § 300.430(f)(1)(i)(A). If the NCP sections cited above were not clear enough, the regulations expressly state, "Each remedial alternative selected as a Superfund remedy will employ the [nine] criteria … to make the following determination: … On-site remedial actions selected in a ROD must attain those ARARs that are identified at the time of ROD signature or provide grounds for invoking a waiver under § 300.430(f)(1)(ii)(C)." 40 C.F.R. § 300.430(f)(1)(ii)(B); *see also* EPA Executive Summary to FFS at ES-13 ("The two Threshold Criteria relate directly to statutory requirements that must be satisfied by a selected alternative, as ultimately documented in the ROD.").

BU36-7

EPA states in the Proposed Plan, "All of the alternatives would achieve the criterion of compliance with ARARs." Proposed Plan at 8-4. However, EPA then goes on to acknowledge that ARARs for surface water cannot be met at the completion of the remedial actions, but will instead require an unknown period of time of "natural source depletion" for ARARs to actually

BU36-8

10

Response to comment BU36-6

The commenter raises issues regarding the large geographic area of the Upper Basin and the lengthy cleanup time. CERCLA and the regulations that govern its implementation, the National Oil and Hazardous Substances Pollution Contingency Plan, obligate EPA to respond to releases or threatened releases of hazardous substances that pose unacceptable risks to human health and/or the environment regardless of the scale of the environmental problem and cleanup response thereto. EPA has responded to releases at other large sites which will take long periods of time to cleanup. The cleanup effort in the Upper Basin is commensurate to the human health and environmental risks presented by the release of mine waste contamination. A large complex site like the Upper Basin of the Coeur d'Alene River, which contains a massive amount of hazardous substances deposited over about a century of mining activities, can logically be expected to take a long time to remediate and cleanup. Regarding the actual time that will be necessary to implement the remedy, see the ROD Amendment, Part 3, Section 3.10.1.

Response to comment BU36-7

The commenter correctly describes the role of the threshold criteria in the selection of final remedial actions for a site or operable unit. CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan require remedial actions to attain applicable or relevant and appropriate requirements (ARARs) unless an ARAR waiver is invoked. If an ARAR is not attained at the completion of onsite remedial actions, additional response actions may be necessary to attain the ARAR. However, a decision to select additional response actions for a site where a ROD has already been issued is not made until the EPA's determines that the selected remedy will not attain ARARs and additional response actions are needed to attain ARARs.

EPA selected an interim remedy for the Upper Basin in a manner consistent with the National Oil and Hazardous Substances Pollution Contingency Plan. In response to public comments, EPA reduced the scope of the Preferred Alternative as identified in the Proposed Plan (EPA, 2010, *Proposed Plan, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site*), and did not include all of the remedial actions that were identified in its Preferred Alternative. Therefore, the Selected Remedy is not

intended to fully address surface water contamination in all locations in the Upper Basin. Nor is it intended to fully address groundwater contamination. Thus, the Selected Remedy is an interim remedy for the Upper Basin. However, the Selected Remedy will address many significant sources of contamination in the Upper Basin and will be sufficiently protective of human health and the environment within the context of its scope.

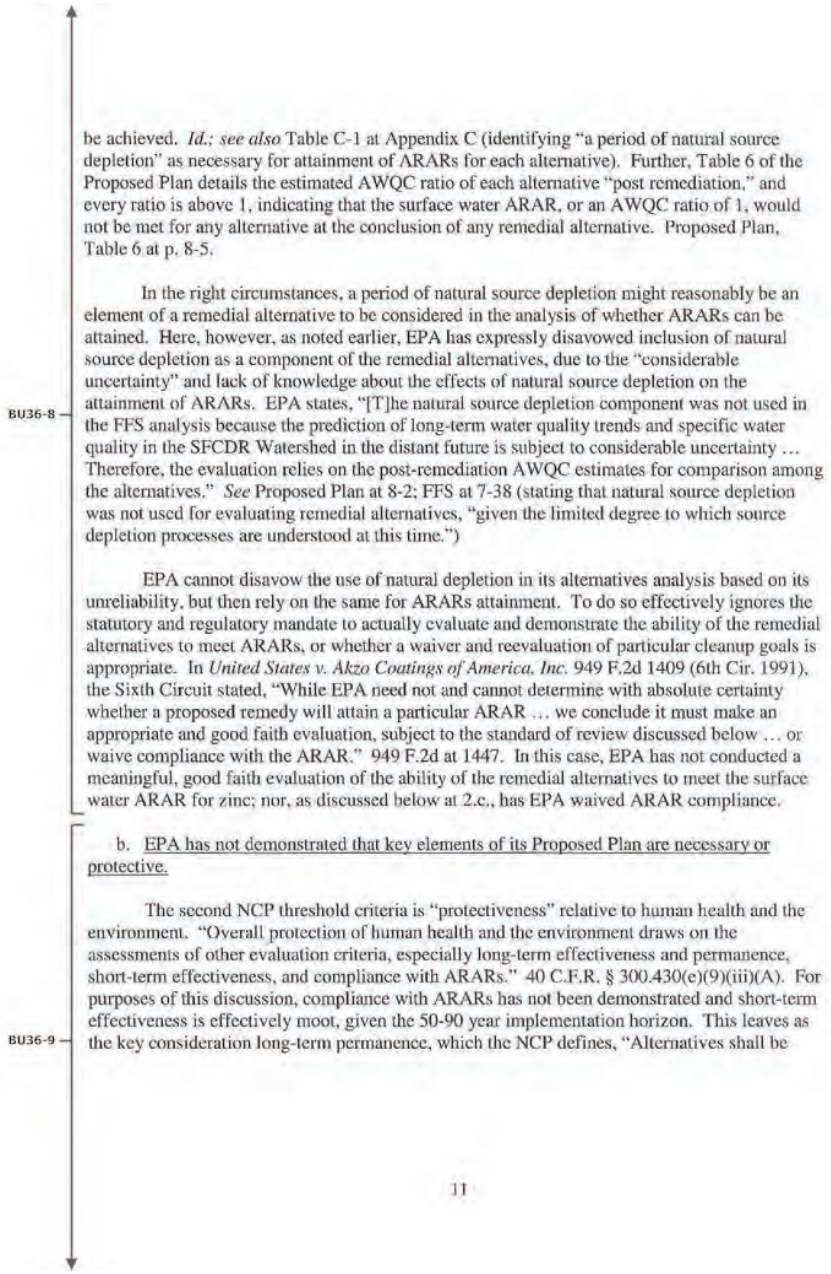
The Selected Remedy will result in significant improvements to surface water quality in the Upper Basin and may achieve ambient water quality criteria (AWQC) applicable or relevant and appropriate requirements (ARARs) under the Clean Water Act in many locations following periods of natural recovery; however, it may not achieve these ARARs in all locations. Furthermore, although the Selected Remedy will result in significant improvement to groundwater quality, it is not intended to achieve groundwater maximum contaminant level (MCL) ARARs under the Safe Drinking Water Act throughout the Upper Basin. Similarly, although the Selected Remedy will provide additional safe habitat for special-status species and may achieve ARARs under the Migratory Bird Treaty Act (MBTA) and Endangered Special Act (ESA) where remedial actions are taken, it will not achieve these ARARs in all locations. The remedial actions included in the Selected Remedy will also result in the achievement of cleanup levels for soil and sediments where actions are taken.

The Selected Remedy satisfies CERCLA's protectiveness criteria as applied to an interim remedy. The level of protectiveness provided by an interim remedy is evaluated by the scope of its actions. Accordingly, the Selected Remedy, by its nature, need not be as protective as the final remedy is required to be under the statute. The Selected Remedy is designed to provide significant improvements to surface water and groundwater, and to significantly reduce risks posed to human health and the environment within the Upper Basin. Thus, the level of protection that the Selected Remedy will provide is commensurate to the scope of the Selected Remedy, and the Selected Remedy is deemed to be sufficiently protective in the context of its scope, even though it does not, by itself, meet the statutory protectiveness standard that a final remedy would meet. In summary, although the Selected Remedy will address many significant sources of contamination in the Upper Basin, it is an interim, not a final, remedy. Consequently, achieving certain ARARs, including AWQC, MCLs, MBTA, and ESA, and fully protecting human health and the environment in all areas of the Upper Basin is outside its scope.

Consistent with 40 Code of Federal Regulations (CFR) 300.430(a)(ii)(B) and 40 CFR 300.430(f)(1)(ii)(C)(1), the Selected Remedy, an interim action, is neither inconsistent with nor precludes implementation of a final remedy that will attain ARARs. The final remedy will be identified in subsequent decision documents.

Response to comment BU36-8

Regarding the ability of the Selected Remedy to achieve ARARs, see the response to Comment No. BU36-7 above. The commenter correctly states that a period of natural source depletion may be part of a remedial action. Given the widespread mine waste contamination in the Basin, particularly in locations that are not easily accessible, EPA's decision to include some period of natural source depletion in the Selected Remedy is rationally connected to the information EPA considered in this remedy decision. The commenter's statement that "EPA has expressly disavowed inclusion of natural source depletion as a component of the remedial alternatives" is mistaken. EPA has made clear in the ROD Amendment that it anticipates a period of natural source depletion to be necessary before AWQC ARARs will be achieved. What EPA has not decided to do is estimate exactly what this time period will be. The reason for this, as described in Section 8 of the Proposed Plan (EPA, 2010, *Proposed Plan, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site*) and in Appendix B of the Final Focused Feasibility Study (FFS) Report (EPA, August 2012, *Final Focused Feasibility Study Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site*), is that there is too much uncertainty associated with the accuracy of such a calculation. However, EPA will closely monitor the cleanup progress of its Selected Remedy and will communicate refined cleanup expectations during implementation through an adaptively managed process.



be achieved. *Id.; see also* Table C-1 at Appendix C (identifying "a period of natural source depletion" as necessary for attainment of ARARs for each alternative). Further, Table 6 of the Proposed Plan details the estimated AWQC ratio of each alternative "post remediation," and every ratio is above 1, indicating that the surface water ARAR, or an AWQC ratio of 1, would not be met for any alternative at the conclusion of any remedial alternative. Proposed Plan, Table 6 at p. 8-5.

In the right circumstances, a period of natural source depletion might reasonably be an element of a remedial alternative to be considered in the analysis of whether ARARs can be attained. Here, however, as noted earlier, EPA has expressly disavowed inclusion of natural source depletion as a component of the remedial alternatives, due to the "considerable uncertainty" and lack of knowledge about the effects of natural source depletion on the attainment of ARARs. EPA states, "[T]he natural source depletion component was not used in the FFS analysis because the prediction of long-term water quality trends and specific water quality in the SFCDR Watershed in the distant future is subject to considerable uncertainty … Therefore, the evaluation relies on the post-remediation AWQC estimates for comparison among the alternatives." *See* Proposed Plan at 8-2; FFS at 7-38 (stating that natural source depletion was not used for evaluating remedial alternatives, "given the limited degree to which source depletion processes are understood at this time.")

BU36-8

EPA cannot disavow the use of natural depletion in its alternatives analysis based on its unreliability, but then rely on the same for ARARs attainment. To do so effectively ignores the statutory and regulatory mandate to actually evaluate and demonstrate the ability of the remedial alternatives to meet ARARs, or whether a waiver and reevaluation of particular cleanup goals is appropriate. In *United States v. Akzo Coatings of America, Inc.* 949 F.2d 1409 (6th Cir. 1991), the Sixth Circuit stated, "While EPA need not and cannot determine with absolute certainty whether a proposed remedy will attain a particular ARAR … we conclude it must make an appropriate and good faith evaluation, subject to the standard of review discussed below … or waive compliance with the ARAR." 949 F.2d at 1447. In this case, EPA has not conducted a meaningful, good faith evaluation of the ability of the remedial alternatives to meet the surface water ARAR for zinc; nor, as discussed below at 2.c., has EPA waived ARAR compliance.

b. EPA has not demonstrated that key elements of its Proposed Plan are necessary or protective.

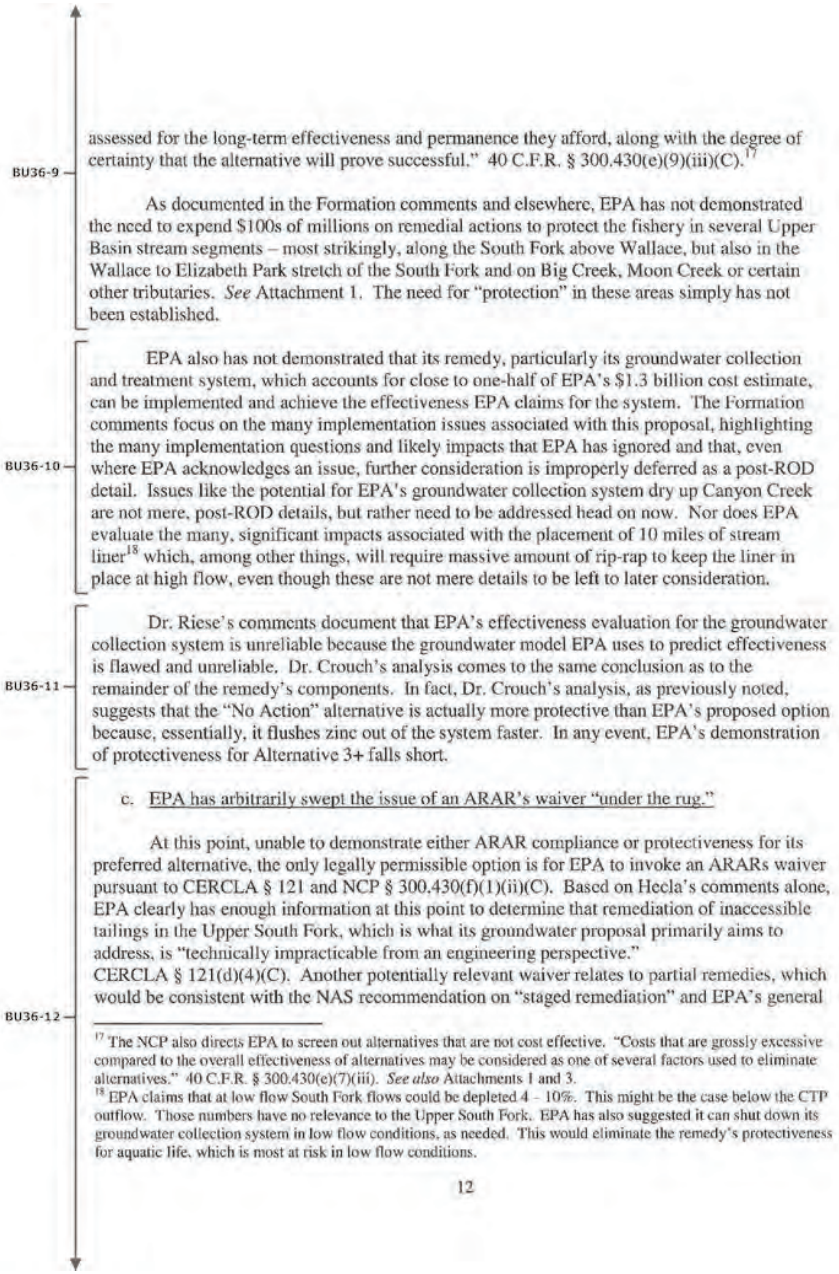
The second NCP threshold criteria is "protectiveness" relative to human health and the environment. "Overall protection of human health and the environment draws on the assessments of other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs." 40 C.F.R. § 300.430(e)(9)(iii)(A). For purposes of this discussion, compliance with ARARs has not been demonstrated and short-term effectiveness is effectively moot, given the 50-90 year implementation horizon. This leaves as the key consideration long-term permanence, which the NCP defines, "Alternatives shall be

BU36-9

11

Response to comment BU36-9

Regarding the issues raised about protectiveness, achievement of ARARs and implementation time, see response to Comment No. BU36-7 above. Regarding comments that question the need for certain of EPA's actions identified in the Proposed Plan, EPA has reduced the scope of its Selected Remedy, an interim action, from that of the Preferred Alternative. For further details, see ROD Amendment, Part 2, Section 14.0.



assessed for the long-term effectiveness and permanence they afford, along with the degree of certainty that the alternative will prove successful." 40 C.F.R. § 300.430(e)(9)(iii)(C).[17]

BU36-9

As documented in the Formation comments and elsewhere, EPA has not demonstrated the need to expend $100s of millions on remedial actions to protect the fishery in several Upper Basin stream segments – most strikingly, along the South Fork above Wallace, but also in the Wallace to Elizabeth Park stretch of the South Fork and on Big Creek, Moon Creek or certain other tributaries. *See* Attachment 1. The need for "protection" in these areas simply has not been established.

BU36-10

EPA also has not demonstrated that its remedy, particularly its groundwater collection and treatment system, which accounts for close to one-half of EPA's $1.3 billion cost estimate, can be implemented and achieve the effectiveness EPA claims for the system. The Formation comments focus on the many implementation issues associated with this proposal, highlighting the many implementation questions and likely impacts that EPA has ignored and that, even where EPA acknowledges an issue, further consideration is improperly deferred as a post-ROD detail. Issues like the potential for EPA's groundwater collection system dry up Canyon Creek are not mere, post-ROD details, but rather need to be addressed head on now. Nor does EPA evaluate the many, significant impacts associated with the placement of 10 miles of stream liner[18] which, among other things, will require massive amount of rip-rap to keep the liner in place at high flow, even though these are not mere details to be left to later consideration.

BU36-11

Dr. Riese's comments document that EPA's effectiveness evaluation for the groundwater collection system is unreliable because the groundwater model EPA uses to predict effectiveness is flawed and unreliable. Dr. Crouch's analysis comes to the same conclusion as to the remainder of the remedy's components. In fact, Dr. Crouch's analysis, as previously noted, suggests that the "No Action" alternative is actually more protective than EPA's proposed option because, essentially, it flushes zinc out of the system faster. In any event, EPA's demonstration of protectiveness for Alternative 3+ falls short.

c. EPA has arbitrarily swept the issue of an ARAR's waiver "under the rug."

BU36-12

At this point, unable to demonstrate either ARAR compliance or protectiveness for its preferred alternative, the only legally permissible option is for EPA to invoke an ARARs waiver pursuant to CERCLA § 121 and NCP § 300.430(f)(1)(ii)(C). Based on Hecla's comments alone, EPA clearly has enough information at this point to determine that remediation of inaccessible tailings in the Upper South Fork, which is what its groundwater proposal primarily aims to address, is "technically impracticable from an engineering perspective."
CERCLA § 121(d)(4)(C). Another potentially relevant waiver relates to partial remedies, which would be consistent with the NAS recommendation on "staged remediation" and EPA's general

[17] The NCP also directs EPA to screen out alternatives that are not cost effective. "Costs that are grossly excessive compared to the overall effectiveness of alternatives may be considered as one of several factors used to eliminate alternatives." 40 C.F.R. § 300.430(e)(7)(iii). *See also* Attachments 1 and 3.
[18] EPA claims that at low flow South Fork flows could be depleted 4 – 10%. This might be the case below the CTP outflow. Those numbers have no relevance to the Upper South Fork. EPA has also suggested it can shut down its groundwater collection system in low flow conditions, as needed. This would eliminate the remedy's protectiveness for aquatic life, which is most at risk in low flow conditions.

12

Response to comment BU36-10

With regards to the cost of the Selected Remedy as opposed to the Preferred Alternative as identified in the Proposed Plan (EPA, 2010, *Proposed Plan, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site*), as noted above EPA has reduced the scope of its Selected Remedy. The total estimated cost for the Selected Remedy is decreased by about half to $635 million. This includes capital costs as well as long-term operation and maintenance costs. This estimate, consistent with CERCLA guidance is -30 to +50%. As part of its National Oil and Hazardous Substances Pollution Contingency Plan-compliant remedy selection process, EPA evaluated the remedy for both implementability and effectiveness (long and short term), and stands by that evaluation.

As to the claim that the groundwater collection system will "dry up Canyon Creek," see ROD Amendment, Part 3, Section 3.7.3 and the Final Focused Feasibility Study (FFS) Report (EPA, August 2012, *Final Focused Feasibility Study Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site*). In addition, EPA notes that the commenter provided no analytical support for this claim and the claim appears to be based on a misguided application of high-water flow withdrawals of water during low-flow conditions. Regarding concerns for extensive stream lining, see ROD Amendment, Part 2, Section 14.2 regarding changes made to the groundwater collection actions between Wallace and Elizabeth Park.

Response to comment BU36-11

For a detailed response to comments by Dr. Riese and Dr. Crouch, see responses in Document Nos. BU49 and BU48, respectively. As described in those responses, EPA disagrees that the effectiveness evaluation used in evaluating the remedial alternatives was unreliable. The EPA process was National Oil and Hazardous Substances Pollution Contingency Plan-compliant and adequate to evaluate the remedial alternatives considered. As to protectiveness, as described in EPA's response to Comment No. BU36-7 above, the Selected Remedy satisfies CERCLA's protectiveness criteria as applied to an interim remedy. The level of protectiveness provided by an interim remedy is evaluated by the scope of its

actions. Accordingly, the Selected Remedy, by its nature, need not be as protective as the final remedy is required to be under the statute. The Selected Remedy is designed to provide significant improvements to surface water, groundwater, soil, and sediment, and to significantly reduce risks posed to human health and the environment within the Upper Basin. Thus, the level of protection that the Selected Remedy will provide is commensurate to the scope of the Selected Remedy, and the Selected Remedy is deemed to be sufficiently protective in the context of its scope, even though it does not, by itself, meet the statutory protectiveness standard that a final remedy would meet.

Response to comment BU36-12

The comment erroneously asserts that "EPA has arbitrarily swept the issue of an ARARs waiver under the rug." For a more detailed discussion of EPA's Selected Remedy and its expectations regarding applicable or relevant and appropriate requirements (ARARs) and protectiveness, see Section 13.0 of the ROD Amendment and the response to Comment No. BU36-7 above.

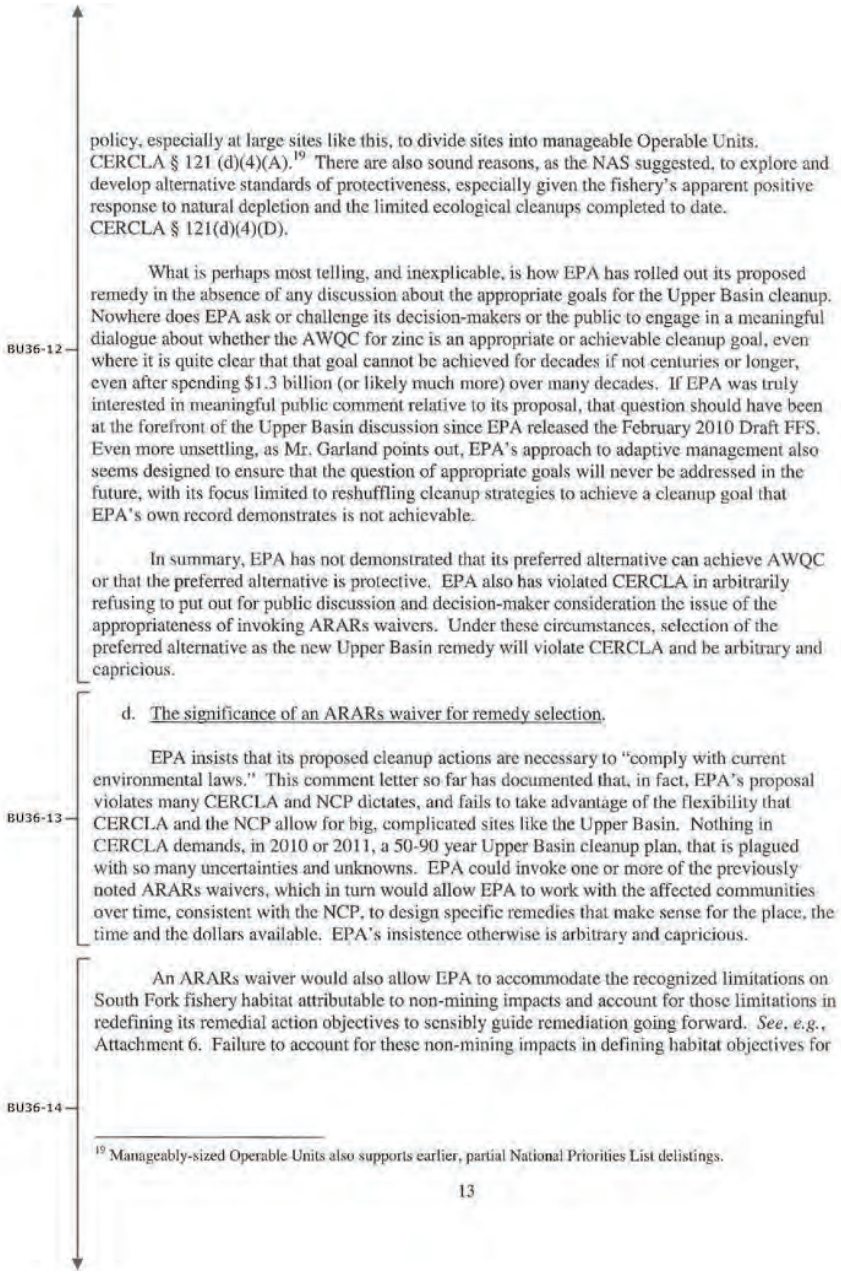
CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan require a remedial action to attain each ARAR unless it is waived. There are six bases for waiving an ARAR. The commenter asserts that EPA should have waived the ambient water quality criteria (AWQC) for zinc because it is technically impracticable from an engineering perspective to attain this ARAR. However, EPA has not concluded that it is technically impracticable to attain the subject ARAR, and in general EPA does not waive ARARs until efforts to remediate the contaminated media have been undertaken. Furthermore, this is an interim action. CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan provide that one of the circumstances under which a remedial alternative may be selected when it does not meet an ARAR is if the alternative is an interim measure that is part of a remedial action that will attain the ARAR when completed. This circumstance applies here since the Selected Remedy for the Upper Basin is an interim remedy that is neither inconsistent with nor precludes implementation of the final remedy that will be identified in subsequent decision documents.

At complex sites such as the Upper Basin, it is reasonable to expect that considerable time will be necessary to achieve cleanup and considerable uncertainty is associated with predicting cleanup times at such sites. For complex sites like these, EPA typically examines the magnitude and extent of contamination, selects and implements remedies, and then collects empirical data over time to assess the effectiveness of the remedies. Although it is possible that future data may support a technical impracticability ARAR waiver in the Upper Basin, it is not appropriate to invoke this waiver before any substantive cleanup has even taken place.

Benefits to aquatic life will begin much sooner than when AWQC are ultimately met. As cleanup actions move forward, reducing metals concentrations, aquatic conditions will improve and benefits will accrue as concentrations drop further over time. Such benefits will occur much sooner with aggressive cleanup actions, such as those in the Selected Remedy than if less aggressive actions were to be taken. Although the results of early cleanup actions will likely not achieve AWQC or fully support aquatic life, the reduced dissolved metals concentrations will bring a substantial improvement to the health of the fisheries and the overall ecosystem. The populations and species diversity of fish and aquatic organisms will continue to improve as cleanup progresses in the Upper Basin.

As to the comment that EPA should "explore and develop alternative standards of protectiveness" and that there should be a wider based discussion of goals for Upper Basin Cleanup, see ROD Amendment, Part 3, Section 3.4.1, which clearly documents that EPA intends to implement a cleanup of the Upper Basin that is protective of the environment, monitor the protectiveness of the Selected Remedy as it is implemented, and develop benchmarks that may provide the basis for standard of protectiveness that differs from the AWQC for zinc.

Contrary to the comment that "selection of the preferred alternative as the Upper Basin remedy will violate CERCLA and be arbitrary and capricious," the Preferred Alternative was not selected by EPA and the process for selecting a remedy was National Oil and Hazardous Substances Pollution Contingency Plan-compliant as described in the ROD Amendment, and therefore not arbitrary and capricious.



policy, especially at large sites like this, to divide sites into manageable Operable Units. CERCLA § 121 (d)(4)(A).[19] There are also sound reasons, as the NAS suggested, to explore and develop alternative standards of protectiveness, especially given the fishery's apparent positive response to natural depletion and the limited ecological cleanups completed to date. CERCLA § 121(d)(4)(D).

What is perhaps most telling, and inexplicable, is how EPA has rolled out its proposed remedy in the absence of any discussion about the appropriate goals for the Upper Basin cleanup. Nowhere does EPA ask or challenge its decision-makers or the public to engage in a meaningful dialogue about whether the AWQC for zinc is an appropriate or achievable cleanup goal, even where it is quite clear that that goal cannot be achieved for decades if not centuries or longer, even after spending $1.3 billion (or likely much more) over many decades. If EPA was truly interested in meaningful public comment relative to its proposal, that question should have been at the forefront of the Upper Basin discussion since EPA released the February 2010 Draft FFS. Even more unsettling, as Mr. Garland points out, EPA's approach to adaptive management also seems designed to ensure that the question of appropriate goals will never be addressed in the future, with its focus limited to reshuffling cleanup strategies to achieve a cleanup goal that EPA's own record demonstrates is not achievable.

BU36-12

In summary, EPA has not demonstrated that its preferred alternative can achieve AWQC or that the preferred alternative is protective. EPA also has violated CERCLA in arbitrarily refusing to put out for public discussion and decision-maker consideration the issue of the appropriateness of invoking ARARs waivers. Under these circumstances, selection of the preferred alternative as the new Upper Basin remedy will violate CERCLA and be arbitrary and capricious.

d. The significance of an ARARs waiver for remedy selection.

EPA insists that its proposed cleanup actions are necessary to "comply with current environmental laws." This comment letter so far has documented that, in fact, EPA's proposal violates many CERCLA and NCP dictates, and fails to take advantage of the flexibility that CERCLA and the NCP allow for big, complicated sites like the Upper Basin. Nothing in CERCLA demands, in 2010 or 2011, a 50-90 year Upper Basin cleanup plan, that is plagued with so many uncertainties and unknowns. EPA could invoke one or more of the previously noted ARARs waivers, which in turn would allow EPA to work with the affected communities over time, consistent with the NCP, to design specific remedies that make sense for the place, the time and the dollars available. EPA's insistence otherwise is arbitrary and capricious.

BU36-13

An ARARs waiver would also allow EPA to accommodate the recognized limitations on South Fork fishery habitat attributable to non-mining impacts and account for those limitations in redefining its remedial action objectives to sensibly guide remediation going forward. *See, e.g.*, Attachment 6. Failure to account for these non-mining impacts in defining habitat objectives for

BU36-14

[19] Manageably-sized Operable Units also supports earlier, partial National Priorities List delistings.

13

Response to comment BU36-13

For a response to the comments regarding National Oil and Hazardous Substances Pollution Contingency Plan consistency, time to implement the Selected Remedy, ARAR waivers, and EPA's continuing involvement with the public, see responses to Comment Nos. BU36-7, BU36-6, and BU36- 12 above, and ROD Amendment, Part 3, Section 3.4.2 and Section 3.11.6.

Response to comment BU36-14

The comment raises the issue of non-mining impacts and suggests that they have adversely affected the Upper Basin and have not been taken into account by EPA. The ROD Amendment is focused on the effects of historic mining activities on the environment of the Upper Basin. These mining effects, which are substantial, are documented in the Final Focused Feasibility Study (FFS) Report (EPA, August 2012*, Final Focused Feasibility Study Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site*) and summarized in the Proposed Plan and ROD Amendment. EPA acknowledged in its supporting technical documents that physical habitat conditions are limiting to fish and wildlife populations, and that non-mining-related modifications of habitats for these species have had a significant effect. However, it is also apparent that secondary effects from mining-related metals contamination have also contributed to the degradation of physical habitat conditions in the Basin (e.g., metals can damage or eliminate vegetation, which promotes erosion and destroys habitat). Such degradation falls under the purview of CERCLA and was considered in the Selected Remedy.

The comment also raises the issue of using other metrics than just water quality to help guide cleanup. EPA is currently working with Federal Natural Resource Trustees (such as U.S. Fish and Wildlife Service and U.S. Forest Service) and the Upper Basin Project Focus Team to develop ecological response metrics for evaluating remedial progress during the implementation period for the Selected Remedy. The aquatic ecological response metrics are refined in part from the fishery tiers included in the 2002 ROD for OU 3 (EPA, 2002; www.epa.gov/superfund/sites/rods/fulltext/r1002032.pdf), and reflect the current understanding of the river system. Identification of measurable

ecological response metrics will provide EPA with a means to evaluate, predict, and report on environmental improvements associated with remedial actions planned and implemented in the Upper Basin. The intent of such ecological response metrics is to provide EPA and the public with:

- Tools to estimate potential environmental and ecological improvements that could result from specific remedial actions;
- Target receptors to evaluate environmental recovery; and
- A means for measuring environmental recovery and progress toward cleanup goals following the implementation of remedial actions.

Also see ROD Amendment, Part 3, Section 3.4.1.

EPA acknowledges the work of the National Academy of Sciences (NAS) in the Coeur d'Alene Basin and has endeavored to address issues raised by the NAS. See ROD Amendment, Part 3, Section 3.5.2.

The commenter also identifies the expert testimony Dr. Wesche provided on behalf of the commenter and other defendants in a natural resource damage lawsuit brought by the United States and Coeur d'Alene Tribe. The United States and Tribe provided expert reports and testimony that rebutted the work of Dr. Wesche. While this litigation is now resolved, it is noteworthy that the Court found, contrary to the conclusions of Dr. Wesche, that co-mingled mine waste was the primary cause of damage to natural resources in the Coeur d'Alene Basin, including certain fish in the Upper Basin as well as vegetation along the SFCDR. EPA considered information developed during the natural resource damage assessment process, including information that was responsive to Dr. Wesche.

fishery improvements compromises the ability of EPA or the public to properly evaluate the effectiveness of alternatives and the ability to successfully achieve a properly defined goal.[20] 40 C.F.R. § 300.430 (e)(9)(iii) (C). Moreover, unless these non-mining impacts are factored in, the CERCLA-driven cleanup objective and need, will be overstated.[21]

When the NAS evaluated EPA's Superfund practices in the Coeur d'Alene Basin in 2005, including the 2002 Record of Decision, it noted that EPA was focused on water quality to the exclusion of other important ecological factors:

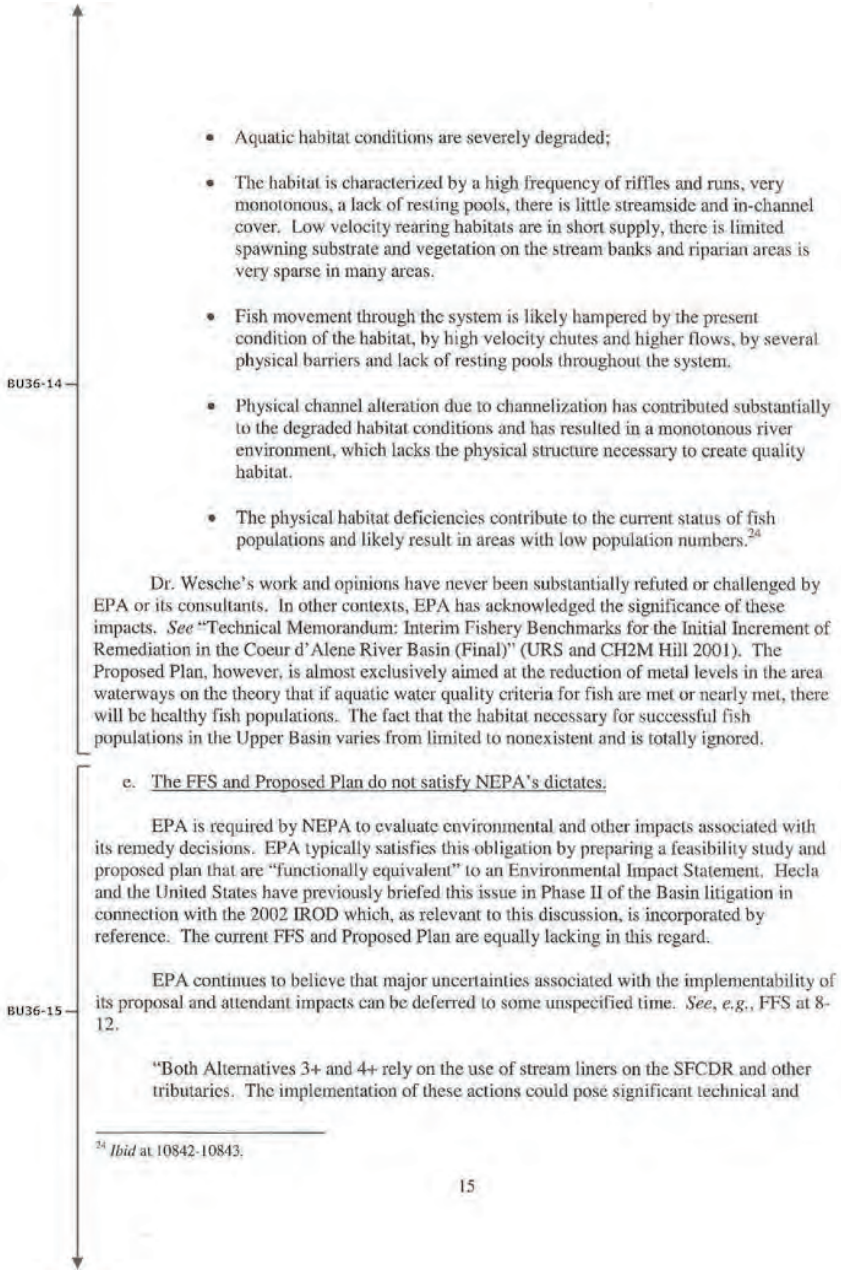
> "In developing restoration goals and performance metrics, additional consideration should be given to habitat modifications (for example, stream channelization) resulting from human activities that may prevent a return to premining conditions." NAS, p. 10.
> "Non-mining-related stressors were not explicitly considered in the [Ecological Risk Assessment]. These types of stressors include habitat modification, infrastructure development (roads and railways), and stream channelization." NAS, p. 293.
> "In developing performance metrics and restoration goals, additional consideration should be given to development-related habitat modifications (for example, stream channelization) that may prevent a return to pre-mining conditions. Remedial activities designed to reduce metals exposure and transport should, to the extent practicable, concomitantly strive to improve habitat for fish and wildlife." NAS, p. 321.

BU36-14 In 2004, Dr. Tom Wesche, a noted expert in western fisheries and aquatic habitat, reported that 70 percent of the SFCDR channel between Elizabeth Park and Canyon Creek is severely altered, with the remaining 30 percent classified as highly altered. He concluded that "the aquatic habitat of the SFCDR below Canyon Creek is severely degraded and generally not supportive of high salmonid abundance."[22] In 1999, Dr. Wesche had personally conducted a habit analysis of the SFCDR and lower Canyon and Nine Mile Creeks by walking the river bank and noting the habitat condition, over some 32 miles of stream.[23] In 2001, he testified as to the habitat conditions in the SFCDR as follows:

[20] EPA's Remedial Action Objective for surface water in the Upper Basin is to "remediate [s]urface water to mitigate mining-related impacts and **provide habitat capable of supporting a functioning ecosystem.**" Proposed Plan at p.6-1 (emphasis added). Note that this RAO distinguishes between mining and non-mining impacts related to water quality, but ignores that distinction relative to habitat.
[21] EPA's RAOs also include a goal of reducing metals concentrations to protect bull trout. This is inappropriate for a host of reason. First, bull trout are not present in the Main Stem Coeur d'Alene River and have not been present for many years. The Main Stem Coeur d'Alene River lacks suitable habitat and sufficient prey base for resident fish, including bull trout. *2002 Recovery Plan*, Chapter 15, pp. 19 & 21. The 1998 Biological Assessment for the Coeur d'Alene River (July 9, 1998), at p. 7, found that facilities such as roads and other encroachments near the streams in the Coeur d'Alene drainage have had a "profound" impact which is "wide spread and pervasive" in this basin. Thermal barriers in the Main Stem inhibit the use of the Main Stem Coeur d'Alene as a corridor during the summer months. *2005 Biological Monitoring Coeur d'Alene Basin, Operable Unit 3* (FWS July 2006). *See Hecla Mining Company Comments On The Proposed Designation Of The North Fork Coeur d'Alene River And Mainstream Coeur d'Alene River As Critical Habitat For Bull Trout* (April 5, 2010), which are incorporated by this reference.
[22] Expert Report of Thomas A. Wesche, PhD. August 2004 *United States v. Asarco Incorporated. No. CV-96-0122-N-EJL (Phase II), USDC Idaho.*
[23] Transcript of Trial pages 10835-10839, Day 52, May 31, 2001, *United States v. Asarco Incorporated, No. CV-96-0122-N-EJL.*

14

No comments



- Aquatic habitat conditions are severely degraded;
- The habitat is characterized by a high frequency of riffles and runs, very monotonous, a lack of resting pools, there is little streamside and in-channel cover. Low velocity rearing habitats are in short supply, there is limited spawning substrate and vegetation on the stream banks and riparian areas is very sparse in many areas.
- Fish movement through the system is likely hampered by the present condition of the habitat, by high velocity chutes and higher flows, by several physical barriers and lack of resting pools throughout the system.
- Physical channel alteration due to channelization has contributed substantially to the degraded habitat conditions and has resulted in a monotonous river environment, which lacks the physical structure necessary to create quality habitat.
- The physical habitat deficiencies contribute to the current status of fish populations and likely result in areas with low population numbers.[24]

Dr. Wesche's work and opinions have never been substantially refuted or challenged by EPA or its consultants. In other contexts, EPA has acknowledged the significance of these impacts. *See* "Technical Memorandum: Interim Fishery Benchmarks for the Initial Increment of Remediation in the Coeur d'Alene River Basin (Final)" (URS and CH2M Hill 2001). The Proposed Plan, however, is almost exclusively aimed at the reduction of metal levels in the area waterways on the theory that if aquatic water quality criteria for fish are met or nearly met, there will be healthy fish populations. The fact that the habitat necessary for successful fish populations in the Upper Basin varies from limited to nonexistent and is totally ignored.

e. The FFS and Proposed Plan do not satisfy NEPA's dictates.

EPA is required by NEPA to evaluate environmental and other impacts associated with its remedy decisions. EPA typically satisfies this obligation by preparing a feasibility study and proposed plan that are "functionally equivalent" to an Environmental Impact Statement. Hecla and the United States have previously briefed this issue in Phase II of the Basin litigation in connection with the 2002 IROD which, as relevant to this discussion, is incorporated by reference. The current FFS and Proposed Plan are equally lacking in this regard.

EPA continues to believe that major uncertainties associated with the implementability of its proposal and attendant impacts can be deferred to some unspecified time. *See, e.g.*, FFS at 8-12.

"Both Alternatives 3+ and 4+ rely on the use of stream liners on the SFCDR and other tributaries. The implementation of these actions could pose significant technical and

[24] *Ibid* at 10842-10843.

15

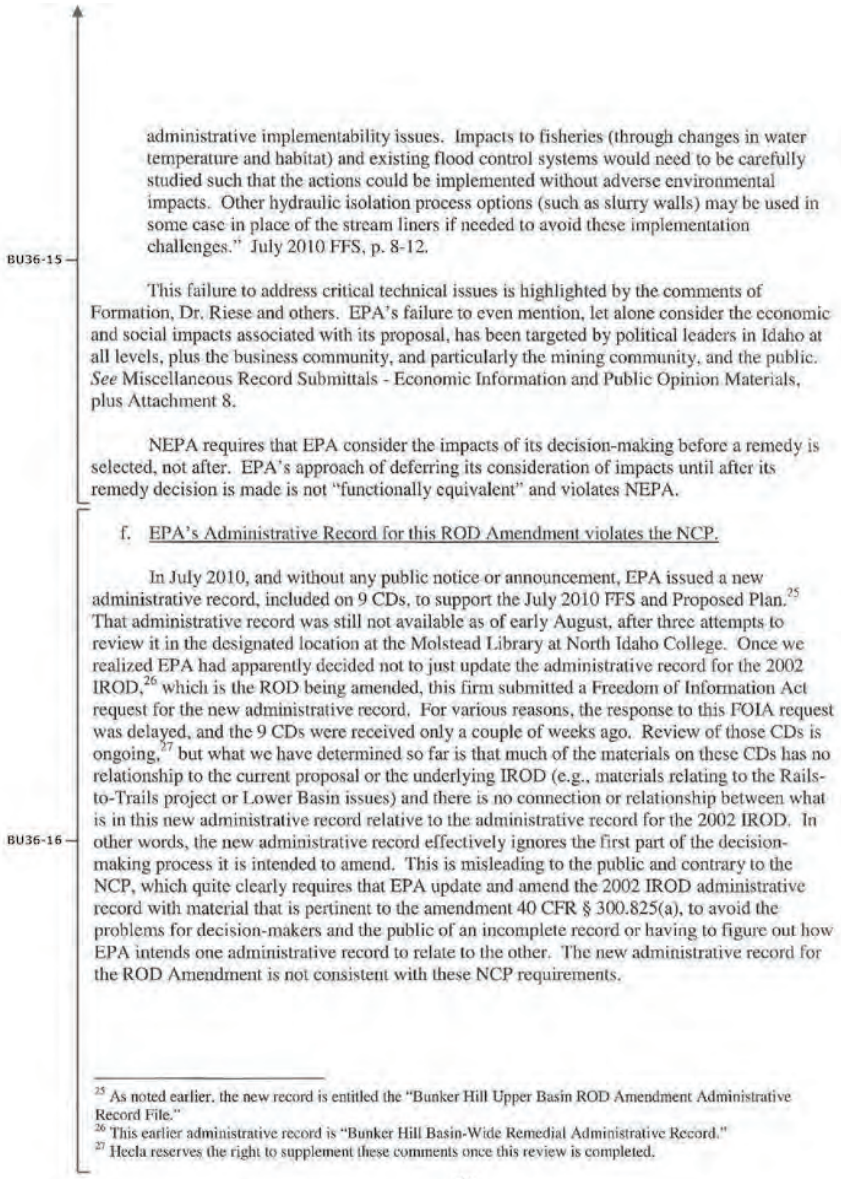
BU36-14

BU36-15

Response to comment BU36-15

The comment raises issues regarding whether EPA satisfied National Environmental Policy Act (NEPA) requirements. For CERCLA response actions, EPA is exempted from the procedural requirements of environmental laws, including NEPA. CERCLA Section 121(d)(2)(A) addresses the applicability of other environmental laws through applicable or relevant and appropriate requirements (ARARs). The National Oil and Hazardous Substances Pollution Contingency Plan interprets this to require compliance only with substantive, not procedural, aspects of ARARs. Because NEPA requirements are procedural, NEPA is not an ARAR for CERCLA response actions. Courts consistently have recognized that EPA procedures or environmental reviews under CERCLA enabling legislation are functionally equivalent to the NEPA process and, thus, exempt from the procedural requirements in NEPA. CERCLA addresses the two basic objectives of NEPA: (1) the agency should consider significant environmental impacts of the proposed action, and (2) relevant environmental information should be made available to the public, which allows the public to play a role in the agency's decision-making process and implementation of the decision.

The administrative record EPA developed in support of the Selected Remedy documents that EPA, by following the requirements of the National Oil and Hazardous Substances Pollution Contingency Plan, conducted a remedy selection process that was the functional equivalent of NEPA. Contrary to the assertion of the commenter, the Selected Remedy clearly considers input EPA received from the local population and state representatives during the public comment period. See, the ROD Amendment, Part 2, Section 3.0, detailing community participation during the ROD Amendment process.



administrative implementability issues. Impacts to fisheries (through changes in water temperature and habitat) and existing flood control systems would need to be carefully studied such that the actions could be implemented without adverse environmental impacts. Other hydraulic isolation process options (such as slurry walls) may be used in some case in place of the stream liners if needed to avoid these implementation challenges." July 2010 FFS, p. 8-12.

BU36-15

This failure to address critical technical issues is highlighted by the comments of Formation, Dr. Riese and others. EPA's failure to even mention, let alone consider the economic and social impacts associated with its proposal, has been targeted by political leaders in Idaho at all levels, plus the business community, and particularly the mining community, and the public. *See* Miscellaneous Record Submittals - Economic Information and Public Opinion Materials, plus Attachment 8.

NEPA requires that EPA consider the impacts of its decision-making before a remedy is selected, not after. EPA's approach of deferring its consideration of impacts until after its remedy decision is made is not "functionally equivalent" and violates NEPA.

f. EPA's Administrative Record for this ROD Amendment violates the NCP.

In July 2010, and without any public notice or announcement, EPA issued a new administrative record, included on 9 CDs, to support the July 2010 FFS and Proposed Plan.[25] That administrative record was still not available as of early August, after three attempts to review it in the designated location at the Molstead Library at North Idaho College. Once we realized EPA had apparently decided not to just update the administrative record for the 2002 IROD,[26] which is the ROD being amended, this firm submitted a Freedom of Information Act request for the new administrative record. For various reasons, the response to this FOIA request was delayed, and the 9 CDs were received only a couple of weeks ago. Review of those CDs is ongoing,[27] but what we have determined so far is that much of the materials on these CDs has no relationship to the current proposal or the underlying IROD (e.g., materials relating to the Rails-to-Trails project or Lower Basin issues) and there is no connection or relationship between what is in this new administrative record relative to the administrative record for the 2002 IROD. In other words, the new administrative record effectively ignores the first part of the decision-making process it is intended to amend. This is misleading to the public and contrary to the NCP, which quite clearly requires that EPA update and amend the 2002 IROD administrative record with material that is pertinent to the amendment 40 CFR § 300.825(a), to avoid the problems for decision-makers and the public of an incomplete record or having to figure out how EPA intends one administrative record to relate to the other. The new administrative record for the ROD Amendment is not consistent with these NCP requirements.

BU36-16

[25] As noted earlier, the new record is entitled the "Bunker Hill Upper Basin ROD Amendment Administrative Record File."
[26] This earlier administrative record is "Bunker Hill Basin-Wide Remedial Administrative Record."
[27] Hecla reserves the right to supplement these comments once this review is completed.

16

Response to comment BU36-16

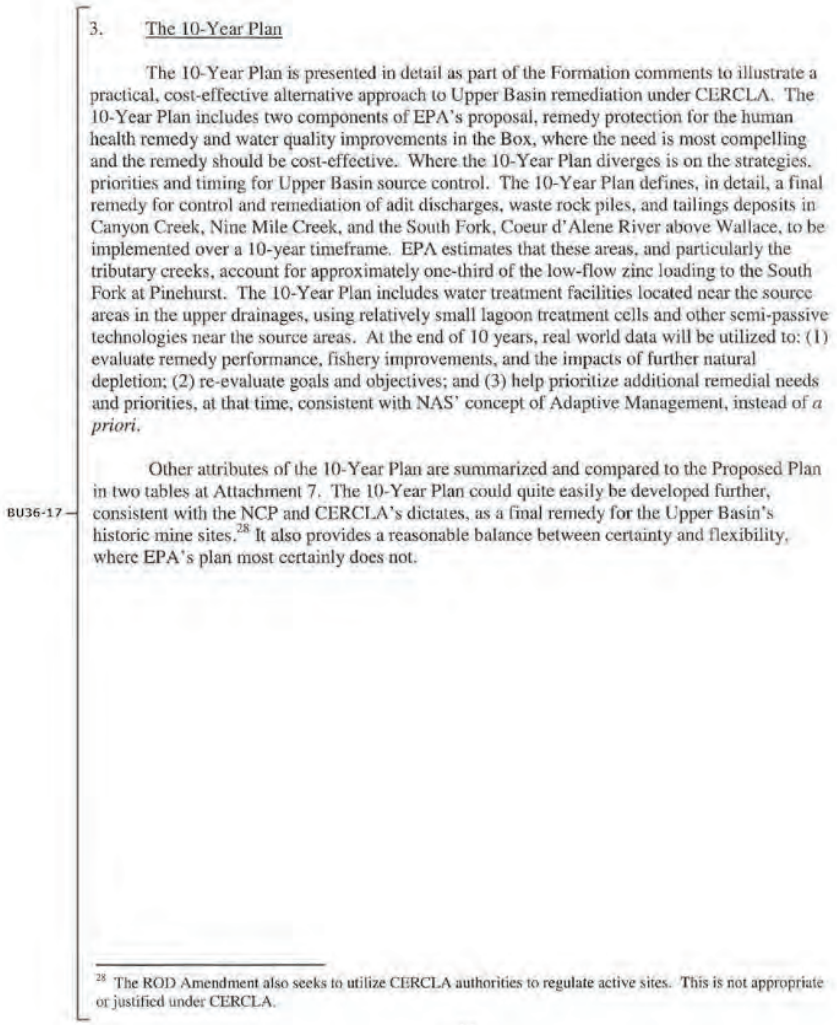
Apparently, the commenter contends that EPA management of the administrative record site file for the Upper Basin ROD amendment violates the National Oil and Hazardous Substances Pollution Contingency Plan because it was not made available to the public in a timely manner and because "there is no connection or relationship between this administrative record relative to the administrative record for the 2002 IROD." The commenter's contention is incorrect.

EPA's administrative record management practices for the Selected Remedy complied with CERCLA's and the National Oil and Hazardous Substances Pollution Contingency Plan's(NCP's) administrative record management requirements. The NCP requires EPA to establish an administrative record that contains the documents that form the basis of the selection of a response action (40 Code of Federal Regulations [CFR] § 300.800(a)). The NCP also requires EPA to maintain an administrative record file at its office and at a location at or near the Site (40 CFR § 300.805(a)). EPA is required to make the administrative record file available for inspection as it is performing the studies that support the selection of a response action (e.g., remedial investigation and feasibility study) (40 CFR § 300.815(a)). EPA is required to make the proposed plan and the information contained in the administrative record available to the public and to provide the public with an opportunity to comment on the proposed plan (40 CFR §§ 300.430(f)(3) and 300.815(b)). In general, the administrative record for a remedial action becomes final when the document selecting the remedy is signed by the appropriate EPA official (40 CFR §§ 300.815(d) and 300.825(a)).

As documented in the ROD Amendment, Part 2, Section 3.0, EPA provided opportunities for public involvement that go well beyond the requirements of the CERCLA and the NCP. In regards to the issues raised by the commenter, EPA maintains a copy of the administrative record site file supporting the Selected Remedy at its office in Seattle and at the Molstead Library located at the North Idaho College in Coeur d'Alene, Idaho. A copy of the complete administrative record site file as of the date the Proposed Plan was published was mailed to the Molstead Library on July 8, 2010. EPA also maintains key documents related to

the Bunker Hill Mining and Metallurgical Superfund Site, and the Upper Basin portion of the Site at three locations in addition to the Molstead Library that are located within or close to the Bunker Hill Site, as well as on a web page that is updated on a regular basis and is widely advertised. Moreover, EPA extended the public comment period and provided the public with 135 days to review and comment on the Proposed Plan and the administrative record file that supported the Proposed Plan. In addition, during the comment period, EPA held three informal open houses, hosted a formal public comment meeting that was transcribed, attended numerous community meetings, and hosted a public tour of some of the sites included in the Proposed Plan. EPA also participated in U.S. Senator Crapo's Town Hall meeting in Kellogg and the Wallace Town Hall meeting sponsored by the mayors of Upper Basin communities.

The commenter's suggestion that the Selected Remedy administrative record bears no relationship to the administrative record for the EPA's 2002 ROD is puzzling and has no basis. The administrative record for the Selected Remedy contains the documents that form the basis of the selection of the Selected Remedy. The administrative record for the Selected Remedy incorporates several sections of the administrative record for the 2002 ROD's administrative record as well as the administrative record for other earlier response action decisions at the Bunker Hill Site.



3. The 10-Year Plan

The 10-Year Plan is presented in detail as part of the Formation comments to illustrate a practical, cost-effective alternative approach to Upper Basin remediation under CERCLA. The 10-Year Plan includes two components of EPA's proposal, remedy protection for the human health remedy and water quality improvements in the Box, where the need is most compelling and the remedy should be cost-effective. Where the 10-Year Plan diverges is on the strategies, priorities and timing for Upper Basin source control. The 10-Year Plan defines, in detail, a final remedy for control and remediation of adit discharges, waste rock piles, and tailings deposits in Canyon Creek, Nine Mile Creek, and the South Fork, Coeur d'Alene River above Wallace, to be implemented over a 10-year timeframe. EPA estimates that these areas, and particularly the tributary creeks, account for approximately one-third of the low-flow zinc loading to the South Fork at Pinehurst. The 10-Year Plan includes water treatment facilities located near the source areas in the upper drainages, using relatively small lagoon treatment cells and other semi-passive technologies near the source areas. At the end of 10 years, real world data will be utilized to: (1) evaluate remedy performance, fishery improvements, and the impacts of further natural depletion; (2) re-evaluate goals and objectives; and (3) help prioritize additional remedial needs and priorities, at that time, consistent with NAS' concept of Adaptive Management, instead of *a priori*.

Other attributes of the 10-Year Plan are summarized and compared to the Proposed Plan in two tables at Attachment 7. The 10-Year Plan could quite easily be developed further, consistent with the NCP and CERCLA's dictates, as a final remedy for the Upper Basin's historic mine sites.[28] It also provides a reasonable balance between certainty and flexibility, where EPA's plan most certainly does not.

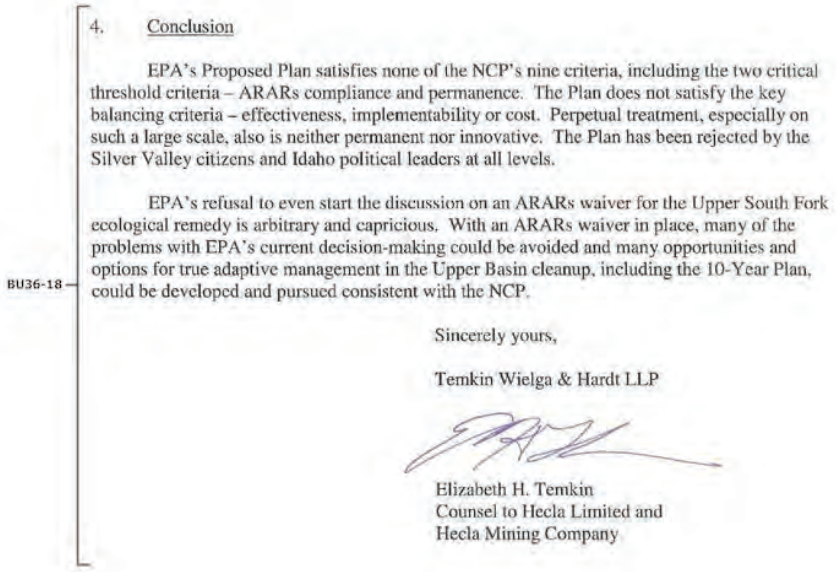
BU36-17

[28] The ROD Amendment also seeks to utilize CERCLA authorities to regulate active sites. This is not appropriate or justified under CERCLA.

17

Response to comment BU36-17

The comment promotes a "10-Year Plan" submitted on behalf of Hecla by Formation Environmental. The "10-Year Plan" does not provide a cleanup approach that would appropriately respond to the mining waste contamination in the Upper Basin. For EPA's response, see ROD Amendment, Part 3, Section 3.10.4.



4. Conclusion

EPA's Proposed Plan satisfies none of the NCP's nine criteria, including the two critical threshold criteria – ARARs compliance and permanence. The Plan does not satisfy the key balancing criteria – effectiveness, implementability or cost. Perpetual treatment, especially on such a large scale, also is neither permanent nor innovative. The Plan has been rejected by the Silver Valley citizens and Idaho political leaders at all levels.

EPA's refusal to even start the discussion on an ARARs waiver for the Upper South Fork ecological remedy is arbitrary and capricious. With an ARARs waiver in place, many of the problems with EPA's current decision-making could be avoided and many opportunities and options for true adaptive management in the Upper Basin cleanup, including the 10-Year Plan, could be developed and pursued consistent with the NCP.

BU36-18

Sincerely yours,

Temkin Wielga & Hardt LLP

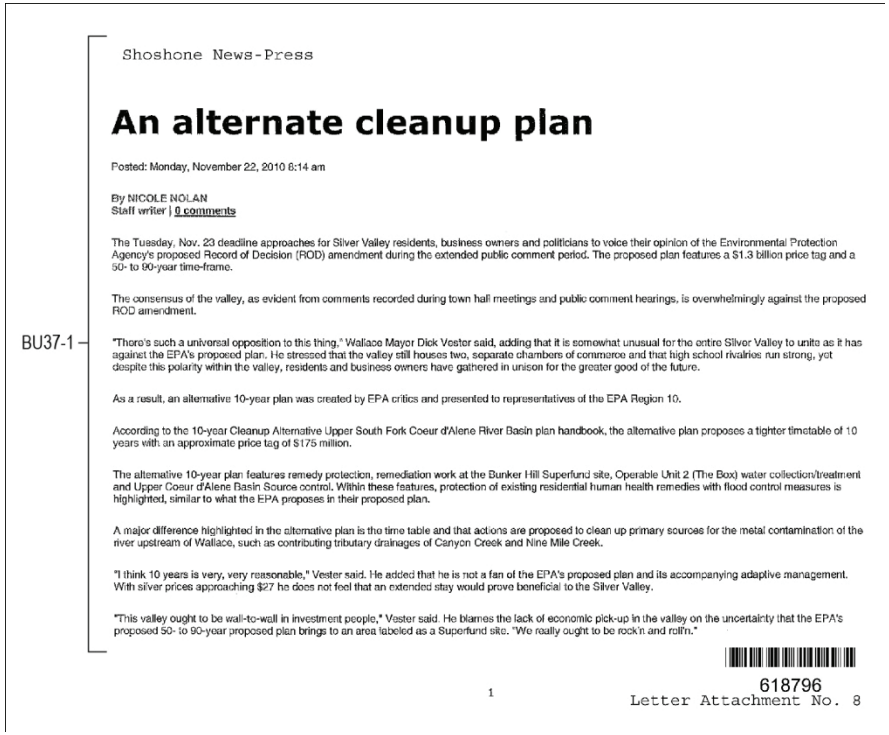
Elizabeth H. Temkin
Counsel to Hecla Limited and
Hecla Mining Company

18

Response to comment BU36-18

The comment basically contends the Proposed Plan is not National Oil and Hazardous Substances Pollution Contingency Plan (NCP)-compliant. EPA disagrees. As demonstrated in the Proposed Plan and the ROD Amendment, the Preferred Alternative and Selected Remedy, respectively, were determined in an NCP-compliant manner. The comment goes on to pose that the Proposed Plan has been rejected by the Silver Valley citizens and Idaho political leaders. As required by CERCLA, EPA carefully considered Proposed Plan comments of such entities when preparing its ROD Amendment (see ROD Amendment, Part 2, Section 10.0 and ROD Amendment, Part 3). Such comments fall under what is referred to as Modifying Criteria by CERCLA. Regarding the applicable or relevant and appropriate requirement (ARAR) issues raised, see EPA response to Comment No. BU36-12 above.

Hecla Mining Company (submitted by Temkin Wielga & Hardt LLP), BU37, Letter 618796



Shoshone News-Press

An alternate cleanup plan

Posted: Monday, November 22, 2010 6:14 am

By NICOLE NOLAN
Staff writer | 0 comments

The Tuesday, Nov. 23 deadline approaches for Silver Valley residents, business owners and politicians to voice their opinion of the Environmental Protection Agency's proposed Record of Decision (ROD) amendment during the extended public comment period. The proposed plan features a $1.3 billion price tag and a 50- to 90-year time-frame.

The consensus of the valley, as evident from comments recorded during town hall meetings and public comment hearings, is overwhelmingly against the proposed ROD amendment.

BU37-1 – "There's such a universal opposition to this thing," Wallace Mayor Dick Vester said, adding that it is somewhat unusual for the entire Silver Valley to unite as it has against the EPA's proposed plan. He stressed that the valley still houses two, separate chambers of commerce and that high school rivalries run strong, yet despite this polarity within the valley, residents and business owners have gathered in unison for the greater good of the future.

As a result, an alternative 10-year plan was created by EPA critics and presented to representatives of the EPA Region 10.

According to the 10-year Cleanup Alternative Upper South Fork Coeur d'Alene River Basin plan handbook, the alternative plan proposes a tighter timetable of 10 years with an approximate price tag of $175 million.

The alternative 10-year plan features remedy protection, remediation work at the Bunker Hill Superfund site, Operable Unit 2 (The Box) water collection/treatment and Upper Coeur d'Alene Basin Source control. Within these features, protection of existing residential human health remedies with flood control measures is highlighted, similar to what the EPA proposes in their proposed plan.

A major difference highlighted in the alternative plan is the time table and that actions are proposed to clean up primary sources for the metal contamination of the river upstream of Wallace, such as contributing tributary drainages of Canyon Creek and Nine Mile Creek.

"I think 10 years is very, very reasonable," Vester said. He added that he is not a fan of the EPA's proposed plan and its accompanying adaptive management. With silver prices approaching $27 he does not feel that an extended stay would prove beneficial to the Silver Valley.

"This valley ought to be wall-to-wall in investment people," Vester said. He blames the lack of economic pick-up in the valley on the uncertainty that the EPA's proposed 50- to 90-year proposed plan brings to an area labeled as a Superfund site. "We really ought to be rockin and rollin."

1

618796
Letter Attachment No. 8

Response to comment BU37-1

This document was an attachment to Document BU36 above. See responses to Document BU36.

In a letter Vester addressed to EPA Region 10 Administrator Dennis McLerran, the mayor expressed his disappointment in McLerran's response to the alternative 10-year plan. He writes that it is "apparent from your comments that EPA has predetermined the outcome of decision making on its proposed plan prior to considering what the Silver Valley communities and citizens have to say about the plan."

"How disappointing to have him reject the 10-year plan prior to the comment period ending," Vester said Friday. "I'm not sure how (the public comment period) is supposed to work, but I don't think it's supposed to be that way."

According to a certified copy of the EPA Comments Public Hearing held Oct. 20 in Wallace, every individual who stepped up to the podium to formally submit a comment opposed the EPA proposed plan.

"This is not a Republican/Democratic issue," Vester said. "Opposition is coming from Democrats and Republicans, old people and young people, Shoshone people and Kootenai County people."

Vester continued to say that if the EPA doesn't listen to the united voice of the Silver Valley, then it is evident that the EPA is a government agency run amok.

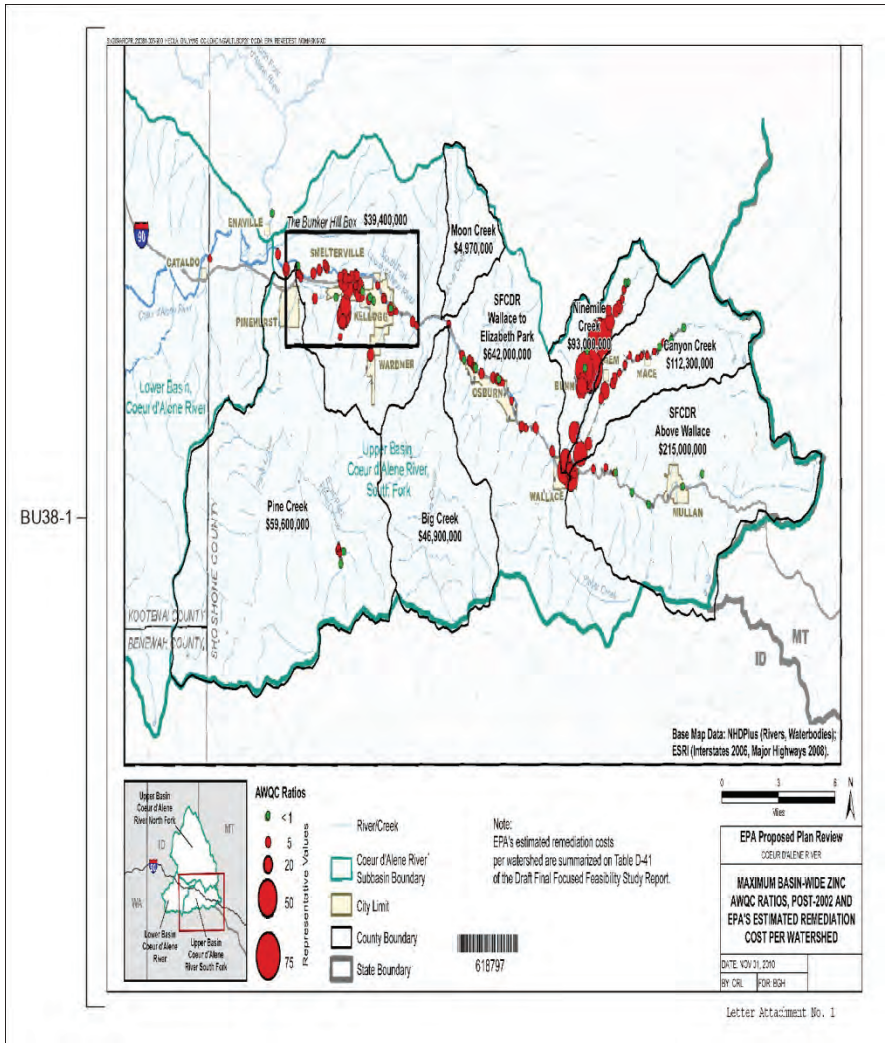
"EPA in the Silver Valley seems to be carved in stone."

2

No comments

Hecla Mining Company (submitted by Temkin Wielga & Hardt LLP), BU38, Letter 618797

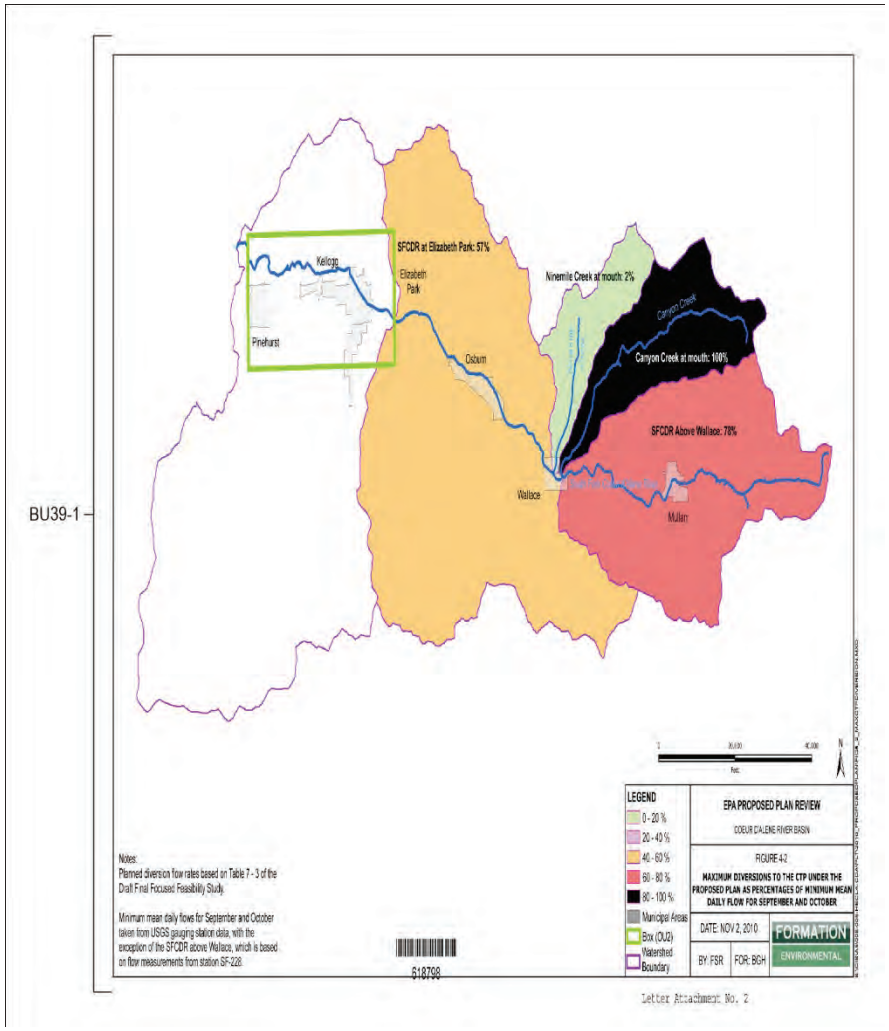
BU38-1



Response to comment BU38-1

This document was an attachment to Document BU36 above. See responses to Document BU36.

Hecla Mining Company (submitted by Temkin Wielga & Hardt LLP), BU39, Letter 618798

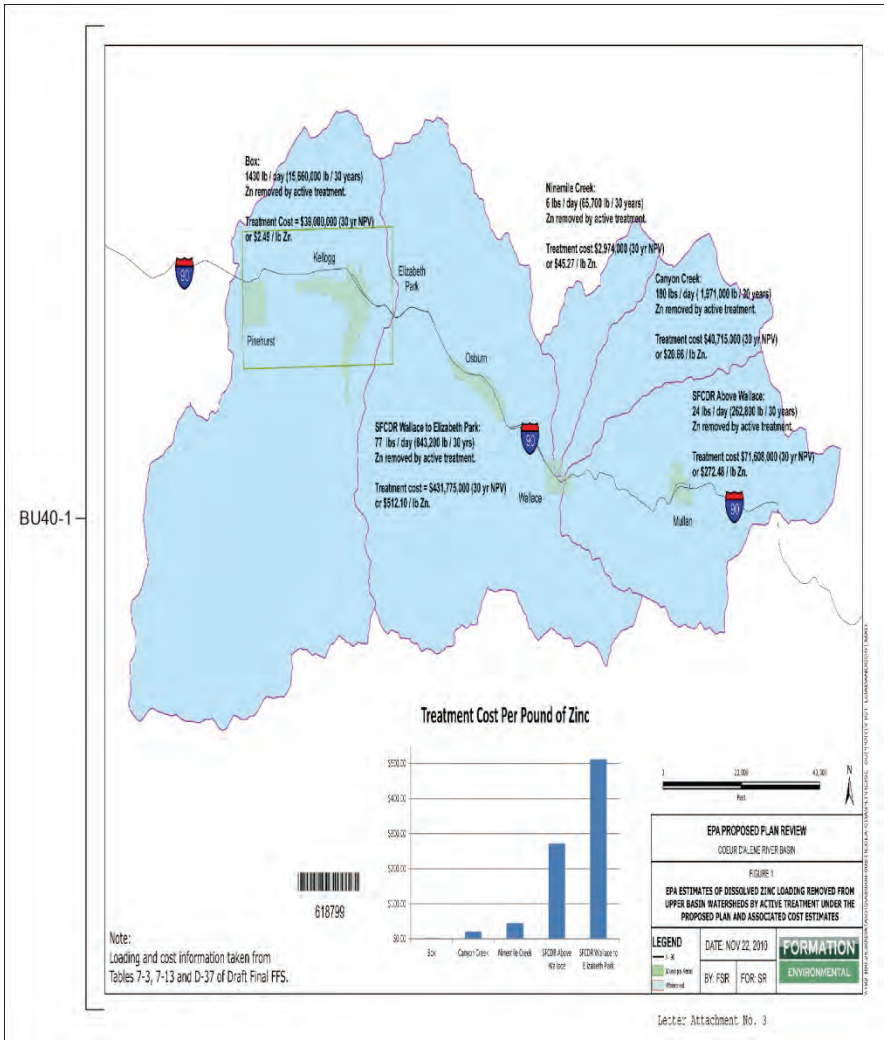


Response to comment BU39-1

This document was an attachment to Document BU36 above. See responses to Document BU36.

Hecla Mining Company (submitted by Temkin Wielga & Hardt LLP), BU40, Letter 618799

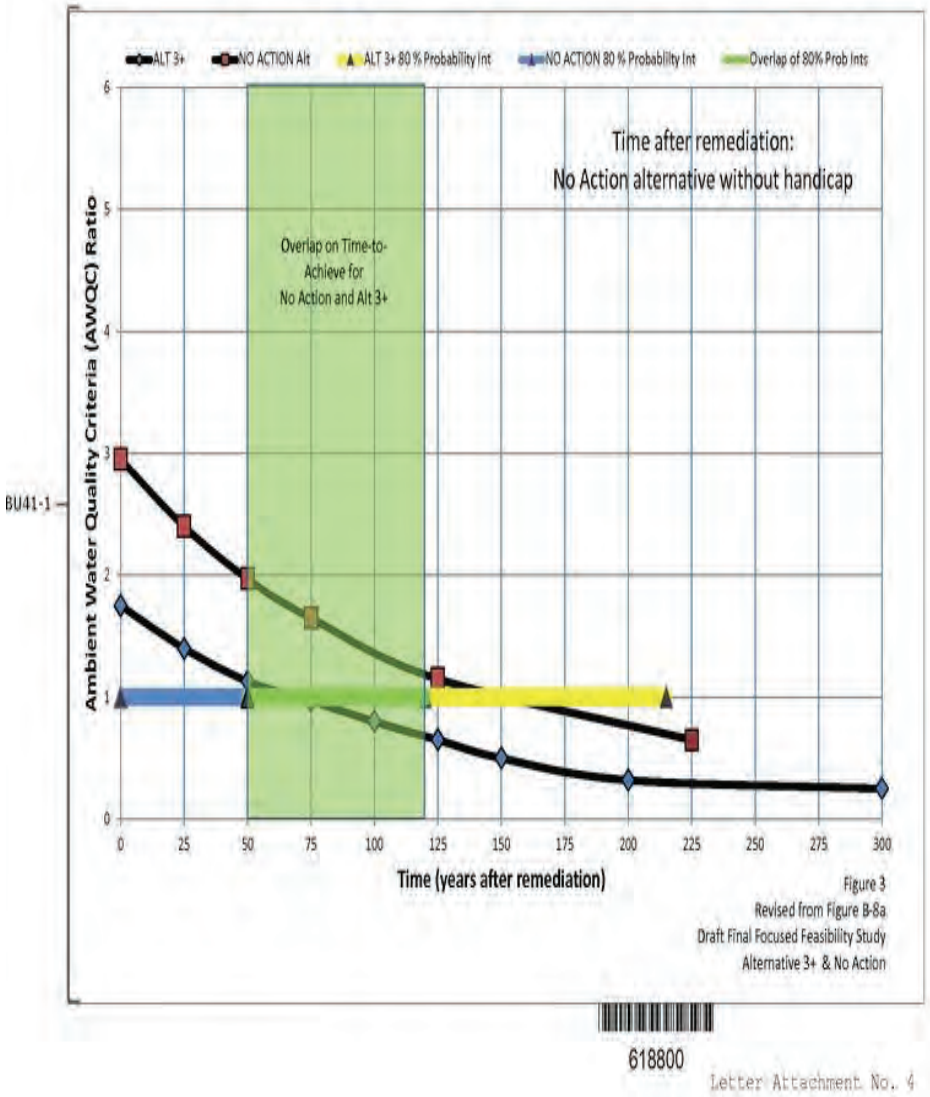
BU40-1



Response to comment BU40-1

This document was an attachment to Document BU36 above. See responses to Document BU36.

Hecla Mining Company (submitted by Temkin Wielga & Hardt LLP), BU41, Letter 618800

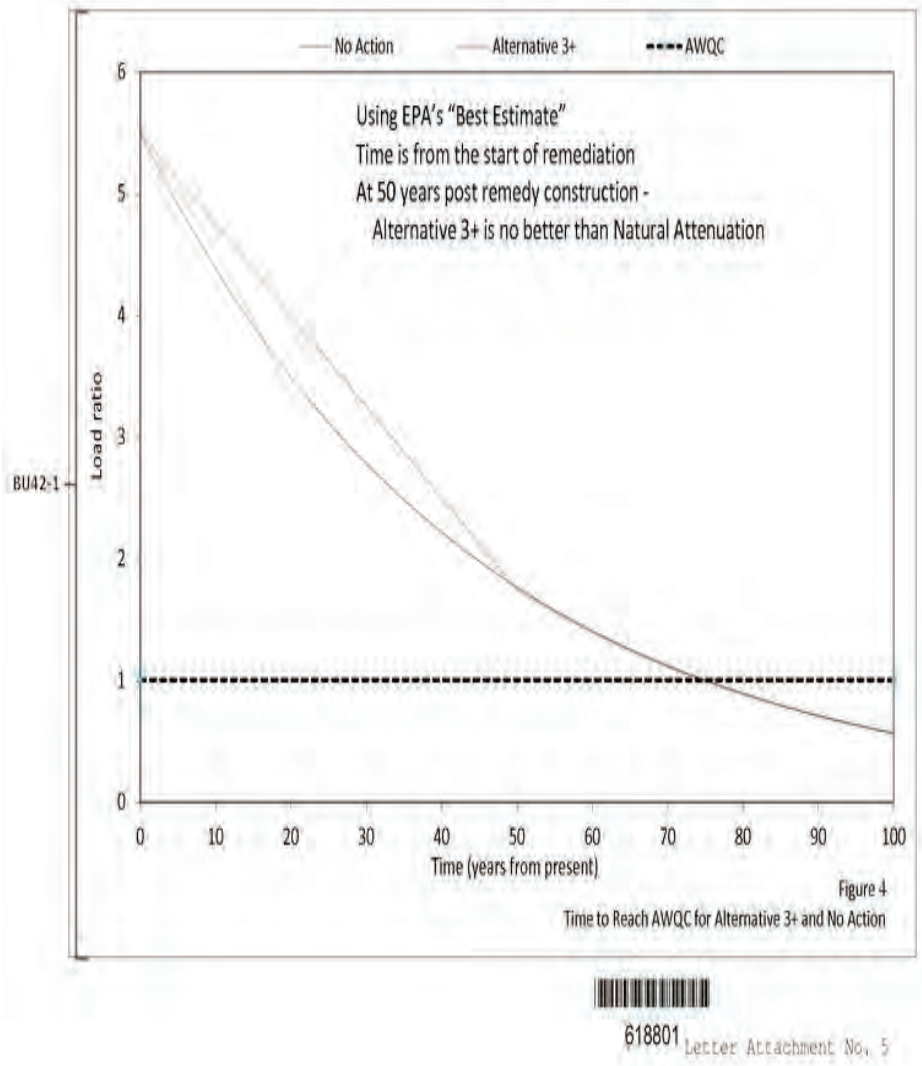


BU41-1

Response to comment BU41-1

This document was an attachment to Document BU36 above. See responses to Document BU36.

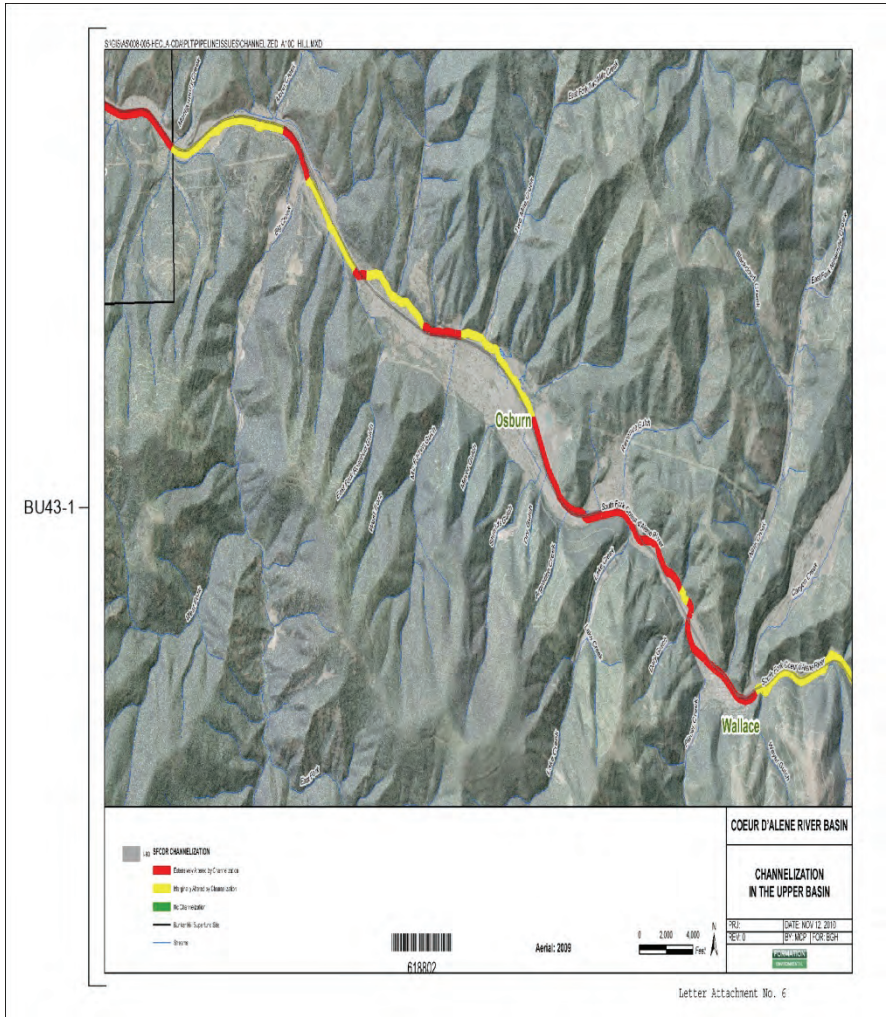
Hecla Mining Company (submitted by Temkin Wielga & Hardt LLP), BU42, Letter 618801



Response to comment BU42-1

This document was an attachment to Document BU36 above. See responses to Document BU36.

Hecla Mining Company (submitted by Temkin Wielga & Hardt LLP), BU43, Letter 618802



Response to comment BU43-1

This document was an attachment to Document BU36 above. See responses to Document BU36.

Hecla Mining Company (submitted by Temkin Wielga & Hardt LLP), BU44, Letter 618803

BU44-1

COMPARISON OF PROPOSED PLAN AND 10-YEAR PLAN COST ESTIMATES

PLAN COMPONENT	EPA'S PROPOSED PLAN	10-YEAR PLAN
Protection of Existing Human Health Remedies	$33,900,000 (Does not include FEMA Flood Study)	$36,000,000 (Includes FEMA Flood Study)
Water Collection/Conveyance/Treatment - Within Box	$39,000,000	$39,000,000
Water Collection/Conveyance/Treatment - Outside of Box	$603,731,000	$75,000,000 to $100,000,000[1]
Excavation/Haul/Repository - Outside of Box	$162,656,000	
Other Actions - Outside of Box	$455,613,000	
TOTAL COST	$1,300,000,000 (rounded)	$175,000,000 (max. estimate)
OUTCOME	50-90 years; enormous cost, unnecessary components and unaccounted for, significant impacts	Fixes top priorities; re-evaluate in 10-years

[1] The activities included in the 10-Year Plan outside of the Box are different than the activities included in EPA's Proposed Plan.

618803

Letter Attachment No. 7

Response to comment BU44-1

This document was an attachment to Document BU36 above. See responses to Document BU36.

BU44-1

A 10-Year Planning Approach vs. the EPA Proposed Plan for the Upper Coeur d'Alene River Basin

10-Year Plan	EPA's Plan
$150 - $175 million	$1.38 billion (or $3.4 - $5.4 billion)
10 Years	50 - 90 years
Can be implemented consistent with the National Contingency Plan ("NCP")	Inconsistent with the NCP
Relies on facts and location-specific information	Relies on theory and a deficient model that has been roundly criticized
Fishery improvement drives future remediation; recognizes habitat constraints	EPA dictates an unrealistic and unnecessary cleanup goal; does not recognize habitat constraints
Meaningful & ongoing public input	EPA can limit public input
Valley controls future land use	EPA controls future land use in the Valley
Addresses key historic sources in Canyon/Nine Mile Creeks; likely water quality improvements are predictable	No stated priorities; effectiveness cannot be predicted because the model used is flawed
Flat ground preserved for development	Multiple repositories occupy the limited flat space available
Consistent with more mining and more mining jobs	Complicates mining and replaces high paid mining jobs with temporary, seasonal jobs
Cleans up Canyon Creek	Sacrifices Canyon Creek
Preserves stream flows and aquatic habitat	Depletes stream flows and threatens fish habitat
Consistent with National Academies of Sciences ("NAS") recommendations for ecological remedy	Inconsistent with NAS recommendations for ecological remedy
Includes $2 million for additional flood control study	Limited remedy-related protection

Letter Attachment No. 7 cont'd

No comments

Hecla Mining Company (submitted by Formation Environmental), BU45, Letter 618804

Technical Comments on EPA's Proposed Plan,
Upper Basin of the Coeur d'Alene River,
Bunker Hill Mining and Metallurgical Complex Superfund Site

November 22, 2010

Prepared for

Hecla
MINING COMPANY

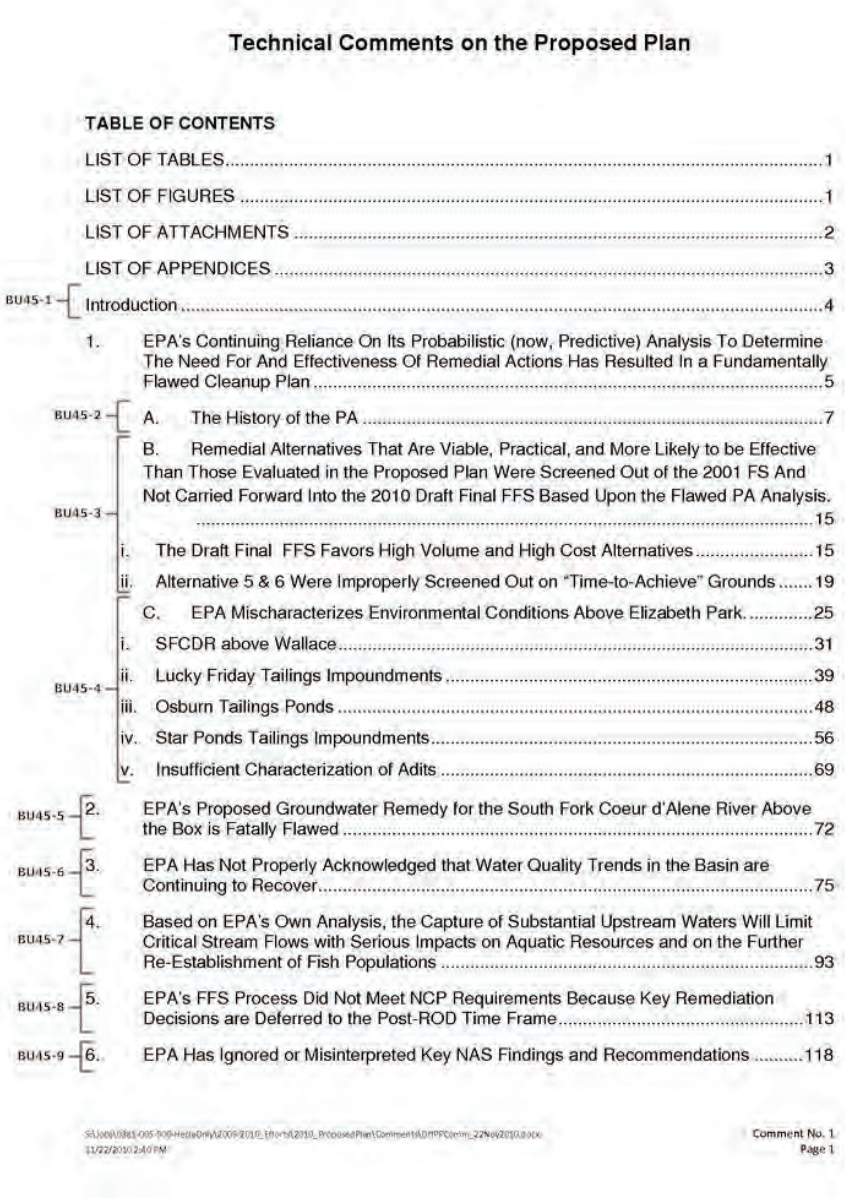
Prepared by Formation Environmental, LLC

FORMATION
ENVIRONMENTAL

618804

Note: This comment was submitted by Formation Environmental on behalf of Hecla Mining Company as a full report entitled *Technical Comment on EPA's Proposed Plan*. The table of contents of this report was delineated and responded to below. The complete report, including appendices, can be found in EPA's administrative record file under the following document numbers:

- EPA Site File Document Number 618804 - Technical Comments on EPA's Proposed Plan, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site (Formation Env)
- EPA Site File Document number 618805 - Appendix A - Lucky Friday
- EPA Site File Document number 618806 - Appendix B - Ten Year Plan



Technical Comments on the Proposed Plan

TABLE OF CONTENTS

11/22/2010 2:40 PM

Comment No. 1
Page 1

Response to comment BU45-1

This introductory comment is critical of EPA's Preferred Alternative for the Upper Basin, as identified in the Proposed Plan, and of the rationale upon which the choice of this alternative was based. The document that follows includes specific comments that seek to support the commenter's opinions. EPA's responses to these comments are provided below.

Response to comment BU45-2

The introduction to comment 1 contains broad criticisms of EPA's use of the Probabilistic (now Predictive) Analysis (PA) and states that it has resulted in a fundamentally flawed cleanup plan. EPA disagrees with these criticisms and stands by its use of the PA in evaluating the effectiveness of the remedial alternatives considered in the Focused Feasibility Study (FFS). EPA has extensively documented the development and use of the PA over time, as indicated in Table 1-1 in item A that discusses the history of the PA. The PA was initially developed to support the evaluation of alternatives in the 2001 Feasibility Study (FS) for OU 3 (EPA, October 2001, *Final [Revision 2] Feasibility Study Report, Coeur d'Alene Basin Remedial Investigation/Feasibility Study*), and was subsequently used to support evaluations in the Proposed Plan and 2002 ROD for OU 3 (EPA, 2002; www.epa.gov/superfund/sites/rods/fulltext/r1002032.pdf). Comments regarding the use of the PA were addressed by EPA in the 2002 ROD. The Predictive Analysis was subsequently evaluated as part of the program review conducted by the NAS. When the pre-publication NAS review report was released, EPA responded in detail to both the NAS review and criticism of the PA contained in Appendix F of the NAS report (EPA, July 26 2006, Personal communication (email) from A. Dailey/EPA to D. Reisman and E. Bates/EPA: entitled *EPA Region 10 "Error of Fact" Comments on the NAS Pre-publication Report Entitled: "Superfund and Mining Megasites – Lessons from the Coeur d'Alene Basin"*).

Furthermore, following the NAS review, an independent review of the PA was conducted on behalf of EPA by a well-known leader in the field of probabilistic modeling and a member of the NAS (Dr. Gregory B. Baecher, University of Maryland, A.J. Clark School of Engineering, College Park, Maryland) to evaluate

the approach used by EPA and assess concerns raised by the NAS. The independent review validated the approach used by EPA and its use in the evaluation and comparison of alternatives. For further information regarding EPA's use of the PA and responses to criticisms of its use, see EPA responses to comments from Dr. Crouch (submitted on behalf of Hecla Mining) in Document No. BU48.

Response to comment BU45-3

Item B states that some potentially viable remedial alternatives were screened out of the 2001 FS for the Coeur d'Alene Basin, as a result of a flawed PA analysis, and therefore were not carried forward for consideration in the FFS for the Upper Basin. EPA did indeed exclude some of the 2001 remedial alternatives (Ecological Alternatives 1, 2, 5, and 6) from further consideration in determining the alternatives to be evaluated in the FFS. The specific alternatives referenced in the comment as excluded by EPA were Alternatives 5 and 6 (the State of Idaho and Mining Company Alternatives, respectively). As documented in the 2001 Proposed Plan for OU 3 (EPA, October 29, 2001*, Coeur d'Alene Basin Proposed Plan*), an National Oil and Hazardous Substances Pollution Contingency Plan-consistent evaluation resulted in elimination of these alternatives from further review in selecting a remedy. Consequently, as documented in the 2010 Draft Final FFS Report (EPA, August 2012, *Final Focused Feasibility Study Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site*) and Proposed Plan for the Upper Basin (EPA, 2010, http://www.epa.gov/region10/pdf/sites/bunker_hill/upper_basin_final_pp_0710.pdf), these alternatives were not considered in the development of alternatives for the Upper Basin, and only Ecological Alternatives 3 and 4 were carried forward from the 2001 FS. As described above, EPA disagrees that its PA was flawed (see also the EPA responses to comments from Dr. Crouch in Document No. BU48).

With respect to issues raised by the commenter regarding cleanup times, discussed in Section 8 of the Proposed Plan, EPA chose to not include predictions of time to achieve applicable or relevant and appropriate requirements (ARARs) in selecting its Preferred Alternative. The PA includes a component that can be used to estimate the effects of natural source depletion on ambient water quality criteria (AWQC) ratios over time as a function of a decay rate. However, the natural source depletion component was not used in the FFS analysis because the prediction of long-term water quality trends and specific water quality in the SFCDR Watershed in the distant future is subject to considerable uncertainty. These uncertainties include complex weathering rates and the changes in these rates for the numerous mine waste types and source areas in the watershed. Site-specific exposure to seasonal wetting and water flux, as well as variations in particle surface area, iron sulfide content, trace metal content, air diffusion, and other factors, control the release of contaminants from mine wastes. The effects of cleanup actions further complicate these predictions. Therefore, the effectiveness evaluation relies on the post-remediation AWQC estimates, not uncertain cleanup times, for comparison among the alternatives. This provides a meaningful measure of relative effectiveness.

Response to comment BU45-4

Item C contends that EPA mischaracterizes environmental conditions above Elizabeth Park as the result of using the PA. The commenter discusses the PA's inability to track or replicate actual site conditions, and cites examples of the PA's mischaracterization of environmental conditions in several specific areas within the Upper Basin: the SFCDR above Wallace, Lucky Friday Tailings Impoundments, Osburn Tailings Pond, Star Ponds Tailings Impoundments, and adits.

The commenter seems to misunderstand the purpose of the PA and how it was used in the decisionmaking process for the Upper Basin. The purpose of the PA is not to "track or replicate actual site conditions" at all locations.

The PA was used in the FFS and the Proposed Plan to provide approximations of the effects of specific upstream remedial alternatives on two downstream metal loading locations (Elizabeth Park and Pine Creek) for use in evaluating and comparing the alternatives considered. The analysis uses a straightforward accounting scheme to sum up the contributions of upstream sources to downstream metal loads. The effects of varying remedial actions at the sources are taken into account by modifying the contributions of each source of metals entering the river. The combined effects of each of the remedial alternatives are forecast by aggregating the contributions over all the sources.

The PA combines existing information about the Upper Basin with scientific understanding of environmental processes, but neither is perfect. Detailed historical monitoring data on stream flows, levels of contamination, and other environmental conditions are limited for the purposes of analyzing and predicting natural conditions in the Upper Basin. As a result, professional

judgment is required to interpret data and to help estimate initial parameter values. Limitations in the empirical monitoring data (including sources, source volumes, and dissolved metals loading), coupled with the assignment of model parameters such as relative loading potential and treatment effectiveness (based on best professional judgment), result in estimation uncertainties. The PA uses a probabilistic approach to capturing such uncertainties and propagating their combined effects through to forecasts. The known uncertainties are quantified by mathematically propagating the uncertainties in the input variables, as measured by their coefficients of variation, through the PA model to the output variables. The results are engineering approximations based on a synthesis and an interpretation of available information, and provide a sound basis for informed decision-making for comparing alternatives and assisting in the selection of a remedy.

EPA will implement the Selected Remedy in the Upper Basin using an adaptive management approach. As the remedy is implemented, EPA will collect considerable monitoring data which, coupled with existing data, will assist in making increasingly improved predictions regarding the effectiveness of cleanup actions and methods. Data collected and interpreted over time to monitor the results of remediation will be used to document changes in water quality. Such data can be compared to modeled predictions to refine the predictive process.

Furthermore, due in part to extensive public concern about the duration and cost of cleanup, EPA has decided to significantly reduce the scope of the Selected Remedy by prioritizing the remedial actions that were presented as EPA's Preferred Alternative in the Proposed Plan. The Upper Basin Selected Remedy is an interim remedy which identifies the priority remedial actions that are expected to provide the greatest reduction of contamination in the SFCDR and its tributaries and protection of in-place human health barriers in local communities. EPA reduced the scope of Alternative 3+ in the Preferred Alternative for OU 3 from 345 to 145 mine and mill sites included in the Selected Remedy. The sites included in the Selected Remedy primarily focus on areas with the highest levels of contaminated material including Canyon Creek, Ninemile Creek, the mainstem of the SFCDR between Wallace and Elizabeth Park, and the Bunker Hill Box.

The commenter also questions whether sufficient data exist for adits that are included in EPA's Preferred Alternative. It is not clear exactly how this argument relates to the commenter's overall criticism of the PA. As discussed in the ROD Amendment, sufficient information exists to support the Upper Basin Selected Remedy. However, insufficient information exists to characterize all the specific sources of metals contamination that affect the SFCDR, streams, and floodplains in some areas of the Upper Basin. Before the cleanup of each site takes place, pre-design data will be collected including additional characterization of discharges from adits.

Response to comment BU45-5

This comment states that that the groundwater treatment remedy for the SFCDR upstream from the Bunker Hill Box in the Proposed Plan is flawed. The commenter makes two basic arguments for this conclusion: (1) the proposed groundwater collection system along the SFCDR between Wallace and Elizabeth Park is technically infeasible; and (2) the groundwater collection and treatment scheme for the SFCDR is not cost-effective.

After consideration of comments on the Proposed Plan from stakeholders and the public, EPA has significantly reduced the scope of the Selected Remedy for the Upper Basin and is no longer including all of the groundwater treatment actions that were identified in EPA's Preferred Alternative. Most significantly, the Selected Remedy modifies the Preferred Alternative's groundwater collection and treatment actions along the SFCDR between Wallace and Elizabeth Park. Hydraulic isolation and groundwater collection actions along the SFCDR between Wallace and Elizabeth Park (a reach over 10 miles in length) were included in the Preferred Alternative in the Proposed Plan. These remedial actions are not included in the Selected Remedy; instead, a groundwater interception drain only in the Osburn area (a reach less than 1 mile in length) is included. The stream liner along the SFCDR between Wallace and Elizabeth Park that was included in the Preferred Alternative is also not included in the Selected Remedy. The Final FFS Report (EPA, August 2012*, Final Focused Feasibility Study Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site*) documents and explains these changes in detail. A summary of the changes is provided in Upper Basin ROD Amendment, Part 2, Section 14.0.

The commenter also states that the relatively low cost-effectiveness of water treatment upstream from Wallace should preclude these actions from being part of the remedy. Since the Proposed Plan was issued, EPA has prioritized the cleanup actions to identify the highest priority mine and mill sites for remedial action and, thus, those that are included in the Selected Remedy. Due to the

current water quality conditions in the Upper SFCDR (upstream from Wallace), the Selected Remedy includes relatively few sites designated for water treatment in the Upper SFCDR Watershed.

Contrary to the comment that water treatment is not cost-effective, water treatment is a key part of the Selected Remedy because it will (1) address subsurface materials too deep or impractical to be removed, (2) generally provide a high degree of metals load reduction for a relatively low cost, and (3) achieve immediate improvements in water quality. The value of water treatment to the Upper Basin Selected Remedy is best demonstrated by comparing the estimated costs and metals load reductions for water treatment actions and the remedy as a whole. Water treatment actions represent only about 19 percent of the total 30-year net present value (NPV) cost and about 45 percent of the operation and maintenance (O&M) costs for the Selected Remedy, while providing an estimated 66 percent of the total metals load reduction. Hence, based upon the available information, it appears that water treatment will be highly effective.

Response to comment BU45-6

This comment states that EPA has not considered water quality trends as part of its remedy selection process. The commenter primarily argues that chemical (primarily dissolved zinc) and biological (fish study) data show that the levels of contamination in the Upper Basin are declining.

Since the Proposed Plan was issued, EPA has conducted a statistical evaluation of surface water data collected from selected monitoring stations in the Upper and Lower Basins. The methodology and results of this evaluation are documented in the *Draft Basin Environmental Monitoring Plan/ Environmental Monitoring Plan (BEMP/EMP) Surface Water Statistical Evaluation* (CH2M HILL, 2011). The evaluation sought to determine whether statistically significant trends in surface water quality are occurring. The evaluation examined station-specific trends over both the full period of the sampling record and the sampling period subsequent to 2002. A total of 33 stations, 26 stations in the Upper Basin, were evaluated. Both measured variables (metals and nutrient concentrations) and calculated variables (ambient water quality criteria [AWQC], AWQC ratios, and loads) were included in the evaluation.

Results from the evaluation indicate that metals concentrations, AWQC ratios, and metals loads show generally decreasing trends at most stations over the full period of the sampling record. However, results from the evaluation of post-2002 trends indicated the following:

- The majority of stations exhibit no significant post-2002 trends, suggesting that conditions are unchanging, based on what the post-2002 data can detect.
- The majority of stations have median post-2002 AWQC ratios that exceed 1, with five stations exceeding the dissolved zinc AWQC by more than 20 times and eight stations exceeding the dissolved cadmium AWQC by more than 20 times.

The evaluation concluded that unchanging trends, coupled with AWQC ratios significantly exceeding 1, suggest that conditions at the stations with the AWQC exceedances will likely continue to exceed AWQC without significant additional cleanup actions that target improvements in water quality.

Regarding fish data and its implications to cleanup, studies conducted to date continue to show adversely impacted areas throughout the Upper Basin with reduced or non-existent fish populations. As described in greater detail below under Comment No. BU45-9, EPA is working with Federal Natural Resource Trustees (such as U.S. Fish and Wildlife Service and U.S. Forest Service) and the Upper Basin Project Focus Team to develop ecological response metrics for evaluating remedial progress during the implementation period for the Selected Remedy. The aquatic ecological response metrics are refined in part from the fishery tiers included in the 2002 ROD for OU 3, and reflect the current understanding of the river system. Identification of measurable ecological response metrics will provide EPA with a means to evaluate, predict, and report on environmental improvements associated with remedial actions planned and implemented in the Upper Basin.

Response to comment BU45-7

This comment states that EPA did not evaluate how water treatment would impact minimum flow and temperature requirements for aquatic resources in the Upper Basin. The comment also provides an estimate of stream flow reduction using estimated treatment volumes from the FFS and stream flow records from the U.S. Geological Survey (USGS). Based on the results of

calculations presented in Table 4-1 and Figure 4-1, the commenter concludes that proposed water treatment actions would remove nearly all the surface water from Canyon Creek and the SFCDR upstream from Wallace.

EPA has documented in the ROD Amendment that sufficient information exists to support the Selected Remedy. However, insufficient information exists to characterize all the specific sources of metals contamination that affect the SFCDR, streams, and floodplains in some areas of the Upper Basin. Before the cleanup takes place, many pre-design activities will be conducted at specific sites. For water treatment actions, pre-design activities will include assessment of surface water and groundwater flows. Following pre-design work, enough information will be available to begin early site-specific remedial design. The use of this iterative process to address uncertainty is common in EPA response actions. In most cases, EPA anticipates that changes from the typical conceptual designs specified in the ROD Amendment to the site-specific remedial designs will be small and primarily related to quantities (e.g., the flow of water requiring treatment or the length of a collection drain) rather than to assumed remedial technologies. However, it is possible that some significant decisions will need to be made after the ROD Amendment is issued. EPA will determine whether these warrant separate decision processes, such as another ROD Amendment or an Explanation of Significant Differences. In any event, the public will have the opportunity to review work plans and associated remedial design documents as well as any future decision documents.

The commenter also concludes that water treatment will eliminate or greatly reduce surface water flows in creeks and rivers. This analysis is flawed and based on improbable flow scenarios. The analysis appeared to use maximum groundwater and adit discharge flows, which would only take place under high-flow conditions (conditions during peak runoff periods as occur in spring runoff or rain-on-snow events), and compared these adit flows to the lowest stream-flow conditions (from USGS stream flow records), which occur during dry periods like late summer and early fall. This logic is flawed in that it is contrary to nature. Peak flows do not occur during the dry season. Therefore, any assessment of stream flow reduction must consider both stream flows and projected groundwater and adit discharge collection under the same flow regime (i.e., comparison of high-flow to high-flow and low-flow to low-flow conditions).

For the Selected Remedy, EPA has modeled stream flow reductions resulting from groundwater collection during low-flow and average-flow conditions. The modeling estimates that the maximum stream flow reductions in Canyon Creek and the SFCDR during extreme low-flow conditions would be about 10 percent and 16 percent, respectively. To put this in perspective, in a "typical" year, dry season flow rates, as represented by flows in the 10 percentile, have been shown to fluctuate by 21 percent on average over the period of record. Therefore, a fluctuation of 16 percent is within the range of average natural low-flow fluctuation from year to year. Under average-flow conditions, the reductions are estimated to only be about 1 percent in Canyon Creek and 5 percent in the SFCDR. Further, this reduction will only occur for a small stretch of river between the collection points in Osburn and Canyon Creek and Kellogg, where the same volume of clean treated water will be returned to the SFCDR. EPA has estimated this expected stream flow reduction using the Basin-wide groundwater model and historical stream flow monitoring data collected by USGS. *The Estimated Stream Flow Reductions Resulting from Groundwater Remedial Actions Technical Memorandum* (CH2M HILL, 2012) documents and explains these estimated flow reductions in detail. The impact of collecting contaminated adit drainage water was not included in EPA's flow reduction analysis because insufficient data exist for most discharges (i.e., in most cases there has only been one flow measurement at a given adit, and these measurements were generally not made during low-flow periods for comparability to the low-flow condition). Collection of flow and analytical data for adit discharges will be a high priority pre-design task. When data are available, estimates of potential flow reduction will be refined prior to the implementation of remedial actions. Before conducting any water treatment project as part of the Selected Remedy, EPA will perform additional study and remedial design to ensure that stream flows are not reduced to a point that will have negative effects on aquatic life.

Response to comment BU45-8

This comment states that EPA did not meet National Oil and Hazardous Substances Pollution Contingency Plan (NCP) requirements because key remediation decisions are deferred to the post-ROD time frame. In partial support of this statement, the commenter mistakenly contends that the Proposed Plan is conceptual and does little to advance the understanding of the remedies that will actually be implemented in the Upper Basin. The Upper Basin Proposed Plan and ROD Amendment have been carefully developed in a manner consistent with the NCP, and establish a viable path forward for this very large and complex area. The Selected Remedy builds upon the remedies identified in the previous RODs and incorporates additional information obtained since 2002 when the ROD for OU 3 was issued (EPA, 2002; www.epa.gov/superfund/sites/rods/fulltext/r1002032.pdf). The ROD Amendment documents the Selected Remedy, and interim remedy, for surface water, soil, sediments, and groundwater in the Upper Basin. The Selected Remedy also includes actions to protect portions of the human health remedies selected in previous RODs. Adaptive management and implementation planning will be key components of the remedy as it is implemented. The Upper Basin Selected Remedy is an interim remedy which identifies the priority remedial actions that are expected to provide the greatest reduction of contamination in the SFCDR and its tributaries and protection of in-place human health barriers in local communities. EPA reduced the scope of Alternative 3+ in the Preferred Alternative for OU 3 from 345 to 145 mine and mill sites included in the Selected Remedy. The sites included in the Selected Remedy primarily focus on areas with the highest levels of contaminated material including Canyon Creek, Ninemile Creek, the mainstem of the SFCDR between Wallace and Elizabeth Park, and the Bunker Hill Box.

The commenter also contends that EPA's cleanup approach is not compliant with the NCP in that it will bypass public reviews. Again, EPA disagrees. As described in the Proposed Plan and the ROD Amendment, EPA used an NCP-compliant approach in selecting its remedy for the Upper Basin. As further described in ROD Amendment, Part 3, Sections 3.11.2 and 3.11.6, there will be ample opportunity for public input. In addition, EPA will comply with the public involvement requirements of CERCLA and the NCP if it later determines that components of the Selected Remedy should be changed.

The commenter also questions whether EPA's process satisfies National Environmental Policy Act (NEPA) requirements. Because NEPA's requirements are procedural and because CERCLA provides an environmental analysis of the kind required by NEPA, CERCLA response actions need not comply with NEPA. For additional details, see response to Comment No. BU36-15 below.

The commenter further questions whether EPA will use an adaptive management approach. As described in the Proposed Plan and the ROD Amendment, EPA will indeed use such an approach. For further details regarding EPA's use of adaptive management, see response to comments from Dr. Crouch in Document No. BU48 and ROD Amendment, Part 3, Section 3.11.1, and Part 2, Section 12.3.

Finally, the comment states that EPA has made essentially no progress in implementing the 2002 ROD for OU 3. EPA strongly disagrees. As described in the ROD Amendment, cleanup activities since the 2002 ROD for OU 3 have primarily focused on implementation of the human health remedy in community, residential, and recreational areas, and these are ongoing. EPA received additional funding through the American Recovery and Reinvestment Act of 2009 to accelerate the implementation of remaining human health cleanup activities in OU 3. By the end of 2009 (as documented in the most recent Five-Year Review Report for the Bunker Hill Superfund Site [EPA, 2010]), nearly 2,600 residential properties and rights-of-way in OU 3 had been remediated and approximately 560,000 cubic yards of contaminated material had been removed as part of the Selected Human Health Remedy for OU 3. The ROD for OU 3 also selected an interim remedy for protection of the environment that focused on improving water quality, minimizing downstream migration of metal contaminants, and improving conditions for fish and wildlife populations. Because a conscious decision to prioritize human health actions was made, such actions were taken first; consequently, most of the actions to protect the environment have not yet been implemented. However, EPA conducted actions at four mine and mill sites that addressed recreational human health as well as ecological exposures. In addition, EPA worked with a willing private property owner, along with the U.S. Fish and Wildlife Service and Ducks Unlimited, Inc., to establish a clean wetland feeding habitat in the Lower Basin.

Response to comment BU45-9

This comment states that EPA has ignored or misinterpreted key NAS findings and recommendations. In support of this, the commenter makes a number of

points. First, the commenter raises the issue of the validity of the PA. As described above and in the response to comments from Dr. Crouch in Document No. BU48, EPA stands by the use of the PA as a valid means of evaluating the effectiveness of the remedial alternatives for the Upper Basin.

Second, the commenter states that the NAS recommended source control (removal or stabilization) first and less reliance on water treatment. This comment is misleading in that it refers to issues relevant to the 2002 ROD for OU 3 and the process leading up to it. As described in the Upper Basin ROD Amendment (Part 3, Section 3.5.2), the Selected Remedy is responsive to the NAS review and does indeed focus on controlling numerous sources. Water treatment is employed where necessary and in a manner that is consistent with the NAS recommendations.

Third, the commenter states the NAS identified the need for meaningful evaluations of the implementability/practicability and effectiveness of the considered alternatives. As described in the ROD Amendment (Part 2, Section 13.0), EPA evaluated the remedial alternatives in an NCP-consistent manner, which included consideration of both implementability and effectiveness.

Fourth, the commenter states that the NAS recommended EPA pursue biologically based water quality criteria rather than concentration-based ARARs. CERCLA requires that a selected remedy must attain ARARs, such as AWQC, unless they are waived. An interim remedy need not attain ARARs if it will be part of a total remedy that will attain ARARs. The Selected Remedy, an interim remedy, will result in significant improvements to surface water quality in the Upper Basin and may achieve AWQC ARARs under the Clean Water Act in many locations following periods of natural recovery; however, it may not achieve these ARARs at all locations. EPA is making no decisions regarding future ARAR waivers at this time.

Regarding the use of biologically based water quality criteria, EPA is working with Federal Natural Resource Trustees (such as the U.S. Fish and Wildlife Service and U.S. Forest Service) and the Upper Basin Project Focus Team to develop ecological response metrics for evaluating remedial progress during the implementation period for the Selected Remedy. The aquatic ecological response metrics are refined in part from the fishery tiers included in the 2002 ROD for OU 3, and reflect the current understanding of the river system. Identification of measurable ecological response metrics will provide EPA with a means to evaluate, predict, and report on environmental improvements associated with remedial actions planned and implemented in the Upper Basin. The intent of such ecological response metrics is to provide EPA and the public with:

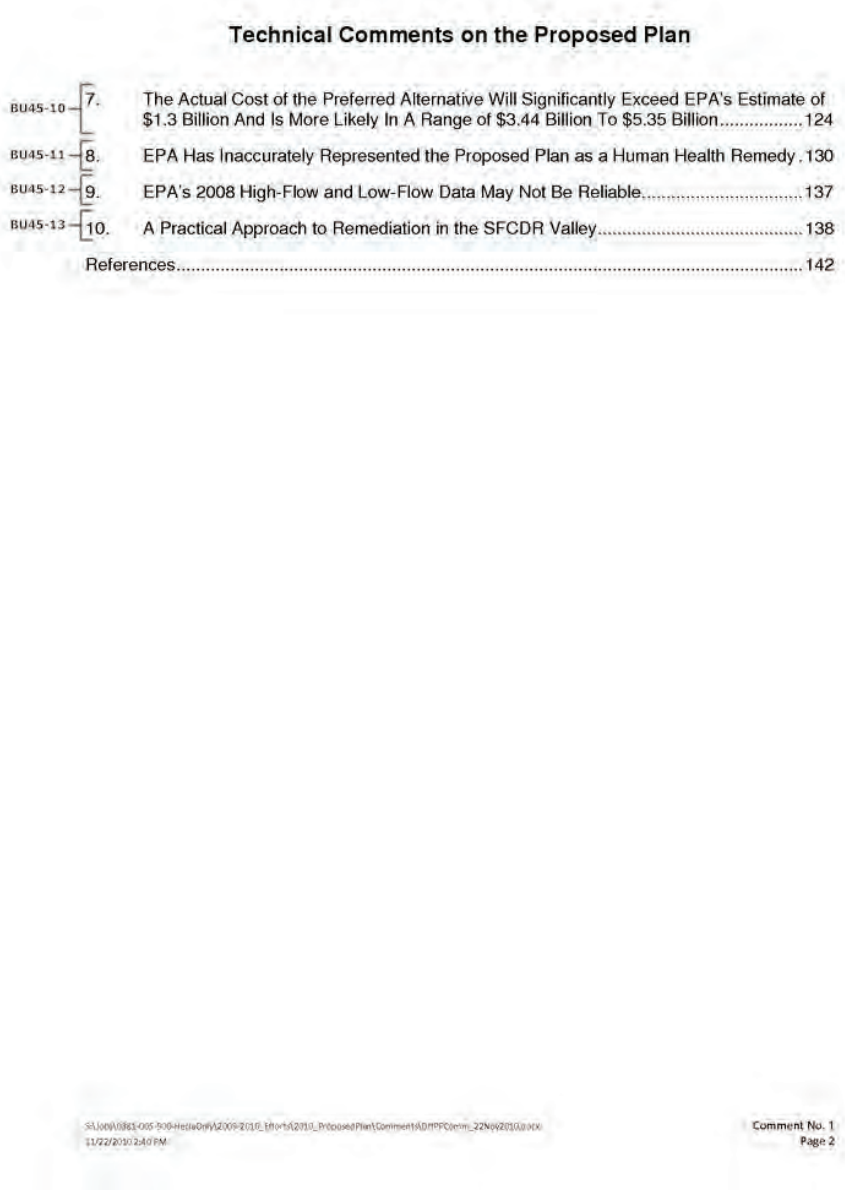
- Tools to estimate potential environmental and ecological improvements that could result from specific remedial actions;
- Target receptors to evaluate environmental recovery; and
- A means for measuring environmental recovery and progress toward cleanup goals following the implementation of remedial actions.

For further details, see ROD Amendment, Part 3, Section 3.4.1.

Fifth, the commenter states the NAS endorsed the use of an adaptive management approach, but expressed reservations regarding the lack of interim performance indicators that are needed to properly evaluate the effectiveness of the approach. As described above, EPA will be using an adaptive management approach that will include ecological response metrics for evaluating remedial progress during the implementation period for the Selected Remedy. Monitoring is a key ingredient of EPA's strategy. EPA is currently working with stakeholders to develop an update to the original BEMP and EMP to be consistent with the Selected Remedy for the Upper Basin and to consolidate all the Basin-wide environmental monitoring efforts into an amended BEMP. The revised BEMP will guide all the monitoring efforts within the Upper and Lower Basins. Consistent with the framework of the original environmental monitoring programs, the revised BEMP will provide data to support the following objectives:

- Assess long-term status and trends of surface water, sediment, groundwater, and biological resource conditions in the Basin.
- Evaluate progress toward meeting remedial action objectives, ARARs, and cleanup levels (as presented in the ROD Amendment, Part 2, Sections 8.0 and 12.1.4.1).
- Improve the understanding of Coeur d'Alene Basin environmental processes and variability to improve the effectiveness and efficiency of cleanup actions included in the Upper Basin Selected Remedy.
- Provide data for CERCLA-required Five-Year Reviews of remedy performance.

Sixth, the commenter states that the NAS urged EPA to consider existing physical habitat modifications that limit cleanup. The ROD Amendment is focused on the effects of historical mining activities on the environment of the Upper Basin. These mining effects, which are substantial, are documented in the FFS Report (EPA, August 2012, *Final Focused Feasibility Study Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site*) and summarized in the Proposed Plan and ROD Amendment. EPA has acknowledged in its supporting technical documents that physical habitat conditions are limiting to fish and wildlife populations, and that non-mining-related modifications of habitats for these species have had a significant effect. However, it is also apparent that secondary effects from mining-related metals contamination have also contributed to the degradation of physical habitat conditions in the Basin (e.g., metals can damage or eliminate vegetation, which promotes erosion and destroys habitat). Such degradation falls under the purview of CERCLA and was considered in the Selected Remedy.



Technical Comments on the Proposed Plan

Response to comment BU45-10

This comment states that EPA used an unrealistic discount factor and did not account for increases in construction costs during the development of cost estimates in the FFS Report. The commenter contends that EPA has underestimated the cost of the Preferred Alternative.

The cost estimate was developed according to CERCLA guidance for the Feasibility Study (FS) process. EPA guidance (*Guide to Developing and Documenting Cost Estimates During the Feasibility Study*, EPA, 2000) states that the accuracy of the cost estimates presented in an FS should be -30 percent to +50 percent , and that a discount rate of 7 percent should be used to estimate total project costs in today's dollars. This 7 percent discount rate accounts for inflation and the rising costs of construction over time. In this case, 2009 dollars are the basis for the net present value (NPV) cost estimate, consistent with cost estimates presented in the Final FFS Report (EPA, August 2012, *Final Focused Feasibility Study Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site*). The cost estimate for the Upper Basin Selected Remedy includes the costs of both the remedial actions and operation and maintenance (O&M). Cost estimates for work to be performed will be further refined during the remedial design process.

Response to comment BU45-11

This comment focuses on statements made in the Proposed Plan regarding the human health benefits of cleaning up surface waters, and states that EPA has inaccurately represented the Proposed Plan as a human health remedy. EPA has not focused its Selected Remedy on drinking water. Past cleanup plans described in the RODs for OUs 1, 2, and 3 (EPA, 1991, 1992, and 2002, respectively; available at www.epa.gov/superfund/sites/rods/fulltext/r1091028.pdf) have already addressed residential drinking water issues. However, the Upper Basin Selected Remedy will significantly improve surface water quality in the SFCDR and its tributaries. In the case of the SFCDR, the applicable or relevant and appropriate requirements (ARARs) that will protect the environment include site-specific ambient water quality criteria (AWQC). These criteria were developed by the State of Idaho to protect aquatic life. The water quality

standards to protect the environment are more stringent than drinking water standards (i.e., maximum contaminant levels [MCLs]) for contaminants of concern in the Basin. (There is one exception -- mercury, but this has not been found to be prevalent in the Upper Basin.) Therefore, EPA believes that achieving ARARs will inherently have a potential drinking water benefit. It should be noted, however, that the remedy is interim, not final. As described in the ROD Amendment, the Selected Remedy will result in significant improvements to surface water quality in the Upper Basin and may achieve AWQC ARARs under the Clean Water Act at many locations following periods of natural recovery; however, the remedy may not achieve these ARARs at all locations.

Response to comment BU45-12

Comment noted.

Response to comment BU45-13

This comment states that EPA should implement a prioritized, practical, engineering- based cleanup approach of working from the top down within the Basin, as embodied in Hecla's 10-Year Plan. As described in the ROD Amendment, EPA developed its Selected Remedy in a manner consistent with the National Oil and Hazardous Substances Pollution Contingency Plan. The remedy does contain a prioritized, practical, and engineering-based approach for the Upper Basin. In terms of "top down," as described in the ROD Amendment, Part 2, Section 12.3.3, EPA will prioritize the implementation of remedial actions in order to reduce the potential for recontamination of previously remediated areas. This will typically mean conducting work at sites that are topographically higher in a drainage area first, in order to avoid recontamination from sites above them. Furthermore, the Upper Basin cleanup will greatly enhance EPA's understanding of the cleanup needs for the Lower Basin. EPA is continuing to pursue data collection and analysis efforts in the Lower Basin to provide decision-makers with an improved understanding of the Lower Basin and to support evaluations of specific remedial alternatives. These evaluations could include the implementation of small-scale pilot studies to evaluate the effectiveness and implementability of various cleanup alternatives. After these studies have been completed, EPA will prepare a Lower Basin Proposed Plan, subject to public comment, and a subsequent ROD Amendment to select a remedy for the Lower Basin.

With regard to Hecla's 10-Year Plan, EPA believes that this plan is inadequate to serve as a viable cleanup plan for the Upper Basin. Most of the sites identified in Hecla's 10-Year Plan are also priority sites in EPA's Selected Remedy. However, the actions included in the 10-Year Plan are much less robust than those in the Selected Remedy and only address a fraction of the contamination that is addressed under EPA's Selected Remedy. Hecla's 10-Year Plan also relies heavily on less protective remedial actions such as "toe pull-back" (moving the base of waste piles away from creeks and the SFCDR), regrading, soil capping, and revegetation. Furthermore, elements of Hecla's 10-Year Plan may not be technically feasible. For example, the plan calls for contaminated adit and seep discharges to be collected and treated at lagoon-type systems which, as proposed, have serious technical flaws and are not likely implementable.

In contrast to Hecla's 10-Year Plan, EPA's Selected Remedy identifies effective and proven actions. For example, the remedy includes methods such as excavation of highly contaminated floodplain sediments and tailings, and groundwater collection and treatment, to address contamination that is inaccessible for removal (such as materials located beneath roads and communities). EPA believes these actions will be more effective in reducing metals loading to the SFCDR and its tributaries, and will more comprehensively protect human health and the environment.

Hecla Mining Company (submitted by Cambridge Environmental, Inc.), BU48, Letter 619210

No comments

Comments on

A Predictive Analysis for Post-Remediation Metal Loading
(URS Group, Inc., 2007)

and its use in the

Draft Final
Focused Feasibility Study Report
Upper Basin of the Coeur d'Alene River,
Bunker Hill Mining and Metallurgical Complex Superfund Site
(CH2MHill, July 2010)

by

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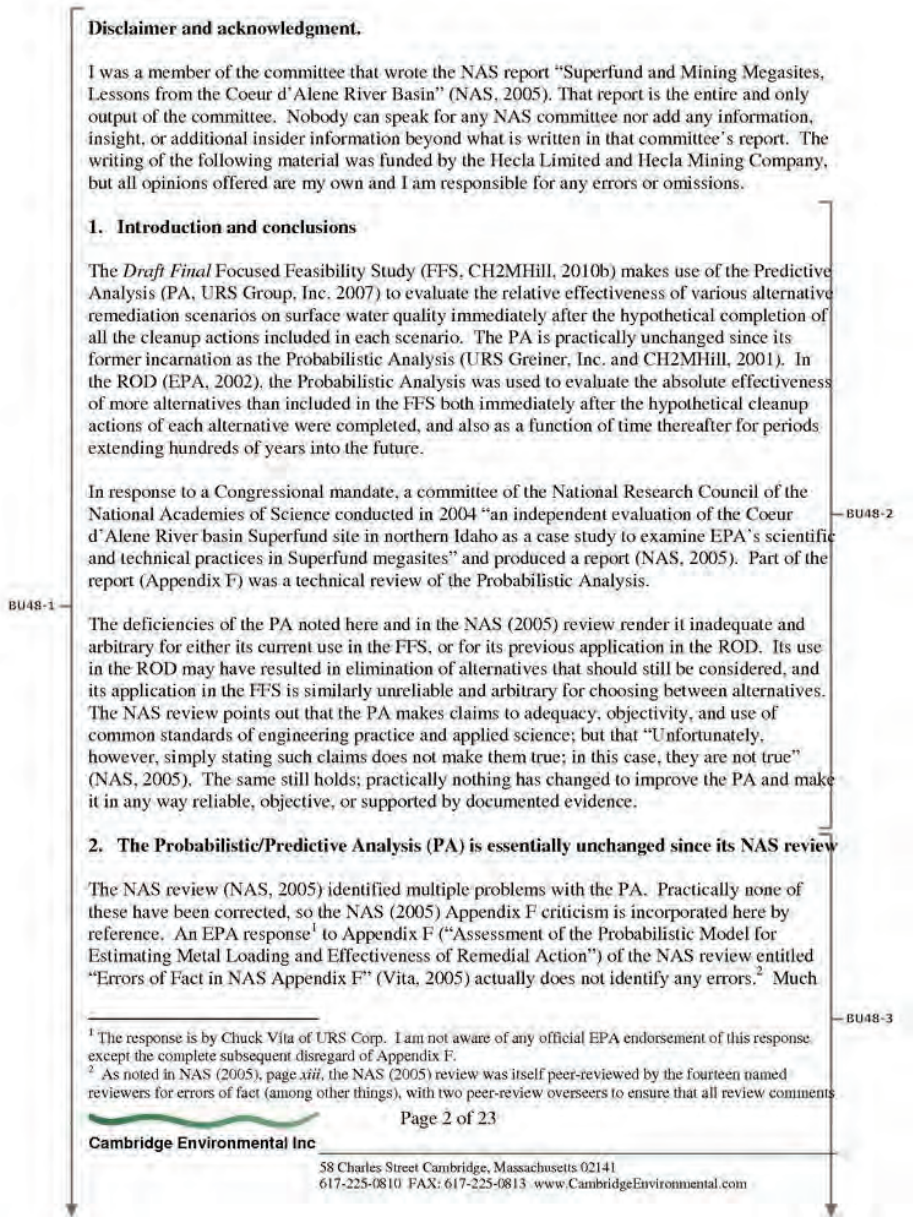
November 22, 2010



Disclaimer and acknowledgment.

I was a member of the committee that wrote the NAS report "Superfund and Mining Megasites, Lessons from the Coeur d'Alene River Basin" (NAS, 2005). That report is the entire and only output of the committee. Nobody can speak for any NAS committee nor add any information, insight, or additional insider information beyond what is written in that committee's report. The writing of the following material was funded by the Hecla Limited and Hecla Mining Company, but all opinions offered are my own and I am responsible for any errors or omissions.

1. Introduction and conclusions

The *Draft Final* Focused Feasibility Study (FFS, CH2MHill, 2010b) makes use of the Predictive Analysis (PA, URS Group, Inc. 2007) to evaluate the relative effectiveness of various alternative remediation scenarios on surface water quality immediately after the hypothetical completion of all the cleanup actions included in each scenario. The PA is practically unchanged since its former incarnation as the Probabilistic Analysis (URS Greiner, Inc. and CH2MHill, 2001). In the ROD (EPA, 2002), the Probabilistic Analysis was used to evaluate the absolute effectiveness of more alternatives than included in the FFS both immediately after the hypothetical cleanup actions of each alternative were completed, and also as a function of time thereafter for periods extending hundreds of years into the future.

In response to a Congressional mandate, a committee of the National Research Council of the National Academies of Science conducted in 2004 "an independent evaluation of the Coeur d'Alene River basin Superfund site in northern Idaho as a case study to examine EPA's scientific and technical practices in Superfund megasites" and produced a report (NAS, 2005). Part of the report (Appendix F) was a technical review of the Probabilistic Analysis. BU48-2

BU48-1

The deficiencies of the PA noted here and in the NAS (2005) review render it inadequate and arbitrary for either its current use in the FFS, or for its previous application in the ROD. Its use in the ROD may have resulted in elimination of alternatives that should still be considered, and its application in the FFS is similarly unreliable and arbitrary for choosing between alternatives. The NAS review points out that the PA makes claims to adequacy, objectivity, and use of common standards of engineering practice and applied science; but that "Unfortunately, however, simply stating such claims does not make them true; in this case, they are not true" (NAS, 2005). The same still holds; practically nothing has changed to improve the PA and make it in any way reliable, objective, or supported by documented evidence.

2. The Probabilistic/Predictive Analysis (PA) is essentially unchanged since its NAS review

The NAS review (NAS, 2005) identified multiple problems with the PA. Practically none of these have been corrected, so the NAS (2005) Appendix F criticism is incorporated here by reference. An EPA response[1] to Appendix F ("Assessment of the Probabilistic Model for Estimating Metal Loading and Effectiveness of Remedial Action") of the NAS review entitled "Errors of Fact in NAS Appendix F" (Vita, 2005) actually does not identify any errors.[2] Much BU48-3

[1] The response is by Chuck Vita of URS Corp. I am not aware of any official EPA endorsement of this response except the complete subsequent disregard of Appendix F.
[2] As noted in NAS (2005), page *xiii*, the NAS (2005) review was itself peer-reviewed by the fourteen named reviewers for errors of fact (among other things), with two peer-review overseers to ensure that all review comments

Page 2 of 23

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Response to comment BU48-1

The comments of Dr. Crouch on behalf of Hecla Mining Company are critical of EPA's use of the Predictive Analysis (PA) in evaluating remedial alternatives. As described below, EPA has responded previously to such criticisms when Dr. Crouch was part of the National Academy of Sciences (NAS) panel. EPA carefully developed its PA over time to assist in evaluating the effectiveness of the remedial alternatives considered, and stands by its use for that purpose. The materials used to develop, review, and apply the PA are part of the EPA administrative record for the site.

The Predictive Analysis (originally referred to as the Probabilistic Analysis) was initially developed to support the evaluation of alternatives in the 2001 FS (EPA, October 2001, *Final [Revision 2] Feasibility Study Report, Coeur d'Alene Basin Remedial Investigation/Feasibility Study*), , and was subsequently used to support evaluations in the Proposed Plan and 2002 Interim ROD for OU 3 (EPA, 2002; www.epa.gov/superfund/sites/rods/fulltext/r1002032.pdf). The PA was subsequently evaluated as part of the program review conducted by NAS (National Academy of Sciences, 2005, http://www.epa.gov/superfund/accomp/coeur/, Appendix F). When the pre-publication NAS review report was released, EPA responded in detail to both the review and criticism of the PA contained in Appendix F of the NAS report (EPA, July 26 2006, Personal communication (email) from A. Dailey/EPA to D. Reisman and E. Bates/EPA: entitled *EPA Region 10 "Error of Fact" Comments on the NAS Pre-publication Report Entitled: "Superfund and Mining Megasites – Lessons from the Coeur d'Alene Basin"*).

Furthermore, following review by the NAS, EPA enlisted an independent review of the PA by a well-known leader in the field of probabilistic modeling and member of the NAS, Dr. Gregory B. Baecher, University of Maryland, A.J. Clark School of Engineering (College Park, Maryland), to evaluate the approach used by EPA and assess concerns raised by the NAS. The independent review validated the approach used by EPA and its use in the evaluation and comparison of alternatives. This review culminated in a technical memorandum, *A Predictive Analysis for Post-Remediation Metals Loading* (EPA, 2007), which provided

clarification and additional documentation, including sensitivity analyses, related to the PA. Dr. Beacher's transmittal letter concluded:

> In my opinion, the Predictive Analysis strikes a reasonable balance between the needs of the Remedial Investigation and Feasibility Study (RI/FS) to chart a course forward, and the difficulty of acquiring sufficient data on the basin from which to analyze conditions in a statistically exhaustive way. The approach taken by the Predictive Analysis is the traditional one of using professional judgment—both engineering and scientific—to form assumptions and to make estimates of parameter values, boundary conditions, and initial conditions. In my opinion, this is sound engineering practice.

The PA was used in the Focused Feasibility Study (FFS) to provide approximations of the aggregated effects of specific upstream remedial alternatives on downstream metal loadings at two locations (Elizabeth Park and Pine Creek) for use in evaluating and comparing the alternatives considered. A comparative analysis of remedial alternatives is required under the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) when EPA is selecting a remedy.

A number of modifications to the original PA used in 2002 were necessary to support the evaluation of alternatives in the FFS. These modifications were performed to:

- Add Elizabeth Park as a modeled location.
- Update "current" water quality conditions.
- Update source types, volumes, and remedial actions.
- Integrate estimates of load reduction from groundwater model s (where appropriate).

The analysis uses a straightforward accounting scheme to sum up the contributions of upstream sources to downstream metal loads. The effect of varying remedial actions at the sources is taken into account by modifying the contributions of each source of metals entering the river. The combined effect of each of the remedial alternatives is forecast by aggregating the contributions over all the sources.

The PA combines existing information about the Upper Basin with scientific understanding of environmental processes, but neither the existing information nor the scientific understanding of environmental processes is perfect. Detailed historical monitoring data on stream flows, levels of contamination, and other environmental conditions are limited for the purposes of analyzing and predicting natural conditions in the Upper Basin. As a result, expert judgment is required to interpret data and to help estimate parameter values, which is standard practice in scientific and regulatory modeling.

Limitations in the empirical monitoring data (including sources, source volumes, and dissolved metals loading), coupled with the assignment of model parameters such as relative loading potential and treatment effectiveness (based on best professional judgment), result in estimation uncertainties. The PA uses a probabilistic approach to capturing such uncertainties and propagating their combined effect through to forecasts. The known uncertainties were quantified by mathematically propagating the uncertainty of the input variables, as measured by their coefficients of variation, through the PA model to the output variables. The results are engineering approximations based on a synthesis and interpretation of available information, and provide a sound basis for informed decision-making for comparing alternatives and assisting in the selection of a remedy.

EPA will implement the Selected Remedy in the Upper Basin using an adaptive management approach, which includes prioritization of cleanup actions. As implementation of the Selected Remedy occurs, EPA will collect considerable monitoring data which, coupled with existing data, will assist in making increasingly improved predictions regarding cleanup effectiveness. Post-ROD Amendment data collected and interpreted over time to monitor the results of remediation will be used to define changes in water quality. Such data can be compared to modeled predictions to refine the predictive process. Furthermore, as part of the adaptive management approach, EPA will evaluate the use of additional ecological response metrics to measure, predict, and report environmental cleanup progress in the Upper Basin. These findings will all be used to further refine the prioritization of cleanup actions.

The commenter divides his comments into eight numbered categories. EPA's responses track these categories. The above response is included by reference into each of the specific responses below.

Response to comment BU48-2

In category 1, the comment questions the adequacy of the PA for use in the FFS, and presumably by inference, the Proposed Plan. EPA stands by its use of the PA in evaluating the effectiveness of the remedial alternatives considered in the FFS. As described above, EPA carefully developed the PA to enable EPA to evaluate the anticipated effectiveness of the remedial alternatives considered. Inherent uncertainties in such predictions were acknowledged and treated appropriately with a probabilistic approach. The PA was subjected to the scrutiny of the NAS and EPA responded to the subsequent critique. Furthermore, EPA submitted the PA to an independent expert review by Dr. Gregory Baecher, who validated EPA's use of the PA.

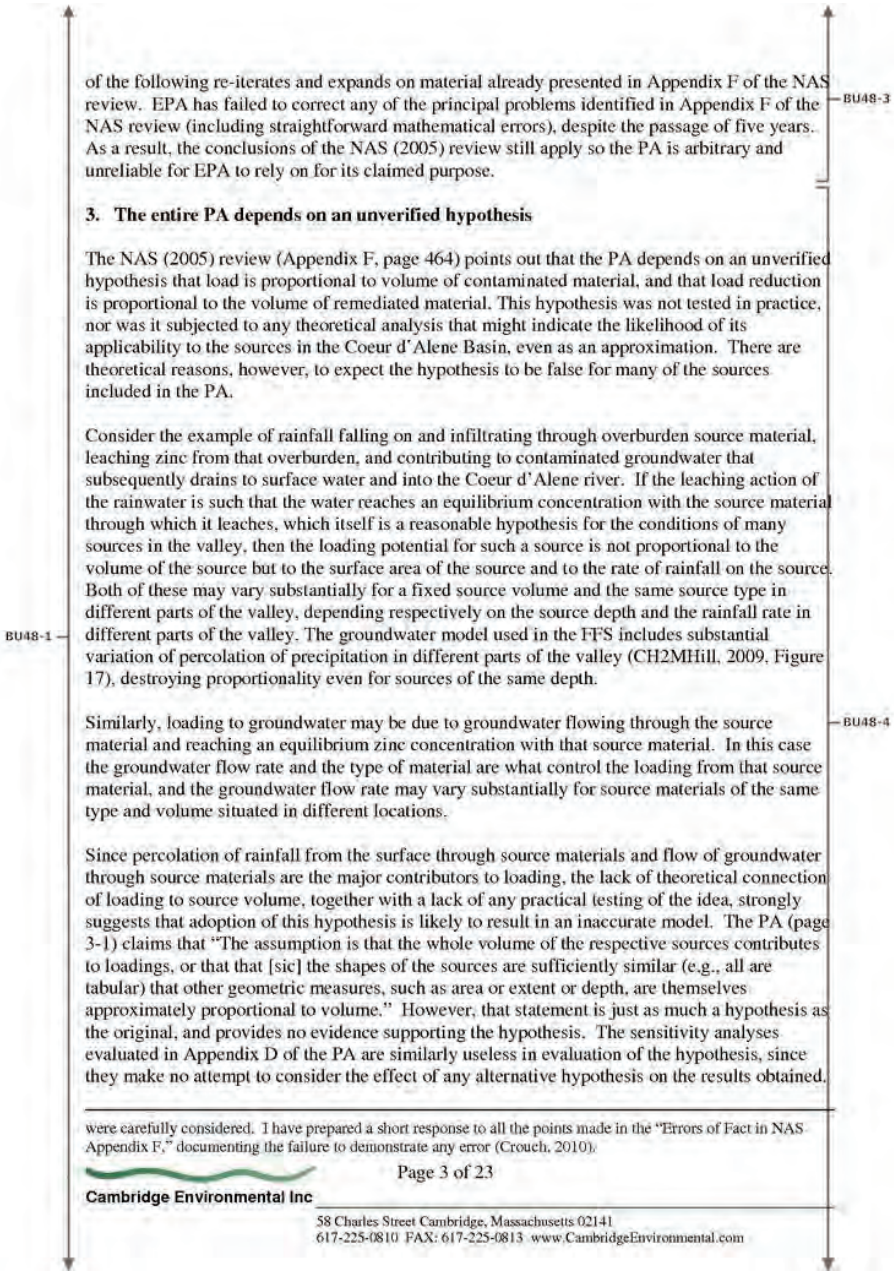
The NAS review supported the cleanup approach in the 2002 ROD and the recommendations for areas of improvement primarily focused on ecological protection. EPA carefully considered the NAS report and its recommendations, and conducted studies and evaluations to address the major recommendations. The results of those efforts are reflected in the actions identified in the Upper Basin Selected Remedy and documented in the administrative record for the Upper Basin. EPA believes the Selected Remedy presented in the ROD Amendment addresses the NAS report's recommendations, while recognizing EPA's statutory obligations under CERCLA.

The comment further questions whether an adequate set of remedial alternatives were considered at the time of the 2002 ROD, and whether this in turn affects the adequacy of alternatives considered in the FFS. EPA disagrees. An adequate range of alternatives was considered for both the 2002 ROD and the ROD Amendment, as prescribed by CERCLA. EPA evaluated the range of alternatives using the nine CERCLA-prescribed criteria. The 2005 NAS review did not disagree with the range of alternatives examined by EPA for the 2002 ROD. In the 2001 Feasibility Study (FS) Report (EPA, October 2001, *Final [Revision 2] Feasibility Study Report, Coeur d'Alene Basin Remedial Investigation/Feasibility Study*), six ecological remedial alternatives, including a no-action alternative, were evaluated to address ecological risks to waterfowl, other birds, fish, and plants in OU 3, including both the Upper and Lower Basins. Consistent with CERCLA, its implementing regulations, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and the findings presented in the 2001 FS Report and the 2002 ROD for OU 3, EPA determined that it was appropriate to carry forward only the Upper Basin components of Ecological Alternatives 3 and 4 as the basis for remedial alternatives to be considered in the FFS for the Upper Basin. It was also determined that Ecological Alternatives 1, 2, 5, and 6 in the 2001 FS Report would not be sufficiently protective of human health and the environment, and did not warrant further analysis. Alternative 1, the No Action Alternative, while not NCP-compliant, was evaluated in the FFS Report for comparative purposes only. Therefore, EPA updated and expanded Ecological Alternatives 3 and 4, using information obtained since the three previous RODs were issued, to develop remedial alternatives for evaluation in the FFS. The updated and expanded remedial alternatives for OU 3 are referred to as Alternatives 3+ and 4+.

The 2005 NAS review also emphasized the need to comprehensively address sources of metals contributing loadings to the Upper Basin, dissolved zinc loadings in the Bunker Hill Box, and remedy protection measures (see pages 340, 370, 371, 375, and 399 of National Academy of Sciences, 2005, http://www.epa.gov/superfund/accomp/coeur/). The FFS, Proposed Plan, and ROD Amendment for the Upper Basin further addressed all three of these topics.

Response to comment BU48-3

In category 2, the comment contends that the PA is essentially unchanged since its NAS review. As described above under the introductory material, EPA carefully considered the NAS findings and further evaluated the approach through Dr. Baecher, and stands by its use in evaluating the effectiveness of the remedial alternatives considered in the FFS. Also see response to BU48-5 below.



of the following re-iterates and expands on material already presented in Appendix F of the NAS review. EPA has failed to correct any of the principal problems identified in Appendix F of the NAS review (including straightforward mathematical errors), despite the passage of five years. As a result, the conclusions of the NAS (2005) review still apply so the PA is arbitrary and unreliable for EPA to rely on for its claimed purpose. BU48-3

3. The entire PA depends on an unverified hypothesis

The NAS (2005) review (Appendix F, page 464) points out that the PA depends on an unverified hypothesis that load is proportional to volume of contaminated material, and that load reduction is proportional to the volume of remediated material. This hypothesis was not tested in practice, nor was it subjected to any theoretical analysis that might indicate the likelihood of its applicability to the sources in the Coeur d'Alene Basin, even as an approximation. There are theoretical reasons, however, to expect the hypothesis to be false for many of the sources included in the PA.

Consider the example of rainfall falling on and infiltrating through overburden source material, leaching zinc from that overburden, and contributing to contaminated groundwater that subsequently drains to surface water and into the Coeur d'Alene river. If the leaching action of the rainwater is such that the water reaches an equilibrium concentration with the source material through which it leaches, which itself is a reasonable hypothesis for the conditions of many sources in the valley, then the loading potential for such a source is not proportional to the volume of the source but to the surface area of the source and to the rate of rainfall on the source. Both of these may vary substantially for a fixed source volume and the same source type in different parts of the valley, depending respectively on the source depth and the rainfall rate in different parts of the valley. The groundwater model used in the FFS includes substantial variation of percolation of precipitation in different parts of the valley (CH2MHill, 2009, Figure 17), destroying proportionality even for sources of the same depth. BU48-1

Similarly, loading to groundwater may be due to groundwater flowing through the source material and reaching an equilibrium zinc concentration with that source material. In this case the groundwater flow rate and the type of material are what control the loading from that source material, and the groundwater flow rate may vary substantially for source materials of the same type and volume situated in different locations. BU48-4

Since percolation of rainfall from the surface through source materials and flow of groundwater through source materials are the major contributors to loading, the lack of theoretical connection of loading to source volume, together with a lack of any practical testing of the idea, strongly suggests that adoption of this hypothesis is likely to result in an inaccurate model. The PA (page 3-1) claims that "The assumption is that the whole volume of the respective sources contributes to loadings, or that that [sic] the shapes of the sources are sufficiently similar (e.g., all are tabular) that other geometric measures, such as area or extent or depth, are themselves approximately proportional to volume." However, that statement is just as much a hypothesis as the original, and provides no evidence supporting the hypothesis. The sensitivity analyses evaluated in Appendix D of the PA are similarly useless in evaluation of the hypothesis, since they make no attempt to consider the effect of any alternative hypothesis on the results obtained.

were carefully considered. I have prepared a short response to all the points made in the "Errors of Fact in NAS Appendix F," documenting the failure to demonstrate any error (Crouch, 2010).

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Response to comment BU48-4

In categories 3 through 6, the comments raise various issues that the commenter acknowledges were originally raised during the NAS review. These are summarized in the comments as:

- The entire PA depends on an unverified hypothesis.
- Unvalidated, undocumented, and nonreproducible parameter values are used.
- The calculated result of the PA (used in the FFS) does not adequately relate to ambient water quality criteria (AWQC).
- The treatment of time is incorrect.

As noted above under the introductory materials, EPA has already responded in detail to the issues raised by the NAS report (EPA, July 26 2006, Personal communication (email) from A. Dailey/EPA to D. Reisman and E. Bates/EPA: entitled *EPA Region 10 "Error of Fact" Comments on the NAS Pre-publication Report Entitled: "Superfund and Mining Megasites – Lessons from the Coeur d'Alene Basin"*), including those of the commenter. EPA stands by those responses, and consequently will not be further responding herein. EPA continues to support the use of the PA in evaluating the effectiveness of the remedial alternatives considered. As described above, EPA carefully developed the PA to enable EPA to evaluate the anticipated effectiveness of the remedial alternatives considered. Inherent uncertainties in such predictions were acknowledged and treated appropriately with a probabilistic approach. The PA was subjected to the scrutiny of the NAS and EPA responded to the subsequent critique. Furthermore, EPA submitted the PA to an independent expert review by Dr. Baecher, who validated EPA's use of the PA.

With regard to issues raised by the commenter regarding cleanup times, as described in Section 8 of the Upper Basin Proposed Plan, EPA consciously chose to not include predictions of time to achieve applicable or relevant and appropriate requirements (ARARs) in selecting its remedy. The PA includes a component that can be used to estimate the effects of natural source depletion on AWQC ratios over time as a function of a decay rate. However, the natural

source depletion component was not used in the FFS analysis because the prediction of long-term water quality trends and specific water quality in the SFCDR Watershed in the distant future is subject to considerable uncertainty. These uncertainties include complex weathering rates and the changes in these rates for the numerous mine waste types and source areas in the watershed. Site-specific exposure to seasonal wetting and water flux, as well as variations in particle surface area, iron sulfide content, trace metal content, air diffusion, and other factors, control the release of contaminants from mine wastes. The effect of cleanup actions further complicates these predictions. Therefore, the evaluation relies on the post remediation AWQC estimates for comparison among the alternatives. (Also see Appendix B of the FFS Report.)

Adoption in the PA model of the hypothesis without any field tests or theoretical basis is therefore arbitrary, and the results of the PA are arbitrary and unreliable for the use made of it by the EPA.

4. Unvalidated, undocumented, and non-reproducible parameter values are used

The PA model contains many values that are supposed to represent the relative amounts of zinc that may be released by various types of source materials, or to represent the amount by which these amounts may be reduced by various remedial actions, or which relate uncertainty distributions for different parameters. The first are called Relative Loading Potential (given the symbol RLP), the second Remediation Factors (given the symbol R), the third are correlation coefficients (usually given the symbol ρ, the Greek letter rho, in the PA). The RLP, R, and many of the ρ values are undocumented, unvalidated, not reproducible, hence unreliable and arbitrary for any modeling effort (as was pointed out in Appendix F, NAS, 2005).

The individual RLP factors are introduced on pages 3-4 to 3-9 of the PA (URS Group, Inc., 2007), where the factors potentially affecting their values are qualitatively discussed and the final values adopted are specified. They are also described in general terms in Appendix C of the PA. As an example of the typical level of detail, the entire technical discussion in Appendix C of the RLP for "other floodplain sediments" is:

> The RLP estimates "other floodplain sediments," which consists primarily of upland sediments, was 0.10. The estimate considered the upland geography in terms of physical distance and elevation above the river and resultant limited exposure to erosion. A limited potential for groundwater transport is also expected because of shallow hydraulic gradients and low hydraulic conductivity of the upland sediments.

BU48-1

BU48-4

The entire technical discussion for all the RLPs apparently occurs in Section C.3.3, page 16, of Appendix C (on a single page). There is no reference there, nor in the earlier qualitative discussions at pages 3-4 to 3-9 of the PA to any experimental data, or to any methodology by which these estimates were obtained, or to the supposed experts who provided or commented on these values (see Crouch, 2010, Comment 30), nor to the claimed stakeholders reviews (op. cit.). As stated in Appendix F (NAS, 2005) of the previous version of the PA (URS Greiner, Inc. and CH2M Hill, 2001):

> There is no semblance of objectivity for these estimates; indeed, in most cases it is impossible to discern their origin. The descriptions of how the estimates were obtained are entirely qualitative; indeed, it is even claimed that the analyses performed were almost entirely qualitative, yet at the end a number somehow appears. (NAS, 2005, page 470).

That statement remains true of the 2007 update (URS Group, Inc., 2007).

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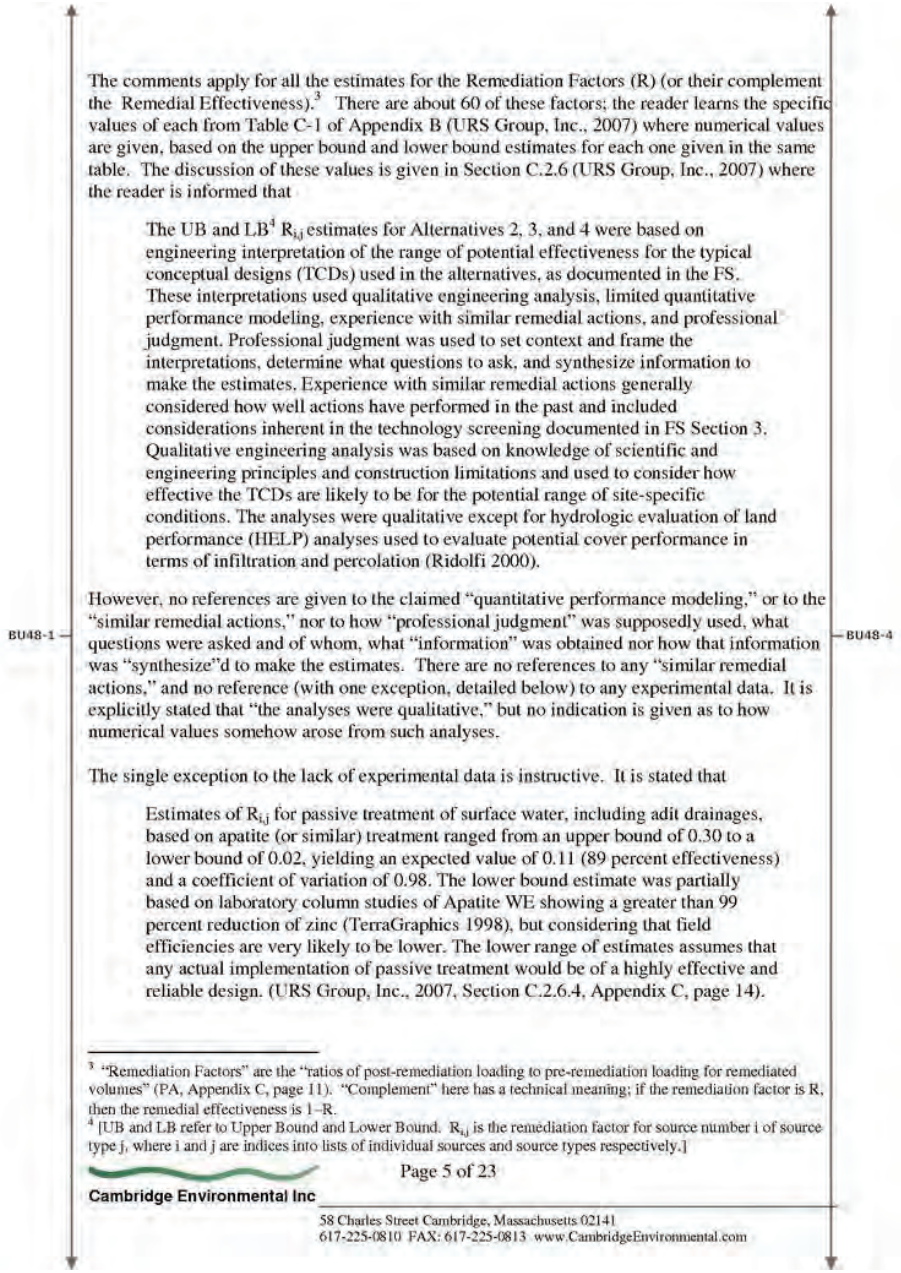
No comments



The comments apply for all the estimates for the Remediation Factors (R) (or their complement the Remedial Effectiveness).[3] There are about 60 of these factors; the reader learns the specific values of each from Table C-1 of Appendix B (URS Group, Inc., 2007) where numerical values are given, based on the upper bound and lower bound estimates for each one given in the same table. The discussion of these values is given in Section C.2.6 (URS Group, Inc., 2007) where the reader is informed that

> The UB and LB[4] $R_{i,j}$ estimates for Alternatives 2, 3, and 4 were based on engineering interpretation of the range of potential effectiveness for the typical conceptual designs (TCDs) used in the alternatives, as documented in the FS. These interpretations used qualitative engineering analysis, limited quantitative performance modeling, experience with similar remedial actions, and professional judgment. Professional judgment was used to set context and frame the interpretations, determine what questions to ask, and synthesize information to make the estimates. Experience with similar remedial actions generally considered how well actions have performed in the past and included considerations inherent in the technology screening documented in FS Section 3. Qualitative engineering analysis was based on knowledge of scientific and engineering principles and construction limitations and used to consider how effective the TCDs are likely to be for the potential range of site-specific conditions. The analyses were qualitative except for hydrologic evaluation of land performance (HELP) analyses used to evaluate potential cover performance in terms of infiltration and percolation (Ridolfi 2000).

However, no references are given to the claimed "quantitative performance modeling," or to the "similar remedial actions," nor to how "professional judgment" was supposedly used, what questions were asked and of whom, what "information" was obtained nor how that information was "synthesize"d to make the estimates. There are no references to any "similar remedial actions," and no reference (with one exception, detailed below) to any experimental data. It is explicitly stated that "the analyses were qualitative," but no indication is given as to how numerical values somehow arose from such analyses.

BU48-1

BU48-4

The single exception to the lack of experimental data is instructive. It is stated that

> Estimates of $R_{i,j}$ for passive treatment of surface water, including adit drainages, based on apatite (or similar) treatment ranged from an upper bound of 0.30 to a lower bound of 0.02, yielding an expected value of 0.11 (89 percent effectiveness) and a coefficient of variation of 0.98. The lower bound estimate was partially based on laboratory column studies of Apatite WE showing a greater than 99 percent reduction of zinc (TerraGraphics 1998), but considering that field efficiencies are very likely to be lower. The lower range of estimates assumes that any actual implementation of passive treatment would be of a highly effective and reliable design. (URS Group, Inc., 2007, Section C.2.6.4, Appendix C, page 14).

[3] "Remediation Factors" are the "ratios of post-remediation loading to pre-remediation loading for remediated volumes" (PA, Appendix C, page 11). "Complement" here has a technical meaning; if the remediation factor is R, then the remedial effectiveness is 1–R.

[4] [UB and LB refer to Upper Bound and Lower Bound. $R_{i,j}$ is the remediation factor for source number i of source type j, where i and j are indices into lists of individual sources and source types respectively.]

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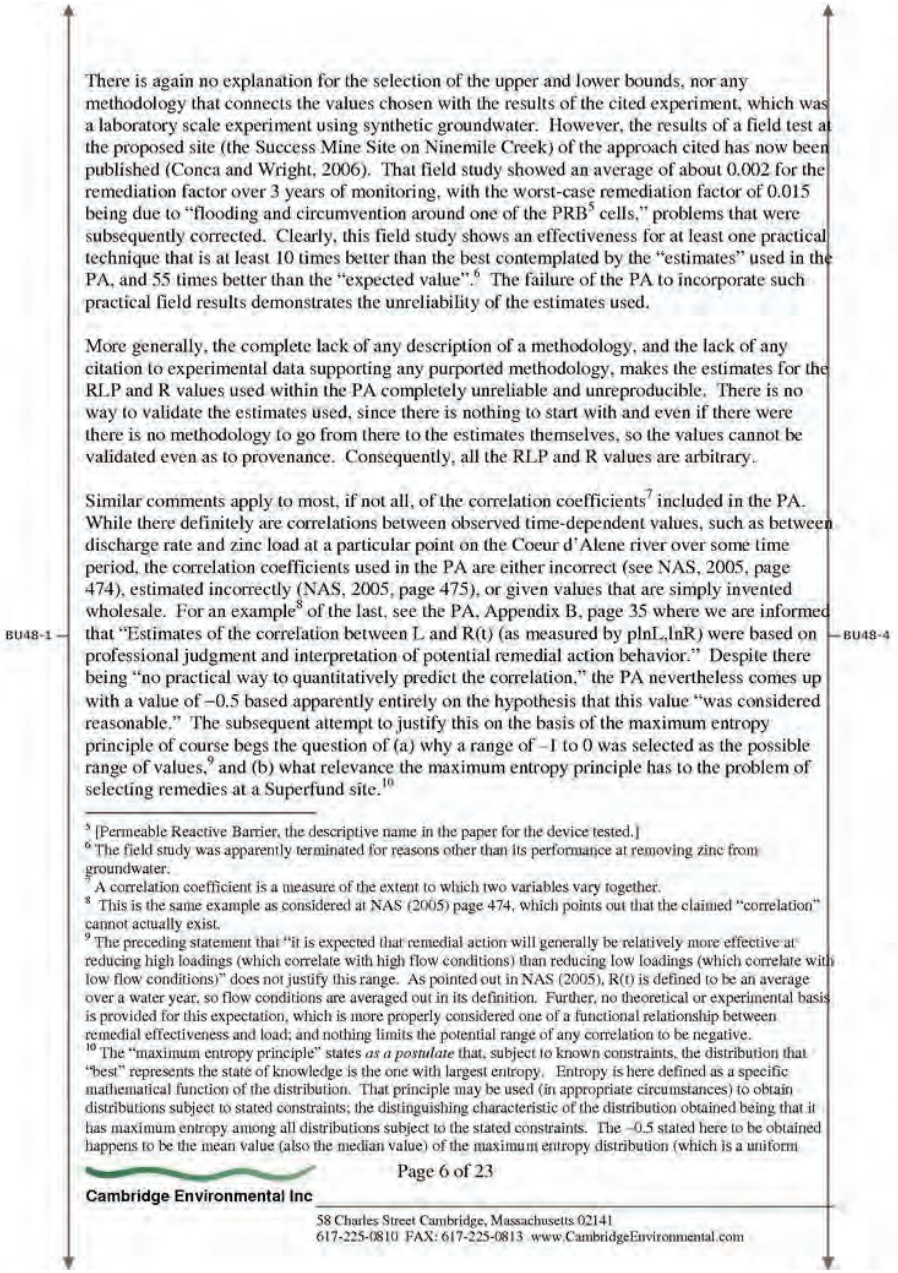
No comments



There is again no explanation for the selection of the upper and lower bounds, nor any methodology that connects the values chosen with the results of the cited experiment, which was a laboratory scale experiment using synthetic groundwater. However, the results of a field test at the proposed site (the Success Mine Site on Ninemile Creek) of the approach cited has now been published (Conca and Wright, 2006). That field study showed an average of about 0.002 for the remediation factor over 3 years of monitoring, with the worst-case remediation factor of 0.015 being due to "flooding and circumvention around one of the PRB[5] cells," problems that were subsequently corrected. Clearly, this field study shows an effectiveness for at least one practical technique that is at least 10 times better than the best contemplated by the "estimates" used in the PA, and 55 times better than the "expected value".[6] The failure of the PA to incorporate such practical field results demonstrates the unreliability of the estimates used.

More generally, the complete lack of any description of a methodology, and the lack of any citation to experimental data supporting any purported methodology, makes the estimates for the RLP and R values used within the PA completely unreliable and unreproducible. There is no way to validate the estimates used, since there is nothing to start with and even if there were there is no methodology to go from there to the estimates themselves, so the values cannot be validated even as to provenance. Consequently, all the RLP and R values are arbitrary.

Similar comments apply to most, if not all, of the correlation coefficients[7] included in the PA. While there definitely are correlations between observed time-dependent values, such as between discharge rate and zinc load at a particular point on the Coeur d'Alene river over some time period, the correlation coefficients used in the PA are either incorrect (see NAS, 2005, page 474), estimated incorrectly (NAS, 2005, page 475), or given values that are simply invented wholesale. For an example[8] of the last, see the PA, Appendix B, page 35 where we are informed that "Estimates of the correlation between L and R(t) (as measured by plnL,lnR) were based on professional judgment and interpretation of potential remedial action behavior." Despite there being "no practical way to quantitatively predict the correlation," the PA nevertheless comes up with a value of –0.5 based apparently entirely on the hypothesis that this value "was considered reasonable." The subsequent attempt to justify this on the basis of the maximum entropy principle of course begs the question of (a) why a range of –1 to 0 was selected as the possible range of values,[9] and (b) what relevance the maximum entropy principle has to the problem of selecting remedies at a Superfund site.[10]

BU48-1

BU48-4

[5] [Permeable Reactive Barrier, the descriptive name in the paper for the device tested.]
[6] The field study was apparently terminated for reasons other than its performance at removing zinc from groundwater.
[7] A correlation coefficient is a measure of the extent to which two variables vary together.
[8] This is the same example as considered at NAS (2005) page 474, which points out that the claimed "correlation" cannot actually exist.
[9] The preceding statement that "it is expected that remedial action will generally be relatively more effective at reducing high loadings (which correlate with high flow conditions) than reducing low loadings (which correlate with low flow conditions)" does not justify this range. As pointed out in NAS (2005), R(t) is defined to be an average over a water year, so flow conditions are averaged out in its definition. Further, no theoretical or experimental basis is provided for this expectation, which is more properly considered one of a functional relationship between remedial effectiveness and load; and nothing limits the potential range of any correlation to be negative.
[10] The "maximum entropy principle" states *as a postulate* that, subject to known constraints, the distribution that "best" represents the state of knowledge is the one with largest entropy. Entropy is here defined as a specific mathematical function of the distribution. That principle may be used (in appropriate circumstances) to obtain distributions subject to stated constraints; the distinguishing characteristic of the distribution obtained being that it has maximum entropy among all distributions subject to the stated constraints. The –0.5 stated here to be obtained happens to be the mean value (also the median value) of the maximum entropy distribution (which is a uniform

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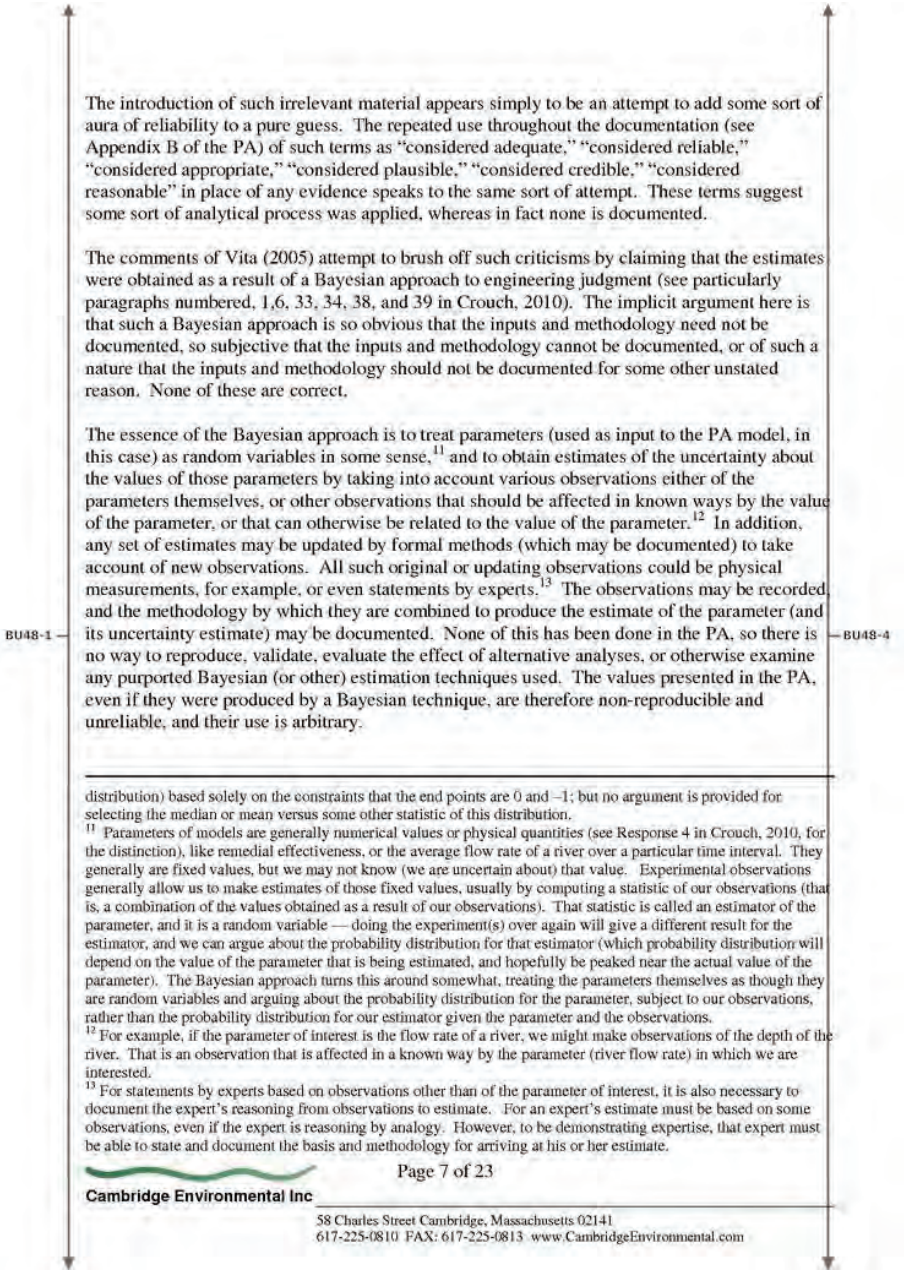

The introduction of such irrelevant material appears simply to be an attempt to add some sort of aura of reliability to a pure guess. The repeated use throughout the documentation (see Appendix B of the PA) of such terms as "considered adequate," "considered reliable," "considered appropriate," "considered plausible," "considered credible," "considered reasonable" in place of any evidence speaks to the same sort of attempt. These terms suggest some sort of analytical process was applied, whereas in fact none is documented.

The comments of Vita (2005) attempt to brush off such criticisms by claiming that the estimates were obtained as a result of a Bayesian approach to engineering judgment (see particularly paragraphs numbered, 1,6, 33, 34, 38, and 39 in Crouch, 2010). The implicit argument here is that such a Bayesian approach is so obvious that the inputs and methodology need not be documented, so subjective that the inputs and methodology cannot be documented, or of such a nature that the inputs and methodology should not be documented for some other unstated reason. None of these are correct.

The essence of the Bayesian approach is to treat parameters (used as input to the PA model, in this case) as random variables in some sense,[11] and to obtain estimates of the uncertainty about the values of those parameters by taking into account various observations either of the parameters themselves, or other observations that should be affected in known ways by the value of the parameter, or that can otherwise be related to the value of the parameter.[12] In addition, any set of estimates may be updated by formal methods (which may be documented) to take account of new observations. All such original or updating observations could be physical measurements, for example, or even statements by experts.[13] The observations may be recorded and the methodology by which they are combined to produce the estimate of the parameter (and its uncertainty estimate) may be documented. None of this has been done in the PA, so there is no way to reproduce, validate, evaluate the effect of alternative analyses, or otherwise examine any purported Bayesian (or other) estimation techniques used. The values presented in the PA, even if they were produced by a Bayesian technique, are therefore non-reproducible and unreliable, and their use is arbitrary.

BU48-1

BU48-4

distribution) based solely on the constraints that the end points are 0 and –1; but no argument is provided for selecting the median or mean versus some other statistic of this distribution.

[11] Parameters of models are generally numerical values or physical quantities (see Response 4 in Crouch, 2010, for the distinction), like remedial effectiveness, or the average flow rate of a river over a particular time interval. They generally are fixed values, but we may not know (we are uncertain about) that value. Experimental observations generally allow us to make estimates of those fixed values, usually by computing a statistic of our observations (that is, a combination of the values obtained as a result of our observations). That statistic is called an estimator of the parameter, and it is a random variable — doing the experiment(s) over again will give a different result for the estimator, and we can argue about the probability distribution for that estimator (which probability distribution will depend on the value of the parameter that is being estimated, and hopefully be peaked near the actual value of the parameter). The Bayesian approach turns this around somewhat, treating the parameters themselves as though they are random variables and arguing about the probability distribution for the parameter, subject to our observations, rather than the probability distribution for our estimator given the parameter and the observations.

[12] For example, if the parameter of interest is the flow rate of a river, we might make observations of the depth of the river. That is an observation that is affected in a known way by the parameter (river flow rate) in which we are interested.

[13] For statements by experts based on observations other than of the parameter of interest, it is also necessary to document the expert's reasoning from observations to estimate. For an expert's estimate must be based on some observations, even if the expert is reasoning by analogy. However, to be demonstrating expertise, that expert must be able to state and document the basis and methodology for arriving at his or her estimate.

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5. The calculated result of the PA (used in the FFS) does not adequately relate to AWQC.

The result of the PA is purportedly some metric of load ratio at Pinehurst and Elizabeth Park. As pointed out in NAS (2005) at page 473, the precise metric is not adequately specified, and does not relate to AWQC as defined by Idaho. Examination of the load ratio at Pinehurst, Elizabeth Park, and Canyon Creek shows that the PA profoundly misinterprets the measurements, treating as random variation the annual and daily fluctuations. Diurnal ("diel") fluctuations in zinc concentrations have been measured directly (Nimick *et al.*, 2003) in the South Fork of the Coeur d'Alene river (at SF271), possibly caused by diurnal variation in temperature or light. While Nimick *et al.* (2003) did not measure hardness, these fluctuations in zinc concentration suggest variations in load ratios also, and evaluation of the measured load ratios at Pinehurst (SF271), Elizabeth Park (SF268), and Canyon Creek (CC288) over the period 2002 through 2010 demonstrates a very strong variation with time of year and time of day (together with a weak variation with stream discharge). All these predictable variations have been ignored entirely by the PA; the variation in measured load ratios is attributed to a random fluctuation whereas most is due to this entirely predictable variation. For example, at SF271 the PA effectively treats the fluctuations of load ratio as being lognormal with a coefficient of variation of about 25%; however, a fuller analysis shows that there is a predictable annual variation of about 32%, combined with a daily variation of about 24%, and the apparently random[14] component has a coefficient of variation of just 13% (Figure 1). Thus even if the PA's metric somehow indicated compliance with ARARs on average at SF271, annual and daily fluctuations would ensure considerable periods out of compliance. And the same applies at Elizabeth Park (SF268), the other location evaluated by the PA (Figure 2).

BU48-1

BU48-4

[14] Just as the PA misinterprets the measurements as random, this remaining apparently random component may be at least partially explained by other regular fluctuations.

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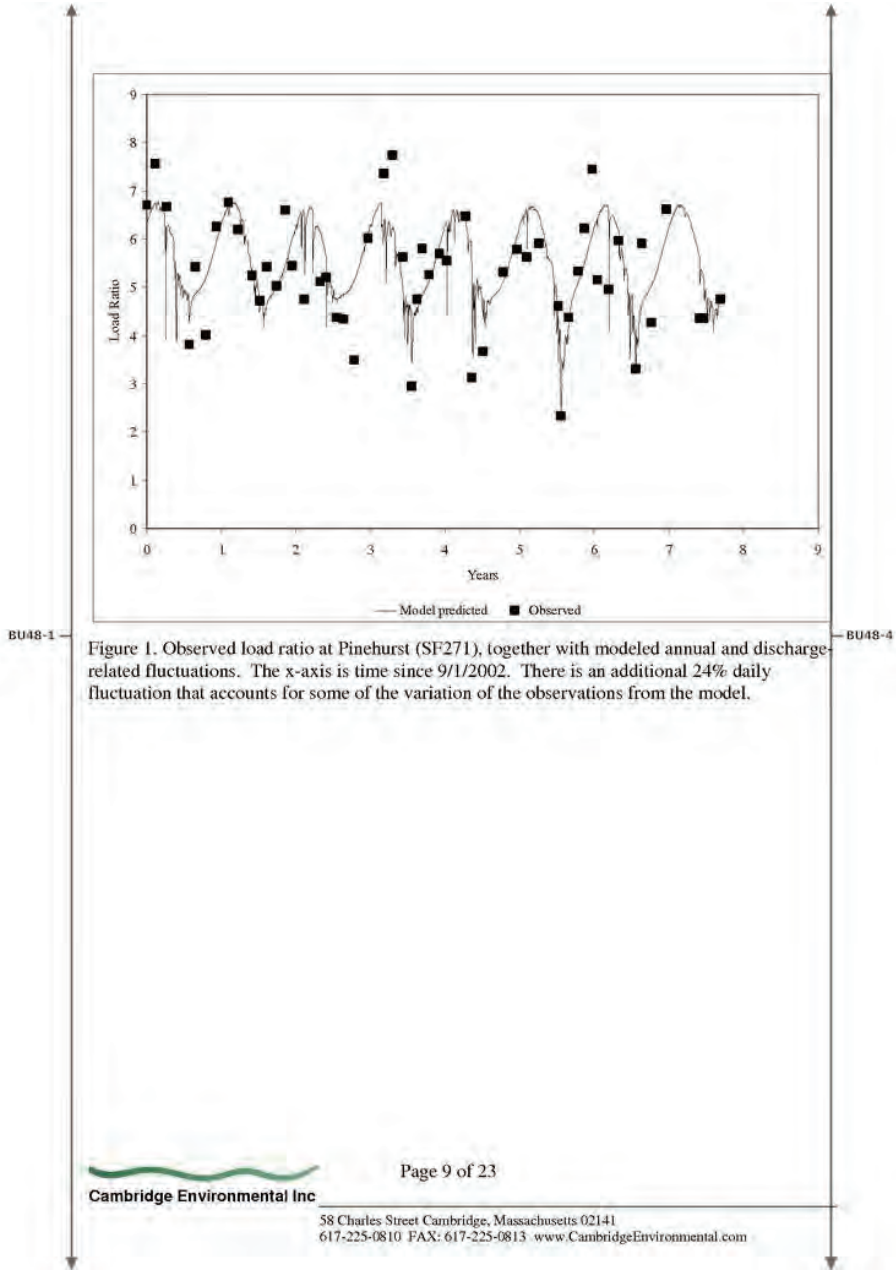

Figure 1. Observed load ratio at Pinehurst (SF271), together with modeled annual and discharge-related fluctuations. The x-axis is time since 9/1/2002. There is an additional 24% daily fluctuation that accounts for some of the variation of the observations from the model.

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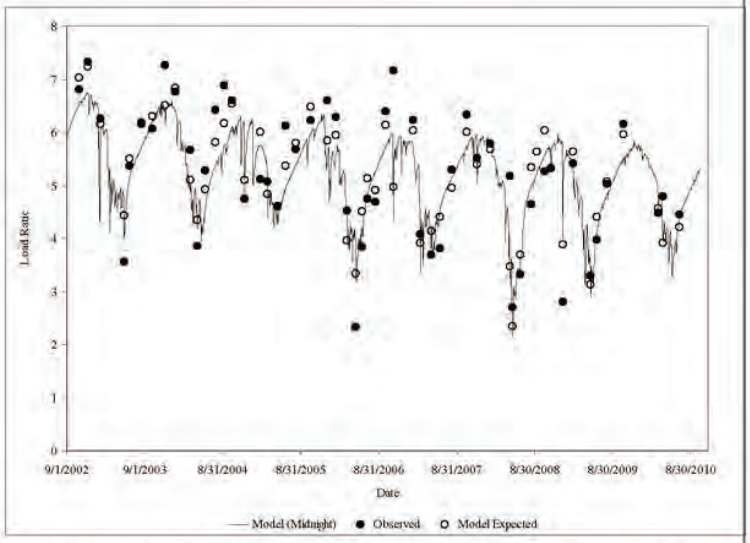

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Figure 2. Observed load ratio at Elizabeth Park (SF268), together with modeled annual and discharge-related fluctuations. The "Model expected" values are calculated to correspond in both day and time with the observations, so are off the "Model (Midnight)" curve which corresponds to the modeled value at midnight each day.

BU48-4

Further, the FFS claims that Pinehurst (SF271) and Elizabeth Park (SF268) are representative of the Upper Basin as a whole. For example, the FFS (at page ES-15) states "These two locations provide an estimate of overall cleanup progress in the Upper Basin,"[15] and (at page 8-4) that Pinehurst (SF271) is "representative of the Upper Basin as a whole," although it subsequently (in the next paragraph) contradicts this with the statement that "post-remediation AWQC ratios could be lower or higher at some locations upstream of Pinehurst." Moreover, the FFS points out that load ratios (AWQC ratios) "are much higher in some upstream reaches" of Canyon Creek and Ninemile Creek than at the mouth of each (FFS, page 3-43). The observed load ratio at other locations can indeed be substantially different from those at Pinehurst or Elizabeth Park — Figure 3 shows that load ratios at the mouth of Canyon Creek have a substantially different distribution from (and are substantially higher than) those at Pinehurst or Elizabeth Park, and Figure 4 demonstrates that the load ratio at Pinehurst does not predict the load ratio at the same time (within one day) at Canyon Creek.[16] These observations indicate that load ratios at other locations would be expected to be substantially different from those at Pinehurst and Elizabeth Park. It follows that demonstration of compliance with ARARs at Pinehurst or Elizabeth Park

[15] The same statement is repeated in the Proposed Plan (EPA, 2010) at page
[16] These comparisons ignore time-of-day variations due to measurements at different times of day at the different locations, but the differences are so profound that such variations do not matter.

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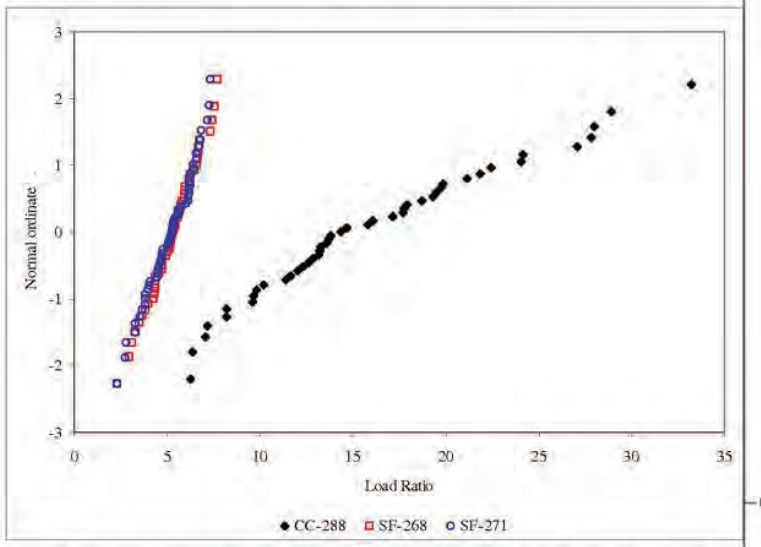
locations does not demonstrate compliance anywhere else. The PA is thus an unreliable tool for evaluation of compliance with ARARs, so that its use for such a purpose is arbitrary.



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BU48-4

Figure 3. The distributions of load ratio at Pinehurst (SF271), Elizabeth Park (SF268), and Canyon Creek (CC-288), demonstrating that Canyon Creek is very different from Pinehurst.

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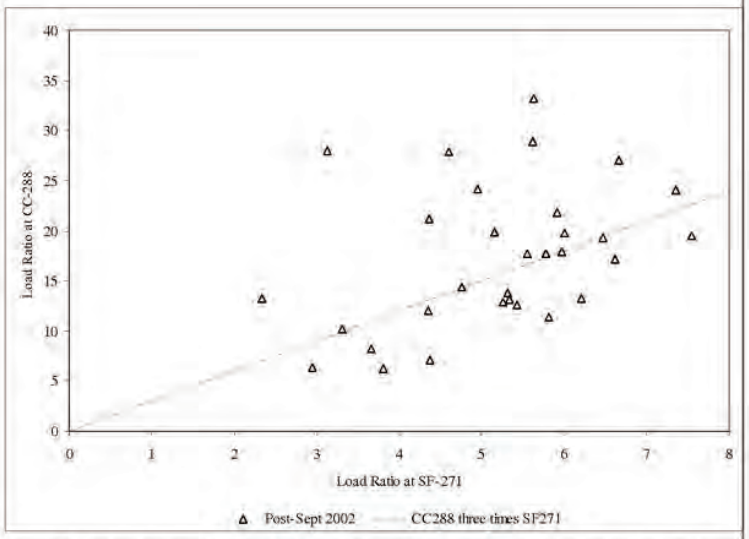

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Figure 4. The load ratio at Canyon Creek (CC-288) compared with that at Pinehurst (SF-271) within one day of each other. The dotted line corresponds to load ratio at CC-288 being three times that at SF-271.

BU48-4

6. The treatment of time is incorrect

The NAS (2005) review pointed out that the treatment of time in the PA is incorrect. This incorrect treatment is unchanged in the update. The PA makes a fundamental error in assuming that remedial actions will change the total zinc mass present in the contaminated material (see Vita, 2005; in particular Comments 16 and 18 in Crouch, 2010, but also Comments 3, 12, 15, 17, 21, and 22, op cit.) and hence ultimately leached down the river. However, zinc is an element. None of the remedial actions contemplated can change the total mass of zinc, it can only be moved around and placed in situations where it is more or less likely to leach. Only by removing material from the valley would the mass ultimately available for leaching down the river be changed.

It is therefore necessarily true that reducing the rate of leaching of zinc from any source (or from all sources combined) will extend the time period over which that leaching occurs. It is equally true that sources with different leaching characteristics will have different fractional rates of leaching (that is, the fraction of zinc leached per unit time will be different for sources of different characteristics). The FFS discussion of Contaminant Release Rates at §3.3.4.3 now appears to accept both these physical characteristics of leaching, indicating that the release rate from different sources will be different, and may change over time. In direct contradiction to the

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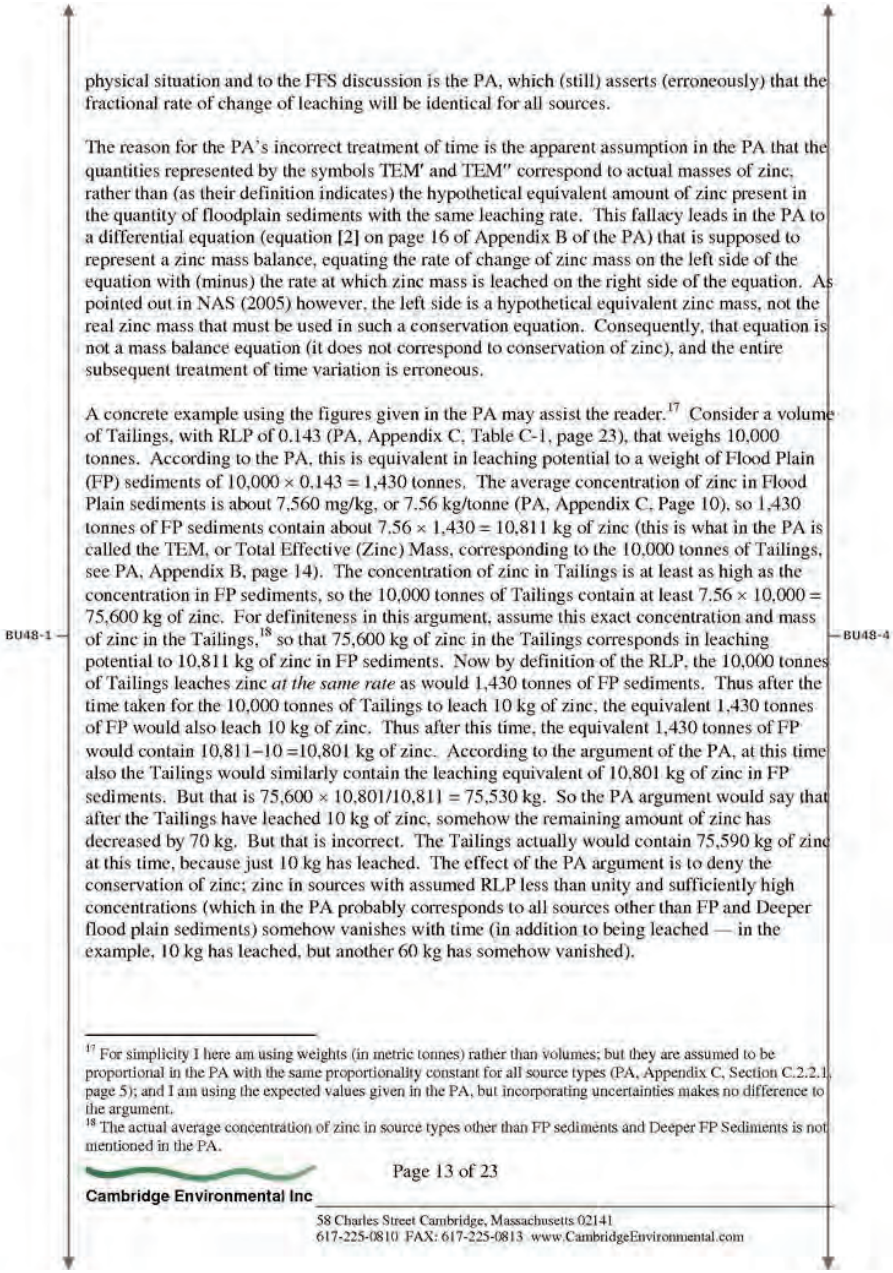

physical situation and to the FFS discussion is the PA, which (still) asserts (erroneously) that the fractional rate of change of leaching will be identical for all sources.

The reason for the PA's incorrect treatment of time is the apparent assumption in the PA that the quantities represented by the symbols TEM′ and TEM″ correspond to actual masses of zinc, rather than (as their definition indicates) the hypothetical equivalent amount of zinc present in the quantity of floodplain sediments with the same leaching rate. This fallacy leads in the PA to a differential equation (equation [2] on page 16 of Appendix B of the PA) that is supposed to represent a zinc mass balance, equating the rate of change of zinc mass on the left side of the equation with (minus) the rate at which zinc mass is leached on the right side of the equation. As pointed out in NAS (2005) however, the left side is a hypothetical equivalent zinc mass, not the real zinc mass that must be used in such a conservation equation. Consequently, that equation is not a mass balance equation (it does not correspond to conservation of zinc), and the entire subsequent treatment of time variation is erroneous.

A concrete example using the figures given in the PA may assist the reader.[17] Consider a volume of Tailings, with RLP of 0.143 (PA, Appendix C, Table C-1, page 23), that weighs 10,000 tonnes. According to the PA, this is equivalent in leaching potential to a weight of Flood Plain (FP) sediments of 10,000 × 0.143 = 1,430 tonnes. The average concentration of zinc in Flood Plain sediments is about 7,560 mg/kg, or 7.56 kg/tonne (PA, Appendix C, Page 10), so 1,430 tonnes of FP sediments contain about 7.56 × 1,430 = 10,811 kg of zinc (this is what in the PA is called the TEM, or Total Effective (Zinc) Mass, corresponding to the 10,000 tonnes of Tailings, see PA, Appendix B, page 14). The concentration of zinc in Tailings is at least as high as the concentration in FP sediments, so the 10,000 tonnes of Tailings contain at least 7.56 × 10,000 = 75,600 kg of zinc. For definiteness in this argument, assume this exact concentration and mass of zinc in the Tailings,[18] so that 75,600 kg of zinc in the Tailings corresponds in leaching potential to 10,811 kg of zinc in FP sediments. Now by definition of the RLP, the 10,000 tonnes of Tailings leaches zinc *at the same rate* as would 1,430 tonnes of FP sediments. Thus after the time taken for the 10,000 tonnes of Tailings to leach 10 kg of zinc, the equivalent 1,430 tonnes of FP would also leach 10 kg of zinc. Thus after this time, the equivalent 1,430 tonnes of FP would contain 10,811−10 =10,801 kg of zinc. According to the argument of the PA, at this time also the Tailings would similarly contain the leaching equivalent of 10,801 kg of zinc in FP sediments. But that is 75,600 × 10,801/10,811 = 75,530 kg. So the PA argument would say that after the Tailings have leached 10 kg of zinc, somehow the remaining amount of zinc has decreased by 70 kg. But that is incorrect. The Tailings actually would contain 75,590 kg of zinc at this time, because just 10 kg has leached. The effect of the PA argument is to deny the conservation of zinc; zinc in sources with assumed RLP less than unity and sufficiently high concentrations (which in the PA probably corresponds to all sources other than FP and Deeper flood plain sediments) somehow vanishes with time (in addition to being leached — in the example, 10 kg has leached, but another 60 kg has somehow vanished).

BU48-1

BU48-4

[17] For simplicity I here am using weights (in metric tonnes) rather than volumes; but they are assumed to be proportional in the PA with the same proportionality constant for all source types (PA, Appendix C, Section C.2.2.1, page 5); and I am using the expected values given in the PA, but incorporating uncertainties makes no difference to the argument.

[18] The actual average concentration of zinc in source types other than FP sediments and Deeper FP Sediments is not mentioned in the PA.

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Despite the protestations in Vita (2005) documented above, this loss of zinc is physically impossible. The time-related results of the PA are predicated on a physical impossibility, so are necessarily incorrect and reliance on them is arbitrary. The PA artificially accelerates the rate of load reduction, regardless of whether or not a remedial action is taken.

6.1. Cross-over of load-ratio curves for different cleanup options

A consequence of the erroneous treatment of time in the PA is that all the time-related predictions of the PA are incorrect. Figure 5 illustrates qualitatively a necessary consequence of the assumptions of the PA when time-variation is correctly taken into account[19] — the more effective the remediation initially, the longer the time scale of natural depletion subsequently. It follows that the load ratio curves over time will necessarily cross (based on the assumptions of the PA);[20] a more effective initial remedy will reduce the load ratio further initially, but subsequently that load ratio will decrease more slowly; and natural attenuation might well achieve clean-up to ARARs before a more aggressive remedial option

In the ROD (EPA, 2002) various alternative remedial options were removed from further consideration based in part on the PA estimates of time to achieve ARARs (e.g. ROD Figures 10.2-3, 10.2-4, EPA 2002). Those estimates of time were unreliable and incorrect, and even the relative placement of the curves due to each of the alternatives considered were unreliable and incorrect. It follows that they were arbitrary, even in a relative sense (indeed none of the curves crossed, as necessarily would happen with the assumptions included in the PA). Consequently, the ROD used an unreliable and hence arbitrary methodology to remove consideration of other remedies.

BU48-1

BU48-4

[19] I have chosen a time scale of 100 years purely for illustrative purposes, and because it corresponds roughly to the time scale of the "best estimates" given in a previous draft of the FFF (see Section 6.2 and Figure 6). As just pointed out, the treatment of time in the PA is completely erroneous, so the actual time scales for natural attenuation are not known, and could extend into the thousands of years; at this point, in the absence of any reliable analysis, we do not know.

[20] The caveat "based on the assumptions of the PA" is introduced, because this behavior is not physically necessary under all circumstances. However, if loading is proportional to the mass of zinc present, as assumed in the PA, then the cross-over behavior will necessarily occur; although that is not the only condition under which is will occur.

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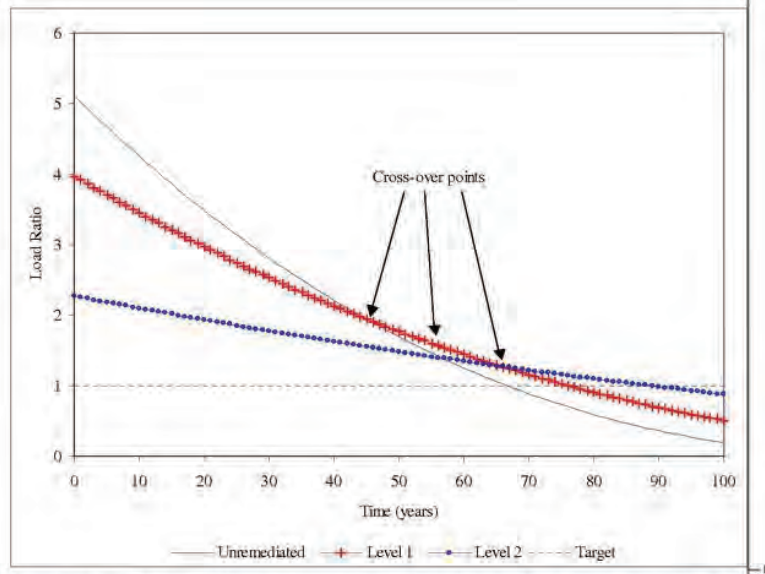

BU48-4

Figure 5 Hypothetical load ratio curves versus time for various levels of remediation, with the assumptions of the PA.

6.2. Distortion of the comparison of remedial alternatives

EPA may have realized that the treatment of time in the PA is incorrect, perhaps in response to the State comments (IDEQ, 2010) on a previous Draft of the FFS (CH2MHill, 2010a) which strongly criticized the use of the PA and the time variation obtained from it, since the only mention of time variation in the Draft Final FFS (CH2MHill, 2010b) is now the phrase "but only after a period of natural source depletion, which is common to all of the alternatives" (FFS, §7.3.13.2, §8.2) or "Attainment of ARARs for surface water would require a period of natural source depletion" (Table 8-1a, all alternatives). The FFS statements are profoundly misleading, however, since they imply the same depletion rate for all alternatives, whereas in fact the depletion rate will differ for the different alternatives; and the concentration versus time curves for different alternatives probably cross at various future times as indicated in Figure 5.

In consequence, the objective of achieving ARARs is substantially misrepresented by the EPA summary in the FFS, for example at FFS Figure 8-1 since that objective could well be achieved most rapidly by alternative remedial approaches (such as the approach suggested by NAS, 2005) or even by natural attenuation with no remediation. Basing decisions entirely on the "immediate" relative effectiveness suggested by an inadequate and arbitrary PA model of a limited number of alternatives, none of which "immediately" attain ARARs, without taking

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account of the time to actually achieve ARARs, particularly when "immediate" may mean 50 to 90 years after starting the remedy, is arbitrary.

To illustrate the problem, consider the implications of the PA results shown in Table B-7 of the Draft FFS[21] (CH2MHill, 2010a) for Elizabeth Park, which location the FFS considers to be representative of the entire upper basin (see Section 5). Plotting the time course of load ratios implied by the given information, together with the expectation that the remedies will take from 50+ years to complete for Alternatives 3+, and 80+ years to complete for Alternatives 4+ (FFS, pp 8-10 to 8-11), shows that according to the PA natural attenuation would achieve the same or better results than either alternative (Figure 6).

The FFS fails to take account of the results shown in Figure 6 in the alternative selection process, hence profoundly mis-represents (e.g. in FFS Figure 8-1) the outcomes predicted by the model (the PA) upon which it purports to rely. The FFS is therefore arbitrary in its rankings (in Section 8) of alternatives, since it fails to recognize that the unranked alternative of no action achieves the same (or better) results as the selected alternatives, with higher implementability, equal compliance with ARARs, better long-term effectiveness, and lower cost.

The results in Figure 6 are of course incredible in the exact sense of that term — not believable; but that is what the FFS relies upon. They are based on a PA analysis that is inadequate and arbitrary both for the initial estimate of remedial effectiveness, and the time course subsequent to that. Since this is what the FFS currently relies upon, the FFS reliance is necessarily both incorrect and arbitrary.

BU48-1

BU48-4

[21] I use the Draft FFS because the Draft Final FFS omits this information. However, the Draft Final FFS continues to rely on the PA analysis that necessarily leads to exactly the same conclusions.

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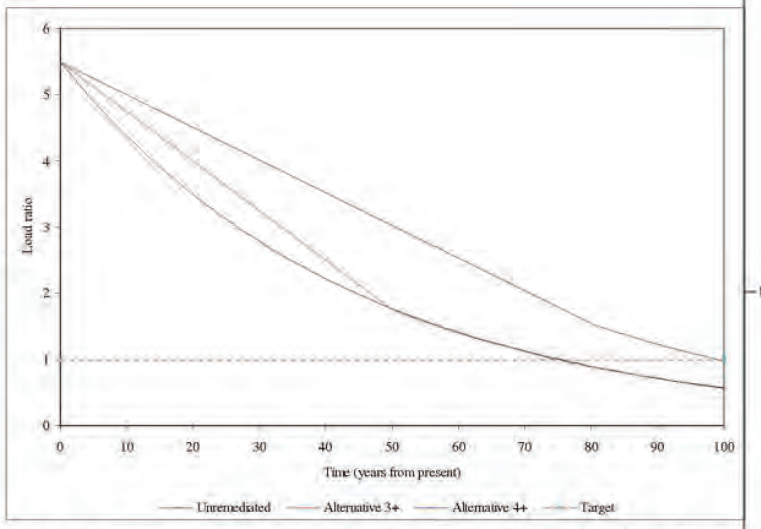

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Figure 6 Time course of load ratio implied by Table B-7 of the Draft FFS (CH2MHill, 2010a) for Elizabeth Park, using the best estimates. I have arbitrarily inserted a straight line segment between now and the time remediation is completed for the two remedial alternatives considered; no analysis is available to examine what would happen in this interval.

BU48-1

7. Prof. Baecher's review.

Appendix B to the FFS states that

> USEPA sought an independent review of the PAT by a well-known leader in the field of probabilistic modeling, Dr. Gregory B. Baecher, University of Maryland, A.J. Clark School of Engineering (College Park, Maryland). The independent review validated the approach used by USEPA and its use in the evaluation and comparison of alternatives. This review culminated in a second technical memorandum, A Predictive Analysis for Post-Remediation Metal Loading, Coeur d'Alene Basin RI/FS (URS, 2007), which provided clarification and additional documentation of the approach used by USEPA. (FFS, CH2MHill, 2010b, Appendix B, page B-1.)

BU48-5

The only such "review" apparent in the record is a letter (Baecher, 2007) apparently transmitting the updated version of the PA (URS Group, Inc., 2007). The letter suggests that Prof. Baecher had some hand in preparing that updated PA, although no such acknowledgment appears within it. The metadata on the updated PA, however, lists the author as Gregory Baecher, although the relation between Dr. Baecher and URS Group, Inc. is not apparent. While the letter states that "this review and updating" took account of "external reviews by the National Research Council

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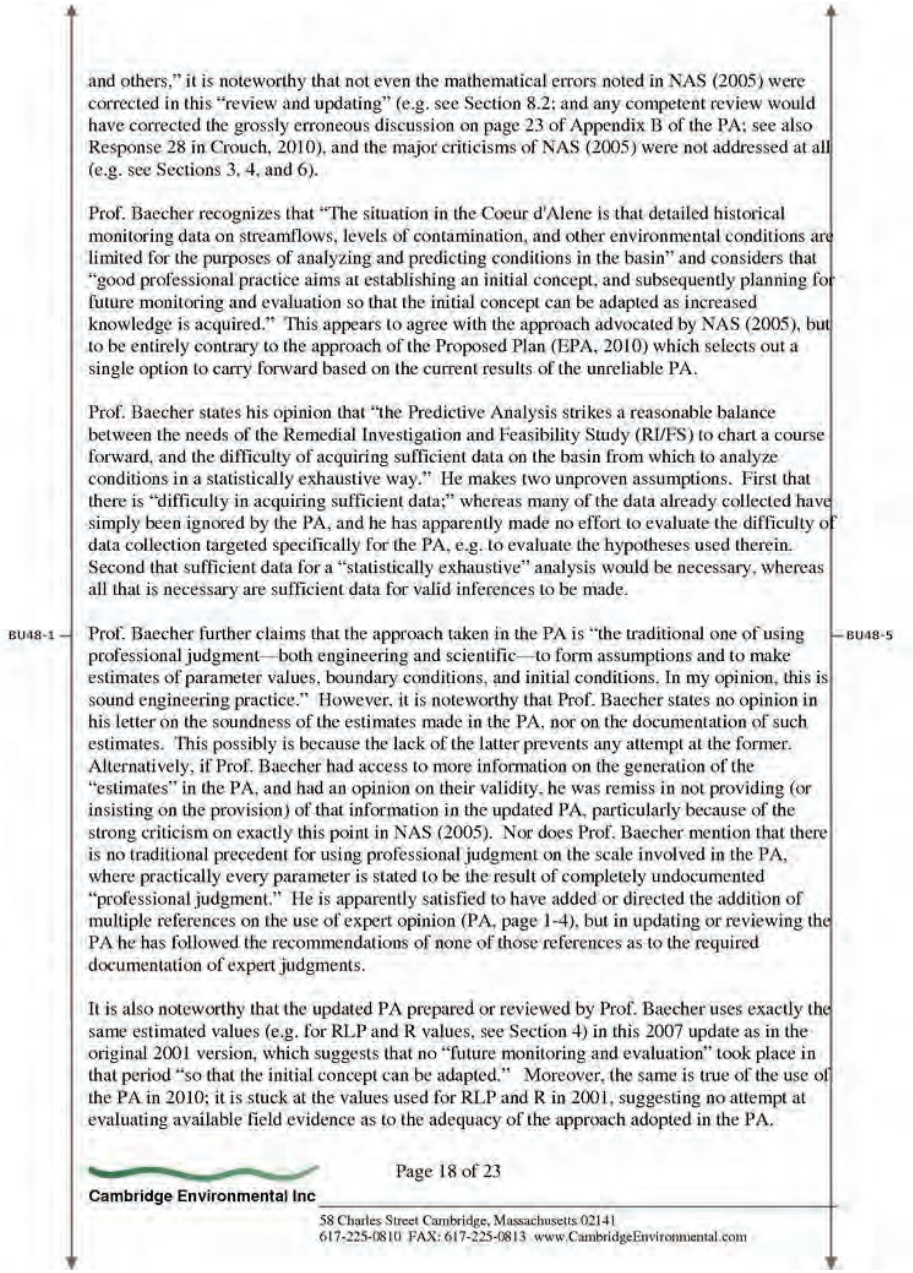
Response to comment BU48-5

In category 7, the comment questions the adequacy of Dr. Baecher's review of the PA on behalf of the EPA, as well as whether that review was truly independent. Dr. Baecher's background and involvement is described above under the introductory material. He thoroughly reviewed EPA's PA approach. His assignment, contrary to the implications of the comment, was indeed to provide EPA with an independent review of the PA, which he did. Dr. Baecher's scope of work included: (1) a review of the draft Probabilistic Analysis of Post-Remediation Metal Loading report in light of external reviews by the National Research Council (also referred to as NAS review) and others; (2) an assessment of the analytical approach, including the basis for assumptions made and for parameter values estimated; and (3) a review of sensitivity studies made to verify the approach. Subsequent to this review, the draft documentation for the PA was updated into a new version.



and others," it is noteworthy that not even the mathematical errors noted in NAS (2005) were corrected in this "review and updating" (e.g. see Section 8.2; and any competent review would have corrected the grossly erroneous discussion on page 23 of Appendix B of the PA; see also Response 28 in Crouch, 2010), and the major criticisms of NAS (2005) were not addressed at all (e.g. see Sections 3, 4, and 6).

Prof. Baecher recognizes that "The situation in the Coeur d'Alene is that detailed historical monitoring data on streamflows, levels of contamination, and other environmental conditions are limited for the purposes of analyzing and predicting conditions in the basin" and considers that "good professional practice aims at establishing an initial concept, and subsequently planning for future monitoring and evaluation so that the initial concept can be adapted as increased knowledge is acquired." This appears to agree with the approach advocated by NAS (2005), but to be entirely contrary to the approach of the Proposed Plan (EPA, 2010) which selects out a single option to carry forward based on the current results of the unreliable PA.

Prof. Baecher states his opinion that "the Predictive Analysis strikes a reasonable balance between the needs of the Remedial Investigation and Feasibility Study (RI/FS) to chart a course forward, and the difficulty of acquiring sufficient data on the basin from which to analyze conditions in a statistically exhaustive way." He makes two unproven assumptions. First that there is "difficulty in acquiring sufficient data;" whereas many of the data already collected have simply been ignored by the PA, and he has apparently made no effort to evaluate the difficulty of data collection targeted specifically for the PA, e.g. to evaluate the hypotheses used therein. Second that sufficient data for a "statistically exhaustive" analysis would be necessary, whereas all that is necessary are sufficient data for valid inferences to be made.

BU48-1 — Prof. Baecher further claims that the approach taken in the PA is "the traditional one of using professional judgment—both engineering and scientific—to form assumptions and to make estimates of parameter values, boundary conditions, and initial conditions. In my opinion, this is sound engineering practice." However, it is noteworthy that Prof. Baecher states no opinion in his letter on the soundness of the estimates made in the PA, nor on the documentation of such estimates. This possibly is because the lack of the latter prevents any attempt at the former. Alternatively, if Prof. Baecher had access to more information on the generation of the "estimates" in the PA, and had an opinion on their validity, he was remiss in not providing (or insisting on the provision) of that information in the updated PA, particularly because of the strong criticism on exactly this point in NAS (2005). Nor does Prof. Baecher mention that there is no traditional precedent for using professional judgment on the scale involved in the PA, where practically every parameter is stated to be the result of completely undocumented "professional judgment." He is apparently satisfied to have added or directed the addition of multiple references on the use of expert opinion (PA, page 1-4), but in updating or reviewing the PA he has followed the recommendations of none of those references as to the required documentation of expert judgments. — BU48-5

It is also noteworthy that the updated PA prepared or reviewed by Prof. Baecher uses exactly the same estimated values (e.g. for RLP and R values, see Section 4) in this 2007 update as in the original 2001 version, which suggests that no "future monitoring and evaluation" took place in that period "so that the initial concept can be adapted." Moreover, the same is true of the use of the PA in 2010; it is stuck at the values used for RLP and R in 2001, suggesting no attempt at evaluating available field evidence as to the adequacy of the approach adopted in the PA.

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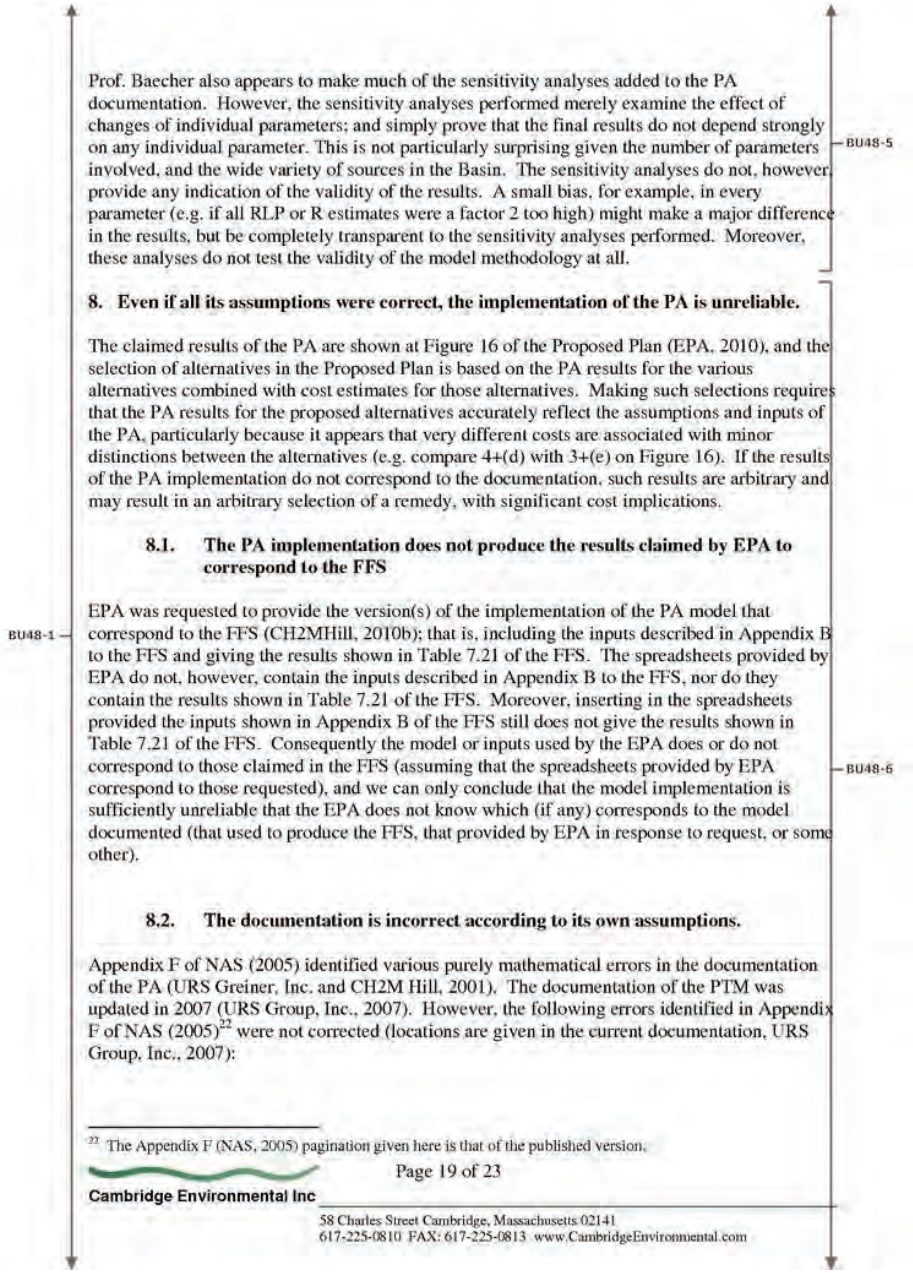
No comments



Prof. Baecher also appears to make much of the sensitivity analyses added to the PA documentation. However, the sensitivity analyses performed merely examine the effect of changes of individual parameters; and simply prove that the final results do not depend strongly on any individual parameter. This is not particularly surprising given the number of parameters involved, and the wide variety of sources in the Basin. The sensitivity analyses do not, however, provide any indication of the validity of the results. A small bias, for example, in every parameter (e.g. if all RLP or R estimates were a factor 2 too high) might make a major difference in the results, but be completely transparent to the sensitivity analyses performed. Moreover, these analyses do not test the validity of the model methodology at all. BU48-5

8. Even if all its assumptions were correct, the implementation of the PA is unreliable.

The claimed results of the PA are shown at Figure 16 of the Proposed Plan (EPA, 2010), and the selection of alternatives in the Proposed Plan is based on the PA results for the various alternatives combined with cost estimates for those alternatives. Making such selections requires that the PA results for the proposed alternatives accurately reflect the assumptions and inputs of the PA, particularly because it appears that very different costs are associated with minor distinctions between the alternatives (e.g. compare 4+(d) with 3+(e) on Figure 16). If the results of the PA implementation do not correspond to the documentation, such results are arbitrary and may result in an arbitrary selection of a remedy, with significant cost implications.

8.1. The PA implementation does not produce the results claimed by EPA to correspond to the FFS

BU48-1 EPA was requested to provide the version(s) of the implementation of the PA model that correspond to the FFS (CH2MHill, 2010b); that is, including the inputs described in Appendix B to the FFS and giving the results shown in Table 7.21 of the FFS. The spreadsheets provided by EPA do not, however, contain the inputs described in Appendix B to the FFS, nor do they contain the results shown in Table 7.21 of the FFS. Moreover, inserting in the spreadsheets provided the inputs shown in Appendix B of the FFS still does not give the results shown in Table 7.21 of the FFS. Consequently the model or inputs used by the EPA does or do not correspond to those claimed in the FFS (assuming that the spreadsheets provided by EPA correspond to those requested), and we can only conclude that the model implementation is sufficiently unreliable that the EPA does not know which (if any) corresponds to the model documented (that used to produce the FFS, that provided by EPA in response to request, or some other). BU48-6

8.2. The documentation is incorrect according to its own assumptions.

Appendix F of NAS (2005) identified various purely mathematical errors in the documentation of the PA (URS Greiner, Inc. and CH2M Hill, 2001). The documentation of the PTM was updated in 2007 (URS Group, Inc., 2007). However, the following errors identified in Appendix F of NAS (2005)[22] were not corrected (locations are given in the current documentation, URS Group, Inc., 2007):

[22] The Appendix F (NAS, 2005) pagination given here is that of the published version.

Page 19 of 23

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Response to comment BU48-6

In category 8, the comment describes EPA's remedy selection process as dependent on two criteria: cost and PA results. This comment fails to recognize how EPA actually selects remedies under CERCLA. Remedial alternatives are evaluated through the use of nine criteria, not just two as implied by the comment. As described in detail in the Proposed Plan and ROD Amendment, EPA developed remedial alternatives and evaluated them with the nine CERCLA criteria in a manner consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and then selected an NCP-consistent remedy. The measures selected in this remedy will provide an adequate level of protectiveness of human health and the environment; comply with federal, state, and tribal requirements that are applicable or relevant and appropriate within the scope of the Selected Remedy; result in a cost-effective action; utilize permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable; and satisfy the statutory preference for treatment as a principal element of the remedy (i.e., reduce the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment).

The comment also questions whether EPA provided certain PA documentation for review. The commenter prepared his comments on behalf of Hecla Mining Company. EPA provided Hecla with all the materials it requested.

- Equation (2) at Appendix A, page 23 (see NAS, 2005, Appendix F, page 480, equation (1.17)).
- 2nd equation at Appendix B, page 10 (see NAS, 2005, Appendix F, page 481, equation (1.20)).
- Equations [6] and [7] at Appendix B, pages 40 to 41 (see NAS, 2005, Appendix F, page 482, equation (1.22)).

Since these errors are purely mathematical in nature — the referenced equations are supposed to describe mathematical identities — it is difficult to understand why they were not corrected. Any such errors carried over into the implementation will provide results that disagree with the assumptions purportedly going into them, resulting in an unreliable implementation.

Moreover, there are further purely mathematical errors (not highlighted in Appendix F of NAS, 2005) in the current documentation (URS Group, Inc., 2007).[23] Specifically, (at least) equations [6] and [7] at pages 40 and 41 of the PA (URS Group, Inc., 2007), Appendix B, are incorrect in two ways (that do not cancel). The denominator of these equations is incorrect from the second line onwards, as documented by Equation (1.22) of Appendix F of NAS (2005). In addition, however, the numerator is also incorrect from the third line onwards in both equations. It appears to have been missed that the numerator is one of those cases documented in Footnote 4 in Section A.2.1 of Appendix A of the PA (at page 8). The correct expression for the numerator in equation [7] is given by:

$$\mathrm{V}\left(\sum_{j=1}^{K}\sum_{i=1}^{N_j} RLP_j V_{i,j} R_{i,j}\right)$$

BU48-1

$$= \sum_{j=1}^{K}\left\{\sum_{i=1}^{N_j}\left\{\left(\mathrm{CV}\left[RLP_j\right]^2+1\right)\left(\mathrm{CV}\left[V_{i,j}\right]^2+1\right)\left(\mathrm{CV}\left[R_{i,j}\right]^2+1\right)-1\right\}\left(\mathrm{E}\left[RLP_j\right]\mathrm{E}\left[V_{i,j}\right]\mathrm{E}\left[R_{i,j}\right]\right)^2\right.$$

$$\left. +2\mathrm{CV}\left[RLP_j\right]^2\mathrm{E}\left[RLP_j\right]^2\sum_{i=1}^{N_j}\sum_{k=i+1}^{N_j}\mathrm{E}\left[V_{i,j}\right]\mathrm{E}\left[V_{k,j}\right]\mathrm{E}\left[R_{i,j}\right]\mathrm{E}\left[R_{k,j}\right]\right\}$$

BU48-6

while the numerator for equation [6] is the same with all the terms involving R omitted (equivalently, to obtain the numerator of equation [6] set $\mathrm{E}[R] = 1$, $\mathrm{CV}[R] = 0$). Equations [6] and [7] erroneously omit the term in the third line of this equation, which term arises because RLP_j multiplies all the terms in the sum over i, inducing the 'so-called "spurious correlation" between independent variables that are multiplied or divided by a common variable' described in Footnote 4 of Appendix A. This numerator is more conveniently calculated (avoiding the double sum inside the sum over j) using the equivalent expressions:

[23] Exactly the same errors occurred in the previous documentation (URS Greiner, Inc. and CH2M Hill, 2001) at equations [6] and [7] on page B-43.

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$$\mathrm{V}\left(\sum_{j=1}^{K}\sum_{i=1}^{N_j} RLP_j V_{i,j} R_{i,j}\right)$$

$$= \sum_{j=1}^{K}\left\{\left(\mathrm{CV}\left[RLP_j\right]^2+1\right)\mathrm{E}\left[RLP_j\right]^2 \sum_{i=1}^{N_j}\left\{\left(\mathrm{CV}\left[V_{i,j}\right]^2+1\right)\left(\mathrm{CV}\left[R_{i,j}\right]^2+1\right)-1\right\}\left(\mathrm{E}\left[V_{i,j}\right]\mathrm{E}\left[R_{i,j}\right]\right)^2 + \left(\mathrm{CV}\left[RLP_j\right]\mathrm{E}\left[RLP_j\right]\sum_{i=1}^{N_j}\mathrm{E}\left[V_{i,j}\right]\mathrm{E}\left[R_{i,j}\right]\right)^2\right\}$$

$$= \sum_{j=1}^{K}\left[\left(\mathrm{V}\left[RLP_j\right]+\mathrm{E}\left[V_{i,j}\right]^2\right)\sum_{i=1}^{N_j}\left\{\left(\mathrm{V}\left[V_{i,j}\right]+\mathrm{E}\left[V_{i,j}\right]^2\right)\left(\mathrm{V}\left[R_{i,j}\right]+\mathrm{E}\left[R_{i,j}\right]^2\right)-\left(\mathrm{E}\left[V_{i,j}\right]\mathrm{E}\left[R_{i,j}\right]\right)^2\right\} + \mathrm{V}\left[RLP_j\right]\left(\sum_{i=1}^{N_j}\mathrm{E}\left[V_{i,j}\right]\mathrm{E}\left[R_{i,j}\right]\right)^2\right]$$

The documentation is thus mathematically incorrect in multiple ways, so would produce results that are incorrect according to its own assumptions.

8.3. The implementation does not follow the documentation.

BU48-1 — The implementation of the PA does not appear to be part of any public record, as noted (Footnote 6, page 463) in NAS (2005). The NAS committee was provided with copies of the claimed implementation spreadsheets (the PAT1 and PAT2 spreadsheets referred to at page 3-2 of URS Greiner, Inc. and CH2M Hill, 2001), and more recent versions of similar spreadsheets (again PAT1 and PAT2) that are claimed (page 4-1, URS Group, Inc., 2007)) to implement the PA for the FFS have been obtained from EPA. — BU48-6

However, the spreadsheets PAT1 and PAT2 (all versions) fail to calculate what is documented as the denominator in equations [6] and [7] of the PA (URS Group, Inc., 2007), Appendix B, pages 40 and 41. Interestingly enough, the spreadsheets implement the correct expression for the denominator.

Since all the results of the PA presented in the FFS are claimed to come from this implementation, those results do not match what was presented in the PA (wrong though it is), although in this example they do match what was intended by the PA.

8.4. The implementation is incorrect.

The implementation (in PAT1 and PAT2 spreadsheets) does, however, follow the documentation of the PA for the numerator of equations [6] and [7] (URS Group, Inc., 2007), Appendix B, pages 40 and 41. Once again, since all the results of the PA presented in the FFS are claimed to come from this implementation, those results match what was presented in the PA as a logical consequence of the assumptions and input documented in the PA (*i.e.* the equations given). However those results do not in fact represent the logical consequences of the assumptions and inputs documented in the PA, since the equations presented there incorrect (see Section 8.2); the results therefore do not match what was intended by the PA.

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No comments

9. References

Baecher, G.B., 2007. Subject: Coeur d'Alene Predictive Analysis. Transmittal letter, Prof. G.B. Baecher to Ms. Angela Chung, Bunker Hill/CDA Team Leader, U.S. EPA, Region 10, apparently accompanying the updated PA (URS Group, Inc., 2007).

CH2MHill, 2009. South Fork of the Coeur d'Alene River Watershed: Basinwide Groundwater Flow Model Documentation. Prepared for USEPA, Region 10, AES10 – Task Order 49, Contract No 68-2&-04-01, April 2009.

CH2MHill, 2010a. Draft Focused Feasibility Study Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site. February, 2010.

CH2MHill, 2010b. Draft Final Focused Feasibility Study Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site. Volume 1, Executive Summary and Main Text; Volume 2, Figures and Tables Accompanying Main Text; Volume 3; Appendices A through D; Volume 4, Appendices E through G. Prepared by CH2MHill for EPA Region 10, July 2010.

Conca, J.L., and Wright, J. 2006. An Apatite II permeable reactive barrier to remediate groundwater containing Zn, Pb and Cd. Applied Geochemistry 21(12)2188–2200.

Crouch, E. 2010. Response to "ERRORS OF FACT IN NAS APPENDIX F". Cambridge Environmental Inc., 58 Charles Street, Cambridge, MA. November 19, 2010.

EPA, 2002. The Bunker Hill Mining And Metallurgical Complex Operable Unit 3, Record of Decision, September 2002.

EPA, 2010. Proposed Plan, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site. EPA Region 10, July 12, 2010.

IDEQ, 2010. FFS Review Comments and Memos from IDEQ. Email from Rob Hanson, Min Wast Program Manager, Idaho Department of Environmental Quality, to Anne Dailey, USEPA Region 10, dated 3/5/2010, with attachments.

NAS, 2005. Superfund and mining megasites — Lessons from the Coeur d'Alene river basin. Committee on Superfund Site Assessment and Remediation in the Coeur d'Alene River Basin, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies, National Research Council of the National Academies, Washington, D.C. Available http://www.nap.edu/catalog.php?record_id=11359 and http://www.epa.gov/superfund/accomp/coeur/index.htm.

Nimick, D.A., Gammons, C.H., Cleasby, T.E., Madison, J.P., Skaar, D., and Brick, C.M. 2003. Diel cycles in dissolved metal concentrations in streams: Occurrence and possible causes. Water Resources Research 39(9)1247, doi:10.1029/2002WR001571.

TerraGraphics. 1998. Final Preliminary Engineering Design Report—Success Mine Site Passive Treatment Project. October, 1998.

URS Greiner, Inc. and CH2M Hill, 2001. Probabilistic Analysis of Post-Remediation Metal Loading Technical Memorandum (Revision 1), September 20, 2001.

URS Group, Inc., 2007. Coeur d'Alene Basin RI/FS Technical Memorandum. A predictive analysis for post-remediation metal loading. Prepared by URS Group, INc., 1501 Fourth Avenue, Suite 1400, Seattle, Washington 98101, for U.S. Environmental Protection Agency, Region 10, 1200 Sixth Avenue, Seattle, Washington 98101. October 1, 2007.

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Available from
http://yosemite.epa.gov/R10/CLEANUP.NSF/sites/bh+rod+amendment!OpenDocument&ExpandSection=3#_Section3 (main document and four appendices).

Vita, C. 2005. Errors of fact in NAS Appendix F. Attachment to email to Ted Yackulic, Region 10, USEPA from Chuck Vita, URS Corp., dated 7/25/2005.

No comments

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Hecla Mining Company (submitted by Dr. Arthur C. Riese), BU49, Letter 619211

No comments

AFFIDAVIT OF ARTHUR C. RIESE, Ph.D., R.G., C.HG.

I, Dr. Arthur C. Riese, hereby declare as follows:

1. I am the Managing Member of EnSci, Inc. a consulting firm that provides environmental consulting and litigation support, specializing in water quality, water resources development, fate and transport of contaminants, forensic geochemistry and environmental cost analysis and allocation. I founded the firm in January of 2000. I was previously President of Harding Lawson Associates, Inc., a $160 million publicly traded company (NASDAQ:HLAG) providing planning, environmental, transportation, water-wastewater engineering, and construction services to governmental and private sector clients worldwide. I have a B.S. degree in Geology and a M.S. degree in Chemistry from the New Mexico Institute of Mining and Technology, and a Ph.D. from the Colorado School of Mines in Geochemistry. I am a certified professional hydrogeologist (C.HG.), a certified professional geological scientist (CPG) and a licensed professional geologist (PG) in more than ten states. I have been qualified as an expert in chemistry, geochemistry, geology, hydrogeology and toxicology in United States Federal Court and State Courts. My qualifications and curriculum vitae are provided in Appendix A.

2. I have been retained by the law firm of Temkin Wielga & Hardt LLP on behalf of Hecla Limited. My testimonial experience is provided in Appendix B.

3. I have been asked to review the groundwater model (as developed by the U.S. Environmental Protection Agency and its contractor CH_2MHill) and opine on its utility in describing the groundwater-surface water interactions in the South Fork of the Coeur d'Alene River (SFCDR) Watershed and implications for remedy decisionmaking in the Upper Basin Operable Unit #3.

4. In spite of the limited information available to the public and the incomplete information provided in response to Freedom of Information Act requests, I have reviewed the model development and calibration results, the model results for simulating flows between groundwater and surface water, and along with measured dissolved metals concentrations in certain monitoring wells, the model's ability to estimate metals loading to the SFCDR. I have reviewed as well the information provided concerning flow simulations performed under base

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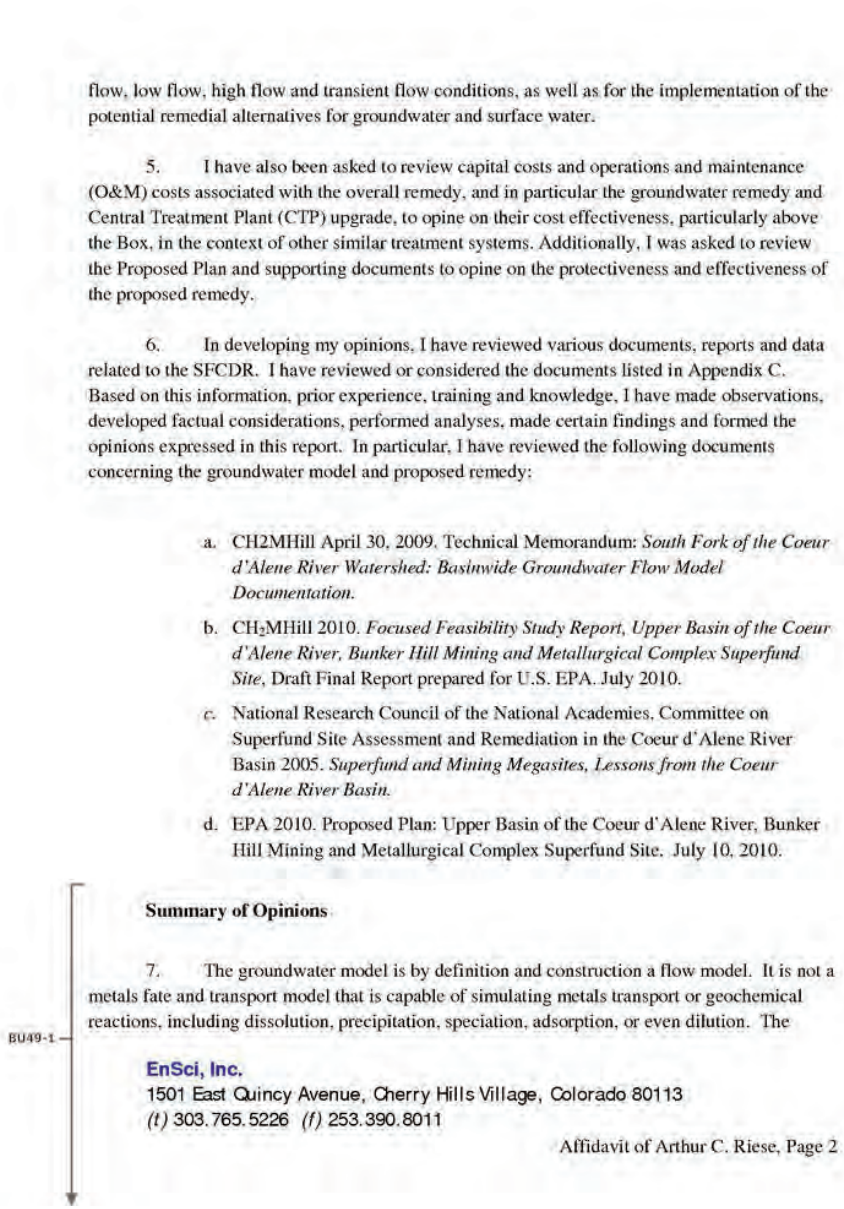
619211



flow, low flow, high flow and transient flow conditions, as well as for the implementation of the potential remedial alternatives for groundwater and surface water.

5. I have also been asked to review capital costs and operations and maintenance (O&M) costs associated with the overall remedy, and in particular the groundwater remedy and Central Treatment Plant (CTP) upgrade, to opine on their cost effectiveness, particularly above the Box, in the context of other similar treatment systems. Additionally, I was asked to review the Proposed Plan and supporting documents to opine on the protectiveness and effectiveness of the proposed remedy.

6. In developing my opinions, I have reviewed various documents, reports and data related to the SFCDR. I have reviewed or considered the documents listed in Appendix C. Based on this information, prior experience, training and knowledge, I have made observations, developed factual considerations, performed analyses, made certain findings and formed the opinions expressed in this report. In particular, I have reviewed the following documents concerning the groundwater model and proposed remedy:

a. CH2MHill April 30, 2009. Technical Memorandum: *South Fork of the Coeur d'Alene River Watershed: Basinwide Groundwater Flow Model Documentation.*

b. CH_2MHill 2010. *Focused Feasibility Study Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site*, Draft Final Report prepared for U.S. EPA. July 2010.

c. National Research Council of the National Academies. Committee on Superfund Site Assessment and Remediation in the Coeur d'Alene River Basin 2005. *Superfund and Mining Megasites, Lessons from the Coeur d'Alene River Basin.*

d. EPA 2010. Proposed Plan: Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site. July 10, 2010.

Summary of Opinions

7. The groundwater model is by definition and construction a flow model. It is not a metals fate and transport model that is capable of simulating metals transport or geochemical reactions, including dissolution, precipitation, speciation, adsorption, or even dilution. The

BU49-1

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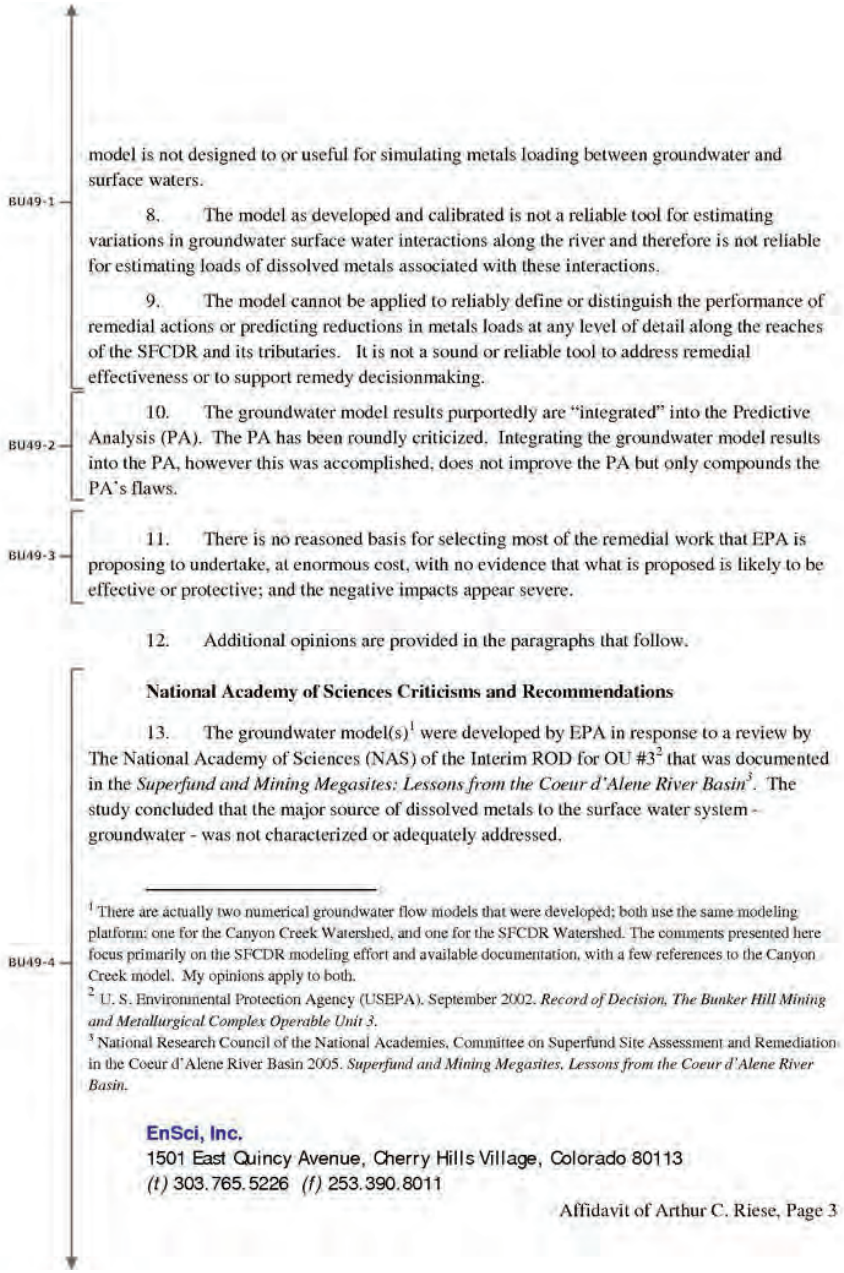
Response to comment BU49-1

The comment questions the type of groundwater model used, the reliability of the model and its applicability for evaluating remedial effectiveness and supporting remedy decision-making. As documented in the detailed responses to specific comments below, EPA disagrees with the commenter. In short, use of a fate and transport model, as suggested, as opposed to using the flow model approach EPA used, is no panacea for all potential problems. It assumes a degree of data availability which simply does not exist at this time over this large a scale, and ignores the uncertainties which would surround and undermine premature use of such a model. The flow model used, linked with groundwater and surface water physical data, was appropriate for its intended use in evaluating remedial alternatives. As more data are collected over time, and cause-and-effect relationships are established with more certainty, further refinements will be made to enhance predictive abilities. EPA will use such information as it adaptively manages the cleanup program.



model is not designed to or useful for simulating metals loading between groundwater and surface waters.

BU49-1

8. The model as developed and calibrated is not a reliable tool for estimating variations in groundwater surface water interactions along the river and therefore is not reliable for estimating loads of dissolved metals associated with these interactions.

9. The model cannot be applied to reliably define or distinguish the performance of remedial actions or predicting reductions in metals loads at any level of detail along the reaches of the SFCDR and its tributaries. It is not a sound or reliable tool to address remedial effectiveness or to support remedy decisionmaking.

BU49-2

10. The groundwater model results purportedly are "integrated" into the Predictive Analysis (PA). The PA has been roundly criticized. Integrating the groundwater model results into the PA, however this was accomplished, does not improve the PA but only compounds the PA's flaws.

BU49-3

11. There is no reasoned basis for selecting most of the remedial work that EPA is proposing to undertake, at enormous cost, with no evidence that what is proposed is likely to be effective or protective; and the negative impacts appear severe.

12. Additional opinions are provided in the paragraphs that follow.

National Academy of Sciences Criticisms and Recommendations

13. The groundwater model(s)[1] were developed by EPA in response to a review by The National Academy of Sciences (NAS) of the Interim ROD for OU #3[2] that was documented in the *Superfund and Mining Megasites: Lessons from the Coeur d'Alene River Basin*[3]. The study concluded that the major source of dissolved metals to the surface water system - groundwater - was not characterized or adequately addressed.

BU49-4

[1] There are actually two numerical groundwater flow models that were developed; both use the same modeling platform: one for the Canyon Creek Watershed, and one for the SFCDR Watershed. The comments presented here focus primarily on the SFCDR modeling effort and available documentation, with a few references to the Canyon Creek model. My opinions apply to both.
[2] U. S. Environmental Protection Agency (USEPA). September 2002. *Record of Decision, The Bunker Hill Mining and Metallurgical Complex Operable Unit 3.*
[3] National Research Council of the National Academies, Committee on Superfund Site Assessment and Remediation in the Coeur d'Alene River Basin 2005. *Superfund and Mining Megasites. Lessons from the Coeur d'Alene River Basin.*

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Response to comment BU49-2

The comment suggests the Predictive Analysis (PA) is flawed. As discussed in detail in responses to Dr. Crouch in Document BU48, EPA disagrees. The PA was carefully developed and rigorously reviewed, and EPA continues to support its use in evaluating the effectiveness of the remedial alternatives.

Response to comment BU49-3

The comment questions EPA's basis for selecting remedial actions for the Upper Basin. As described in detail in the Proposed Plan and the ROD Amendment, EPA used an National Oil and Hazardous Substances Pollution Contingency Plan (NCP)-compliant process in selecting remedies for the Upper Basin. Cost is one of the nine criteria EPA considers when selecting a remedy. However, just because the cost of remedy for a large, complex cleanup is high does not preclude the remedy's selection. Furthermore, in response to public comments, EPA has reduced the scope of its remedy and its resulting cost. The Selected Remedy was determined by EPA to be effective, and protective within its scope as an interim remedy.

Response to comment BU49-4

The comment selectively discusses the NAS's 2005 critique of EPA actions. As discussed in the ROD Amendment, EPA has gone to great lengths to address the concerns of the NAS. Regarding the commenter's reference to specific NAS concerns about adequate characterization of source contributions to groundwater and its implications to effects of groundwater on surface water, EPA took additional actions as described in Section 3.0 of the Draft Final Focused Feasibility Study (FFS) Report (EPA, 2010, *Draft Final Focused Feasibility Study Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site*). EPA believes these actions were appropriate and effective in addressing NAS concerns.

14. Specific recommendations from the NAS report addressing this issue are as follows:

a. Incorporate new data from the U.S. Geological Survey (USGS), the Coeur d'Alene Tribe and others since issuance of the ROD; proceed, as planned, with more thorough source identification before cleanup to verify the location, magnitude, disposition, and contribution from contaminant sources (NAS Page 6).

b. Site characterization did not adequately address groundwater – the primary source of dissolved metals in surface water – or identify specific locations and materials contributing metals to groundwater (Page 2); characterization needs to be conducted to locate the specific sources contributing zinc to groundwater (which subsequently discharges to surface water) and set priorities for their remediation (Page 375 and Page 402).

c. Develop a better understanding of dissolved metals, particularly zinc, to account for movement to and from groundwater and surface water; this evaluation should be sufficiently rigorous to identify source areas of contaminants and permit evaluation of the consequences of alternative remedies to the transport of dissolved metals through the system (Page 6 and Page 153).

BU49-4

d. Speciation information should be collected and examined to elucidate the potential for metal transport and the effect of transformation processes on the fluxes and bioavailability of metals (Page 6).

15. The conclusions and recommendations of the NAS Report pointed to a failure on the part of EPA to appropriately characterize and evaluate the groundwater related processes contributing to site contamination. This failure led to a lack of confidence in the analyses EPA used to support its decisions at the time. Unfortunately, since the NAS Report in 2005, there has been only limited additional characterization of source contributions to groundwater, and no real advancement in the understanding for most of the Upper Basin of groundwater impacts to surface water.

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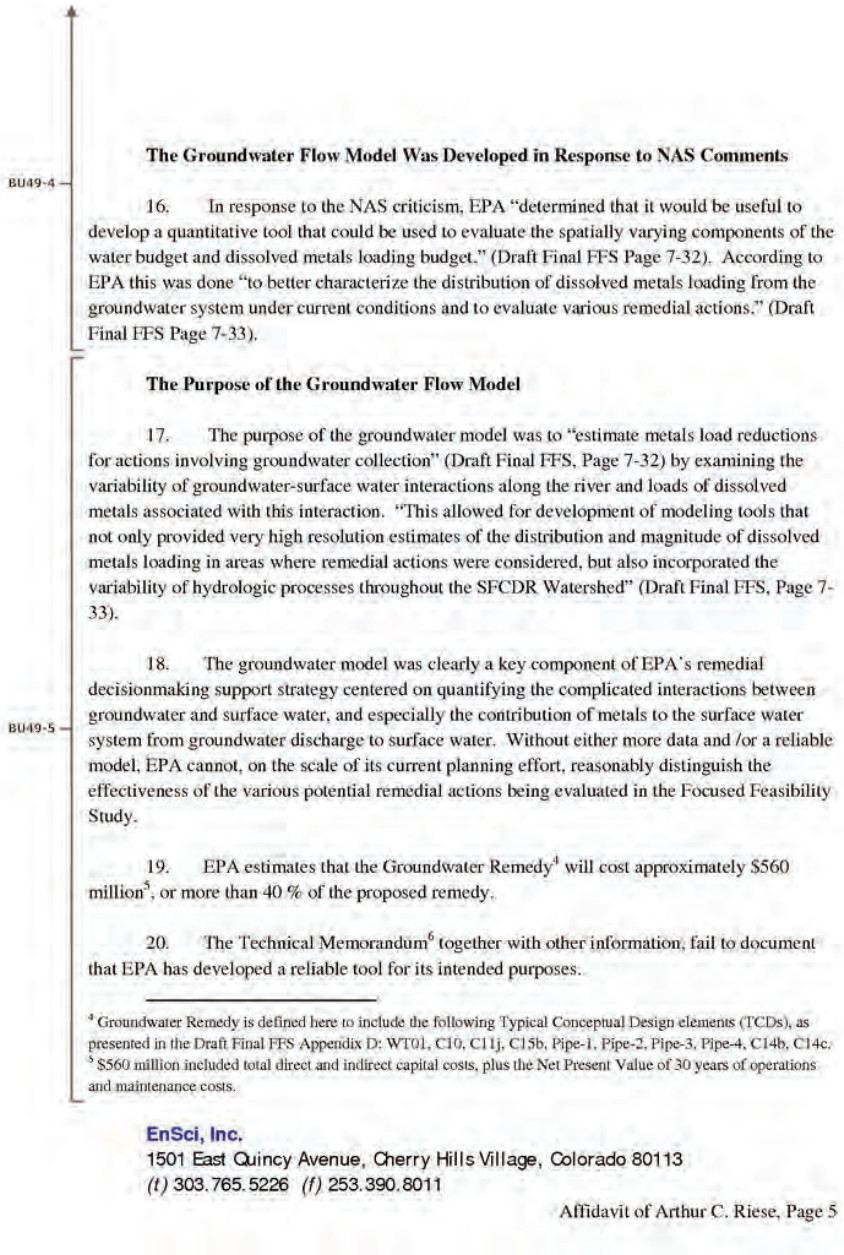
No comments



The Groundwater Flow Model Was Developed in Response to NAS Comments

BU49-4

16. In response to the NAS criticism, EPA "determined that it would be useful to develop a quantitative tool that could be used to evaluate the spatially varying components of the water budget and dissolved metals loading budget." (Draft Final FFS Page 7-32). According to EPA this was done "to better characterize the distribution of dissolved metals loading from the groundwater system under current conditions and to evaluate various remedial actions." (Draft Final FFS Page 7-33).

The Purpose of the Groundwater Flow Model

17. The purpose of the groundwater model was to "estimate metals load reductions for actions involving groundwater collection" (Draft Final FFS, Page 7-32) by examining the variability of groundwater-surface water interactions along the river and loads of dissolved metals associated with this interaction. "This allowed for development of modeling tools that not only provided very high resolution estimates of the distribution and magnitude of dissolved metals loading in areas where remedial actions were considered, but also incorporated the variability of hydrologic processes throughout the SFCDR Watershed" (Draft Final FFS, Page 7-33).

BU49-5

18. The groundwater model was clearly a key component of EPA's remedial decisionmaking support strategy centered on quantifying the complicated interactions between groundwater and surface water, and especially the contribution of metals to the surface water system from groundwater discharge to surface water. Without either more data and /or a reliable model, EPA cannot, on the scale of its current planning effort, reasonably distinguish the effectiveness of the various potential remedial actions being evaluated in the Focused Feasibility Study.

19. EPA estimates that the Groundwater Remedy[4] will cost approximately $560 million[5], or more than 40 % of the proposed remedy.

20. The Technical Memorandum[6] together with other information, fail to document that EPA has developed a reliable tool for its intended purposes.

[4] Groundwater Remedy is defined here to include the following Typical Conceptual Design elements (TCDs), as presented in the Draft Final FFS Appendix D: WT01, C10, C11j, C15b, Pipe-1, Pipe-2, Pipe-3, Pipe-4, C14b, C14c.
[5] $560 million included total direct and indirect capital costs, plus the Net Present Value of 30 years of operations and maintenance costs.

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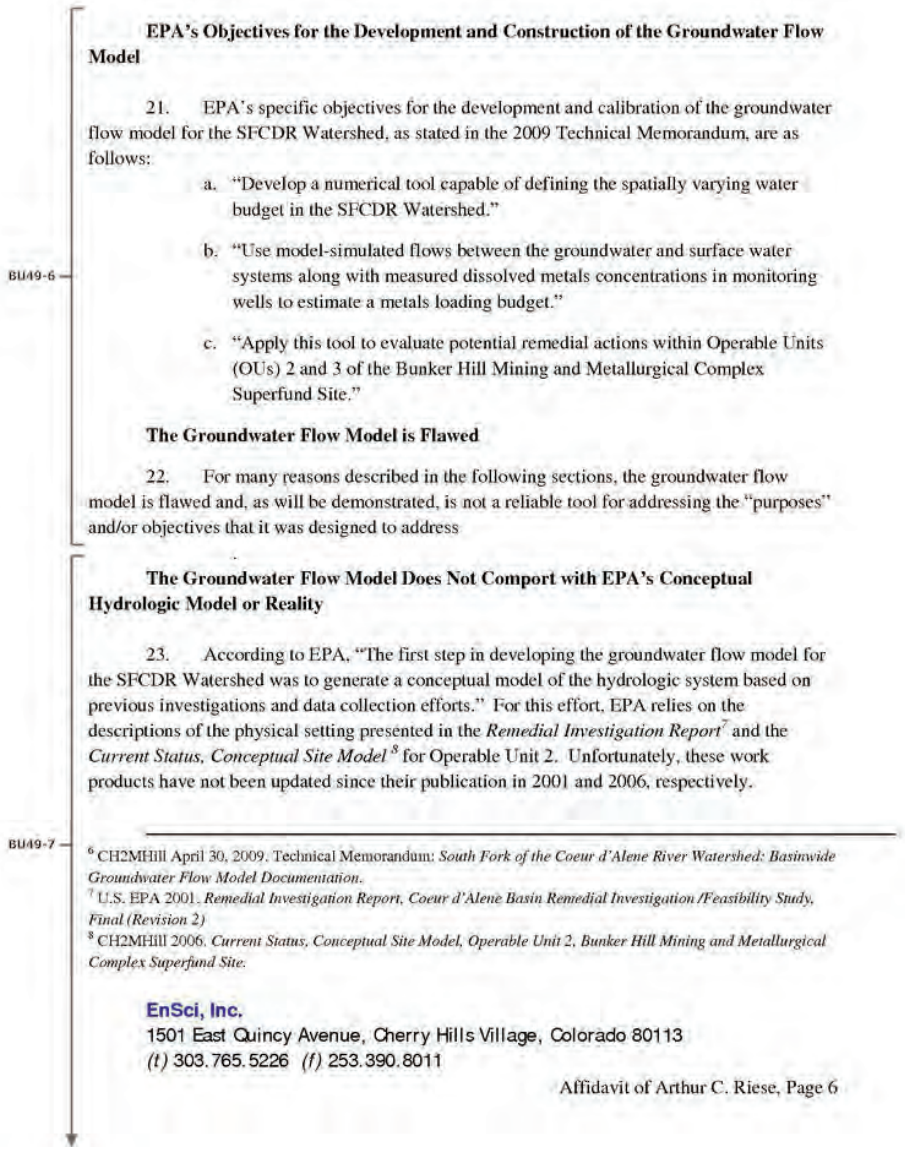
Affidavit of Arthur C. Riese, Page 5

Response to comment BU49-5

The comment includes summaries of EPA's purpose and estimated cost of the groundwater model as described in the Draft Final FFS Report and questions EPA for failing to document that EPA has developed a reliable tool for its intended purposes. The *Technical Memorandum: SFCDR Watershed; Basinwide Groundwater Flow Model Documentation* (CH2M HILL, 2009) provides thorough documentation of the construction, calibration, and application of the SFCDR Basin-wide model.



EPA's Objectives for the Development and Construction of the Groundwater Flow Model

21. EPA's specific objectives for the development and calibration of the groundwater flow model for the SFCDR Watershed, as stated in the 2009 Technical Memorandum, are as follows:

a. "Develop a numerical tool capable of defining the spatially varying water budget in the SFCDR Watershed."

b. "Use model-simulated flows between the groundwater and surface water systems along with measured dissolved metals concentrations in monitoring wells to estimate a metals loading budget."

c. "Apply this tool to evaluate potential remedial actions within Operable Units (OUs) 2 and 3 of the Bunker Hill Mining and Metallurgical Complex Superfund Site."

BU49-6

The Groundwater Flow Model is Flawed

22. For many reasons described in the following sections, the groundwater flow model is flawed and, as will be demonstrated, is not a reliable tool for addressing the "purposes" and/or objectives that it was designed to address

The Groundwater Flow Model Does Not Comport with EPA's Conceptual Hydrologic Model or Reality

23. According to EPA, "The first step in developing the groundwater flow model for the SFCDR Watershed was to generate a conceptual model of the hydrologic system based on previous investigations and data collection efforts." For this effort, EPA relies on the descriptions of the physical setting presented in the *Remedial Investigation Report*[7] and the *Current Status, Conceptual Site Model*[8] for Operable Unit 2. Unfortunately, these work products have not been updated since their publication in 2001 and 2006, respectively.

BU49-7

[6] CH2MHill April 30, 2009. Technical Memorandum: *South Fork of the Coeur d'Alene River Watershed: Basinwide Groundwater Flow Model Documentation.*
[7] U.S. EPA 2001. *Remedial Investigation Report, Coeur d'Alene Basin Remedial Investigation /Feasibility Study, Final (Revision 2)*
[8] CH2MHill 2006. *Current Status, Conceptual Site Model, Operable Unit 2, Bunker Hill Mining and Metallurgical Complex Superfund Site.*

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Affidavit of Arthur C. Riese, Page 6

Response to comment BU49-6

The comments summarize the objective of the groundwater model as stated in the *Technical Memorandum: SFCDR Watershed; Basinwide Groundwater Flow Model Documentation* (CH2M HILL, 2009) and states that the groundwater model is flawed. EPA disagrees as described below.

Response to comment BU49-7

This comment questions EPA for relying on the 2001 and 2006 documentation of the conceptual model for the Upper Basin. The degree of characterization of the SFCDR Watershed is consistent with that of many other watersheds across the country where similar evaluations have been successfully performed. The state of calibration of the SFCDR Basin-wide model satisfies commonly accepted industry guidelines for calibration criteria and provides a technically defensible tool for the purposes of alternatives evaluation to support the FFS Report and selection of a remedy.

EPA has conducted several studies, as described in detail in Section 2.0 of the FFS Report (EPA, August 2012*, Final Focused Feasibility Study Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site*), to better characterize the aquifer system and the nature of dissolved metals loading from groundwater to the surface water system including:

- *2008 High-Flow and Low-Flow Surface Water Study Report* (CH2M HILL, 2009) documents a rigorous sampling program that was implemented to quantify the dissolved metals loading of individual (or small groups of) source areas to the surface water system under both high and low flow conditions.
- *Groundwater Monitoring Report* (CH2M HILL, 2009) presents procedures, field activities, and results from groundwater data from both May and October 2008 sampling in order to support the conceptual site model and groundwater flow model.
- *The Canyon Creek Hydrologic Study* (CH2M HILL, 2007) documents investigations to better characterize the physical characteristics of the aquifer system, the distribution of dissolved zinc in groundwater, and the

nature of groundwater/surface water interaction within the Canyon Creek Drainage.

- *Conceptual Site Model, Osburn Flats in Operable Unit 3* (CH2M HILL, 2009) presents data collected to characterize the aquifer and surface water system in Osburn Flats, including, well/piezometer installation, staff gage installation, groundwater quality sampling, aquifer testing, groundwater surface water interaction studies, and evaluation of diel fluctuations in dissolved metals concentrations.
- A network of data-logging pressure transducers have been installed in groundwater monitoring wells, piezometers, and staff gages within OU 2 and OU 3 to gain insight into the transient behavior of the groundwater and surface water system.

BU49-7

24. To the extent that the groundwater model relies on the *Remedial Investigation Report* and *Conceptual Site Model* for its development, the NAS comments still largely apply in that groundwater characterization and source delineation are still deficient.

25. After many varied adjustments to achieve calibration[9] against groundwater levels and river flows, certain model parameters (representing aquifer properties) appear to be considerably different than those selected for initial model construction, the conceptual model and natural conditions. Even with these many calibration efforts, the model cannot accurately represent surface water/ groundwater impacts of different remedial options, and measured natural conditions are in some cases orders of magnitude different than the numerical simulations.

Groundwater Flow Model Does Not Calibrate Well Against Measured Field Parameters

26. According to EPA, "The next step in the development of the numerical groundwater model was to calibrate the model to a series of observed conditions within the SFCDR Watershed." (Page 15 of the model documentation). It appears the model was not calibrated to a series of observed conditions; but instead to a single set of observed conditions, that being one synoptic water level sampling event in the Fall of 2008 (the only other being ten years earlier, 1998), and adjustments made to various aquifer properties in order to calibrate against various observed data including base flow and water levels.

BU49-8

27. Continuing, (on Page 15) "This process ensured that the numerical model could accurately replicate the hydrologic processes observed in the Watershed, and that it was a reliable tool to forecast future hydraulic conditions in response to changes in the natural system that may occur with the implementation of remedial actions."

28. Unfortunately, even after calibration, the model does not come close to accurately replicating average annual high flow and low flow events in the river, or high flow events associated with potentially less frequent regimes, including the 50 and 100 year flows. This should be an obvious need given the proposed length of the remedy implementation (50 to 90 years), time to achieve performance (up to 400 years post construction) and the identified need to protect installed infrastructure from erosion and washout.

[9] Model calibration is the process of adjustment of certain model parameters, within the margins of the uncertainties (in model parameters) to obtain a model representation of the system of interest that satisfies pre-agreed criteria (Goodness-of-Fit), or otherwise measured parameters. It is sometime referred to as "history matching."

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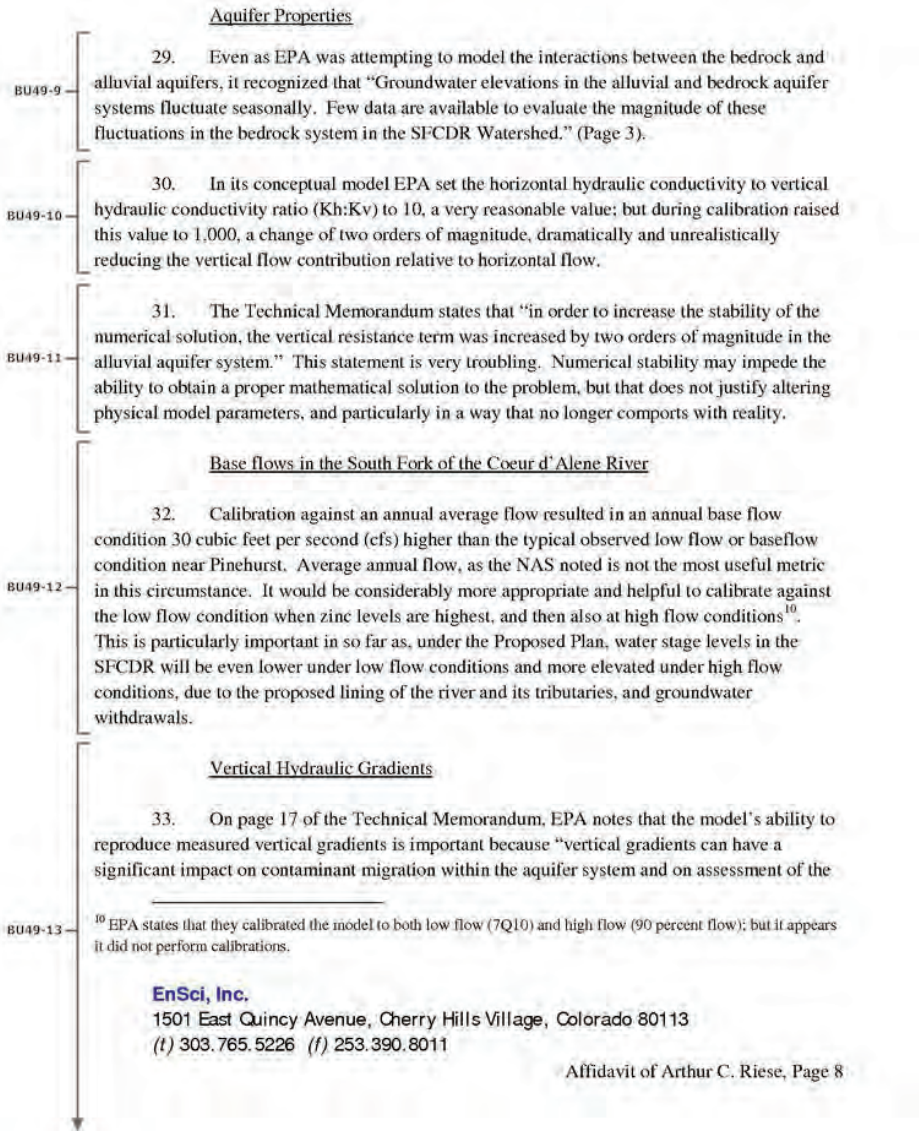
Response to comment BU49-8

This comment questions the level of calibration of the groundwater flow model. As described on pages 15 through 22 of the *Technical Memorandum: SFCDR Watershed; Basinwide Groundwater Flow Model Documentation* (CH2M HILL, 2009) and on pages A-5 through A-10 of the Final FFS Report (EPA, August 2012, *Final Focused Feasibility Study Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site*), the groundwater flow model(s) were calibrated to five distinct hydrologic conditions including: steady-state calibration to the 2008 baseflow period, transient calibration to the spring 2008 runoff period, steady-state calibration to a 7Q10 hydrologic condition, steady-state calibration to a 90th percentile flow tier hydrologic condition, and transient calibration to an annual cycle which included the spring 2009 runoff period. Further, the numerical model is a groundwater flow model and does not simulate surface water flow, only groundwater discharge to/recharge from surface water. As such, EPA agrees that the model was not calibrated to "annual high flow and low flow events in the river."



Aquifer Properties

BU49-9

29. Even as EPA was attempting to model the interactions between the bedrock and alluvial aquifers, it recognized that "Groundwater elevations in the alluvial and bedrock aquifer systems fluctuate seasonally. Few data are available to evaluate the magnitude of these fluctuations in the bedrock system in the SFCDR Watershed." (Page 3).

BU49-10

30. In its conceptual model EPA set the horizontal hydraulic conductivity to vertical hydraulic conductivity ratio (Kh:Kv) to 10, a very reasonable value; but during calibration raised this value to 1,000, a change of two orders of magnitude, dramatically and unrealistically reducing the vertical flow contribution relative to horizontal flow.

BU49-11

31. The Technical Memorandum states that "in order to increase the stability of the numerical solution, the vertical resistance term was increased by two orders of magnitude in the alluvial aquifer system." This statement is very troubling. Numerical stability may impede the ability to obtain a proper mathematical solution to the problem, but that does not justify altering physical model parameters, and particularly in a way that no longer comports with reality.

Base flows in the South Fork of the Coeur d'Alene River

BU49-12

32. Calibration against an annual average flow resulted in an annual base flow condition 30 cubic feet per second (cfs) higher than the typical observed low flow or baseflow condition near Pinehurst. Average annual flow, as the NAS noted is not the most useful metric in this circumstance. It would be considerably more appropriate and helpful to calibrate against the low flow condition when zinc levels are highest, and then also at high flow conditions[10]. This is particularly important in so far as, under the Proposed Plan, water stage levels in the SFCDR will be even lower under low flow conditions and more elevated under high flow conditions, due to the proposed lining of the river and its tributaries, and groundwater withdrawals.

Vertical Hydraulic Gradients

33. On page 17 of the Technical Memorandum, EPA notes that the model's ability to reproduce measured vertical gradients is important because "vertical gradients can have a significant impact on contaminant migration within the aquifer system and on assessment of the

BU49-13

[10] EPA states that they calibrated the model to both low flow (7Q10) and high flow (90 percent flow); but it appears it did not perform calibrations.

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Affidavit of Arthur C. Riese, Page 8

Response to comment BU49-9

This comment questions EPA for simulating the interaction between the bedrock and alluvial aquifers despite the scarcity of data available to use in the calibration process. While the contribution of the bedrock system to the water budget is important on a basin-wide scale, it is not as important when evaluating groundwater/surface water interaction. The alluvial aquifer system along the SFCDR is the primary pathway for metals transport and discharge to surface water, and bedrock is a secondary or tertiary source of water

Response to comment BU49-10

This comment questions how the horizontal-to-vertical hydraulic conductivity ratio values were modified during the calibration process. The majority of lithologic logs available for the SFCDR Basin show that the alluvial aquifer system comprises predominantly silty sands and gravels. While the horizontal hydraulic conductivity estimated from single well aquifer tests is driven by the coarse fraction (sands and gravels), the vertical permeability of the system would be limited by the finer fraction (silts and clays). As shown on Figure 18 of the *Technical Memorandum: SFCDR Watershed; Basinwide Groundwater Flow Model Documentation* (CH2M HILL, 2009), horizontal hydraulic conductivity of the upper aquifer estimated from single well aquifer tests ranges from approximately 200 to 1,400 feet/day. The hydraulic conductivity of silts and clays can range from 0.028 to 2.83 feet/day (10^{-3} to 10^{-5} centimeters per second [cm/s]) or lower. This would imply a wide range of Kh:Kv ratios that could exceed 1,000:1, and therefore the values EPA used resulting from the calibration process are reasonable.

Response to comment BU49-11

This comment questions considering the "numerical stability" of the simulation in the groundwater flow model construction and calibration process. It is reasonable to consider model run times and stability as part of the model calibration process. Although the *Technical Memorandum: SFCDR Watershed; Basinwide Groundwater Flow Model Documentation* (CH2M HILL, 2009) states that the change to the Kh:Kv ratio was changed during calibration to increase

numerical stability, the vertical resistance value is not inconsistent with the local geology. Also see response to Comment No. BU45-10 above.

Response to comment BU49-12

This comment suggests that calibration of the groundwater model resulted in higher baseflow than observed baseflow conditions. As stated on Page 16 of the *Technical Memorandum: SFCDR Watershed; Basinwide Groundwater Flow Model Documentation* (CH2M HILL, 2009):

> The final calibrated model simulated a groundwater discharge to the SFCDR of approximately 130 cfs. This simulated discharge rate is slightly higher than the minimum baseflow value measured in late summer/fall of approximately 100 cfs. This is because the model-simulated value represents an annual average baseflow rate, and baseflow tends to increase during the higher flow winter periods. Therefore, a simulated baseflow value slightly higher than the minimum value observed during late fall is appropriate.

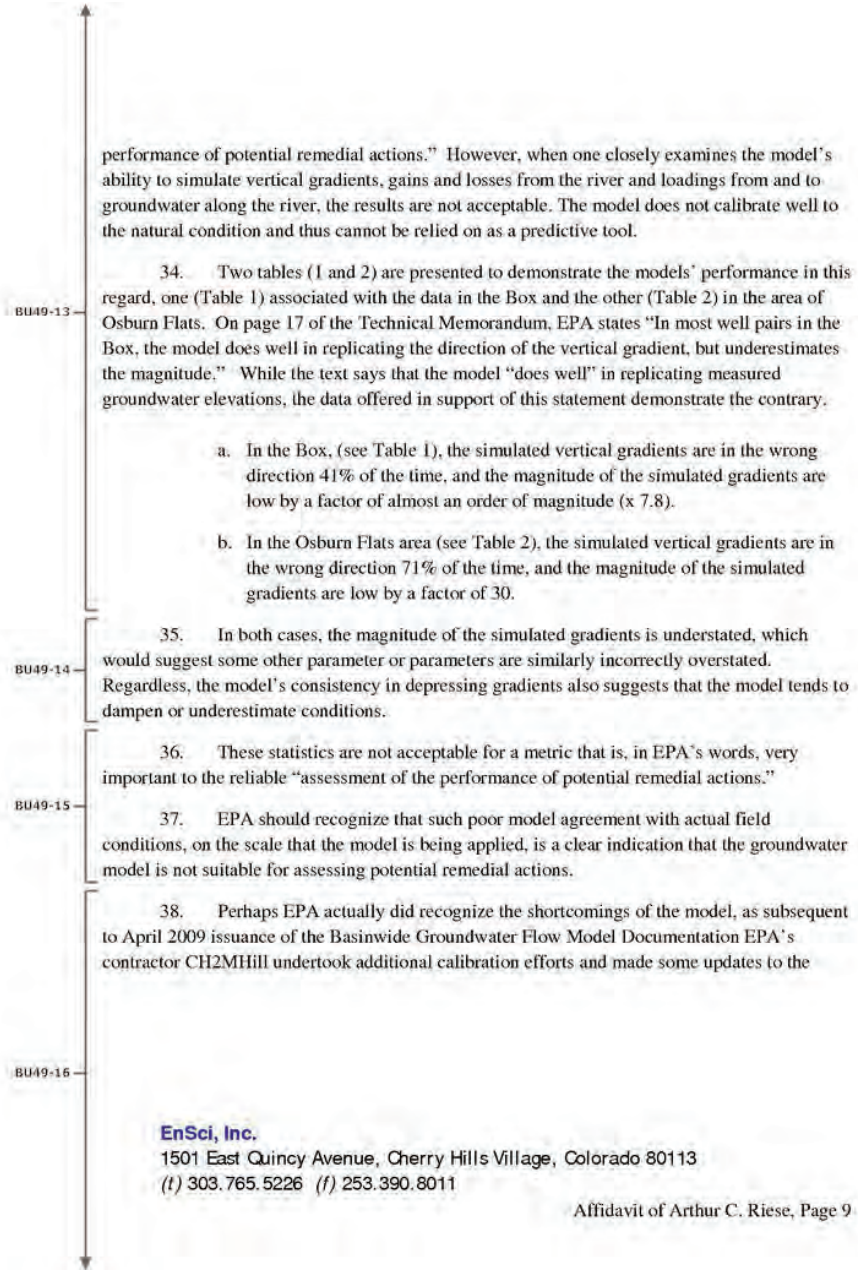
There appears to be some confusion over the terms "annual average flow" used by the commenter and "annual average baseflow rate" used in the model documentation. Because the model is a steady-state depiction of the annual climatic cycle, it is necessary to capture the variability in total deep percolation over the course of the water year. This results in the need to consider the variability in groundwater discharge to the stream system, or baseflow, throughout the year. Since the rate of groundwater discharge increases during the winter and spring months, the appropriate annual average baseflow rate is somewhat higher than that observed during the minimum flow period in late fall. Additionally, as described in the response to Comment No. BU49-8 above, the model was calibrated to a variety of hydrologic conditions, including the 7Q10 (extreme low flow) and the 90th percentile flow tiers.

Response to comment BU49-13

In response to the comment regarding simulated vertical gradients in the Bunker Hill Box, of the 17 well pairs listed in Table 1 of the *Technical Memorandum: SFCDR Watershed; Basinwide Groundwater Flow Model Documentation* (CH2M HILL, 2009), the vertical hydraulic gradient from the simulated heads is in the wrong direction for 6 well pairs (35 percent). Additionally, 10 of the well pairs listed in Table 1 are located along the SFCDR, the most critical locations spatially for accurate simulation of groundwater/surface water interaction; the remaining 7 are located distal from the SFCDR within the valley or along tributary streams. Of the 10 well pairs along the SFCDR, the simulated vertical hydraulic gradient is in the incorrect direction for 1 well pair (10 percent). As shown in the final calibration results presented in Table A-3 of the Draft Final FFS, 10% simulated vertical hydraulic gradients in the 10 well pairs along the SFCDR are in the wrong direction.

With regards to the simulated versus observed magnitudes of the vertical hydraulic gradients, it is acknowledged that some of the simulated values are significantly lower than measured. However, it should be noted that the primary pathway for metals migration from the groundwater aquifer to the SFCDR occurs within the upper aquifer, while the majority of the vertical gradients measure head differences between the upper and lower aquifers, across the low-permeability confining unit. Therefore, overall the model provides reasonable calibration to natural conditions, particularly in the critical areas of groundwater discharge along the SFCDR, where metals enter the surface water system. Limitations of the model are discussed in the *South Fork of the Coeur d'Alene River Watershed: Basinwide Groundwater Flow Model Documentation* (CH2M HILL, 2009).

In response to the comment regarding simulated vertical gradients in the Osburn Flats area, it is acknowledged that the level of calibration in the Osburn Flats area was not as rigorous as in the Box due to limited data available. However, the degree of calibration satisfies commonly accepted industry guidelines for calibration criteria and provides a technically defensible tool for the purposes of alternatives evaluation to support the FFS Report and selection of a remedy.



performance of potential remedial actions." However, when one closely examines the model's ability to simulate vertical gradients, gains and losses from the river and loadings from and to groundwater along the river, the results are not acceptable. The model does not calibrate well to the natural condition and thus cannot be relied on as a predictive tool.

BU49-13

34. Two tables (1 and 2) are presented to demonstrate the models' performance in this regard, one (Table 1) associated with the data in the Box and the other (Table 2) in the area of Osburn Flats. On page 17 of the Technical Memorandum, EPA states "In most well pairs in the Box, the model does well in replicating the direction of the vertical gradient, but underestimates the magnitude." While the text says that the model "does well" in replicating measured groundwater elevations, the data offered in support of this statement demonstrate the contrary.

a. In the Box, (see Table 1), the simulated vertical gradients are in the wrong direction 41% of the time, and the magnitude of the simulated gradients are low by a factor of almost an order of magnitude (x 7.8).

b. In the Osburn Flats area (see Table 2), the simulated vertical gradients are in the wrong direction 71% of the time, and the magnitude of the simulated gradients are low by a factor of 30.

BU49-14

35. In both cases, the magnitude of the simulated gradients is understated, which would suggest some other parameter or parameters are similarly incorrectly overstated. Regardless, the model's consistency in depressing gradients also suggests that the model tends to dampen or underestimate conditions.

BU49-15

36. These statistics are not acceptable for a metric that is, in EPA's words, very important to the reliable "assessment of the performance of potential remedial actions."

37. EPA should recognize that such poor model agreement with actual field conditions, on the scale that the model is being applied, is a clear indication that the groundwater model is not suitable for assessing potential remedial actions.

BU49-16

38. Perhaps EPA actually did recognize the shortcomings of the model, as subsequent to April 2009 issuance of the Basinwide Groundwater Flow Model Documentation EPA's contractor CH2MHill undertook additional calibration efforts and made some updates to the

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Affidavit of Arthur C. Riese, Page 9

Response to comment BU49-14

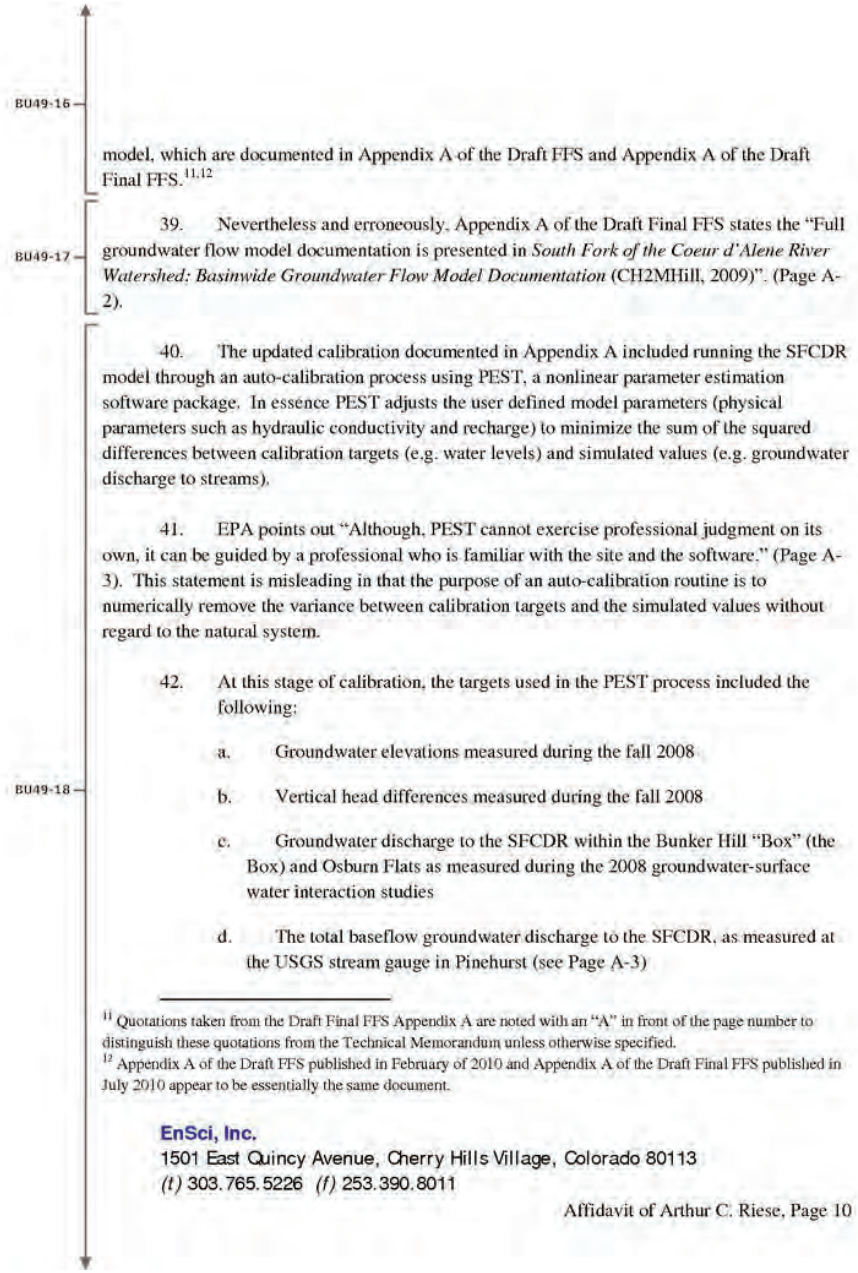
The commenter is focusing on the magnitude of the difference between simulated and measured vertical hydraulic gradients without respect to the absolute residuals between simulated and measured heads. Within the Box, the average residual between simulated and measured heads in wells screened within the Lower Aquifer is 3.3 feet, while that of wells screened within the Upper Aquifer is 1.5 feet. When one considers all of the shallow wells within the Box (including those in Government Gulch and the Smelter Closure Area), the average residual in heads is 0.7 feet. Additionally, the simulated hydraulic gradients and flow directions within the Upper Aquifer match measured data reasonably well suggesting that the SFCDR model does not "dampen" conditions.

Response to comment BU49-15

As noted in the response to Comment No. BU49-13 above, the simulated direction of the vertical gradients along the SFCDR, the area relevant to metals transport from the groundwater system to the surface water system, matches field data in 100 percent of the cases. That is certainly an acceptable level of accuracy for a basin-wide model of this type.

Response to comment BU49-16

This comment questions whether EPA recognized the shortcomings of the groundwater model. Models developed for sites of this complexity often undergo periodic recalibration as additional data become available and additional project needs are identified. This does not reflect one way or another on the quality of the previous calibration. The groundwater model as presented in the FFS Report (EPA, August 2012, *Final Focused Feasibility Study Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site*) provides a technically defensible tool for the purposes of alternatives evaluation to support the FFS Report and selection of a remedy.



BU49-16

model, which are documented in Appendix A of the Draft FFS and Appendix A of the Draft Final FFS.[11,12]

BU49-17

39. Nevertheless and erroneously, Appendix A of the Draft Final FFS states the "Full groundwater flow model documentation is presented in *South Fork of the Coeur d'Alene River Watershed: Basinwide Groundwater Flow Model Documentation* (CH2MHill, 2009)". (Page A-2).

40. The updated calibration documented in Appendix A included running the SFCDR model through an auto-calibration process using PEST, a nonlinear parameter estimation software package. In essence PEST adjusts the user defined model parameters (physical parameters such as hydraulic conductivity and recharge) to minimize the sum of the squared differences between calibration targets (e.g. water levels) and simulated values (e.g. groundwater discharge to streams).

41. EPA points out "Although, PEST cannot exercise professional judgment on its own, it can be guided by a professional who is familiar with the site and the software." (Page A-3). This statement is misleading in that the purpose of an auto-calibration routine is to numerically remove the variance between calibration targets and the simulated values without regard to the natural system.

42. At this stage of calibration, the targets used in the PEST process included the following:

BU49-18

a. Groundwater elevations measured during the fall 2008

b. Vertical head differences measured during the fall 2008

c. Groundwater discharge to the SFCDR within the Bunker Hill "Box" (the Box) and Osburn Flats as measured during the 2008 groundwater-surface water interaction studies

d. The total baseflow groundwater discharge to the SFCDR, as measured at the USGS stream gauge in Pinehurst (see Page A-3)

[11] Quotations taken from the Draft Final FFS Appendix A are noted with an "A" in front of the page number to distinguish these quotations from the Technical Memorandum unless otherwise specified.
[12] Appendix A of the Draft FFS published in February of 2010 and Appendix A of the Draft Final FFS published in July 2010 appear to be essentially the same document.

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Affidavit of Arthur C. Riese, Page 10

Response to comment BU49-17

The commenter states that the Draft Final FFS does not fully document the groundwater model. The *Technical Memorandum: SFCDR Watershed; Basinwide Groundwater Flow Model Documentation* (CH2M HILL, 2009) provides a complete description of the construction, calibration, and application of the SFCDR model that had been undertaken at that point in time. Any subsequent updates to the model were documented in Appendix A of the Draft Final FFS Report.

Response to comment BU49-18

This comment argues that EPA did not appropriately use the auto-calibration software in the calibration process for the groundwater flow model and further suggests that auto-calibration should be executed without professional judgment in order to "numerically remove the variance between calibration targets and the simulated values without regard to the natural system." EPA disagrees with this comment. Professional judgment is routinely incorporated into auto-calibration exercises in a number of ways, and was definitely incorporated into the calibration process for the SFCDR Basin-wide model.

One method of incorporating professional judgment into the Bunker Hill model calibration process was to assign the best estimate of aquifer properties into the model prior to deploying PEST, and then instructing PEST to adjust multipliers to those values as little as necessary to calibrate the model. PEST was instructed to use Tikhonov regularization to keep those multipliers at a value of 1.0 (i.e., no change from the pre-calibration estimate) as the preferred condition. In general, PEST will deviate from the 1.0 multiplier more and more (for sensitive parameters; insensitive parameters will remain near 1.0) as the residuals between measured and simulated targets are reduced. In short, PEST is mathematically instructed to deviate from professional judgment only as much is necessary to make improvements to the fit between measured and simulated values.

This use of Tikhonov regularization is strongly tied to a second method of incorporating professional judgment into auto-calibration exercises, which is to choose which optimization iteration will be used as the "final" model. In general,

PEST will make large improvements to the total sum of squared residuals in the first few optimization iterations with relatively small multipliers. On later optimization iterations, diminishing returns are observed, where large changes in parameter values are required to achieve minor improvements in the total sum of squared residuals. It is common to use the results of an earlier optimization iteration with less deviation from preferred values, but which has received much of the residual-reduction benefits of the auto-calibration exercise. It is unwise to use the results of a later iteration, in which parameter values have moved so far from the original estimates that professional judgment requires the rejection of the "over-calibrated" model.

A third method of incorporating professional judgment into auto-calibration exercises is the selection of calibration weights for the various targets. While the selection of weights for water-levels alone may be fairly straightforward, when additional calibration targets are employed, professional judgment necessarily is involved. For the SFCDR Basin-wide model, in addition to the water-level targets, head-difference targets and estimated groundwater/surface-water interactions were also employed. It is rare that targets of different types can be related to each other in a mathematically plausible way. For example, there is no method by which one could calculate that an estimate of discharge to a section of the SFCDR can be converted to 12.7 water-level measurements, and therefore should be given a bit less than one-twelfth the calibration weight of a water level.

Although the commenter questions EPA's auto-calibration process, as described above professional judgment has been used appropriately during the SFCDR Basin-wide model auto-calibration exercise.

BU49-18

e. Total dissolved zinc load from groundwater to the SFCDR within the eastern gaining stream reach along the northern side of the Central Impoundment Area

f. The total dissolved zinc load from groundwater to Government Creek within the "gulch" portion.

BU49-19

43. These targets indicate that the auto-calibration process focused on a single water level sampling event in fall 2008, groundwater discharges within a limited area (the Box), and SFCDR stream stage at Pinehurst, the most downstream point considered in the model, where flow is the greater than anywhere else in the system. This approach does not test the calibration of the model against any upstream locations in the many reaches that are being evaluated in the modeling analysis. Also, the last two targets pertaining to zinc loading (e & f, above) cannot be addressed in a PEST process as the model is not a fate and transport model, it is simply a flow model.

BU49-20

44. EPA's Table A-4 of the Draft Final FFS, "Simulated versus Observed Vertical Head Gradients in Well Pairs – Osburn Flats", includes the previous calibration and updated model calibration against observed vertical gradients. For the seven wells tabulated in the table, the new calibration resulted in improvements in two locations, improvements in three locations but the gradients are still reversed, and a worsening of the fit in one, plus an incorrect reversal in one prior gradient.

BU49-21

45. In EPA's Table A-5, "Comparison of Simulated Gains and Losses to Data Measured During the 2008 Groundwater-Surface Water Interaction Studies," both the previous calibration and updated model calibration against SFCDR Discharge Gain/Loss for the Box and Osburn area are given. The table shows that the resulting auto-calibrated (PEST) updated model calibrations were either not improved or rendered less accurate than the previous calibration for 63 percent of the SFCDR stream reaches simulated.

46. It appears that while EPA made what it calls "slight changes" to the input parameters in the model as a result of the final parameter estimation calibration, the overall result was an even poorer fit of simulated values against measured values.

Gaining and Losing Stream Reaches of the SFCDR Cannot be Simulated

BU49-22

47. Similarly, when one examines the ability of the model to simulate gains and losses in flow along the river, the models results are poor. EPA states "The model does well in

Response to comment BU49-19

This comment further questions the auto-calibration process used for the groundwater model. The PEST auto-calibration process was applied to the steady-state baseflow calibration period and target data sets, as noted by the commenter. The auto-calibration target dataset included targets in "upstream locations in the many reaches that are being evaluated in the modeling analysis," as noted by the commenter. The reaches where stream flow was gauged during low flow groundwater-surface water interaction studies in both the Box and Osburn Flats were included.

Although the SFCDR model does not include solute transport capabilities, the auto-calibration process followed the same methodology as the manual calibration process for estimating loading to the SFCDR. At the end of each simulation, the simulated discharge to the SFCDR was multiplied by an associated zinc concentration measured in a shallow monitoring well adjacent to or near the stream. The resulting estimated zinc load was then compared to the PEST calibration target.

Response to comment BU49-20

It is acknowledged that the level of calibration in Osburn Flats area was not as rigorous as in the Box due to limited data available. However, the degree of calibration satisfies commonly accepted industry guidelines for calibration criteria and provides a technically defensible tool for the purposes of alternatives evaluation to support the FFS Report and selection of a remedy.

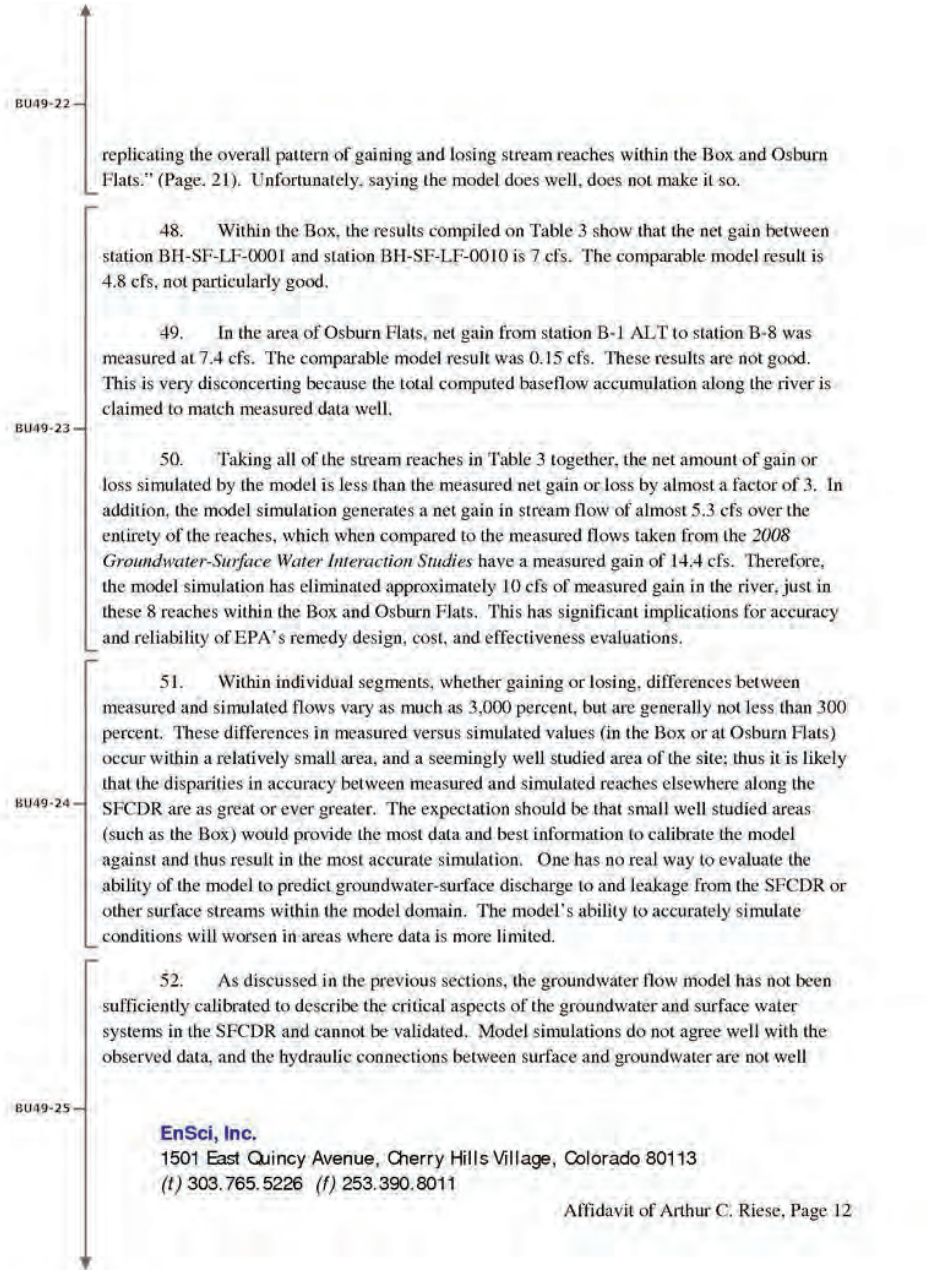
Response to comment BU49-21

The commenter is focusing on a single calibration target (magnitude of groundwater discharge to the SFCDR). As shown on Figures A-6a and A-6b Appendix A of the Draft Final FFS, the residuals between measured and simulated groundwater elevations were improved at 53 percent of locations within the Box through the application of the auto-calibration process. Additionally, the average improvement in simulated heads had a higher magnitude than the average decline in residuals resulting in better calibration statistics, as illustrated by comparing Figures 21 (CH2M HILL, 2009, *Technical*

Memorandum: SFCDR Watershed; Basinwide Groundwater Flow Model Documentation) and A-5 in Appendix A of the Draft Final FFS.

Response to comment BU49-22

The commenter claims that the model does not accurately simulate the pattern of gains and losses in flow along the SFCDR. As shown on Figures 25 and 26 of the *Technical Memorandum: SFCDR Watershed; Basinwide Groundwater Flow Model Documentation* (CH2M HILL, 2009), with the exception of a portion of the Site B-5 ALT to Site B-7 reach in Osburn Flats, the simulated pattern of stream gain/loss on a reach scale in both the Box and Osburn Flats matches the measured data.



BU49-22

replicating the overall pattern of gaining and losing stream reaches within the Box and Osburn Flats." (Page. 21). Unfortunately, saying the model does well, does not make it so.

48. Within the Box, the results compiled on Table 3 show that the net gain between station BH-SF-LF-0001 and station BH-SF-LF-0010 is 7 cfs. The comparable model result is 4.8 cfs, not particularly good.

49. In the area of Osburn Flats, net gain from station B-1 ALT to station B-8 was measured at 7.4 cfs. The comparable model result was 0.15 cfs. These results are not good. This is very disconcerting because the total computed baseflow accumulation along the river is claimed to match measured data well.

BU49-23

50. Taking all of the stream reaches in Table 3 together, the net amount of gain or loss simulated by the model is less than the measured net gain or loss by almost a factor of 3. In addition, the model simulation generates a net gain in stream flow of almost 5.3 cfs over the entirety of the reaches, which when compared to the measured flows taken from the *2008 Groundwater-Surface Water Interaction Studies* have a measured gain of 14.4 cfs. Therefore, the model simulation has eliminated approximately 10 cfs of measured gain in the river, just in these 8 reaches within the Box and Osburn Flats. This has significant implications for accuracy and reliability of EPA's remedy design, cost, and effectiveness evaluations.

51. Within individual segments, whether gaining or losing, differences between measured and simulated flows vary as much as 3,000 percent, but are generally not less than 300 percent. These differences in measured versus simulated values (in the Box or at Osburn Flats) occur within a relatively small area, and a seemingly well studied area of the site; thus it is likely that the disparities in accuracy between measured and simulated reaches elsewhere along the SFCDR are as great or ever greater. The expectation should be that small well studied areas (such as the Box) would provide the most data and best information to calibrate the model against and thus result in the most accurate simulation. One has no real way to evaluate the ability of the model to predict groundwater-surface discharge to and leakage from the SFCDR or other surface streams within the model domain. The model's ability to accurately simulate conditions will worsen in areas where data is more limited.

BU49-24

52. As discussed in the previous sections, the groundwater flow model has not been sufficiently calibrated to describe the critical aspects of the groundwater and surface water systems in the SFCDR and cannot be validated. Model simulations do not agree well with the observed data, and the hydraulic connections between surface and groundwater are not well

BU49-25

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Response to comment BU49-23

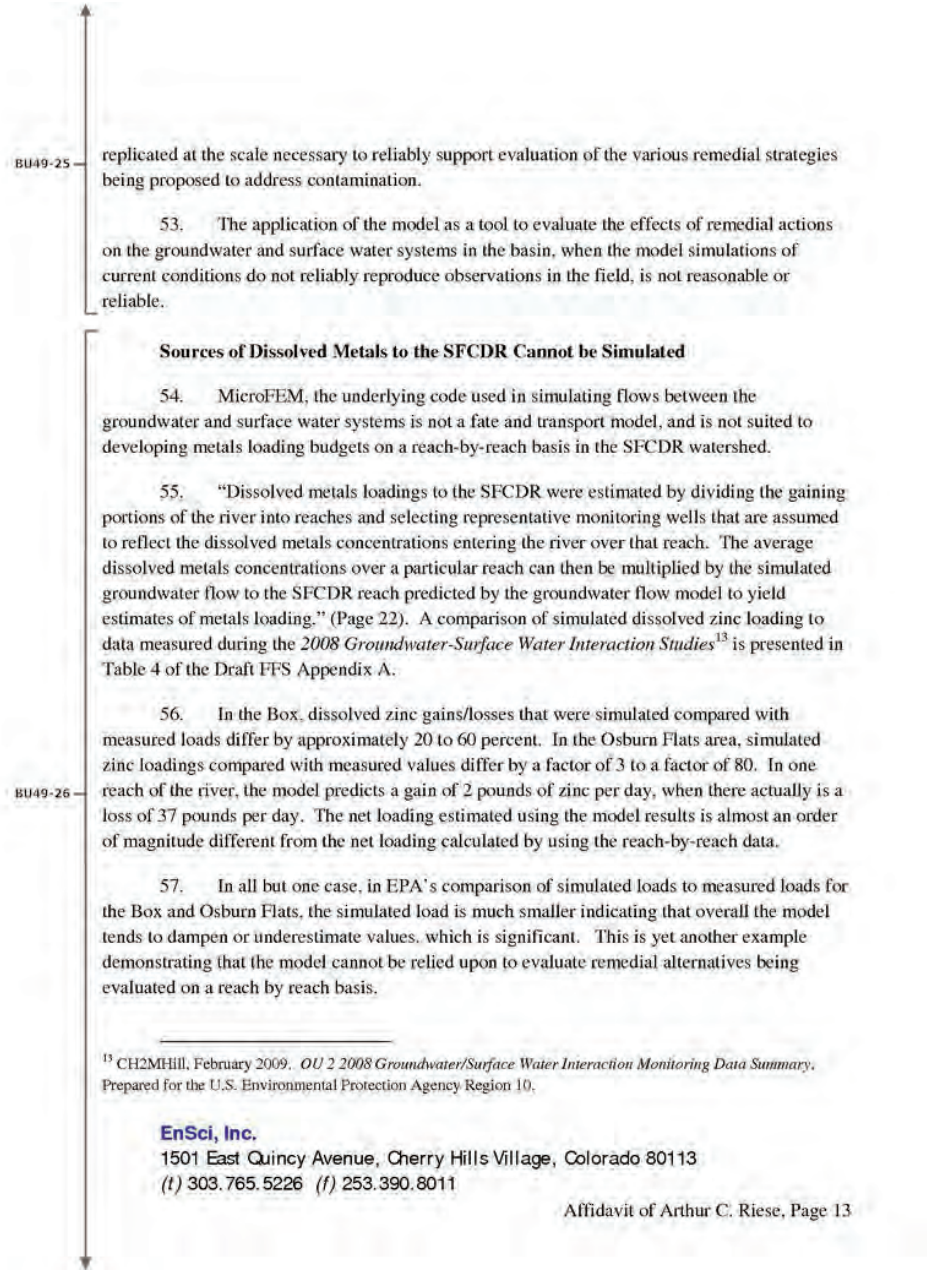
The premise of these comments is that the measured data are "right" and a failure to match these data implies that the simulated values are "wrong." It is important to note when comparing model-simulated and field-measured stream flow value that there are errors associated with each estimate. In the paper *Cumulative Uncertainty in Measured Streamflow and Water Quality Data for Small Watersheds* (Harmel et al., 2006), it is discussed that errors associated with in-stream flow measurements using the velocity discharge method can be as high as +/-20 percent. When one considers the magnitude of the flow in the SFCDR during these particular measurements (>100 cubic feet per second [cfs]), the uncertainty in each of the "measured" stream flow values used to obtain the net gain estimate is at a minimum plus or minus 10 cfs. Therefore, a simulated estimate of 4.8 cfs is well within the reasonable error bounds for the field estimated gain of 7 cfs.

Response to comment BU49-24

The comment argues that the difference between the model's simulated groundwater discharge/recharge to/from the surface water system and those measured during field studies are too large. See response to Comment No. BU49-23 above. Even in "well studied" watersheds, one cannot avoid the uncertainty associated with measurement error. The approach taken here was to calibrate the model to many different calibration targets to obtain a reliable tool to support the FFS. These include not only field measured stream flow values, but also the response of groundwater levels to high flow runoff events (calibration to spring 2009 water levels), and the response of the aquifer system to an annual hydrologic cycle (calibration from July 2008 through July 2009).

Response to comment BU49-25

EPA disagrees with the comments that the model is not adequately calibrated. See responses to Comment Nos. BU49-7 through BU49-24 above.



BU49-25 replicated at the scale necessary to reliably support evaluation of the various remedial strategies being proposed to address contamination.

53. The application of the model as a tool to evaluate the effects of remedial actions on the groundwater and surface water systems in the basin, when the model simulations of current conditions do not reliably reproduce observations in the field, is not reasonable or reliable.

Sources of Dissolved Metals to the SFCDR Cannot be Simulated

54. MicroFEM, the underlying code used in simulating flows between the groundwater and surface water systems is not a fate and transport model, and is not suited to developing metals loading budgets on a reach-by-reach basis in the SFCDR watershed.

55. "Dissolved metals loadings to the SFCDR were estimated by dividing the gaining portions of the river into reaches and selecting representative monitoring wells that are assumed to reflect the dissolved metals concentrations entering the river over that reach. The average dissolved metals concentrations over a particular reach can then be multiplied by the simulated groundwater flow to the SFCDR reach predicted by the groundwater flow model to yield estimates of metals loading." (Page 22). A comparison of simulated dissolved zinc loading to data measured during the *2008 Groundwater-Surface Water Interaction Studies*[13] is presented in Table 4 of the Draft FFS Appendix A.

56. In the Box, dissolved zinc gains/losses that were simulated compared with measured loads differ by approximately 20 to 60 percent. In the Osburn Flats area, simulated zinc loadings compared with measured values differ by a factor of 3 to a factor of 80. In one BU49-26 reach of the river, the model predicts a gain of 2 pounds of zinc per day, when there actually is a loss of 37 pounds per day. The net loading estimated using the model results is almost an order of magnitude different from the net loading calculated by using the reach-by-reach data.

57. In all but one case, in EPA's comparison of simulated loads to measured loads for the Box and Osburn Flats, the simulated load is much smaller indicating that overall the model tends to dampen or underestimate values, which is significant. This is yet another example demonstrating that the model cannot be relied upon to evaluate remedial alternatives being evaluated on a reach by reach basis.

[13] CH2MHill, February 2009. *OU 2 2008 Groundwater/Surface Water Interaction Monitoring Data Summary*. Prepared for the U.S. Environmental Protection Agency Region 10.

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Response to comment BU49-26

The comment questions the use of a combination of simulated flows from MicroFEM (a groundwater flow model) and measured dissolved metals concentrations in groundwater to estimate dissolved metals loading to the surface water system. EPA acknowledges that MicroFEM is a groundwater flow code. The estimates of zinc gain or loss in particular reaches of the SFCDR is directly proportional to the simulated and field estimates of groundwater gain and stream loss to/from the SFCDR. All of the issues discussed above regarding the ability of the model to replicate field-measured values of flow changes are relevant to load changes as well. There is significant uncertainty in the field-measured estimates, and in some cases in the western portion of the Box, the field-measured stream flows imply groundwater discharge volumes to the SFCDR that are not physically possible given the characteristics of the groundwater flow system purported to deliver that flow (hydraulic conductivity, aquifer geometry, hydraulic gradient). So it is important to consider the nature of both the field estimate and the simulated value for each stream reach of interest. With that in mind, the model accurately replicates the observed spatial patterns of zinc gains and losses along the SFCDR through the Box.

BU49-26

58. If the model cannot accurately describe the actual loads or flows, that are occurring and are measurable, the model cannot be used to accurately simulate the added effects of remedial actions, or evaluate the differences in impacts or effectiveness between remedial actions. Nor can it be used to accurately size the groundwater remedy in the preferred alternative.

Professional Judgment was Not Consistent with Sensitivity Analysis

BU49-27

59. During the groundwater model calibration process, EPA modified a number of model parameters, one example being the Kv:Kh ratio. As noted herein, EPA modified this value by a factor of 1,000 in order to achieve numerical stability of the model. EPA also modified the hydraulic conductivities in some areas of the bedrock by a factor of 1,000. Later, during the auto-calibration process, EPA stated that the process was "guided by a professional who is familiar with the site and the software" (Page A-3).

BU49-28

60. It is problematic that when EPA performed its sensitivity analysis on individual parameters prior to assigning properties for the simulation of the various remedial actions, it chose to modify without explanation, acceptable ranges of (for example) hydraulic conductivities in the alluvial aquifer by factors of 5 and 10, and in the case of vertical resistance by factors of 10 and 100. In addition EPA performed its sensitivity analysis on individual parameters. EPA did not in its sensitivity analysis couple the effects of multiple parameters. This erroneously creates the impression in Figure A-34 of the FFS that the model is more accurate and precise, and therefore reliable, in simulating the groundwater system and the impacts of the various remedial actions than is the case.

BU49-29

61. Nevertheless, EPA states "Increases in the hydraulic conductivity by factors of 5 and 10 over currently assumed values result in extremely high values (up to 10,000 feet/day), greater than would be expected for the aquifer materials at the site." Here, EPA defends its selected model values and indicates that even a narrow variation in hydraulic conductivity during its sensitivity analysis produces unrealistic values for the site; but during calibration has no difficulty in modifying hydraulic conductivities from its conceptual model and measured field parameters by factors of 1,000.

The Groundwater Model is a Key Component of the Predictive Analysis

BU49-30

62. As stated by EPA in the Draft Final FFS (Page 7-32) "Remedial effectiveness was evaluated in this FFS using both the numerical groundwater models and the Predictive Analysis (PA). In general, the groundwater models were used to estimate metals loads reductions for

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Response to comment BU49-27

This comment questions EPA's use of professional judgment during the model calibration process. EPA's use of professional judgment is rationally based on the facts and other information that were developed to support the modeling effort. Professional judgment was used during all aspects of model construction, calibration, and application. The Kh:Kv ratio was increased by a factor of 100 during model calibration. As described in the response to Comment No. BU49-10 above, this resultant value is not unrealistic given the local geology.

With respect to the bedrock system, groundwater flow in bedrock systems (particularly metamorphic rocks such as those found in the Belt Supergroup) is primarily controlled by structural elements such as faults and fractures. Fracture density and aperture decrease with depth due to increased overburden stress, resulting in a decreased bulk permeability of the bedrock system with depth. This relationship has been demonstrated with both packer tests in drill holes and aquifer tests from deep bedrock wells. The change in a uniform bedrock hydraulic conductivity field to one that decreases with depth is consistent with the geological system in the SFCDR Watershed.

Response to comment BU49-28

This comment suggests that EPA inappropriately performed the model sensitivity analysis by only varying one parameter at a time to increase confidence in the final set of model parameters. The groundwater model is reliable for its intended use. It is acknowledged that a sensitivity analysis that varies multiple parameters simultaneously would be more rigorous; however, this does not negate the results of the sensitivity analysis performed on the SFCDR Basin-wide model. This analysis tested the sensitivity of model output (simulated load to the SFCDR) to variations in individual parameters. The results presented on Figure A-34 (in the Draft Final FFS Report) do not imply a degree of accuracy or precision in model output, rather they illustrate the degree to which various alternative simulations are sensitive to changes in model input parameters.

Response to comment BU49-29

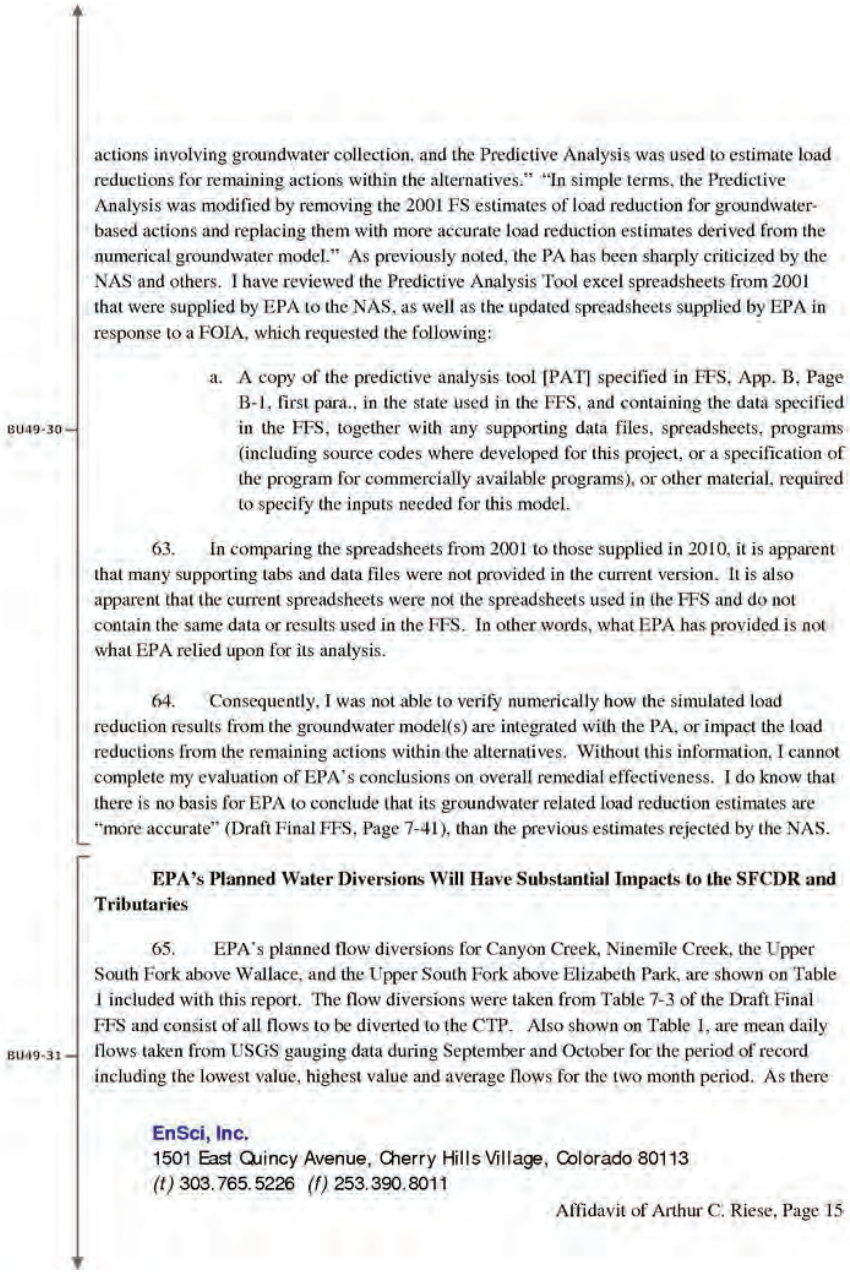
This comment questions EPA's assumptions of horizontal hydraulic conductivity values assigned to the bedrock and alluvial aquifer systems. The horizontal

hydraulic conductivity values incorporated into the numerical model in the Box and Osburn Flats are based on data from aquifer tests [as shown on Figures 18 and 20 of the *Technical Memorandum: SFCDR Watershed; Basinwide Groundwater Flow Model Documentation* (CH2M HILL, 2009)]. These data can be used to constrain values used during the sensitivity analysis. There are no such measured data with which to constrain vertical hydraulic conductivities or horizontal hydraulic conductivity in the bedrock system.

Response to comment BU49-30

The comment questions whether EPA provided all documentation for review. The commenter prepared his comments on behalf of Hecla Mining Company. EPA provided Hecla with all the materials it requested.

The comment concludes that EPA's groundwater-related load reduction estimates are not more accurate than previous estimates at the time of the NAS review. No further explanation for this conclusion is provided, and EPA assumes it derives from the commenter's previous criticisms in the comments. As described in detail in these responses to the commenter, EPA continues to support its decision to develop groundwater models to respond to NAS concerns. These models have enhanced EPA's ability to make predictions of the effectiveness of the remedial alternatives.



actions involving groundwater collection, and the Predictive Analysis was used to estimate load reductions for remaining actions within the alternatives." "In simple terms, the Predictive Analysis was modified by removing the 2001 FS estimates of load reduction for groundwater-based actions and replacing them with more accurate load reduction estimates derived from the numerical groundwater model." As previously noted, the PA has been sharply criticized by the NAS and others. I have reviewed the Predictive Analysis Tool excel spreadsheets from 2001 that were supplied by EPA to the NAS, as well as the updated spreadsheets supplied by EPA in response to a FOIA, which requested the following:

BU49-30

a. A copy of the predictive analysis tool [PAT] specified in FFS, App. B, Page B-1, first para., in the state used in the FFS, and containing the data specified in the FFS, together with any supporting data files, spreadsheets, programs (including source codes where developed for this project, or a specification of the program for commercially available programs), or other material, required to specify the inputs needed for this model.

63. In comparing the spreadsheets from 2001 to those supplied in 2010, it is apparent that many supporting tabs and data files were not provided in the current version. It is also apparent that the current spreadsheets were not the spreadsheets used in the FFS and do not contain the same data or results used in the FFS. In other words, what EPA has provided is not what EPA relied upon for its analysis.

64. Consequently, I was not able to verify numerically how the simulated load reduction results from the groundwater model(s) are integrated with the PA, or impact the load reductions from the remaining actions within the alternatives. Without this information, I cannot complete my evaluation of EPA's conclusions on overall remedial effectiveness. I do know that there is no basis for EPA to conclude that its groundwater related load reduction estimates are "more accurate" (Draft Final FFS, Page 7-41), than the previous estimates rejected by the NAS.

EPA's Planned Water Diversions Will Have Substantial Impacts to the SFCDR and Tributaries

65. EPA's planned flow diversions for Canyon Creek, Ninemile Creek, the Upper South Fork above Wallace, and the Upper South Fork above Elizabeth Park, are shown on Table 1 included with this report. The flow diversions were taken from Table 7-3 of the Draft Final FFS and consist of all flows to be diverted to the CTP. Also shown on Table 1, are mean daily flows taken from USGS gauging data during September and October for the period of record including the lowest value, highest value and average flows for the two month period. As there

BU49-31

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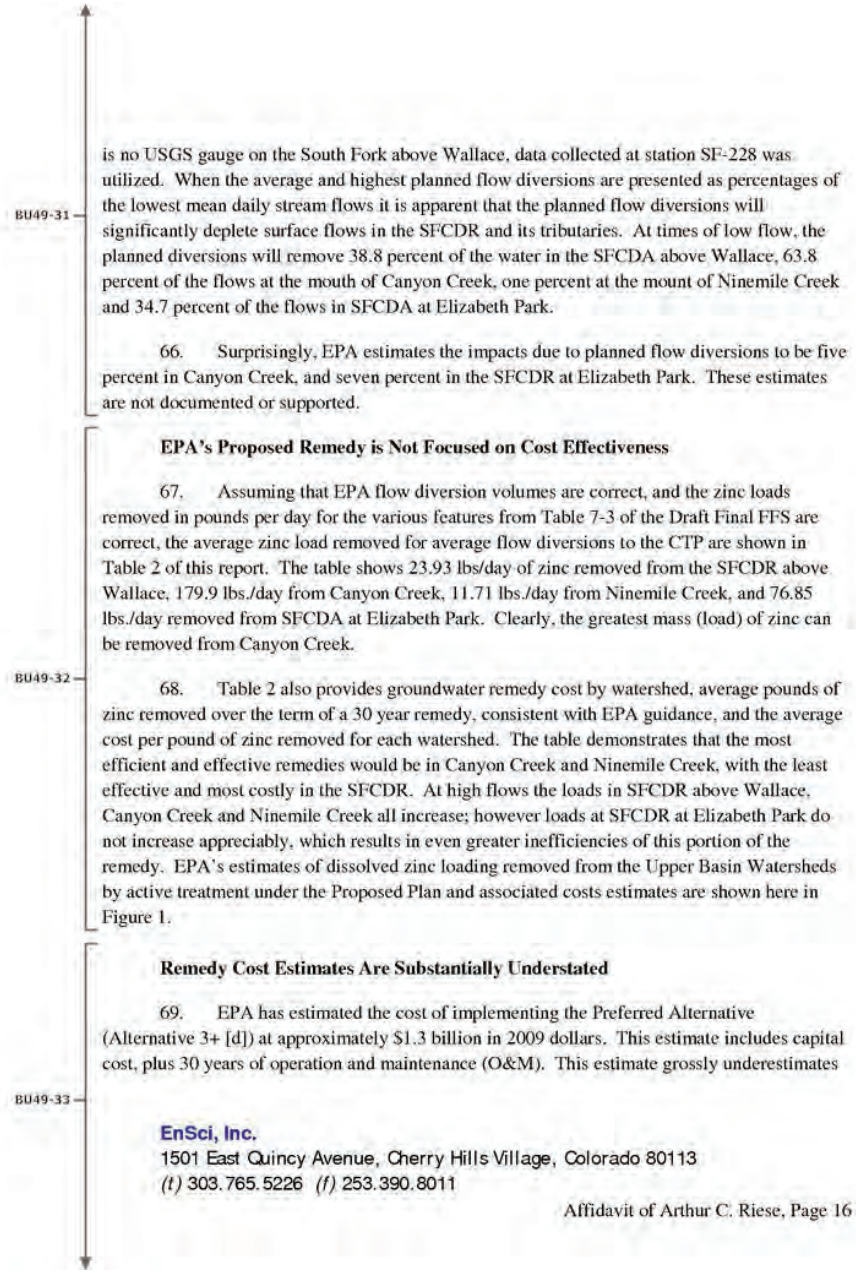
Affidavit of Arthur C. Riese, Page 15

Response to comment BU49-31

The comment concludes that the planned water diversions will have substantial impacts on the SFCDR and tributaries. This conclusion is erroneous. Withdrawal of contaminated groundwater will not result in stream flow reductions anywhere near the magnitude suggested by the commenter. A more detailed discussion of this topic may be found in the response to Comment No. BU45-7 submitted by Formation Environmental on behalf of Hecla, and in the *Streamflow Reduction Technical Memorandum* (CH2M HILL, 2012).



is no USGS gauge on the South Fork above Wallace, data collected at station SF-228 was utilized. When the average and highest planned flow diversions are presented as percentages of the lowest mean daily stream flows it is apparent that the planned flow diversions will significantly deplete surface flows in the SFCDR and its tributaries. At times of low flow, the planned diversions will remove 38.8 percent of the water in the SFCDA above Wallace, 63.8 percent of the flows at the mouth of Canyon Creek, one percent at the mount of Ninemile Creek and 34.7 percent of the flows in SFCDA at Elizabeth Park.

BU49-31

66. Surprisingly, EPA estimates the impacts due to planned flow diversions to be five percent in Canyon Creek, and seven percent in the SFCDR at Elizabeth Park. These estimates are not documented or supported.

EPA's Proposed Remedy is Not Focused on Cost Effectiveness

67. Assuming that EPA flow diversion volumes are correct, and the zinc loads removed in pounds per day for the various features from Table 7-3 of the Draft Final FFS are correct, the average zinc load removed for average flow diversions to the CTP are shown in Table 2 of this report. The table shows 23.93 lbs/day of zinc removed from the SFCDR above Wallace, 179.9 lbs./day from Canyon Creek, 11.71 lbs./day from Ninemile Creek, and 76.85 lbs./day removed from SFCDA at Elizabeth Park. Clearly, the greatest mass (load) of zinc can be removed from Canyon Creek.

BU49-32

68. Table 2 also provides groundwater remedy cost by watershed, average pounds of zinc removed over the term of a 30 year remedy, consistent with EPA guidance, and the average cost per pound of zinc removed for each watershed. The table demonstrates that the most efficient and effective remedies would be in Canyon Creek and Ninemile Creek, with the least effective and most costly in the SFCDR. At high flows the loads in SFCDR above Wallace, Canyon Creek and Ninemile Creek all increase; however loads at SFCDR at Elizabeth Park do not increase appreciably, which results in even greater inefficiencies of this portion of the remedy. EPA's estimates of dissolved zinc loading removed from the Upper Basin Watersheds by active treatment under the Proposed Plan and associated costs estimates are shown here in Figure 1.

Remedy Cost Estimates Are Substantially Understated

69. EPA has estimated the cost of implementing the Preferred Alternative (Alternative 3+ [d]) at approximately $1.3 billion in 2009 dollars. This estimate includes capital cost, plus 30 years of operation and maintenance (O&M). This estimate grossly underestimates

BU49-33

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Affidavit of Arthur C. Riese, Page 16

Response to comment BU49-32

The comment concludes the proposed remedy is not focused on cost effectiveness. EPA disagrees. As described in the Proposed Plan and the ROD, EPA used cost as one of its nine remedy evaluation criteria, consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). As described in the ROD Amendment, Part 2, Section 13, EPA has determined that the Selected Remedy is cost effective; that is, its costs are proportional to its overall effectiveness (NCP §300.430(f)(l)(ii)(D)). Overall effectiveness was evaluated by assessing three of the five CERCLA Primary Balancing Criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness) of those alternatives that satisfied the CERCLA Threshold Criteria (i.e., were both protective of human health and the environment and applicable or relevant and appropriate requirement [ARAR]-compliant).

The comment questions the cost of proposed remedies in the upper reaches of the basin (above Wallace) as well as within the SFCDR. As described in the ROD Amendment, in response to public comments, EPA has significantly reduced the scope of the Selected Remedy including areas of the SFCDR upstream from Wallace. The result of these decisions will be to reduce the cost of remedies in the areas that are the subject of the comment.

Response to comment BU49-33

The comment concludes that remedy cost estimates are substantially understated. The cost estimate was developed according to EPA CERCLA guidance for the Feasibility Study (FS) process (EPA, July 2000, *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study*). This guidance states that the accuracy of the cost estimates presented in an FS should be within -30 percent to +50 percent, and that a discount rate of 7 percent should be used to estimate total project costs in today's dollars (EPA, 2000). According to the guidance, this 7 percent discount rate accounts for inflation and the rising costs of construction over time. In this case, 2009 dollars are the basis for the net present value (NPV) cost estimate, consistent with cost estimates presented in the FFS Report (EPA, August 2012, *Final Focused Feasibility Study*

Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site). The cost estimate includes the costs of both the remedial actions and operation and maintenance (O&M). Because the remedy protection actions have not been staged or phased over time, all capital costs are considered NPV costs assuming year 2009 dollars. The effect of staging over the implementation period would be to reduce the NPV of both capital and O&M costs. Some components of the remedy are expected to have O&M requirements that extend beyond the assumed 30-year period of performance per EPA guidance (EPA, 2000, http://yosemite1.epa.gov/EE/EPA/ria.nsf/vwTD/D80FCAF00F14E6A585256A6F004C10B2). If the O&M period was extended to 100 years, the increase in total cost would be relatively small, approximately 4 percent. Cost estimates for work to be performed will be further refined during the remedial design process.

The comment also concludes that the size and cost associated with the Central Treatment Plant (CTP) upgrade are unprecedented. CERCLA and the regulations that govern its implementation, the NCP, obligate EPA to respond to releases or threatened releases of hazardous substances that pose unacceptable risks to human health and/or the environment regardless of the scale of the environmental problem and cleanup response thereto. The simple response to this comment is that a large complex area like the Upper Basin of the Coeur d'Alene River, which contains a massive amount of hazardous substances deposited over about a century of mining activities, can logically be expected to take a large-scale effort costing large amounts of money to remediate and cleanup. EPA has responded to releases at other large sites that also cost large amounts of money to cleanup. The cleanup effort in the Upper Basin is commensurate to the human health and environmental risks presented by the release of mine waste contamination.

the actual cost of implementation as it assumes construction of the remedy within 30 years, rather than 50 to 90 years as stated in the Proposed Plan.

70. In addition, O&M costs are substantially understated as they are effectively terminated at 30 years rather than extending them for the anticipated duration (reportedly hundreds of years in prior documents).

71. In performing its net present value calculations of remedial cost, EPA uses unrealistic discount rates, which further underestimate the capital and O&M cost for implementing the proposed plan. Utilizing this approach for a remedial plan of such unprecedented proportion is misleading and incorrect. Given these factors and the uncertainty in performance for many of the elements of the Proposed Plan, EPA's estimated cost for implementation is likely understated by more than several hundred percent and likely exceeds $5 billion.

BU49-33

The Size and Cost Associated with the Central Treatment Plant Upgrade are Unprecedented

72. EPA has estimated the capital cost for the Central Treatment Plan (CTP) upgrade and appurtenant infrastructure to be approximately $485 million. This upgraded CTP will have a capacity to treat approximately 19,000 gpm assuming average planned diversions from the SFCDR from Wallace to Elizabeth Park, Ninemile Creek, Canyon Creek and SFCDR above Wallace.

73. In Table 3, I have assembled information for ten lime treatment plants and appurtenant conveyance systems, for which information was readily available in the public domain. I have personally visited 5 of these plants. A treatment plant, the size of the upgraded CTP, is almost four times the size the largest plants currently in operation at mine (remediation) sites in North America. In spite of the economies of scale expected in both capital cost and operating cost for a plant of this magnitude, even accepting EPA's estimated capital cost as correct, the capital cost for the CTP would be at least double the capital cost of the ten treatment plants at mine (remediation) sites in operation today (on a treated gallon per day basis), and triple the cost of the largest plants (those in excess of 2,000 gpd). The only plant more expensive than the proposed CTP, for which I was able to find information, is a small plant at the Yak Tunnel, that was constructed almost two decades ago, the cost of which would not justify building it today.

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No comments

EPA Has Biased the Outcome of Its Evaluation Towards Alternative 3+ and Has Not Been Transparent on Time-to-Achieve Considerations

74. In the Proposed Plan, EPA states "An analysis was conducted during the FFS to estimate relative post-remediation AWQC ratios and dissolved zinc load reduction in the SFCDR at Elizabeth Park and Pinehurst for each alternative. … However, there are differences between the initial relative effectiveness of each alternative in reducing AWQC ratios, as shown in Table 6." (PP page 8-5). EPA does not however provide an estimate of the time needed to achieve these AWQC ratios either in the 2010 Draft Final FFS or Proposed Plan.

75. EPA goes on to say, "The results of this analysis indicate that all of the remedial action alternatives would meet the Threshold Criterion of compliance with ARARs for surface water, but only after a natural source depletion period, which is common to all the alternatives." (PP page 8-5). In other words, none of the (initial) alternatives will reach ARARs by the post-construction period, but according to EPA, all will eventually achieve ARARs via natural attenuation, including the No Action alternative.

76. What EPA does not say, among other things, is that the benefits of natural source depletion occurring during an assumed 75 year period of remedial construction (EPA says 50 to 90 years) for Alternative 3+ are not included in the No Action alternative. In essence, natural attenuation is turned off for the No Action alternative, until implementation of the other alternatives and their attending remedial benefits are realized. Then the alternatives are evaluated post-remediation based on future performance with natural attenuation benefits being accrued by all alternatives. In other words, the natural depletion option is improperly handicapped by the length of the construction period.

BU49-34

77. Further, in the February 2010 Draft FFS (Table B-7), EPA estimates in the conservative case, that the No Action alternative will achieve ARARs in 230 years, with a confidence limit of 80% corresponding to a period of somewhere between 125 and 290 years from today. EPA estimates that alternative 3+ (OU 3 Only) will achieve ARARs in 65 years, with an 80% confidence interval corresponding to a range of 0 to 120 years *post remedy completion.* See Figure 2 herein.

78. If EPA were to consider Natural Source Depletion in its analysis of alternatives, as it is occurring today and will continue to occur for the decades that Alternative 3+ is under construction, it would discover that on an "apples to apples" comparison, by the end of the post-remediation period, the No Action alternative would have a projected estimated post-remediation

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Response to comment BU49-34

The comment concludes that EPA has biased the outcome of its evaluation towards Alternative 3+. EPA disagrees. The evaluation of alternatives was conducted in a manner consistent with the National Oil and Hazardous Substances Pollution Contingency Plan and took no predetermined position as to which remedy would be selected. EPA evaluated the alternatives using the nine prescribed criteria and selected a remedy that represented the best balance of tradeoffs. The comment also questions EPA for not adequately considering natural source depletion during and after cleanup. As described in Section 8 of the Proposed Plan, EPA chose to not include predictions of time to achieve applicable or relevant and appropriate requirements (ARARs) in selecting its remedy. The Predictive Analysis (PA) includes a component that can be used to estimate the effects of natural source depletion on ambient water quality criteria (AWQC) ratios over time as a function of a decay rate. However, the natural source depletion component was not used in the Focused Feasibility Study (FFS) analysis because the prediction of long-term water quality trends and specific water quality in the SFCDR Watershed in the distant future is subject to considerable uncertainty. These uncertainties include complex weathering rates and the changes in these rates for the numerous mine waste types and source areas in the watershed. Site-specific exposure to seasonal wetting and water flux, as well as variations in particle surface area, iron sulfide content, trace metal content, air diffusion, and other factors, control the release of contaminants from mine wastes. The effect of cleanup actions further complicates these predictions. Therefore, the evaluation relies on the post-remediation AWQC estimates for comparison among the alternatives.

AWQC ratio for dissolved zinc at Pinehurst of 2.9[14], not 5.2, as indicated in Table 6 and Figure 16 in the Proposed Plan.

79. On even closer examination, using EPAs own estimates, in the 70 years between 50 -120 years post-remedy construction, Natural Attenuation is just as likely as alternative 3+ to achieve the AWQC for zinc. See Figure 3 herein, which properly "credits" the no action alternative with the benefit of natural source depletion. The green area represents the overlap in time, after Alternative 3+ is implemented when it and the No Action alternative coincide. The blue and yellow bars correspond with the range of times to achieve the target AWQC ratio of 1, based on the 80% confidence limit (for the 95% UCL Conservative case [Beta =0.01]). This result is being achieved without spending any of the $1.3 billion EPA plans to spend in the Upper Basin.

80. EPA may argue that natural source depletion should be "credited" to all of the alternatives. This is incorrect, given the environmental disturbances that are expected to impact zinc ratios during construction of any alternative, other than No Action. Even then, the No Action alternative would still result in an AWQC ratio of between 1.6 and 2.6 (expected value of 2.0) at the end of any post-remediation period of time. More to the point, as presented by EPA, the No Action alternative is not given credit for source depletion, but the other remedies are
BU49-34 immediately given credit for initial cleanup upon remedy completion, which biases the comparison in favor of the constructed remedies.

81. If one examines time to achieve ARARs using EPA's Best Estimate case (Beta = 0.025), and plots the progress of Alternative 3+ over an assumed 50 years to construct and implement, versus the progress of natural attenuation as it is occurring today, Figure 3 is the result. This comparison shows, rather astoundingly that there is no difference between Alternative 3+ and the No Action alternative. One can see as well, why EPA states that all of the constructed remedies require natural attenuation as an element of cleanup, if they are to achieve a post-remediation AWQC ration of 1 for dissolved zinc.

82. EPA removed its estimates of time to achieve ARARs between issuing the February 2010 Draft FFS and the July 2010 Draft Final FFS, claiming the results were too uncertain. So, where the February 2010 Draft FFS considered time to achieve in some detail, the July FFS is effectively silent on this subject with one critical exception. The July FFS does state its intention to actually resurrect the "PAS source depletion component … during remedy

[14] See February 2010 Draft FFS Figure B-8a at 75 years.

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No comments

implementation."[15] Regardless, EPA's treatment of the No Action alternative is misleading, in spite of the fact that natural source reduction is an essential element for any of the alternatives to ultimately achieve ARARs.

BU49-34

83. This illustration is not intended as an opinion that no remediation work is appropriate or necessary in the Upper Basin. It does however highlight two key points. One is that EPA's own "time-to-achieve" analysis, which EPA has now, effectively, tried to expunge from the record, does not support EPA's massive proposal as necessary or more protective. EPA should re-consider the effectiveness of all of the alternatives (including those already screened out), and without handicapping the No Action option, before making a final decision on the Proposed Plan. It is clear that EPA has not properly considered or documented the time dependant relative effectiveness of the various alternatives in the Draft Final FFS.

An Inescapable Conclusion

BU49-35

84. For the reasons stated, there is no reasoned basis for selecting most of the remedial work that EPA is proposing to undertake, at enormous cost, with no evidence that what is proposed is likely to be effective or protective; and the negative impacts appear severe.

FURTHER AFFIANT SAYETH NOT.

Dated: November 22, 2010

Arthur C. Riese

[15] "...the natural source depletion component was not used in the FFS analysis because the prediction of long-term water quality trends and specific water quality in the SFCDR Watershed in the distant future is subject to considerable uncertainty at this time. This uncertainty stems from the complex weathering rate and the changes in these rates for the numerous mine waste types and source areas in the watershed. It is anticipated that the PAT source depletion component will be updated on an ongoing basis, based on BEMP statistical analyses, and will be used during remedy implementation, including adaptive management." (Proposed Plan, page 7-39).

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Response to comment BU49-35

The comment questions whether EPA had a valid basis for selecting a remedy. EPA supports the remedy selected. As described in detail in the Proposed Plan and ROD Amendment, EPA developed and evaluated remedial alternatives in a manner consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and then selected an NCP-consistent remedy. The measures selected in this remedy will provide an adequate level of protectiveness of human health and the environment; comply with federal, state, and tribal requirements that are applicable or relevant and appropriate within the scope of the Selected Remedy; result in a cost effective action; utilize permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable; and satisfy the statutory preference for treatment as a principal element of the remedy (i.e., reduce the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment).

No comments

TABLES

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No comments

Table 1

Proposed Plan - Planned Flow Diversions Relative to Low Stream-Flow Conditions

Stream Location	Planned Flow Diversion Above this location (cfs) (1)		Minimum Average Daily Flow at Diversion Point in Sept. and Oct. (cfs) (2)	Period of Record	Planned Flow Diversion as a Percentage of Minimum Average Daily Flow in Sept. and Oct.	
	Average	Maximum			Average Flow Diversion	Maximum Flow Diversion
South For CdA River Above Wallace (SF-228) (3)	9.2	18.5	23.7	1991-1999	38.8%	78.1%
Mouth of Canyon Creek (CC-288, USGS 12413125) (4)	8.3	15.0	13	1998-2009	63.8%	115.4%
Mouth of Ninemile Creek (NM-305, USGS 12413130) (4)	0.032	0.062	3.2	1998-2009	1.0%	1.9%
South Fork CdA River At Eliz. Park (SF-268, USGS 12413210) (4)	25.7	42.0	74	1987-2009	34.7%	56.8%

(1) Planned diversion flow rates are based on information provided in Table 7-3 of the Draft Final Focused Feasibility Study Report.

(2) The lowest discharge rates typically occur in September and October. The listed values are the lowest of the available mean daily flows recorded during those months for the period of record

(3) Mean daily flows for this station are based in monthly flow data acquired from the STORET data base

(4) Mean daily flows for this station are based on daily statistics maintained by the U.S. Geological Survey (www.usgs.gov)

No comments

TABLE 2

Alternative 3+ Zinc Load Removed Under Planned Flow Diversions to CTP

Stream/Location	Planned Flow Diversions Above This Point (cfs)** Ave	Max	Average Measured Low Flows (cfs)* September	Zinc Load Removed lbs./day Ave Flow	Zinc Load Removed lbs./day Max Flow	Zinc Conc., ppm During Average Diversion	Zinc Conc., ppm During Maximum Diversion	GW Remedy Cost	Zinc Average Pounds Removed 30 yrs	Zinc Average Cost Per Pound
South Fork CdA River Above Wallace (SF-228)	9.2	18.5	36.7	**23.93**	**57.19**	0.482	0.573	$71,807,630	262,213	273
Mouth of Canyon Creek (CC-288, USGS 12413125)	8.3	15.0	15	**179.90**	**286.00**	4.019	3.535	$40,714,850	1,971,254	21
Mouth of Ninemile Creek (NM-305, USGS 12413130)	0.032	0.062	3.7	**8.00**	**11.71**	46.356	35.021	$2,973,880	87,660	34
South Fork CdA River At Eliz. Park (SF-268, USGS 12413210)	25.7	42.0	79	**76.82**	**76.85**	0.554	0.339	$431,775,044	841,755	513

Secondary Drinking Water Quality Criteria	5 mg/L
Idaho Chronic AWQC SFCDR Specific - Hardness 30 mg/L	**87.9** µg/L
Idaho Chronic AWQC SFCDR Specific - Hardness 50 mg/L	123 µg/L
Idaho Chronic AWQC SFCDR Specific - Hardness 100 mg/L	195 µg/L

Notes:
*Average Measured Lowest Daily Flow
**Groundwater Remedy Includes Adit Flows Routed to CTP

No comments

Table 3

Summary Comparison of Lime Treatment Facilities[1]

Facility	Year Constructed	Maximum Flow Rate (gpm)	Capital Cost	Max Flow Rate (gpd)	Capital Cost per gpd	Inflation Adjusted Capital Cost (2010$)	Capital Cost per gpd (max flow)
Brittania Beach (BC, Canada)	2006	4,600	$ 17,592,900	6,624,000	$ 2.66	$ 20,979,383	$ 3.17
Henderson Mine (Empire, CO)	1996	4,000	$ 9,800,000	5,760,000	$ 1.70	$ 18,149,060	$ 3.15
Equity Silver (BC, Canada)	2003	2,600	$ 10,000,000	3,744,000	$ 2.67	$ 13,608,618	$ 3.63
Horseshoe Bend (Butte, MT)	2003	4,800	$ 17,557,000	6,912,000	$ 2.54	$ 23,892,651	$ 3.46
Eagle Mine (Eagle County, CO)	1990	200	$ 600,000	288,000	$ 2.08	$ 1,447,028	$ 5.02
Leadville Mine Drainage Tunnel (Leadville, CO)	1992	2,000	$ 7,500,000	2,880,000	$ 2.60	$ 16,563,591	$ 5.75
Argo Tunnel (Denver, CO)	1998	700	$ 5,000,000	1,008,000	$ 4.96	$ 8,479,407	$ 8.41
Landusky Mine (Fort Belknap, MT)	1997	600	$ 5,589,874	864,000	$ 6.47	$ 9,906,353	$ 11.47
Gilt Edge Mine (Lawrence, SD)	2003	250	$ 3,172,000	360,000	$ 8.81	$ 4,316,654	$ 11.99
Yak Tunnel (CO)	1992	850	$ 11,982,770	1,224,000	$ 9.79	$ 26,463,693	$ 21.62
Coeur d'Alene CTP (ID)	2030	19,402	$ 385,375,000	27,938,880	$ 13.79	$ 385,375,000	$ 13.79

Average Capital Cost of Plants, $/gpd	$ 7.77
Average Capital Cost, Large Plants, $/gpd	$ 3.83
Capital Cost Coeur d'Alene CTP, $/gpd	$ 13.79

These costs include infrastructure appertenances including conveyance pipelines, etc.

[1]Data from Kuiper and Zuzulock: Financial Assurance for Hardrock Mine Cleanup; October 2003; Montana Bureau of Mines; EPA 5-Year Review Reports; Gov't websites; See Reference List.

No comments

FIGURES

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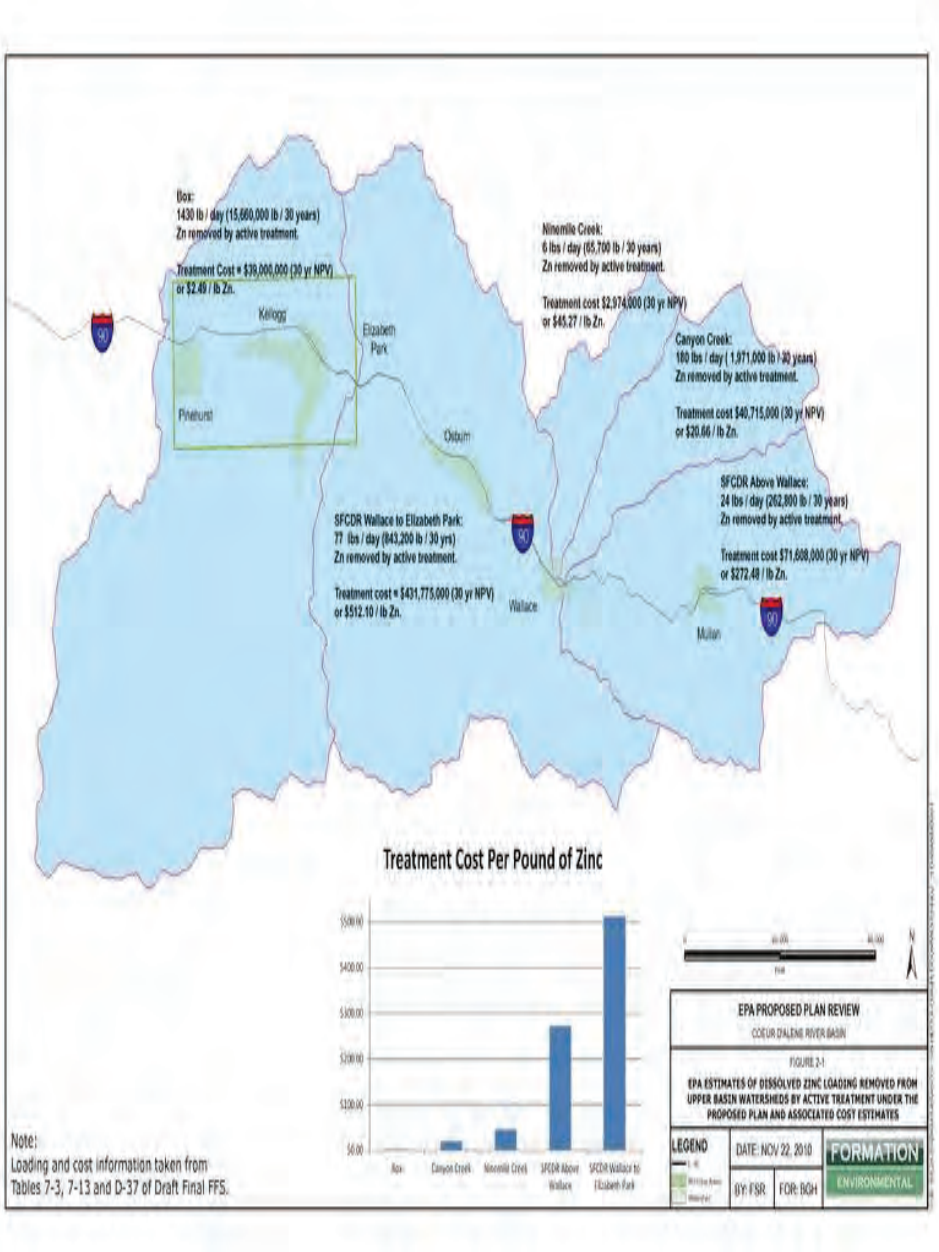
Box:
1430 lb / day (15,660,000 lb / 30 years)
Zn removed by active treatment.
Treatment Cost = $39,000,000 (30 yr NPV)
or $2.49 / lb Zn.
Kellogg
Elizabeth Park
Pinehurst
Osburn
Ninemile Creek:
6 lbs / day (65,700 lb / 30 years)
Zn removed by active treatment.
Treatment cost $2,974,000 (30 yr NPV)
or $45.27 / lb Zn.
Canyon Creek:
180 lbs / day (1,971,000 lb / 30 years)
Zn removed by active treatment.
Treatment cost $40,715,000 (30 yr NPV)
or $20.66 / lb Zn.
SFCDR Above Wallace:
24 lbs / day (262,800 lb / 30 years)
Zn removed by active treatment.
Treatment cost $71,608,000 (30 yr NPV)
or $272.48 / lb Zn.
SFCDR Wallace to Elizabeth Park:
77 lbs / day (843,200 lb / 30 yrs)
Zn removed by active treatment.
Treatment cost = $431,775,000 (30 yr NPV)
or $512.10 / lb Zn.
Wallace
Mullan
Treatment Cost Per Pound of Zinc
$500.00
$400.00
$300.00
$200.00
$100.00
$0.00
Box
Canyon Creek
Ninemile Creek
SFCDR Above Wallace
SFCDR Wallace to Elizabeth Park
Note:
Loading and cost information taken from
Tables 7-3, 7-13 and D-37 of Draft Final FFS.
EPA PROPOSED PLAN REVIEW
COEUR D'ALENE RIVER BASIN
FIGURE 2-1
EPA ESTIMATES OF DISSOLVED ZINC LOADING REMOVED FROM UPPER BASIN WATERSHEDS BY ACTIVE TREATMENT UNDER THE PROPOSED PLAN AND ASSOCIATED COST ESTIMATES
LEGEND
DATE: NOV 22, 2010
BY: FSR
FOR: BOH
FORMATION
ENVIRONMENTAL

No comments

No comments

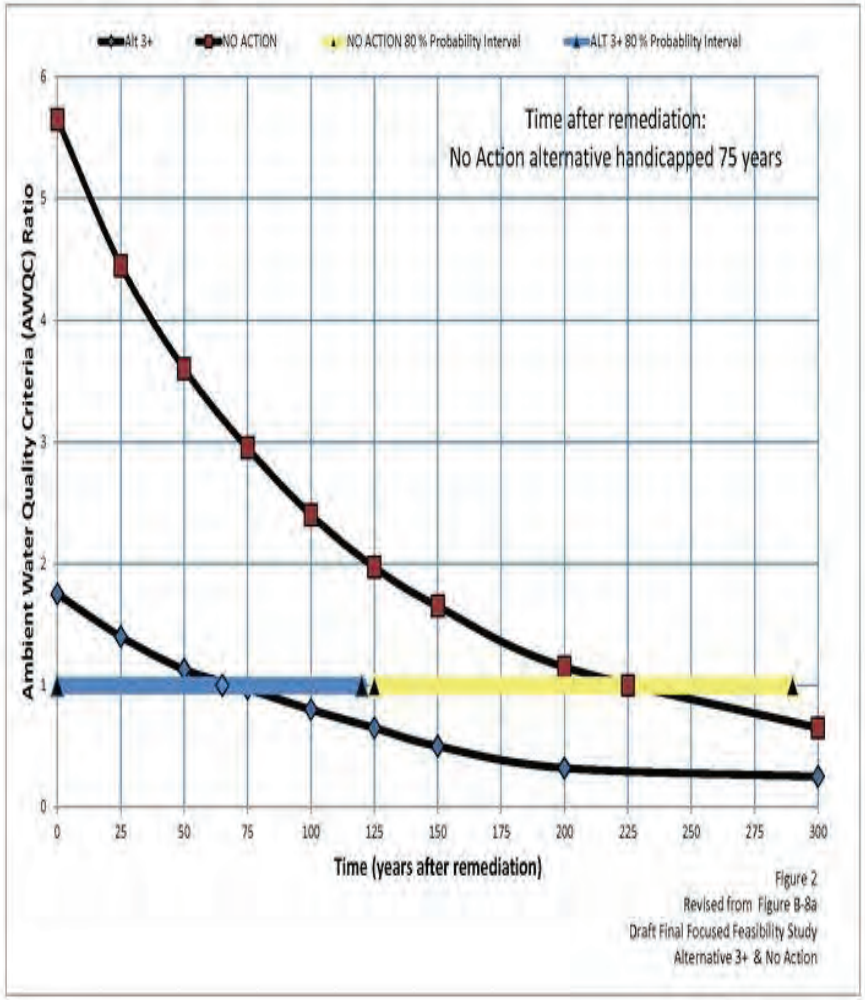

Figure 2
Revised from Figure B-8a
Draft Final Focused Feasibility Study
Alternative 3+ & No Action

No comments

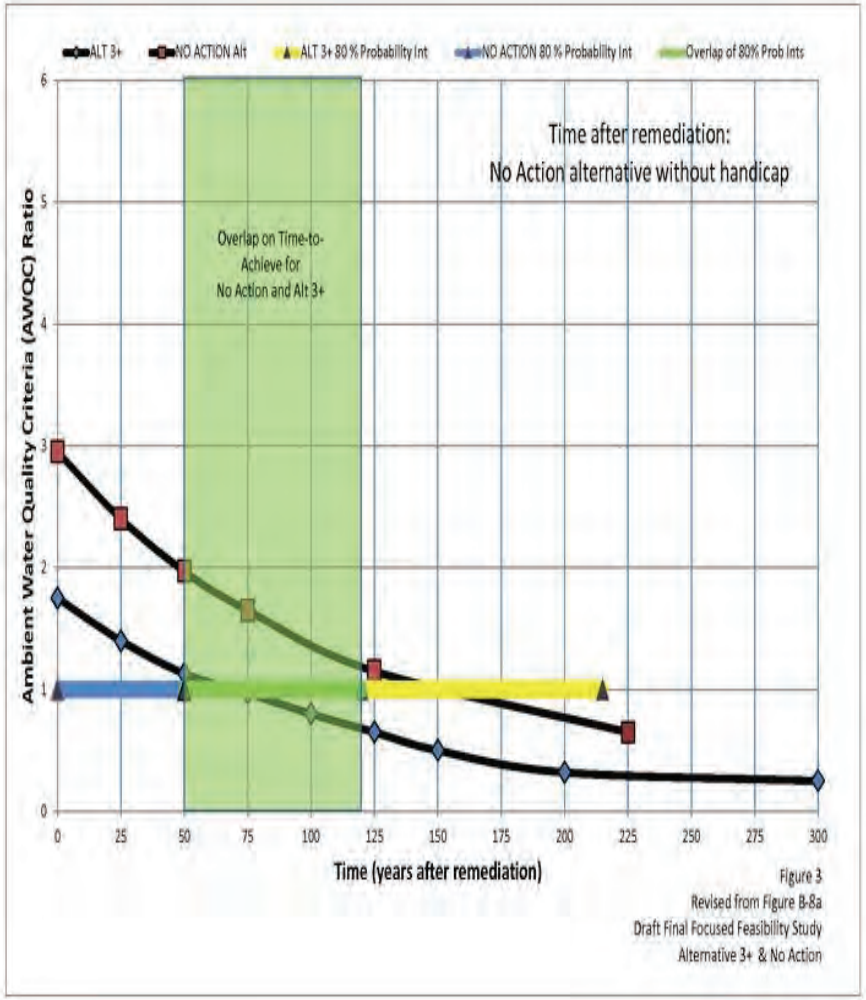

Figure 3
Revised from Figure B-8a
Draft Final Focused Feasibility Study
Alternative 3+ & No Action

No comments

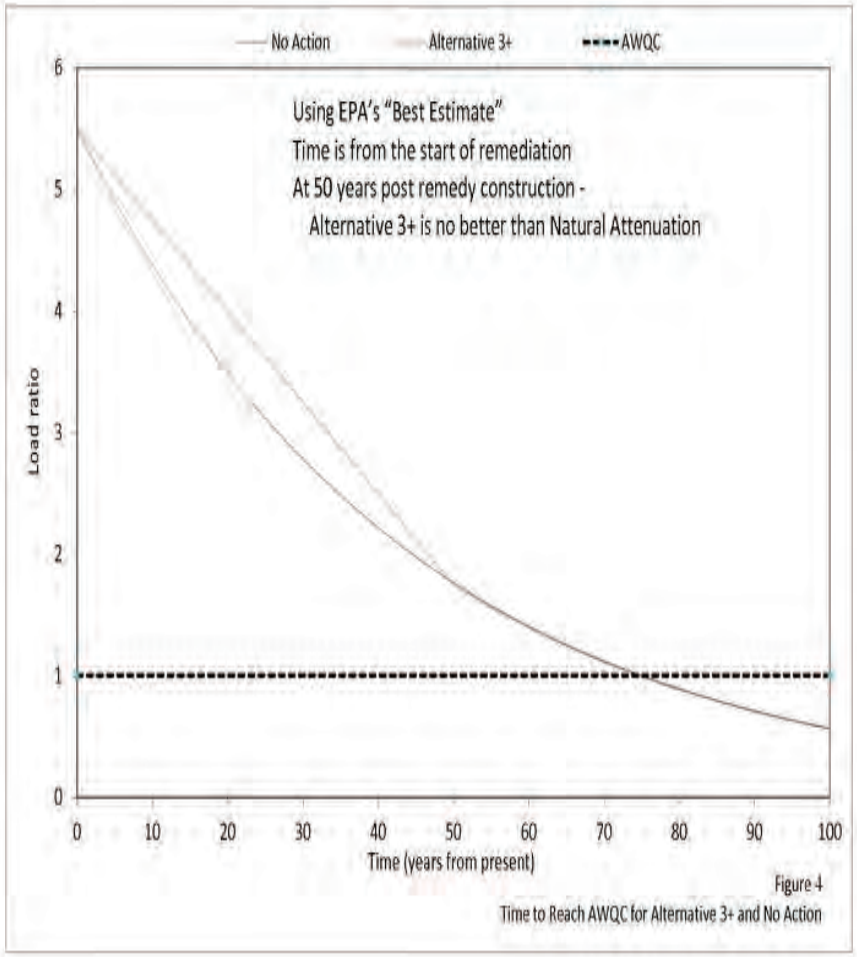

Figure 4
Time to Reach AWQC for Alternative 3+ and No Action

No comments

APPENDIX A

Qualifications and Curriculum Vitae for Arthur C. Riese, Ph.D., R.G., C.HG.

A

No comments

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

EDUCATION

Ph.D., Geochemistry, Colorado School of Mines, Golden, 1981
M.S., Chemistry, New Mexico Institute of Mining and Technology, Socorro, 1978
B.S., Geology, New Mexico Institute of Mining and Technology, Socorro, 1976

PROFESSIONAL EXPERIENCE

EnSci, Inc., Denver, Colorado
President & CEO
January 2000 – Present
Dr. Riese provides strategic technical consulting services, expert witness services and litigation support for environmental and natural resource based litigations, through his company EnSci, Inc. which he founded in January 2000.

Dr. Riese provides expert testimony in the fields of hydrogeology, geochemistry and risk assessment, specifically concerning the hydro-geochemical fate and transport of metals and organic compounds in the environment. Dr. Riese has considerable experience in understanding and predicting the chemical quality of surface and subsurface water, both pristine and polluted. Dr. Riese has over 30 years of experience in basic and applied research, teaching, consulting, and working in the hydro-geochemical environmental and extractive industry arenas. Dr. Riese has worked extensively on problems ranging from toxic metal, radionuclide and organic chemical contamination and transport, including that for solvents, pesticides, herbicides and petroleum products, acid mine drainage and mine tailings, aquifer restoration, hydro-geochemical exploration, deep-well injection, oil field reservoir characterization and formation damage, and radioactive waste disposal. Dr. Riese has considerable experience with regulatory agencies and is familiar with CERCLA, RCRA, HSWA, SARA, CWA, SDWA and other regulatory frameworks. Dr. Riese has considerable experience in evaluating remedial technologies, conducting feasibility studies and alternatives analysis, and in evaluating the effectiveness of a broad spectrum of remedial measures and in reclamation and remediation cost estimating. Dr. Riese is presently providing strategic consulting and litigation support for one of the mining industry's largest ever CERCLA actions.

Harding Lawson Associates, Inc.
Senior Vice President, Harding Lawson Associates, Inc.
Sr. Vice President, Central Region Manager,
Sr. Vice President, Construction Division
June 1999 – January 2000
Responsible for Harding Lawson Associates, Inc., Central Region Operating Unit, encompassing more than 20 states, with 9 offices in Albuquerque and El Paso, NM; Denver and Grand Junction, Colorado; Helena, Montana; Houston, Texas; Salt Lake City, Utah; Farmington Hills, Michigan; and Chicago, Illinois. Additionally responsible for HLA's National Design Practice and Construction Division. Combined financial responsibilities resulted in excess of $50 million annual gross revenues, operating margins in excess of 20%

No comments

of net revenues and net contribution margin after region and corporate expenses, and taxes of 6 percent. Responsible for divesting the company's international businesses in Australia and Mexico. Served on HLAG's Management and Operating Committees, the Information Management Steering Committee, the Y2K Compliance Committee and the Risk Management Committee. Chaired HLA's Construction Division Risk Management Committee. As Program Director or Executive Sponsor, provided strategic leadership and technical guidance for major federally funded contracts and significant petroleum and mining industry accounts. Provided expert witness services and was responsible for several major litigation support matters.

President
December 1996 – June 1999
Responsible for all of Harding Lawson Associates, Inc., (HLA's) Domestic and International Operations encompassing more than 50 offices with more than 1,200 technical professionals in the United States, Australia, Mexico, Indonesia and Singapore. Additionally responsible for HLA's firm-wide Design Centers, Construction Division and Applied Information Technology Practice. Combined financial responsibilities have resulted in $165 million annual gross revenues, operating margins of 20% of net revenues, and return on net assets in excess of 15% after G&A expenses. Led the firm's corporate initiatives to expand business with the mining, and oil and gas industries, including a joint venture with Integrated Software Systems, LLC (ISS) and membership on the ISS Board of Directors. As President of publicly traded Harding Lawson Associates Group, Inc., (NASDQ:HLAG) served as a member of HLAG's Management and Operating Committees, and several other focused steering committees, including the Information Management Steering Committee, the Y2K Compliance Committee and the Risk Management Committee. Also served as Chairman of the Board for HLA-Envirosciences Pty. Ltd., HLA's Australian subsidiary. Dr. Riese was very active with the firm's clients. As Program Director or Executive Client Sponsor, he provided strategic leadership and technical guidance for major federal and industry clients. As a Consulting Vice President, he assisted clients with strategic planning, litigation support and expert witness services.

Senior Vice President, Central Region Manager
June 1992 - December 1996
Responsible for Harding Lawson Associates' (HLA's) Central Region Operating Unit encompassing 14 states, with seven offices in Albuquerque, New Mexico; Denver and Grand Junction, Colorado; Helena, Montana; Houston, Texas; Phoenix, Arizona; and Salt Lake City, Utah. Additionally responsible for HLA's firm-wide Remedial Engineering Design Center, Construction Division, and Risk Assessment practice. Combined financial responsibilities resulted in $30 million annual gross revenues, operating margins of 25% of net revenues, and return on net assets (RONA) consistently above 25%. Led the firm's corporate initiatives to penetrate the mining industry, including a joint venture with Integrated Software Systems, LLC (ISS) and membership on ISS' Board of Directors. Led the firm's corporate initiative to expand oil & gas industry sector revenues. Achieved growth rates in excess of 70 percent for both industry sectors on a year over year basis. Serves on HLAG's Management and Operating Committees, and several other focused steering committees. As Program Director or Executive Sponsor, he provided strategic leadership and technical guidance for major DOD and DOE federal contracts, including the

No comments

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

Rocky Mountain Arsenal, Rocky Flats, the Grand Junction Project Office and significant petroleum and mining industry accounts.

Vice President and Profit Center Manager
May 1989 - May 1992
Denver Office Manager responsible for continued growth of the office from 10 to 140 professionals and $20 million in gross revenues with operating margins in excess of 25% of net revenues. Responsible for all aspects of profit center management, including business planning, financial management, operations, administration, project management, marketing, technical disciplines, health and safety, and quality assurance/quality control. Planned and implemented an organizational structure that incorporated health and safety, quality assurance/quality control, human resources, contracts management, subcontracts management and purchasing, information systems management, project coordination, and records management. Performed as one of HLA's representatives in the joint venture design team with Oracle Corporation to develop the Oracle Project Accounting System, a fully integrated project accounting MIS. Guided the re-engineering and integration of office administrative and technical group resource utilization planning with project management control systems to optimize productivity of staff, efficiency of office operations, and performance and quality of services to projects and clients. Program Manager and Program Director for a $100 million Department of Defense (DOD) prime contract at the Rocky Mountain Arsenal Superfund Site to provide technical services (RI/FS) and perform interim response actions (IRAs). Initiated the creation of the firm's Remedial Design Center. Served on the firm's Management Committee for firm-wide strategic planning.

Managing Principal Geochemist/Hydrogeologist and Profit Center Manager
March 1987 - April 1989
Denver Office Manager and Principal-in-Charge for office of 45 professionals with gross revenues of $8 million and operating margins in excess of 30% of net revenues. Responsible for all aspects of planning, financial performance, operations, marketing, technical group management, health and safety, and quality assurance/quality control. Project Manager and Program Manager for a $25 million DOD prime contract at the Rocky Mountain Arsenal providing remedial investigation, feasibility study planning and groundwater monitoring. Developed prime contract administrative management and reporting procedures including, estimating, cost and schedule controls, contract management and subcontract management, data management and records management. Also performed as Project Manager and Technical Consultant for several potentially responsible parties (PRP) led Superfund site investigations, remedial actions and voluntary response actions.

Atlantic Richfield Company, (ARCO) Los Angeles, California
Manager of Technology Planning and Technology Transfer
Senior Planning Analyst, Corporate Planning
August 1985 - March 1987
Responsible for identifying business leveraging technologies and evaluating their impact on the ARCO's nine subsidiary company's revenues. Performed economic evaluations for capital planning and construction of a $2 billion natural gas to gasoline processing plant to be located in the Gulf Coast, Alaska or Malaysia. Participated in business development,

No comments

planning, and performed resource and economic evaluations for natural gas processing options, including natural gas to liquid fuels options and enhanced oil recovery processes. Participated as a member oil price planning team. Transferred viable exploration, production and refining technologies to appropriate operating company subsidiaries. Key participant in identifying, evaluating, and implementing inter-company programs addressing environmental issues and reservoir process technologies. Recipient of the National Planning Award.

Technical Coordinator, Corporate Technology
July 1984 - August 1985
Program and Project Manager for "Major Projects" for ARCO Alaska and for the ARCO's Domestic Oil and Gas Company. Responsible for assessing impacts of new technologies on ARCO's subsidiary businesses, planning, initiating and managing research programs for petroleum exploration and production. Provided expert testimony for the Prudhoe Bay arbitration hearings concerning permeability, porosity, oil viscosity, and reservoir pressures, to determine ownership of ongoing oil production and 37 trillion cubic feet of natural gas reserves. Evaluated R&D projects based on Return on Investment (ROI). Project leader for a multidisciplinary group conducting reservoir characterization and enhanced recovery production research and modeling for North Slope reservoirs. Served as Technical Coordinator for external research programs supporting nine subsidiary company R&D centers and 10 universities. Also provided geochemical consultation to operating company districts on oil well completion technology and formation damage problems. Principal responsible for identifying evaluating, and implementing inter-company programs addressing environmental issues and reservoir process technology. Corporate representative for the Petroleum Environmental Research Forum. Responsibilities required skills in project management, financial management, planning, budgeting, scheduling, and supervision of staff.

Gulf Oil Corporation
Gulf Research and Development Company
Research Geochemist, Production Research Center, Houston, Texas
July 1983 - July 1984
Project Leader for Fluid-Rock Integration research program area in reservoir engineering department. Developed and applied geochemical techniques to petroleum exploration, reservoir characterization, and reservoir simulation and enhanced oil recovery processes. Designed well completion fluids for onshore and offshore oil and gas wells. Developed integrated geochemical reservoir production and interactive seismic interpretation systems for reservoir analysis. Responsibilities included all phases of project planning, budgeting, interpretation, and management. Served as Acting Director and supervised staff.

Research Geochemist, Project Geologist
Chemicals and Minerals Division, Lakewood, Colorado
September 1979 - July 1983
Project Leader responsible for development and application of geochemical and hydrologic computer models for mineral exploration, and prediction of contaminant transport from uranium mill-tailings sites and oil shale retorts. Provided testimony for hearings before the New Mexico Environmental Protection Division concerning the permitting of the Mt. Taylor uranium tailings impoundment and the fate and transport of uranium and other

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

metals and radionuclides. Supervised GR&DC Laboratories in Golden, Colorado, and the laboratory was licensed for up to one gram of radium.

Project Geologist responsible for exploration and property evaluations in the Rocky Mountain States and Pacific Northwest for underground coal gasification. Managed projects from exploration through development phase. Evaluated geochemical aspects of coals and combustion by-products for impacts to groundwater and the environment. Supervised drilling programs, temporary staff, and provided inter-company consulting.

Geochemist, Chemicals and Minerals Division, Harmarville, Pennsylvania
August 1978 - August 1979
Developed and implemented geochemical, hydrologic and statistical models for describing insitu uranium leach and groundwater restoration systems, including the dissolution, transport, precipitation and sorption of uranium and attending metals and radionuclides. Responsibilities included project planning, budgeting, management, and monitoring university contracts.

Nord Resources, Inc., Albuquerque, New Mexico
Geologist
June 1975 - September 1975
Responsible for the field supervision and organization of drilling crews, and geologic sampling of base metal terrains in northern Canada. Conducted gravity and magnetic surveys on properties in northern New Mexico.

New Mexico Bureau of Mines and Mineral Resources, Socorro, New Mexico
Assistant to the State Petroleum Geologist
November 1973 - June 1975
September 1975 - August 1976
Responsible for well-log interpretation and oil and gas reserve estimations for selected fields in the Delaware Basin. Conducted subsurface geologic and hydrogeologic studies utilizing E-logs for the proposed Waste Isolation Pilot Plant (WIPP) site.

No comments

No comments

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

EXPERT TESTIMONY EXPERIENCE

Gulf Oil Corporation v. New Mexico Department of Environmental Quality; **Environmental Hearing, Santa Fe, New Mexico.**

The United States of America and The State of Colorado v. Protex Corporation; **United States District Court for the District of Colorado.**

Mobil, Phillips, Chevron v. ARCO, Exxon, Sohio; **Arbitration Hearing, Seattle Washington and Anchorage Alaska.**

Union Carbide Corporation v. Aetna Casualty and Surety Company, et al.; **Superior Court, United States District of Danbury, Danbury Connecticut; Case Docket CV 88-0294989(S).**

Connor Cattle Company, Inc. v. Thiokol Corporation; **First Judicial District Court, Box Elder County, State of Utah; Case Number CV980100145PD.**

Eagle Shadow Metropolitan District v. Starlight Resources, LLC and Treasurer of Adams County, Colorado; **District Court, County of Adams, State of Colorado; Civil Action No. 00-CV-487.**

National Warehouse Investment Company v. IT Group, Inc. and Groundwater Technology, Inc.; **United States District Court; District of Utah, Central Division; Case No. 2: 00CV-0345 ST.**

The Pinal Creek Group, et al., v. Newmont Mining Corporation, et al.; **United States District Court; District of Arizona; Civil Action No. 91-1764 PHX DAE (LOA), Expert Witness.**

The Pinal Creek Group, et al., v. Newmont Mining Corporation, et al.; **United States District Court; District of Arizona; Civil Action No. 91-1764 PHX DAE (LOA), R.Civ.P. 30(b)(6) Witness.**

K.C. 1986 Limited Partnership v. Reade Manufacturing, et al.; **United States District Court; District for the Western District of Missouri, Western Division; Civil Action No. 02-0853- CV-W-NKL.**

U.S. Borax, Inc. v. Royal Insurance Company et al.; **San Francisco Superior Court Case No. CGC-05-444742.**

Consolidated Aluminum Corporation v. Alcoa, Inc., as successor to and d/b/a Reynolds Metals Company, d/b/a Lake Charles Carbon; **United States District Court for the Southern District of New York; Case No. 03-CV-5973**

No comments

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

ACADEMIC EXPERIENCE

University of Colorado at Denver and Health Sciences Center, Denver Colorado
College of Engineering and Applied Science
Engineering Advisory Council
April 1999 – 2007
Industry Executive providing advice on strategic planning for the College, Engineering Curriculum, and special projects including the Bio-Engineering Center and the Colorado Advanced Photonics Technology Center.

Colorado School of Mines, Golden Colorado
Advisor to College President and Trustees
Environmental Science and Engineering Division
August 2001 – January 2005
Industry Executive providing advice on strategic planning for the Environmental Science and Engineering Division and Chemistry and Geochemistry Departments.

Colorado School of Mines, Golden Colorado
Affiliate Faculty
September 1989 - May 1994
Industry representative sitting graduate (M.S. and Ph.D.) committees in the Chemistry and Geological Engineering Departments.

University of Texas, Austin Texas
Affiliate Faculty
September 1983 - February 1987
Industry representative for graduate (M.S. and Ph.D.) committees in the Department of Chemical Engineering and Petroleum Engineering.

Colorado School of Mines, Golden, Colorado
Visiting Faculty/Research Associate
September 1979 - June 1982
Principal investigator for research concerning the geochemical controls on uranium radium, thorium, and other metals migration in groundwater and surface water. Developed predictive computer models for complex metal ion adsorption on mineral surfaces.

New Mexico Institute of Mining and Technology, Socorro New Mexico
Research Assistant
May 1977 - August 1978
Conducted research in aqueous geochemistry and mineralogy leading to the development of improved leaching methods for copper and uranium ores. Investigated aspects of environmental chemistry controlling the distribution of trace elements in the Rio Grande River.

Teaching Assistant
September 1976 - May 1977
Instructor for general chemistry and intermediate organic chemistry laboratories.

No comments

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

REGISTRATIONS AND CERTIFICATIONS

Certified Professional Hydrogeologist, No. CHG-760, American Institute of Hydrology, 1988

Certified Professional Geological Scientist, No. 7232, American Institute of Professional Geologists, 1986

Licensed Professional Geologist – Michigan, 1999, in preparation.

Licensed Geologist - North Carolina 1988, No. 190, Utah 2004, No. 5557291-2250

Certified Professional Geologist - South Carolina 1987, No. 639, Arkansas 1988, No. 365, Florida 1989, No. 489, Wyoming 1992, No. PG 1286, Missouri 1996, No. 0265

Registered Professional Geologist - Tennessee 1989, No. 673

Professional Geologist - Wisconsin 1998, No. 1059, Nebraska 1999, No. GO-179

Registered Geologist - Texas 2003, No. 6372

HONORS AND AWARDS

2004 – 2005. Who's Who Empowering Executives and Professionals, 2004-2005 Honors Edition.

2004 – 2005. Who's Who in the World, 21st Edition, published by the Marquis Who's Who Publication Board.

2003. Wall of Fame – Lifetime Achievement Award from the Colorado School of Mines Department of Chemistry and Geochemistry. This was the first time this award had been given.

2003 – 2004. Who's Who in Science and Engineering, 7th Edition, published by the Marquis Who's Who Publication Board.

2002 – 2003. Who's Who in Science and Engineering, 6th Edition, published by the Marquis Who's Who Publication Board.

2001 – 2002. Who's Who in America, 56th Edition, published by the Marquis Who's Who Publication Board.

2001 – 2002. Who's Who in America, 55th Edition, published by the Marquis Who's Who Publication Board.

2000 – 2001. Who's Who in Science and Engineering, 5th Edition, published by the Marquis Who's Who Publication Board.

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

2000 - 2001. Who's Who in the West, 27th Edition, published by the Marquis Who's Who Publication Board.

2000 – 2001. Millennium Edition of Strathmore's Who's Who.

1999 – 2000. International Who's Who of Professionals.

1996 - 1997. Who's Who in Science and Engineering, Third Edition, published by the Marquis Who's Who Publication Board.

1996 - 1997. Who's Who in Finance and Industry, 29th Edition, published by the Marquis Who's Who Publication Board.

1996 - 1997. Who's Who in the West, 25th Edition, published by the Marquis Who's Who Publication Board.

1994 - 1995. Who's Who in Executives and Professionals, National Director, published by the Marquis Who's Who Publication Board.

1994 - 1995. Who's Who in Finance and Industry, 28th Edition, published by the Marquis Who's Who Publication Board.

1994 - 1995. Who's Who in the West, 24th Edition, published by the Marquis Who's Who Publication Board.

1995. HLA Technical Excellence Award.

1994. Engineering Excellence Award, environmental category, American Consulting Engineers Council, for design of the Rocky Mountain Arsenal Offpost Groundwater Extraction, Treatment, and Recharge System.

1994. HLA Technical Excellence Award.

1993 - 1994. Who's Who in the World, published by the Marquis Who's Who Publication Board.

1992 - 1993. Who's Who in the West, 23rd Edition, published by the Marquis Who's Who Publication Board.

1991. Engineering Excellence Award, environmental category, Colorado Consulting Engineers Council, for design of the Rocky Mountain Arsenal Hydrazine Wastewater Treatment System.

1991. HLA Technical Excellence Award.

1986. National Planning Award, from American Association of Strategic Planners, Atlantic Richfield Corporate Planning Group.

No comments

No comments

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

1986. Invited Session Chairman, Symposium on the Origin and Evolution of Brines in the Subsurface, 192nd ACS Annual Meeting, Anaheim, California.

1985. Session Chairman, Simulator Development, NIPER Reservoir Characterization Conference, Dallas, Texas.

1981. Invited Speaker, Special Session, GAC-MAC-CGU Annual Meeting, Calgary, Canada.

1979. Invited Speaker, Workshop on Geochemistry of Nuclear Waste Management, AECL Whiteshell Nuclear Research Establishment, Pinawa, Manitoba, Canada.

1976. Named among the top 100 geology students by the National Association of Geology Teachers and the U.S. Geological Survey.

MEMBERSHIPS

American Academy for the Advancement of Science
American Association of Petroleum Geologists
American Consulting Engineers Council (Consulting Engineers Council of Colorado)
American Chemical Society
American Geophysical Union
American Institute of Mining Engineers
American Management Association
Geochemical Society
Geological Society of America
National Association for Groundwater Scientists
National Water Well Association
Sigma Xi
Society of Economic Geologists

PATENTS

1994. U.S. Patent Pending, Method and Apparatus for Removal of Radionuclide Contaminated Materials by Enhanced Solvent Extraction (with Catherine Armstead, William Heins, and Lanny D. Weimer).

1988. U.S. Patent, Metal Value Recovery: Patent No. 4,765,827, August 23 (with Thomas J. Clough and John W. Sibert).

1987. U.S. Patent, Metal Value Recovery from Carbonaceous Ores: Patent No. 4,801,329, January 31 (with Thomas J. Clough and John W. Sibert).

No comments

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

PUBLICATIONS AND PRESENTATIONS

See Attached List.

REPRESENTATIVE PROJECTS

See Attached List.

No comments

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

PUBLICATIONS AND PRESENTATIONS

2008. Death Valley Springs Geochemical Investigation Yucca Mountain Nuclear Repository (in preparation with John D. Bredehoeft and Michael King).

2007. Determining the Feasibility of Producing Coal-Bed Methane. (in prep.)

1999. Geologic, Hydrogeologic, and Geochemical Characterization of the North Carolina Low-Level Radioactive Waste Repository Utilizing 3-D Computer Visualization Techniques. (in prep.)

1994. Evaluation of a pilot-scale solvent extraction study performed on Rocky Mountain Arsenal soil (with C. E. Armstead, M. A. Dahm, and M. R. Colsman).

1994. Assimilation - sorption studies and modeling to develop appropriate and applicable analytical methods at Rocky Mountain Arsenal.

1994. Field optimization of groundwater extraction and recharge: design re-evaluation during system construction and startup, Rocky Mountain Arsenal.

1993. Evaluation of solvent extraction for removal of organochlorine pesticides from Rocky Mountain Arsenal (with C. E. Armstead, M. R. Colsman, and B. Wachob).

1993. Fate and transport studies and analytical method development for hydrazines at Rocky Mountain Arsenal. Presented at the ACS Special Symposium, Atlanta, Georgia, September 27 to 29. (with M. R. Colsman, R. A. Howe, J. E. Kilduff, E. L. Miller, and G. R. Mohrman).

1991. Regional ground-water flow model at Rocky Mountain Arsenal. Submitted to the 15th Annual Army Environmental R&D Symposium, Williamsburg, Virginia, June 25 to 27.

1991. A systematic approach to analytical method development for NDMA and hydrazine fuel compounds. Submitted to the 15th Annual Army Environmental R&D Symposium, Williamsburg, Virginia, June 25 to 27.

1991. Soil vapor extraction for odor control and chemical mass removal from Basin F solids at Rocky Mountain Arsenal, Commerce City, Colorado. Submitted to the 15th Annual Army Environmental R&D Symposium, Williamsburg, Virginia, June 25 to 27.

1991. Development of optimal treatment processes and operational procedures for treatment of hydrazine wastewater. Submitted to the 15th Annual Army Environmental R&D Symposium, Williamsburg, Virginia, June 25 to 27.

1991. Offsite remediation of contaminated alluvial ground water at Rocky Mountain Arsenal: pilot-scale testing results applied to full-scale design. Submitted to the 15th Annual Army Environmental R&D Symposium, Williamsburg, Virginia, June 25 to 27.

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

1990. Selecting a chemical oxidation/ultraviolet treatment system and successful treatment of hydrazine wastewater at RMA. Presented at the Hazardous Materials Control Research Institute, Superfund 90 Conference, Washington, D.C. (with R. T. Jelinek and K. R. Cain).

1988. Prediction of geochemical formation damage in the Vicksburg Formation of south Texas: Society of Petroleum Engineers, SPE 18132, pp. 273-282. Presented at the 63rd Annual Technical Conference and Exhibition of SPE, Houston, Texas, October 2 to 5 (with W. C. Riese).

1988. Origins and mechanisms of formation damage. Submitted to AAPG 1988 National Meeting, Houston, Texas (with R. S. Schechter and W. C. Riese).

1987. Geochemical modeling applied to the analysis of formation damage with an example from the Gulf of Mexico. AAPG Research Conference on Prediction of Reservoir Quality, Park City, Utah (with W. C. Riese and M. H. Reed).

1986. The surface properties of birnessite and quartz (with J. G. Catts) (in prep).

1986. Hydroxyaluminum solution behavior determined by NMR. Presented at the 61st Annual Technical Conference of SPE, New Orleans, Louisiana (with R. H. Lane, C. G. S. Eley, and N. Pinsky).

1986. Geochemical modeling applied to the analysis of formation damage with an example from the Gulf of Mexico. Presented at the GSA Annual Meeting, San Antonio, Texas (with W. C. Riese and M. H. Reed).

1985. The thermodynamic properties of radium. *Geochem. Cosmochem.* Acta, Vol. 49, No. 7, pp. 1593-1601 (with D. Langmuir).

1983. Adsorption of thorium onto quartz and kaolinite: Effect of hydroxyl and sulfate complexing. *Abstracts with Programs*. Presented at the 184th ACS Annual Meeting, Seattle, Washington (with D. Langmuir).

1983. Barite-radium sulfate solid solution: Solubility control on Ra-226 mobility in uranium mill tailings and saline groundwater from a potential nuclear waste repository. *Abstracts with Programs*. Presented at the 96th GSA Annual Meeting, Indianapolis, Indiana (with D. Langmuir and D. C. Melchior).

1982. Modeling adsorption of aqueous U, Th, Ra, and Pb onto some oxides and silicates. *Abstracts with Programs*. Presented at the 183rd Annual Meeting, Las Vegas, Nevada (with J. G. Catts, C-K. D. Hsi, and D. Langmuir).

1982. Who (if anybody) contaminated the groundwater? Presented at the NWWA Conference on Practical Groundwater Monitoring Considerations for the Mining Industry, Denver, Colorado, Groundwater Monitoring Review, Vol. 3, No. 1, p. 149 (with D. Langmuir).

No comments

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

1982. The mobility of radium in groundwater. *Abstracts with Programs.* Presented at the 94th GSA Annual Meeting (with D. Langmuir).

1982. Adsorption of radium and thorium onto quartz and kaolinite: A comparison of solution-surface equilibria models. Ph.D. dissertation, Colorado School of Mines, Golden, Colorado, 292 pp.

1981. The effect of complexing on thorium adsorption from natural waters at low temperatures. Geological Association of Canada - Mineralogical Association of Canada - Canadian Geophysical Union Annual Meeting, Calgary, Canada (with D. Langmuir).

1981. Geochemical modeling of radionuclides and chemical species transport in subsurface waters: Application to uranium mill tailings. Geological Association of Canada - Mineralogical Association of Canada - Canadian Geophysical Union Annual Meeting, Calgary, Canada (with D. Langmuir).

1980. Experimental and theoretical study of uranium in-situ solution mining with H_2SO_4. Presented at the AIME Annual Meeting, Dallas, Texas. Submitted to the SPE (with G. J. Harloff).

1980. Application of solution-mineral equilibrium chemistry to the solution mining of uranium ores. New Mexico Bureau of Mines and Mineral Resources, Memoir No. 38, pp. 344-358 (with C. J. Popp).

1979. Geochemical controls on the migration of uranium and thorium in natural groundwater. *Abstracts with Programs.* Presented at the Workshop on the Geochemistry of Nuclear Waste Management, AECL Whiteshell Nuclear Research Establishment, Pinawa, Manitoba, Canada (with D. Langmuir).

1978. An application of solution-mineral equilibrium chemistry within the system K_2O-Na_2O-Al_2O_3-SiO_2-H_2O to the solution mining of uranium ores. M.S. thesis, New Mexico Institute of Mining and Technology, Socorro, New Mexico, 150 pp.

No comments

No comments

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

REPRESENTATIVE PROJECTS

Deepwater Horizon Incident – Technical Consultant assisting with Mississippi Canyon #252 exploration well in the Gulf of Mexico. Client: Confidential

Allocation of Response Costs – Expert Witness responsible for evaluating and testifying regarding remedy design, remediation, remedy cost evaluation, and cost allocation of past and future costs associated with the cleanup of PCBs at an aluminum refinery in Louisiana. Client: Confidential

Sulfur Mine RIFS and Response Actions - Third Party Technical Review – Technical Consultant responsible for providing independent, third-party reviews, comments, cost estimates and recommendations for work plans, reports, designs, procurement documents, construction bid and contract documents, construction plans, and regulatory documents and correspondence a variety of Interim Response Actions for acid neutralization and metals removal at an abandoned CERCLA copper mine site in the Sierra Nevada Mountains. Services include recommendations on the various technical and design elements for the various storm water management, contaminant containment, water treatment, collection and conveyance systems, as well as waste pile, heap leach pad and pond reclamations. Also provide technical review, recommendations and cost evaluations for the Remedial Investigation Feasibility Study (RIFS), Administrative Orders, Scopes of Work and other correspondence with USEPA and the State of Nevada NDEP and other stakeholders and Trustees. Client: Confidential

Smelter Slag Characterization and Evaluation – Consulting Expert responsible for providing technical review and critique of the utility of copper smelter slag for industrial and building materials. Review focused on the physical and chemical characterization the slag for specific commercial uses and developing economic models for processing, transportation and sale. Client: Confidential

Allocation of Response Costs – Consulting Expert responsible for providing technical review and critique of proposed remedial actions, independent reclamation cost estimates and development of cost allocation for past and future costs associated with the cleanup of a 75 year old copper mine in northern Nevada. The preferred remedy included the removal of approximately one million cubic yards of mining materials from various valley bottom tailings ponds to an on-site repository with concomitant water treatment and restoration of the valley and Creek to the confluence of the Owyhee River above tribal lands. Performed cost allocation among PRPs for owner operator liability over an eighty year period based on operational practices, toxicity and impacts to the environment. Provided third party technical review of settlement proposals, proposed plan, remedial designs and bidding to a design-build contractor as an insured fixed price contract. Client: Confidential

Bioreactor Treatment for Acid Mine Drainage – Third Party Technical Review – Technical Consultant responsible for providing independent review, comments and recommendations for the operation of a compost-free bioreactor treatment system for the treatment of AMD. The bioreactor relies on sulfate reducing microorganisms, to reduce sulfate to sulfide to precipitation metal sulfide sludge. The bioreactor operates remotely through the winter months with power from a propane powered generator set coupled with

No comments

battery banks to reduce generator dependence. The system is monitored remotely by telemetry and requires O&M visits once per month. Client: Confidential

Waste Water Treatment Plant for Acid Mine Drainage - Third Party Technical Review – Technical Consultant responsible for providing independent, third-party reviews, comments, and recommendations for work plans, reports, designs, procurement documents, construction bid and contract documents, construction plans, and regulatory documents and correspondence for an AMD High Density Sludge Treatment Plant for acid neutralization and metals removal at an abandoned CERCLA copper and sulfur mine site in the Sierra Nevada Mountains. Services include process recommendations on the various technical and design elements for the treatment system, and collection and conveyance systems, as well as recommendations for the operations, reliability, and treatment performance, operational issues, design considerations, constructability. Also provide recommendations for the Remedial Investigation Feasibility Study (RIFS), Administrative Orders, Scopes of Work and other correspondence with USEPA and the State of California RWQCB and other stakeholders and Trustees. Client: Confidential

Reclamation Cost Estimates – Consulting Expert responsible for providing reclamation costs for reclamation bonds and estimates supporting Bona Fide Prospective Purchaser costs for a non-operating copper mine in southern Nevada. Costs included numerous options under NDEP and EPA regulatory frameworks and underground and open pit mining scenarios. Client: Confidential

Nuclear Waste Repository – Technical Consultant responsible for evaluating far-field issues related to the potential transport, by groundwater, of radionuclides from the Yucca Mountain High Level Nuclear Waste Repository into Death Valley. The evaluation of a potential connection between the Lower Carbonate Aquifer which underlies the repository and the biosphere, involved the geochemical study of spring waters and groundwaters in the Death Valley mountain blocks utilizing major element, trace element, radionuclide and isotope chemical compositions of the springs and regional groundwaters in conjunction with regional geologic conditions. Client: Confidential

Insurance Litigations – Technical Consultant and Consulting Expert responsible for apportionment among several third party defendants and their insurers for recovery of defense and response costs incurred by a potentially responsible party at a CERCLA mine site for six separate actions in three state courts and federal court. Applied decision analysis techniques to estimate the value of future remediation costs, and other uncertainties, including the time value of money, magnitude of contaminated material, failure of potential treatment technologies, potential migration of contamination, litigation risks and transaction costs; applied decision tree analysis and Monte Carlo simulations to evaluate the potential range of outcomes for litigation and settlement discussions. Client: Confidential

Chromium and Nickel Plating Facility, Colorado – Technical Consultant responsible for evaluating compliance with various regulatory frameworks, including RCRA, NFPA OSHA and DOT. Evaluated wastewater treatment of process waste streams, regulatory compliance programs, hazardous materials management plan, hazardous materials inventory and permitting with regard to flammability, reactivity and toxicity of hazardous substances. Provided support to counsel for negotiation of compliance order. Client:

No comments

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

Confidential

Chromium Remediation at a Former Gas Processing Plant – Technical Consultant responsible for peer review of groundwater remediation system consisting of a hydraulic containment system of approximately 40 wells and a chromium (VI) reduction field pilot study. Client: Confidential

Herbicide Manufacturing Facility, Kansas City, Missouri – Expert Witness responsible for evaluating various allocation methodologies appropriate for apportioning CERCLA response costs among the various owners and operators at one of the largest herbicide manufacturing and blending facilities in the country. The facility has been in operation since the beginning of the century handling hundreds of different chemicals and coined the word Herbicide© for one of its products. Final allocation methodology involved a detailed technical evaluation of numerous equitable factors including the toxicity and mobility of arsenic (III) and arsenic (V), 2,4-D, 2,4,5-T and Pentachlorophenol, standard of care, cooperation with the government and other mitigating or aggravating factors. Other contaminants evaluated included mercury, cadmium, lead, and thallium. Provided deposition and trial testimony. Client: U.S. Borax, Inc.

Gas Station Site, Nederland, Colorado – Consultant and Expert Witness responsible for evaluating site characterization, risk assessment, engineering design, construction, and start-up operations of a hydrocarbon contaminated site alleged to have caused offsite contamination and personal injury to employees at adjacent businesses. Evaluation included the fate and transport of hydrocarbons in groundwater, soil vapor and from stack emissions from an air sparging and soil vapor extraction remediation system. Client: Confidential.

Pinal Creek Mine Site, Miami, Arizona – Expert Witness responsible for evaluating various allocation methodologies, including copper production and metals loading to the Pinal Creek aquifer system, for proportioning past and future response costs for the Miami Copper Company mine in Miami, Arizona. Response costs are estimated to be in excess of $450 million. Evaluation included assessment of hydrologic and chemical inputs from the Smelter, acid plant, various tailings piles and disposal ponds since 1915, as well as consumption of the acid neutralization capacity of the Pinal Creek aquifer. Developed a chemical mass loading and transport analysis of releases from smelter-related wastes to assess impacts of the International Smelter to the Pinal Creek aquifer. Metals of concern included iron, aluminum, manganese, zinc, copper, cadmium, and antimony. Client: Confidential.

Pinal Creek Mine Site, Miami, Arizona – 30(b)(6) Witness for Atlantic Richfield concerning the waste disposal practices of International Smelting and Refining Company, potential impacts to the environment from concentrates, flue dust, smelter waste water discharges and air emissions, industry standards and standard of care exercised during the period 1915 to 1960. Client: Confidential.

Water Supply Development – Technical Consultant responsible for the development of a new drinking water supply where the existing groundwater had become contaminated as a result of commercial and industrial activities on surrounding properties. Project involved the design and construction of a deep groundwater well in fractured terrain beneath the

No comments

contaminated aquifer. Client: Confidential.

Water Quality Evaluation – Technical Consultant responsible for the design and implementation of groundwater treatment system in a mountain community to supply whole house water supplies of potable quality water to a subdivision. Project included evaluation and treatment for metals, radionuclides, radon, bacteria and secondary water-quality criteria. Client: Confidential.

Water Rights Evaluation – Technical Consultant responsible for evaluating the cost and environmental considerations associated with the development of approximately 30,000 acre feet of water rights in the South Platte River Valley commensurate with the organization and formation of a new Municipal District. Client: Confidential.

Rocket Fuel Manufacturing Facility, Brigham City, Utah – Consultant and Expert Witness responsible for evaluating the environmental fate and transport of several contaminants of concern originating from the open burning of solid and hazardous wastes. Evaluation included assessment of impacts to human health and the environment, especially that to wild and domestic ruminants and a surrounding working cattle ranch. Hazardous wastes consisted of discarded gas generant or "accelerant" manufactured at the facility and used in motor vehicle air bag inflator assemblies. The wastes were composed of sodium azide, molybdenum disulfide and sulfur, were reactive, and mixed with various organic solvents. Assignment included evaluating the chemical transport mechanisms (oxidation, speciation, dissolution and precipitation) of combustion products present in the smoke aerosol, including aerial transport, condensation, deposition on plants and in soils, leaching and transport in the soil column and surface waters, followed by uptake by forbs and grasses for ultimate ingestion by cattle. Assessment included determination of background concentrations for metals and estimate of an affected area; contaminants evaluated included molybdenum, copper, cadmium, chromium, aluminum and perchlorate. Client: Connor Cattle Co.

Petroleum Contaminated Freight Terminal, Salt Lake City, Utah – Consultant and Expert Witness responsible for independently reviewing and evaluating the issues, activities, conditions and standard of care pertaining to the environmental investigations, site characterization and remedial activities conducted at the site. The purpose of this review and analysis was to develop and set forth opinions with regard to the appropriateness and utility of the site characterization, analysis of the means and methods utilized, and the consequences of these activities in developing, designing, constructing and operating a liquid hydrocarbon removal and soil vapor extraction system as a part of the overall remedial strategy for the site. Client: Confidential.

West Elk Mine, Somerset, Colorado – Technical consultant for the mitigation of a large active landslide near Somerset, Colorado. The project involved extensive landslide monitoring using surface monuments, slope inclinometers, and piezometers and interpretation of the data for prediction of rates of movement and time to failure. The project involved the design and construction of tiebacks and a roller compacted concrete buttress to arrest landslide movements in the critical production corridor of the mine. It further involved the design and construction of dewatering systems. Client: ARCO Coal Company.

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

Summitville Mine Site, Summitville, Colorado – Consultant to defendant and counsel for hydrologic and geochemical assessment of environmental impacts resulting from naturally occurring, historical mining, and recent mining activities. Assessments centered on surface and ground water impacts resulting from acid mine drainage, copper and cyanide contamination from open-pit and cyanide heap leaching facilities, as well as underground mining operations dating back to 1873. Assessments included evaluations of mine adit plugging, open-pit reclamation and capping, surface seepage, waste rock disposal water treatment and impacts to the Alamosa river valley, Terrace reservoir and downstream agricultural lands. Evaluated the utility and efficiency of the year-round water treatment facilities operated by Summitville Consolidated Mining Company and the U. S. Environmental Protection Agency and its contractors, in support of a Title 18 False Claim suit. Provided litigation support to counsel as principal consultant responsible for identifying and managing the activities of more than 12 expert witnesses over a period of 2.5 years. Provided review and comment on the government's Use Attainability Study, Data Evaluations, RI/FS, and Reclamation Planning. Developed an allocation model for counsel for all owners and operators of the mine site since 1873. Client: Confidential

Oil Field Impacts to Municipal Water Wells, North Denver, Colorado – Expert Witness responsible for assessing and opining on the possibility for future environmental impacts of a producing oil and gas field on municipal water wells in the Laramie Fox-Hills aquifer system. The aquifer in question presently serves an existing development in North Denver and was the proposed water source for a larger new development. Client: Confidential

Uranium Mill and Tailings Site Reclamation Project, Moab, Utah – Technical Consultant for the reclamation of a 130-acre tailings impoundment located adjacent to the Colorado River in Moab, Utah. Project involved the characterization of groundwater and surface-water contamination, assessment of human health and ecological risks related to releases of uranium and other mill tailings by-product materials, and the evaluation of engineering alternatives for the reclamation of the tailings impoundment and the remediation of contaminated groundwater and surface water. Activities on this project involved considerable interaction with the U.S. Environmental Protection, the Utah Department of Environmental Quality, the Nuclear Regulatory Commission on the Environmental Impact Studies and the U.S. Fish and Wildlife Service relative to the administration and enforcement of the Endangered Species Act. Client: Atlas Mining

Rocky Mountain Arsenal (RMA), Denver, Colorado - Program Manager for the $50 million RMA Technical Support Contract. Responsibilities included technical and regulatory strategy, and overall project direction and management of tasks that supported (1) conducting a Remedial Investigation/Endangerment Assessment/Feasibility Study (RI/EA/FS) program consistent with CERCLA and Superfund Amendments and Reauthorization Act (SARA) legislation and ongoing litigation, (2) evaluating alternatives and implementing cleanup measures that were specified in the Record of Decision for the offpost operable unit, (3) evaluating innovative and emerging technologies at the bench- and pilot-scale phase for unique application or treatment of RMA wastes, and (4) designing and implementing Interim Response Actions (IRAs), which emerged from ongoing litigation, before the final decision on remediation of RMA. RMA, a National Priorities List site, was established in 1942 and has been used to manufacture chemical and incendiary

No comments

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

munitions as well as chemical ordinance demilitarization. Private parties at the site manufactured pesticides and herbicides containing arsenic and mercury among other constituents.

Specific duties as Deputy Program Manager included providing technical and administrative direction and guidance to HLA task managers and program support staff, preparing and defining scopes of work, cost estimates, and schedules, negotiating delivery orders and modifications with the Contracting Officer, conducting monthly technical and performance review meetings with the Army, reviewing monthly cost/schedule status reports, conducting technical and QC reviews, auditing HLA's performance, and conducting presentations to stakeholders involved in the RMA program. Specific delivery order projects included (1) Offpost Operable Unit (OU) remedial investigation (RI), endangerment assessment (EA), FS, and ROD preparation; (2) Offpost OU IRA groundwater extraction/treatment/recharge system treatability studies, design, and engineering services during construction; (3) Offpost OU monitoring well installation, sampling, and analytical program; (4) treatability studies program in support of the Onpost OU FS (treatability studies included evaluating subsurface drains, 12 aquifer pumping tests, UV/chemical oxidation treatment of contaminated groundwater, and SVE for removal of mass and odor-causing chemicals from near the Basin F waste pile); (5) Emerging Technologies Evaluation Program where bench-scale treatability studies were performed using aqueous soil washing and solvent extraction processes to provide input to the onpost FS with respect to reducing the potential 3,000,000 cubic yards of organochlorine pesticide-contaminated soil requiring remediation; in addition, 14 soil, groundwater, and contaminated building emerging technologies were evaluated under a similar format to the EPA Superfund Innovative Technology Evaluation (SITE) program; (6) installation wide onpost and offpost comprehensive (1800 wells) groundwater monitoring program; (7) installation wide data quality assessment including review of well construction, water quality, and water levels to support a vertical extent of contamination assessment; (8) in accordance with RCRA, management of soil, water, used personal protective equipment, and laboratory wastes from RMA sampling activities, including collection, transport, and storage; solidifying wastes; and operating, maintaining, and inspecting the Basin F IRA waste pile, tank farm, and surface impoundment structures; (9) implementation of Section 36 complex disposal trenches IRA including monitoring and annual reevaluation report; (10) Hydrazine Blending and Storage Facility IRA including treatability testing, design, construction, and operation of UV/chemical oxidation treatment process for removal of hydrazine rocket fuels and NDMA from rinse water; (11) evaluation of the 19.5-acre three cell Basin F waste pile, including assessments of the cover, leachate collection and removal systems, secondary liner, and response action plan; (12) pilot-scale evaluation of solvent extraction process for removal of pesticides from soil; (13) pilot-scale evaluation of SVE technology at 16 locations in Basin A, Basin F, and South Plants; (14) geotechnical soil boring program (98 soil borings, 340 geotechnical analyses) to evaluate the use of onsite low permeability soil for landfill cap, landfill liner, and structural borrow materials for construction of an onsite landfill; and (15) preparation of closure plans for Basin F IRA structures, including Pond A, Pond B, the tank farm, and the submerged quench incinerator. The standardized closure process included the decontamination, removal, restoration, and certification phases. Client: U.S. Department of the Army (The Army)

No comments

No comments

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

Rocky Mountain Arsenal, Denver, Colorado - Program Manager and Technical Consultant for $4.2 million IRA for decommissioning an abandoned hydrazine blending and storage facility. Design and construction of this project was awarded a 1991 "Engineering Excellence" award by the Consulting Engineers Council of Colorado. Project involved preparation of planning documents, bench- and pilot-scale testing of three vendor's ultraviolet/chemical oxidation treatment systems, design and construction of a state-of-the-art full-scale treatment system to treat 360,000 gallons of hydrazine wastewater to levels acceptable for discharge to a sanitary sewer system, and preparation of an implementation document for decommissioning. Resource Conservation and Recovery Act (RCRA) design requirements were incorporated in the facility. Extensive sampling of wastewater influent, effluent, and intermediate process effluent to analyze for hydrazine fuels, n-nitrosodimethylamine (NDMA), purgeable halocarbons, priority pollutant metals, pesticides, polychlorinated biphenyl's (PCBs), acid/base neutrals, and semivolatile organic compounds (SVOCs) was conducted. Extensive real and nonreal-time air monitoring and single release air modeling was performed. Ten wastewater batches were treated with full-scale system to non-detect and 100 part per trillion (ppt) levels for hydrazine fuel compounds and NDMA respectively. Client: U.S. Department of the Army (The Army)

Hotel, St. John, United States Virgin Islands – Technical Consultant for the design and construction of a $3,000,000 swimming pool, complete renovation and reconstruction of a 100,000 gallon per day reverse osmosis water treatment plant, and the design and construction of modifications for a 100,000 gpd tertiary, non-discharging wastewater treatment plant. Design and construction of the improvements were completed in four months for the re-opening of a 400-room luxury resort. The pool design won third place in the North American Pool Design Competition. Client: Westin Hotels

Electronics Manufacturing Facility, Colorado Springs, Colorado - Technical Consultant for an RFI and corrective action being performed in accordance with a Compliance Order on Consent with the Colorado Department of Health. The site investigation was performed to assess the nature and extent of soil, groundwater, and surface-water contamination in the vicinity of the facility. A health risk assessment was performed, indicating that the potential risk to human health and the environment was within acceptable EPA and state guidelines. A groundwater containment and treatment was designed to limit further migration of contaminated groundwater from the facility. Client: Hewlett-Packard Company

RCRA Corrective Action Project, Loveland, Colorado - Project Manager and Technical Lead for soil and groundwater contamination remediation project. Project involved soil and groundwater characterization, evaluation of human health and ecological risks, the evaluation of remedial alternatives and groundwater treatment technologies, and negotiations with the Colorado Department of Health and Environment. Client: Hewlett-Packard Company

Nationwide TSD Facility Audit Program – Technical consultant and investigator for a nationwide program of periodic audits of RCRA-permitted TSD Facilities in assure industrial clients that these facilities were operating and had operated in a manner that did not result in risk to generators from disposal of their regulated wastes. Clients: Confidential

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

No-Migration Variance Petition – Waste Isolation Pilot Plant, Carlsbad, New Mexico – Technical reviewer to assess the adequacy of the petition in addressing groundwater transport pathways for radionuclides as well as gas generation from mixed radioactive and hazardous waste proposed for disposal at the facility. Client: A.T. Kearney

RCRA Program Assistance – Provided technical consulting and review to EPA for implementation of Resource Conservation and Recovery Act (RCRA). Work involved review of applications for variances to requirements for groundwater monitoring and technical changes to regulations. Client: A.T. Kearney

North Carolina Low-Level Radioactive Waste Disposal Facility, Wake County, North Carolina – Licensed Geologist in responsible charge for assessing past technical and regulatory negotiation approaches to licensing a disposal site for low-level radioactive waste in North Carolina under their obligation to the Southeast Compact Commission. Recommended significant changes to the previous unsuccessful technical approach, project management and regulatory negotiation strategy. Client: North Carolina Low-Level Radioactive Waste Management Authority

Industrial Solvents Reclaiming Site, Winnebago County, Illinois - Principal Geochemist responsible for design and implementation of a program for obtaining soil chemistry, water quality, and treatment system performance data for the RI/FS. Assessed data collection and analytical techniques, and directed interpretive efforts related to source material definition. Also, assessed possible treatment efforts aimed at reducing toxicity and mobility in support of a potential de-listing petition; soil-gas and rock core sampling of unsaturated fractured dolomite bedrock to determine the nature and extent of remedial efforts that may require characterization of the nature and extent of groundwater contamination; evaluation of overlapping contamination resulting from adjacent sources; and evaluation of the performance of individual carbon treatment units installed at nearby residences that were using contaminated groundwater. Client: Confidential

48th and Holly Landfill, Commerce City, Colorado - Technical Consultant for the remedial design/remedial action (RD/RA) activities combining two operable units (OUs 3/6) at this Superfund site. HLA prepared a combined Work Plan/Remedial Design Report and submitted the final version to EPA on schedule. During the design phase, HLA performed extensive work to develop the evaluation of groundwater monitoring data including statistical evaluations. Within a month after EPA's approval of the report, HLA implemented the long-term groundwater-monitoring program on schedule to meet EPA's completion milestone for the overall site. Recognized by EPA for site accomplishments and successful working relationship with EPA. Clients: Browning-Ferris Industries of Colorado, Inc., and Burlington Northern Santa Fe

19th Avenue Landfill, Phoenix, Arizona – Technical Consultant for the site characterization activities covering approximately 125 acres, on the northern edge of the Salt River at 19th Avenue. This NPL site was previously mined by sand and gravel companies along a 7-mile stretch of the river to depths of 90 feet. The City of Phoenix took over several pits for use as waste disposal sites. Portions of the landfill which accepted waste for 25 years are within the 10-year flood plain of the Salt River, and in 1979 flooded, filling the pits and breaching the dikes, opening the landfill cells and caused refuse to wash into the river. Studies showed leachate was being generated and that saturation of the

No comments

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

waste was creating a methane explosion hazard to the adjoining community. Project required and RI/FS, EA and RD/RA. Client: Confidential

Various U.S. Department of Energy sites, Monticello, Utah - Technical Consultant for a multitask contract for the Grand Junction, Colorado, projects office. Work to date has included geophysical and hydrogeologic assessment for OU 1 at the Monticello Tailings Mill site, Utah; project management assistance relative to Idaho National Engineering Laboratory Environmental Restoration Program; geotechnical engineering evaluation of the uranium mill tailings waste repository landfill cell (Operable Unit 1) at the Monticello Uranium Tailings Mill site, Utah; regulatory compliance and permitting support for mobile treatment units (MTUs) developed for treatment of mixed waste at various DOE sites nationwide; ecological and human health risk assessment support for the Monticello Uranium Tailings Mill site evaluating the fate and transport and exposure to uranium, radium and other radionuclides, Utah, Operable Unit 3 RI/FS; technical support for preparation of EE/CA for OU 3 soil remediation; and wetlands delineation and ecological sampling. Client: RUST Geotech, Inc., for the U.S. Department of Energy

Industrial Solvents Reclaiming Site, Winnebago County, Illinois - Quality Assurance (QA) Manager for RI/FS and interim remedial measures. Supervised preparation of a Quality Assurance Project Plan (QAPP) and obtained approval of the plan from U.S. Environmental Protection Agency (EPA) Region V and the Illinois EPA. Directed data validation and quality control efforts for soil, waste, surface-water, groundwater, treated domestic water, and soil-gas data. Supervised technical training of staff and field and laboratory audits under the QA program. Client: Confidential

Syncrude Refinery, Colorado – Technical Consultant for full facility decommissioning and closure activities at an oil shale mining and refining facility in Colorado. Project included clean closing six RCRA permitted hazardous waste surface impoundments and design/build/operation of treatment facility for treating 25 million gallons of hazardous waste liquids. Developed and negotiated the regulatory strategy for investigating and cleaning more than 5 miles of the facility's industrial sewer system with the Colorado Department of Public Health and the Environment. Work with project team to developed and negotiate RFI strategy for 25 SWMUs. Provided construction and demolition services for dismantling oil shale retorting facility and provided RCRA training for facility personnel. Client: Confidential

Oil Refineries, Denver, Colorado - Principal Technical Advisor for a RCRA facilities investigation (RFI) and corrective measures study (CMS) at facilities that have impacted soil, groundwater, and surface water. Responsible for providing technical oversight services related to remediation, design review of groundwater recovery, treatment, and reinjection systems. Also responsible for performance and cost, design and installation of a slurry wall separating free-phase hydrocarbon contamination from a public drinking water supply, and development of a negotiation strategy with appropriate federal and state agencies. Client: Confidential

Oil Refinery, Oklahoma - Principal Technical Consultant for a RCRA Facility Investigation (RFI) and Corrective Measures Study (CMS) at a large petroleum refinery in Oklahoma that had impacted soil, groundwater, and surface water. Project required the investigation of 35 solid waste management units (SWMUs). Developed and successfully

No comments

No comments

negotiated a regulatory strategy for streamlining the RFI process with EPA Region VI and the Oklahoma Department of Environmental Quality. Project resulted in an accelerated CMS for 8 SWMUs, a regular CMS for 2 SWMUs, and no further action for 25 SWMUs. Designated a Corrective Action Management Unit (CAMU) at the facility and negotiated RCRA Part B permit modifications. Developed a risk-based investigation and cleanup strategy integrated with remedial actions for free phase hydrocarbon recovery. Client: Confidential

Oil Refinery, El Paso, Texas – Technical Consultant for development of a strategy to conduct a RCRA RFI at 29 SWMUs and alternative closure approaches for two previously closed RCRA regulated units. The approaches utilized the data quality objectives process and negotiations with the state regulatory agency to significantly reduce the scope of additional data collection requirements. Client: Confidential

Oil Refinery, New Mexico - Principal Technical Consultant for an RFI and CMS for 65 solid waste management units that have impacted soil, groundwater, and surface water. Responsible for developing a risk-based investigative and cleanup strategy and integration with interim remedial actions for free-phase floating hydrocarbon recovery and soil vapor extraction. Client: Confidential

Aviation facility, Denver, Colorado - Technical Consultant and QA Manager of an RFI and CMS for groundwater remediation of petroleum products and chlorinated solvents. Remedial investigation required fingerprinting solvents, degradation products and gasoline additives for assessment of contributing sources. Client: Confidential

Chemical Distribution Facility, Omaha, Nebraska - Principal Consultant for an RFI at a facility potentially contaminated with dioxins, furans, pesticides, herbicides, and chlorinated (and bromine containing) solvents. Responsible for design of an investigation strategy for determining the nature and extent of contamination and evaluating corrective measures. Client: Confidential

Chemical Distribution Facility, Albuquerque, New Mexico - Project Manager for a public health evaluation and principal technical advisor for an RI/FS at a facility contaminated with chlorinated solvents. Responsibilities included managing and participating in a multidisciplinary team that evaluated the potential public health impacts from exposure to contaminated groundwater via municipal water-supply wells. The public health evaluation required complex fate and transport and hydrogeologic modeling of both the regional and local aquifer system via pseudo three-dimensional hydrogeologic modeling to assess potential exposure over a 100-plus year period. Subsequent responsibility included technical oversight to the design, pilot testing, and implementation of the final remedy that involved groundwater pumping, air stripping, and reinjection. Client: Confidential

Pesticide Manufacturing Facility, Commerce City, Colorado - Principal Technical advisor for an RI/FS and responsible for providing technical oversight in assessing the nature and extent of soil and groundwater contamination, potential migration pathways and exposure analysis, and evaluating, assembling, and costing remedial alternatives.

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

Lowry Landfill, Arapahoe County, Colorado - Principal Geochemist and Quality Assurance Manager for an RI/FS at this Superfund site. Developed the Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) and all geochemical aspects of the RI/FS. Responsible for the design and review of the analytical program, selection and audits of analytical laboratories and approval of analytical protocol, data validation, and contaminant migration, fate, and transport evaluations in support of treatability studies, risk assessment and allocation. Client: PRP Group

Acetone Spill Remediation Site at an Industrial Facility, Colorado Springs, Colorado - Technical consultant on the engineering evaluation and implementation of soil vapor extraction methods for remediation of acetone in the vadose zone at the site. Client: Confidential

RMA, Denver, Colorado - Project manager and principal geochemist responsible for comprehensive evaluation of regional hydrogeologic conditions and contaminant transport at RMA. Project entailed design of a comprehensive groundwater monitoring network exceeding 300 monitoring wells, definition of surficial and bedrock aquifer units, including their configuration, extent and interconnection, and personal interaction with various regulatory agencies. Client: The Department of the Army

RMA, Denver, Colorado - Project manager responsible for developing and implementing groundwater flow and contaminant transport models to support a wide range of feasibility studies and conceptual design activities at RMA. Project entailed accessing and modifying existing codes and models previously developed for RMA and applying them to evaluation of remedial measures addressing regional, aerial, and site-specific problems at RMA. Project required a working knowledge of a wide variety of flow and transport models including one-, two-, and three-dimensional flow models alone or in conjunction with solute transport solutions and process models related to contaminant leaching and attenuation in the unsaturated zone. Client: The Department of the Army

RMA, Denver, Colorado - Principal geochemist responsible for the design and interpretation of multiple media sampling activities with the objective of assessing migration, attenuation, retardation, transformation, and degradation properties for a wide variety of volatile, semi-volatile, pesticide, and warfare agent derived contaminants at RMA. The project involved literature-based, field, and laboratory efforts for defining distribution coefficients, along with analytical modeling to determine the precision and accuracy of the estimates of various geochemical properties and constants. Client: The Department of the Army

RMA, Denver, Colorado - Project Manager and Principal Geochemist for continued groundwater monitoring of the 27-square mile site. Responsible for design of groundwater monitoring network for 2,000 available monitoring wells, selection of analytical methods, interpretation of data, and network modification. Monitoring of multiple contaminant sources and plumes as well as groundwater extraction/treatment systems. Client: R.G. Stollar for the U.S. Army

No comments

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

Petroleum Products Marketing and Retail Acquisition – Southern United States – Lead technical consultant for environmental assessment of 56 petroleum product retailing sites both prior to and post acquisition. Many sites required soil and groundwater investigation, including source fingerprinting, based predominantly on petroleum product additive chemistry, and ultimately remediation. Client: Confidential

Petroleum Products Marketing and Retail Acquisition – Eastern United States – Technical Consultant and Client Sponsor for pre-acquisition environmental assessment of approximately 150 petroleum product retailing sites. Assessment required site reviews of soil and groundwater investigations conducted prior to acquisition, including source fingerprinting for gasoline additives at sites having several potential sources, and estimated costs for remediation. Client: Confidential

Gas-to-Liquids Technology, North America, and Asia - Senior planning analyst responsible for technology evaluations, technology transfer, and economic evaluations of innovative chemical and petroleum processes. Technologies evaluated included natural gas to liquid fuels processes that relied heavily on long-term oil/product price predictions and national and world economic conditions. Responsible for project feasibility planning and economic evaluations of a $2 billion natural gas to gasoline plant to be constructed on the North Slope of Alaska the Gulf of Mexico, or Malaysia. Manager of Technology Planning reporting to the Vice President of Corporate Strategic Planning.

Copper Mine Process Water Treatment, Salt Lake City, Utah – Consultant advising on the methodology for laboratory investigation and pilot scale studies to develop innovative, patented, selenium removal treatment process to remove > 1 mg/l of selenium to less than 0.05 ug/l of selenium prior to discharge of 800 gpm of contaminated groundwater to sensitive ecological wetlands. Studies verified concepts, treatability goals, and cost effectiveness. Client: Kennecott

Uranium Mill and Mining Site, Parachute, Colorado – Technical Consultant for the design of an enhanced mechanical evaporation system to greatly reduce the volume of high TDS and radionuclide contaminated wastewater contained in over 50 acres of storage ponds. Wastewater was consolidated in a single pond for final disposal. Project saved the client over $3,000,000 and eliminated the need for construction of additional long-term wastewater storage ponds. Client: UMETCO (Union Carbide Mining Division)

Uranium Mine and Mill, Grants, New Mexico - Expert witness to court-appointed arbitration board evaluating permit requirements and environmental impacts of uranium mill tailing impoundments for the proposed Mt. Taylor, New Mexico, uranium mill. Performed and directed hydrologic and geochemical solute transport assessments of potential contaminant migration and associated impacts resulting from the project. Included application of proprietary two-dimensional finite element and finite difference fluid flow and solute transport codes. Geochemical evaluations included assessment of the migration and attenuation of uranium, vanadium, radium, thorium, molybdenum, arsenic, selenium and iron, as well as changes in pH and reduction-oxidation potential in ground water.

Uranium and Vanadium Mine and Mill, Uravan, Colorado – Consultant and Expert witness for $70 million litigation between a uranium and vanadium mining and milling

No comments

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

company and its insurance carrier regarding remediation of the facility in Western Colorado. Provided assessment of environmental impacts and evaluation of tailings and waste rock disposal practices, including standard of care.

Mineral Exploration, Casa Grade, Arizona – Project leader responsible for the development and application of hydro-geochemical models for the exploration of porphyry copper deposits and base metal accumulation using ground water chemistry data.

Oil Shale Project, Rifle, Colorado – Project Leader responsible for the development and application of geochemical and hydrologic computer models used for evaluation of contaminant transport from oil shale retorts. Served as an expert witness in administrative hearings. Project was performed for Rio Blanco Oil Shale Company, a Shell Oil Company and Gulf Oil Company joint venture: supervised research and development laboratories in Golden, Colorado.

Coal Gasification, Pacific Northwest, Rocky Mountains - Project geologist responsible for geological, environmental, and financial evaluations from exploration through development for numerous underground coal gasification projects throughout the Rocky Mountain and Pacific Northwest regions. Evaluated geochemical impacts of coals and combustion products, including poly-nuclear aromatics to groundwater. Conducted groundwater assessments in support of Environmental Impact Statement preparation. Responsible to the program manager for assessing the economic and environmental feasibility of underground coal gasification projects in seven Northwestern States.

Mining and Milling, Groundwater Restoration, Wyoming, New Mexico, Texas - As geochemist, developed and implemented geochemical, hydrologic, and statistical models for designing in-situ uranium leach and groundwater restoration systems. Responsibilities included project planning, budgeting, management, and monitoring subcontractors.

Uranium Mill Tailings, Contaminant Transport, New Mexico – Principal Investigator for research concerning the geochemical controls of radium and thorium migration in surface and ground water environments. Developed predictive computer models for complex metal ion adsorption on mineral surfaces in order to assess contaminant migration and attenuation mechanisms.

Mining and Milling, Properties, Arizona - Conducted aqueous and mineralogy research leading to development of improved leaching methods for copper and uranium ores. Techniques were based on enhancing dissolution of ore minerals while minimizing dissolution and acid consumption by gangue minerals in the rocks.

Environmental Assessment, Rio Grande River Valley, New Mexico - Investigated aspects of environmental chemistry controlling the distribution and transport of trace elements, including heavy metals (uranium, mercury, cadmium, chromium, cobalt, arsenic, selenium) and radionuclides in the sediments and aqueous phase in the Rio Grande River (over 200 miles from the confluence of the Rio Puerco to Las Cruces).

Petroleum Reservoir Evaluation and Reserve Estimation, Permian Basin, New Mexico - Responsible for well-log interpretation and oil and gas reserve estimations for

No comments

Arthur C. (Sandy) Riese, Ph.D., R.G., C.HG.

selected fields in the Delaware Basin in Texas and New Mexico. Prepared estimates of long-term production rates from the basin for submission to regulatory agencies.

Gold and Base Metal Exploration, Ontario, Quebec, and British Columbia, Canada - Responsible for field supervision and organization of drilling crews and geologic sampling of base metal terrains in northern Canada.

Gold and Base Metal Exploration, New Mexico - Conducted gravity and magnetic surveys on various precious and base metal properties in northern New Mexico.

Petroleum Exploration and Production, Gulf Coast, Permian Basin, Rocky Mountains - Project leader for fluid-rock interaction research program. Applied geochemical techniques to petroleum exploration, reservoir characterization, reservoir stimulation, and enhanced oil recovery. Responsibilities included all phases of project planning, budgeting, interpretation, and management. Served as acting director and supervised junior staff.

Petroleum Exploration and Production, Prudhoe Bay, Alaska - Project leader for multi-disciplinary group conducting reservoir characterization and production research for North Slope, Alaska, petroleum reservoirs. Research included evaluation of industry standard well completion technologies, evaluation of formation damage and development of techniques and fluid compositions compatible with reservoir rocks and formation fluids. Evaluated reservoir characteristics of Prudhoe Bay, Lisbourne, Kuparak and West Sak fields.

No comments

No comments

APPENDIX B

Prior Testimony for Arthur C. Riese, Ph.D., R.G., C.HG.

No comments

ARTHUR C. ("SANDY") RIESE, Ph.D., R.G, C.HG.

EXPERT TESTIMONY EXPERIENCE IN THE PRECEDING TEN YEARS

Union Carbide Corporation v. Aetna Casualty and Surety Company, et al.; ***Superior Court, United States District of Danbury, Danbury Connecticut; Case Docket CV 88-0294989(S).***

Connor Cattle Company, Inc. v. Thiokol Corporation: ***First Judicial District Court, Box Elder County, State of Utah; Case Number CV980100145PD.***

Eagle Shadow Metropolitan District v. Starlight Resources, LLC and Treasurer of Adams County, Colorado; ***District Court, County of Adams, State of Colorado; Civil Action No. 00-CV-487.***

National Warehouse Investment Company v. IT Group, Inc. and Groundwater Technology, Inc.; ***United States District Court; District of Utah, Central Division; Case No. 2: 00CV-0345 ST.***

The Pinal Creek Group, et al., v. Newmont Mining Corporation, et al.; ***United States District Court; District of Arizona; Civil Action No. 91-1764 PHX DAE (LOA), Expert Witness.***

The Pinal Creek Group, et al., v. Newmont Mining Corporation, et al.; ***United States District Court; District of Arizona; Civil Action No. 91-1764 PHX DAE (LOA), R.Civ.P. 30(b)(6) Witness.***

K.C. 1986 Limited Partnership v. Reade Manufacturing, et al.; ***United States District Court; District for the Western District of Missouri, Western Division; Civil Action No. 02-0853- CV-W-NKL.***

U.S. Borax, Inc. v. Royal Insurance Company et al.; ***San Francisco Superior Court Case No. CGC-05-444742.***

B-1

No comments

APPENDIX C
References Relied Upon or Considered

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No comments

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Privileged and Confidential, Attorney Client Communication, Attorney Work Product

Colorado State University. 1999, *Tailings and Mine Waste '99: Proceedings of the Sixth International Conference on Tailings and Mine Waste, Fort Collins, Colorado.* January 1999.

Kuipers, J. R., and Zuzulock, S., October 2003. *Financial Assurance for Hardrock Mine Cleanup.* October 2003.

McLaughlin, Dennis, Ph.D. 2004. *Expert Report of Dennis McLaughlin. Review of Probabilistic Analysis.* United States District Court for the District of Idaho. United States v. ASARCO incorporated, et al. No. CV 96-0122-N-EJL.

National Academy of Sciences (NAS). 2005. *Superfund and Mining Megasites: Lessons from the Coeur d'Alene River Basin.* Prepared by the Committee On Superfund Site Assessment and Remediation in the Coeur d'Alene River Basin, Board on Environmental Studies and Toxicology, Division on Earth and Life Sciences, National Research Council of the National Academies.

Rouhani, Shahrokh. 2004. *Expert Report of Shahrokh Rouhani, Ph.D., P.E. – Review of Probabilistic Analysis.* United States District Court for the District of Idaho. United States v. ASARCO incorporated, et al. No. CV 96-0122-N-EJL.

TerraGraphics Environmental Engineering, Inc. March 5, 2010. *Memorandum from Jerry Lee, et al. to Rob Hanson et al. Subject: Upper Basin Focused Feasibility Study Draft Review Comments and Concerns.*

URS Greiner. September 20, 2001. *Technical Memorandum (Revision 1): Probabilistic Analysis of Post-Remediation Metal Loading*. Prepared for U.S. Environmental Protection Agency Region 10.

U. S. Environmental Protection Agency (USEPA). August 2000. *Technical Memorandum: Draft Final Conceptual Site Model Summary and Update.* Prepared by CH2M HILL for USEPA Region 10. August 31, 2000.

No comments

DRAFT

Privileged and Confidential, Attorney Client Communication, Attorney Work Product

U. S. Environmental Protection Agency (USEPA). November 2000. *Draft Remedial Investigation (RI) Report, Coeur d'Alene Basin Remedial Investigation/Feasibility Study.* Prepared by URS Greiner and CH2M HILL for USEPA Region 10.

U. S. Environmental Protection Agency (USEPA). 2001. *Remedial Investigation Report, Coeur d'Alene Basin Remedial Investigation /Feasibility Study, Final (Revision 2).* Prepared by URS Greiner and CH2M HILL for USEPA Region 10.

U. S. Environmental Protection Agency (USEPA). July 2001. *National Remedy Review Board Presentation Information Coeur d'Alene Basin Remedial Investigation/Feasibility Study.* Prepared by URS Greiner and CH2M HILL for USEPA Region 10. July 2001.

U. S. Environmental Protection Agency (USEPA). October 2001. *Final (Revision 2) Feasibility Study Report, Coeur d'Alene Basin Remedial Investigation/Feasibility Study.* Prepared by URS Greiner and CH2M HILL for USEPA Region 10.

U. S. Environmental Protection Agency (USEPA). September 2002. *Record of Decision,The Bunker Hill Mining and Metallurgical Complex Operable Unit 3.*

U. S. Environmental Protection Agency (USEPA). 2006. *Current Status, Conceptual Site Model, Operable Unit 2, Bunker Hill Mining and Metallurgical Complex Superfund Site.* Prepared by CH2M HILL for USEPA Region 10. Prepared by CH2M HILL for USEPA Region 10. December 8, 2006.

U. S. Environmental Protection Agency (USEPA). December 2006. *Technical Memorandum: Issues Associated with CTP Expansion for Other OU2/OU3 Source Waters.*

U. S. Environmental Protection Agency (USEPA). May 2007. *Canyon Creek Groundwater Metal Source Characterization.* By Karen Wright, George Redden, Carl Palmer, Idaho National Laboratory, Prepared for the U. S. Environment Protection Agency. May 2007.

U. S. Environmental Protection Agency (USEPA). August 2007. *Canyon Creek Hydrologic Study.* Prepared by CH2M HILL for USEPA Region 10.

No comments

DRAFT

Privileged and Confidential, Attorney Client Communication, Attorney Work Product

U. S. Environmental Protection Agency (USEPA). September 2007. *Third Five-Year Review Report for California Gulch, Leadville, Lake County, Colorado.* Prepared by HDR Engineering, Inc. for USEPA Region 8. September 28, 2007.

U. S. Environmental Protection Agency (USEPA). October 2007. *A Predictive Analysis of Post-Remediation Metals Loading.* USEPA Site File 1131190. Prepared by URS Greiner and CH2M HILL for USEPA Region 10. October 1, 2007.

U. S. Environmental Protection Agency (USEPA). December 21, 2007. *Technical Memorandum, Evaluation of Zinc Loading to the South Fork Coeur d'Alene River, Upper Basin Analysis.* Prepared by CH2M HILL for USEPA Region 10. USEPA Site File 1353239.

U. S. Environmental Protection Agency (USEPA). 2008a. *Fact Sheet and Technical Evaluation Proposed Modification to Permit No. ID-0000175 Hecla Mining Company, Lucky Friday Mine and Mill.* (http://yosemite.epa.gov/r10/water.nsf/NPDES+Permits/Current+ID1319/$FILE/ID0000175_FS_mod_08.pdf)

U. S. Environmental Protection Agency (USEPA). July 17, 2008. Permit No. *ID-0000175 Authorization to Discharge Under the National Pollutant Discharge Elimination System.* (http://yosemite.epa.gov/r10/water.nsf/NPDES+Permits/Current+ID1319/$FILE/ID0000175+FP+mod2.pdf)

U. S. Environmental Protection Agency (USEPA). April 2009. *Technical Memorandum: South Fork of the Coeur d'Alene River Watershed: Basinwide Groundwater Flow Model Documentation.* Prepared by CH2M HILL for USEPA Region 10. April 30, 2009.

U. S. Environmental Protection Agency (USEPA). March 2009. *Technical Memorandum: OU2 2008 Groundwater / Surface Water Interaction Monitoring Data Summary.* Prepared by CH2M HILL for USEPA Region 10. March 31, 2010.

U. S. Environmental Protection Agency (USEPA). May 2009. *Technical Memorandum: Osburn Flats Subsurface Exploration and Well Installation Summary Upper Coeur d'Alene Basin Field Investigation, Osburn, Idaho, October-November 2008.* Prepared by CH2M HILL for USEPA Region 10. May 20, 2009.

No comments

DRAFT

Privileged and Confidential, Attorney Client Communication, Attorney Work Product

U. S. Environmental Protection Agency (USEPA). *2008 High-Flow and Low-Flow Surface Water Study Report, Upper Basin of the South Fork Coeur d'Alene River, Bunker Hill Superfund Site, Shoshone County, Idaho.* Prepared by CH2M HILL for USEPA Region 10. June 2009.

U. S. Environmental Protection Agency (USEPA). July 2009. *Technical Report: Osburn Flats Groundwater-Surface Water Interaction Study, Bunker Hill Mining and Metallurgical Complex Superfund Site.* Prepared by CH2M HILL for USEPA Region 10. July 2009.

U. S. Environmental Protection Agency (USEPA). August 2009. *Groundwater Monitoring Report Upper Basin Field Studies, Phase 1 and Phase 2 Investigations, Bunker Hill Mining and Metallurgical Complex Superfund Site.* Prepared by CH2M HILL for USEPA Region 10. August 2009.

U. S. Environmental Protection Agency (USEPA). March 2010. *Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site, Site Information Package for National Remedy Review Board.* March 26, 2010

U. S. Environmental Protection Agency (USEPA). February 2010. *Draft Focused Feasibility Study (FFS) Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site.* Prepared by CH2M HILL for USEPA Region 10.

U. S. Environmental Protection Agency (USEPA). July 2010. *Draft Final Focused Feasibility Study (FFS) Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site.* Prepared by CH2M HILL for USEPA Region 10.

U. S. Environmental Protection Agency (USEPA). July 2010. *Proposed Plan, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site.* Prepared by CH2M HILL for USEPA Region 10. July 12, 2010.

U. S. Environmental Protection Agency (USEPA). August 2009. *Technical Memorandum: Osburn Flats Aquifer Testing Summary, Upper Coeur d'Alene Basin Field Studies, Phase*

No comments

DRAFT

Privileged and Confidential, Attorney Client Communication, Attorney Work Product

2 *Investigation, Bunker Hill Mining and Metallurgical Complex Superfund Site.* August 28, 2009.

U. S. Environmental Protection Agency (USEPA). November 2009. *Working Technical Memorandum: Overview of the Simplified Tool for Estimating Post-Remediation Water Quality.* Prepared by Steve Hicks at CH2M HILL for USEPA Region 10. November 19, 2010.

U. S. Environmental Protection Agency (USEPA). September 2010. EPA Response to FOIA Request No. 10-FOI-00330-10. Request dated July 1, 2010 and expanded July 21, 2010.

U. S. Environmental Protection Agency (USEPA). September 2010. *Technical Memorandum: Conceptual Site Model, Osburn Flats in Operable Unit 3, Bunker Hill Mining and Metallurgical Complex Superfund Site.* Prepared by CH2M HILL for USEPA Region 10. September 18, 2009.

U. S. Environmental Protection Agency (USEPA). *Current Status, Conceptual Site Model, Operable Unit 2, Bunker Hill Mining and Metallurgical Complex Superfund Site.* Prepared by CH2M HILL for USEPA Region 10.

U. S. Geological Survey (USGS). *Dissolved Cadmium, Zinc, and Lead Loads from Ground-Water Seepage in the South Fork Coeur d'Alene River System. Prepared in Co-operation with the U. S. Environmental Protection Agency. By Gary J. Barton. 2002.*

U. S. Geological Survey (USGS). 2002. *Dissolved Cadmium, Zinc, and Lead Loads from Ground-Water Seepage into the South Fork Coeur d'Alene River System, Northern Idaho, 1999.* Water Resources Investigations Report 01-4274. By Gary J. Barton.

Vita, Chuck. May 25, 2000. *Email Correspondence from Chuck Vita, URS Corp. to John Lincoln, CH2M HILL, RE: Alt Eval Methodology.* USEPA Site File 1131649.

Vita, Chuck. March 18, 2001. *Coeur d'Alene Basin RI/FS Technical Memorandum, Probabilistic Analysis of Remedial Alternatives for Metal Mass Loading, Working Draft as of March 17, 2001.* USEPA Site File 1131190.

No comments

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Vita, Chuck. July 2005. Errors of fact in NAS Appendix F. Attachment to email to Ted Yackulic, Region 10, USEPA from Chuck Vita, URS Corp., July 25, 2005.

Vita, Chuck. October 2007. *Technical Memorandum: A Compendium of Sensitivity Analyses Done in Support of the Predictive Analysis of Post-Remediation Me[t]al Loading (Coeur d'Alene Basin).* October 4, 2007.

Vita, Chuck. March 8, 2010. *Technical Memorandum: Mathematical Updates to Predictive Analysis Implemented in PAT1.* Attachment 1 Appendix B to Draft Final FFS, July 2010.

Vita, Chuck. January 2010. *Email Correspondence with Thomas Dahl regarding Friday Teleconference on the PA and BEMP Estimates.* January 22, 2010

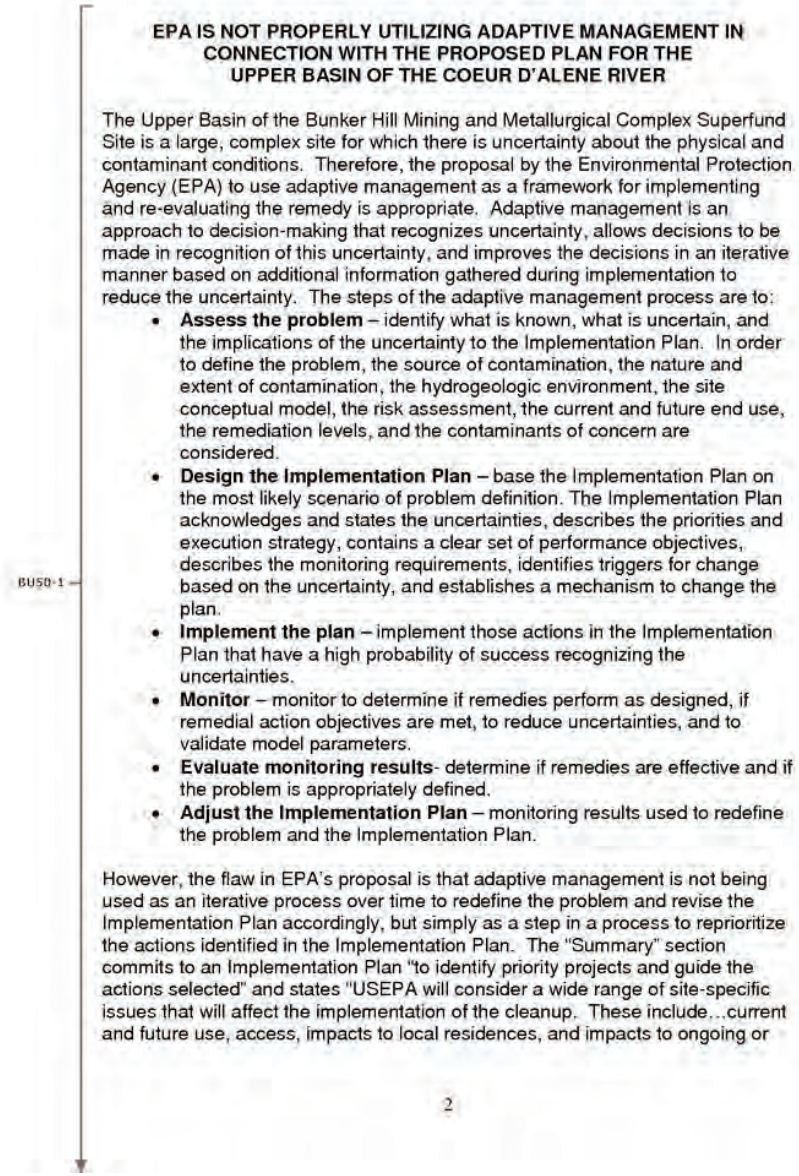
Hecla Mining Company (submitted by Sidney B. Garland II), BU50, Letter 619212

No comments

COMMENTS ON THE PROPOSED PLAN FOR THE UPPER BASIN OF THE COEUR D'ALENE RIVER

Sidney B. Garland II, Professional Engineer, Board Certified Environmental Engineer

619212



EPA IS NOT PROPERLY UTILIZING ADAPTIVE MANAGEMENT IN CONNECTION WITH THE PROPOSED PLAN FOR THE UPPER BASIN OF THE COEUR D'ALENE RIVER

The Upper Basin of the Bunker Hill Mining and Metallurgical Complex Superfund Site is a large, complex site for which there is uncertainty about the physical and contaminant conditions. Therefore, the proposal by the Environmental Protection Agency (EPA) to use adaptive management as a framework for implementing and re-evaluating the remedy is appropriate. Adaptive management is an approach to decision-making that recognizes uncertainty, allows decisions to be made in recognition of this uncertainty, and improves the decisions in an iterative manner based on additional information gathered during implementation to reduce the uncertainty. The steps of the adaptive management process are to:

- **Assess the problem** – identify what is known, what is uncertain, and the implications of the uncertainty to the Implementation Plan. In order to define the problem, the source of contamination, the nature and extent of contamination, the hydrogeologic environment, the site conceptual model, the risk assessment, the current and future end use, the remediation levels, and the contaminants of concern are considered.
- **Design the Implementation Plan** – base the Implementation Plan on the most likely scenario of problem definition. The Implementation Plan acknowledges and states the uncertainties, describes the priorities and execution strategy, contains a clear set of performance objectives, describes the monitoring requirements, identifies triggers for change based on the uncertainty, and establishes a mechanism to change the plan.
- **Implement the plan** – implement those actions in the Implementation Plan that have a high probability of success recognizing the uncertainties.
- **Monitor** – monitor to determine if remedies perform as designed, if remedial action objectives are met, to reduce uncertainties, and to validate model parameters.
- **Evaluate monitoring results**- determine if remedies are effective and if the problem is appropriately defined.
- **Adjust the Implementation Plan** – monitoring results used to redefine the problem and the Implementation Plan.

BU50-1

However, the flaw in EPA's proposal is that adaptive management is not being used as an iterative process over time to redefine the problem and revise the Implementation Plan accordingly, but simply as a step in a process to reprioritize the actions identified in the Implementation Plan. The "Summary" section commits to an Implementation Plan "to identify priority projects and guide the actions selected" and states "USEPA will consider a wide range of site-specific issues that will affect the implementation of the cleanup. These include…current and future use, access, impacts to local residences, and impacts to ongoing or

2

Response to comment BU50-1

The comment begins by supporting EPA's decision to use adaptive management as a framework for implementing and re-evaluating the Selected Remedy as appropriate. However, the comment concludes that the process was flawed because "adaptive management is not being used as an iterative process over time to redefine the problem and revise the Implementation Plan accordingly, but simply as a step in a process to reprioritize the actions identified in the Implementation Plan." It is not clear from the comments whether the commenter reviewed the *Draft Upper Basin Adaptive Management Plan* (CH2M HILL, October 2010), a detailed report that describes the Upper Basin adaptive management process, or whether the commenter only reviewed the summary discussions of adaptive management included in the Proposed Plan. The 2010 Draft Adaptive Management Plan provides significant detail on the iterative aspect of prioritizing, implementing, monitoring, evaluating, and making necessary adjustments to the conceptual site model, remedial action approaches, the implementation plan, and the Selected Remedy based on the information learned. "Lessons learned" and updates to the Upper Basin conceptual site model are then incorporated such that uncertainty is reduced for future actions as the cleanup work progresses towards the achievement of remedial action objectives. The adaptive management process will guide the collection of valuable information to plan and implement cleanup actions and then make modifications to the conceptual site model, the implementation plan and individual remedial actions as appropriate, so the greatest amount of effective cleanup is achieved for the lowest cost.

The commenter mischaracterizes EPA's approach of the adaptive management process. EPA fully intends to use the adaptive management of the cleanup as an iterative process to, among other things, both inform and shape future needs. In the summary of the adaptive management process presented in the Proposed Plan, a significant amount of attention is given to the implementation planning process. This is a result of local stakeholder interest in this process. However, this should not be construed as substituting implementation planning for a robust and scientifically sound adaptive management process.

The comment also poses that implementation of the adaptive management process may result in revisions to the remedy. EPA agrees and has described the administrative processes that would accompany such revisions (nonsignificant, significant, or fundamental modifications to the Selected Remedy) in ROD Amendment, Part 2, Section 12.3.2. Due in part to extensive public concern about the duration and cost of cleanup, EPA has decided to significantly reduce the scope of the Selected Remedy by prioritizing the remedial actions that were presented as EPA's Preferred Alternative in the Proposed Plan. The Upper Basin Selected Remedy is an interim remedy which identifies the priority remedial actions that are expected to provide the greatest reduction of contamination in the SFCDR and its tributaries and protection of in-place human health barriers in local communities. EPA reduced the scope of Alternative 3+ in the Preferred Alternative for OU 3 from 345 to 145 mine and mill sites included in the Selected Remedy. The total estimated cost of the Selected Remedy as presented in the ROD Amendment is $635 million, a significant reduction from the $1.3 billion estimate for the Preferred Alternative identified in the Proposed Plan. The ROD Amendment, Part 2, Section 12.3 describes the implementation process for the Selected Remedy, which includes regular attention to re-evaluation of needs.

As described in detail in the 2010 Adaptive Management Plan, uncertainty is unavoidable, and the implementation of the Selected Remedy must be managed taking this uncertainty into account. An adaptive management framework provides a methodology to carry out the Selected Remedy in a structured, iterative way. Adaptive management considers uncertainty, and monitors and evaluates the effectiveness of the remedial actions and cleanup technologies including progress (ecological response metrics) towards long-term cleanup goals.

future site development…." None of these issues redefine the problem but simply reprioritize the actions. Further, the "Summary" states that "USEPA will use an adaptive management process to prioritize actions…as more information becomes available on the effectiveness of the initial cleanup actions." Again, this is not the appropriate use of adaptive management. Adaptive management should evaluate if the initial problem definition in terms of contaminant source term, contaminant pathways, human and environmental receptors, and cleanup requirements has changed. If so, then the remedy may have to be revised, not reprioritized.

The "Introduction" section similarly commits EPA to "develop an Implementation Plan …to prioritize these actions. Because the actions will take years to implement and conditions will change over time, USEPA will also use a process called adaptive management to make decisions on prioritization and to update the Implementation Plan." Figure 2 illustrates adaptive management as a step in the CERCLA process to reprioritize the Implementation Plan rather than an iterative process to redefine the problem and then revise the solution as set forth in the Implementation Plan.

Section 10 "Implementation of the Selected Remedy" states that USEPA will prepare an Implementation Plan to prioritize the actions for implementation of the remedy and "will use adaptive management to incorporate 'lessons learned' and to guide efforts to prioritize work." Figure 22, Adaptive Management Process illustrates the use of adaptive management to reprioritize actions but not to redefine either the problem or the solution. Even though this section acknowledges that "there may be situations in the future when new phases of an action for a particular area differ significantly from the remedial action selected in the ROD Amendment", there is no process explained in the Proposed Plan to accomplish this.

BU50-1

The *Adaptive Management Plan* describes the above six steps of adaptive management and states that adaptive management might result in changes to the conceptual site model (which I was quite surprised to learn has not been updated since 2000), the remedial action objectives, and portions of the selected remedy. The majority of the *Adaptive Management Plan*, however, discusses how the selected remedy will be prioritized and provides no detail on how the problem might be redefined. The *Adaptive Management Plan* states in the "Monitoring" section that "Monitoring will be used to clarify uncertainty regarding site conditions…update and refine the Upper Basin CSM (conceptual site model)" to enable the "planning and forecasting tools" to be refined and validated. These planning tools are focused on priorities and sequencing the selected remedy, and not on necessary modifications to the problem statement or the remedial solutions. The process appears in fact to be designed to avoid ROD amendments for significant changes in course, even when an amendment might be appropriate.

3

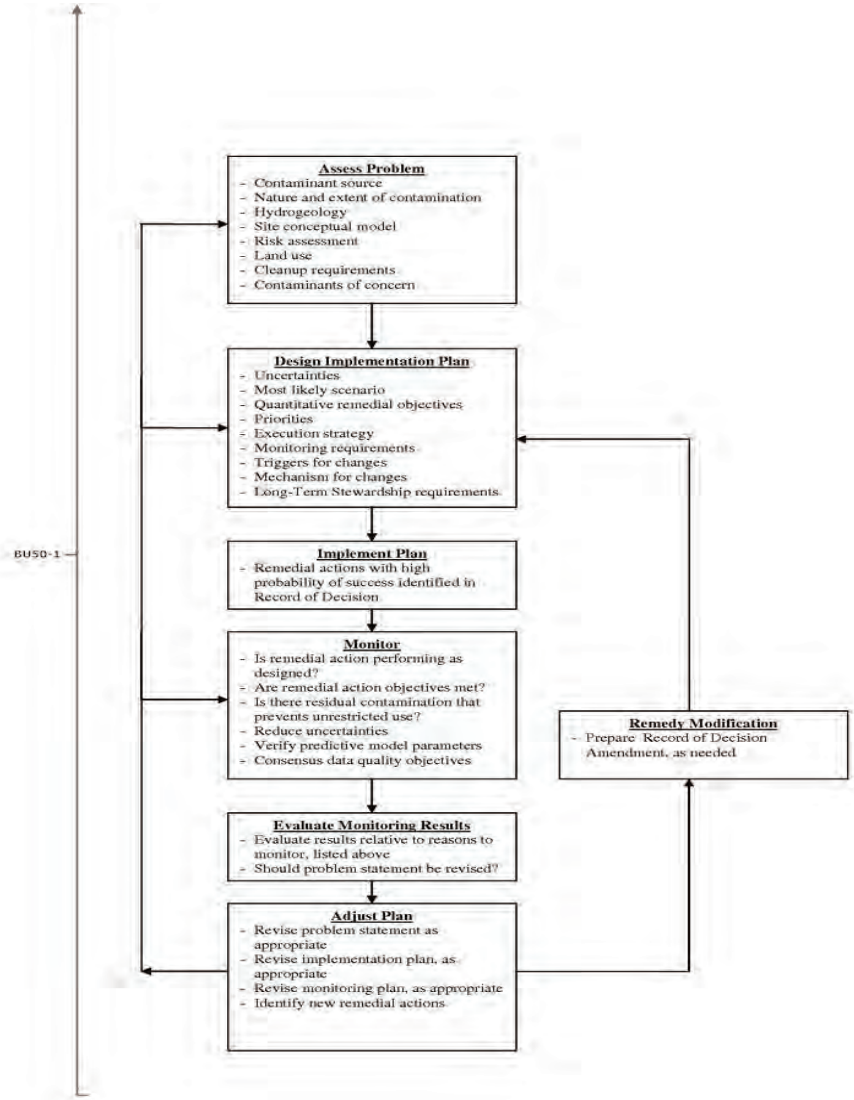
No comments

Rather than embracing adaptive management as a process for iterative remedial decision-making, EPA is proposing to use components of adaptive management simply to reprioritize the selected remedy. This is illustrated in Figure 4-2 in the *Adaptive Management Plan* in which there is no feedback to assessment of the problem based on the monitoring, which is the primary emphasis of adaptive management. The only feedback is to the prioritization process. For a site this big and complicated and given all of the large technical uncertainties, adaptive management is an appropriate if not necessary approach. However, EPA's proposal does not reflect adaptive management as an iterative remedial decision-making process and ignores potential changes to end use and desired and appropriate cleanup levels. Nor does it, as the National Academy of Sciences recommended, identify for the public "the circumstances and indicators" that will require EPA to modify its plan.

A more appropriate approach for the Upper Basin is for the Proposed Plan to adopt adaptive management as the remedy, with a list of proposed near-term, high priority remedial actions with a high likelihood of success. The Proposed Plan should describe the six iterative steps of adaptive management, identify the uncertainties, explain the objectives of monitoring to evaluate performance as well as reduce uncertainty, identify how the problem and solution will be reevaluated, commit to an Implementation Plan and a near-term priority list, and explain how subsequent remedial actions will be selected. The Implementation Plan is an important component of such a remedy, not an after-the-fact add-on. BUSO-1 It still will be a road map of the scope, schedule, and cost of complete cleanup, but the remedial actions selected will be presumptive based on evolving site-specific data and information rather than being forever bound by the selected remedial actions in the ROD. This approach better reflects the technical and risk management uncertainties associated with a site this large and complex and will allow better remedies to be selected in the future. Adaptive management is a process for accommodating change and managing the many uncertainties associated with large, complex sites. The process does not assure certainty or eliminate uncertainty, unless it is defined incorrectly as EPA has done here as merely a reshuffling of priorities. A suggested flow chart is below.

No comments

No comments



5

SIDNEY B. GARLAND II, PE, BCEE

Mr. Garland has over 35 years of engineering, management, and strategic planning experience in the US, Far East, Middle East, and Mexico. He has been responsible for the design and construction of water treatment, wastewater treatment, and solid waste disposal facilities; wastewater reuse facilities; roads and airports; and hazardous and radioactive remediation sites. He has managed an occupational safety and health program on Okinawa, environmental programs in Okinawa, Saudi Arabia, and the US, a $US500 million program to provide infrastructure to a new development in Saudi Arabia, a $US100 million/year remediation program at the Oak Ridge National Laboratory, and strategic planning for a $US6 billion remediation and waste management program for the Department of Energy in Oak Ridge. He served on a National Academy of Sciences committee that developed a recommendation for the use of adaptive management for the US Navy.

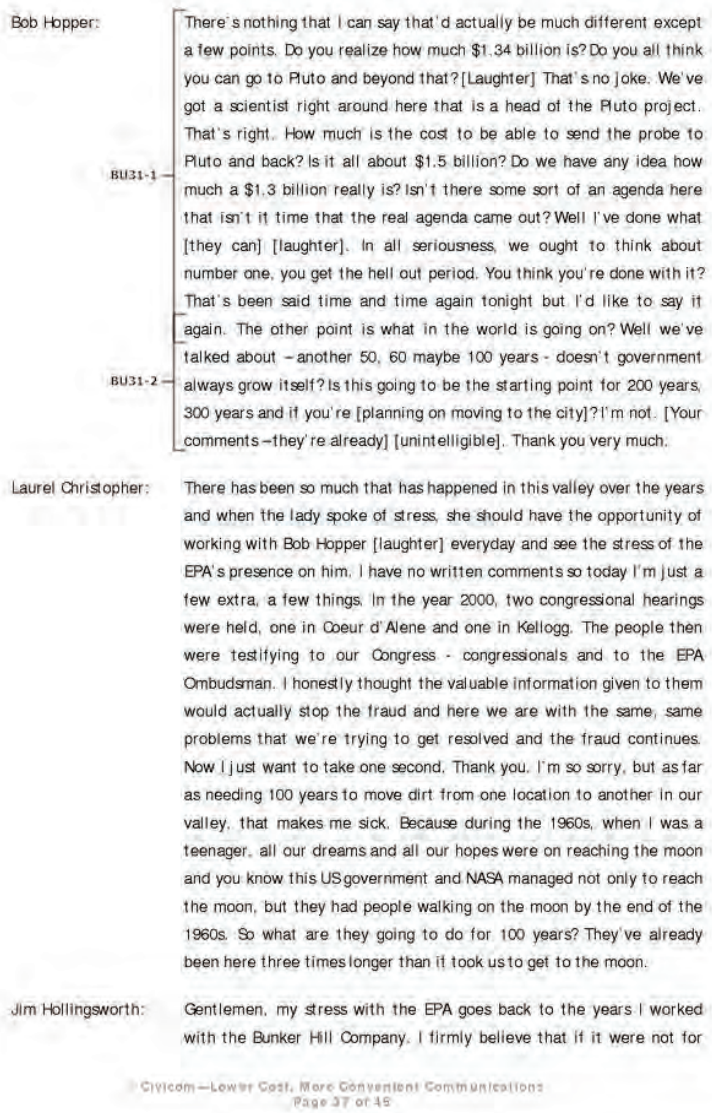
He earned a BE in civil engineering from Vanderbilt University, an MS in environmental health engineering from the University of Texas, and an MPA in public administration from the University of Oklahoma.

Mr. Garland is a registered professional engineer in Texas and Tennessee and is a Board Certified Environmental Engineer with the American Academy of Environmental Engineers.

Mr. Garland currently works for Bechtel Jacobs Company, LLC. in Oak Ridge, Tennessee.

No comments

Hopper, Bob, BU31, Letter 616015-45



Bob Hopper: There's nothing that I can say that'd actually be much different except a few points. Do you realize how much $1.34 billion is? Do you all think you can go to Pluto and beyond that? [Laughter] That's no joke. We've got a scientist right around here that is a head of the Pluto project. That's right. How much is the cost to be able to send the probe to Pluto and back? Is it all about $1.5 billion? Do we have any idea how much a $1.3 billion really is? Isn't there some sort of an agenda here that isn't it time that the real agenda came out? Well I've done what [they can] [laughter]. In all seriousness, we ought to think about number one, you get the hell out period. You think you're done with it? That's been said time and time again tonight but I'd like to say it again. The other point is what in the world is going on? Well we've talked about – another 50, 60 maybe 100 years - doesn't government always grow itself? Is this going to be the starting point for 200 years, 300 years and if you're [planning on moving to the city]? I'm not. [Your comments – they're already] [unintelligible]. Thank you very much.

BU31-1

BU31-2

Laurel Christopher: There has been so much that has happened in this valley over the years and when the lady spoke of stress, she should have the opportunity of working with Bob Hopper [laughter] everyday and see the stress of the EPA's presence on him. I have no written comments so today I'm just a few extra, a few things. In the year 2000, two congressional hearings were held, one in Coeur d'Alene and one in Kellogg. The people then were testifying to our Congress - congressionals and to the EPA Ombudsman. I honestly thought the valuable information given to them would actually stop the fraud and here we are with the same, same problems that we're trying to get resolved and the fraud continues. Now I just want to take one second. Thank you. I'm so sorry, but as far as needing 100 years to move dirt from one location to another in our valley, that makes me sick. Because during the 1960s, when I was a teenager, all our dreams and all our hopes were on reaching the moon and you know this US government and NASA managed not only to reach the moon, but they had people walking on the moon by the end of the 1960s. So what are they going to do for 100 years? They've already been here three times longer than it took us to get to the moon.

Jim Hollingsworth: Gentlemen, my stress with the EPA goes back to the years I worked with the Bunker Hill Company. I firmly believe that if it were not for

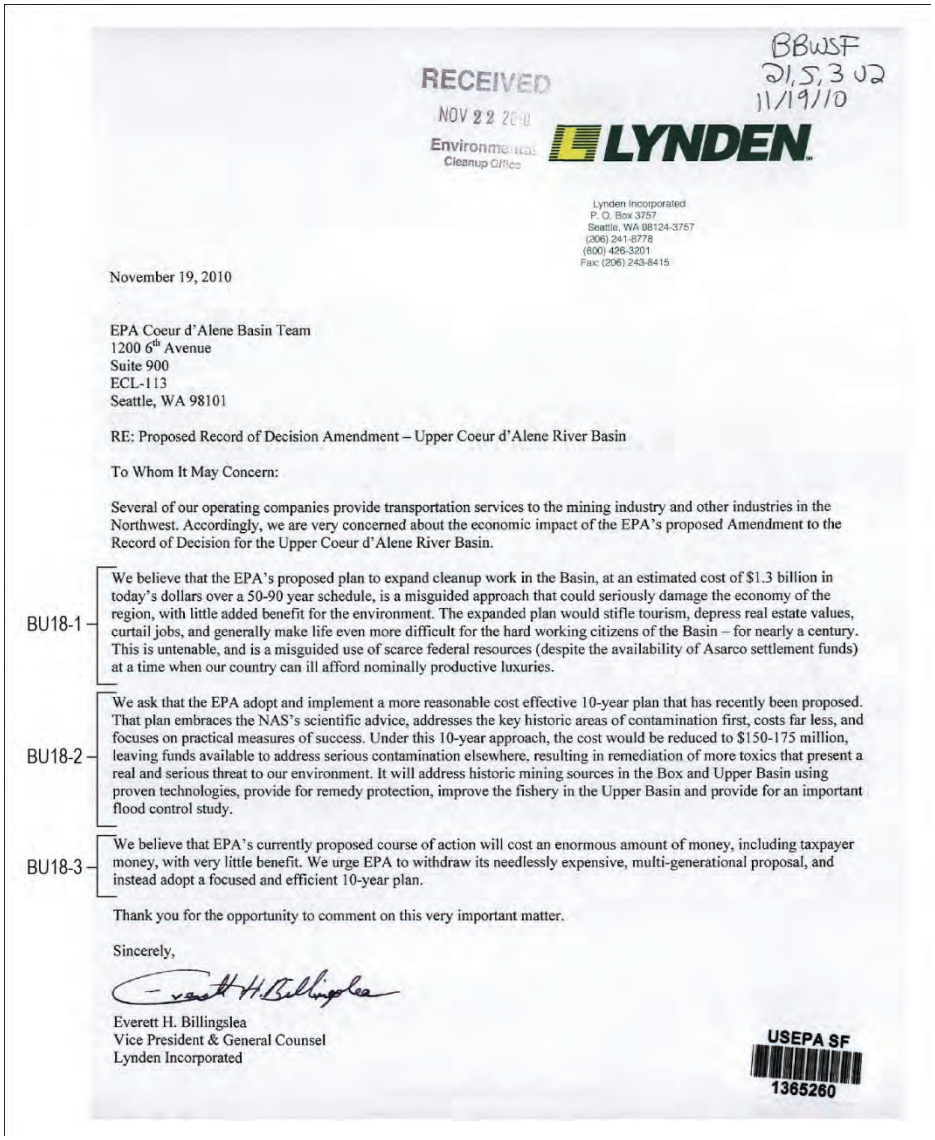
Response to comment BU31-1

See response to Comment No. I58-2.

Response to comment BU31-2

See response to Comment No. I58-1.

Lynden Incorporated, BU18, Letter 1365260



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LYNDEN

Lynden Incorporated
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(800) 426-3201
Fax: (206) 243-8415

November 19, 2010

EPA Coeur d'Alene Basin Team
1200 6th Avenue
Suite 900
ECL-113
Seattle, WA 98101

RE: Proposed Record of Decision Amendment – Upper Coeur d'Alene River Basin

To Whom It May Concern:

Several of our operating companies provide transportation services to the mining industry and other industries in the Northwest. Accordingly, we are very concerned about the economic impact of the EPA's proposed Amendment to the Record of Decision for the Upper Coeur d'Alene River Basin.

BU18-1 – We believe that the EPA's proposed plan to expand cleanup work in the Basin, at an estimated cost of $1.3 billion in today's dollars over a 50-90 year schedule, is a misguided approach that could seriously damage the economy of the region, with little added benefit for the environment. The expanded plan would stifle tourism, depress real estate values, curtail jobs, and generally make life even more difficult for the hard working citizens of the Basin – for nearly a century. This is untenable, and is a misguided use of scarce federal resources (despite the availability of Asarco settlement funds) at a time when our country can ill afford nominally productive luxuries.

BU18-2 – We ask that the EPA adopt and implement a more reasonable cost effective 10-year plan that has recently been proposed. That plan embraces the NAS's scientific advice, addresses the key historic areas of contamination first, costs far less, and focuses on practical measures of success. Under this 10-year approach, the cost would be reduced to $150-175 million, leaving funds available to address serious contamination elsewhere, resulting in remediation of more toxics that present a real and serious threat to our environment. It will address historic mining sources in the Box and Upper Basin using proven technologies, provide for remedy protection, improve the fishery in the Upper Basin and provide for an important flood control study.

BU18-3 – We believe that EPA's currently proposed course of action will cost an enormous amount of money, including taxpayer money, with very little benefit. We urge EPA to withdraw its needlessly expensive, multi-generational proposal, and instead adopt a focused and efficient 10-year plan.

Thank you for the opportunity to comment on this very important matter.

Sincerely,

Everett H. Billingslea

Everett H. Billingslea
Vice President & General Counsel
Lynden Incorporated

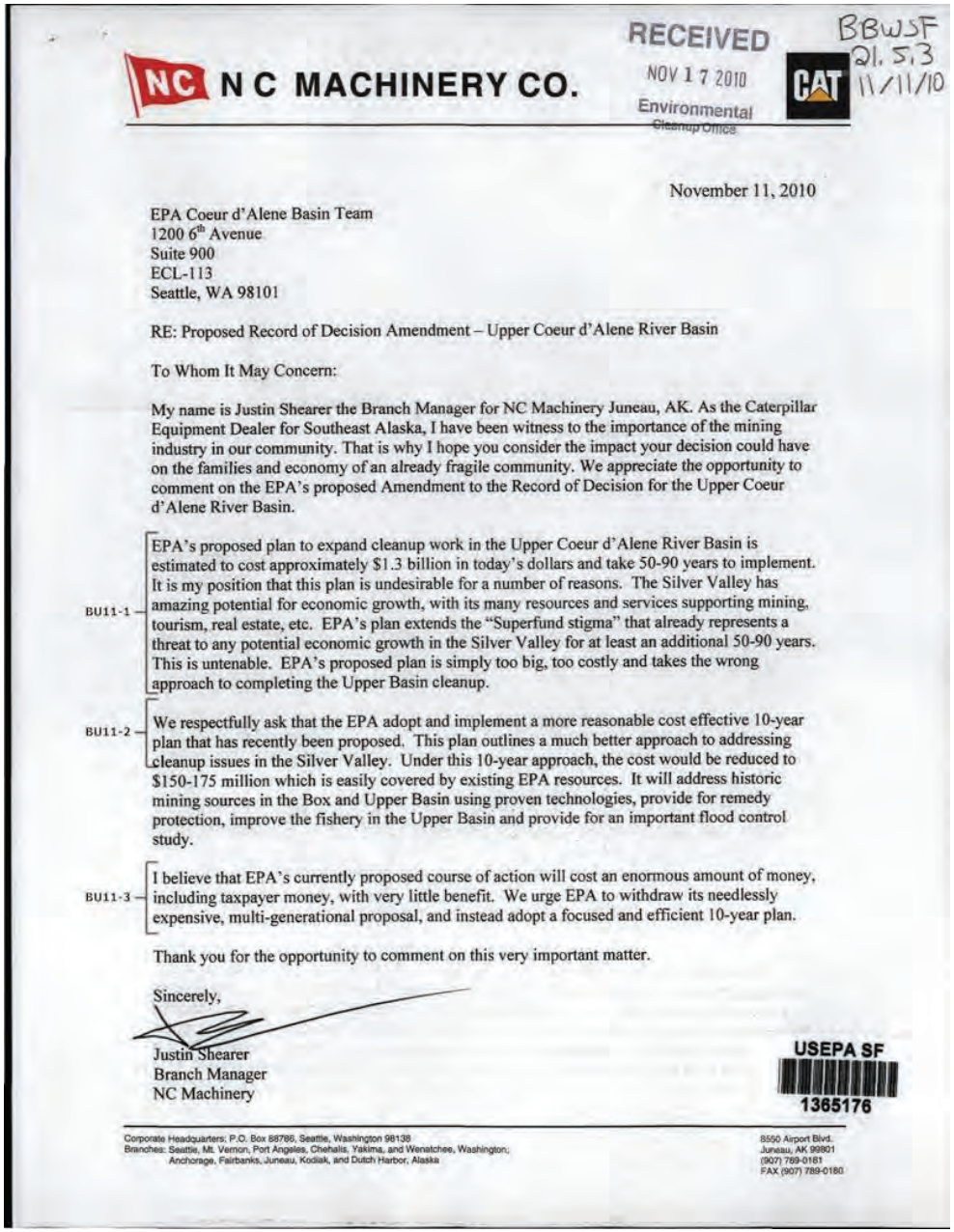
USEPA SF
1365260

Response to comment BU18-1
See response to Comment No. I474-1.

Response to comment BU18-2
See response to Comment No. I474-2.

Response to comment BU18-3
See response to Comment No. I474-3.

N C Machinery Company, BU11, Letter 1365176



NC N C MACHINERY CO.

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November 11, 2010

EPA Coeur d'Alene Basin Team
1200 6th Avenue
Suite 900
ECL-113
Seattle, WA 98101

RE: Proposed Record of Decision Amendment – Upper Coeur d'Alene River Basin

To Whom It May Concern:

My name is Justin Shearer the Branch Manager for NC Machinery Juneau, AK. As the Caterpillar Equipment Dealer for Southeast Alaska, I have been witness to the importance of the mining industry in our community. That is why I hope you consider the impact your decision could have on the families and economy of an already fragile community. We appreciate the opportunity to comment on the EPA's proposed Amendment to the Record of Decision for the Upper Coeur d'Alene River Basin.

BU11-1 — EPA's proposed plan to expand cleanup work in the Upper Coeur d'Alene River Basin is estimated to cost approximately $1.3 billion in today's dollars and take 50-90 years to implement. It is my position that this plan is undesirable for a number of reasons. The Silver Valley has amazing potential for economic growth, with its many resources and services supporting mining, tourism, real estate, etc. EPA's plan extends the "Superfund stigma" that already represents a threat to any potential economic growth in the Silver Valley for at least an additional 50-90 years. This is untenable. EPA's proposed plan is simply too big, too costly and takes the wrong approach to completing the Upper Basin cleanup.

BU11-2 — We respectfully ask that the EPA adopt and implement a more reasonable cost effective 10-year plan that has recently been proposed. This plan outlines a much better approach to addressing cleanup issues in the Silver Valley. Under this 10-year approach, the cost would be reduced to $150-175 million which is easily covered by existing EPA resources. It will address historic mining sources in the Box and Upper Basin using proven technologies, provide for remedy protection, improve the fishery in the Upper Basin and provide for an important flood control study.

BU11-3 — I believe that EPA's currently proposed course of action will cost an enormous amount of money, including taxpayer money, with very little benefit. We urge EPA to withdraw its needlessly expensive, multi-generational proposal, and instead adopt a focused and efficient 10-year plan.

Thank you for the opportunity to comment on this very important matter.

Sincerely,

Justin Shearer
Branch Manager
NC Machinery

USEPA SF
1365176

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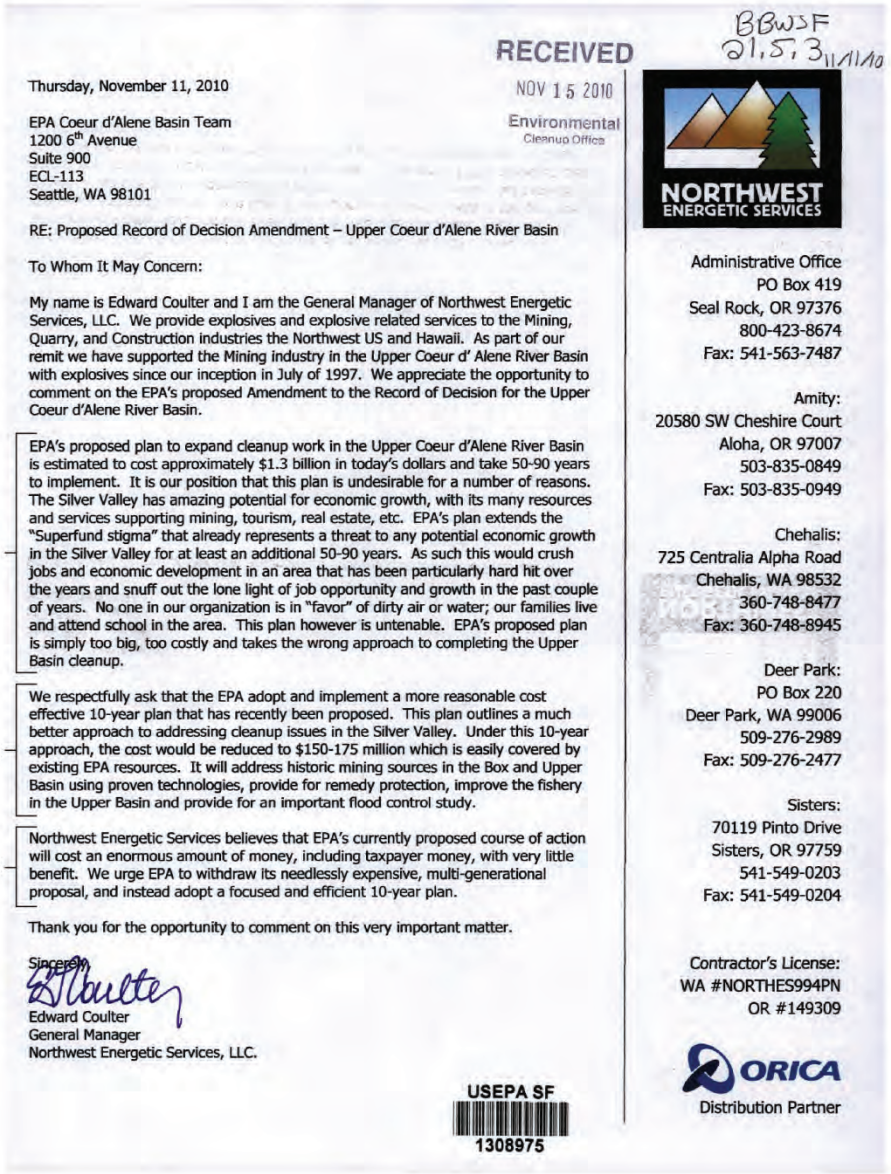
Response to comment BU11-1
See response to Comment No. I474-1.

Response to comment BU11-2
See response to Comment No. I474-2.

Response to comment BU11-3
See response to Comment No. I474-3.

Northwest Energetic Services LLC, BU7, Letter 1308975



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NOV 15 2010
Environmental Cleanup Office

BBWSF 21,5,3 11/11/10

Thursday, November 11, 2010

EPA Coeur d'Alene Basin Team
1200 6th Avenue
Suite 900
ECL-113
Seattle, WA 98101

RE: Proposed Record of Decision Amendment – Upper Coeur d'Alene River Basin

To Whom It May Concern:

My name is Edward Coulter and I am the General Manager of Northwest Energetic Services, LLC. We provide explosives and explosive related services to the Mining, Quarry, and Construction industries the Northwest US and Hawaii. As part of our remit we have supported the Mining industry in the Upper Coeur d' Alene River Basin with explosives since our inception in July of 1997. We appreciate the opportunity to comment on the EPA's proposed Amendment to the Record of Decision for the Upper Coeur d'Alene River Basin.

BU7-1 – EPA's proposed plan to expand cleanup work in the Upper Coeur d'Alene River Basin is estimated to cost approximately $1.3 billion in today's dollars and take 50-90 years to implement. It is our position that this plan is undesirable for a number of reasons. The Silver Valley has amazing potential for economic growth, with its many resources and services supporting mining, tourism, real estate, etc. EPA's plan extends the "Superfund stigma" that already represents a threat to any potential economic growth in the Silver Valley for at least an additional 50-90 years. As such this would crush jobs and economic development in an area that has been particularly hard hit over the years and snuff out the lone light of job opportunity and growth in the past couple of years. No one in our organization is in "favor" of dirty air or water; our families live and attend school in the area. This plan however is untenable. EPA's proposed plan is simply too big, too costly and takes the wrong approach to completing the Upper Basin cleanup.

BU7-2 – We respectfully ask that the EPA adopt and implement a more reasonable cost effective 10-year plan that has recently been proposed. This plan outlines a much better approach to addressing cleanup issues in the Silver Valley. Under this 10-year approach, the cost would be reduced to $150-175 million which is easily covered by existing EPA resources. It will address historic mining sources in the Box and Upper Basin using proven technologies, provide for remedy protection, improve the fishery in the Upper Basin and provide for an important flood control study.

BU7-3 – Northwest Energetic Services believes that EPA's currently proposed course of action will cost an enormous amount of money, including taxpayer money, with very little benefit. We urge EPA to withdraw its needlessly expensive, multi-generational proposal, and instead adopt a focused and efficient 10-year plan.

Thank you for the opportunity to comment on this very important matter.

Sincerely,

Edward Coulter
General Manager
Northwest Energetic Services, LLC.

USEPA SF
1308975

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Response to comment BU7-1

See response to Comment No. I474-1.

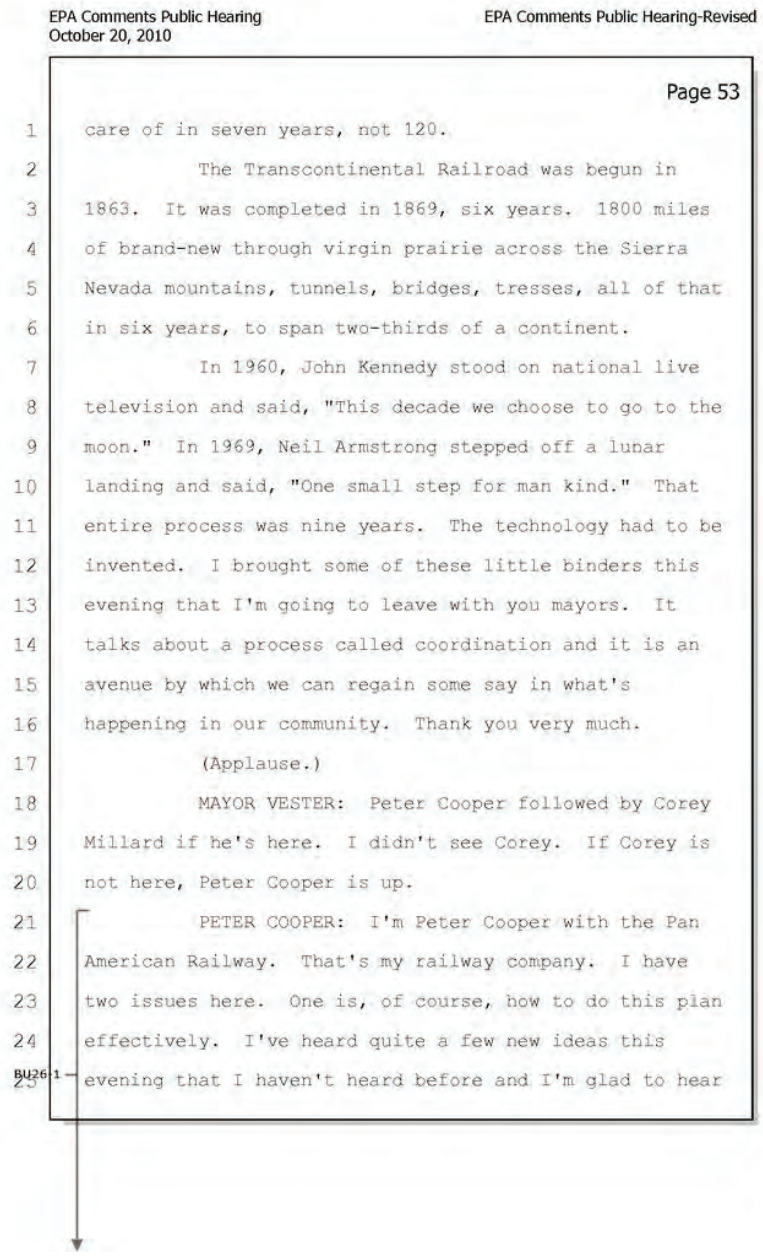
Response to comment BU7-2

See response to Comment No. I474-2.

Response to comment BU7-3

See response to Comment No. I474-3.

Pan American Railway, BU26, Letter 619651-21



EPA Comments Public Hearing
October 20, 2010

EPA Comments Public Hearing-Revised

Page 53

care of in seven years, not 120.

The Transcontinental Railroad was begun in 1863. It was completed in 1869, six years. 1800 miles of brand-new through virgin prairie across the Sierra Nevada mountains, tunnels, bridges, tresses, all of that in six years, to span two-thirds of a continent.

In 1960, John Kennedy stood on national live television and said, "This decade we choose to go to the moon." In 1969, Neil Armstrong stepped off a lunar landing and said, "One small step for man kind." That entire process was nine years. The technology had to be invented. I brought some of these little binders this evening that I'm going to leave with you mayors. It talks about a process called coordination and it is an avenue by which we can regain some say in what's happening in our community. Thank you very much.

(Applause.)

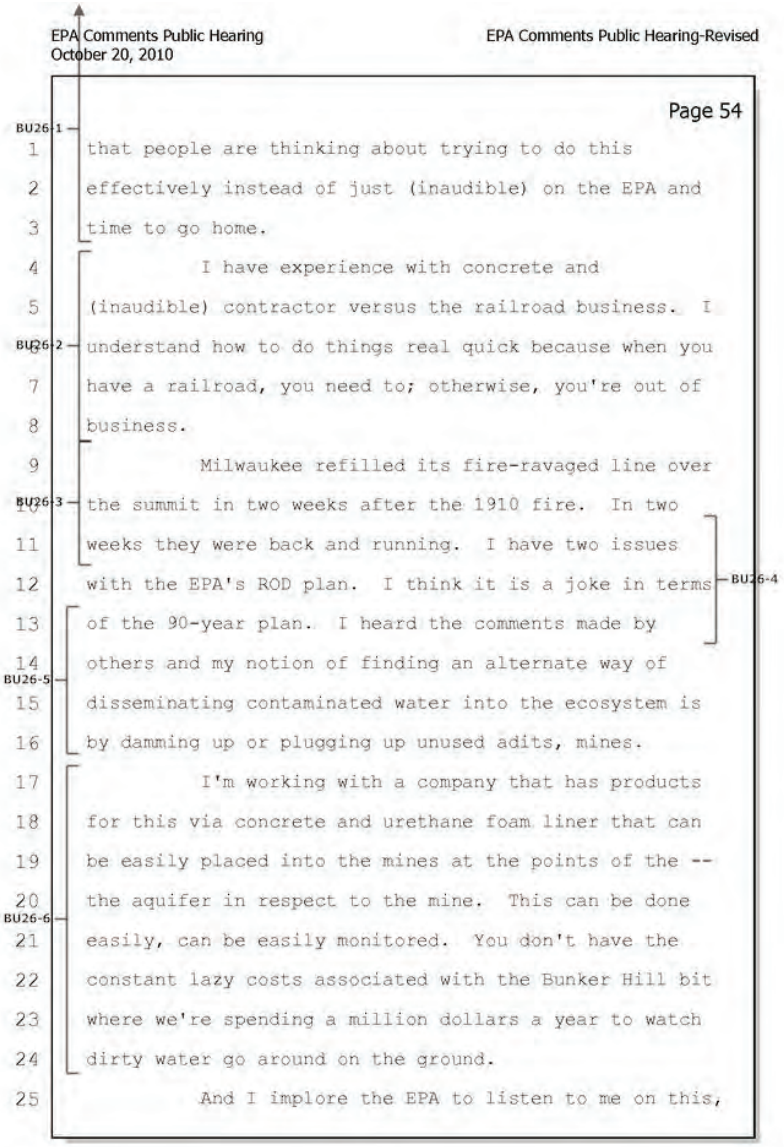
MAYOR VESTER: Peter Cooper followed by Corey Millard if he's here. I didn't see Corey. If Corey is not here, Peter Cooper is up.

PETER COOPER: I'm Peter Cooper with the Pan American Railway. That's my railway company. I have two issues here. One is, of course, how to do this plan effectively. I've heard quite a few new ideas this evening that I haven't heard before and I'm glad to hear

BU26-1

Response to comment BU26-1

Thank you for your comment. EPA has listened to and reviewed many comments from the public regarding the Proposed Plan and made changes to the Selected Remedy.



EPA Comments Public Hearing
October 20, 2010

EPA Comments Public Hearing-Revised

Page 54

BU26-1
that people are thinking about trying to do this effectively instead of just (inaudible) on the EPA and time to go home.

I have experience with concrete and (inaudible) contractor versus the railroad business. I BU26-2 understand how to do things real quick because when you have a railroad, you need to; otherwise, you're out of business.

Milwaukee refilled its fire-ravaged line over BU26-3 the summit in two weeks after the 1910 fire. In two weeks they were back and running. I have two issues with the EPA's ROD plan. I think it is a joke in terms BU26-4 of the 90-year plan. I heard the comments made by others and my notion of finding an alternate way of BU26-5 disseminating contaminated water into the ecosystem is by damming up or plugging up unused adits, mines.

I'm working with a company that has products for this via concrete and urethane foam liner that can be easily placed into the mines at the points of the -- the aquifer in respect to the mine. This can be done BU26-6 easily, can be easily monitored. You don't have the constant lazy costs associated with the Bunker Hill bit where we're spending a million dollars a year to watch dirty water go around on the ground.

And I implore the EPA to listen to me on this,

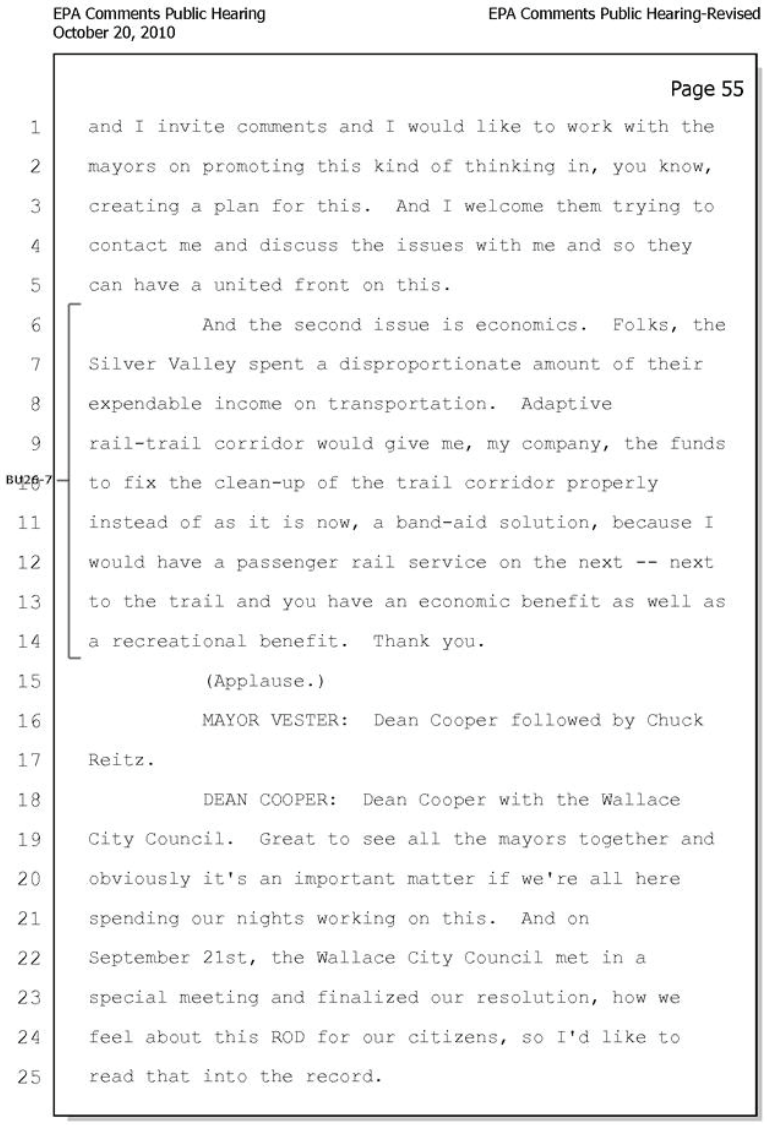
Response to comment BU26-2
Comment noted.

Response to comment BU26-3
Thank you for your comment.

Response to comment BU26-4
See response to Comment No. I58-1.

Response to comment BU26-5
The installation of check dams within mine adits to prevent the discharge of contaminated water is a technique that was considered during the Focused Feasibility Study (FFS) (EPA, August 2012, *Final Focused Feasibility Study Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site*) and selected for use in OU 2 as part of the Selected Remedy. Check dams can be an effective means of eliminating discharge flows, but can only be successful when there are no other openings within the mine where water could discharge as pressure builds up behind the check dam. Check dams, along with diversion of surface water to prevent the flow of clean water into mines, are approaches that will be considered during site-specific designs.

Response to comment BU26-6
Comment noted.



EPA Comments Public Hearing
October 20, 2010

EPA Comments Public Hearing-Revised

Page 55

and I invite comments and I would like to work with the mayors on promoting this kind of thinking in, you know, creating a plan for this. And I welcome them trying to contact me and discuss the issues with me and so they can have a united front on this.

And the second issue is economics. Folks, the Silver Valley spent a disproportionate amount of their expendable income on transportation. Adaptive rail-trail corridor would give me, my company, the funds to fix the clean-up of the trail corridor properly instead of as it is now, a band-aid solution, because I would have a passenger rail service on the next -- next to the trail and you have an economic benefit as well as a recreational benefit. Thank you.

BU26-7

(Applause.)

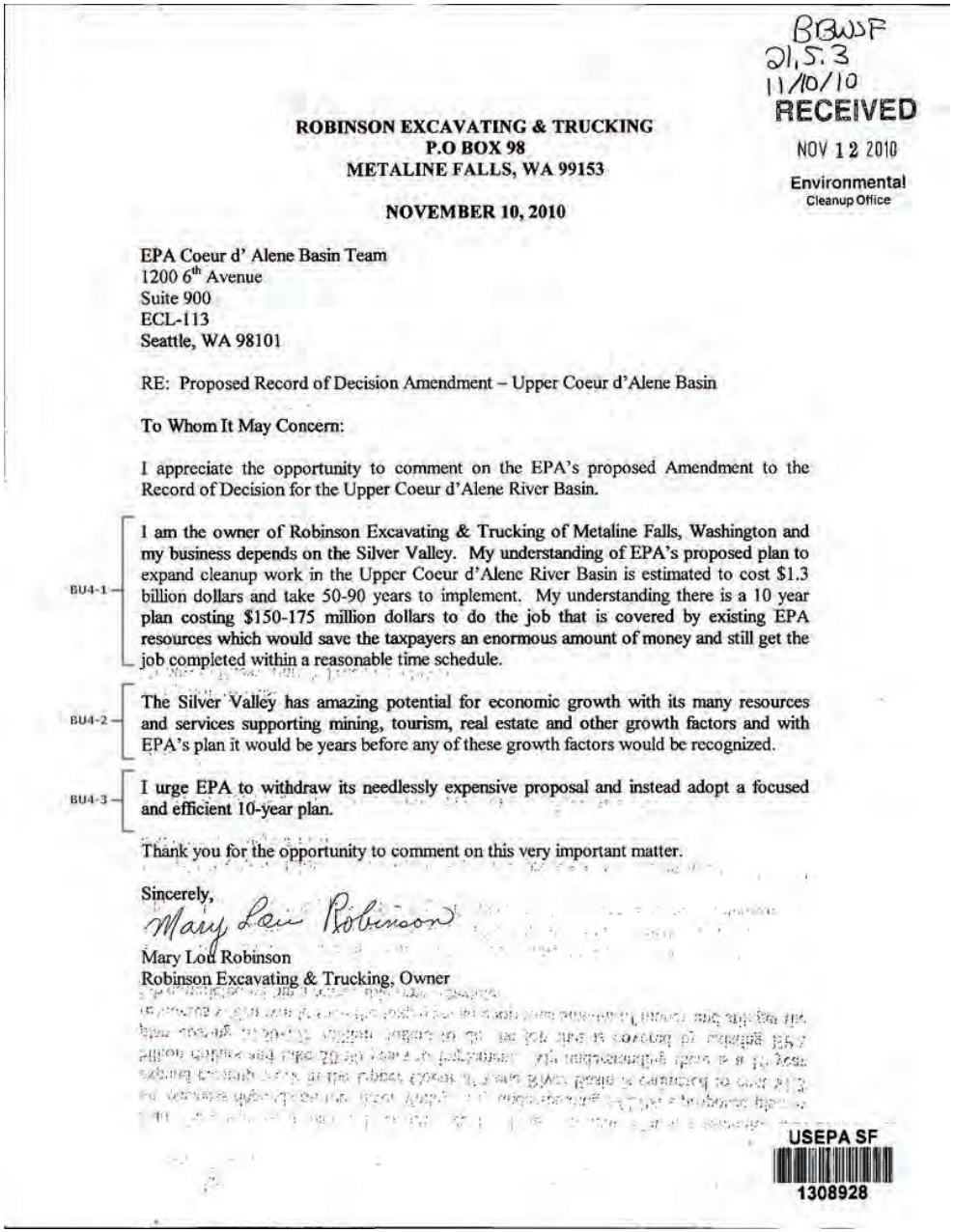
MAYOR VESTER: Dean Cooper followed by Chuck Reitz.

DEAN COOPER: Dean Cooper with the Wallace City Council. Great to see all the mayors together and obviously it's an important matter if we're all here spending our nights working on this. And on September 21st, the Wallace City Council met in a special meeting and finalized our resolution, how we feel about this ROD for our citizens, so I'd like to read that into the record.

Response to comment BU26-7

Thank you for your comment.

Robinson Excavating & Trucking, BU4, Letter 1308928



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ROBINSON EXCAVATING & TRUCKING
P.O BOX 98
METALINE FALLS, WA 99153

NOVEMBER 10, 2010

EPA Coeur d' Alene Basin Team
1200 6th Avenue
Suite 900
ECL-113
Seattle, WA 98101

RE: Proposed Record of Decision Amendment – Upper Coeur d'Alene Basin

To Whom It May Concern:

I appreciate the opportunity to comment on the EPA's proposed Amendment to the Record of Decision for the Upper Coeur d'Alene River Basin.

BU4-1 I am the owner of Robinson Excavating & Trucking of Metaline Falls, Washington and my business depends on the Silver Valley. My understanding of EPA's proposed plan to expand cleanup work in the Upper Coeur d'Alene River Basin is estimated to cost $1.3 billion dollars and take 50-90 years to implement. My understanding there is a 10 year plan costing $150-175 million dollars to do the job that is covered by existing EPA resources which would save the taxpayers an enormous amount of money and still get the job completed within a reasonable time schedule.

BU4-2 The Silver Valley has amazing potential for economic growth with its many resources and services supporting mining, tourism, real estate and other growth factors and with EPA's plan it would be years before any of these growth factors would be recognized.

BU4-3 I urge EPA to withdraw its needlessly expensive proposal and instead adopt a focused and efficient 10-year plan.

Thank you for the opportunity to comment on this very important matter.

Sincerely,
Mary Lou Robinson
Mary Lou Robinson
Robinson Excavating & Trucking, Owner

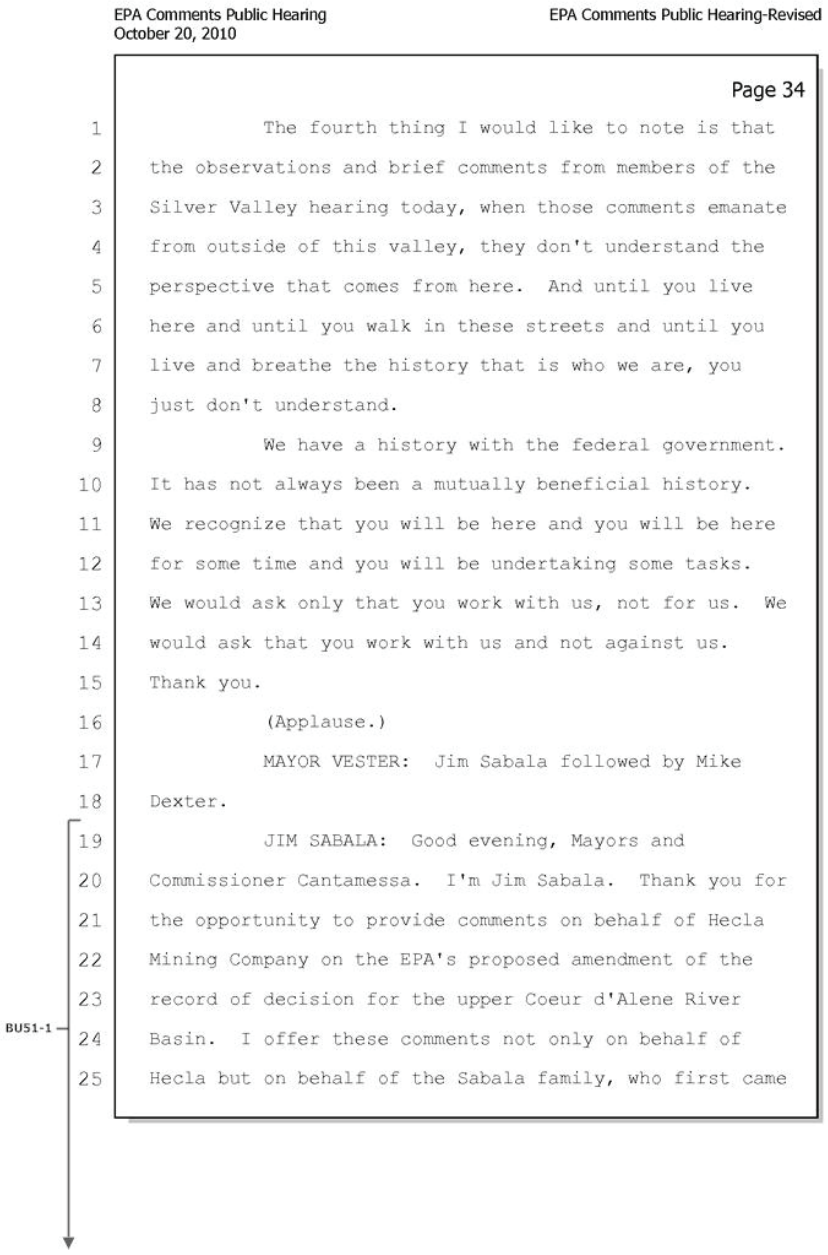
USEPA SF
1308928

Response to comment BU4-1
See response to Comment No. I474-2.

Response to comment BU4-2
See response to Comment No. I474-1.

Response to comment BU4-3
See response to Comment No. I474-2.

Sabala, Jim, BU51, Letter 619651-14



EPA Comments Public Hearing
October 20, 2010

EPA Comments Public Hearing-Revised

Page 34

The fourth thing I would like to note is that the observations and brief comments from members of the Silver Valley hearing today, when those comments emanate from outside of this valley, they don't understand the perspective that comes from here. And until you live here and until you walk in these streets and until you live and breathe the history that is who we are, you just don't understand.

We have a history with the federal government. It has not always been a mutually beneficial history. We recognize that you will be here and you will be here for some time and you will be undertaking some tasks. We would ask only that you work with us, not for us. We would ask that you work with us and not against us. Thank you.

(Applause.)

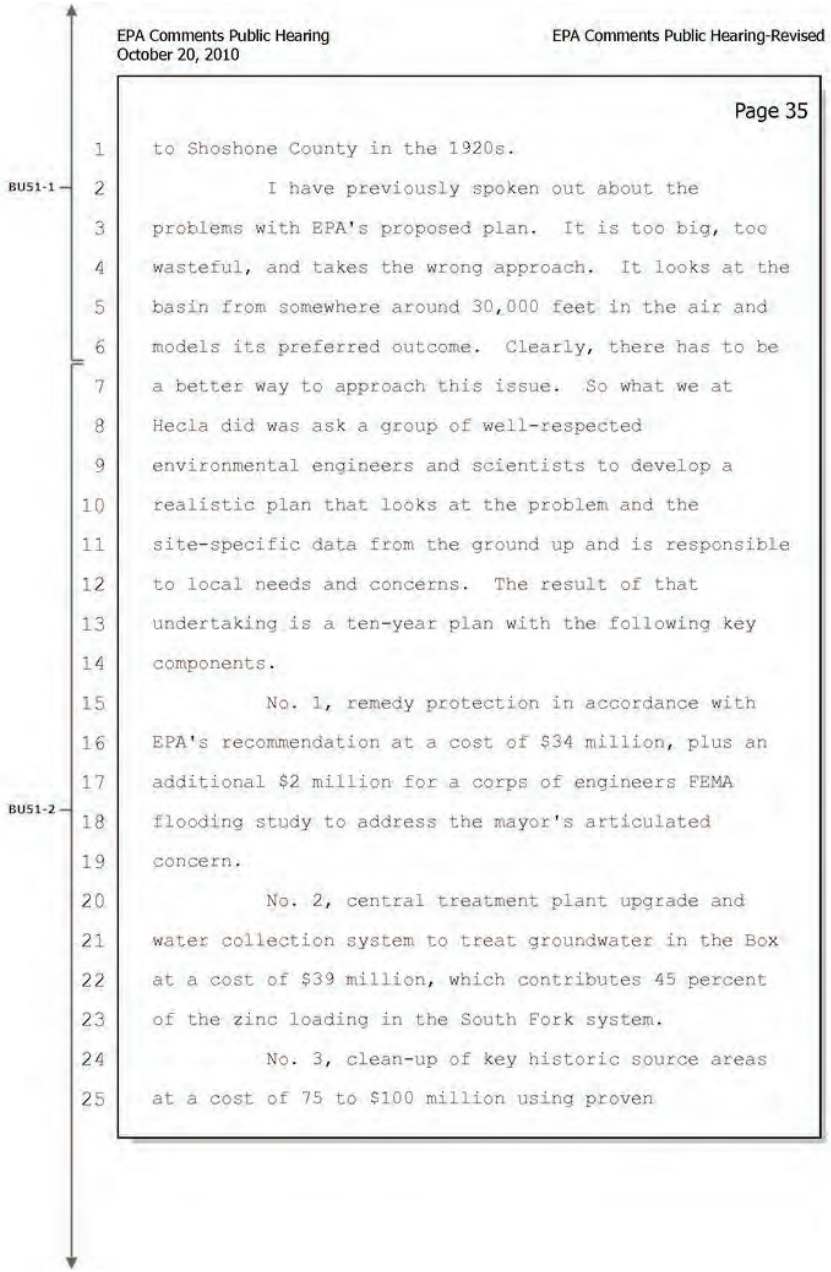
MAYOR VESTER: Jim Sabala followed by Mike Dexter.

JIM SABALA: Good evening, Mayors and Commissioner Cantamessa. I'm Jim Sabala. Thank you for the opportunity to provide comments on behalf of Hecla Mining Company on the EPA's proposed amendment of the record of decision for the upper Coeur d'Alene River Basin. I offer these comments not only on behalf of Hecla but on behalf of the Sabala family, who first came

BU51-1

Response to comment BU51-1

See response to Comment No. I58-1. As described in response to Comment No. I295-2, the Selected Remedy was developed in a collaborative process with the public. It is consistent with the National Oil and Hazardous Substances Pollution Contingency Plan, as required by CERCLA.



EPA Comments Public Hearing
October 20, 2010

EPA Comments Public Hearing-Revised

Page 35

to Shoshone County in the 1920s.

BU51-1 I have previously spoken out about the problems with EPA's proposed plan. It is too big, too wasteful, and takes the wrong approach. It looks at the basin from somewhere around 30,000 feet in the air and models its preferred outcome. Clearly, there has to be a better way to approach this issue. So what we at Hecla did was ask a group of well-respected environmental engineers and scientists to develop a realistic plan that looks at the problem and the site-specific data from the ground up and is responsible to local needs and concerns. The result of that undertaking is a ten-year plan with the following key components.

No. 1, remedy protection in accordance with EPA's recommendation at a cost of $34 million, plus an additional $2 million for a corps of engineers FEMA

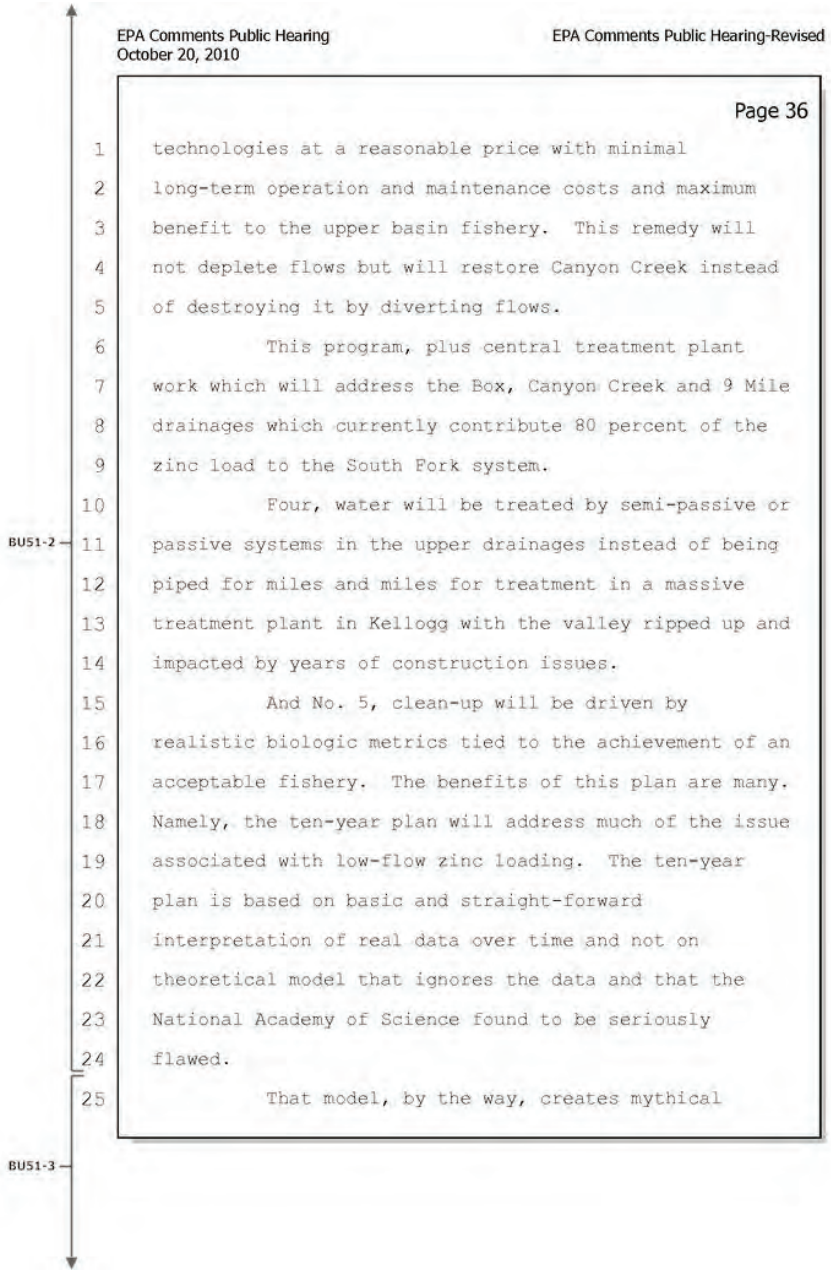
BU51-2 flooding study to address the mayor's articulated concern.

No. 2, central treatment plant upgrade and water collection system to treat groundwater in the Box at a cost of $39 million, which contributes 45 percent of the zinc loading in the South Fork system.

No. 3, clean-up of key historic source areas at a cost of 75 to $100 million using proven

Response to comment BU51-2

See responses to Comment Nos. I58-1, I474-2, I54-8, and SA4-13.



EPA Comments Public Hearing
October 20, 2010

EPA Comments Public Hearing-Revised

Page 36

technologies at a reasonable price with minimal long-term operation and maintenance costs and maximum benefit to the upper basin fishery. This remedy will not deplete flows but will restore Canyon Creek instead of destroying it by diverting flows.

This program, plus central treatment plant work which will address the Box, Canyon Creek and 9 Mile drainages which currently contribute 80 percent of the zinc load to the South Fork system.

Four, water will be treated by semi-passive or passive systems in the upper drainages instead of being piped for miles and miles for treatment in a massive treatment plant in Kellogg with the valley ripped up and impacted by years of construction issues.

And No. 5, clean-up will be driven by realistic biologic metrics tied to the achievement of an acceptable fishery. The benefits of this plan are many. Namely, the ten-year plan will address much of the issue associated with low-flow zinc loading. The ten-year plan is based on basic and straight-forward interpretation of real data over time and not on theoretical model that ignores the data and that the National Academy of Science found to be seriously flawed.

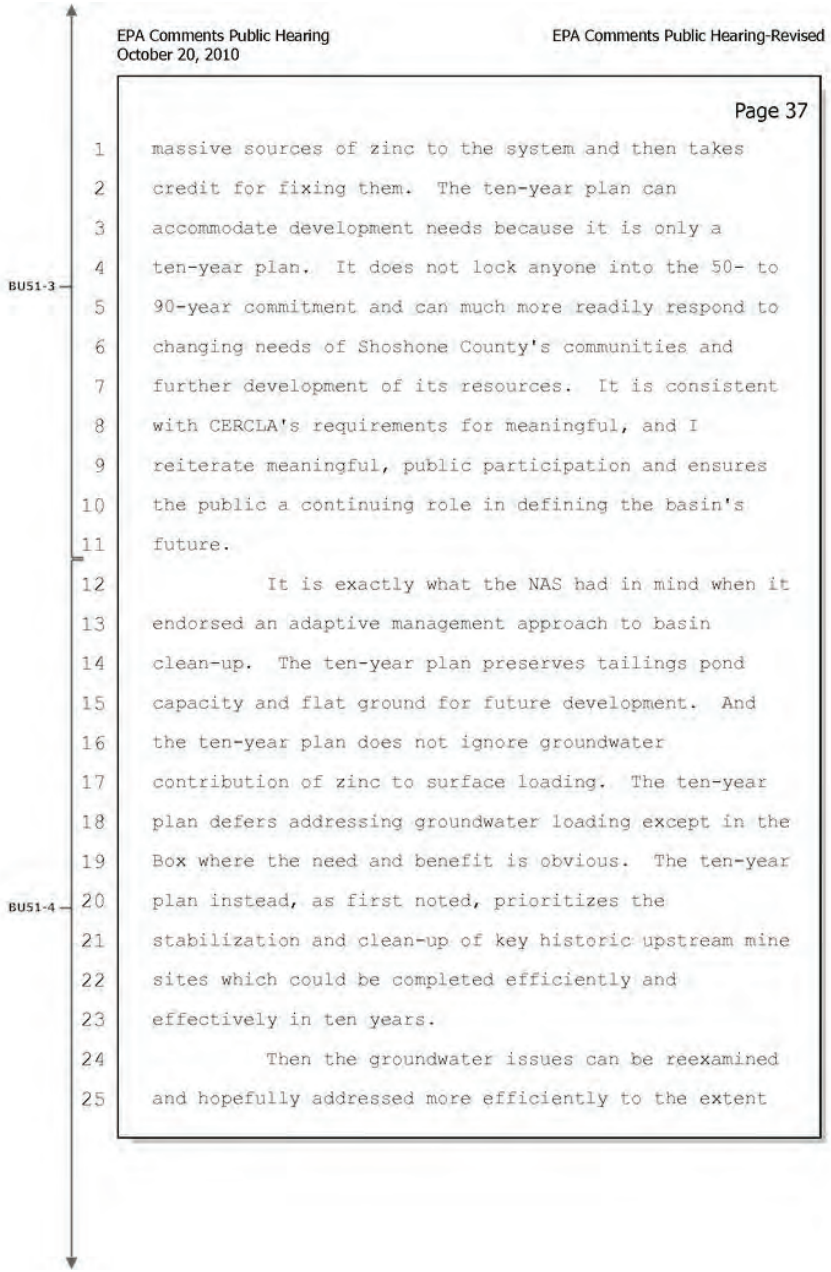
That model, by the way, creates mythical

BU51-2

BU51-3

Response to comment BU51-3

Regarding EPA's use of the Predictive Analysis in evaluating remedial alternatives, see response to comment LJ27-8. As to the inadequacy of Hecla's 10-year plan, see response to comment I474-2.



EPA Comments Public Hearing
October 20, 2010

EPA Comments Public Hearing-Revised

Page 37

massive sources of zinc to the system and then takes credit for fixing them. The ten-year plan can accommodate development needs because it is only a ten-year plan. It does not lock anyone into the 50- to 90-year commitment and can much more readily respond to changing needs of Shoshone County's communities and further development of its resources. It is consistent with CERCLA's requirements for meaningful, and I reiterate meaningful, public participation and ensures the public a continuing role in defining the basin's future.

It is exactly what the NAS had in mind when it endorsed an adaptive management approach to basin clean-up. The ten-year plan preserves tailings pond capacity and flat ground for future development. And the ten-year plan does not ignore groundwater contribution of zinc to surface loading. The ten-year plan defers addressing groundwater loading except in the Box where the need and benefit is obvious. The ten-year plan instead, as first noted, prioritizes the stabilization and clean-up of key historic upstream mine sites which could be completed efficiently and effectively in ten years.

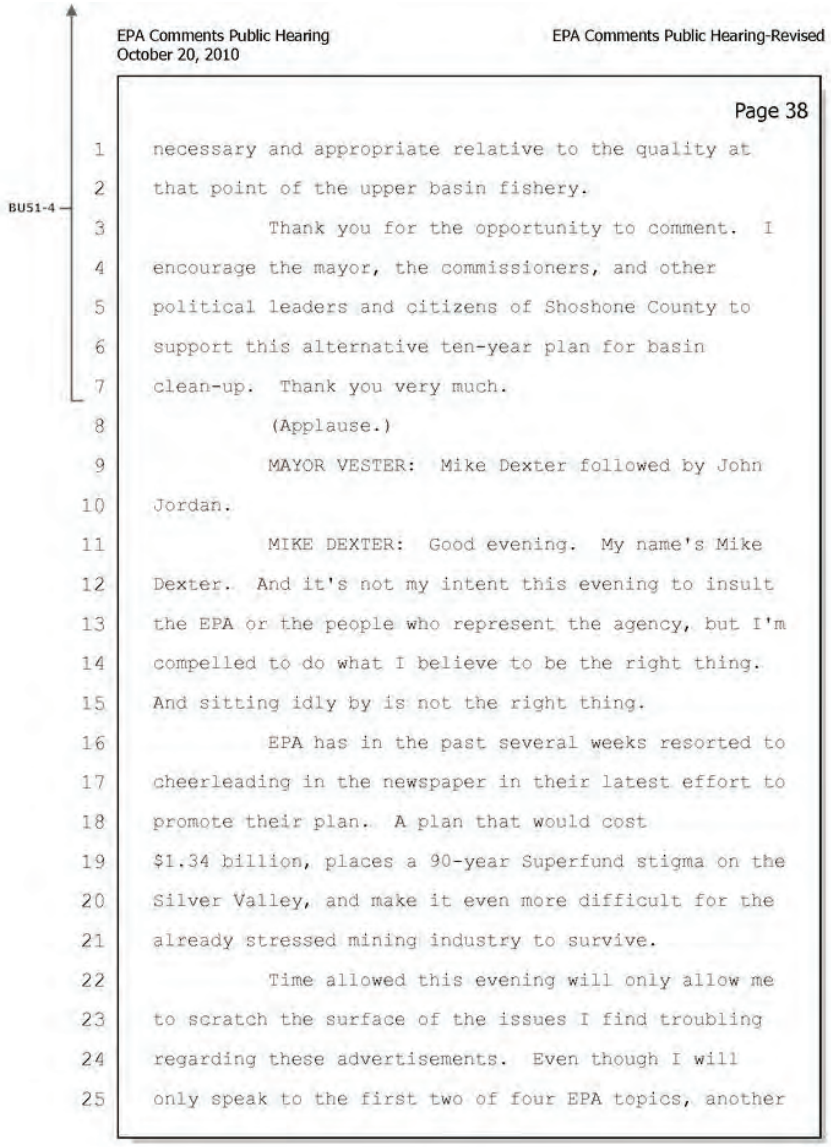
Then the groundwater issues can be reexamined and hopefully addressed more efficiently to the extent

BU51-3

BU51-4

Response to comment BU51-4

See response to Comment No. I474-2.



EPA Comments Public Hearing
October 20, 2010

EPA Comments Public Hearing-Revised

Page 38

BU51-4

necessary and appropriate relative to the quality at that point of the upper basin fishery.

Thank you for the opportunity to comment. I encourage the mayor, the commissioners, and other political leaders and citizens of Shoshone County to support this alternative ten-year plan for basin clean-up. Thank you very much.

(Applause.)

MAYOR VESTER: Mike Dexter followed by John Jordan.

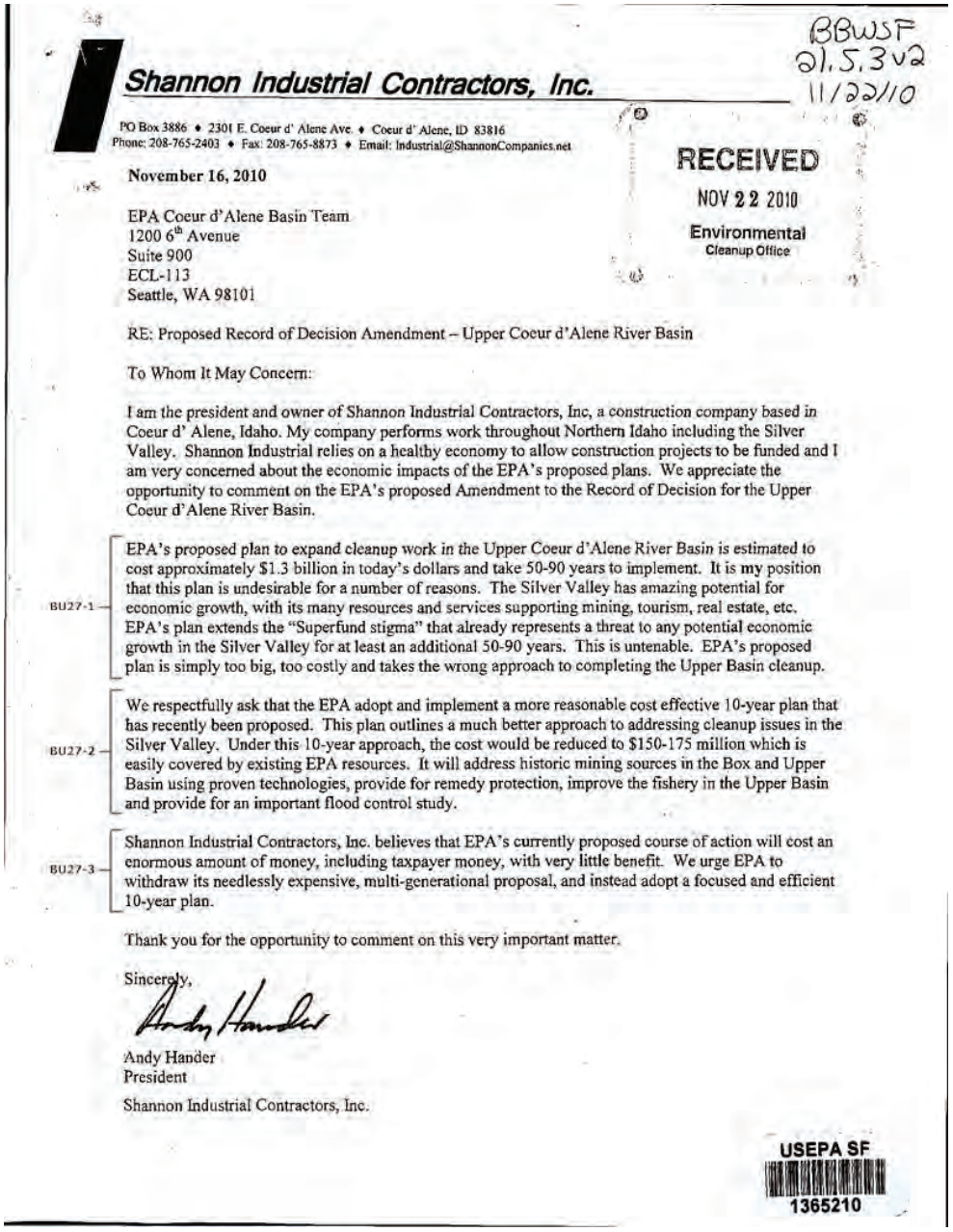
MIKE DEXTER: Good evening. My name's Mike Dexter. And it's not my intent this evening to insult the EPA or the people who represent the agency, but I'm compelled to do what I believe to be the right thing. And sitting idly by is not the right thing.

EPA has in the past several weeks resorted to cheerleading in the newspaper in their latest effort to promote their plan. A plan that would cost $1.34 billion, places a 90-year Superfund stigma on the Silver Valley, and make it even more difficult for the already stressed mining industry to survive.

Time allowed this evening will only allow me to scratch the surface of the issues I find troubling regarding these advertisements. Even though I will only speak to the first two of four EPA topics, another

No comments

Shannon Industrial Contractors, Inc., BU27, Letter 1365210



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Shannon Industrial Contractors, Inc.

PO Box 3886 ♦ 2301 E. Coeur d' Alene Ave. ♦ Coeur d' Alene, ID 83816
Phone: 208-765-2403 ♦ Fax: 208-765-8873 ♦ Email: Industrial@ShannonCompanies.net

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Cleanup Office

November 16, 2010

EPA Coeur d'Alene Basin Team
1200 6th Avenue
Suite 900
ECL-113
Seattle, WA 98101

RE: Proposed Record of Decision Amendment – Upper Coeur d'Alene River Basin

To Whom It May Concern:

I am the president and owner of Shannon Industrial Contractors, Inc, a construction company based in Coeur d' Alene, Idaho. My company performs work throughout Northern Idaho including the Silver Valley. Shannon Industrial relies on a healthy economy to allow construction projects to be funded and I am very concerned about the economic impacts of the EPA's proposed plans. We appreciate the opportunity to comment on the EPA's proposed Amendment to the Record of Decision for the Upper Coeur d'Alene River Basin.

BU27-1 EPA's proposed plan to expand cleanup work in the Upper Coeur d'Alene River Basin is estimated to cost approximately $1.3 billion in today's dollars and take 50-90 years to implement. It is my position that this plan is undesirable for a number of reasons. The Silver Valley has amazing potential for economic growth, with its many resources and services supporting mining, tourism, real estate, etc. EPA's plan extends the "Superfund stigma" that already represents a threat to any potential economic growth in the Silver Valley for at least an additional 50-90 years. This is untenable. EPA's proposed plan is simply too big, too costly and takes the wrong approach to completing the Upper Basin cleanup.

BU27-2 We respectfully ask that the EPA adopt and implement a more reasonable cost effective 10-year plan that has recently been proposed. This plan outlines a much better approach to addressing cleanup issues in the Silver Valley. Under this 10-year approach, the cost would be reduced to $150-175 million which is easily covered by existing EPA resources. It will address historic mining sources in the Box and Upper Basin using proven technologies, provide for remedy protection, improve the fishery in the Upper Basin and provide for an important flood control study.

BU27-3 Shannon Industrial Contractors, Inc. believes that EPA's currently proposed course of action will cost an enormous amount of money, including taxpayer money, with very little benefit. We urge EPA to withdraw its needlessly expensive, multi-generational proposal, and instead adopt a focused and efficient 10-year plan.

Thank you for the opportunity to comment on this very important matter.

Sincerely,

Andy Hander
President
Shannon Industrial Contractors, Inc.

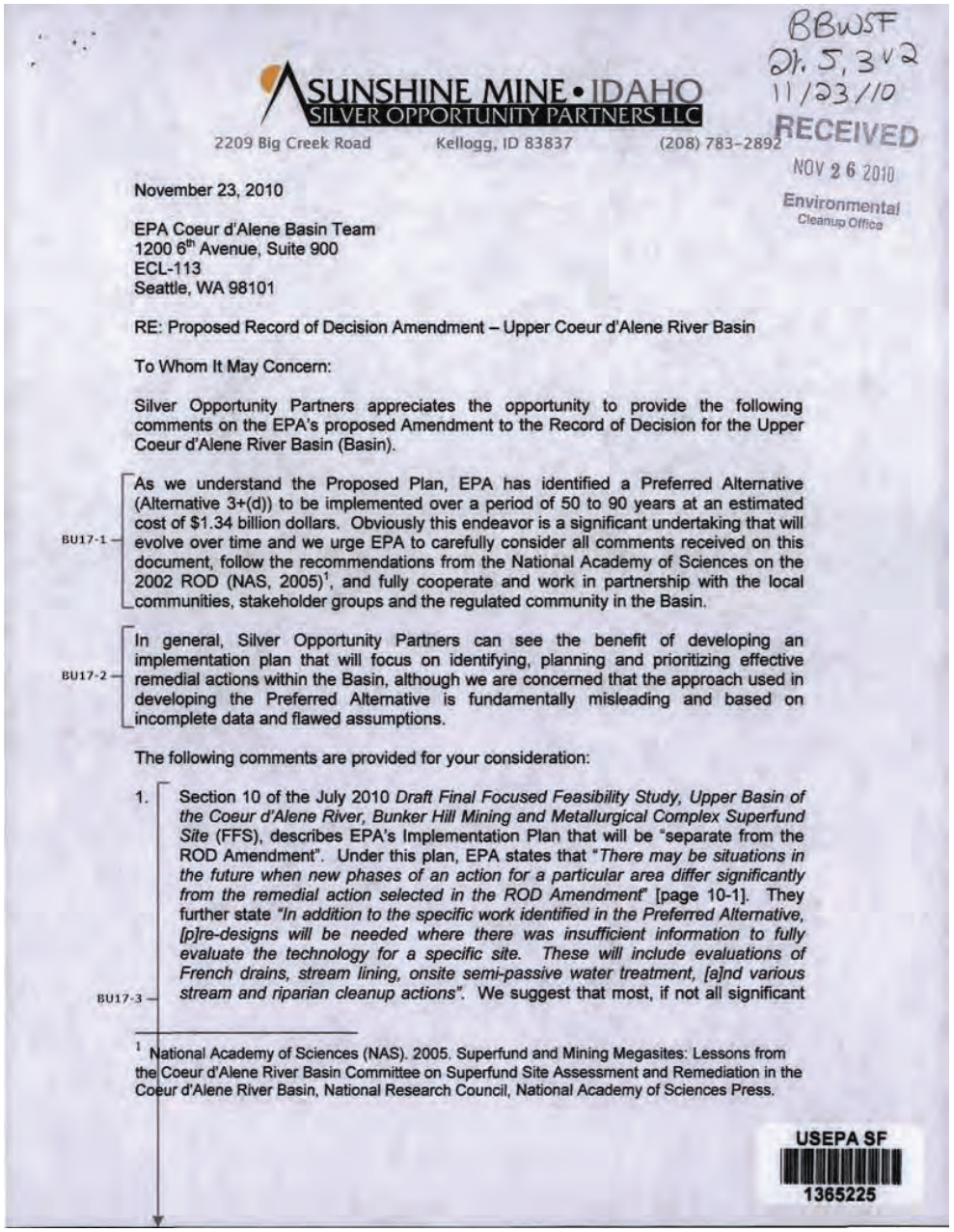
USEPA SF
1365210

Response to comment BU27-1
See response to Comment No. I474-1.

Response to comment BU27-2
See response to Comment No. I474-2.

Response to comment BU27-3
See response to Comment No. I474-3.

Silver Opportunity Partners LLC, BU17, Letter 1365225



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SUNSHINE MINE • IDAHO
SILVER OPPORTUNITY PARTNERS LLC

2209 Big Creek Road Kellogg, ID 83837 (208) 783-2892

November 23, 2010

EPA Coeur d'Alene Basin Team
1200 6th Avenue, Suite 900
ECL-113
Seattle, WA 98101

RE: Proposed Record of Decision Amendment – Upper Coeur d'Alene River Basin

To Whom It May Concern:

Silver Opportunity Partners appreciates the opportunity to provide the following comments on the EPA's proposed Amendment to the Record of Decision for the Upper Coeur d'Alene River Basin (Basin).

BU17-1 As we understand the Proposed Plan, EPA has identified a Preferred Alternative (Alternative 3+(d)) to be implemented over a period of 50 to 90 years at an estimated cost of $1.34 billion dollars. Obviously this endeavor is a significant undertaking that will evolve over time and we urge EPA to carefully consider all comments received on this document, follow the recommendations from the National Academy of Sciences on the 2002 ROD (NAS, 2005)[1], and fully cooperate and work in partnership with the local communities, stakeholder groups and the regulated community in the Basin.

BU17-2 In general, Silver Opportunity Partners can see the benefit of developing an implementation plan that will focus on identifying, planning and prioritizing effective remedial actions within the Basin, although we are concerned that the approach used in developing the Preferred Alternative is fundamentally misleading and based on incomplete data and flawed assumptions.

The following comments are provided for your consideration:

1. Section 10 of the July 2010 *Draft Final Focused Feasibility Study, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site* (FFS), describes EPA's Implementation Plan that will be "separate from the ROD Amendment". Under this plan, EPA states that "*There may be situations in the future when new phases of an action for a particular area differ significantly from the remedial action selected in the ROD Amendment*" [page 10-1]. They further state "*In addition to the specific work identified in the Preferred Alternative, [p]re-designs will be needed where there was insufficient information to fully evaluate the technology for a specific site. These will include evaluations of French drains, stream lining, onsite semi-passive water treatment, [a]nd various stream and riparian cleanup actions*". We suggest that most, if not all significant

BU17-3

[1] National Academy of Sciences (NAS). 2005. Superfund and Mining Megasites: Lessons from the Coeur d'Alene River Basin Committee on Superfund Site Assessment and Remediation in the Coeur d'Alene River Basin, National Research Council, National Academy of Sciences Press.

USEPA SF
1365225

Response to comment BU17-1

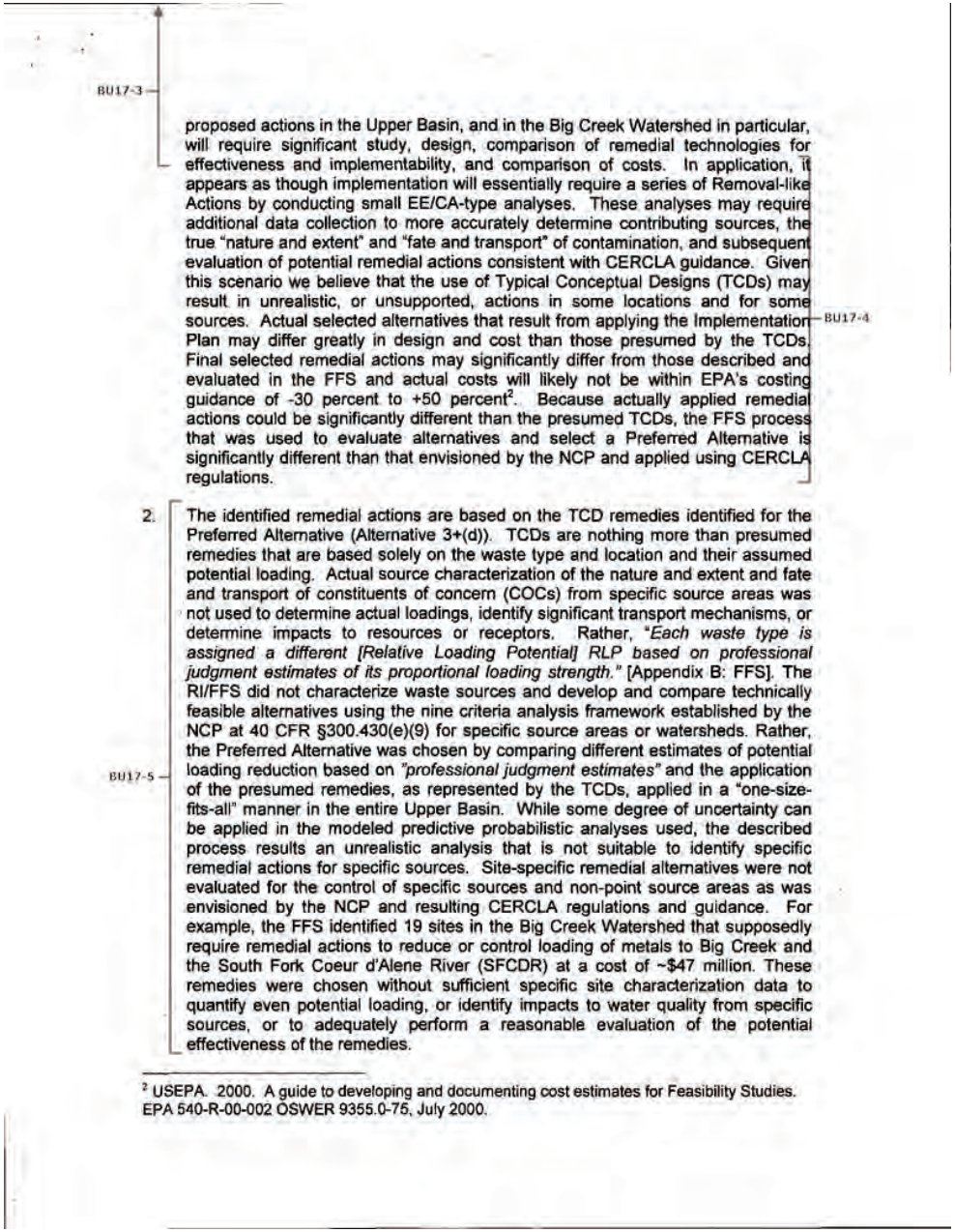
Regarding cost and duration of the Selected Remedy, EPA has significantly reduced the scope, resulting in an estimated cost of $635 million. EPA has considered all comments received on the Proposed Plan. See responses to Comments No. I58-1 and I58-2 for a more detailed response. See response to Comment No. LJ27-8 regarding how EPA has addressed the National Academy of Sciences (NAS) recommendations. EPA is committed to continuing meaningful community participation throughout the Superfund process in the Coeur d'Alene Basin. Over the years, EPA has engaged the public through all phases of its work. This includes working with the Basin Commission's Upper Basin Project Focus Team (PFT), a group focused on technical issues related to cleanup. The PFT members include interested citizens and representatives from the State of Idaho, Shoshone County, the U.S. Bureau of Land Management, the U.S. Fish and Wildlife Service, the U.S. Forest Service, the Coeur d'Alene and Spokane Tribes, and the State of Washington. Additional stakeholders have participated in some of these PFT meetings, including mining industry representatives.

Response to comment BU17-2

Regarding the implementation of the Selected Remedy, see the ROD Amendment, Part 2, Section 12.3. Adaptive management is a critical component of the Selected Remedy because it is not possible for physical and chemical conditions to be fully defined and known for this large and complex area. Uncertainty is unavoidable, and the Selected Remedy must be managed and put into action taking this uncertainty into account. Adaptive management considers uncertainty, monitors and evaluates the effectiveness of the remedial actions and cleanup technologies, and then incorporates the "lessons learned" such that uncertainty is reduced for future actions as the cleanup work progresses towards achievement of the remedial action objectives. The adaptive management process will provide valuable information to prioritize cleanup actions so the greatest amount of effective cleanup is achieved for the lowest cost.

Response to comment BU17-3

Comment noted.



BU17-3

proposed actions in the Upper Basin, and in the Big Creek Watershed in particular, will require significant study, design, comparison of remedial technologies for effectiveness and implementability, and comparison of costs. In application, it appears as though implementation will essentially require a series of Removal-like Actions by conducting small EE/CA-type analyses. These analyses may require additional data collection to more accurately determine contributing sources, the true "nature and extent" and "fate and transport" of contamination, and subsequent evaluation of potential remedial actions consistent with CERCLA guidance. Given this scenario we believe that the use of Typical Conceptual Designs (TCDs) may result in unrealistic, or unsupported, actions in some locations and for some sources. Actual selected alternatives that result from applying the Implementation Plan may differ greatly in design and cost than those presumed by the TCDs. Final selected remedial actions may significantly differ from those described and evaluated in the FFS and actual costs will likely not be within EPA's costing guidance of -30 percent to +50 percent[2]. Because actually applied remedial actions could be significantly different than the presumed TCDs, the FFS process that was used to evaluate alternatives and select a Preferred Alternative is significantly different than that envisioned by the NCP and applied using CERCLA regulations.

BU17-4

2. The identified remedial actions are based on the TCD remedies identified for the Preferred Alternative (Alternative 3+(d)). TCDs are nothing more than presumed remedies that are based solely on the waste type and location and their assumed potential loading. Actual source characterization of the nature and extent and fate and transport of constituents of concern (COCs) from specific source areas was not used to determine actual loadings, identify significant transport mechanisms, or determine impacts to resources or receptors. Rather, "*Each waste type is assigned a different [Relative Loading Potential] RLP based on professional judgment estimates of its proportional loading strength.*" [Appendix B: FFS]. The RI/FFS did not characterize waste sources and develop and compare technically feasible alternatives using the nine criteria analysis framework established by the NCP at 40 CFR §300.430(e)(9) for specific source areas or watersheds. Rather, the Preferred Alternative was chosen by comparing different estimates of potential loading reduction based on *"professional judgment estimates"* and the application of the presumed remedies, as represented by the TCDs, applied in a "one-size-fits-all" manner in the entire Upper Basin. While some degree of uncertainty can be applied in the modeled predictive probabilistic analyses used, the described process results an unrealistic analysis that is not suitable to identify specific remedial actions for specific sources. Site-specific remedial alternatives were not evaluated for the control of specific sources and non-point source areas as was envisioned by the NCP and resulting CERCLA regulations and guidance. For example, the FFS identified 19 sites in the Big Creek Watershed that supposedly require remedial actions to reduce or control loading of metals to Big Creek and the South Fork Coeur d'Alene River (SFCDR) at a cost of ~$47 million. These remedies were chosen without sufficient specific site characterization data to quantify even potential loading, or identify impacts to water quality from specific sources, or to adequately perform a reasonable evaluation of the potential effectiveness of the remedies.

BU17-5

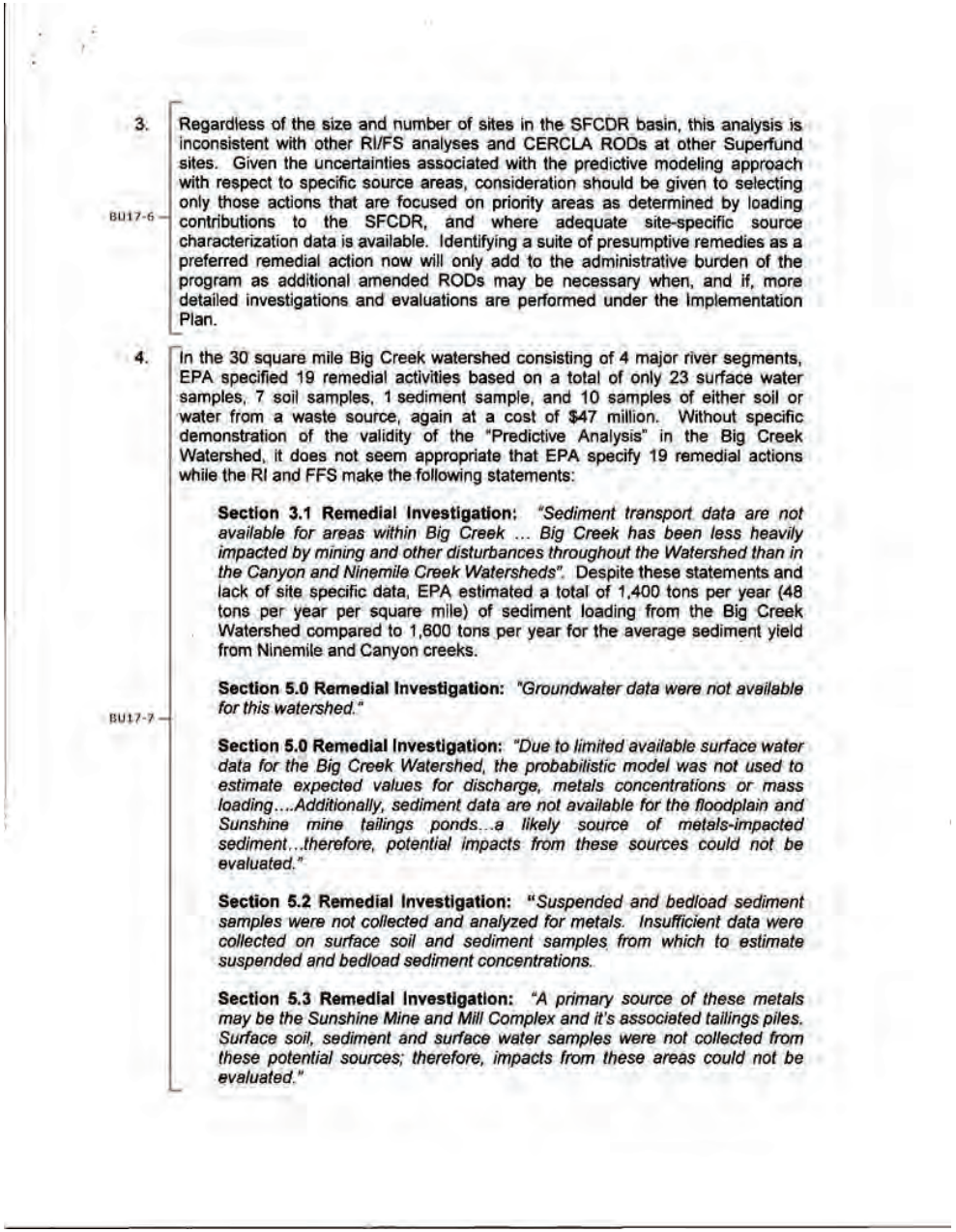
[2] USEPA. 2000. A guide to developing and documenting cost estimates for Feasibility Studies. EPA 540-R-00-002 OSWER 9355.0-75, July 2000.

Response to comment BU17-4

Regarding EPA's implementation of the Selected Remedy, see the ROD Amendment, Part 2, Section 12.3. In most cases, EPA anticipates that changes from the typical conceptual designs (TCDs) specified in the ROD Amendment to the site-specific remedial designs will be small and largely related to quantities (e.g., the volume of soil requiring excavation) rather than to remedial technologies. However, it is possible that some significant decisions will need to be made after the ROD Amendment is issued. EPA will determine whether these warrant separate decision processes, such as another ROD Amendment or an Explanation of Significant Differences.

Response to comment BU17-5

The Focused Feasibility Study (FFS), Proposed Plan, and ROD Amendment were developed in a manner consistent with the National Oil and Hazardous Substances Pollution Contingency Plan, as required by CERCLA. Regarding EPA's use of the Predictive Analysis in evaluating the relative effectiveness of remedial alternatives, see response to Comment No. LJ27-8. As described in the ROD Amendment, EPA has significantly reduced the scope and attendant cost of the Selected Remedy from that of the Preferred Alternative in the Proposed Plan. This has resulted in part in significantly less actions to be taken in the Big Creek Watershed. Sufficient information exists to support the Selected Remedy. However, insufficient information exists to characterize all the specific sources of metals contamination that affect the SFCDR, streams, and floodplains in some areas of the Upper Basin. Before the cleanup takes place, many pre-design activities will take place at specific sites. In most cases, EPA anticipates that changes from the TCDs specified in the ROD Amendment to the site-specific remedial designs will be small and primarily related to quantities (e.g., the volume of soil requiring excavation) rather than to remedial technologies. However, it is possible that some significant decisions will need to be made after the ROD Amendment is issued. EPA will determine whether these warrant separate decision processes, such as another ROD Amendment or an Explanation of Significant Differences. The Upper Basin is large and the contamination is extensive, and it is not known how the entire Upper Basin environmental system will respond to cleanup. This is why a critical component of the Selected Remedy is adaptive management. The TCD approach taken with the Selected Remedy complements the adaptive management approach. As EPA learns more about remedial effectiveness and the site-specific extent of contamination, detailed remedial designs will be prepared.



3. Regardless of the size and number of sites in the SFCDR basin, this analysis is inconsistent with other RI/FS analyses and CERCLA RODs at other Superfund sites. Given the uncertainties associated with the predictive modeling approach with respect to specific source areas, consideration should be given to selecting only those actions that are focused on priority areas as determined by loading contributions to the SFCDR, and where adequate site-specific source characterization data is available. Identifying a suite of presumptive remedies as a preferred remedial action now will only add to the administrative burden of the program as additional amended RODs may be necessary when, and if, more detailed investigations and evaluations are performed under the Implementation Plan.

BU17-6

4. In the 30 square mile Big Creek watershed consisting of 4 major river segments, EPA specified 19 remedial activities based on a total of only 23 surface water samples, 7 soil samples, 1 sediment sample, and 10 samples of either soil or water from a waste source, again at a cost of $47 million. Without specific demonstration of the validity of the "Predictive Analysis" in the Big Creek Watershed, it does not seem appropriate that EPA specify 19 remedial actions while the RI and FFS make the following statements:

Section 3.1 Remedial Investigation: *"Sediment transport data are not available for areas within Big Creek ... Big Creek has been less heavily impacted by mining and other disturbances throughout the Watershed than in the Canyon and Ninemile Creek Watersheds".* Despite these statements and lack of site specific data, EPA estimated a total of 1,400 tons per year (48 tons per year per square mile) of sediment loading from the Big Creek Watershed compared to 1,600 tons per year for the average sediment yield from Ninemile and Canyon creeks.

Section 5.0 Remedial Investigation: *"Groundwater data were not available for this watershed."*

BU17-7

Section 5.0 Remedial Investigation: *"Due to limited available surface water data for the Big Creek Watershed, the probabilistic model was not used to estimate expected values for discharge, metals concentrations or mass loading....Additionally, sediment data are not available for the floodplain and Sunshine mine tailings ponds...a likely source of metals-impacted sediment...therefore, potential impacts from these sources could not be evaluated."*

Section 5.2 Remedial Investigation: **"***Suspended and bedload sediment samples were not collected and analyzed for metals. Insufficient data were collected on surface soil and sediment samples from which to estimate suspended and bedload sediment concentrations.*

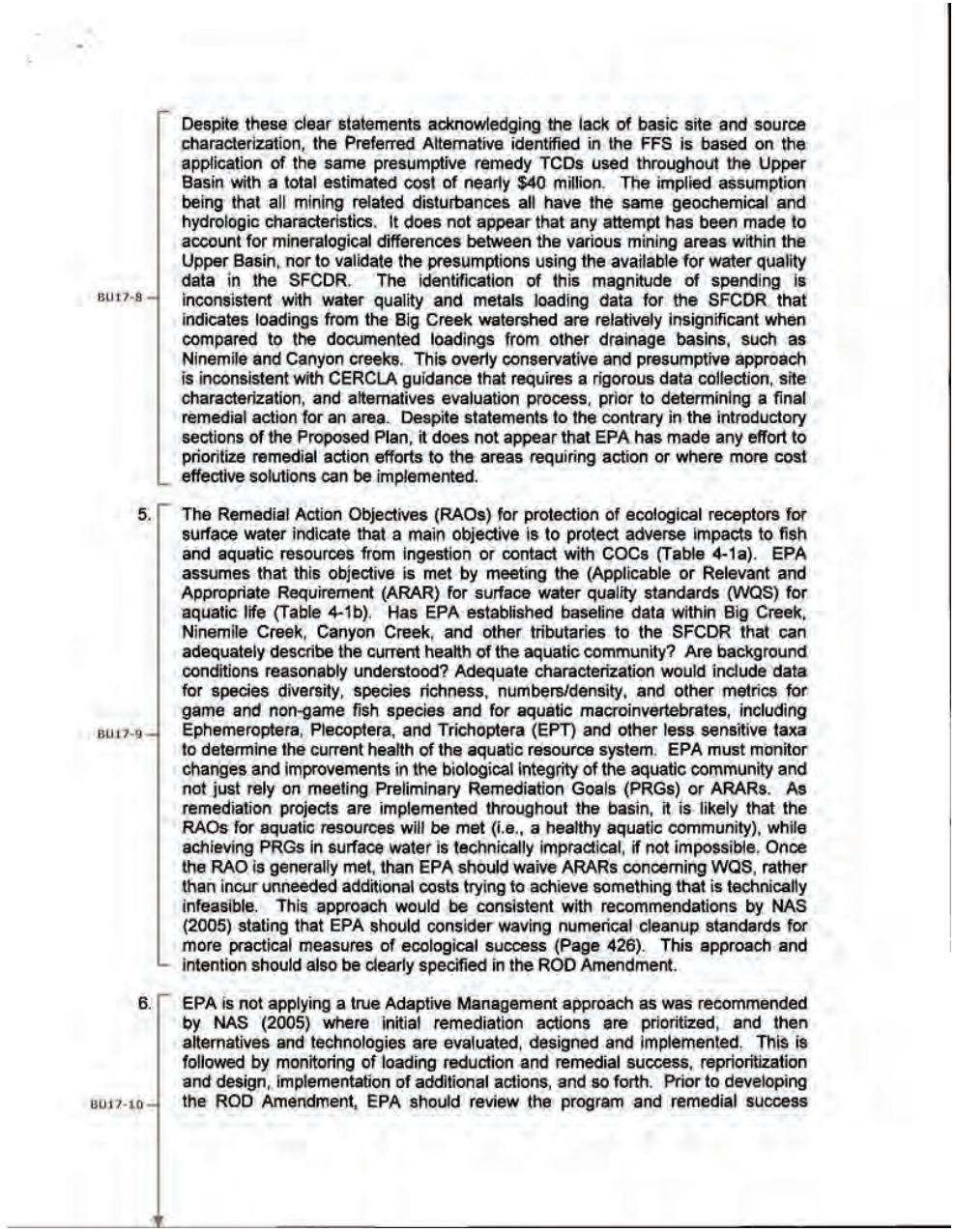
Section 5.3 Remedial Investigation: *"A primary source of these metals may be the Sunshine Mine and Mill Complex and it's associated tailings piles. Surface soil, sediment and surface water samples were not collected from these potential sources; therefore, impacts from these areas could not be evaluated."*

Response to comment BU17-6

The FFS, Proposed Plan and ROD Amendment, including the Selected Remedy, were developed in a manner consistent with the NCP, as required by CERCLA. EPA's goal is to complete the cleanup in the Basin as quickly as possible and with minimum disruption. EPA is required by law to ensure protection of human health and the environment. The Upper Basin is a large area with complicated contamination issues that have evolved over a long period of time. The extent and nature of the contamination dictate that it will take substantial time and resources to clean up. The ROD Amendment provides details regarding the implementation approach for the Selected Remedy in Section 12.3, including where the work starts and how it will proceed over time. With help from stakeholders and community members involved in the Basin Commission's Upper Basin PFT over the last several years, EPA developed a logical and transparent prioritization process for cleanup actions. Using this prioritization process, the Selected Remedy, an interim action, focuses on a prioritized set of cleanup actions. The actions include the most contaminated drainages (i.e., Ninemile and Canyon Creeks), areas that have the greatest adverse impact on groundwater and surface water (e.g., OU 2), and areas that provide protection for existing remedies. This process of prioritizing actions included in the Selected Remedy is consistent with the adaptive management approach. The estimated time for implementing the Selected Remedy is about 30 years.

Response to comment BU17-7

See response to Comment No. BU17-5 above regarding the reduced scope of the Selected Remedy and its relationship to Big Creek.



Despite these clear statements acknowledging the lack of basic site and source characterization, the Preferred Alternative identified in the FFS is based on the application of the same presumptive remedy TCDs used throughout the Upper Basin with a total estimated cost of nearly $40 million. The implied assumption being that all mining related disturbances all have the same geochemical and hydrologic characteristics. It does not appear that any attempt has been made to account for mineralogical differences between the various mining areas within the Upper Basin, nor to validate the presumptions using the available for water quality data in the SFCDR. The identification of this magnitude of spending is inconsistent with water quality and metals loading data for the SFCDR that indicates loadings from the Big Creek watershed are relatively insignificant when compared to the documented loadings from other drainage basins, such as Ninemile and Canyon creeks. This overly conservative and presumptive approach is inconsistent with CERCLA guidance that requires a rigorous data collection, site characterization, and alternatives evaluation process, prior to determining a final remedial action for an area. Despite statements to the contrary in the introductory sections of the Proposed Plan, it does not appear that EPA has made any effort to prioritize remedial action efforts to the areas requiring action or where more cost effective solutions can be implemented.

BU17-8

5. The Remedial Action Objectives (RAOs) for protection of ecological receptors for surface water indicate that a main objective is to protect adverse impacts to fish and aquatic resources from ingestion or contact with COCs (Table 4-1a). EPA assumes that this objective is met by meeting the (Applicable or Relevant and Appropriate Requirement (ARAR) for surface water quality standards (WQS) for aquatic life (Table 4-1b). Has EPA established baseline data within Big Creek, Ninemile Creek, Canyon Creek, and other tributaries to the SFCDR that can adequately describe the current health of the aquatic community? Are background conditions reasonably understood? Adequate characterization would include data for species diversity, species richness, numbers/density, and other metrics for game and non-game fish species and for aquatic macroinvertebrates, including Ephemeroptera, Plecoptera, and Trichoptera (EPT) and other less sensitive taxa to determine the current health of the aquatic resource system. EPA must monitor changes and improvements in the biological integrity of the aquatic community and not just rely on meeting Preliminary Remediation Goals (PRGs) or ARARs. As remediation projects are implemented throughout the basin, it is likely that the RAOs for aquatic resources will be met (i.e., a healthy aquatic community), while achieving PRGs in surface water is technically impractical, if not impossible. Once the RAO is generally met, than EPA should waive ARARs concerning WQS, rather than incur unneeded additional costs trying to achieve something that is technically infeasible. This approach would be consistent with recommendations by NAS (2005) stating that EPA should consider waving numerical cleanup standards for more practical measures of ecological success (Page 426). This approach and intention should also be clearly specified in the ROD Amendment.

BU17-9

6. EPA is not applying a true Adaptive Management approach as was recommended by NAS (2005) where initial remediation actions are prioritized, and then alternatives and technologies are evaluated, designed and implemented. This is followed by monitoring of loading reduction and remedial success, reprioritization and design, implementation of additional actions, and so forth. Prior to developing the ROD Amendment, EPA should review the program and remedial success

BU17-10

Response to comment BU17-8

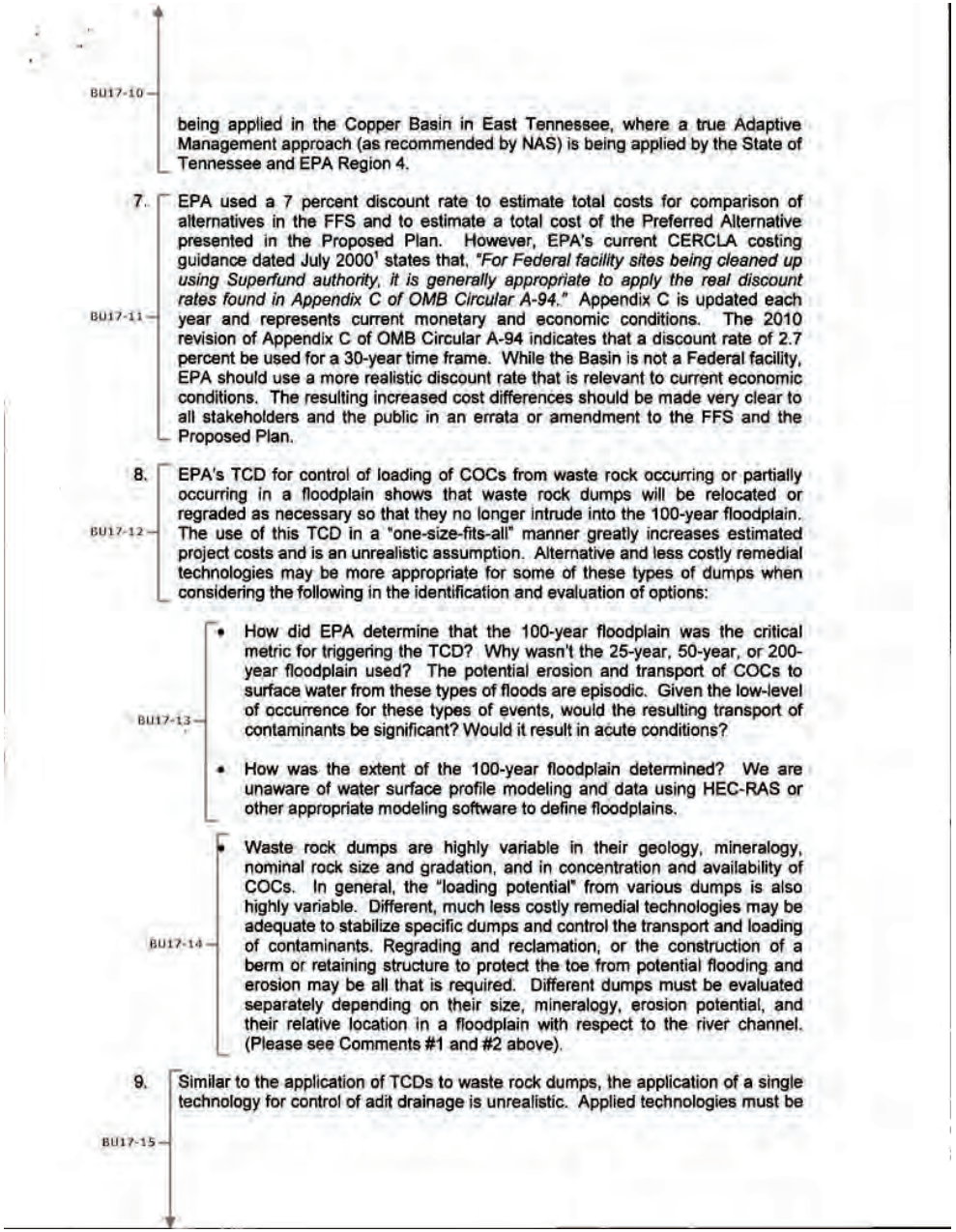
The ROD Amendment, including the Selected Remedy, was developed in a manner consistent with the NCP, as required by CERCLA. In response to comments, EPA has significantly reduced the scope of the Selected Remedy and is not including all of the remedial actions that were identified in EPA's Preferred Alternative for the Upper Basin in the Proposed Plan. Changes made to the Selected Remedy are described in detail in the ROD Amendment, Part 2, Section 14.0. The number of previously proposed actions in Big Creek that are referred to in the comment have been significantly reduced in the Selected Remedy.

Response to comment BU17-9

Regarding the implementation of the Selected Remedy, an interim action, see the ROD Amendment, Part 2, Section 12.3. Regarding the monitoring of biologic conditions during implementation of the Selected Remedy, see response to Comment No. SA4-13. Regarding applicable or relevant and appropriate requirements (ARAR) waivers, see response to Comment No. SA4-11.

Response to comment BU17-10

Regarding EPA's use of the adaptive management process, see the ROD Amendment, Part 2, Section 12.3. Also see the response to Comment No. LJ11-2.



BU17-10

being applied in the Copper Basin in East Tennessee, where a true Adaptive Management approach (as recommended by NAS) is being applied by the State of Tennessee and EPA Region 4.

7. EPA used a 7 percent discount rate to estimate total costs for comparison of alternatives in the FFS and to estimate a total cost of the Preferred Alternative presented in the Proposed Plan. However, EPA's current CERCLA costing guidance dated July 2000[1] states that, *"For Federal facility sites being cleaned up using Superfund authority, it is generally appropriate to apply the real discount rates found in Appendix C of OMB Circular A-94."* Appendix C is updated each year and represents current monetary and economic conditions. The 2010 revision of Appendix C of OMB Circular A-94 indicates that a discount rate of 2.7 percent be used for a 30-year time frame. While the Basin is not a Federal facility, EPA should use a more realistic discount rate that is relevant to current economic conditions. The resulting increased cost differences should be made very clear to all stakeholders and the public in an errata or amendment to the FFS and the Proposed Plan.

BU17-11

8. EPA's TCD for control of loading of COCs from waste rock occurring or partially occurring in a floodplain shows that waste rock dumps will be relocated or regraded as necessary so that they no longer intrude into the 100-year floodplain. The use of this TCD in a "one-size-fits-all" manner greatly increases estimated project costs and is an unrealistic assumption. Alternative and less costly remedial technologies may be more appropriate for some of these types of dumps when considering the following in the identification and evaluation of options:

BU17-12

- How did EPA determine that the 100-year floodplain was the critical metric for triggering the TCD? Why wasn't the 25-year, 50-year, or 200-year floodplain used? The potential erosion and transport of COCs to surface water from these types of floods are episodic. Given the low-level of occurrence for these types of events, would the resulting transport of contaminants be significant? Would it result in acute conditions?

BU17-13

- How was the extent of the 100-year floodplain determined? We are unaware of water surface profile modeling and data using HEC-RAS or other appropriate modeling software to define floodplains.

- Waste rock dumps are highly variable in their geology, mineralogy, nominal rock size and gradation, and in concentration and availability of COCs. In general, the "loading potential" from various dumps is also highly variable. Different, much less costly remedial technologies may be adequate to stabilize specific dumps and control the transport and loading of contaminants. Regrading and reclamation, or the construction of a berm or retaining structure to protect the toe from potential flooding and erosion may be all that is required. Different dumps must be evaluated separately depending on their size, mineralogy, erosion potential, and their relative location in a floodplain with respect to the river channel. (Please see Comments #1 and #2 above).

BU17-14

9. Similar to the application of TCDs to waste rock dumps, the application of a single technology for control of adit drainage is unrealistic. Applied technologies must be

BU17-15

Response to comment BU17-11

The cost estimate was developed according to CERCLA guidance for the Feasibility Study (FS) process. EPA guidance states that the accuracy of the cost estimates presented in an FS should be -30 percent to +50 percent , and that a discount rate of 7 percent be used to estimate total project costs in today's dollars (EPA, July 2000, *A Guide to Developing and Documenting Cost Estimates during the Feasibility Study*). According to guidance, this 7 percent discount rate accounts for inflation and the rising costs of construction over time. In this case, 2009 dollars are the basis for the net present value (NPV) cost estimate, consistent with cost estimates presented in the FFS Report (EPA, August 2012, *Final Focused Feasibility Study Report, Upper Basin of the Coeur d'Alene River, Bunker Hill Mining and Metallurgical Complex Superfund Site*). The cost estimate includes the costs of both the remedial action and operation and maintenance (O&M). Cost estimates for work to be performed will be further refined during the remedial design process.

Response to comment BU17-12

In most cases, EPA anticipates that changes from the TCDs specified in the ROD Amendment to the site-specific remedial designs will be small and primarily related to quantities (e.g., the volume of soil requiring excavation) rather than to remedial technologies. The cost estimate was developed according to CERCLA guidance for the FS process. EPA guidance states that the accuracy of the cost estimates presented in an FS should be -30 percent to +50 percent.

Response to comment BU17-13

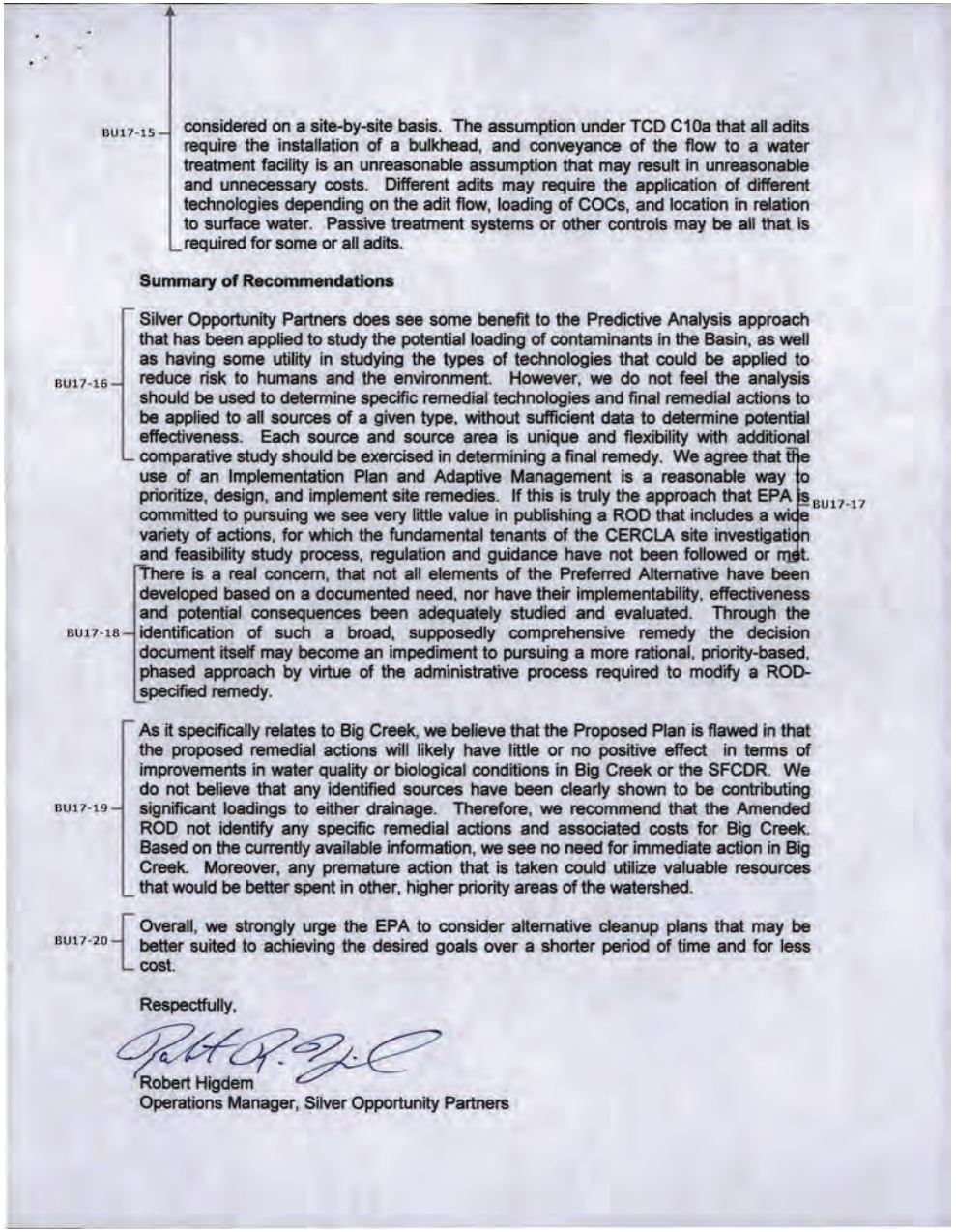
Use of the 100-year recurrence interval is standard engineering practice when developing conceptual designs such as those resented in the Proposed Plan. The 100-year flood elevation for the basin was calculated in 1975 for the 1979 FEMA flood report. The results of the study were compiled into a GIS coverage by the Bureau of Land Management (1997). As a result of changes to basin cover and stream channels, the current 100-year flood elevation may differ from the 1975 elevation. Should the 100-year flood elevation be used as a design criterion, its exact elevation would have to be determined during remedial design.

Response to comment BU17-14

See response to Comment No. BU17-5.

Response to comment BU17-15

Contaminated adit discharges are a type of water that will be collected under the Selected Remedy. Some of the adit discharges will be treated onsite with technologies such as passive treatment, near the point of collection from the adit, and the treated water will be discharged to the nearest surface water body. Others will be collected and conveyed to the Central Treatment Plant (CTP) for treatment. The decision to treat specific contaminated water onsite, at the CTP, or at all will be made following pre-design work, and site-specific remedial design.



BU17-15 considered on a site-by-site basis. The assumption under TCD C10a that all adits require the installation of a bulkhead, and conveyance of the flow to a water treatment facility is an unreasonable assumption that may result in unreasonable and unnecessary costs. Different adits may require the application of different technologies depending on the adit flow, loading of COCs, and location in relation to surface water. Passive treatment systems or other controls may be all that is required for some or all adits.

Summary of Recommendations

BU17-16 Silver Opportunity Partners does see some benefit to the Predictive Analysis approach that has been applied to study the potential loading of contaminants in the Basin, as well as having some utility in studying the types of technologies that could be applied to reduce risk to humans and the environment. However, we do not feel the analysis should be used to determine specific remedial technologies and final remedial actions to be applied to all sources of a given type, without sufficient data to determine potential effectiveness. Each source and source area is unique and flexibility with additional comparative study should be exercised in determining a final remedy. We agree that the use of an Implementation Plan and Adaptive Management is a reasonable way to prioritize, design, and implement site remedies. If this is truly the approach that EPA is committed to pursuing we see very little value in publishing a ROD that includes a wide variety of actions, for which the fundamental tenants of the CERCLA site investigation and feasibility study process, regulation and guidance have not been followed or met.

BU17-17

BU17-18 There is a real concern, that not all elements of the Preferred Alternative have been developed based on a documented need, nor have their implementability, effectiveness and potential consequences been adequately studied and evaluated. Through the identification of such a broad, supposedly comprehensive remedy the decision document itself may become an impediment to pursuing a more rational, priority-based, phased approach by virtue of the administrative process required to modify a ROD-specified remedy.

BU17-19 As it specifically relates to Big Creek, we believe that the Proposed Plan is flawed in that the proposed remedial actions will likely have little or no positive effect in terms of improvements in water quality or biological conditions in Big Creek or the SFCDR. We do not believe that any identified sources have been clearly shown to be contributing significant loadings to either drainage. Therefore, we recommend that the Amended ROD not identify any specific remedial actions and associated costs for Big Creek. Based on the currently available information, we see no need for immediate action in Big Creek. Moreover, any premature action that is taken could utilize valuable resources that would be better spent in other, higher priority areas of the watershed.

BU17-20 Overall, we strongly urge the EPA to consider alternative cleanup plans that may be better suited to achieving the desired goals over a shorter period of time and for less cost.

Respectfully,

Robert Higdem
Operations Manager, Silver Opportunity Partners

Response to comment BU17-16

Regarding the use of the Predictive Analysis in evaluating remedial alternatives, see response to Comment No. LJ27-8.

Response to comment BU17-17

Regarding the implementation of the Selected Remedy, see the ROD Amendment, Part 2, Section 12.3. The FFS, Proposed Plan and ROD Amendment were developed in a manner consistent with the NCP, as required by CERCLA.

Response to comment BU17-18

As described in the ROD Amendment, the scope of Selected Remedy, an interim action, has been reduced considerably from that of the Preferred Alternative identified in the Proposed Plan. Also see response to Comment No. I58-1.

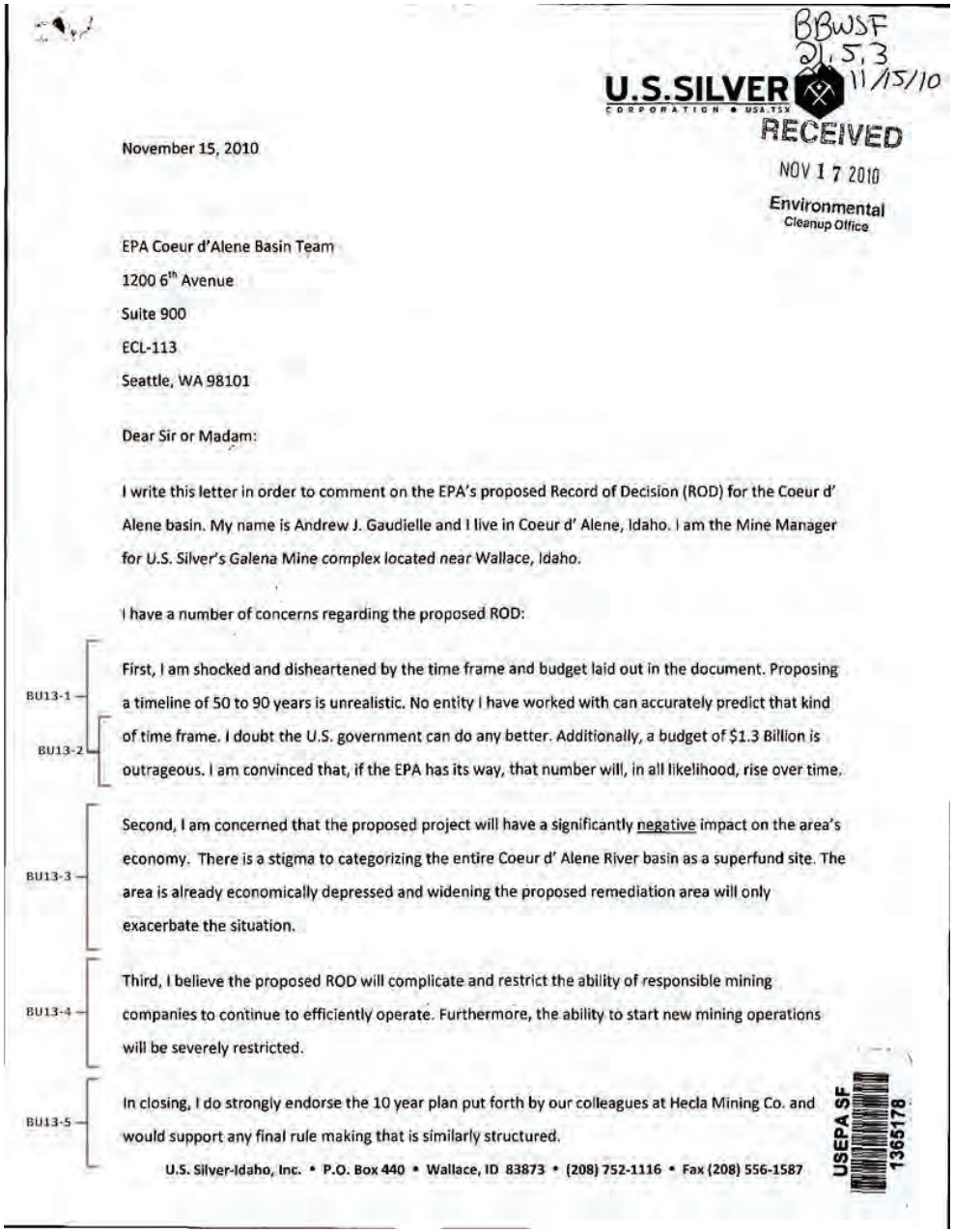
Response to comment BU17-19

The significant reduction in the scope of the Selected Remedy from that of the Preferred Alternative in the Proposed Plan has resulted in a significant reduction in actions planned for the Big Creek Watershed.

Response to comment BU17-20

Comment noted. See response to Comment No. I58-1 regarding the scope and estimated duration of the Selected Remedy. The estimated cost has been reduced to $635 million from $1.3 Billion.

U.S. Silver Corporation, BU13, Letter 1365178



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Environmental
Cleanup Office

November 15, 2010

EPA Coeur d'Alene Basin Team
1200 6th Avenue
Suite 900
ECL-113
Seattle, WA 98101

Dear Sir or Madam:

I write this letter in order to comment on the EPA's proposed Record of Decision (ROD) for the Coeur d' Alene basin. My name is Andrew J. Gaudielle and I live in Coeur d' Alene, Idaho. I am the Mine Manager for U.S. Silver's Galena Mine complex located near Wallace, Idaho.

I have a number of concerns regarding the proposed ROD:

BU13-1 — First, I am shocked and disheartened by the time frame and budget laid out in the document. Proposing a timeline of 50 to 90 years is unrealistic. No entity I have worked with can accurately predict that kind

BU13-2 — of time frame. I doubt the U.S. government can do any better. Additionally, a budget of $1.3 Billion is outrageous. I am convinced that, if the EPA has its way, that number will, in all likelihood, rise over time.

BU13-3 — Second, I am concerned that the proposed project will have a significantly negative impact on the area's economy. There is a stigma to categorizing the entire Coeur d' Alene River basin as a superfund site. The area is already economically depressed and widening the proposed remediation area will only exacerbate the situation.

BU13-4 — Third, I believe the proposed ROD will complicate and restrict the ability of responsible mining companies to continue to efficiently operate. Furthermore, the ability to start new mining operations will be severely restricted.

BU13-5 — In closing, I do strongly endorse the 10 year plan put forth by our colleagues at Hecla Mining Co. and would support any final rule making that is similarly structured.

U.S. Silver-Idaho, Inc. • P.O. Box 440 • Wallace, ID 83873 • (208) 752-1116 • Fax (208) 556-1587

USEPA SF 1365178

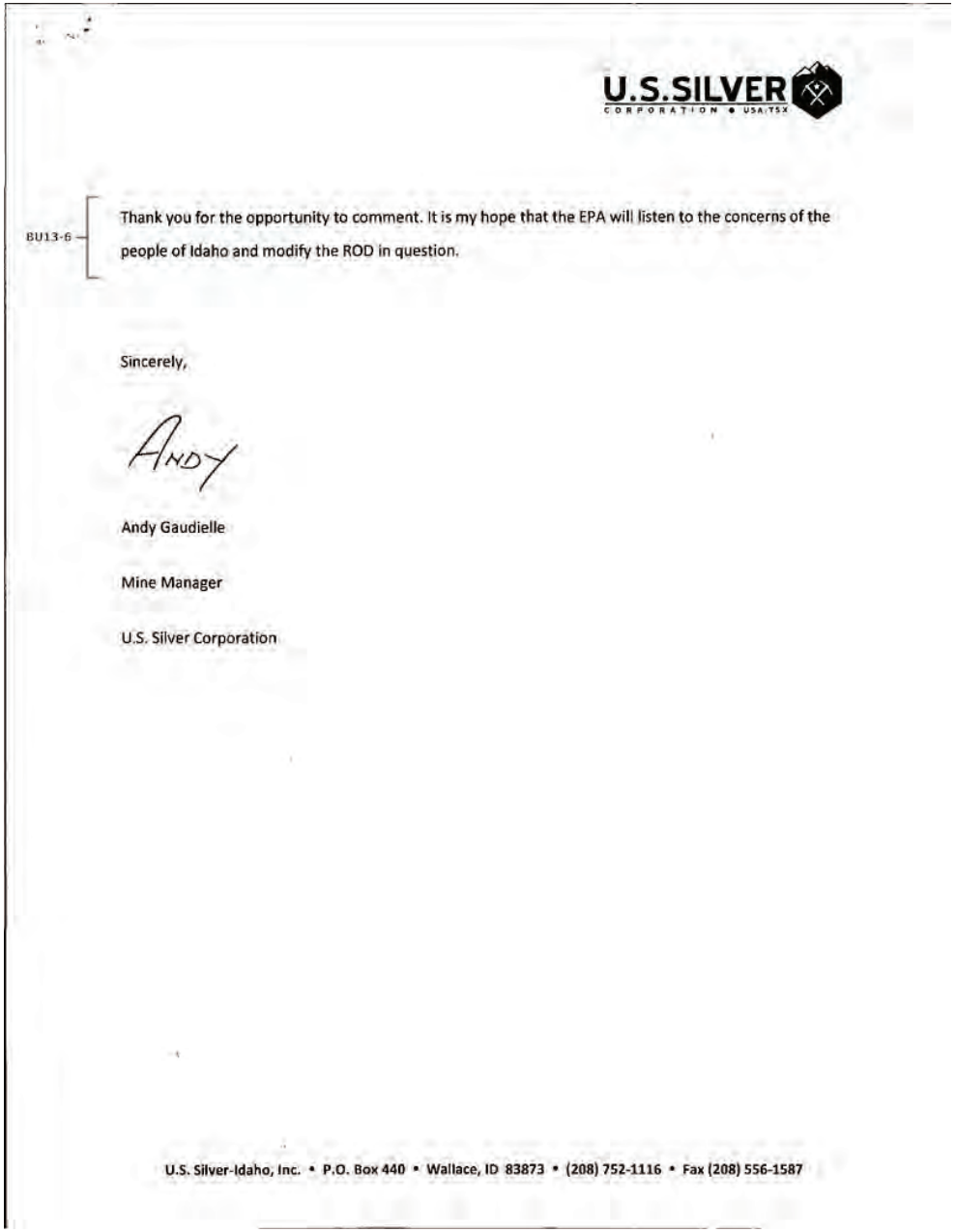
Response to comment BU13-1
See response to Comment No. I58-1.

Response to comment BU13-2
See response to Comment No. I58-2.

Response to comment BU13-3
See response to Comment No. I54-2.

Response to comment BU13-4
See response to Comment No. I58-5.

Response to comment BU13-5
See response to Comment No. I474-2.



U.S. SILVER
CORPORATION • USA:TSX

BU13-6 Thank you for the opportunity to comment. It is my hope that the EPA will listen to the concerns of the people of Idaho and modify the ROD in question.

Sincerely,

Andy

Andy Gaudielle

Mine Manager

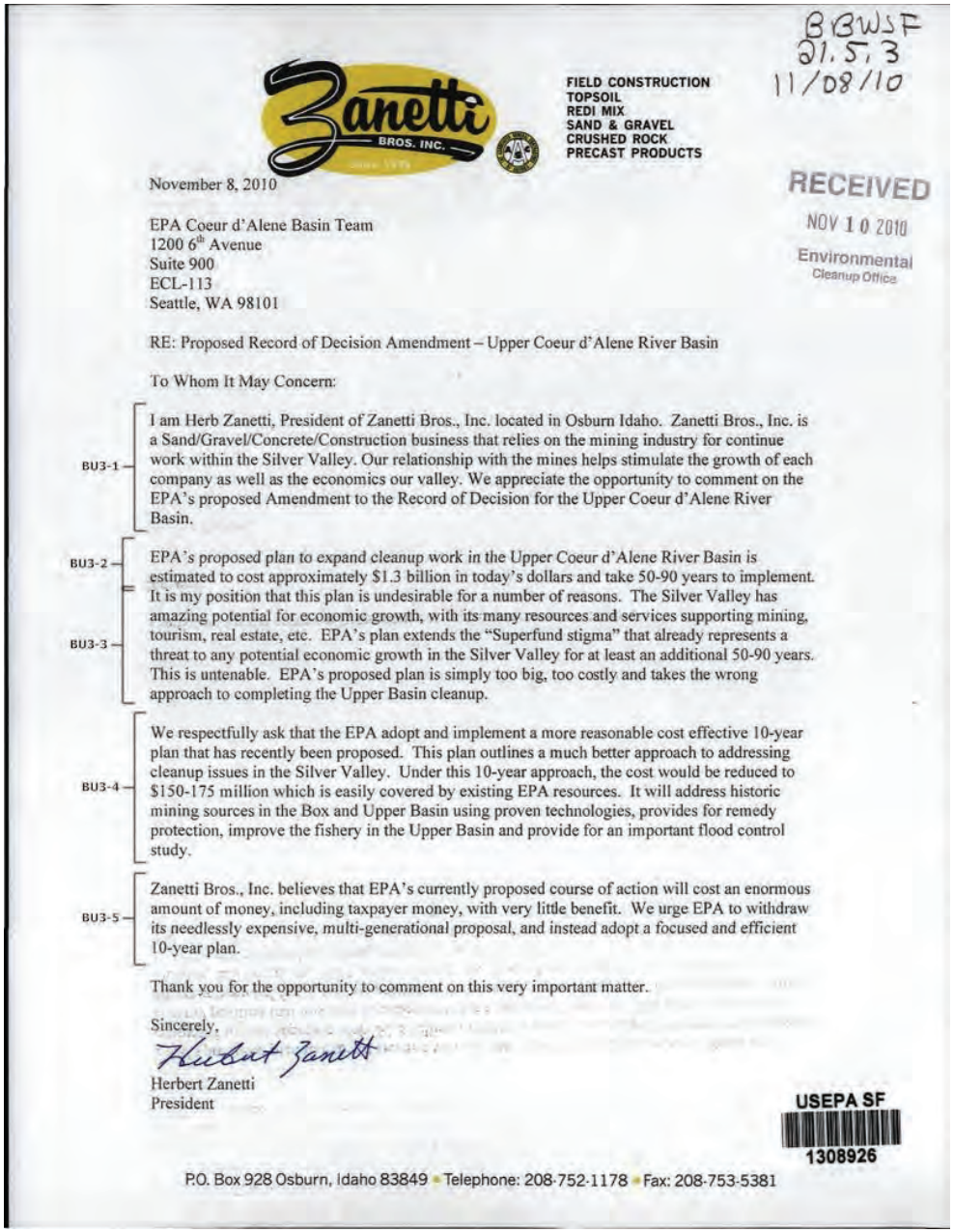
U.S. Silver Corporation

U.S. Silver-Idaho, Inc. • P.O. Box 440 • Wallace, ID 83873 • (208) 752-1116 • Fax (208) 556-1587

Response to comment BU13-6

Comment noted. See response to Comment No. I295-2.

Zanetti Brothers, Inc., BU3, Letter 1308926



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11/08/10

Zanetti BROS. INC.

FIELD CONSTRUCTION
TOPSOIL
REDI MIX
SAND & GRAVEL
CRUSHED ROCK
PRECAST PRODUCTS

November 8, 2010

RECEIVED
NOV 10 2010
Environmental Cleanup Office

EPA Coeur d'Alene Basin Team
1200 6th Avenue
Suite 900
ECL-113
Seattle, WA 98101

RE: Proposed Record of Decision Amendment – Upper Coeur d'Alene River Basin

To Whom It May Concern:

BU3-1 I am Herb Zanetti, President of Zanetti Bros., Inc. located in Osburn Idaho. Zanetti Bros., Inc. is a Sand/Gravel/Concrete/Construction business that relies on the mining industry for continue work within the Silver Valley. Our relationship with the mines helps stimulate the growth of each company as well as the economics our valley. We appreciate the opportunity to comment on the EPA's proposed Amendment to the Record of Decision for the Upper Coeur d'Alene River Basin.

BU3-2 EPA's proposed plan to expand cleanup work in the Upper Coeur d'Alene River Basin is estimated to cost approximately $1.3 billion in today's dollars and take 50-90 years to implement. It is my position that this plan is undesirable for a number of reasons. The Silver Valley has amazing potential for economic growth, with its many resources and services supporting mining, tourism, real estate, etc. EPA's plan extends the "Superfund stigma" that already represents a

BU3-3 threat to any potential economic growth in the Silver Valley for at least an additional 50-90 years. This is untenable. EPA's proposed plan is simply too big, too costly and takes the wrong approach to completing the Upper Basin cleanup.

BU3-4 We respectfully ask that the EPA adopt and implement a more reasonable cost effective 10-year plan that has recently been proposed. This plan outlines a much better approach to addressing cleanup issues in the Silver Valley. Under this 10-year approach, the cost would be reduced to $150-175 million which is easily covered by existing EPA resources. It will address historic mining sources in the Box and Upper Basin using proven technologies, provides for remedy protection, improve the fishery in the Upper Basin and provide for an important flood control study.

BU3-5 Zanetti Bros., Inc. believes that EPA's currently proposed course of action will cost an enormous amount of money, including taxpayer money, with very little benefit. We urge EPA to withdraw its needlessly expensive, multi-generational proposal, and instead adopt a focused and efficient 10-year plan.

Thank you for the opportunity to comment on this very important matter.

Sincerely,

Herbert Zanetti
President

USEPA SF
1308926

P.O. Box 928 Osburn, Idaho 83849 • Telephone: 208-752-1178 • Fax: 208-753-5381

Response to comment BU3-1
Thank you for your comment.

Response to comment BU3-2
See responses to Comment Nos. I58-1 and I58-2.

Response to comment BU3-3
See responses to Comment Nos. I474-1, I58-1, and I58-2.

Response to comment BU3-4
See response to Comment No. I474-2.

Response to comment BU3-5
See response to Comment No. I474-2.